



CITY OF
**West
Linn**

INVITATION FOR BID

CONSTRUCTION PROJECT

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

City of West Linn

Plans and Bid Documents

Project Number: **PW-14-12**

Project Description: **Emergency Intertie Water Pump Station Improvements**

Prospective Bidders' Conference: March 18, 2015 10:00 a.m., local time

Due Date: March 31, 2015 2:00 p.m., local time

Plans and Specifications are available for download at no charge from the City's website at <http://westlinnoregon.gov/rfps>

Alternately, copies may be reviewed or picked-up for a \$25.00 fee per set at:

**Public Works Department
Engineering Division
22500 Salamo Road
West Linn, Oregon 97068**

PROSPECTIVE BIDDERS' CONFERENCE ATTENDANCE IS REQUIRED

It is highly encouraged that Contractors and Subcontractors visit the site.





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APPENDIX A

FORMS REQUIRED FOR SUBMITTAL WITH BID

(In addition to Notice of Invitation to Bid and Contract and any addenda)

1. BID FORM
2. BID BOND
3. NONCOLLUSION AFFIDAVIT
4. THREE YEAR EXPERIENCE RECORD
5. FIRST-TIER SUBCONTRACTOR DISCLOSURE (WH-179)
Submit within 2 hours of bid closing.
6. AFFIDAVIT OF COMPLIANCE WITH TAX LAWS

FORMS NOT REQUIRED AT TIME OF BID

1. PERFORMANCE BOND
2. PAYMENT BOND
3. CONTRACTOR'S AFFADAVIT, SETTLEMENT OF CLAIMS
4. PUBLIC WORKS FEE INFORMATION FORM (WH-39)
To be completed and paid by City upon award
5. NOTICE OF PUBLIC WORKS (WH-81)
To be completed by City upon award.
6. PUBLIC WORKS FEE ADJUSTMENT FORM (WH-40)
To be completed by City after final completion of project.
7. PAYROLL INSTRUCTIONS (WH-38A)
8. PAYROLL/CERTIFIED STATEMENT FORM (WH-38)
9. CURRENT PREVAILING WAGE RATE COVER AND AMENDMENTS
The complete prevailing wage rate documents can be downloaded from the Oregon Bureau of Labor and Industries website at http://www.oregon.gov/boli/WHD/PWR/pages/pwr_state.aspx

APPENDIX B

TECHNICAL SPECIAL PROVISIONS

APPENDIX C

PLANS



CITY OF
**West
Linn**

City of West Linn, Oregon

Notice of Invitation for Bid and Contract

Project Number: **PW-14-12** Bid Due Date: **March 31, 2015**
 Project Name: Emergency Intertie Water Pump Station Improvements Bid Due Time: 2:00 p.m.
 Bid Opening Location: City of West Linn – City Hall Council Chambers Contact: Jim Whynot
 22500 Salamo Rd., West Linn, OR 97068 Title: Operations Supervisor
 Time of Completion: October 31, 2015 Phone: (503) 742-8615

Project Description:
 The project includes the installation of one end suction centrifugal pump and motor, piping, valves, and electrical and control system upgrades within the existing Emergency Intertie Water Pump Station. Exterior site improvements include yard fencing, piping and the installation of a new buried flow meter vault.

Sealed bids for the project identified and described above will be received by the City of West Linn at the specified location above until the date and time cited above. Bids received by the correct date and time shall be publicly opened and the bid price read. Bids shall be in the actual possession of the identified bidding department on or prior to the exact date and time indicated above. Late bids will not be considered, except as provided in the City of West Linn Procurement Policy. **Bids shall be submitted in a sealed envelope with the Invitation for Bid Project Number, Project Description, and the bidder's name and address clearly indicated on the front of the envelope.** All bids shall be completed in ink or typewritten. This Bid is for a public works project subject to ORS 279C.800 to 279C.870. Bidders are strongly encouraged to carefully read the **entire** Invitation for Bid Package.

BIDDER

To the City of West Linn:

The undersigned hereby Bids and agrees to furnish materials and/or services in compliance with all terms, conditions, specifications and addenda in the Notice of Invitation for Bid except for any written exceptions in the Bid. The signature below also certifies his or her understanding and compliance with The City of West Linn Standard Terms and Conditions.

Is the Bidder a "Resident" Bidder per ORS 279A.120? _____
 Construction Contractors Board Yes/No

For clarification of this Bid contact:
 Name: _____

Registration Number: _____

Telephone: _____

Federal Employer Identification Number: _____

 Company Name

 Authorized Signature for Bidder

 Address

 Printed Name

 City State Zip Code

 Title

ACCEPTANCE OF BID AND CONTRACT AWARD (For City of West Linn Use Only)

Your bid is hereby accepted. The Contractor is now bound to sell the materials and/or services listed by the attached award notice based upon the solicitation, including all terms, conditions, specifications, plans, addendum, amendments, etc., and the Contractor's Bid as accepted by the City.

Approved as to form:

City of West Linn, Oregon.

Awarded on _____, _____.

 Megan Thornton
 Assistant City Attorney

 Chris Jordan, City Manager



STANDARD TERMS AND CONDITIONS

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1. PREPARATION OF BID:

- a. All bids shall be submitted on the forms provided in this *Invitation to Bid* package. It is permissible to copy these forms if required. Telegraphic (facsimile), electronic or mailgram bids will not be considered.
- b. The Bid and Contract Award document shall be submitted with an original ink signature by a person authorized to sign the Bid.
- c. Erasures, interlineations, or other modifications in the bid shall be initialed in original ink by the authorized person signing the Bid.
- d. If price is a consideration and in case of error in the extension of prices in the bid, the unit price shall govern. No bid shall be altered, amended, or withdrawn after the specified bid due date and time.
- e. Periods of time, stated as a number of days, shall be calendar days.
- f. Bid due date and time is stated as local Oregon time.
- g. The following items must be completed as part of the Bid submittal; Notice of Invitation for Bid and Contract (indicating Oregon Construction Contractors Board License Number), Bid Form, Bid Guaranty (Bond), Non-Collusion Affidavit, Three-Year Experience, and Addenda. Within two (2) hours of the Bid submittal, or with the Bid submittal, the First Tier Subcontractor Disclosure Form must be submitted if the bid is greater than \$100,000.
- h. It is the responsibility of all Bidders to examine the entire *Invitation For Bid* package and seek clarification of any item or requirement that may not be clear and to check all responses for accuracy before submitting a bid. Negligence in preparing a Bid confers no right of withdrawal after bid due date and time.

2. **INQUIRIES:** Any question related to the *Invitation For Bid (IFB)* shall be directed to the Buyer whose name appears as the Contact on the *IFB*. The Bidder shall not contact or ask questions of the department for which the requirement is being procured. Questions should be submitted in writing when time permits. The Buyer may require any and all questions be submitted in writing at the Buyer's sole discretion. Any correspondence related to an *Invitation For Bid* should refer to the appropriate *IFB* number, page, and paragraph number. All requests for additional information or interpretation of the *IFB* shall be submitted to the Buyer no later than five (5) calendar days before the deadline for submission of bids. If, in the opinion of the City, additional information or clarification is required, an addendum will be issued to all plan holders on record. Any addenda issued by the City seventy-two (72) hours or more before the scheduled closing time for filing bids shall be binding upon the Bidder. Addenda may be downloaded from the City's website. Bidders shall frequently check the City's website until closing including at least daily the week of the closing. Failure of the Bidder to receive or obtain such addenda shall not excuse them from compliance therewith if they are awarded the contract. Oral instructions or information given by City Officers, employees or agents to Bidders concerning this *IFB* or the work in general shall not bind the City.

3. **PROSPECTIVE BIDDERS CONFERENCE (REQUIRED):** A prospective Bidders conference will be held. If scheduled, the date and time of this conference will be indicated on the cover page of this document. The purpose of this conference will be to clarify the contents of this *Invitation For Bid* in order to prevent any misunderstanding of the City's position. Any doubt as to the requirements of this *Invitation For Bid* or any apparent omission or discrepancy should be presented to the City at this conference. The City will then determine if any action is necessary and may issue a written addendum to the *IFB*.

4. **LATE BIDS:** Late Bids received after the scheduled bid due date and time will be returned to the Bidder unopened.

5. **WITHDRAWAL OF BID:** At any time prior to the specified bid due date and time, a Bidder (or designated representative) may withdraw the bid.

6. **ADDENDUM OF BID:** Receipt of Addendum shall be acknowledged by signing and returning the document with the Bid at the specified bid due date and time.

7. **CONSTRUCTION CONTRACTORS REGISTRATION:** A person shall not submit a bid or proposal to work as a construction contractor unless that person is first registered with the Construction Contractors Board as required by ORS 701.021 or licensed by the State Landscape Contractor's Board as required by ORS 671.530. Bids from persons who fail to comply with this requirement shall be deemed non-responsive and be rejected.

8. AWARD OF CONTRACT:

- a. Notwithstanding any other provision of this *Invitation For Bid*, The City expressly reserves the right to: waive any immaterial defect or informality, reject any bids that do not comply with the prescribed public contracting procedures (including the requirement to demonstrate the bidder's responsibility under ORS 279C.375 (3)(b)), reject all bids for good cause if in the public interest, or reissue an *Invitation For Bid*.
- b. A response to an *Invitation For Bid* is a Bid to contract with the City based upon the terms, conditions and specifications contained in the City's *Invitation For Bid* and the written addenda thereto, if any. Bids do not become contracts unless and until they are accepted and executed by the **City Local Contract Review Board, City Manager or Department Director** in accordance with the City of West Linn Procurement Policy. A contract is formed when written notice of award(s) is provided to the successful Bidder(s). The contract has its inception in the award document, eliminating a formal signing of a separate contract. For that reason, all of the terms and conditions of the procurement contract are contained in the *Invitation For Bid*; unless modified by an Addendum.



STANDARD TERMS AND CONDITIONS

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THE FOLLOWING TERMS AND CONDITIONS ARE AN EXPLICIT PART OF THE SOLICITATION AND ANY RESULTANT CONTRACT.

1. **APPLICABLE LAW:** In the performance of this agreement, contractors shall abide by and conform to any and all laws of the United States, State of Oregon and City of West Linn including but not limited to federal and state executive orders providing for equal employment and procurement opportunities, the Federal Occupational Safety and Health Act and any other federal or state laws applicable to this agreement.

Attention is called to the requirements of Oregon Revised Statutes (O.R.S.) Chapter 279A, 279B, and 279C. This contract shall be governed by the laws of the State of Oregon. Any action or suits pertaining to this contract may be brought only in courts in the Circuit Court of Clackamas County or the U.S. District Court in Portland. Each and every provision of law and any clause required by law to be in the contract will be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the contract will forthwith be physically amended to make such insertion or correction.

The City may cancel this contract without penalty or further obligations by the City or any of its departments or agencies if any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the City or any of its departments or agencies, is at any time while the contract or any extension of the contract is in effect, an employee of any other party to the contract in any capacity or a consultant to any other party of the contract with respect to the subject matter of the contract.

2. **AMERICANS WITH DISABILITIES ACT, DISCRIMINATION & AFFIRMATIVE ACTION:** Bidders agree that if awarded a contract, the successful Bidder will comply with all applicable provisions of the Americans with Disabilities Act of 1990, 42 USC Section 12101 et seq. If any Bidder requires special assistance or auxiliary aids during the bidding process, please notify the City of West Linn, 503-657-0331 or TDD 503-657-7845 at least two (2) business days prior to the required assistance. To the extent applicable, the Contractor represents that it will comply with Executive Order 11246 as amended, Executive Order 11141, Section 503 of the Vocational Rehabilitation Act of 1973 as amended and the Age Discrimination Act of 1975, and all rules and regulations issued pursuant to the Acts. It is the policy of the City of West Linn that suppliers of goods or services to the City adhere to a policy of equal employment opportunity and demonstrate an affirmative effort to recruit, hire, and promote regardless of race, color, religion, gender, national origin, age or disability. By submitting the first tier subcontractor disclosure form, Bidder certifies that it has complied with ORS 279A.110(1), which states that a bidder may not discriminate against a subcontractor in awarding a subcontract because the subcontractor is a minority, women or emerging business enterprise certified under ORS 200.055 or a business enterprise that is owned or controlled by, or that employs a disabled veteran.
3. **BUSINESS LICENSE:** A current business license is required before doing business with the City. Information related to complying with the business license requirements is available by contacting the City Finance Department at 503-657-0331 or online at <https://westlinnoregon.gov/finance/online-business-license-registration>.
4. **CONSTRUCTION AND LANDSCAPE CONTRACTORS BOARDS:** Construction contractors must be licensed with the State of Oregon Construction Contractors Board in accordance with O.R.S. 701.005 and any other specialty licensing as required in the bid specification prior to submitting a bid to the City. For information contact:

CONSTRUCTION CONTRACTORS BOARD
700 Summer St. NE, Suite #300, Salem, OR 97310
(503) 378-4621 (website) <http://www.ccb.state.or.us>

A Landscape Contractors Board license is required in accordance with O.R.S. 671.510 if the bid specification includes landscape work as defined by O.R.S. 671.510. For information contact:

LANDSCAPE CONTRACTORS BOARD
2111 Front St. NE, Suite #2-101, Salem, OR 97310
(503) 378-5909 (website) <http://www.oregon.gov/LCB/>



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5. **LEGAL REMEDIES:** All claims and controversies shall be subject to resolution according to the terms of the City of West Linn Procurement Policy.
6. **BID GUARANTY:** All construction contracts shall be accompanied by a bid guaranty. No bid for construction will be considered unless accompanied by a certified check, cashier's check, or a bid bond for an amount not less than ten percent (10%) of the aggregate amount of the bid by a surety company authorized to issue such bonds in the State of Oregon. It shall be payable to the City of West Linn as a guaranty that the bid shall be irrevocable for a period of sixty (60) calendar days, unless otherwise specified, after the bid opening date and time and as liquidated damages should the Bidder fail or neglect to furnish the required performance bond and insurance and execute a contract within ten (10) calendar days after receiving said contract from the City for execution. The City will hold all bid security during the evaluation process. As soon as is practical after the completion of the evaluation, the City will issue a contract award notice for those Bids accepted by the City and return all checks to those who have not been issued a contract award notice.

All bid security from contractors who have been issued an award notice shall be held until the successful execution of all required contractual documents and bonds (performance bond, insurance, etc.). If the contractor fails to execute the required contractual documents and bonds within the time specified, or ten (10) days after notice of award if no period is specified, the contractor may be found to be in default and the contract terminated by the City. In case of default, the City reserves all rights inclusive of, but not limited to, the right to purchase material and/or to complete the required work in accordance with the City of West Linn Procurement Policy and to recover any actual excess costs from the contractor. Collection against the bid security shall be one of the measures available toward the recovery of any excess costs.
7. **CONFLICT OF INTEREST:** A Bidder submitting a bid hereby certifies that no officer, agent or employee of the City who has a pecuniary interest in this bid has participated in the contract negotiations on the part of the City, that the bid is made in good faith without fraud, collusion, or connection of any kind with any other Bidder of the same Invitation for Bids, and that the Bidder is competing solely in its own behalf without connection with, or obligation to, any undisclosed person or firm. No bid will be considered unless accompanied by the notarized Non-Collusion Affidavit form included in the Invitation for Bid.
8. **PRE-BID REQUIREMENTS:** Before submitting a bid, each Bidder shall carefully examine the Drawings, read the Specifications and all Addenda and visit the work site, if applicable. Each Bidder shall fully inform themselves prior to submitting a bid as to all existing conditions and limitations under which the Work is to be performed, and shall include in the bid a sum to cover all costs of all items necessary to perform the Work as set forth in the Bid Documents. No allowance will be made to any Bidder because of lack of such examination or knowledge. Submission of a bid will be construed as conclusive evidence that the Bidder has made such examination.
9. **LOCAL BUSINESS PREFERENCE:** ORS 279A.120 requires that, in all public contracts, the public contracting agency shall prefer good or services that have been manufactured or produced in this State if price, fitness, availability and quality are otherwise equal. As such the City desires to employ local businesses in the purchase, lease, or sale of any personal property, public improvements or services that have been manufactured or produced by a local business if price, fitness, availability and quality are otherwise equal. When a public contract is awarded to a nonresident bidder and the contract price exceeds \$10,000, the bidder shall promptly report to the Department of Revenue on forms provided by the department all information as required by ORS 279A.120(3).
10. **COST OF BID/PROPOSAL PREPARATION:** The City shall not reimburse the cost of developing, presenting, or providing any response to this solicitation. Bids submitted for consideration should be prepared simply and economically, providing adequate information in a straightforward and concise manner. The Invitation For Bid does not commit the City to pay any costs incurred by a Bidder in the submission of their bid, or in making any necessary studies or designs for the preparation thereof.
11. **CONTRACT:** The contract between the City and the Contractor shall consist of (1) the Invitation for Bid, including instructions, all terms and conditions, specifications, scopes of work, attachments, price sheet(s) and any amendments thereto, and (2) the Bid submitted by the Contractor in response to the Invitation for Bid (IFB). In the event of a conflict in



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language between the IFB and the Bid, the provisions and requirements in the IFB shall govern. However, the City reserves the right to clarify, in writing, any contractual terms with the concurrence of the Contractor, and such written contract shall govern in case of conflict with the applicable requirements stated in the IFB or the Vendor's Bid. The IFB shall govern in all other matters not affected by the written contract. The contract, if awarded, will be made to the lowest, responsive and responsible Bidder offering the lowest unit price base bid. Determination of the lowest responsive, responsible bid is subject to review by the City. Adversely affected or aggrieved bidders shall have seven calendar days after notice of award to submit to the City a written protest of the notice of award. Any written protest must be submitted in accordance with the adopted City Local Contract Review Board Rules.

12. **CONTRACT AMENDMENTS:** This contract may be modified only by a written Contract Amendment signed by persons duly authorized to enter into contracts on behalf of the City and the Contractor.
13. **CONTRACT APPLICABILITY:** The Bidder shall substantially conform to the terms, conditions, specifications and other requirements found within the text of this IFB. All previous agreements, contracts, or other documents, which have been executed between the Bidder and the City are not applicable to this IFB or any resultant contract.
14. **DRUG TESTING PROGRAM:** Pursuant to O.R.S. 279.505 (2) (1), the Contractor awarded the contract shall demonstrate that an employee drug-testing program is in place. The Contractor demonstrates that a drug-testing program is in place by signing of the contract. The drug testing program will apply to all employees and will be maintained for the duration of the Contract awarded. Failure to maintain a program shall constitute a material breach of contract.
15. **RELATIONSHIP TO PARTIES:** It is clearly understood that each party will act in its individual capacity and not as an agent, employee, partner, joint venturer, or associate of the other. An employee or agent of one party shall not be deemed or construed to be the employee or agent of the other for any purpose whatsoever. The Contractor is advised that taxes or Social Security payments will not be withheld from any City payments issued hereunder and that the Contractor should make arrangements to directly pay such expenses, if any.
16. **INTERPRETATION-PAROL EVIDENCE:** This contract represents the entire agreement of the Parties with respect to its subject matter, and all previous agreements, whether oral or written, entered into prior to this contract are hereby revoked and superseded by this contract. No representations, warranties, inducements or oral agreements have been made by any of the Parties except as expressly set forth herein, or in any other contemporaneous written agreement executed for the purposes of carrying out the provisions of this contract. This contract may not be changed, modified or rescinded except as provided for herein, absent a written agreement signed by both Parties. Any attempt at oral modification of this contract shall be void and of no effect.
17. **SUBCONTRACTS – ASSIGNMENT & DELEGATION:** Contractor shall submit a list of Subcontractors for approval by the City, and Contractor shall be fully responsible for the acts or omissions of any Subcontractors and of all persons employed by them, and neither the approval by City of any Subcontractor nor anything contained herein shall be deemed to create any contractual relation between the Subcontractor and City.

This agreement, and all of the covenants and conditions hereof, shall inure to the benefit of and be binding upon the City and the Contractor respectively and their legal representatives. Contractor shall not assign any rights nor delegate any duties incurred by this contract, or any part hereof without the written consent of City, and any assignment or delegation in violation hereof shall be void.

18. **APPROVAL OF SUBSTITUTIONS:** The materials, products, and equipment described in the Documents and Addenda establish a standard or required function, dimension, appearance, and quality to be met by any proposed substitution. No substitute will be considered unless written request for approval has been received by the City or its representative at least five (5) days prior to the scheduled closing time for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including any drawings, cuts, performance, and test data and any other information necessary for evaluation of the substitute. If a substitute is approved, the approval shall be acknowledged in writing. Bidder shall not consider approvals made in any other manner.



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19. **RIGHTS AND REMEDIES:** No provision in this document or in the vendor's Bid shall be construed, expressly or by implication, as waiver by the City of any existing or future right and/or remedy available by law in the event of any claim of default or breach of contract. The failure of the City to insist upon the strict performance of any term or condition of the contract or to exercise or delay the exercise of any right or remedy provided in the contract, or by law, or the City's acceptance of and payment for materials or services, shall not release the Contractor from any responsibilities or obligations imposed by this contract or by law, and shall not be deemed a waiver of any right of the City to insist upon the strict performance of the Contract.

20. **INDEMNIFICATION:** Contractor warrants that all its work will be performed in accordance with generally accepted professional practices and standards as well as the requirements of applicable federal, state and local laws, it being understood that acceptance of a contractor's work by City shall not operate as a waiver or release.

Contractor agrees to indemnify and defend the City, its officers, agents and employees and hold them harmless from any and all liability, causes of action, claims, losses, damages, judgments or other costs or expenses including attorney's fees and witness costs and (at both trial and appeal level, whether or not a trial or appeal ever takes place) that may be asserted by any person or entity which in any way arise from, during or in connection with the performance of the work described in this contract, except liability arising out of the sole negligence of the City and its employees. If any aspect of this indemnity shall be found to be illegal or invalid for any reason whatsoever, such illegality or invalidity shall not affect the validity of the remainder of this indemnification. The amount and type of insurance coverage requirements set forth herein will in no way be construed as limiting the scope of the indemnity in this paragraph.

21. **EARLY TERMINATION:** This agreement may be terminated without cause prior to the expiration of the agreed upon term by mutual written consent of the parties and for the following reasons:

- a. If work under the Contract is suspended by an order of a public agency for any reason considered to be in the public interest other than by a labor dispute or by reason of any third party judicial proceeding relating to the work other than a suit or action filed in regard to a labor dispute; or
- b. If the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the Contract.

Payment of Contractor shall be as provided by ORS 279C.660 and shall be prorated to and include the day of termination and shall be in full satisfaction of all claims by Contractor against City under this Contract. Termination under any provision of this paragraph shall not affect any right, obligation, or liability of Contractor or City which accrued prior to such termination.

22. **CANCELLATION WITH CAUSE:** City may terminate this Contract effective upon delivery of written notice to Contractor, or at such later date as may be established by City, under any of the following conditions:

- a. If City funding from federal, state, local, or other sources is not obtained and continued at levels sufficient to allow for the purchase of the indicated quantity of services. This Contract may be modified to accommodate a reduction in funds,
- b. If Federal or State regulations or guidelines are modified, changed, or interpreted in such a way that the services are no longer allowable or appropriate for purchase under this Contract,
- c. If any license or certificate required by law or regulation to be held by Contractor, its subcontractors, agents, and employees to provide the services required by this Contract is for any reason denied, revoked, or not renewed,
- d. If Contractor becomes insolvent, if voluntary or involuntary petition in bankruptcy is filed by or against Contractor, if a receiver or trustee is appointed for Contractor, or if there is an assignment for the benefit of creditors of Contractor, or



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- e. If Contractor fails to maintain reasonable relations with the public. Verbal abuse, threats, or other inappropriate behavior towards members of the public constitutes grounds for termination.

Any such termination of this agreement under this section shall be without prejudice to any obligations or liabilities of either party already accrued prior to such termination.

City, by written notice of default (including breach of contract) to Contractor, may terminate the whole or any part of this Contract:

- f. If Contractor fails to provide services called for by this Contract within the time specified herein or any extension thereof, or
- g. If Contractor fails to perform any of the other provisions of this Contract, or so fails to pursue the work as to endanger performance of this Contract in accordance with its terms, and after receipt of written notice from City, fails to correct such failures within ten (10) days or such other period as City may authorize.

The rights and remedies of City provided in the above clause related to defaults (including breach of contract) by Contractor shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

If City terminates this Contract per clause f or g above, Contractor shall be entitled to receive as full payment for all services satisfactorily rendered and expenses incurred, an amount which bears the same ratio to the total fees specified in this Contract as the services satisfactorily rendered by Contractor bear to the total services otherwise required to be performed for such total fee; provided, that there shall be deducted from such amount the amount of damages, if any, sustained by City due to breach of contract by Contractor. Damages for breach of contract shall be those allowed by Oregon law, reasonable and necessary attorney fees, and other costs of litigation at trial and upon appeal.

23. **SEVERABILITY:** In the event any provision or portion of this Contract is held to be unenforceable or invalid by any court of competent jurisdiction, the remainder of this Contract shall remain in full force and effect and shall in no way be affected or invalidated thereby.
24. **FORCE MAJEURE:** Neither City nor Contractor shall be considered in default because of any delays in completion of responsibilities hereunder due to causes beyond the control and without fault or negligence on the part of the party so disabled, including, but not restricted to, an act of God or of a public enemy, volcano, earthquake, fire, flood, epidemic, quarantine, restriction, area-wide strike, freight embargo, unusually severe weather or delay of Subcontractor or suppliers due to such cause; provided that the party so disabled shall within ten (10) days from the beginning of such delay, notify the other party in writing of the causes of delay and its probable extent. Such notification shall not be the basis for a claim for additional compensation. Each party shall, however, make all reasonable efforts to remove or eliminate such a cause of delay or default and shall, upon cessation of the cause, diligently pursue performance of its obligation under Contract.
25. **RIGHT TO ASSURANCE:** Whenever one party to this contract in good faith has reason to question the other party's intent to perform he may demand that the other party give a written assurance of this intent to perform. In the event that a demand is made and no written assurance is given within five (5) days, the demanding party may treat this failure as an anticipatory repudiation of the Contract.
26. **RIGHT TO ACCESS RECORDS:** City shall have access to such books, documents, papers and records of Contractor and Subcontractors as are directly pertinent to this Contract for the purpose of making audit, examination, excerpts, and transcripts.
27. **WARRANTIES:** All work shall be guaranteed by the Contractor for a period of 18 months after the date of final acceptance of the work by the Owner. Contractor warrants that all practices and procedures, workmanship, and materials shall be the best available unless otherwise specified in the profession. Neither acceptance of the work nor payment



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therefore shall relieve Contractor from liability under warranties contained in or implied by this contract. Additional warranty requirements may be set forth in the solicitation.

28. **TITLE AND RISK OF LOSS:** The title and risk of loss of material and/or service shall not pass to the City until the City actually receives the material or service at the point of delivery, unless otherwise provided within this Contract.
29. **CONFLICT BETWEEN TERMS:** It is expressly agreed by and between the parties hereto that should there be any conflict between the terms of this instrument and the bid of the Contractor, this instrument shall control and nothing herein shall be considered as an acceptance of the said terms of said bid conflicting herewith.
30. **NONWAIVER:** The failure of the City to insist upon or enforce strict performance by Contractor of any of the terms of this contract or to exercise any rights hereunder shall not be construed as a waiver or relinquishment to any extent of its right to assert or rely upon such terms or rights on any future occasion.
31. **LIENS:** All materials, service or construction shall be free of all liens, and if the City requests, a formal release of all liens shall be delivered to the City.
32. **LICENSES:** Contractor shall have at the time of bid submittal, and shall maintain in current status, all Federal, State and Local licenses and permits required for the operation of the business conducted by the Contractor as applicable to this Contract. The conclusion of the issuing authority in each case is to be deemed conclusive for the purposes of complying with this provision. By submitting a bid for this public contract, you agree that, with respect to the contract, substantial compliance does not meet the minimum requirements of this or any provision hereof, or of any applicable law or other authority, and that strict compliance alone is adequate to meet those requirements, unless the City consents to such substantial compliance in writing at the time of bid submittal. The determination shall be made by the City.
33. **ATTORNEY'S FEES:** In case suit or action is instituted to enforce the provisions of this contract, the parties agree that the losing party shall pay such sum as the Court may adjudge reasonable attorney's fees and court costs including attorney's fees and court costs on appeal.
34. **PUBLIC RECORD:** All Bids submitted in response to this solicitation shall become the property of the City and shall become a matter of public record available for review, subsequent to the award notification, in accordance with the City's Procurement Policy.
35. **WORK IS PROPERTY OF THE CITY:** All work performed by Contractor under this Contract shall be the property of the City.
36. **ADVERTISING:** Contractor shall not advertise or publish information concerning this Contract, without prior written consent of the City.



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1. **DEFINITIONS:** The terms, as used in or pertaining to the contract, are defined as follows:

CITY: The word “*City*” shall refer to the City of West Linn, Oregon.

CONTRACTOR: The word “*Contractor*” is defined as the person, firm or corporation with whom the contract is made by the City.

CONTRACT: The word “*Contract*” will include; the Invitation to Bid Notice and Contract, Instructions to Bidders, Bid Form, Bid Guaranty, Performance Bond, Payment Bond, Notice of Award, Notice to Proceed, Change Order, Certificate of Insurance, Certificate of Completion, Contractor’s Affidavit Regarding Settlement of Claims, Contractor’s Affidavit Certifying Non-Collusion in Bidding, Standard Terms & Conditions, General Terms & Conditions, Special Terms & Conditions, Technical Provisions, Plans and Addenda thereto.

ENGINEER: The word “*Engineer*” is defined as the person, firm or corporation duly authorized by the City to act as agent in providing professional services including studies, planning, engineering design and construction administration services, inspecting materials and construction, and interpreting plans and specifications.

MATERIALS: The word “*Materials*” will include, in addition to materials incorporated in the project, equipment and other material used and/or consumed in the performance of the work.

SUBCONTRACTOR: The word “*Subcontractor*” is defined as those persons or groups of persons having a direct contract with the contractor and those who furnish material worked to a special design according to the plans and/or specifications for this work, and includes those who merely furnish materials not so worked.

WORK: The word “*Work*” shall include all labor necessary to accomplish the construction required by the Contract and all materials and equipment incorporated or to be incorporated in said construction.

2. **REFERENCE STANDARDS:**

- a. The “2010 City of West Linn Public Works Standards” which are sponsored and distributed by the City of West Linn Engineering Division, and which are hereinafter referred to as the “*COWL Specifications*,” are hereby adopted as part of these contract documents.
- b. If any contradiction exists between “*COWL Specifications*” and this solicitation document, the solicitation language shall prevail.

3. **LAWS AND REGULATIONS:** The Contractor shall keep himself fully informed of all existing and future City and County ordinances and regulations and state and federal laws and Occupational Safety and Health Standards (OSHA) in any manner affecting the work herein specified. He shall at all times observe and protect and indemnify the City of West Linn, Oregon, and its officers and agents against any claim or liability arising from or based on the violation of any such ordinances, regulations or laws. It is the responsibility of the Contractor to obtain any and all information regarding the laws and regulations which may be referenced in the Specifications.

4. **RIGHTS OF WAY:** The Contractor shall not enter or occupy with workers, tools, equipment or materials any private ground outside the property or easement right of the City of West Linn, without the consent of the owner.

The Contractor, at his own expense, is responsible for the acquisition of any additional easements or rights-of-way that he may desire to complete the work of this contract.



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5. **PROPOSAL QUANTITIES**: It is expressly understood and agreed by the parties hereto that the quantities of the various classes of work to be done and the material to be furnished under this Contract, which have been estimated as stated in the Bids, are only approximate and are to be used solely for the purpose of comparing, on a consistent basis, the bids for the work under this Contract. The Contractor further agrees that the City of West Linn will not be held responsible if any of the quantities shall be found incorrect; and the Contractor will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or misstatement is found to occur in the estimated quantities, the same shall not invalidate this Contract or the whole or any part of the work in accordance with the Specifications and Plans herein mentioned, and for the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damage or compensation except as may be provided in this contract.

6. **PREVAILING WAGE RATE DETERMINATION**: The Contractor shall pay the applicable prevailing wage rates that are in effect at the time the Contract is bid. If the contract price exceeds \$50,000 and is not otherwise exempt, workers shall be paid not less than the specified minimum hourly rate of wage in accordance with ORS 279C.838 and ORS 279C.840. Hard copies of the prevailing wage rates publication may be obtained by contacting the Oregon Bureau of Labor and Industries via telephone at: (971) 673-0839. The applicable prevailing wage rates may be accessed via the internet at: http://www.oregon.gov/BOLI/WHD/PWR/pwr_book.shtml. If the Project is subject to the Davis-Bacon Act and the state prevailing rate of wage is higher than the federal prevailing rate of wage, the contractor and every subcontractor on the Project shall pay at least the state prevailing rate of wage as determined under ORS 279C.815.

The Contractor and all subcontractors must have a public works bond filed with the Oregon Construction Contractors Board before starting work on the Project, unless exempt under ORS 279C.836(4), (7), (8) or (9). If the contractor fails to pay for labor or services, the City can pay and withhold these amounts from payments due the contractor in accordance with ORS 279C.515. Daily, weekly, weekend, and holiday overtime will be paid as required in ORS 279C.540. The Contractor shall provide workers with a written schedule showing the number of hours per day and days per week the employee may be required to work in accordance with ORS 279C.520. Contractor must promptly pay for any medical services they have agreed to pay per ORS 279C.530.

The City will not receive or consider a bid unless the bid contains a statement by the bidder that the bidder will comply with ORS 279C.838, ORS 279C.840, or 40 U.S.C. 3141. By signing and submitting the Bid, the Contractor agrees to comply with ORS 279C.838 or 279C.840 and/or 40 U.S.C. 3141 et seq. for a public works project subject to the state prevailing wage rates under ORS 279C.800 to 279C.870, the federal prevailing wage rates under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) or both.

For contracts \$50,000 or greater, the City shall pay a fee to the Bureau of Labor and Industries and shall be mailed or otherwise delivered to the Bureau in accordance with Form WH-81 & WH-39.

7. **PAYMENTS TO CONTRACTOR**: City agrees to pay Contractor for performance of those services provided hereunder, which payment shall be based upon the following applicable terms:

a. **Payment**: Payment shall be based upon the unit prices bid by the Contractor, as listed in attached bid. Contractor shall prepare and submit each month to the Buyer identified in the Invitation for Bid at the address listed, a statement of services rendered, (indicating the description of each service used in the bid and the dollar amount of each service completed through the stated date), together with a request for payment duly verified by the Contractor's Representative.

Payment by the City shall release the City from any further obligation for payment to Contractor for services performed or expenses incurred as of the date of the statement of services. Payment of installments shall not be considered acceptance or approval of any work or waiver of any defects therein. City certifies that sufficient funds are available and authorized for expenditure to finance costs of this contract. Contractor shall include proof of payment to any and all



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subcontractors and suppliers with each statement submitted to the City. The City shall retain the right to withhold payments if required proof of payment to subcontractor and suppliers is not included with a statement.

- b. **Timing of Payments:** Progress payments, less a five percent retainage as authorized by ORS 279C.555, shall be made to the Contractor within twenty (20) days of the City's receipt of the statement of services.
- c. **Final Payment:** The Contractor shall notify the City in writing when the Contractor considers the project complete, and the City shall, within 15 days after receiving the written notice, either accept the work or notify the Contractor of work yet to be performed on the contract. If accepted by the City, the remaining balance due to the Contractor, including the retained percentage, shall be paid to the Contractor by the City within 30 days after the date of said acceptance.

The City shall pay to the Contractor interest at the rate of one and one-half percent per month on the final payment due the Contractor, to commence 30 days after the work under the Contract has been completed and accepted and to run until the date when final payment is tendered to the Contractor. If the City does not, within 15 days after receiving written notice of completion, notify the Contractor of work yet to be performed to fulfill contractual obligations, the interest provided by this subsection shall commence to run 30 days after the end of the 15-day period.

As a further condition of final acceptance, the City may require the Contractor to submit evidence, satisfactory to the City's Representative, that all payrolls, material bills, and other indebtedness connected with the project have been paid. If any indebtedness or liens are in dispute, the Contractor may submit a surety bond satisfactory to the City guaranteeing payment of all such disputed amounts if such payment has not already been guaranteed by surety bond.

All notices, bills and payments shall be made in writing and may be given by personal delivery or by mail. Notices, bills and payments sent by mail should be addressed to the attention of the Buyer and/or Authorized Bidder at the addresses identified in the Invitation for Bid and shall be deemed given upon deposit in the United States mail, postage paid. In all other instances, notices, bills and payments shall be deemed given at the time of actual delivery. Changes may be made in the names and addresses of the person to whom notices, bills, and payments are to be given by giving written notice pursuant to this paragraph.

8. **LIQUIDATED DAMAGES:** The Contractor agrees that the "Time of Completion" is defined in the Bid and agrees to complete the work by said date. The Contractor and City agree that the City will suffer damages each day the work remains uncompleted after the Time of Completion and that the amounts of those damages are difficult to calculate. Contractor and City agree that a reasonable amount of damages for late completion is **\$500 per calendar day** and Contractor agrees to pay such amounts as liquidated damages if the work is not completed by the Time of Completion. Contractor agrees that the liquidated damages specified herein are a fair way of ascertaining damages to the City and are not a penalty for late completion.
9. **STATUS OF CONTRACTOR AS INDEPENDENT CONTRACTOR:** Contractor certifies that:
 - a. Contractor acknowledges that for all purposes related to this Agreement, Contractor is and shall be deemed to be an Independent Contractor as defined by ORS 670.600 and not an employee of City, shall not be entitled to benefits of any kind to which an employee of City is entitled and shall be solely responsible for all payments and taxes required by law. Furthermore, in the event that Contractor is found by a court of law or any administrative agency to be an employee of City for any purpose, City shall be entitled to offset compensation due, or to demand repayment of any amounts paid to Contractor under the terms of this Agreement, to the full extent of any benefits or other remuneration Contractor receives (from City or third party) as a result of said finding and to the full extent of any payments that City is required to make (to Contractor or to a third party) as a result of said finding.



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- b. The Contractor hereby represents that no employee of the City, or any partnership or corporation in which a City employee has an interest, has or will receive any remuneration of any description from Contractor, either directly or indirectly, in connection with the letting or performance of this Agreement, except as specifically declared in writing.
 - c. If payment is to be charged against Federal funds, Contractor certifies that he or she is not currently employed by the Federal Government and the amount charged does not exceed his or her normal charge for the type of service provided.
 - d. Contractor and its employees, if any, are not active members of the Oregon Public Employees Retirement System and are not employed for a total of 600 hours or more in the calendar year by any public employer participating in the Retirement System.
 - e. Contractor certifies that it currently has a City business license or will obtain one prior to delivering services under this Agreement.
 - f. Contractor is not an officer, employee, or agent of the City as those terms are used in ORS 30.265.
10. **CERTIFIED PAYROLL:** The Contractor shall make payment promptly, as due, to all persons supplying to such Contractor labor or material for the performance of the work provided for in this contract. The Contractor will pay all contributions or amounts due the Industrial Accident Fund under the Worker's Compensation Law from such Contractor or Subcontractor incurred in the performance of this contract. The Contractor will pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167. The Contractor shall not permit any lien or claim to be filed or prosecuted against the City of West Linn on account of any labor or material furnished.

The Contractor or the Contractor's Surety and every Subcontractor or the Subcontractor's Surety shall file certified statements with the City in writing on a 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 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 shall be verified by the oath of the Contractor or the Contractor's Surety or Subcontractor or the Subcontractor's Surety that the Contractor or Subcontractor has read such statement and certificate and knows the contents thereof and that the same is true to the Contractor's or Subcontractor's knowledge.

- a. The certified statements shall set out accurately and completely the payroll records, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, and the gross wages the worker earned during each week identified in the certified statement.
- b. Each certified statement required herein shall be delivered or mailed by the Contractor or Subcontractor to the City. A true copy of the certified statements shall also be filed at the same time with the Commissioner of the Bureau of Labor and Industries. Certified statements shall be submitted as set forth in ORS 279C.845.
- c. The City shall retain 25 percent of any amount earned by Contractor until the certified statements as required by this section have been filed. City shall pay Contractor the amount retained under this subsection within 14 days after Contractor files the certified statements as required by this section, regardless of whether a subcontractor has failed to file certified statements as required by this section. City is not required to verify the truth of the contents of certified statements filed by Contractor.

The Contractor agrees that if the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with this contract as such claim becomes due, the proper office of the City of West Linn may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due to the Contractor by reason of such contract. Payment of a



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claim in this manner shall not relieve the Contractor or the Contractor's Surety from obligation with respect to any unpaid claims.

Contractor agrees that no person shall be employed 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 when public policy absolutely requires it, and in such cases the laborer shall be paid at least time and a half pay for all overtime in excess of eight (8) hours in any one day or forty (40) hours in any one week when the workweek is five consecutive days, Monday through Friday, or ten (10) hours in any one day and or forty (40) hours in any one week when the workweek is four consecutive days, Monday through Friday and for all work performed on Saturday and on any legal holiday as specified in ORS 279C.540.

Contractor agrees to pay promptly as due, to any person, co partnership, association or corporation furnishing medical, surgical, and hospital care or other needed care and attention incident to sickness or injury to the Contractor's employees, of all sums which the Contractor agreed to pay for such services and all money and sums which the Contractor collected or deducted from employee wages pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

11. **PRE-CONSTRUCTION CONFERENCE:** Within 30 days of the issuance of the Notice of Award, the Contractor is required to attend a Pre-construction Conference. The City will contact the Contractor to schedule a specific date, time and location for the Pre-construction conference. The purpose of the meeting is to outline specific construction items and procedures and to address items which require special attention on the part of the Contractor. The Contractor may also present proposed variations in procedures which the Contractor believes may improve constructability of the project, reduce cost, or will reduce inconvenience to the public. Any necessary coordination and procedures for Construction inspection and staking will be addressed during the Pre-construction Conference. The Contractor will be required to provide the following information at the Pre-construction Conference:

- a. Names and emergency telephone numbers of key personnel involved in the project.
- b. Names and telephone numbers of all subcontractors proposed for use on the project.
- c. A construction progress schedule showing the estimated time for start and completion of the major items of work.
- d. A written proposal outlining the intended plans for maintaining continuous access to residences and businesses along the construction site, and traffic control.
- e. An itemized list of all required shop drawings, material and equipment submittals and a schedule indicating the dates each of these items will be transmitted to the City for review.

Each of the above items is subject to the review and approval by the City.

12. **INSURANCE REQUIREMENTS:** The Contractor, at Contractor's own expense, shall purchase and maintain the herein stipulated minimum insurance with companies licensed to do business in the State of Oregon with policies and forms satisfactory to the City. The City reserves the right to reject all or any insurance carrier(s) with an unacceptable financial rating. All insurance required herein shall be maintained in full force and effect until all work required to be performed under the terms of the Contract is satisfactorily completed and formally accepted; failure to do so may, at the sole direction of the City, constitute a material breach of this Contract. The Contractor's insurance shall be primary insurance, and any insurance or self insurance maintained by the City shall not contribute to it.

Any failure to comply with the claim reporting provisions of the policies or any breach of an insurance policy warranty shall not affect coverage afforded under the policy to protect the City. The insurance policies shall contain a waiver of transfer



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rights of recovery (subrogation) against the City, its agents, representatives, directors, officers, and employees for any claims arising out of the Contractor's work or service.

The City reserves the right to request and to receive, within 10 working days, certified copies of any or all of the herein required insurance policies and/or endorsements. The City shall not be obligated, however, to review same or to advise Contractor of any deficiencies in such policies and endorsements, and such receipt shall not relieve Contractor from, or be deemed a waiver of the City's right to insist on, strict fulfillment of Contractor's obligations under this Contract.

The insurance policies required by this Contract shall name the City, its agents, representatives, officers, directors, officials and employees as Additional Insured with respect to this contract. All Liability Insurance policies will be endorsed to show this additional coverage. A cross-liability clause or separation of insured clause will be included in general liability policy.

The policy or policies of insurance maintained by the Contractor and its subcontractors shall provide at least the following limits and coverage:

- a. **Commercial General Liability Insurance:** Includes all liability including all major divisions of coverage, but not limited to, Premises/Operations, Completed Operations, Independent Contractors' Protective, Products-Completed Operations, Contractual Liability (including coverage for the Contractor's indemnity obligations and other contractual indemnity obligations assumed by the Contractor), Personal Injury, and Broad Form Property Damage (including coverage for Explosion, Collapse, and Underground Hazards). The following insurance will be carried:

Employer's Liability Insurance
\$ 2,000,000.00 Each Occurrence
\$ 2,000,000.00 Disease Each Employee
\$ 2,000,000.00 Disease – Policy

Commercial General Liability insurance
\$ 2,000,000.00 Each Occurrence Limit
\$ 3,000,000.00 General Aggregate
\$ 3,000,000.00 Products/Completed Operations Aggregate
\$ 3,000,000.00 Personal and Advertising Injury
\$ 2,000,000.00 Limited Job Site Pollution Occurrence Sub-Limit

Comprehensive Automobile Liability Insurance including coverage for all owned, hired and non-owned vehicles
\$ 2,000,000.00 Each Occurrence Combined Single Limit
\$ 3,000,000.00 Aggregate Bodily Injury & Property Damage

or

\$ 2,000,000.00 Each Person Bodily Injury
\$ 2,000,000.00 Each Occurrence Bodily Injury
\$ 2,000,000.00 Each Occurrence Property Damage
\$ 2,000,000.00 Each Occurrence Pollution Occurrence Sub-Limit

- b. "All risk" Builder's Risk Insurance (including earthquake and flood) covering the real and personal property of others in the care, custody, and control of the contractor, if applicable. Coverage shall include theft and damage to building interiors, exterior, in transit and offsite storage. The minimum amount of coverage to be carried shall be equal to the full amount of the contract.

The policy shall be endorsed to have the General Aggregate apply to this Project Only.

The insurance policies may provide coverage which contains deductibles or self-insured retentions. Such deductible and/or self insured retentions shall not be applicable with respect to the coverage provided to the City under such policies. The



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Contractor shall be solely responsible for deductible and/or self insured retention and the City, at its option, may require the Contractor to secure the payment of such deductible or self-insured retentions by a surety bond or an irrevocable and unconditional letter of credit.

Certificates of Insurance: Prior to commencing Services under this Contract, Contractor shall furnish the City with Certificates of Insurance, or formal endorsements as required by the Contract, issued by Contractor's insurer(s), as evidence that policies providing the required coverage, conditions and limits required by this Contract are in full force and effect. Certificates of Insurance should read "Insurance certificate pertaining to (this contract). The City of West Linn, its officers, directors and employees shall be added as additional insured with respects to this contract. Insured coverage is primary" in the description portion of the certificate.

If a policy does expire during the life of the contract, a renewal certificate must be sent to the City ten (10) days prior to the expiration date. Insurance required herein shall not expire, be canceled, or materially changed without thirty (30) days prior written notice to the City. The procuring of such required insurance shall not be construed to limit contractor's liability hereunder. Notwithstanding said insurance, Contractor shall be obligated for the total amount of any damage, injury, or loss caused by negligence or neglect connected with this Contract.

13. **PERFORMANCE BOND:** The contractor shall be required to furnish non-revocable security binding the contractor to provide faithful performance of the contract in the amount of 100% of the total contract price payable to the City of West Linn.

Performance security shall be in the form of a performance bond, certified check or cashier's check. This security must be in the possession of the City within the time specified or ten (10) days after notice of award if no period is specified. If the contractor fails to execute the security document as required, the contractor may be found in default and the contract terminated by the City. In case of default the City reserves all rights.

All performance bonds shall be executed on the Performance Bond form included in the Bid Document, duly executed by the Bidder as Principal and having as Surety thereon a Surety company approved by the owner and holding a Certificate of Authority to transact surety business in the State of Oregon, by the Oregon Department of Insurance. Individual sureties are unacceptable. All Insurers and Sureties shall have at the time of submission of the proposal an A.M. Best's Key Rating Guide of "A-" or better as currently listed in the most recent Best Key Guide, published by the A.M. Best Company, payable without condition to the Owner.

14. **PAYMENT BOND:** The contractor shall be required to furnish non-revocable security for the protection of all persons supplying labor and material to the contractor or any subcontractor for the performance of any work related to the contract. Payment security shall be in the amount of 100% of the total contract price and be payable to the City of West Linn. Payment security shall be in the form of a payment bond, certified check or cashier's check.

All payment bonds shall be executed on the Payment Bond form included in the Bid Document, duly executed by the Bidder as Principal and having as Surety thereon a Surety company approved by the owner and holding a Certificate of Authority to transact surety business in the State of Oregon, by the Oregon Department of Insurance. Individual sureties are unacceptable. All Insurers and Sureties shall have at the time of submission of the proposal and A.M. Best's Key Rating Guide of "A-" or better as currently listed in the most recent Best Key Guide, published by the A.M. Best Company, payable without condition to the Owner.

15. **NOTICE TO PROCEED:** Within 45 days of the issuance of the Notice of Award the City may issue a written Notice to Proceed. The Notice to Proceed shall stipulate the actual contract start date, the contract duration and the contract completion date. The time required for the Contractor to obtain permits, licenses and easements shall be included in the contract duration and shall not be justification for a delay claim by the Contractor. The time required for the Contractor to



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prepare, transmit and obtain approval of applicable submittals shall be included in the contract duration and shall not be justification for a delay claim by the Contractor.

No work shall be started until after all required permits, licenses, and easements have been obtained.

No work shall be started until all applicable submittals have been submitted and returned approved by the City's Representative.

16. **PROTECTION OF FINISHED OR PARTIALLY FINISHED WORK:** The Contractor shall properly guard and protect all finished or partially finished work, and shall be responsible for the same until the entire contract is completed and accepted by the City Engineer. The Contractor shall turn over the entire work in full accordance with these Specifications before final settlement shall be made.
17. **CHANGE ORDERS:** The City may at any time, and without notice, issue a written Change Order requiring additional work within the general scope of this Contract, or any amendment thereto, or directing the omission of or variation in work. If such Change Order results in a material change in the amount or character of the work, an equitable adjustment in the Contract price and other provisions of this Contract as may be affected may be made. Any claim by Contractor for an adjustment under this section shall be asserted in writing within thirty (30) days from the date of receipt by Contractor of the notification of change or the claim will not be allowed. Whether made pursuant to this section or by mutual agreement, no change shall be binding upon City until a Change Order is executed by the Authorized Representative of City, which expressly states that it constitutes a Change Order to this Contract. The issuance of information, advice, approvals, or instructions by City's Representative or other City personnel shall not constitute an authorized change pursuant to this section. Nothing contained in this section shall excuse the Contractor from proceeding with the prosecution of the work in accordance with the Contract, as changed.
18. **STOCKPILE OF MATERIALS:** The Contractor may, if approved by the City Engineer, place or stockpile materials in the public right-of-way provided they **do not** prevent access to adjacent properties or prevent compliance with traffic regulations. Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintained.
19. **EXCESS MATERIALS:** When excavations are made, resultant loose earth shall be utilized for filling by compacting in place or disposed of off the site. Excess or unsuitable material, broken asphaltic concrete and broken portland cement concrete excavated from the right-of-way shall be removed from the project and disposed of by the Contractor.

Waste material shall not be placed on private property without express permission of the property owner.

The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work, he shall remove all equipment, tools and surplus materials, and shall completely clean the premises, removing and disposing of all debris and rubbish, and cleaning all stains, spots, marks, dirt, smears, etc. When work premises are turned over to the City, they shall be thoroughly clean and ready for immediate use.

Clean-up shall include removal of all excess pointing mortar materials within pipes and removal of oversized rocks and boulders left after finish grading. The Contractor shall provide for the legal disposal of all waste products debris, etc., and shall make necessary arrangements for such disposal.

20. **ENVIRONMENTAL POLLUTION:** As provided by ORS 279C.525, all applicable provisions of federal, state or local statutes, ordinances and regulations dealing with the prevention of environmental pollution and the preservation of natural resources that affect the work under this contract are by reference incorporated herein to the same force and affect as if set forth herein in full. If the Contractor must undertake additional work due to the enactment of new or the amendment of existing statutes, ordinances or regulations occurring after the submission of the successful bid, the City shall issue a Change Order setting forth the additional work that must be undertaken. The Change Order shall not invalidate the Contract and



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there shall be, in addition to a reasonable extension, if necessary, of the contract time, a reasonable adjustment in the contract price, if necessary, to compensate the Contractor for all costs and expenses incurred, including overhead and profits, as a result of the delay or additional work.

- 21. **SALVAGE, COMPOSTING OR MULCHING:** If this is a contract for demolition work, the Contractor shall salvage or recycle construction and demolition debris, if feasible and cost-effective. If this is a contract for lawn and landscape maintenance, Contractor shall compost or mulch yard waste material at an approved site, if feasible and cost-effective.
- 22. **LOSSES AND DAMAGES:** All loss or damage arising out of the nature of the work to be done or from the action of the elements or from any unforeseen circumstances in the prosecution of the same, or from any unusual obstructions or difficulties which may be encountered in and/or during the prosecution of the work, or from any casualty whatsoever of every description, shall be sustained and borne by the Contractor at his own cost and expense.
- 23. **CHARACTER AND STATUS OF WORKMEN:** Only skilled foremen and workmen shall be employed on work requiring special qualifications. When required by the City, the Contractor shall discharge any person who is, in the opinion of the City Engineer, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. The Contractor shall keep the City harmless from damages or claims for compensation that may occur in the enforcement of this section.
- 24. **WORK METHODS:** The methods, equipment and appliances used on the work shall be such as will produce a satisfactory quality of work, and shall be adequate to complete the contract within the time limit specified.

Except as is otherwise specified, the Contractor's procedure and methods of construction may, in general, be of his own choosing, provided they follow best general practice and are calculated to secure results which will satisfy the requirements of the specifications and the supervision of the work.

The work covered by this Contract shall be carefully laid out in advance and performed in a manner to minimize interference with normal operation and utilization of the roads. The Contractor shall exercise caution during the course of this construction work to avoid damage to all known existing or possible unknown existing underground utilities. He shall conduct his construction operations in such a manner as to avoid injury to his personnel and to avoid damage to all utilities. Any damage done will be repaired without delay and at the expense of the Contractor.

- 25. **INSPECTION:** All material and/or services are subject to inspection and acceptance by the City. Materials and/or services failing to conform to the specifications of this Contract will be held at Contractor's risk and may be returned to the Contractor. If so returned, all costs are the responsibility of the Contractor. The City may elect to do any or all of the following per written determination:
 - a. Waive the non-conformance.
 - b. Stop the work immediately.
 - c. Bring material into compliance.
- 26. **TRAFFIC REGULATIONS:** All traffic affected by this construction shall be regulated in accordance with the *Oregon Temporary Traffic Control Handbook*, latest edition, as prepared by the Oregon Department of Transportation and any questions shall be referred to the City of West Linn City Engineer for interpretation.

At the time of the pre-construction conference, the Contractor shall designate an employee who is well qualified and experienced in construction traffic control and safety to be responsible for implementing, monitoring and altering traffic control measure, as necessary. At the same time the City will designate a representative who will be responsible to see that



GENERAL TERMS AND CONDITIONS

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

all traffic control and any alterations are implemented and monitored to the extent that traffic is carried through the work area in an effective manner and that motorists, pedestrians, bicyclists and workers are protected from hazard and accidents.

- a. All traffic control devices required for this project shall be the responsibility of the Contractor. The Contractor shall place advance warnings signs in accordance with the Traffic Control Handbook.
- b. The Contractor shall provide, erect and maintain all necessary flashing arrow boards, barricades, suitable and sufficient warning lights, signals and signs, and shall take all necessary precautions for the protection of the work and safety of the public. The Contractor shall provide, erect and maintain acceptable and adequate detour signs at all closures and along detour routes.
- c. All barricades and obstructions shall be illuminated at night, and all safety lights shall be kept burning from sunset until sunrise. All barricades and signs used by the Contractor shall conform to the standard design, generally accepted for such purposes, and payment for all such services and materials shall be considered as included in the other pay items of the Contract unless specifically listed and identified.
- d. The Contractor shall insure that all existing traffic signs are erect, clean and in full view of the intended traffic at all times. Street name signs at major street intersections shall be maintained erect at all times. If these signs should interfere with construction, the Contractor shall notify the Inspector at least forty eight (48) hours in advance for City personnel to temporarily relocate said signs. The City will re-set all traffic and street name signs to permanent locations when notified by the Contractor that construction is complete unless otherwise stated in the specifications.
- e. When construction activities or traffic hazards at the construction site require the use of flagmen, it shall be the Contractor's responsibility to provide adequate personnel including flagmen to direct traffic safely.
- f. Equipment used and/or directed by the Contractor shall travel with traffic at all times. Supply trucks shall travel with traffic except when being spotted. Provide a flagman to assist with this operation.
- g. During construction, it may be necessary to alter traffic control. Alterations shall be in accordance with the Traffic Control Handbook.
- h. **NO STREET WITHIN THIS PROJECT MAY BE CLOSED TO THROUGH TRAFFIC OR TO LOCAL EMERGENCY TRAFFIC WITHOUT THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER PER DIRECTION OF THE CITY MANAGER OF THE CITY OF WEST LINN.** Written approval may be given if sufficient time exists to allow for notification of the public at least two (2) days in advance of such closing. Partial closure of streets within the project shall be done in strict conformity with written directions to be obtained from the City Engineer.
- i. The Contractor shall address how local access to adjacent properties will be handled in accordance with the specification herein.
- j. Where crossings of existing pavements occur, no open trenches shall be permitted overnight, but plating may be permitted if conditions allow as determined by the City Engineer or his authorized representative. If plates cannot be used, crossings shall be appropriately back-filled to provide a safe smooth travelling surface.

27. **OUTDOOR CONSTRUCTION RESTRICTIONS:** Outdoor construction is restricted to the times listed below in the following table:

	Weekdays (Mon.-Fri.)	Weekends (Sat.-Sun.), Holidays
All Outdoor Construction Work	7:00 a.m. to 7:00 p.m.	9:00 a.m. to 5:00 p.m.



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Holidays include: New Year's Day, Martin Luther King Jr. Birthday, Washington's Birthday/President's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, and Christmas Day.

28. **FIRST TIER SUBCONTRACTOR DISCLOSURE:** If a Bid for the Project is greater than \$100,000, within two working hours of the date and time the Bids are due, the Bidder must submit a written disclosure for all First Tier Subcontractors furnishing labor or labor and materials whose subcontracts are equal to or greater in value than 5% of the total Project Bid or \$15,000, whichever is greater, or \$350,000 regardless of the percentage of the total project bid in accordance with ORS 279C.370. The Bidder must disclose the following information about their first-tier subcontracts either in its Bid submission or within two (2) working hours after the date and time of the deadline when bids are due:

- a. The subcontractor's name, address, Construction Contractor's Board Number (as applicable), and
- b. The dollar value of the subcontract, and
- c. The category of work that the subcontractor will be performing.

If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the accompanying form. Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A non-responsive bid will not be considered for award. It is the Bidder's responsibility to determine all the documents are must be submitted to the City.

29. **USE OF EQUALS:** When the specifications for materials, articles, products, and equipment state "or equal", Contractor may bid upon, and use materials, articles, products, and equipment which will perform equally the duties imposed by the general design. The Engineer will have the final approval of all materials, articles, products, and equipment proposed to be used as an "equal." It shall not be purchased or installed without prior written approval from the City or its representative.

30. **HAZARDOUS MATERIALS:** The Contractor shall supply the City with a list of any and all hazardous substances used in performance of this Contract. That list shall identify the location of storage and use of all such hazardous substances and identify the amounts stored and used at each location. Contractor shall provide City with material safety data sheets for all hazardous substances brought onto City property, created on City property or delivered to City pursuant to this Contract. For the purpose of this section, "hazardous substance" means hazardous substance as defined by ORS 453.307(5). Contractor shall complete the State Fire Marshall's hazardous substance survey as required by ORS 453.317 and shall assist City to complete any such survey that it may be required to complete because of substances used in the performance of this Contract.

31. **HAZARDOUS WASTE:** If, as a result of performance of this Contract, Contractor generates any hazardous wastes, Contractor shall be responsible for disposal of any such hazardous wastes in compliance with all applicable federal and state requirements. Contractors shall provide City with documentation, including all required manifests, demonstrating proper transportation and disposal of any such hazardous wastes. Contractor shall defend, indemnify, and hold harmless City for any disposal or storage of hazardous wastes generated pursuant to this Contract and any releases or discharges of hazardous materials.

32. **TEMPORARY SANITARY FACILITIES:** The Contractor shall provide facilities for the use of workmen employed on the work site in accordance with the requirements of ORS 654.150, (Sanitary facilities at construction projects; standards, exemptions) and the rules adopted pursuant thereto. Whether or not ORS 654.150 is applicable to the project is the sole responsibility of the Contractor. Contractor shall be responsible for all costs that may be incurred in complying with or in securing exemption or partial exemption from the requirements as incidental to this contract.

33. **ELECTRIC POWER, WATER AND TELEPHONE:** Unless otherwise specified, the Contractor shall make his own arrangements for electric power, water and telephone. Subject to the convenience of the utility, he may be permitted to



GENERAL TERMS AND CONDITIONS

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22500 Salamo Road
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Telephone: (503) 722-5500
Fax: (503) 656-4106

connect to existing facilities where available, but he shall meter and bear the cost of such power or water, and installation and disconnect of such power, water and telephone services.

34. **UTILITIES AND ELECTRICAL POWER LINES:** The electric utility company may maintain energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measure, including maintaining a minimum ten (10) feet clearance between the lines and all construction equipment and personnel. (see: OSHA Std. 1926.550 (a) 15).

Electrical utility companies may maintain energized underground electrical power lines in the immediate vicinity of this project. These power lines represent an extreme hazard of electrical shock to any construction personnel or equipment coming in contact with them. Contractors, their employees, and all other personnel working near any underground power lines must be warned to take adequate protective measure. (see: OSHA Std. 1926-651 (A)).

Oregon law requires all parties planning excavations in public rights-of-way to contact utilities for locations of their underground facilities in accordance with the 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.

35. **COOPERATIVE PURCHASING:** Any publicly funded city, county, district, agency or similar entity shall have the authority to purchase specified goods/services directly from the contractor under the terms and conditions of this contract as indicated below:
- a. The bidder agrees to extend identical pricing to local public agencies for the same terms. Quantities listed in this document reflect the City of West Linn’s estimated usage only.
 - b. Each contracting agency will execute a separate contract with the successful bidder for its requirements.
 - c. Any bidder, by written notification at the time of the bid due date and time, may decline to extend the prices and terms of this bid to any, and/or all other public agencies.
 - d. Additional costs may be incurred by the successful bidder in contracting with another public agency. All demonstrable costs (shipping, etc.) may be passed on to that public agency.

Contractor shall provide information regarding total usage of contract upon request of the City of West Linn.



CITY OF
**West
Linn**

SPECIAL TERMS AND CONDITIONS

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

Purpose: The City of West Linn intends to establish a contract for the **Emergency Intertie Water Pump Station Improvements project**. For the Technical Special Provisions of this contract see Appendix B.

1. **Prospective Bidders Conference:** Prospective bidders are required to attend a conference to be held at the City of West Linn City Hall:

ADDRESS: 22500 Salamo Road
West Linn, Oregon 97068
Bolton Conference Room

DATE/TIME: AS INDICATED ON INVITATION FOR BID

The purpose of this conference will be to clarify the contents of this Invitation For Bid in order to prevent any misunderstanding of the City’s position. Any doubt as to the requirements of this Invitation For Bid or any apparent omission or discrepancy should be presented to the City at this conference. The City will then determine the appropriate action necessary, if any, and issue a written addendum to the Invitation For Bid. Oral statements or instructions shall not constitute an amendment to the Invitation For Bid.

2. **Bid Acceptance Period:** In order to allow for an adequate evaluation, the City requires a Bid in response to this Solicitation to be valid and irrevocable for sixty (60) days after the opening time and date.
3. **Time of Completion:** The Contractor shall commence work for this project on or before the fifth (5) day following the project start date indicated on the “Notice to Proceed” issued by the City of West Linn and shall fully complete all work under the project within the “Time of Completion” stated on the “Notice of Invitation to Bid and Contract.” The Contractor shall, at all times, during the continuance of the Contract, prosecute the work with such force and equipment as is sufficient to complete all work within the time specified.
4. **Plans and Specifications to Successful Bidder:** The successful Bidder may obtain five (5) sets of Plans and Specifications for this project from the City at no cost.
5. **City of West Linn Permit:** As a City project, the Contractor is not required to obtain a City Public Works Construction, Improvement, Blasting, or Erosion Control permit. The Contractor will be responsible for any other required agency permits.
6. **Key Personnel:** It is essential that the Contractor provide adequate experienced personnel, capable of and devoted to the successful accomplishment of work to be performed under this contract. The Contractor must agree to assign specific individuals to the key positions.
 - b. The Contractor agrees that, once assigned to work under this contract, key personnel shall not be removed or replaced without written notice to the City.
 - c. If key personnel are not available for work under this contract for a continuous period exceeding 30 calendar days, or are expected to devote substantially less effort to the work than initially anticipated, the Contractor shall immediately notify the City, and shall, subject to the concurrence of the City, replace such personnel with personnel of substantially equal ability and qualifications.



CITY OF
**West
Linn**

FORMS

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

Appendix A

FORMS



CITY OF
**West
Linn**

BID FORM

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

Item	Spec. Reference	Description of material and/or services	Quantity	Unit	Unit Price	Total Amount
1	TSP 01200	Mobilization	1	LS	\$	\$
2	N/A	Bollards	4	EA	\$	\$
3	TSP DIV 1, DIV 2, DIV 3, DIV 15, DIV 16, and DIV 17	Furnish and install flow meter vault and related items as shown on the drawings, including precast concrete vault, electromagnetic flow meter, electrical work, instrumentation and process integration, valving, water piping, and drain piping, complete	1	LS	\$	\$
4	TSP DIV 1, DIV 11, DIV 15, DIV 16, and DIV 17	Furnish and install all items inside existing pump station as shown on the drawings, including end suction centrifugal pump, motor, electrical work, instrumentation and process integration, valving, piping, lifting eyes, complete	1	LS	\$	\$
		Total Bid:				\$ _____



CITY OF
**West
Linn**

BID BOND

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____, as "Principal,"
(Name of Principal)

and _____, an _____ Corporation,
(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto the City of West Linn ("Obligee") the sum of (\$ _____) _____ dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its proposal or bid to an agency of the Obligee in response to Obligee's procurement document for the project identified in the Solicitation Number indicated above which proposal or bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to ten (10%) percent of the total amount of the bid pursuant to the procurement document and ORS 279C.365(4) for competitive bidding or 279C.400(5) for competitive proposals.

NOW, THEREFORE, if the proposal or bid submitted by Principal is accepted, and if a contract pursuant to the proposal or bid is awarded to Principal, and if Principal enters into and executes such contract within the time specified in the procurement document and executes and delivers to Obligee its good and sufficient performance and payment bonds required by Obligee, as well as any required proof of insurance, within the time fixed by Obligee, then this obligation shall be void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly authorized legal representatives this _____ day of _____, 20__.

PRINCIPAL: _____

SURETY: _____

By _____
Signature

BY ATTORNEY-IN-FACT:

Official Capacity

Name

Attest: _____
Corporation Secretary

Signature

Address

City State Zip

Phone Fax



CITY OF
**West
Linn**

FORMS

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

NONCOLLUSION AFFIDAVIT

I, **(Type/Print Name)** _____, state that I am **(Position Title)** _____ of **(Name of Firm)** _____ and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and, officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

1. The price(s) and the amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder.
2. Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.
3. No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
4. The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
5. **(Name of Firm)** _____, its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any governmental agency and have not in the last four (4) years been convicted or found liable for any act prohibited by state or federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

I state that **(Name of Firm)** _____ understands and acknowledges that the above representations are material and important, and will be relied on by **THE CITY OF WEST LINN, OREGON** in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from **THE CITY OF WEST LINN, OREGON** of the true facts relating to the submission of bids for this contract.

(Signature) (Signatory's Name)

(Signatory's Title)

STATE OF _____)
)§
COUNTY OF _____)

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 20____

Notary Public

My Commission Expires _____



CITY OF
**West
Linn**

FORMS

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

THREE YEAR EXPERIENCE RECORD

Recent projects first

#1 (Project Name, Location, Contract Cost)

Project description: _____

Project completion date: (contract) _____

(actual) _____

Contact name: _____

Telephone: _____

#2 (Project Name, Location, Contract Cost)

Project description: _____

Project completion date: (contract) _____

(actual) _____

Contact name: _____

Telephone: _____

#3 (Project Name, Location, Contract Cost)

Project description: _____



FIRST-TIER SUBCONTRACTOR DISCLOSURE

PROJECT NAME: _____

BID #: _____

BID CLOSING: Date: _____ Time: _____

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

List below the name of each subcontractor that will be furnishing labor or will be furnishing labor and materials and that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

NAME	DOLLAR VALUE	CATEGORY OF WORK
(1) _____	\$ _____	_____
(2) _____	\$ _____	_____
(3) _____	\$ _____	_____
(4) _____	\$ _____	_____
(5) _____	\$ _____	_____
(6) _____	\$ _____	_____
(7) _____	\$ _____	_____
(8) _____	\$ _____	_____
(9) _____	\$ _____	_____

Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A non-responsive bid will not be considered for award.

Form submitted by (bidder name): _____

Contact name: _____

Phone no.: () _____

- ORS 279C.370 First-tier subcontractor disclosure.** (1)(a) Within two working hours after the date and time of the deadline when bids are due to a contracting agency for a public improvement contract, a bidder shall submit to the contracting agency a disclosure of the first-tier subcontractors that:
- (A) Will be furnishing labor or will be furnishing labor and materials in connection with the public improvement contract; and
 - (B) Will have a contract value that is equal to or greater than five percent of the total project bid or \$15,000, whichever is greater, or \$350,000 regardless of the percentage of the total project bid.
 - (b) For each contract to which this subsection applies, the contracting agency shall designate a deadline for submission of bids that has a date on a Tuesday, Wednesday or Thursday and a time between 2 p.m. and 5 p.m., except that this paragraph does not apply to public contracts for maintenance or construction of highways, bridges or other transportation facilities.
 - (c) This subsection applies only to public improvement contracts ("projects") with a value, estimated by the contracting agency, of more than **\$100,000**.
 - (d) This subsection does not apply to public improvement contracts that have been exempted from competitive bidding requirements under ORS 279C.335 (2).
- (2) The disclosure of first-tier subcontractors under subsection (1) of this section must include the name of each subcontractor, the category of work that each subcontractor will perform and the dollar value of each subcontract. The information shall be disclosed in substantially the following [above] form:
- (3) A contracting agency shall accept the subcontractor disclosure. The contracting agency shall consider the bid of any contractor that does not submit a subcontractor disclosure to the contracting agency to be a non-responsive bid and may not award the contract to the contractor. A contracting agency is not required to determine the accuracy or the completeness of the subcontractor disclosure.
- (4) After the bids are opened, the subcontractor disclosures must be made available for public inspection.
 - (5) A contractor may substitute a first-tier subcontractor under the provisions of ORS 279C.585.
 - (6) A subcontractor may file a complaint under ORS 279C.590 based on the disclosure requirements of subsection (1) of this section.

WH-179 (08-10-10)



CITY OF
**West
Linn**

PERFORMANCE BOND

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

KNOW ALL MEN BY THESE PRESENTS, that we, _____
(Official Name & Form of Organization)

Whose address is: _____
(Street Address) (City) (State) (Zip)

as Principal, and, _____
(Name of Surety) (Print - Agent / Contact Name) (Phone Number)

(Street Address of Surety) (City) (State) (Zip)

a corporation duly authorized to conduct a general surety business in the State of Oregon, as Surety, are jointly and severally held and bound unto the City of West Linn, Oregon, a municipality of the State of Oregon, hereinafter called Obligee, in the sum of _____ and ____/100 DOLLARS (\$_____), (The Contract Price, Both in Words & Figures) lawful money of the United State of America, for the payment of which we, as Principal, and as Surety, jointly and severally bind ourselves, our successors and assigns firmly by these presents,

TERMS AND CONDITIONS

On the _____ (Day) of _____ (Month), _____ (Year), _____
(Name of Contractor)

Principal, entered into a contract with the City of West Linn, Oregon, Obligee, to construct certain public improvements and to provide material, labor and equipment for the construction of those improvements. The public improvements and work to be performed by Principal are more fully described in the contract documents between Principal and Obligee. Those contract documents are incorporated herein by reference.

In the event that Principal fails to complete the work as required under the contract, Surety shall either complete the work or pay Obligee the costs of completion of the work. Work is only complete when it meets the standards required by the Contract and applicable City standards. Surety's obligation shall remain in effect until the work is accepted by Obligee, but shall terminate on acceptance by Obligee. The total amount of the Surety's liability to Obligee under this bond shall in no event exceed the amount stated above.

Surety agrees that no change, extension of time, alternation, or addition to the terms of the contract, or to the work to be performed thereunder or the specifications accompanying the same shall in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the work or the specifications.

IN WITNESS WHEREOF, the parties hereto have caused this Bond to be executed in _____, Oregon, this ____ (Day) of _____ (Month), _____ (Year).

Contractor

Witnesses:

Principal Signature

Principal Printed Name

Surety

(A true copy of the Power of Attorney must be attached to the original of this bond)

Countersigned:

Surety Attorney of Fact

Resident Agent



CITY OF
**West
Linn**

PAYMENT BOND

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

KNOW ALL MEN BY THESE PRESENTS, that we, _____
(Official Name & Form of Organization)

Whose address is: _____
(Street Address) (City) (State) (Zip)

as Principal, and, _____
(Name of Surety) (Print - Agent / Contact Name) (Phone Number)

_____ (Street Address of Surety) (City) (State) (Zip)

a corporation duly authorized to conduct a general surety business in the State of Oregon, as Surety, are jointly and severally held and bound unto the City of West Linn, Oregon, a municipality of the State of Oregon, hereinafter called Obligee, in the sum of _____ and _____/100 DOLLARS (\$ _____), (The Contract Price, Both in Words & Figures) lawful money of the United State of America, for the payment of which we, as Principal, and as Surety, jointly and severally bind ourselves, our successors and assigns firmly by these presents,

TERMS AND CONDITIONS

On the _____ (Day) of _____ (Month), _____ (Year), _____
(Name of Contractor)

Principal, entered into a contract with the City of West Linn, Oregon, Obligee, for the construction of certain public improvements. As part of the contract, Principal is required to furnish materials, labor, and equipment to construct the improvements. The contract documents between Principal and Obligee are incorporated herein by this reference.

In the event that Principal fails to make payments when due to suppliers of labor, equipment or materials, Surety shall pay the suppliers the amounts they are due. In the event that Obligee pays any amounts to suppliers that Principal was required to pay, Surety shall reimburse Obligee for those payments. In the event that Principal permits any lien or claim to be filed or prosecution against the City on account of any labor or material furnished, Surety shall take such steps as are necessary to clear the lien, claim or prosecution. In the event that Principal fails to (1) promptly pay all contributions or amounts due the State Unemployment Compensation Trust Fund incurred to the performance of the contract, (2) promptly, as due, make payments to the person, co-partnership, association, or corporation entitled thereto of the money and sums mentioned in Section 279C.600 of the Oregon Revised Statutes, or (3) promptly pay to the Oregon State Tax Commission all sums required to be deducted and retained from wages of employees of the Principal and his sub-Contractors, pursuant to the Section 316.711, Oregon Revised Statues, Surety shall make the required payments. Surety's obligations under this bond shall terminate when all payments required of Principal described in this paragraph are made in full.

The total amount of the Surety's liability under this bond both to the Obligee and to the persons furnishing labor or materials, provisions and goods to any person or persons, shall in no event exceed the amount stated above.

Surety agrees that no change, extension of time, alternation, or addition to the terms of the contract, or to the work to be performed there under or the specifications accompanying the same shall in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the work or the specifications.

IN WITNESS WHEREOF, the parties hereto have caused this Bond to be executed in _____, Oregon, this ____ (Day) of _____ (Month), _____ (Year).

Contractor

Witnesses:

Principal Signature

Principal Printed Name

Surety

(A true copy of the Power of Attorney must be attached to the original of this bond)

Countersigned:

Surety Attorney of Fact

Resident Agent



**CONTRACT FEE SECTION
PREVAILING WAGE RATE UNIT
BUREAU OF LABOR AND INDUSTRIES
800 N.E. OREGON ST., #1045
PORTLAND, OR 97232-2180
PHONE: (971) 673-0852
FAX: (971) 673-0769**

For Office Use Only: Project DB #: _____
--

PUBLIC WORKS FEE INFORMATION FORM

For use by public agencies that have contracted with a contractor on a public works project regulated by ORS 279C.800 to 279C.870, in compliance with ORS 279C.825. Also for use by public agencies that are a party to a public works project pursuant to ORS 279C.800(6)(a)(B), (C) (D) or (E).

PUBLIC AGENCIES: Please complete and mail this form to BOLI at the above address, along with the public works fee of one-tenth of one percent of the contract price (contract amount x .001), payable to BOLI. **The minimum fee is \$250.00; the maximum fee is \$7,500.00.** Without the following completed information, the bureau may be unable to properly credit you for payment received.

PUBLIC AGENCY: _____ **AGENCY #:** _____

AGENCY MAILING ADDRESS: _____

CITY, STATE, ZIP: _____

AGENCY CONTACT PERSON: _____ **PHONE:** (____) _____

PROJECT MANAGER NAME: _____ **PHONE:** (____) _____

PROJECT NAME: _____

CONTRACT NAME (if part of larger project): _____

PROJECT LOCATION: _____

PROJECT NO: _____ **DATE CONTRACT FIRST ADVERTISED:** _____

DATE CONTRACT AWARDED: _____ **CONTRACTOR CCB#:** _____

CONTRACTOR BUSINESS NAME (DBA): _____

CONTRACTOR ADDRESS: _____

CITY, STATE ZIP _____

CONTRACT AMOUNT: \$ _____ **FEE AMOUNT DUE/PAID: \$** _____

If less than \$50K, is it part of a larger project? yes no **Contract amount x .001 = fee due**

(Please duplicate this form for future use.)



BUREAU OF LABOR AND INDUSTRIES
NOTICE OF PUBLIC WORKS
(For use by public agencies in complying with ORS 279C.835)

For Office Use Only:
Project DB #: _____

NOTE: ORS 279C.835 requires that public contracting agencies include with this form a copy of the disclosure of first-tier subcontractors submitted pursuant to ORS 279C.370.

PUBLIC AGENCY INFORMATION

Agency Name: _____
Agency Division: _____ Agency # (if known): _____
Address: _____
City, State, Zip: _____
Email Address: _____
Agency Representative: _____ Phone: _____

SECTION A: To be completed when a public agency awards a contract to a contractor for a public works project, including CM/GC projects. (See reverse for public works projects in which no public agency awards a contract to a contractor.)

CONTRACT INFORMATION:

Project Name: _____
Contract Name (if part of larger project): _____
Project #: _____ Contract #: _____
Project Manager Name: _____ Phone: _____ Fax: _____
Project Location (Street(s), City): _____ Project County: _____
Contract Amount: \$ _____ If under \$50,000, is this contract part of a larger project? YES NO
If yes, total project amount: \$ _____
Will project use federal funds that require compliance with the Davis-Bacon Act? YES NO
Date Contract Specifications First Advertised for Bid (if not advertised, date of RFP or first contact with contractor): _____
OR If CM/GC Contract, Date Contract Became a Public Works Contract (see OAR 839-025-0020(6)): _____
Date Contract Awarded: _____ Date Work Expected to Begin: _____ Date Work Expected to be Complete: _____

PRIME CONTRACTOR INFORMATION:

Name: _____
Address: _____
City, State Zip: _____ Phone: _____
Construction Contractors Board Registration #: _____
Name of Bonding Company: _____
Address: _____
Agent Name: _____ Phone: _____
Payment Bond #: _____

Copy of first-tier subcontractors attached (see NOTE above).

Signature of agency representative completing form: _____
Printed Name: _____ Phone: _____ Date: _____
Email Address: _____

THIS FORM WILL BE RETURNED TO THE PUBLIC AGENCY FOR CORRECTION AND RESUBMITTAL IF INCOMPLETE.

Complete this page for public works projects in which NO PUBLIC AGENCY AWARDS A CONTRACT TO A CONTRACTOR. Complete the CONTRACT INFORMATION AND SECTION B, C, D or E, whichever applies to the project.

CONTRACT INFORMATION:

Name of Project Owner: _____ Phone: _____
Project Name: _____ Project #: _____
Project Location (Street(s), City): _____ Project County: _____
Total Project Cost: \$ _____ Amount of Public Funds Provided for the project: \$ _____
Name(s) of Public Agency(ies) Providing Public Funds: _____
Will project use federal funds that require compliance with the Davis-Bacon Act? YES NO
Date Work Expected to Begin: _____ Date Work Expected to be Complete: _____

SECTION B: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(B) (a project for the construction, reconstruction, major renovation or painting of a privately owned road, highway, building, structure or improvement of any type **that uses funds of a private entity and \$750,000 or more of funds of a public agency**).

Date the public agency or agencies committed to the provision of funds for the project: _____

SECTION C: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(C) (a project for the construction of a privately owned road, highway, building, structure or improvement of any type **that uses funds of a private entity and in which 25 percent or more of the square footage of the completed project will be occupied or used by a public agency**).

Total square footage of privately owned road, highway, building, structure or improvement: _____

Percent of total square footage of the completed project that will be occupied or used by a public agency: _____

Date the public agency or agencies entered into an agreement to occupy or use the completed project: _____

SECTION D: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(D) (a project that includes the construction or installation of a **device, structure or mechanism that uses solar radiation** on public property, regardless of project cost or whether the project uses funds of a public agency).

Date the public agency entered into an agreement for the project: _____

SECTION E: To be completed when a project is a public works pursuant to ORS 279C.800(6)(a)(E) (a project for the construction, reconstruction, major renovation or painting of a road, highway, building, structure, or improvement of any type that occurs, with or without using funds of a public agency, **on real property that the Oregon University System or an institution in the Oregon University System owns**).

Date the public agency entered into an agreement for the project: _____

Signature of agency representative completing form: _____

Printed Name: _____ Phone: _____ Date: _____

Email Address: _____

THIS FORM WILL BE RETURNED TO THE PUBLIC AGENCY FOR CORRECTION AND RESUBMITTAL IF INCOMPLETE.

RETURN THIS COMPLETED FORM TO:

Prevailing Wage Rate Unit • Bureau of Labor and Industries • 800 NE Oregon Street, #1045 • Portland, OR 97232-2180
Telephone (971) 673-0852 • FAX (971) 673-0769 • pwremail@boli.state.or.us



CONTRACT FEE SECTION
PREVAILING WAGE RATE UNIT
BUREAU OF LABOR AND INDUSTRIES
800 N.E. OREGON ST., #1045
PORTLAND, OR 97232-2180
PHONE: (971) 673-0852
FAX: (971) 673-0769

For Office Use Only: Project DB #: _____

PUBLIC WORKS FEE ADJUSTMENT FORM

THIS FORM TO BE USED FOR RECONCILIATION OF FEES UPON COMPLETION OF
PUBLIC WORKS PROJECTS

(As required by ORS 279C.825 and OAR 839-025-0210)

PUBLIC AGENCIES: Complete and mail this form to BOLI at the above address after completion of the public work project and not less than 30 days after the final progress payment is made to the contractor. Public agencies are required to determine the final contract price, including all change orders or other adjustments to the original contract price, and to calculate the adjusted prevailing wage rate fee based on the revised contract price. Documentation must be included to support the final contract price. Documentation of the final contract price may consist of change orders or other contract documents substantiating the amount of the contract. The prevailing wage rate fee of one-tenth of one percent (.001) shall be applied to the final contract price, with credit taken for fees already submitted. The public agency must submit any additional fee payable to BOLI, or submit any request for refund, with this adjustment form. **THE MINIMUM FEE IS \$250.00; THE MAXIMUM FEE IS \$7,500.00. NO ADDITIONAL FEE IS REQUIRED TO BE PAID, AND REFUNDS WILL NOT BE MADE, IF THE BALANCE DUE OR THE REFUND DUE IS LESS THAN \$100.00.**

PUBLIC AGENCY: _____ AGENCY #: _____

AGENCY CONTACT PERSON: _____ PHONE : () _____

MAILING ADDRESS: _____

PROJECT NAME: _____

CONTRACT NAME (if part of larger project): _____

PROJECT NUMBER: _____ PROJECT LOCATION: _____

CONTRACTOR/BUSINESS NAME (DBA): _____

CONTRACTOR CCB#: _____ DATE AWARDED: _____

FINAL CONTRACT/PROJECT AMOUNT: _____ FINAL FEE DUE: _____
(Include all change orders and adjustments to the contract price) (Final Contract amount X .001)

ORIGINAL CONTRACT AMOUNT: _____ INITIAL FEE PAID: _____
(Original Contract amount X .001)

TOTAL ADJUSTMENT: _____ BALANCE DUE*: _____

or

REFUND DUE*: _____

*Final contract fee less initial fee paid

Sample Calculation:			
Final Contract Amount:	\$ 400,000.00	Final Fee Due:	\$ 400.00
Original Contract Amount:	- 300,000.00	Initial Fee Paid:	- 300.00
Total Adjustment:	\$ 100,000.00	Additional Amount Due:	\$ 100.00

(Please duplicate this form for future use)



BUREAU OF LABOR AND INDUSTRIES, PREVAILING WAGE RATE UNIT

INSTRUCTIONS FOR COMPLETING THE PREVAILING WAGE RATE PAYROLL/CERTIFIED STATEMENT FORM (WH-38)

The Payroll/Certified Statement form (WH-38) may be used by contractors for reporting their payroll as required by ORS 279C.845 on public works projects subject to the Prevailing Wage Rate (PWR) Law. Although this form has not been officially approved by the U.S. Department of Labor (US DOL), it is designed to meet the requirements of the federal Davis-Bacon Act. For projects associated with the U.S. Department of Housing and Urban Development (HUD), contact the public agency (owner) associated with the project for assistance with payroll reporting.

Contractors are not required to use the WH-38 form in reporting their payroll; however, the contractor must provide all of the information contained in the form, including the certified statement on page two. The certified statement must be signed by the contractor, certifying the accuracy of the information reported on the payroll, including representations pertaining to the provision of fringe benefits to employees by third parties, and must be submitted with each weekly payroll report. Detailed instructions concerning the preparation of the form follow:

Complete the top third of the form. Be sure to enter the date the contract was first advertised for bid. If you are not sure of this date, contact the public agency (owner) associated with the project. The "Payroll No." is a US DOL requirement and represents the number of weeks the contractor performed work on the project.

Column 1 – NAME AND ADDRESS: The employee's full name must be shown on each payroll submitted. The employee's address must also be shown on the first payroll submitted. The address need not be shown on subsequent payrolls submitted unless the address changes. The US DOL requires an employee identification number for each individual employee, on each payroll submitted. This number may be, but does not have to be, the last four digits of the employee's social security number.

Column 2 – CLASSIFICATION: For assistance in determining the correct classification, use the Bureau of Labor and Industries' publication "Definitions of Covered Occupations for Public Works Contracts in Oregon." On the WH-38, list the classification that is most descriptive of the work actually performed by the employee. Give the group number for those classifications that include such information. Indicate which workers are apprentices, if any, and give their current percentage, classification, and group number when applicable. If an employee works in more than one classification, use the highest rate for all hours worked, or use separate line entries to show hours worked and hourly rates for each classification.

Column 3 – DAY AND DATE: Enter the day of the week (M, T, W, Th, F, S, and Sn) in the top row of boxes, and the corresponding date below.

HOURS WORKED EACH DAY: Enter the total number of straight time hours worked in the row marked "ST." Generally, hours worked over 8 in a day or work performed on Saturdays, Sundays, and legal holidays should be entered as overtime ("OT") hours worked. Contractors who have adopted and followed a written work schedule of four consecutive ten-hour days (Monday through Thursday or Tuesday through Friday) may enter hours worked over 10 in a day as overtime hours. For more information on overtime requirements, see the Contractor Responsibilities section of the Bureau of Labor and Industries' publication "Prevailing Wage Rate Laws" handbook.

Column 4 – TOTAL HOURS: Enter separately the total number of straight time and overtime hours worked by the employee (in each classification, if applicable) on the PWR project during the week. The total number of straight time hours worked should be entered in the lower box ("ST"); the total number of overtime hours worked should be entered in the top box ("OT").

Column 5 – HOURLY BASE RATE: Enter the hourly base rate (plus zone pay, if any) and the hourly overtime rate (plus zone pay, if any) paid to the employee in the appropriate straight time and overtime boxes. (Payment of not less than one and one half times the base rate of pay, including zone pay but not

including fringe benefits, is required to be paid for overtime hours pursuant to ORS 279C.540). Generally, use the appropriate prevailing wage rates in effect at the time the contract was first advertised for bid by the public agency. If this date is not known, or if the project was not advertised for bid, contact the public agency (owner) associated with the project for assistance with applicable rates.

Column 6 – HOURLY FRINGE BENEFIT AMOUNT PAID AS WAGES TO THE EMPLOYEE: Enter hourly fringe benefit amounts paid directly to the employee as wages. (For overtime hours worked, it is not necessary to pay time and one half for the fringe benefit portion of the prevailing wage rate.)

Column 7 – GROSS AMOUNT EARNED: Enter the gross amount earned for work on the PWR project during the week. If part of the employee's wages for the pay period were earned on projects other than the project described on the WH-38, or if the employee is paid less often than on a weekly basis, enter in column 7 first the gross amount earned on the PWR project for the week, then the total gross amount earned for the pay period. For example: \$567.84 / \$1,267.27.

Column 8 – ITEMIZED DEDUCTIONS, FICA, FED, STATE, ETC.: Enter deductions withheld from wages for the pay period. All deductions must be in accordance with the provisions of ORS 652.610 (and as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. Stat. 967, 76 Stat. 357; 40 U.S.C 276c) on projects subject to Davis-Bacon Act). For projects subject to the Davis-Bacon Act, itemize the deductions.

Column 9 – NET WAGES PAID: Enter the total amount of net wages actually paid to the employee for the pay period. This figure can be calculated by subtracting the total deductions reported in Column 8 from the gross amount of wages for the pay period reported in the bottom portion of Column 7.

Column 10 – HOURLY FRINGE BENEFITS PAID TO BENEFITS PARTY, PLAN, FUND OR PROGRAM: Enter the hourly amount of fringe benefits paid to each individually approved party, plan, fund, or program, for each employee. List these amounts separately on the lines provided. Any contractor who is making payments to approved parties, plans, funds or programs in amounts less than the required hourly fringe benefit is obligated to pay the difference directly to the employee as wages in lieu of fringe benefits, and to show that amount in Column 6 of this form. For information on how to calculate hourly fringe benefit credits, see Appendix A in the Bureau of Labor and Industries' publication "Prevailing Wage Rate Laws" handbook.

Column 11 – NAME OF BENEFIT PARTY, PLAN, FUND OR PROGRAM: Enter the name of the party, plan, fund, or program that corresponds to the amount paid as an hourly fringe benefit in Column 10.

CALCULATION CHECK

In order to determine whether the wages and fringe benefits paid are sufficient to meet prevailing wage rate requirements, the following check may be performed:

1. For each classification listed in column 2, compute the sum of:
 - a) the hourly base rate of pay shown in Column 5,
 - b) the hourly fringe benefit amount paid as wages to employee shown in Column 6, and
 - c) the hourly fringe benefits paid to benefit party, plan, fund or program shown in Column 10.
2. This sum must equal or exceed the total of the hourly base rate (including zone pay) and the hourly fringe benefit rate for that classification as listed in the appropriate issue of the Bureau of Labor and Industries publications Prevailing Wage Rates for Public Works Contracts in Oregon.

IF YOU HAVE QUESTIONS REGARDING COMPLETION OF THIS FORM, CONTACT THE PREVAILING WAGE RATE UNIT OF THE BUREAU OF LABOR AND INDUSTRIES AT (971) 673-0838.

NOTE: PAYROLL/CERTIFIED STATEMENTS ARE ONLY REQUIRED TO BE SUBMITTED TO THE PUBLIC AGENCY ASSOCIATED WITH THE PROJECT.

**CERTIFIED PAYROLL AND OTHER FORMS ARE AVAILABLE ON OUR WEBSITE:
WWW.OREGON.GOV/BOLI**

PRIME CONTRACTOR

SUBCONTRACTOR

PAYROLL NO. _____

Business Name (DBA): _____		Phone: () _____		CCB Registration Number: _____	
Project Name: _____		Project Number: _____		Type of Work: _____	
Street Address: _____			Project Location: _____		
Mailing Address: _____			Project County: _____		

Date Pay Period Began: _____ Date Pay Period Ended: _____

THIS SECTION FOR PRIME CONTRACTORS ONLY	THIS SECTION FOR SUBCONTRACTORS ONLY
Public Contracting Agency Name: _____ Phone: () _____ Date Contract Specifications First Advertised for Bid: _____ Contract Amount: _____	Subcontract Amount: _____ Prime Contractor Business Name (DBA): _____ Prime Contractor Phone: () _____ Prime Contractor's CCB Registration Number: _____ Date You Began Work on the Project: _____

(1)	(2)	(3) DAY AND DATE	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)							
NAME, ADDRESS AND EMPLOYEE'S IDENTIFICATION NUMBER	CLASSIFICATION (INCLUDE GROUP # AND APPRENTICESHIP STEP IF APPLICABLE)	HOURS WORKED EACH DAY							TOTAL HOURS	HOURLY BASE RATE	HOURLY FRINGE BENEFIT AMOUNTS PAID AS WAGES TO EMPLOYEE	GROSS AMOUNT EARNED (see directions)	ITEMIZED DEDUCTIONS FICA, FED, STATE, ETC.	NET WAGES PAID	HOURLY FRINGE BENEFITS PAID TO BENEFIT PARTY, PLAN, FUND, OR PROGRAM	NAME OF BENEFIT PARTY, PLAN, FUND, OR PROGRAM	
		OT															
		ST															
		OT															
		ST															
		OT															
		ST															
		OT															
		ST															

*Although this form has not been officially approved by the U.S. Department of Labor, it is designed to meet the requirements of both the state PWR law and the federal Davis-Bacon Act.

CERTIFIED STATEMENT

Date: _____

I, _____ (NAME OF SIGNATORY PARTY) _____ (TITLE)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by:

_____ (CONTRACTOR, SUBCONTRACTOR OR SURETY)
on the _____; that during the payroll period
_____ (BUILDING OR WORK)

commencing on the _____ day of _____, _____, and ending the _____ day
(MONTH) (YEAR)

of _____, _____, all persons employed on said project have been paid the
(MONTH) (YEAR)

full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____

(CONTRACTOR, SUBCONTRACTOR OR SURETY)
from the full weekly wages earned by any person, and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as specified in ORS 652.610, and as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for workers contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each worker conform with work performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a state, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

I HAVE READ THIS CERTIFIED STATEMENT, KNOW THE CONTENTS THEREOF AND IT IS TRUE TO MY KNOWLEDGE:

_____ (NAME AND TITLE)

_____ (SIGNATURE AND DATE)

In addition to completing sections (1) - (3), if your project is subject to the federal Davis-Bacon Act requirements, complete the following section as well:

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS OR PROGRAMS

- In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in Section 4(c) below.

(c) EXCEPTIONS:

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

**FILE THIS FORM WITH THE PUBLIC AGENCY ASSOCIATED WITH THE PROJECT
NOTE TO CONTRACTORS: YOU MUST ATTACH COPIES OF THIS FORM TO EACH OF YOUR PAYROLL SUBMISSIONS ON THIS PROJECT.
INSTRUCTIONS AND ADDITIONAL FORMS ARE AVAILABLE ON OUR WEBSITE: WWW.OREGON.GOV/BOLI.**

PREVAILING WAGE RATES

for

Public Works Contracts in Oregon



OREGON BUREAU OF LABOR AND INDUSTRIES

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

Effective: January 1, 2015



CITY OF
**West
Linn**

**TECHNICAL SPECIAL
PROVISIONS**

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106


Solicitation Number: PW-14-12

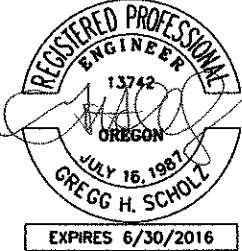

Appendix B

**SEE ATTACHED
TECHNICAL SPECIAL PROVISIONS**


CITY OF WEST LINN, OREGON
 PROJECT NUMBER: PW-14-12
 EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS

TECHNICAL SPECIAL PROVISIONS

<p>Seal w/signature</p> 	<p>I certify the Technical Special Provision Section(s) listed below are applicable to the design for the subject project for site piping and fencing, a precast concrete buried utility vault, an electromagnetic flow meter, and an end suction centrifugal pump and associated piping and valving. Modified Technical Special Provisions were prepared by me or under my supervision.</p> <p>Technical Special Provisions Sections 01100, 01200, 01300, 01650, 01655, 02200, 02222, 02485, 02620, 02800, 03400, 03600, 09800, 11000, 11100, 11230, 15000, 15100, 15101, 15102, 15105, 15107, 15111, 15115, 15221, 15400, 16150</p>
<p>Date Signed: <u>2/4/2015</u></p>	

<p>Seal w/signature</p>  <p>Gregg H. Scholz P.E. Feb 3 2015 11:31 AM </p>	<p>I certify the Technical Special Provision Section(s) listed below are applicable to the design for the subject project for electrical improvements to an existing pump station and a new electromagnetic flow meter vault. Modified Technical Special Provisions were prepared by me or under my supervision.</p> <p>Technical Special Provisions Sections 16010, 16100</p>
<p>Date Signed: <u>Feb. 3, 2015</u></p>	

CITY OF WEST LINN, OREGON
PROJECT NUMBER: PW-14-12
EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS

 <p>RENEWAL DATE: 6/30/16</p>	<p>I certify the Technical Special Provision Section(s) listed below are applicable to the design for the subject project for instrumentation/control and telemetry system improvements to an existing pump station and a new electromagnetic flow meter vault. Modified Technical Special Provisions were prepared by me or under my supervision.</p> <p>Technical Special Provisions Sections 17000</p>
<p>Date Signed: <u>February 3, 2015</u></p>	

APPENDIX B – TECHNICAL SPECIAL PROVISIONS

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SUPPLEMENTARY INFORMATION

- 1. EMERGENCY INTERTIE WATER PUMP STATION RECORD DRAWINGS,
MSA, April 2002*

SECTION 01100

SPECIAL PROVISIONS

PART 1 GENERAL

These Special Provisions supplement the City of West Linn Public Works Standards. The City of West Linn Public Works Standards shall apply except as modified herein. These Special Provisions and additional technical specifications may contain occasional requirements not pertinent to the project. However, these specifications shall apply in all particulars insofar as they are applicable to this project.

1.1 Definitions and Applicable Standard Specifications and Plans

Wherever used in these Special Provisions or other Technical Special Provisions the following terms have the meanings indicated which are applicable to both the singular and plural thereof.

OWNER:

Refers to City of West Linn, a municipal corporation of the State of Oregon, with whom CONTRACTOR has entered into the Contract and for whom the work is to be performed. OWNER is also hereinafter referred to as CITY.

CITY:

Refers to City of West Linn, a municipal corporation of the State of Oregon, with whom CONTRACTOR has entered into the Contract and for whom the work is to be performed. CITY is also hereinafter referred to as OWNER.

CONTRACTOR:

Refers to person, firm or corporation with whom the OWNER has entered into the construction and installation Contract.

ENGINEER:

Refers to Murray, Smith & Associates, Inc. 121 SW Salmon, Suite 900, Portland, Oregon 97204, (503) 225-9010, by whom the Project has been designed.

City of City of West Linn Public Work Standards shall apply except as may be modified by these Special Provisions and Technical Special Provisions. In the case of discrepancy, unless noted otherwise herein, the more restrictive provisions shall apply.

1.2 Scope of Work

The work to be performed under these specifications and drawings consists of :
The project includes the installation of one end suction centrifugal pump, piping, valves, and electrical and control system upgrades within the existing Emergency Intertie Water Pump Station. Exterior site improvements include yard fencing, piping and the installation of a buried flow meter vault.

The above general outline of principal features of the work does not in any way limit the responsibility of the CONTRACTOR(s) to perform all work and furnish all equipment, labor and materials required by the specifications and drawings. The drawings and specifications shall be considered and used together. Anything appearing as a requirement of either shall be accepted as applicable to both even though not so stated therein or shown.

No attempt has been made in these specifications or drawings to segregate work covered by any trade or subcontract under one specification. Such segregation and establishment of subcontract limits will be solely a matter of specific agreement between the CONTRACTOR and its subcontractors and shall not be based upon any inclusion, segregation or arrangement in or of these specifications.

1.3 Coordination of Drawings and Specifications

The drawings and specifications are intended to describe and provide for a complete work. Any requirement in one is as binding as if stated in all. The CONTRACTOR shall provide any work or materials clearly implied in the Contract Documents even if the Contract Documents do not mention it specifically. If there is a conflict within the Contract Documents, it will be resolved by the following order of precedence:

- A. Permits for outside agencies required by law
- B. OWNER-CONTRACTOR Agreement
- C. Addenda to Contract Documents
- D. CONTRACTOR's Proposal
- E. Special Provisions
- F. Contract Drawings
- G. Technical Specifications
- H. Supplementary General Conditions
- I. General Conditions of the Contract
- J. Standard Specifications - Emergency Intertie Water Pump Station Improvements - Volume 1
- K. Standard Plans - Emergency Intertie Water Pump Station Improvements – Volume 2

Dimensions shown on the drawings or that can be computed shall take precedence over scaled dimensions. Notes on drawings are part of the drawings and govern in the order described above. Notes on drawings shall take precedence over drawing details.

The intent of the drawings and specifications is to prescribe the details for the construction and completion of the work which the CONTRACTOR undertakes to perform according to the terms of the Contract. Where the drawings or specifications describe portions of the work in general terms, but details are incomplete or silent, it is understood that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Unless otherwise specified, the CONTRACTOR shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in executing the Contract in a manner satisfactory to the ENGINEER.

The contract drawings are designated by general title, sheet number and sheet title. When reference is made to the drawings, the "Sheet Number" of the drawing will be used. Each drawing bears the ENGINEER's File No. 14-1601 and the general title:

CITY OF WEST LINN, OREGON
EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS

The specific titles of each sheet are contained on Sheet G-1.

1.4 Code Requirements

All work shall be done in strict compliance with the requirements of:

- A. International Building Code
- B. Uniform Mechanical Code
- C. Uniform Plumbing Code
- D. National Electric Code
- E. National Electric Safety Code
- F. Oregon State Bureau of Labor and Industries
- G. City of West Linn
- H. Clackamas County

In case of disagreement between codes or these specifications, the more restrictive shall prevail.

1.5 Time of Completion/Liquidated Damages

The CONTRACTOR shall complete all work shown and specified within the time limits stated in the Agreement (See Section 01300, Submittals, for project schedule submittal requirements). The written Notice to Proceed will be sent to the

CONTRACTOR after the CONTRACTOR submits the signed Contract, Bonds and insurance certificates to the OWNER and those documents have been approved as to form and executed by the OWNER. The CONTRACTOR's attention is directed to the Agreement and the General Terms and Conditions in respect to liquidated damages.

1.6 Coordination With Other Contractors and With OWNER

Certain work within this contract may require connection to and coordination with the work of other contractors and OWNER. The CONTRACTOR under these specifications shall cooperate fully with all other contractors and OWNER and carefully fit its own work to such other work as may be directed by the ENGINEER. The CONTRACTOR shall not commit or permit any act to be committed which will interfere with the performance of work by any other contractor or the OWNER.

1.7 Access to Work

Access to the work shall be provided as may be required by the OWNER or its representatives, and all authorized representatives of the state and federal governments and any other agencies having jurisdiction over any phase of the work, for inspection of the progress of the work, the methods of construction or any other required purposes.

1.8 Permits and Licenses

Unless provided for otherwise in these contract documents, all permits, licenses and fees shall be obtained by the CONTRACTOR and all costs shall be borne by the CONTRACTOR. CONTRACTOR shall pay all plan check fees and other fees necessary to obtain permits and shall accommodate special inspections required thereof. CONTRACTOR shall be responsible for compliance with all permit provisions and shall accommodate all special inspections required thereof, all at no additional expense to the OWNER beyond prices as bid.

1.9 Site Investigation and Physical Data

The CONTRACTOR acknowledges that it is satisfied as to the nature and location of the work and the general and local conditions, including but not limited to those bearing upon transportation, disposal, handling and storage of materials, availability of water, roads, groundwater, access to the sites, coordination with other contractors, and conflicts with pipelines, structures and other contractors. Information and data furnished or referred to herein is furnished for information only. Any failure by the CONTRACTOR to become acquainted with the available information and existing conditions will not be a basis for relief from successfully performing the work and will not constitute justification for additional compensation.

The CONTRACTOR shall verify the locations and elevations of existing pipelines, structures, grades and utilities, prior to construction. The OWNER assumes no responsibility for any conclusions or interpretations made by the CONTRACTOR on the basis of the information made available.

1.10 Temporary Utilities for Construction Purposes

The CONTRACTOR shall make all arrangements necessary to provide all temporary utilities for construction purposes and shall pay all costs associated those temporary utilities. Water for construction purposes will be furnished by the OWNER at no cost. The CONTRACTOR shall furnish all valves, hoses, connections and other devices as necessary to obtain sufficient water for construction and for filling and testing of water lines as required. Fire hydrant use is allowed only by permission of the utility owner. Backflow protection is required on all connections to potable water systems.

1.11 Field Service by Manufacturer's Representative

The CONTRACTOR shall furnish the services of a manufacturer's or material supplier's representative for all major equipment and materials furnished by the CONTRACTOR or OWNER under this contract, to check, place in operation and test the installation, and train operating personnel. The manufacturer's representative shall be qualified and authorized to perform repairs and maintenance on the equipment. The above gives a general scope of the services desired from the manufacturer's representative. It will be the responsibility of the CONTRACTOR and the equipment manufacturer to determine detailed requirements. Costs for services of the manufacturer's representative shall be included in the proposal of the CONTRACTOR. The operator training mentioned above shall include sufficient time during the CONTRACTOR's operation and testing period to fully explain to the operating personnel the features of the equipment and maintenance thereof.

1.12 Construction Within Public Rights-of-Way

When the work contemplated is wholly or partly within the right-of-way of a public agency such as a city, county or state, the OWNER will obtain from these agencies any right-of-way and street opening permits and all other necessary permit(s) required for the work. The CONTRACTOR shall abide by all regulations and conditions stipulated in the permit(s). Such conditions and requirements are hereby made a part of these specifications, as fully and completely as though the same were fully set forth herein. The CONTRACTOR shall examine the permit(s) granted to the OWNER by any city, county, state and federal agencies. Failure to do so will not relieve the CONTRACTOR from compliance with the requirements stated therein.

The CONTRACTOR shall obtain all construction permits and pay all fees or charges and furnish any bonds and insurance coverages as necessary to insure that all

requirements of the city, county, state or federal agencies will be observed and the roadway and ditches are restored to their original condition or one equally satisfactory. A copy of all permits shall be kept on the work site for use of the ENGINEER.

1.13 Construction Within Private Easements

When portions of the work contemplated are within easements held by the OWNER on private property, the CONTRACTOR shall ascertain for itself to what extent the width, status and special conditions attached to easements may have on its operations and all costs resulting therefrom shall be included and absorbed in the unit prices of the CONTRACTOR's bid. CONTRACTOR shall coordinate with private property owners and businesses if required. Landscaping, surface restoration and fence restoration shall be completed within 24 hours following piping and conduit installation and other construction work. Temporary fencing shall be provided continuously until such private fencing is properly restored.

The CONTRACTOR's attention is directed to Paragraph 6.20 of the General Conditions regarding safety and the protection of property. Certain portions of this project require working in close proximity to existing structures and property within private easements. It is the CONTRACTOR'S responsibility to conduct its operations and limit the size of equipment used in such a manner so as to prevent damage to existing property from excessive vibration or from other direct or indirect CONTRACTOR operations. The cost associated with repairing or replacing property that is damaged by the CONTRACTOR's operations shall be the responsibility of the CONTRACTOR, in accordance with the General Conditions.

1.14 Railroad Crossings

Whenever a utility passes under a railroad or is on a railroad right-of-way, the work to be done shall be subject to the approval of proper officials of the railroad involved. Drawings and specifications will be filed by the OWNER with the railroad concerned prior to the time of bidding, but it is the responsibility of the CONTRACTOR to determine the requirements of the railroad with respect to maintaining traffic, amounts of insurance, and allowable construction procedures. All costs due to the existence of railroad track and other related facilities and the requirements of the railroads shall be covered by the price bid in the CONTRACTOR's proposal

1.15 Private Roads and Driveways

Bridges at entrances to business properties where vehicular traffic is necessary shall be provided and maintained. Bridges shall be adequate in width and strength for the service required. No private road or driveway may be closed without approval of the ENGINEER unless written authority has been given by the owner whose property has

been affected. Driveways shall be left open and ready for use at the end of the work shift. All expenses involved in providing for construction, maintenance, and use of private roads or driveways, shall be borne by the CONTRACTOR and the amount thereof absorbed in the unit prices of the CONTRACTOR's bid.

1.16 Traffic Control and Protection

The CONTRACTOR shall maintain traffic control and protection in the work areas twenty-four (24) hours per day. Traffic control shall conform to the standards set forth in the "Oregon Manual on Uniform Traffic Control Devices" issued by the Oregon Department of Transportation.

The CONTRACTOR shall conduct its operations so as to keep one lane of traffic open for public and private access at all times on City, County and Public streets, roads and highways. If required by the State, the CONTRACTOR shall conduct its operations so as to keep both directions of traffic open on State Highways. Permits obtained for the project may have more stringent requirements than noted in this section.

Prior to beginning construction, the CONTRACTOR shall submit a detailed street closure and traffic control plan to the ENGINEER for approval. As construction proceeds, the CONTRACTOR shall notify the ENGINEER as to the status of street closures and detours.

On streets where traffic is heavy, the ENGINEER may require the construction of two-way bridges of adequate design. These bridges shall be provided with guard rails and shall be well lighted at all times. Detours as required by the ENGINEER shall be surfaced with gravel or crushed rock and maintained in good condition. Detours for pedestrians shall not exceed one block in length, and foot bridges over the trenches shall be provided with adequate handrails.

All work shall be carried on with due regard for safety to the public. Open trenches shall be provided with barricades of a type that can be seen at a reasonable distance, and at night they shall be distinctly indicated by adequately placed lights.

1.17 Materials and Compaction Testing

The CONTRACTOR shall provide the services of a licensed, independent agency to perform materials and compaction testing for this project. The agency must be approved by the ENGINEER. Materials and compaction tests will be required to show that specified densities of compacted backfill and asphaltic concrete surfacing are being achieved by the CONTRACTOR's compaction methods. The CONTRACTOR shall provide the ENGINEER with copies of recent Proctor tests for

the backfill and paving material in addition to copies of compaction tests performed in the field.

After the ENGINEER is satisfied that the CONTRACTOR's method of compaction consistently meets specified compaction requirements, the testing frequency may be reduced. The ENGINEER may direct testing at a higher frequency upon failure to obtain specified densities or if the CONTRACTOR changes compaction equipment or methods of compaction. All test locations shall be determined by the ENGINEER.

1.18 Dechlorination and Disposal of Chlorinated Water

Any discharge of chlorinated water shall either be through an approved connection to a public sanitary sewer system or shall include dechlorination to limits acceptable by the Oregon State Department of Environmental Quality (DEQ) for discharge into the existing storm drainage system. No chlorinated water shall be discharged into the storm drainage system prior to approved dechlorination treatment.

1.19 Limits of the Work and Storage of Spoils

The limits of the site which may be used for construction, storage, materials handling, parking of vehicles and other operations related to the project include the project site as shown on the drawings and adjacent public rights-of-way subject to permission of the public owner of that right-of-way. The limits of work also include rights of access obtained by the CONTRACTOR, subject to all public laws and regulations and rights of access by utility companies and other holders of easement rights.

1.20 Existing Water System Shutdown

If the project involves the need to shut down an existing water system, the CONTRACTOR shall coordinate the work to insure a minimum of shutdown time. The CONTRACTOR shall submit a written shutdown schedule to the ENGINEER for approval. The CONTRACTOR shall provide 72-hour notice preceding each shutdown. See Item 1.49 for more information regarding system shutdowns.

1.21 Field Changes, Alignment and Grade

Changes of alignment and grade shall be made during the course of work in order to avoid interference with unforeseen obstructions. The CONTRACTOR shall locate existing utilities to be crossed, by potholing ahead of the pipe installation, of sufficient distance to avoid conflicts through pipe joint deflection if possible. All costs for minor field changes of alignment and grade shall be borne by the CONTRACTOR. The ENGINEER will endeavor to make prompt decisions on such matters. CONTRACTOR shall anticipate a minimum of 72 hours for any decision requiring significant piping change.

1.22 Testing and Operation of Facilities

It is the intent of the OWNER to have a complete and operable facility. All of the work under this contract will be fully tested and inspected in accordance with the specifications. Upon completion of the work, the CONTRACTOR shall operate the completed facilities as required to test the equipment under the direction of the ENGINEER. During this period of operation by the CONTRACTOR, the new facilities will be tested thoroughly to determine their acceptance.

1.23 Protection of Existing Structures and Work

The CONTRACTOR must take all precautions and measures necessary to protect all existing structures and work. Any damage to existing structures and work shall be repaired by removing the damaged structure or work, replacing the work and restoring to original condition satisfactory to the ENGINEER.

1.24 Salvage and Debris

Unless otherwise indicated on the drawings or in the specifications, all castings, pipe, equipment, demolition debris, spoil or any other discarded material or equipment shall become the property of the CONTRACTOR and shall be disposed of in a manner compliant with applicable Federal State and local laws and regulations governing disposal of such waste products. No burning of debris or any other discarded material will be permitted.

1.25 Safety Standards and Accident Prevention

The CONTRACTOR shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. The required and/or implied duty of the ENGINEER to conduct construction review of the CONTRACTOR's performance does not, and is not intended to, include review of the adequacy of the CONTRACTOR's safety measures in, on, or near the construction site.

The CONTRACTOR shall comply with the safety standards provisions of applicable laws and building and construction codes. The CONTRACTOR shall exercise every precaution at all times for the prevention of accidents and protection of persons, including employees, and property. During the execution of the work the CONTRACTOR shall provide and maintain all guards, railing, lights, warnings, and other protective devices which are required by law or which are reasonably necessary for the protection of persons and property from injury or damage.

1.26 Public Safety and Convenience

General Rule: The CONTRACTOR shall ensure the safety of the public during its performance of the Work and shall minimize any public inconvenience in addition to any other requirement imposed by law. These duties include, but are not limited to, the matters listed below.

Access: The CONTRACTOR shall not unreasonably restrict access to public facilities, commercial property, fire hydrants, residential property, and other areas where the public can be expected to be present, such as sidewalks and streets without first obtaining approval of the OWNER. Driveways shall be closed only with the approval of the OWNER or after obtaining specific permission from the property owner or owners. In addition, the CONTRACTOR shall not obstruct or interfere with travel over any public street or sidewalk without approval of the OWNER.

Public Transit: The CONTRACTOR shall not interfere with the normal operation of any public transit vehicles unless otherwise authorized.

Work Site: The CONTRACTOR shall keep the Project site safe in compliance with applicable law. Safety includes, but is not limited to: 1) providing an approved type of secured and adequate barricades or fences that are easily visible from a reasonable distance around open excavations; 2) closing up or covering with steel plates all open excavations at the end of each Working Day in all street areas and in all other areas when it is reasonably required for public safety; 3) marking all open work and obstructions by lights at night; 4) installing and maintaining all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges, and facilities; 5) observing any and all safety instructions received from the OWNER; and 6) following all laws and regulations concerning worker and public safety. In the event that the law requires greater safety obligations than that imposed by the OWNER, the CONTRACTOR shall comply with the law.

Emergency: Emergency vehicles, including but not limited to police, fire, and disaster units shall be provided access to the work site at all times.

Cleanliness: The CONTRACTOR shall, on a continuing basis, keep the surfaces of all public and private roadways, sidewalks, and other pathways free of dirt, mud, cold plane grindings, and other matters that the CONTRACTOR may place upon the road. The cost of performing such work shall be included in the CONTRACTOR's Bid and no additional payment will be made for performing this task.

Parking: The CONTRACTOR shall make any necessary contacts with all applicable governmental bodies to arrange for the removal of parked automobiles, vehicles and other obstructions if they would interfere with the performance of the CONTRACTOR'S work.

Accidents: The CONTRACTOR'S Project Manager or superintendent shall be in charge of accident prevention. CONTRACTOR shall take all actions necessary to prevent damage, injury and loss to persons and property as a result of accidents.

Project Health and Safety Plan: CONTRACTOR shall develop, publish, and implement an overall Project Health and Safety Program for the Project. This Program shall conform to all applicable codes. Contractor shall submit the written Safety Program to the OWNER within thirty (30) days after the receipt of the written Notice to Proceed. The Plan shall be assembled to address project specific health and safety issues to both the public and on-site personnel. The plan shall include the following items when they apply:

- Employee orientation
- Safety inspections
- Instruction and training
- Accident reporting
- Signs and barricades
- Fire prevention and protection
- Welding, cutting and burning
- Painting and surface treatment
- Electricity
- Machinery and mechanized equipment
- Excavations
- Sanitation
- Chlorine safety
- Hazardous materials
- Hazardous communications program
- Job hazard analysis
- First aid/medical facilities
- Personal protective equipment
- Confined space entry plan
- Shoring plan
- Fall protection plan
- Emergency Action Plan
- Housekeeping
- Safety training requirements and certification
- Pedestrian access around work site during construction and after hours

If the project requires other health and safety issues to be addressed, they too shall be included in the Project Health and Safety Plan. The Program shall subsequently be distributed to and implemented by the CONTRACTOR's personnel as well as its Subcontractors and Suppliers. CONTRACTOR shall fully implement and comply with the Safety Program, and shall submit to the OWNER a letter signed by CONTRACTOR'S owner/president affirming such implementation and compliance within fifteen (15) days after on-site work has started. CONTRACTOR shall notify the OWNER when safety meeting will be held so that Owner's personnel may attend. A copy of the approved Health and Safety Plan must be maintained on-site at all times during the life of the Project.

The OWNER has no responsibility for Work site safety. Work site safety is the responsibility of the CONTRACTOR. The CONTRACTOR is required to have a competent person on site at all times during construction activities.

The CONTRACTOR shall provide signs on work zone fencing that provide information regarding access to businesses and stating that such businesses are open and in operation. The CONTRACTOR shall furnish and install the signs and provide sign attachments for the various business names.

1.27 Warranty Period

The CONTRACTOR shall warrant all furnished materials and equipment for a period of 18 months from date of final acceptance of the Work by the OWNER. This warranty shall mean prompt attention to the correction and/or complete replacement of the faulty material or equipment. The expiration of the 18-month warranty period shall not affect any other claims or remedy available to the OWNER. There may be other warranty provisions in these contract documents in addition to those noted above.

1.28 Utility Properties and Service

In areas where the CONTRACTOR's operations are adjacent to or near a utility and such operations may cause damage which might result in significant expense, loss and inconvenience, the operations shall be suspended until all arrangements necessary for the protection thereof have been made by the CONTRACTOR.

The CONTRACTOR shall notify all utility offices which may be affected by the construction operation at least 48 hours in advance. Before exposing any utility, the utility having jurisdiction shall grant permission and may oversee the operation. Should service of any utility be interrupted due to the CONTRACTOR's operation, the proper authority shall be notified immediately. It is of the utmost importance that the CONTRACTOR cooperates with the said authority in restoring the service as promptly as possible. Any costs shall be borne by the CONTRACTOR.

1.29 Sanitary Facilities

The CONTRACTOR shall provide and maintain sanitary facilities for its employees and its subcontractors' employees that will comply with the regulations of the local and State Departments of Health and as directed by the ENGINEER.

1.30 Street Cleanup

The CONTRACTOR shall clean daily all dirt, gravel, construction debris and other foreign material resulting from its operations from all streets and roads.

1.31 Vehicle Parking

The vehicles of the CONTRACTOR's and subcontractors' employees shall be parked in accordance with local parking ordinances.

1.32 Protection of Quality of Water

The work to be performed may involve connections to an existing potable water system. If such work is included in the project, the CONTRACTOR shall take such precautions as are necessary or as may be required to prevent the contamination of the water. Such contamination may include but shall not be limited to deleterious chemicals such as fuel, cleaning agents, paint, demolition and construction debris, sandblasting residue, etc. In the event contamination does occur, the CONTRACTOR shall, at its own expense, perform such work as may be necessary to repair any damage or to clean the affected areas of the water mains to a condition satisfactory to the ENGINEER.

1.33 Record Drawings

CONTRACTOR shall maintain at the site one set of specifications, full size drawings, shop drawings, equipment drawings and supplemental drawings which shall be corrected as the work progresses to show all changes made. Drawings shall be available for inspection by the ENGINEER. Upon completion of the contract and prior to final payment, specifications and drawings shall be turned over to the ENGINEER.

1.34 "Or Equal" Clause

In order to establish a basis of quality, certain processes, types of machinery and equipment or kinds of material may be specified on the drawings or herein by designating a manufacturer's name and referring to its brand or product designation. It is not the intent of these specifications to exclude other processes, equipment or materials of a type and quality equal to those designated. When a manufacturer's name, brand or item designation is given, it shall be understood that the words "or equal" follow such name or designation, whether in fact they do so or not. If the CONTRACTOR desires to furnish items of equipment by manufacturers other than those specified, he shall secure the approval of the ENGINEER prior to placing a purchase order.

No extras will be allowed the CONTRACTOR for any changes required to adopt the substitute equipment. Therefore, the CONTRACTOR's proposal for an alternate shall include all costs for any modifications to the drawings, such as structural and foundation changes, additional piping or changes in piping, electrical changes or any

other modifications which may be necessary or required for approval and adoption of the proposed alternate equipment. Approval of alternate equipment by the ENGINEER before or after bidding does not guarantee or imply that the alternate equipment will fit the design without modifications.

1.35 Surveys

Based upon the information provided by the Contract Documents, the CONTRACTOR shall develop and make all detail surveys necessary for layout and construction, including property boundaries for staking of project fencing, exact component location, working points, lines and elevations. Prior to construction, the field layout shall be approved by the OWNER's representative. The CONTRACTOR shall have the responsibility to carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from its negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

1.36 Work Hour Limitations

All work shall be conducted during the times listed in the City of West Linn's General Terms and Conditions.

1.37 Dust Prevention

All unpaved streets, roads, detours, haul roads or other areas where dust may be generated shall receive an approved dust-preventive treatment or be routinely watered to prevent dust. Applicable environmental regulations for dust prevention shall be strictly enforced.

1.38 Erosion and Sedimentation Control

Temporary construction site erosion control measures shall be designed and constructed in accordance with all applicable regulatory standards and Sheet C-1.

Erosion control measures shall be maintained throughout the project site until approved permanent cover such as a healthy stand of grass, other permanent vegetation, or other ground covering is established. When approved permanent ground cover is established, all temporary erosion control measures shall be removed from the construction site. Erosion control measures shall be installed as approved, per the erosion control drawing(s) in the above referenced document. Erosion control measures including stabilized construction entrances and sediment barriers must be established in conjunction with site clearing and grading.

During construction, and until permanent vegetation or other ground covering is established, the erosion control facilities shall be upgraded as needed for unexpected storm events or site conditions and with the purpose of retaining sediment and sediment-laden water on the construction site.

1.39 Interferences, Obstructions and Sewer Crossings

At certain places, power, light and telephone poles may interfere with excavation and the operation of the CONTRACTOR's equipment. Necessary arrangements shall be made with utility companies for moving or maintaining such poles. The utility company affected by any such interferences shall be notified thereof so that the necessary moving or proper care of poles and appurtenances may have appropriate attention.

All costs resulting from any other interferences and obstructions, or the replacement of such, whether or not herein specifically mentioned, shall be included and absorbed in the unit prices of the CONTRACTOR's bid.

1.40 Noise Limitations

The project areas are located within a residential zoned area. All applicable City, County ordinances and State and Federal regulations shall be complied with.

1.41 Storage and Protection of Equipment and Materials

A. Materials and equipment stored overnight shall be placed neatly on the job site. Unusable materials (i.e. rejected or damaged liner material, old concrete chunks, metal scraps, etc.) shall be expeditiously removed from the job site.

Provide appropriate barricades, signs, and traffic control devices in like-new condition where necessary to protect the public from any hazards associated with the storage of materials and equipment used for this project.

B. No equipment and/or materials shall be stored outside the immediate work area on public right-of-ways, in the following locations, or in the following manner:

1. In any maintained landscaped or lawn area.
2. In a manner that would totally eliminate an individual residents' street parking.
3. In front of any business.

The “immediate work area” is the area where work is taking place or will be taking place within one calendar day. The CONTRACTOR shall immediately move stored material or equipment which causes a nuisance or creates complaints.

1.42 Competent Person Designation

CONTRACTOR shall designate a qualified and experienced “competent person” at the site whose duties and responsibilities shall include enforcement of Oregon - OSHA regulations regarding excavations, the prevention of accidents, and the maintenance and supervision of construction site safety precautions and programs.

1.43 Emergency Maintenance Supervisor

The CONTRACTOR shall submit to the ENGINEER the names, addresses and telephone numbers of at least two employees responsible for performing emergency maintenance and repairs when the CONTRACTOR is not working. These employees shall be designated, in writing by the CONTRACTOR, to act as its representatives and shall have full authority to act on its behalf. At least one of the designated employees shall be available for a telephone call any time an emergency arises.

1.44 Prevailing Wage Rates for Public Works Contracts in Oregon

The CONTRACTOR shall abide by ORS 279C.800 through 279C.870 which relate to the prevailing wage rates for the building and construction trades in the State of Oregon. These prevailing wage rates are shown in the Bureau of Labor and Industries document which is included elsewhere in these contract documents.

1.45 Oregon Products

CONTRACTOR's attention is directed to the provisions of Oregon Law, ORS 279A.120 regarding the preference for products that have been manufactured or produced in Oregon. CONTRACTOR shall use Oregon-produced or manufactured materials with respect to common building materials such as cement, sand, crushed rock, gravel, plaster, etc., and Oregon-manufactured products in all cases where price, fitness, availability and quality are otherwise equal.

1.46 Use of Explosives

The use of explosives shall not be allowed on this project. Alternative methods of excavation shall be utilized.

1.47 Contaminated Material

A. General

It is possible that the CONTRACTOR may encounter contaminated material (soil and/or water) during excavation activities. This specification identifies requirements for handling and disposing contaminated media.

B. Definitions

1. "Contaminated material" is defined as soil, water, free product, Underground Storage Tanks (UST), buried abandoned utility lines containing residual or free product, solid waste, treated wood waste, chemical containers, or other solid, liquid, or gas substances with contamination levels above background levels.
2. "Hazardous substances" shall mean those substances or materials defined in the Oregon Revised Statutes (ORS) 465.200, as amended.
3. "Release" shall have the meaning as defined in ORS 465.200, as amended.
4. "Environmental laws" shall mean any applicable statute, law, ordinance, order, consent decree, judgment, permit, license, code, covenant, deed, common law, treaty, convention or other requirement pertaining to protection of the environment, health or safety, natural resources, conservation, wildlife, waste management or disposal, hazardous substances or pollution, including but not limited to regulation of releases to air, land, water, and groundwater.

C. Execution

1. Discovery of Contaminated Material

In the event that the CONTRACTOR, during the course of construction or during any other activities authorized under this contract, should encounter suspected contaminated material or any other materials suspected of posing a threat to human health and the environment, the CONTRACTOR shall notify the ENGINEER immediately and manage according to requirements identified below.

2. Discovery of Contaminated Soil

CONTRACTOR shall note evidence of contamination (odor, visual staining of soil, free liquid product seeping from soil, sheen on

groundwater etc.) and note location of evidence on a sketch of the excavation and provide to the ENGINEER.

CONTRACTOR shall report the discovery to the ENGINEER immediately. CONTRACTOR shall stop all excavation activities, and secure the site to prevent entry by the public. The excavation shall not be backfilled. Protect all open excavations with berms, plates and fencing. CONTRACTOR may continue with work in other non-contaminated areas.

CONTRACTOR shall assist ENGINEER in collecting sample(s) of suspected contaminated media for testing and characterization. CONTRACTOR shall allow 21 days, at no cost to OWNER, for testing, results and instructions as to how to proceed with contaminated materials.

The CONTRACTOR shall obtain a copy of an approved soil disposal/acceptance permit (Disposal/Treatment Facility requires transporter to have a copy of the permit.)

CONTRACTOR will transport and dispose of contaminated material at an approved disposal/treatment facility.

CONTRACTOR shall provide the ENGINEER with a copy of the contaminated soil disposal receipt.

3. Handling of Contaminated Soil

After approval from the ENGINEER, excavate the soil in a manner that prevents commingling of contaminated and non-contaminated soil. ENGINEER will make determination (based on soil saturation) if contaminated soil can be directly transported to a treatment or disposal facility, or if soil needs to be stockpiled to reduce water content. ENGINEER will determine when stockpiled soil can be transported off-site.

CONTRACTOR will be responsible for stockpiling contaminated soil in containers or on impervious surface to prevent the spread of contamination. Any water runoff from the contaminated soil stockpile area(s) must be contained by CONTRACTOR and handled as contaminated water.

Minimize movement of excavation equipment over or through contaminated soil to prevent movement of contaminated soil into areas

where no contaminated soil exists.

Stockpiles will be created on an approved site and shall be surrounded by a fence to limit access. The stockpiles must be covered and bermed during periods of rainfall to prevent run-on and run-off. The stockpiles shall be covered with a minimum 10 mil high density polyethylene (HDPE) plastic during periods of strong winds, nightfall, over the weekends, or during extended work stoppages. If dust is observed coming from the stockpiles, the stockpiles shall be either covered or the dust controlled with water.

Maintain excavation equipment in good working order. Prevent spillage of oil, fuel, or hazardous substances from equipment. In particular, promptly repair oil leaks from equipment and clean up any contaminated soil.

4. Transport of Contaminated Materials

CONTRACTOR shall comply with all applicable Federal, State, or local laws, codes, and ordinances that govern or regulate contaminated substance transportation. Contaminated soils placed in stockpiles shall be loaded into trucks in a manner that prevents the spilling or tracking of contaminated soil into areas of the site with uncontaminated soil. Loose material falling onto the exterior of the truck during loading shall be removed before the truck leaves the loading area. Any material collected in the loading area shall either be placed back into the truck or back into the stockpile. If loading areas are unpaved, the surface soil shall be sampled at the conclusion of the loading activities to confirm that contaminated soil is not present. If loading areas are paved, any loose soil shall be cleaned from the pavement at the conclusion of the loading activities.

Specific truck haul routes shall be established before beginning off-site contaminated media transport. On-site truck routes shall be established to minimize or prevent movement of trucks over contaminated soils. Off-site truck routes shall be established to reduce the risk of releases of contaminated soils and impact on local traffic. The CONTRACTOR shall be responsible for ensuring that loaded truck weights are within acceptable limits. All trucks shall be covered before they leave the loading area.

The CONTRACTOR shall ensure that all drivers of vehicles transporting contaminated substances have in their possession during transport all applicable Oregon State and local vehicle insurance

requirements, valid driver's license, and vehicle registration and license. The CONTRACTOR shall be responsible for informing all drivers of transport vehicle about:

- a. The nature of the material transported.
- b. Required routes to and from the off-site thermal treatment or disposal facility.
- c. Applicable County street regulations and requirements, and State of Oregon Department of Transportation codes, regulations and requirements.
- d. The County's requirement for proper handling and transportation of the substances.

The CONTRACTOR shall not allow contaminated substances to be spilled or tracked off-site at any time during the project. Trucks used for the transportation of contaminated substances off-site shall be water tight, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local statutes, rules, regulations and ordinances.

If contaminated media is discarded prior to removal of contaminated material, the price per cubic yard of soil materials and price per 100 gallons of contaminated water will be negotiated with OWNER.

1.48 Coordination with LO-Tigard Project

The Lake Oswego – Tigard Water Partnership is constructing an 18” waterline within Old River Road in front of West Linn’s Emergency Intertie Pump Station. Work associated with the installation of this waterline is scheduled to occur February 2015, but if it is delayed and occurs during project schedule associated with this Contract, the CONTRACTOR shall refer and adhere to Paragraph 1.6 of this Specification.

1.49 Work Schedule Limitations

The CONTRACTOR shall comply with the following general requirements during construction:

- A. During installation of the Flow Meter Vault, the CONTRACTOR shall limit the duration of the water system shutdown to one (1) working day. The Vault shall be plumbed, disinfected, and installed such that once the City’s existing pipe is cut, the tie-in connections are made in the most expeditious manner possible.

- B. As described in the Agreement, the CONTRACTOR has a six (6) month window to complete all work associated with this project. However, once the CONTRACTOR has received Notice to Proceed and mobilized equipment onsite, a three (3) month window will be allotted for work to be completed and Substantial Completion to be awarded. Prior to Mobilization and the onset of the three month construction timeframe, shop drawing and submittal approvals shall be conducted which will not interfere with the completion timing requirements.

1.50 Hydrostatic Testing and Disinfection

The CONTRACTOR shall comply with the following general requirements during construction:

- A. During installation of the Flow Meter Vault, the CONTRACTOR shall disinfect and hydrostatically test the new piping, connections and appurtenances as if the work were a tie-in, as described in Section 4.6 of AWWA Standard C651-(Latest Edition) prior to making the final connections. Visual leak inspection will be performed for all joints by the ENGINEER or OWNER. All visible leaks shall be corrected prior to backfilling the Vault and piping.
- B. During installation of the new pump and associated piping, the CONTRACTOR shall disinfect the new piping and appurtenances in one of the approved standard methods described in Section 4.4 of AWWA Standard C651-(Latest Edition) prior to making the final connections. Hydrostatic testing shall be performed as described in Section 5.2 of AWWA Standard C600-(Latest Edition) prior to making the final connections.

1.51 Project Information Signs – Not Applicable to this Project

The CONTRACTOR shall furnish and install project information signs in accordance with the following requirements:

- A. For a project located on a confined site such as a reservoir, pumping station, well house, treatment plant, or similar facility, one project information sign shall be required. For a project located on a public right of way such as a pipeline project, a project information sign shall be installed facing each direction of traffic at each location where traffic is entering the work area. A minimum of two signs will be required for pipeline projects.
- B. A submittal for the project information sign(s) shall be prepared for the ENGINEER'S approval prior to fabrication.

- C. The CONTRACTOR shall install the project information sign(s) at location(s) as directed by the ENGINEER.
- D. No construction work shall commence on the project site until the project information signs are installed.
- E. The CONTRACTOR shall maintain the signs through the duration of the project.

The project information sign(s) shall be constructed of 3/4-inch thick plywood with a finish grade of veneer on the sign face. The sign(s) shall be 48-inches high by 60-inches wide. The sign(s) shall be securely attached to two 4-inch square treated wood posts. The sign(s) shall be installed such that the top of the sign is approximately 10 feet above grade or as necessary to permit proper public viewing. The wood posts shall be buried at least 3 feet below grade. Provide adequate supports for the sign(s) as site conditions dictate. The sign(s) shall have black letters on a white background and they shall be the product of a commercial sign manufacturer or supplier. Logos shall be color. The letters shall be at least 4-inches in height.

The sign(s) will contain basic project information including: Project name, estimated project duration, project construction cost, project OWNER's name and OWNER's contact and phone number, ENGINEER's name, CONTRACTOR's name, OWNER's and ENGINEER's company logos, the CONTRACTOR's logo if the CONTRACTOR so desires, any funding agency logo(s) along with any required wording from those agencies. The logos shall be sized such that they are visible from a distance approved by the ENGINEER. The OWNER, ENGINEER and funding agencies will provide electronic images of their logos for the CONTRACTOR's use in developing the signs. In addition, the sign(s) at a minimum shall contain the following project information:

1.51 Special Inspections

Special inspections and testing as required by Chapter 17 of the IBC shall be conducted by OWNER retained and approved Special Inspectors and Testing Agencies as required and as indicated in the Contract Documents.

- A. Special Inspectors and Testing Agencies Responsibilities
 - 1. Verify that manufacturers maintain detailed fabrication and quality control procedures and review the completeness and adequacy of those procedures to perform the Work.
 - 2. Promptly notify OWNER, ENGINEER and CONTRACTOR of irregularities and deficiencies observed in the Work during performance of their services.

3. Submit certified written report of each test, inspection and similar quality control service to OWNER, ENGINEER, CONTRACTOR and jurisdictional authorities. Interpret test results and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
4. Submit final report of special inspections at Substantial Completion, including a list of unresolved deficiencies.
5. Re-test and re-inspect corrected work.

B. CONTRACTOR'S Responsibilities

1. Provide quality requirements to all subcontractors and enforce all requirements.
2. Notify OWNER, ENGINEER, Special Inspectors and Testing Agencies at least 48 hours in advance of time when Work that requires testing or special inspecting will be performed, unless otherwise indicated in the Contract Documents.
3. Pay for any CONTRACTOR requested testing and inspecting not required by the Contract Documents.
4. Pay for any re-testing or re-inspections by Special Inspectors and Testing Agencies for replacement work resulting from work that failed to comply with the Contract Documents. OWNER will deduct such costs from the Contract Price.
5. Submit copies of licenses, certifications, correspondence, records and similar documents used to establish compliance with standards and regulations that pertain to performance of the Work to the OWNER, ENGINEER and Special Inspectors.
6. Where Special Inspection requires preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - a. Provide test specimens representative of proposed products and construction in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

- b. Provide information on configurations of test assemblies, testing procedures and laboratory test records to adequately demonstrate capability of products to comply with performance requirements.
- 7. Cooperate with Agencies performing required tests, special inspections and similar quality control services. Notify Agencies in advance of operations to permit assignment of personnel. Provide the following:
 - a. Access to the Work.
 - b. Incidental labor, equipment and materials necessary to facilitate tests and special inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist Agencies in obtaining samples.
 - d. Provide facilities for storage and field curing of test samples.
 - e. Deliver samples to Testing Agencies.
- 8. Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and special inspecting.
- 9. Schedule times for tests, special inspections, obtaining samples and similar activities. Distribute schedule to OWNER, ENGINEER, Special Inspectors, Testing Agencies and each party involved in portions of the work where tests and special inspections are required.

END OF SECTION

SECTION 01200

MEASUREMENT AND PAYMENT

PART 1 GENERAL

Measurement and payment will be on a lump sum and unit price basis for all work in accordance with the prices set forth in the proposal for the individual work items. Lump sum payment under all items shall cover all particular elements of the project as above generally outlined, whether or not specifically or specially indentified, as specified herein and as shown on the plans, except for work included separately under other unit price bid items.

1. Mobilization, Bonds, Insurance and Demobilization: Payment for mobilization, bonds, insurance and demobilization will be on a lump sum basis. The amounts paid for mobilization in the contract progress payment will be based on the percent of the original contract amount that is earned from other contract items, as follows:
 - A. When 5% is earned, either 100% of the amount for mobilization or 5% of the original contract amount, whichever is the least
 - B. When all work is completed, amount of mobilization exceeding 5% of the original contract amount

This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the contract.

2. Furnish and install bollards: Payment for furnishing and installing bollards shall be made on a per each basis and shall include all labor, equipment and materials necessary to install the bollards as shown in the Drawings. This item shall include coordination with Owner for field locating bollards during construction.
3. Furnish and install flow meter vault and related items: Measurement and payment for all flow meter vault work required other than as provided for under separate unit prices, will be made on a single lump sum basis. For purposes of evaluating monthly partial payments, this lump sum work is broken down as follows. CONTRACTOR must provide cost breakdown of Instrumentation and Control pay item.
 - a. Shop drawings and approvals.
 - b. Clearing and grubbing including tree removal.
 - c. Erosion and sediment control installation and maintenance.

- d. Site preparation, excavation, import material, shoring, backfill, and grading.
- e. Precast concrete flow meter vault, complete, including access hatch and ladder.
- f. ASTM D3034 PVC drain piping from vault to connection and including connection.
- g. Meter vault mechanical component construction, complete, including but not limited to, locating and exposing existing water line connection points, ductile iron piping and fittings, isolation valves, and all other accessories as noted in the contract drawings and specifications.
- h. All electrical components as outlined on plans and in Division 16 of these Specifications.
- i. Instrumentation and process integration including, but not limited to, furnishing and installing electromagnetic flow meter, field devices within new vault and process integration as outlined on plans and in Division 17 of these Specifications. CONTRACTOR shall use the OWNER's System Integrator, S&B System Specialists, Inc. for all work shown on the Instrumentation and Control Plans and in Division 17.

Lump sum payment under this item shall cover all particular elements of the project as above generally outlined, whether or not specifically or specially identified, as specified herein and as shown on the plans, except for work included separately under other unit price bid items.

- 4. Furnish and install all items inside existing pump station as shown on the drawings: Measurement and payment for all pump station work required other than as provided for under separate unit prices, will be made on a single lump sum basis. For purposes of evaluating monthly partial payments, this lump sum work is broken down as follows. CONTRACTOR must provide cost breakdown of Instrumentation and Control pay item.
 - a. Shop drawings and approvals.
 - b. Pump station mechanical components, complete, including but not limited to, pump with motor, fabricated steel piping, isolation joints, ductile iron piping, all hydraulic and electronic control valves, ductile iron pipe fittings, and all other accessories as noted in the contract drawings and specifications.
 - c. Testing, disinfection, and start-up of pump station additions.
 - d. All electrical components as outlined on the plans and in Division 16.

- e. Instrumentation and process integration including, but not limited to, furnishing equipment and successful installation of the motor control center, all required tubing/piping and valves, and process integration as outlined on plans and in Division 17 of these Specifications. CONTRACTOR shall use the OWNER's System Integrator, S&B System Specialists, Inc. for all work shown on the Instrumentation and Control Plans and in Division 17.

Lump sum payment under this item shall cover all particular elements of the project as above generally outlined, whether or not specifically or specially identified, as specified herein and as shown on the plans, except for work included separately under other unit price bid items.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

The CONTRACTOR shall provide submittals including shop drawings, schedules, drawings, and such other information as may be necessary for the prosecution of the work in the shop and in the field as required by the contract documents or the ENGINEER's instruction. There may be other submittals required elsewhere in these Specifications that are not necessarily included or mentioned in this Section.

Within fourteen (14) days after award of the contract, the CONTRACTOR shall submit to the ENGINEER a proposed list of manufacturers, suppliers, and subcontractors and a schedule of specific target dates for the submission and return of shop drawings required by the contract documents. The list and schedule shall be updated and re-submitted when requested by the ENGINEER. All shop drawings for interrelated items shall be scheduled for submission at the same time. Not less than one (1) week shall be allocated to each submittal for processing by the ENGINEER. At least six (6) copies of all submittals shall be provided to the ENGINEER. Four (4) copies of all submittals will be kept by the ENGINEER. If the CONTRACTOR requests that more than two (2) copies be returned, then the CONTRACTOR shall submit the appropriate quantity of submittals.

The ENGINEER will review shop drawings to determine compliance with the design concept of the project and return them to the CONTRACTOR within the period established in the shop drawings schedule. The ENGINEER may hold shop drawings in cases where partial submission cannot be reviewed until the complete submission has been received or where shop drawings cannot be reviewed until correlated items affected by them have been received. When such shop drawings are held, the ENGINEER will advise the CONTRACTOR in writing that the shop drawing submitted will not be reviewed until shop drawings for all related items have been received.

The CONTRACTOR shall submit to the ENGINEER, for review, six (6) copies each of such shop drawings, electrical diagrams and catalog information for fabricated items and manufactured items required for construction. The ENGINEER will review the submitted data and shop drawings, and will make notations thereon indicating "No Exception Taken", "Make Corrections Noted", "Rejected", "Revise and Resubmit", or "Submit Specified Item". The ENGINEER will then return two copies of the submitted data and shop drawings to the CONTRACTOR. The ENGINEER's review of submittals and shop drawings is not a check of any dimension or quantity, and will

not relieve the CONTRACTOR from responsibility for errors of any sort in the submittals and shop drawings.

When shop drawings and/or submittals are required to be revised or corrected and resubmitted, the CONTRACTOR shall make such revisions and/or corrections and resubmit those items or other materials in the same manner as specified above.

Submitted data shall be sufficient in detail for determination of compliance with the Contract Documents. Color samples for all items for which colors are to be selected shall be submitted at the same time. No equipment or material for which listings, drawings, or descriptive material is required shall be installed until the CONTRACTOR has received review from the ENGINEER.

Regardless of corrections made in or review given to the drawings by the ENGINEER, the CONTRACTOR shall be responsible for the accuracy of such drawings and for their conformity to the drawings and specifications. The CONTRACTOR shall check all submittals before submitting them to the ENGINEER and shall stamp its approval on all copies of the shop drawing documents. Any submittals received by the ENGINEER which do not bear the CONTRACTOR's approval shall be returned without review. If more than two (2) submissions are required to meet the project specifications, the cost of reviewing these additional submissions may be charged directly against the CONTRACTOR and the OWNER may withhold the funds necessary to cover these costs.

Materials and equipment shall be ordered a sufficient time in advance to allow time for reviews, and shall be available on the job when needed. Last minute review will not be given for inferior substitutes for material or equipment.

Required submittals include items listed below. This list is provided for CONTRACTOR's convenience only and may not be complete in all respects. CONTRACTOR shall provide all submittals required, whether or not specifically listed herein.

A. Schedules -- The CONTRACTOR shall prepare and submit to the ENGINEER, within fifteen (15) days after notice to proceed, a practicable schedule showing the order in which the CONTRACTOR proposes to carry out the work, the dates on which the important features of the work will start, and the contemplated dates for completing same. In addition to a time-scaled bar chart schedule depicting the project critical path, the CONTRACTOR shall submit a detailed CPM logic diagram. The CPM diagram and time-scaled bar chart shall include the following:

- Construction activities
- Submittal and approval of material samples and shop drawings

- Procurement of critical materials
- Fabrication, installation, and testing of special material and equipment
- Duration of work, including completion times of all stages and their sub-phases

The activities shall be separately identifiable by coding or use of sub-networks or both. The duration of each activity shall be verifiable by manpower and equipment allocation, in common units of measure, or by delivery dates and shall be justifiable by the CONTRACTOR upon the request of the ENGINEER.

Detailed subnetworks will include all necessary activities and logic connectors to describe the work and all restrictions to it. In the restraints, include those activities from the project schedule which initiated the subnetwork as well as those restrained by it.

Include a tabulation of each activity in the computer mathematical analysis of the network diagram. Furnish the following information as a minimum for each activity:

- Event (node) number(s) for each activity
- Activity description
- Original duration of activities (in normal workdays)
- Estimated remaining duration of activities (in normal workdays)
- Earliest start date or actual start date (by calendar date)
- Earliest finish date or actual finish date (by calendar date)
- Latest start date (by calendar date)
- Latest finish date (by calendar date)
- Slack or float time (in workdays)

Computer printouts shall consist of at least a node sort and an “early start/total-float” sort.

CONTRACTOR’S attention is drawn to typical local climatic weather patterns and the CONTRACTOR shall coordinate work accordingly.

- B. Breakdown of Contract Price -- The CONTRACTOR shall, at the preconstruction meeting, submit a complete breakdown of all lump sum bid items showing the value assigned to each part of the work including an allowance for profit and overhead adding up to the total lump sum contract price. Breakdown of lump sum bids shall be coordinated with the items in the schedule. Preparatory work, bonds, and insurance required in setting up the job will be allowed as a separate entry on the cost breakdown but shall not

exceed 5 percent of the total base bid. Upon acceptance of the breakdown of the contract price by the ENGINEER, it shall be used as the basis for all requests for payment.

- C. Shop Drawings, Schedules and Drawings -- The CONTRACTOR shall provide shop drawings, schedules and such other drawings and information as may be necessary for the prosecution of the work in the shop and in the field as required by the contract documents and/or ENGINEER's instruction.
- D. Design Submittals -- Design submittals as may be required for equipment and systems elsewhere in these Specifications.
- E. Erosion and Sedimentation Control Plan
- F. Materials Lists
- G. CONTRACTOR Contact Persons
- H. Material Safety Data Sheets
- I. Traffic Control and Protection Plan
- J. Miscellaneous Materials and Other Submittals As Required Elsewhere in the Specifications
- K. Operation and Maintenance Instructions

Before acceptance of the installation, the CONTRACTOR shall submit four (4) copies of complete operation and maintenance instructions for all equipment supplied. Submit items in 8-1/2 x 11-inch heavy-duty three-ring binders when appropriate, or in 8-1/2 x 11-inch file folders. All binders and folders shall have clear plastic pockets on the front of the cover and the spine to allow for insertion of identifying information. The equipment manufacturer may furnish instruction manuals prepared specifically for the equipment furnished or standard manuals may be used if statements like "if your equipment has this accessory..." or listings of equipment not furnished are eliminated. Poorly reproduced copies are not acceptable. Operation and maintenance instructions shall contain the following as a minimum:

1. Approved shop drawings and submittal data
2. Model, type, size and serial numbers of equipment furnished
3. Equipment and driver nameplate data

4. List of parts showing replacement numbers
5. Recommended list of spare parts
6. Complete operating instructions including start-up, shutdown, adjustments, cleaning, etc.
7. Maintenance and repair requirements including frequency and detailed instructions
8. Name, address and phone numbers of local representative and authorized repair service

END OF SECTION

SECTION 01650

PIPELINE TESTING AND DISINFECTION

PART 1 GENERAL

1.1 Description

- A. This section covers field pressure testing, disinfection and purity testing of potable water systems piping, fittings, and valves. All piping shall be flushed and hydrostatically pressure and leak tested. Defective items revealed by the testing procedures shall be removed and replaced or otherwise corrected as directed by the ENGINEER. All costs for labor and materials necessary to conduct the flushing, testing and disinfecting procedures specified herein, and all costs of labor and materials required to remedy defective items shall be borne by the CONTRACTOR.
- B. The CONTRACTOR shall provide 72 hour notification to the ENGINEER and OWNER prior to conducting flushing, hydrostatic testing and disinfection. CONTRACTOR shall provide coordination and scheduling required for the OWNER and ENGINEER to witness and provide necessary labor for operating OWNER's existing system during hydrostatic testing and disinfecting procedures. CONTRACTOR shall not operate any part of the existing water or sewer systems.
- C. The CONTRACTOR shall perform flushing and testing of all pipelines and appurtenant piping for water mains and disinfection of all pipelines and appurtenant piping for potable water, complete, including conveyance of test water to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents.
- D. Unless otherwise directed by the ENGINEER, new water mains and appurtenances must be completely installed, flushed, tested, disinfected, and satisfactory bacteriological sample results received prior to completing permanent connections to existing water system.

1.2 Reference Specifications, Codes, and Standards

Codes and Standards: Comply with the provisions of the latest edition of the following codes, standards and specifications, except as otherwise shown and specified:

ANSI/AWWA B300 Hypochlorites

ANSI/AWWA B301 Liquid Chlorine

ANSI/AWWA C651 Disinfecting Water Mains

ANSI/AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances

ANSI/AWWA C605 Underground Installation of PVC Pressure Pipe and Fittings for Water

1.3 Contractor Submittals

A pipeline testing and disinfection plan will be required to be submitted by the CONTRACTOR for review and approval by the ENGINEER a minimum of one month before testing is to start. As a minimum, the CONTRACTOR's pipeline testing and disinfection plan shall include the following:

- A. Testing schedule.
- B. Proposed equipment and chemicals.
- C. Proposed plan for water conveyance including flow rates.
- D. Proposed plan for water control.
- E. Proposed plan for water disposal including flow rates.
- F. Proposed measures to be incorporated in the project to minimize erosion while discharging water from the pipeline.
- G. Proposed plan for disinfection.
- H. Proposed plan for dechlorination of flushing water and superchlorinated disinfection water including discharge points and discharge rates.
- I. Proposed plan for testing chlorine levels throughout the length of the pipeline including test locations.

PART 2 PRODUCTS

2.1 Equipment

- A. All test equipment, chemicals for chlorination, temporary valves, bulkheads, or other water control equipment and materials shall be determined and furnished by the CONTRACTOR subject to the ENGINEER's review. No materials shall be used which would be injurious to the construction or its future functions.

- B. As a minimum, the CONTRACTOR shall furnish the following equipment and materials for the testing:

<u>Amount</u>	<u>Description</u>
2	Graduated containers approved by the ENGINEER
1	Hydraulic pump approved by the ENGINEER with hoses, valves and fittings as needed and required for the testing and disinfection of the facilities..
2	Pressure gauges with pressure range at least 120% greater than the required maximum test pressure with graduations in two (2) psi increments. Gauges shall have been calibrated with 90 days of pressure testing.

- C. Chlorine for disinfection shall be in the form of liquid chlorine or sodium hypochlorite solution.
- D. Sodium hypochlorite and calcium hypochlorite shall be in accordance with the requirements of ANSI/AWWA B300. Liquid chlorine shall be in accordance with the requirements of ANSI/AWWA B301.
- E. All temporary thrust restraint and equipment and facilities required for hydrostatic testing will be considered incidental.

PART 3 EXECUTION

3.1 Hydrostatic Testing of Water Mains

- A. The CONTRACTOR shall make all necessary provisions for conveying water to the points of use and for the proper disposal of test water.
- B. No section of the pipeline shall be hydrostatically tested until all field-placed concrete or mortar has attained full strength. At the CONTRACTOR's option, early strength concrete may be used when the full strength requirements conflict with schedule requirements. All such early applications shall be approved by the ENGINEER prior to each installation.
- C. All piping shall be tested under a hydrostatic test pressure not less than 180 psi (+/- 5 psi) at the highest point along the test section or as shown on the plans. Testing shall be performed by filling the pipe with water, allowing for natural absorption to occur, and applying the specified test pressure by pumping. Once the test pressure has been attained, the pump shall be valved off. The

test will be conducted for one one-hour period in accordance with West Linn Public Works Standard 403.14 with the allowable leakage not to exceed value as per Paragraph D below.

- D. During the test, pipe, fittings and valves with welded and/or flanged joints shall be completely watertight. Pipe, fittings and valves with rubber gasketed joints (mechanical joints or push-on joints) shall have a zero loss in accordance with West Linn Public Works Standard 403.14 (G).
- E. During the test period, operate the pump as required to maintain pressure in the pipe within 5 psi of the specified test pressure at all times. At the end of test period, operate the pump until the specified test pressure is again obtained. The pump suction shall be in a graduated barrel or similar device or metered so that the amount of water required to restore the test pressure may be accurately measured.
- F. If the test reveals any defects, leakage in excess of the allowable, or failure, the CONTRACTOR shall furnish all labor, equipment and materials required to locate and make necessary repairs. The testing of the line (and repairing of defects, excessive leakage, and failures) shall be repeated until a test satisfactory to the ENGINEER has been achieved. All costs for locating, repairing, and retesting shall be borne by the CONTRACTOR.

3.2 Disinfection of Water Mains

- A. After testing and repairing where necessary, all potable water systems shall be thoroughly flushed, cleaned, and disinfected by the CONTRACTOR in accordance with the latest version of AWWA C651. Chlorination by means of tablets or powders (calcium hypochlorite) placed in each length of pipe during installation is specifically prohibited.
- B. Before sterilizing, flush all foreign matter from the pipeline. The CONTRACTOR is to provide at no additional cost to OWNER, hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties. Flushing water discharged to any public waters in the State of Oregon shall be dechlorinated in accordance with Oregon Administrative Rule Chapter 340, Division 41 – Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon and Oregon Department of Environmental Quality memorandum entitled “Chlorinated Water Discharges”, Water Quality Division, DEQ, May 19, 1997. Flushing velocities shall be at least 2.5 fps. For large diameter pipe where it is impractical or impossible to flush the pipe at 2.5 fps velocity, clean the pipe in place from the inside by brushing and sweeping, then flush the line at a lower velocity.

- C. Potable water piping shall be disinfected with a solution containing a minimum 25 parts per million (ppm) and a maximum 50 ppm chlorine. The chlorine solution shall remain in the piping system for a period of 24 hours at which time the sterilizing mixture shall have a strength of at least 10 ppm of chlorine. If check samples fail to produce acceptable results, the disinfection procedure shall be repeated at the expense of the CONTRACTOR until satisfactory results are obtained.
- D. Disposal of any water containing chlorine shall be performed in accordance with the latest edition of AWWA C651, Section 01100 Special Provisions of this specification, and any other state or local requirements. Disposal may be made into existing sanitary sewer systems providing approvals are obtained from the respective system owners. Any chlorinated water discharged to open stream channels must be dechlorinated prior to discharge.
- E. The OWNER will collect samples after the pipeline is flushed in accordance with the latest edition of AWWA C651 at locations directed by ENGINEER. The chlorine residual must be below 1.5 mg/L when the sample is taken.
- F. Results of the bacteriological testing shall be satisfactory with the water system owner and the State Department of Health and/or other appropriate regulatory agencies, or disinfection shall be repeated at the expense of the CONTRACTOR.

3.3 Disinfection of Water Main End Connections and Tie-Ins

Disinfection and pressure testing of potable water piping and appurtenances at end connections which are required to remain in service due to restrictions in allowable shutdown time shall be pressure tested and disinfected as described below:

- A. Prior to connecting new potable water piping and appurtenances with existing piping and appurtenances, the interior of all new pipe, fittings, valves and appurtenances shall be swabbed or sprayed with a 1% to 5% percent calcium hypochlorite solution.
- B. Following the disinfection procedures described above, connection of the new piping and appurtenances to the existing water system shall be made. During the system startup, the ENGINEER and CONTRACTOR shall visually inspect all new fittings, piping, valves and appurtenances for evidence of leakage. Any leakage observed during this period shall be promptly repaired by the CONTRACTOR, at CONTRACTOR's expense as required by the ENGINEER.

END OF SECTION

SECTION 01655

TESTING, TRAINING AND SYSTEM START-UP

PART 1 GENERAL

1.1 Scope

This section specifies equipment and system testing and start-up, services of manufacturer's representatives, training of OWNER's personnel and final testing requirements for the complete facility.

1.2 Contract Requirements

- A. Testing, training and start-up are requisite to the satisfactory completion of the Contract.
- B. Complete all testing, training, and start-up within the Contract Time(s).
- C. Furnish all necessary labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.
- D. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation, testing, and operator training.

1.3 Start-up Plan

- A. Submit start-up plan for each piece of equipment and each system not less than two (2) weeks prior to planned initial equipment or system start-up.
- B. Provide detailed Start-up Progress Schedule with the following activities identified:
 - 1. Manufacturer's services
 - 2. Installation certifications
 - 3. Operator training
 - 4. Submission of operation and maintenance manual
 - 5. Functional testing
 - 6. Performance testing
 - 7. Operational testing

- C. Provide testing plan with test logs for each item of equipment and/or system. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.
- D. Provide summary of shutdown requirements for existing systems if required, which are necessary to complete start-up of new equipment and systems.
- E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.4 General Start-up and Testing Procedures

A. Mechanical Systems:

1. Remove rust preventatives and oils applied to protect equipment during construction.
2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.
3. Flush fuel system and provide fuel for testing and start-up.
4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.
7. Perform cold alignment and hot alignment to manufacturer's tolerances.
8. Adjust V-belt tension and variable pitch sheaves.
9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to insure no leakage, but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.
10. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.
11. Install gratings, safety chains, handrails, shaft guards and sidewalks prior to operational testing.

B. Electrical Systems

1. Perform insulation resistance tests on wiring except 120 volt lighting, wiring, and control wiring inside electrical panels.
2. Perform continuity tests on grounding systems.
3. Test and set switchgear and circuit breaker relays for proper operation.
4. Perform direct current high potential tests on all cables that will operate at more than 2,000 volts. Obtain services of independent testing lab to perform tests.
5. Check motors for actual full load amperage draw. Compare to nameplate value.

C. Instrumentation Systems

1. Bench or field calibrate instruments and make required adjustments and control point settings.
2. Leak test pneumatic controls and instrument air piping.
3. Energize transmitting and control signal systems, verify proper operation, ranges and settings.

1.5 Functional Testing

- A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.
- B. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the manufacturer's representative.
- C. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.
- D. Conduct continuous 8 hour test under full load conditions. Replace parts which operate improperly.

1.6 Certificate of Proper Installation

- A. At completion of functional testing, furnish written report prepared and signed by manufacturer's authorized representative, certifying equipment:
 - 1. Has been properly installed, aligned, adjusted and lubricated.
 - 2. Is free of any stresses imposed by connecting piping or anchor bolts.
 - 3. Is suitable for satisfactory full-time operation under full load conditions.
 - 4. Operates within the allowable limits for vibration.
 - 5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.
 - 6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly functioning.
- B. Furnish written report prepared and signed by the electrical and/or instrumentation subcontractor certifying:
 - 1. Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.
 - 2. Control logic for equipment start-up, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.
- C. Co-sign the reports along with the manufacturer's representative and subcontractors.

1.7 Training of OWNER's Personnel

- A. Provide operations and maintenance training for items of mechanical, electrical and instrumentation equipment. Utilize manufacturer's representatives to conduct training sessions.
- B. Coordinate training schedule with City staff. Coordinate training sessions to prevent overlapping sessions. Arrange sessions so that individual operators and maintenance technicians do not attend more than two (2) sessions per week.

- C. Provide Operation and Maintenance Manual for specific pieces of equipment or systems two (2) weeks prior to training session for that piece of equipment or system.
- D. Satisfactorily complete functional testing before beginning operator training.
- E. The OWNER may videotape the training for later use with the OWNER's personnel.

1.8 Minimum Service Schedule

Minimum services as specified shall be provided in accordance with the following schedule:

<u>Specification Section</u>	<u>Equipment</u>	<u>Minimum On-Site Time Requirements</u>		
		<u>1) Equipment Installation</u>	<u>2) Equipment Testing</u>	<u>3) Operator Training</u>
11230	End Suction Pump	2 CWD	3 CWD	1 CWD
15111 15115	Hydraulic and Electronic Control Valves	0.5 CWD per valve	0.5 CWD per valve	0.25 CWD per valve
17000	Instrumentation & Control	5 CWD	4 CWD	2 CWD

NOTE: CWD is defined as a consecutive working day consisting of 8 hours each from 8:00 a.m. to 5:00 p.m.

1.9 Operational Testing

- A. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation.
- B. Conduct operational test for continuous seven (7) day period.
- C. Owner will provide operations personnel, power, fuel, and other consumables for duration of test.

- D. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.
- E. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

1.10 Record Keeping

- A. Maintain and submit to ENGINEER the following records generated during start-up and testing phase of project:
 1. Daily logs of equipment testing identifying all tests conducted and outcome.
 2. Logs of time spent by manufacturer's representatives performing services on the job site.
 3. Equipment lubrication records.
 4. Electrical phase, voltage, and amperage measurements.
 5. Insulation resistance measurements.
 6. Pump torsional and lateral vibration analysis report.
 7. Data sheets of control loop testing including testing and calibration of instrumentation devices and set-points.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.1 Description

Work covered in this section includes general excavation, fill and backfill work. Earthwork shall meet the specifications of this Section and Oregon Department of Transportation, Standard Specifications for Highway Construction. In the case of conflict, the more stringent specification shall apply.

1.2 Submittals

- A. Submit results of aggregate sieve analysis and standard proctor tests for all granular material.
- B. Submit mix proportions for Controlled Low Strength Material (CLSM). The proposed mix design shall be strength tested in accordance with ASTM D 4832 at 7, 14 and 28 days age and results submitted to the ENGINEER. The CONTRACTOR shall submit to the ENGINEER batch weights of each batch of CLSM used during construction.
- C. See Section 01300 for CONTRACTOR submittals.

1.3 Reference Specifications, Codes and Standards

A. Commercial Standards

ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 403	Test Method for Time of Setting Concrete Mixtures by Penetration Resistance
ASTM D 422	Method for Particle-Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-inch (304.8-mm) Drop (AASHTO T-99)
ASTM D 2487	Classification of Soils for Engineering Purposes

ASTM D 4253	Test Methods for Maximum Index Density of Soils Using a Vibratory Table
ASTM D 4254	Test Methods for Minimum Index Density of Soils and Calculation of Relative Density
ASTM D 4832	Preparation and Testing of Controlled Low Strength Material Test Cylinders
ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

B. Reference Standards

References herein to the “Standard Specifications for Highway Construction” shall mean The Oregon Department of Transportation, Standard Specifications for Highway Construction. References herein to “AASHTO” shall mean Association of American State Highway Transportation Officials.

1.4 Classification of Excavation

A. Unclassified Excavation

Unclassified excavation is defined as all excavation, regardless of the type, character, composition or condition of the material encountered and shall further include all debris, junk, broken concrete, and all other material. All excavation shall be unclassified unless provided for otherwise elsewhere in these specifications.

B. Classified Excavation

1. Common Excavation

Common excavation is defined, as the excavation of all material not classified as Rock Excavation.

2. Rock Excavation

Rock excavation is defined as the removal of rock by systematic and continuous drilling and blasting, if allowed, and hammering, breaking, splitting or other approved methods. Rock is defined as material including boulders, solid bedrock, or ledge rock, which, by actual demonstration, cannot be reasonably excavated with suitable power

excavation equipment. Suitable machinery is defined as a track-mounted hydraulic excavator of the 52,800 to 72,500 pound class equipped with a single shank ripper. The ENGINEER may waive the demonstration if the material encountered is well-defined rock. The term "rock excavation" shall be understood to indicate a method of removal and not a geological formation.

If material which would be classified as rock by the above definition is mechanically removed with equipment of a larger size than specified, it shall be understood that any added costs for the removal of material by this method shall be included in the unit price for common excavation. Before the removal of rock by the methods described above will be permitted, the CONTRACTOR shall expose the material by removing the common material above it and then notify the ENGINEER who, with the CONTRACTOR or his representative, will measure the amount of material to be removed.

In trench excavations, boulders or pieces of concrete below grade larger than one half (1/2) cubic yard will be classified as rock if blasting, hammering, breaking or splitting actually required and used for their removal from the trench. If material, which would be classified as rock by the definition above and elsewhere within these specifications, is mechanically removed without blasting, hammering, breaking or splitting, it will be considered common excavation. If equipment larger than the "suitable machinery" as defined above is brought on the project site for the sole purpose of rock removal without blasting, hammering, breaking or splitting, then such removal will be considered rock excavation.

CONTRACTOR shall verify if the use of explosives for excavation of rock is allowed on this project.

1.5 Quality Assurance

- A. Soil Testing -- Soil sampling and testing to be by an independent laboratory approved by the ENGINEER. The frequency of testing is to be determined by the ENGINEER. All soil testing shall be paid for by the CONTRACTOR.
- B. Compaction Tests -- Maximum density of optimum moisture content by ASTM D698 (AASHTO T-99). In-place density in accordance with Nuclear Testing Method ASTM D2922 and D3017.
- C. Soil Classification -- All imported materials, classification in accordance with ASTM D2487.

- D. Allowable Tolerances -- Final grades shall be plus or minus 0.04 foot.
- E. In Place Testing of CLSM -- CLSM shall be tested in accordance with ASTM C 403.
- F. Compressive Tests of CLSM -- CLSM shall be compressive tested in accordance with ASTM D 4832.

1.6 Site Conditions

- A. Quantity Survey -- CONTRACTOR shall be responsible for calculations of quantities of cut and fill from existing site grades to finish grades established under this contract as indicated on the plans or specified and shall include the cost for all earthwork in the total basic bid.
- B. Dust Control -- Must meet Oregon State DEQ and Local requirements. Protect persons and property from damage and discomfort caused by dust. Water as necessary and when directed by ENGINEER to quell dust.
- C. Soil Control -- Soil shall not be permitted to accumulate on surrounding streets or sidewalks nor to be washed into sewers. See provisions for erosion control.
- D. Existing Underground Utilities -- Protect active utilities encountered and notify persons or agencies owning same. Remove inactive or abandoned utilities from within the project grading limits to a depth at least twelve (12) inches below subgrade established under this contract. All abandoned piping to be plugged as approved by ENGINEER.

PART 2 PRODUCTS

2.1 Crushed Rock

Crushed rock with 3/4 inch-0, 1 inch-0, and 1 1/2 inch-0 gradation as shown on the plans shall meet the gradation and other requirements of the Standard Specifications for Highway Construction for Base Aggregates.

2.2 Granular Drain Backfill Material

Granular drain backfill material shall be crushed or uncrushed rock or gravel as shown on the plans and shall be clean and free-draining. Granular drain backfill material shall be the size as shown on the plans and shall meet the gradation and other requirements of the Standard Specifications for Highway Construction for such material.

2.3 Controlled Low Strength Material (CLSM)

CLSM shall be composed of cement, pozzolans, fine aggregate, water, and admixtures. CLSM shall have a low cement content, be non-segregating, self consolidating, free-flowing and excavatable material which will result in a hardened, dense, non-settling fill and a compressive strength at 28 days of 100 to 200 psi if not otherwise shown or specified.

2.4 Select Native Fill

Select native fill shall consist of approved earth obtained from on-site excavations, free of peat, humus, vegetative matter, organic matter, and rocks greater than 12 inches in diameter, processed as required to be placed in the thicknesses prescribed and at the optimum moisture content to obtain the level of compaction required by these specifications.

2.5 Imported Fill

Imported fill material shall consist of approved imported earth substantially free of organic material and foreign debris. Imported fill material shall meet the requirements for select native fill as defined above and shall be approved by the ENGINEER.

2.6 Topsoil

Top 6 to 12 inches of existing soil containing organic matter. ENGINEER's decision shall be final as to determination of what is of topsoil quality. Topsoil shall be stockpiled on site for later use in landscaping. Care shall be taken in collection of topsoil so as to preserve native seed stocks, which are valuable to restoring native species as part of finish landscaping.

2.7 Spoils

All excess material not suitable or not required for backfill and grading shall be hauled off site and disposed of at a location approved by the ENGINEER. The CONTRACTOR shall make arrangements for disposal of the material at no additional cost to the OWNER. Landfill permit to be obtained by the CONTRACTOR and provided to ENGINEER prior to commencement of disposal.

PART 3 EXECUTION

3.1 General

- A. Prior to work in this section, become familiar with site conditions. In the event discrepancies are found, notify the ENGINEER as to the nature and extent of the differing conditions.
- B. Do not allow or cause any work performed or installed to be covered up or enclosed prior to required tests and approvals. Should any work be enclosed or covered up, uncover at CONTRACTOR's expense.

3.2 Topsoil Stripping and Stockpiling

- A. Site within clearing limits shall be stripped of topsoil to depths approved by the ENGINEER, as required to obtain additional topsoil necessary to complete work indicated on plans or specified.
- B. Topsoil shall be free of sticks, large rocks, clods, and subsoils.
- C. Stockpile topsoil at locations approved by ENGINEER for redistribution as specified. Grade surface of stockpiles remaining over winter months to prevent ponding of water. Cover stockpile to minimize the infiltration of water. See other provisions for erosion control.

3.3 Excavation

- A. Excavate material of every nature and description to the lines and grades as indicated on the drawings and/or as required for construction of the facility.
- B. Provide and maintain equipment to remove and dispose of water during the course of the work of this section and keep excavations dry and free of frost or ice.
- C. Project dewatering is specified elsewhere. Coordinate drainage requirements with this work. Provide temporary drainage ditches as required and regrade as indicated at completion of project.
- D. Excavated material not approved for use in the embankments or in excess of that needed to complete the work shall be hauled off site and disposed of at no expense to the OWNER.

3.4 Rock Excavation

- A. Where the bottom of the excavation encounters ledge rock and/or boulders and large stones which meet the definition of “rock” as described herein, said rock shall be removed to provide 12 inches of clearance on each side and below all structures, pipe and appurtenances.
- B. Excavations below subgrade in rock shall be backfilled to subgrade with approved bedding material and thoroughly compacted.
- C. If explosives are allowed on this project, the CONTRACTOR shall comply with the requirements for the use and security of explosives as specified in the special provisions.
- D. Wherever the use of explosives is required during the course of the work, and if the use of explosives is allowed on this project, the CONTRACTOR shall conform to the recommendations of the Manual of Accident Prevention in Construction, published by AGC, in regard to Section 5, Explosives. Prior to commencing use of explosives, the CONTRACTOR shall submit a certificate of insurance showing coverage of blasting operating and blasting product liability to the limits required by the General Conditions. Coverage for this extra hazard shall be maintained during all blasting operations.
- E. The CONTRACTOR shall provide all necessary approved types of tools and devices required for loading and using explosives, blasting caps and accessories, and conform to and obey all federal, state, and local laws that may be imposed by any public authority.
- F. When blasting rock, cover the area to be shot with blasting mats or other approved types of protective material that will prevent the scattering of rock fragments outside the excavation. The CONTRACTOR shall give ample warning to all persons within the vicinity before blasting, station people and provide signals of danger in suitable places to warn people and vehicles before firing any blasts. Fire all blasts with an electric blasting machine which shall be connected to the circuit immediately prior to the time for firing, and only then by the person who will operate the blasting machine.
- G. The CONTRACTOR shall assume all liability and responsibility connected with or accruing from blasting, or the use of explosives or dangerous material of any kind whatsoever. Such liability shall extend to include, but not be limited to, damage to work or adjacent property, injuries, lawsuits, complaints and all other adverse results, whether actual, alleged, inferred or implied.

3.5 Grading and Filling

- A. General -- Grading and filling operations shall not take place when weather conditions and moisture content of fill materials prevent the attainment of specified density. Vertical curves or roundings at abrupt changes in slope shall be established as approved by ENGINEER. Bring all graded areas to a relatively smooth, even grade and slope by blading or dragging. Remove high spots and fill depressions.
- B. For areas receiving surface structures or existing paved areas to be constructed or replaced by the CONTRACTOR or by others, such as railways, roadways, driveways, parking lots, and sidewalks, place clean well-graded gravel fill material (3/4 inch – 0 inch) in 6-inch lifts and compact with vibratory equipment to 95 percent maximum density unless otherwise specified.
- C. Embankment Construction -- Place fill material shown or specified in 8-inch loose lifts and compact with approved equipment. All fill material within 3 feet of top of fill elevations shall be compacted with vibratory equipment to 95 percent maximum density unless otherwise specified. All fill material below the 3-foot limit shall be compacted with vibratory equipment to 90 percent maximum density unless otherwise specified.

3.6 Topsoil Fill

- A. Scarify prepared subgrade to depth of four inches immediately prior to placing topsoil.
- B. Place topsoil in areas to be seeded to depths indicated, minimum depth of six inches. Place loose; do not compact, do not place in wet or muddy conditions.

3.7 Controlled Low Strength Material (CLSM)

- A. At time of placement, the CLSM must be at least 40 degrees F and ambient air temperature must be at least 34 degrees F and rising. Subgrade on which CLSM is to be placed shall be free of disturbed or soft material, debris and water.
- B. After CLSM is placed, further construction proceeding upon it will be permitted only after initial set is attained, as measured by ASTM C 403. No traffic or construction equipment shall be allowed on CLSM for at least 24 hours after placement.

END OF SECTION

SECTION 02222

EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 Description

- A. Work covered in this Section includes trench excavation for pipe, utility vaults and other utilities, pipe and utility vault bedding, and trench and utility vault backfill. All work shall conform to the specifications of this Section, the City of West Linn Standards, and the Oregon Department of Transportation Standard Specifications for Highway Construction except as modified herein. In the case of conflict, the more stringent specification shall apply.
- B. Excavation for Utilities Includes:
1. Work of making all necessary excavations for the construction of all contract work.
 2. Furnishing, placing and use of sheeting, shoring, and sheet piling necessary in excavating for and protecting the work and workmen.
 3. Performing all pumping and work necessary to keep the trenches free from water.
 4. Providing for uninterrupted flow of existing rivers, treatment plant processes, drains, and sewers and the temporary disposal of water from other sources during the progress of the work.
 5. Damming and coffer damming where necessary.
 6. Supporting and protecting all structures, pipes, conduits, culverts, railroad tracks, posts, poles, wires, fences, buildings, and other public and private property adjacent to the work.
 7. Removing and replacing existing sewers, culverts, pipelines, and bulkheads where necessary.
 8. Removing after completion of the work all sheeting and shoring not necessary to support the sides of excavations.
 9. Removing all surplus excavated material.

10. Performing all backfilling and rough grading of compacted backfill to limits specified or ordered by the ENGINEER.
 11. Restoring all property damaged as a result of the work involved in this contract.
- C. The work includes obtaining and transporting suitable fill material from off-site when suitable on-site material is not available.
 - D. The work includes transporting surplus excavated material not needed for backfill at the location where the excavation is made, to other parts of the work where filling is required, or disposal of all surplus material on other sites provided by the CONTRACTOR.
 - E. Backfill and Fill Compaction: Test consolidated backfill material in trenches around pipes and structures in conformance with "Compaction Tests" specified herein. Where tests indicate insufficient values, perform additional tests as required by the ENGINEER. Testing shall continue until specified values have been attained by additional compaction effort.
 - F. The work includes furnishing and installing temporary facilities to treat and dispose of any water pumped from the trench or utility vault excavations in a proper and approved manner in accordance with all laws and regulations.

1.2 Submittals

- A. Submit results of aggregate sieve analysis and standard proctor tests for all granular material.
- B. See Section 01300 for CONTRACTOR submittals.

1.3 Protection

- A. Exploratory Test Pits -- The CONTRACTOR shall dig such exploratory test pits as may be necessary in advance of excavation to determine the exact location and elevation of subsurface structures, pipelines, duct banks, conduits, and other obstructions which are likely to be encountered or need to be connected to and shall make acceptable provision for their protection, support, and maintenance of their continued operation.
- B. Sheeting, Shoring and Bracing
 1. The CONTRACTOR shall furnish and install adequate sheeting, shoring, and bracing to maintain safe working conditions, and to protect newly

built work and all adjacent and neighboring structures from damage by settlement or other ground movement.

2. Bracing shall be arranged so as not to place a strain on portions of completed work until the construction has proceeded far enough to provide ample strength. Sheeting and bracing may be withdrawn and removed at the time of backfilling, but the CONTRACTOR shall be responsible for all damage to newly built work and adjacent and neighboring structures.

C. Construction Sheeting Left in Place

1. The CONTRACTOR shall furnish, install, and leave in place, construction sheeting and bracing when specified or when indicated or shown on the Drawings.
2. Construction sheeting and bracing, placed by the CONTRACTOR to protect adjacent and neighboring structures, may be left in place if desired by the CONTRACTOR. All such sheeting and bracing left in place shall be included in the cost for excavation.
3. Any construction sheeting and bracing which the CONTRACTOR has placed to facilitate its work may be ordered in writing by the ENGINEER to be left in place. The right of the ENGINEER to order sheeting and bracing left in place shall not be construed as creating an obligation on its part to issue such orders. Failure of the ENGINEER to order sheeting and bracing left in place shall not relieve the CONTRACTOR of its responsibility under the contract.

D. Removal of Water

1. The CONTRACTOR shall at all times during construction provide and maintain ample means and devices with which to remove promptly and dispose of properly all water entering the excavations or other parts of the work and shall keep said excavations dry until the pipelines to be placed therein are completed. In water bearing sand, well points and/or sheeting shall be supplied, together with pumps and other appurtenances of ample capacity to keep the excavation dry as specified.
2. The CONTRACTOR shall dispose of water from the work in a suitable legal manner without damage to adjacent property or structures.

1.4 Definitions

A. Bedding and Pipe Zone Backfill

Bedding and pipe zone backfill is defined as the furnishing, placing and compacting of material below, around and above the top of the pipe barrel to the dimensions shown on the trench detail on the Drawings. The minimum depth for pipe bedding shall be 4 inches. The compaction requirement for the pipe bedding and pipe zone shall not be less than that required for the trench backfill above the pipe zone.

B. Trench Backfill Zone

Trench backfill is defined as the furnishing, placing and compacting of material in the trench above the pipe zone, up to bottom of the pavement base rock, ground surface or surface material.

C. Bedding, Pipe Zone and Backfill Classification

Class A: Backfill with suitable native excavated material. Place the material in lifts with mechanical compaction sufficient to insure that no bridging occurs. Mound the excess material over the trench.

Class B (Defined as Class D on City of West Linn Drawing WL-200): Backfill with suitable native excavated material. Place the material in lifts and mechanically compact to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class C: Backfill with suitable native excavated material. Place the material in the trench and water settle to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class D (Defined as Class B on City of West Linn Drawing WL-200) : Backfill with approved imported granular material. Place the material in lifts and mechanically compact to a relative density as shown on the Drawings or specified herein. Remove and dispose of excess material.

Class E: Backfill with controlled low strength material (CLSM). See Section 02200, Earthwork.

D. Foundation Stabilization

Foundation stabilization is defined as removing unsuitable native material below the design grade of the area being excavated and replacing and

compacting with crushed rock to the dimensions shown on the trench detail, as approved by the ENGINEER, or as otherwise directed by the ENGINEER. Foundation stabilization material shall be placed in lifts not to exceed eight (8) inches and compacted to 95 percent of the maximum density at optimum moisture content.

E. Classification of Excavated Material

Excavated materials are defined within Section 02200, Earthwork.

1.5 Quality Assurance

A. Compaction Requirements

In place dry density of compacted material shall be at the percent of maximum dry density specified or shown at optimum moisture content determined on the basis of the latest edition of AASHTO T-99.

B. Testing Requirements

An independent laboratory retained by the CONTRACTOR and approved by the ENGINEER will perform all soil sampling and testing. Testing locations and frequencies shall be determined by the ENGINEER. All testing will be paid for by the CONTRACTOR.

1.6 References

A. Standard Specifications for Public Works, APWA, current manual, hereinafter called "APWA Standard Specifications".

B. Oregon Department of Transportation, Standard Specifications for Highway Construction, current manual, hereinafter called "Standard Specifications for Highway Construction".

PART 2 MATERIALS

2.1 Native Backfill Material

Native backfill material shall be select excavated native material free from roots or other organic material, trash, mud, muck, frozen material and large stones and shall comply with the select native fill specification within Section 02200, Earthwork. When native excavated material is used for backfill around

the pipe, it shall be free of rocks, cobbles, stones or other debris having a dimension greater than 1-1/2 inches.

2.2 Granular Backfill Material

Unless otherwise shown on the plans or specified herein, granular backfill material shall be well graded crushed rock with a maximum aggregate size of 3/4-inch in the bedding and pipe zone, and a maximum aggregate size of 1-1/2-inch in the trench backfill zone. All gradations of crushed rock shall comply with Section 02200, Earthwork.

2.3 Foundation Stabilization Material

Foundation stabilization material shall be 6 inch - 2 inch or 4 inch - 2 inch gravel, free from clay balls and organic debris, and being well crushed gravel or crushed rock graded with less than 8 percent by weight passing the 1/4-inch sieve, as approved by the ENGINEER.

PART 3 EXECUTION

3.1 Preparation

- A. The site of an open cut excavation shall be first cleared of all obstructions preparatory to excavation. Wherever paved or surfaced streets are cut, saw wheel or approved cutting devices shall be used. Width of pavement cut shall not be less than 12 inches greater than trench width. Any cut or broken pavement shall be removed from site during excavation.
- B. The CONTRACTOR shall maintain street traffic at all times and erect and maintain barricades, warning signs, traffic cones, and other safety devices during construction in accordance with the latest edition of Manual of Uniform Traffic Control Devices (MUTCD), Part 6, to protect the traveling public in any area applicable. Provide flaggers as required during active work in roadway areas.
- C. Intent of specifications is that all streets, structure, and utilities be left in condition equal to or better than original condition. Where damage occurs and cannot be repaired or replaced, CONTRACTOR shall purchase and install new material, which is satisfactory to OWNER. Plans and/or specifications cover and govern replacement and restoration of foreseeable damage.
- D. The CONTRACTOR's operations shall be confined to rights-of-way and easements provided. Avoid encroachment on, or damage to, private property

or existing utilities unless prior arrangements have been made with copy of said arrangement submitted to ENGINEER.

3.2 Obstructions

This item refers to obstructions, which may be encountered and do not require replacement. Obstructions to the construction of the trench such as tree roots, stumps, abandoned piling, abandoned buildings and concrete structures, logs, rubbish, and debris of all types shall be removed without additional compensation from the OWNER. The ENGINEER may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the perpetual easement and right-of-way and without adversely affecting the intended function of the facility or increased costs to the OWNER.

3.3 Interfering Structures or Roadways

- A. The CONTRACTOR shall remove, replace and/or repair any damage done by the CONTRACTOR during construction to fences, buildings, cultivated fields, drainage crossings, and any other properties at its own expense and without additional compensation from the OWNER. The CONTRACTOR shall replace or repair these structures to a condition as good as or better than their pre-construction condition prior to commencing work in the area.
- B. Where paved roadways are cut, trench backfill will be Class D as defined herein. New pavement shall be equal to or better than the existing paved surface, and shall not deviate by more than 1/4-inch from the existing finish elevation.
- C. If the CONTRACTOR encounters existing structures, which will prevent construction and are not adequately shown on the plans, the CONTRACTOR shall notify the ENGINEER before continuing with the work in order that the ENGINEER may make such field revisions as necessary to avoid conflict with the existing conditions. The cost of waiting or “down time” during such field revisions shall be borne by the CONTRACTOR without additional cost to the OWNER or liability to the ENGINEER. If the CONTRACTOR fails to so notify the ENGINEER when a conflict of this nature is encountered, but proceeds with construction despite this interference, the CONTRACTOR shall do so at the CONTRACTOR’s own risk with no additional payment.

3.4 Easements

- A. Where portions of the work are located on private property, easements and permits will be obtained by the OWNER. Easements shall provide for the use of property for construction purposes to the extent indicated on the easements.

Copies of these easements and permits will be available from the OWNER for inspection by the CONTRACTOR. It shall be the CONTRACTOR's responsibility to determine the adequacy of the easement obtained in every case. The CONTRACTOR shall confine its construction operations to within the easement limits or street right-of-way limits, or make special arrangements with the property owners for the additional area required and notify the ENGINEER of any such conditions.

- B. Any damage to private property, either inside or outside the limits of the easements provided by the OWNER, shall be the responsibility of the CONTRACTOR. Before the ENGINEER will authorize final payment, the CONTRACTOR will be required to furnish the OWNER with written releases from the property owners, where the CONTRACTOR has obtained special agreements or easements or where the CONTRACTOR's operations, for any reason, have not been kept within the construction right-of-way obtained by the OWNER. Any such special agreements must be in written form and shall not involve the OWNER or ENGINEER as to liabilities in any way.

3.5 Trench and Utility Vault Excavation

- A. Excavation for trenches in which pipelines are to be installed shall provide adequate space for workers to place and joint the pipe properly and safely, but in every case the trench shall be kept to a minimum width. The width of trench at the top of the pipe shall not exceed the limits specified or as shown on the Drawings. Excavation for manholes and other structures shall be wide enough to provide a minimum of 12 inches between the structure surface and the sides of the excavation.
- B. Unless otherwise permitted by the ENGINEER, trenching operations shall not be performed beyond the distance which will be backfilled and compacted the same day.
- C. In general, backfilling shall begin as soon as the pipe or conduit is in approved condition to receive it and shall be carried to completion as rapidly as possible. New trenching shall not be started when earlier trenches need backfilling or the surfaces of streets or other areas need to be restored to a safe and proper condition.
- D. Where the excavation activities require the removal of portions of an abandoned pipeline, masonry plugs shall be installed in the open ends of the pipe, unless otherwise noted on the plans or by the ENGINEER. Coordinate with ENGINEER prior to plugging. For plugs less than 36 inches in diameter, 8-inch deep masonry units shall be used. For plugs in larger pipelines, 12-inch deep masonry units shall be used.

- E. Excavated material shall be placed at locations and in such a manner that it does not create a hazard to pedestrian or vehicular traffic, or interfere with the function of existing drainage facilities or system operation. The CONTRACTOR shall make arrangements for and dispose of all excess material not required elsewhere on the project at no cost to the OWNER.
- F. The CONTRACTOR shall provide the materials, labor and equipment necessary to protect trenches at all times. The trench protection shall provide safe working conditions in the trench and protect the work, existing property, utilities, pavement, etc. The method of protection shall be according to the CONTRACTOR's design. The CONTRACTOR may elect to use a combination of shoring, overbreak, tunneling, boring, sliding trench shields, or other methods of accomplishing the work provided the method meets the approval of all applicable local, state and federal safety codes. Damages resulting from improper shoring, improper removal of shoring or from failure to shore shall be the sole responsibility of the CONTRACTOR.
- G. The CONTRACTOR shall remove and dispose of existing abandoned sewer pipe, structures, and other facilities as necessary to construct the improvements. The cost of such removal will be considered incidental to trench excavation and backfill.
- H. Trench excavation for piping, utility vaults and other utilities shall be performed to the alignment and grade as indicated on the plans or as required by the ENGINEER. Where grades are not shown, pipe or other utilities shall be laid to grade between control elevations shown on the plans. Water mains shall be installed with a minimum cover of 36 inches.

Changes in the grade and horizontal alignment of the pipeline as shown on the plans or as provided elsewhere in the specifications may be necessary due to unanticipated interferences or other reasons. No additional compensation will be allowed the CONTRACTOR for changes in horizontal alignment unless otherwise provided for within these specifications. No additional compensation will be allowed for changes in grade, which require additional depth of trench excavation and backfill up to 2 feet from those shown on the plans unless provided for within these specifications.

- I. The trench at all times shall be kept free from water to facilitate fine grading, the proper laying and joining of pipe, and prevention of damage to completed joints. Adequate pumping equipment shall be provided to handle and dispose of the water without damage to adjacent property. Water in the trench shall not be allowed to flow through the pipe while construction work is in progress unless special permission to do so has been given by the ENGINEER. An

adequate screen shall be provided to prevent the entrance of objectionable material into the pipe.

- J. For pipe or utility vaults to have bedding material, excavate to a depth of 6 inches minimum below the bottom of the pipe or utility vault. Care shall be taken not to excavate below depths required. If over digging occurs, the trench bottom shall be filled to grade with compacted bedding material. The width of the pipe trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench shall not exceed 12 inches on either side of the pipe. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work.

3.6 Excavation below Grade

If the trench bottom is unsuitable below the depth required for bedding, the ENGINEER may require additional excavation. This extra excavation shall be backfilled with compacted foundation stabilization material. This backfill shall be placed in lifts not to exceed 8 inches and compacted to 95 percent of the maximum density at optimum moisture content.

3.7 Tunneling

The CONTRACTOR may utilize tunnel methods for installation of pipe where ground conditions are favorable and such methods will not disturb foundations under curbs, sidewalks and other structures. The ENGINEER must approve tunneling methods. Where tunneling is used, payment for the pipe installation will be made for the equivalent trench excavation and backfill as if the open cut method was used. Payment will not be made for surface restoration including pavement, curbs, sidewalks and other surface improvements whose replacement is avoided by the tunneling method.

3.8 Pipe Bedding

All pipe 4-inch nominal diameter and over, all steel pipe, all concrete sewer pipe, all plastic pipe, all pipe under existing or future structures or roadways, and all pipe at a depth greater than 6 feet shall be laid in pipe bedding material. Unless otherwise noted on the plans, pipe or conduit of less than 4-inch diameter, outside structure lines and at a depth of less than 6 feet shall be bedded in native material properly shaped as specified below, all as detailed on the drawings.

Following the excavation of the trench, compacted pipe bedding material shall be placed the full width of the excavated trench to a depth as shown on the trench detail. In lieu of a detail, the depth shall be 6 inches. The bottom of the trench shall be

accurately graded and rounded to fit the bottom quadrant of the pipe to provide uniform bearing and support for each section of pipe. Depressions for jointing shall be only of such length, depth and width necessary for the proper making of the joint.

3.9 Pipe Zone and Trench Backfill

- A. All backfill except CLSM shall be placed and compacted in 6 to 8-inch lifts. Backfill shall be carefully placed around the pipe and thoroughly compacted in 6 to 8-inch lifts or in a manner satisfactory to the ENGINEER so as to achieve the specified compaction requirements. When placing pipe zone backfill, the CONTRACTOR shall prevent pipe from moving either horizontally or vertically during placement and compaction of pipe zone material.
- B. Backfill Immediately: All trenches and excavations shall be backfilled immediately after pipe is laid therein and necessary testing is complete, unless otherwise directed by the ENGINEER. Under no circumstances shall water be permitted to rise in open trenches after pipe has been placed.
- C. Where trenches are under existing or future structures, paved areas, road shoulders, driveways or sidewalks, or where designated on the plans or specified elsewhere in these specifications, the trench backfill shall be Class D or Class E and pipe zone backfill shall be Class D. Class D backfill shall be compacted to 95 percent of maximum density at optimum moisture content.
- D. Where trenches are outside existing or future structures, paved areas, road shoulders, driveways or sidewalks, or where designated on plans or specified elsewhere, the trench backfill shall be Class B or Class D and pipe zone backfill in these areas shall be Class D. For these locations, compaction of Class B backfill shall be to not less than 90 percent of maximum density at optimum moisture content. Class D backfill shall be compacted to not less than 95 percent of maximum density at optimum moisture content.

3.10 Compaction Testing

- A. Compaction tests will be required to show that specified densities of compacted backfill are being achieved by the CONTRACTOR's compaction methods.
- B. Tests of pipeline backfill materials shall be made on each lift of fill for every 200 feet of pipeline trench as measured along the pipe centerline. After the ENGINEER is satisfied that the CONTRACTOR's method of compaction consistently meets specified compaction requirements, the testing frequency may be reduced to not less than one test per lift of fill for every 1,500 feet of pipeline trench. The ENGINEER may direct testing at a higher frequency at no additional cost to the OWNER upon failure to obtain specified densities or

if the CONTRACTOR changes compaction equipment or methods of compaction. The ENGINEER shall determine all test locations.

3.11 Utility Crossings

- A. Vertical clearance between the new pipe and existing utilities shall be 12 inches minimum unless otherwise noted on the plans or specified. Where existing utility lines are damaged or broken, the utility shall be repaired or replaced, care being taken to insure a smooth flow line and absolutely no leakage at the new joints. Unless otherwise specified herein, all expenses involved in the repair or replacement of leaking or broken utility lines that have occurred due to the CONTRACTOR's operations shall be borne by the CONTRACTOR and the amount thereof shall be absorbed in the unit prices of its bid.
- B. Water Lines Crossing Sewer Lines -- Whenever water lines cross sewer lines, CONTRACTOR shall comply with Health Department requirements. Wherever possible, the bottom of the water line shall be 1.5 feet or more above the top of sewer pipe and one full length of the water line pipe shall be centered at the crossing. For clearances less than 1.5 feet, the CONTRACTOR shall replace the existing sewer pipe with ductile iron or PVC of equal size, or shall encase existing sewer pipe with concrete for a minimum of 10 feet on both sides of crossing, as directed by the ENGINEER, at no additional cost to the OWNER.

3.12 Disposal of Unsuitable and Surplus Material

- A. All excavated materials which are unsuitable for use in backfilling trenches or around structures, and excavated materials that are in excess of that required for backfilling and for constructing fills and embankments as shown on the drawings, shall be disposed of by the CONTRACTOR at its own expense and at disposal sites provided by the CONTRACTOR as may be required; except that the OWNER reserves the right to require the CONTRACTOR to deposit such surplus at locations designated by the OWNER within a 2-mile radius.
- B. Surplus excavated material shall be disposed of by the CONTRACTOR in a legal manner, in full compliance with applicable codes and ordinances.

3.13 Surface Restoration and Clean-Up

- A. At the end of each work day, all open trenches shall be backfilled and all trenches within streets shall be temporarily paved or covered to the satisfaction of the ENGINEER. Temporary paving shall be replaced with permanent street paving, at completion of construction within street rights-of-way or sooner if

deemed necessary by the ENGINEER. No gravel-filled trenches shall be left open within the street right-of-way at the end of the workday.

- B. Where trenches cross lawns, garden areas, pastures, cultivated fields, or other areas on which reasonable topsoil conditions exist, the CONTRACTOR shall remove the topsoil to the specified depth and place the material in a stockpile. The CONTRACTOR shall not mix the topsoil with other excavated material. After the trench has been backfilled, the topsoil shall be replaced.
- C. CONTRACTOR shall clean up and remove all excess materials, construction materials, debris from construction, etc. CONTRACTOR shall replace or repair any fences, mailboxes, signs, landscaping, or other facilities removed or damaged during construction. CONTRACTOR shall replace all lawns, topsoil, shrubbery, flowers, etc., damaged or removed during construction. CONTRACTOR to be responsible for seeing that lawns, shrubs, etc. remain alive and leave premises in condition equal to original condition before construction.

END OF SECTION

SECTION 02485

FINISH GRADING, EROSION CONTROL AND SEEDING

PART 1 GENERAL

1.1 Description

- A. This section covers the work necessary for the finish grading, erosion control, and establishment of seeding, complete, including furnishing and delivery of labor, materials and equipment.
- B. See GENERAL CONDITIONS and Division I, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.2 Submittals

The following submittals are required as part of this work:

- A. Project Schedule indicating dates for delivery of materials, completion of rough grading, preparation of seedbed, installation of erosion control matting and seeding.
- B. Alternate erosion control matting materials and/or techniques other than specified herein.

PART 2 MATERIALS

2.1 Topsoil

Topsoil is available from stockpiles on the site. Verify quantity prior to commencing work. If more topsoil is needed than has been stockpiled, supply imported topsoil at CONTRACTOR's sole expense.

2.2 Imported Topsoil

Imported topsoil shall be a natural, friable soil, representative of productive soils in the vicinity. It shall be obtained from well-drained areas, free from admixture of subsoil and foreign matter and objects larger than 2-inches in diameter, toxic substances, and any other deleterious material which may be harmful to plant growth

or be a hindrance to grading, planting and maintenance. Imported topsoil supply shall be approved by the ENGINEER.

2.3 Soil Conditioners

A. Organic Material

Peat - A natural material formed by the decomposition of reeds, sedges, or mosses from freshwater sites. Peat shall be free from lumps, roots, or stones, and organic matter shall be not less than 90 percent on a dry weight basis.

Rotted Sawdust - Nitrogen stabilized, 1/4-inch minus, clean sawdust or shavings, free from weed seed, and containing no chemicals or materials harmful to plant life.

Manure - Well-rotted stable or cattle manure, reasonably free from weed seed and refuse, containing no chemicals or materials harmful to plant life. Manure shall be no less than 2 months or more than 1 year old. Sawdust and shavings shall not exceed 50 percent content of manure.

Mushroom Compost - Spent mushroom growing compost.

B. Sand - Clean, coarse, ungraded sand, meeting the requirements of ASTM C 33 for fine aggregate.

2.4 Fertilizer

Slow Release Fertilizer: Slow release fertilizer for use in erosion control seeding containing 22% nitrogen, 16% available phosphoric acid, and 8% potash, including a minimum of 2% sulfur. The fertilizer shall contain not less than 30% available water-insoluble nitrogen derived by incorporating urea formaldehyde.

2.5 Seed Mix "A"

A. Seed shall be certified, blue tag, clean, delivered in original, unopened packages bearing an analysis of the contents, guaranteed 95% pure and to have a minimum germination rate of 95% in one year.

B. Erosion control seed for all cut slopes shall be Pro-time 710 PDX Plus available at Hobbs and Hopkins, Ltd., 1712 SE Ankeny Street, Portland, Oregon, phone (503) 239-7518.

<u>Seed</u>	<u>% by Weight</u>
Elka Perennial Rye Grass	56%
Eureka Hard Fescue	14%
Yarrow	7.5%
Sweet Alyssum	2.5%
Shamrock	2.5%
Dutch White Clover	6.0%
Salinas Strawberry Clover	3.5%
Perennial Lupine	3.5%
Lance Leafed Coreopsis	1.5%
California Poppy	1.5%
Ox-Eye Daisy	1.5%

2.6 Seed Mix “B”

- A. Erosion control seed for all fill slopes shall be REGREEN Sterile Wheatgrass hybrid, developed by HybriTech Seed International, Inc., available at Hobbs and Hopkins, Ltd., 1712 SE Ankeny Street, Portland, Oregon, phone (503) 239-7518. Seed shall be certified, blue tag, clean, delivered in original, unopened packages bearing an analysis of the contents, guaranteed 95 percent pure and to have a minimum germination rate of 95 percent within one year.
- B. Combine REGREEN seed mix with native seed species (as indicated in the plant list) for seeding the herbaceous layer on fill slopes. Provide seed packets from native species seed suppliers. Packets shall be unopened and labeled with type, date, and any available collection information. Sources for native species listed in the plant list can be obtained through the publication titled “Hortus Northwest.”

2.7 Erosion Control Matting

- A. Jute Matting: Jute matting shall consist of a uniform, open, plain weave of single jute yarn. The yarn shall be of loosely-twisted construction and shall not vary in thickness by more than one-half of its normal diameter. The weave shall provide openings of about 1 square inch.

Furnish the matting in widths of 45 inches or more, continuous lengths of not less than 150 feet, and weigh not less than 0.9 pounds per square yard.

Use staples of 12 gauge or heavier steel wire which is bent to a U-shape 2 inches wide. Staples shall not be less than 10 inches long unless the ENGINEER allows a shorter length for hardpan soil conditions.

- B. Excelsior Matting: Consisting of a machine produced blanket of curled wood fibers, of which 80% are 6-inches or longer. Furnish a blanket of uniform thickness, with the fiber evenly distributed over the entire area of the mat. Matting shall have a minimum dry weight of 0.8 pounds per square yard (+/- 10%). Furnish in a minimum 36-inch wide rolls.
- C. Alternate Matting Material: Submit proposed alternate erosion control matting material with specifications, costs, and manufacturer's literature to the ENGINEER for consideration and approval. Alternate materials may be used only if approved after review of submittals.

2.8 Erosion Control Seeding Mulch

Wood or straw mulch processed so that the fibers are uniformly suspended under agitation in water. Blend the mulch with seed, fertilizer, and other typical additives in a hydroseeding mixture to form a homogeneous slurry. The processed mulch shall have the ability to hold grass seed in contact with soil. Fibers shall have moisture-absorption and percolation properties to form a blotter-like cover on the ground. Ship in packages of uniform weight (+/- 5%) and labeled with manufacturer's name and air-dry weight.

2.9 Tackifier

Emulsion designed to retain moisture and heat in the soil. Mulch shall be chemically inert, nontoxic to plants, humans, and animals. Tackifier shall be J-Tac, Sentinell Tackifier additive, or equal.

PART 3 EXECUTION

3.1 Finish Grading Procedures

- A. Mix topsoil with rough grade fill material and mix thoroughly to a depth of 8-inches with soil amendments in the following proportions:

Topsoil	6-inches
Sand	1-inch
Organic Material	1-inch

- B. Finish Grading: Spread fill/topsoil material and rake the area to a uniform grade so that all areas drain, as indicated on the Drawings.
- C. Preparation of Seedbed: Remove all trash and stones exceeding 2-inches prior to seeding.

3.2 Time of Seeding

- A. Conduct seeding operations under favorable weather conditions during seasons which are normal for such work generally from April 1 to June 1, and Sept. 1 to November 1.
- B. Guarantee germination of erosion control seeding by November 1 at the latest.
- C. Seed all native plant species in fall only.

3.3 Erosion Control Matting

Erosion control matting shall be placed on all slopes with a slope ratio of 2:1 and greater, or as directed by the ENGINEER. Matting shall be laid flat in single thickness strips paralleling the direction of probable water flow. Multiple strips of matting shall overlap in shingle fashion. Adjacent strips of matting shall be overlapped a minimum of 1-foot, or as recommended by the manufacturer. The erosion matting shall be in contact with the soil at all points and shall be held in place with wire staples, or as recommended by the manufacturer. Anchor the matting in ditches at the top of the slope to ensure it will stay in place. The installation and minimum spacing of wire staples shall be as per manufacturer's specifications.

3.4 Seeding

- A. Seeding operations shall occur in two applications. The first application shall include seed, fertilizer, and mulch. The second application shall consist of tackifier and mulch only and be applied immediately after the first seeding. A second application of fertilizer shall be made two months after initial seeding at the rate indicated below.
- B. For Seed Mix "A"

Apply materials uniformly at the following rates:

"PDX Plus" Seed Mix	85 pounds per acre
Slow-Release Fertilizer:	200 pounds per acre
Mulch:	2000 pounds per acre (first application)
Mulch:	2000 pounds per acre (second application)
Tackifier:	as needed

C. For Seed Mix “B”

Apply materials uniformly at the following rates:

Native Seed Species	1 packet each species per 1000 SF
REGREEN seed	50 pounds per acre
Slow-Release Fertilizer:	200 pounds per acre
Mulch:	2000 pounds per acre (first application)
Mulch:	2000 pounds per acre (second application)
Tackifier:	as needed

END OF SECTION

SECTION 02620

DUCTILE IRON PIPE, FITTINGS AND SPECIAL ITEMS

PART 1 GENERAL

1.1 Description

Work under this Section applies to the furnishing and installation of ductile iron pipe, fittings and special items for buried service. The CONTRACTOR shall furnish and install ductile iron pipe, fittings, valves, special items and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents.

1.2 Reference Specifications, Codes, and Standards

A. Commercial Standards

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
NSF/ANSI Standard 61	Drinking Water System Components – Health Effects
ASTM A126	Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ANSI/AWWA C104	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C105/A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
ANSI/AWWA C110	Ductile-Iron and Gray-Iron Fittings
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C115/A21.15	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
ANSI/AWWA C150/A21.50	Thickness Design of Ductile-Iron Pipe

ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast
ANSI/AWWA C153/A21.53	Ductile-Iron Compact Fittings for Water Service
ANSI/AWWA C219	Bolted, Sleeve-Type Couplings for Plain-End Pipe
ANSI/AWWA C600	Installation of Ductile-Iron Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
ASTM A536	Standard Specification for Ductile Iron Castings

1.3 Submittals

- A. See Section 01300, Submittals, for submittal procedures.
- B. Product technical data and material data; including all pipe, fittings, restrained joint systems, and appurtenance information.
- C. Lining and coating data.
- D. Applicable material certifications and testing certificates.
- E. Manufacturer's handling, delivery, storage and installation requirements.

1.4 Quality Assurance

- A. Unless otherwise noted, all water works materials provided for the project shall be new, of first class quality and shall be made by reputable manufacturers. All material of a like kind shall be provided from a single manufacturer unless otherwise approved by the ENGINEER. All material shall be carefully handled and installed in good working order free from defect in manufacture, storage and handling. Where an item is to be used but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.
- B. All references to standards of AWWA or other organizations shall be the latest versions of those standards.

PART 2 PRODUCTS

2.1 General

- A. Ductile iron piping materials and specials shall meet the specifications of this Section and of the appropriate AWWA Standard Specifications. In the case of conflict, the more stringent specifications shall apply.
- B. Unless otherwise specified herein or shown on the plans, the minimum working pressure rating of all water works materials specified herein shall be 1.5 times the operating pressure or 180 psi minimum.
- C. All coatings and materials specified herein that come in contact with potable water shall be National Sanitation Foundation (NSF) approved.

2.2 Ductile Iron Pipe

- A. Ductile iron pipe shall conform to AWWA Standard C151 and shall be the standard push-on joint type or restrained joint type as identified on the drawings. Unless otherwise specified herein or shown on the plans, ductile iron pipe shall be thickness Class 52.
- B. All ductile iron pipe 24-inches in diameter or greater that is to be cut in the field shall be gauged full length and, along the full length, shall meet the outside diameter standard dimensions and tolerances required for spigot ends along the full length of pipe to within 2 feet of the bell end. Pipe shall be externally marked, in manufacturer's color, indicating gauged pipe. In addition to pipe supplied for anticipated cutting, a minimum of 5% of each size of piping 24-inches in diameter or greater shall be provided gauged full length as described above.
- C. Ductile iron pipe shall be cement mortar lined, interior and exterior sealed in accordance with AWWA C104.
- D. Push-on or mechanical type pipe joints shall conform to AWWA Standard C111. Flanged ductile iron pipe shall conform to AWWA Standard C115.
- E. Restrained Joint Ductile Iron Pipe
 - 1. Restrained joint ductile iron pipe and fittings shall be provided as identified on the drawings and required for the application. Joint restraint for pipe shall be accomplished with an integral lock mechanism except as may be otherwise specified. Any such system shall be a manufacturer's standard proprietary design, shall be as

recommended by the manufacturer for the application, and shall be performance proven.

2. Restraining components for pipe shall be ductile iron in accordance with applicable requirements of AWWA C110 and/or C153 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with AWWA C111.

The following is the approved list of restrained joint systems:

- a. "MEGALUG", EBAA Iron, Inc.
- b. "Field-Lok", United States Pipe and Foundry Company.

Where any restrained joint system requires the use of a wedge-type mechanical restraint gland for restraint, the glands shall be provided in quantities as may be required and shall be considered incidental to the joint restraint system. Restrained piping shall be pressurized following installation and prior to completing piping tie-ins. Wedge-type mechanical restraining glands shall not be used to restrain the plain end of plain end ductile iron or cast iron fittings.

3. Restrained joints for pipe shall be designed for a water working pressure as shown on the drawings.
4. Restrained joint for pipe shall be capable of being deflected after assembly as follows:

<u>Size</u>	<u>Maximum Deflection</u>
4	5.00°
6	5.00°
8	5.00°
10	5.00°
12	5.00°
14	3.25°
16	3.25°
18	3.00°
20	2.75°
24	2.25°
30	1.75°
36	1.50°
42	0.50°
48	0.50°
54	0.50°

2.3 Fittings and Specials

A. Fittings

1. Fittings used for joining ductile iron pipe shall be of the type, size and strength designated on the plans, elsewhere in the specifications, or in the proposal and, to the extent therein specified, shall conform to the appropriate specification in this section. Fittings shall have pressure ratings as specified above and as shown on the plans.
2. Fittings shall be mortar lined and seal coated. Mortar lining of fittings shall be factory installed only, unless otherwise directed by ENGINEER. All fitting lining interior surfaces shall be smooth finished.
3. Pipe fittings and specials used with ductile iron pipe shall be gray-iron or ductile iron and shall conform to AWWA Standard C110. Ductile iron (compact) fittings conforming to AWWA Standard C153 may be substituted in lieu of AWWA C110 fittings for fitting sizes 3-inches through 24-inches in diameter. Fittings shall be mechanical joint, push-on type, flanged or plain-end as required and as shown on the plans. When fitting joints are to be restrained, pipe joint restraint systems as specified herein shall be used.
4. Fittings shall have the following information cast upon them:
 - a. Manufacturer's identification
 - b. Country of manufacture
 - c. Pressure rating
 - d. Number of degrees or fractions of a circle (bends)

The OWNER may require additional metallurgical documentation or other certifications.

B. Flanges

Threaded flanges shall meet the requirement of AWWA Standard C115 and shall be installed only on pipe with a minimum Class 53 wall thickness. All flanged fittings shall be provided with bolts and gaskets as specified herein. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown. CONTRACTOR shall coordinate with pipe, valve and fitting suppliers to make certain that pipe, valve and fitting flanges match in bolt pattern.

C. Gaskets

Gaskets for flanged joints shall be as follows:

1. Pipe sizes up to 24-inch: Gaskets shall be full face gaskets, premium red SBR rubber, 1/8-inch thickness, Garlock 22 or equal.
2. Pipe sizes 24-inch and greater: Gaskets shall be ring gaskets (unless specified otherwise), premium red SBR rubber, 1/8-inch thickness, Garlock 22 or equal.

D. Bolts and Nuts

Bolts and nuts shall be carbon steel and shall conform to the requirements of ASTM A307 or ASTM A193 grade B7 with ASTM A194 grade 2H heavy hex nuts.

E. Flexible Couplings

1. All flexible couplings shall be of the bolted, sleeve-type and shall meet the requirements of AWWA C219. Couplings may be straight, transition or reducing configuration as shown on the drawings. Center rings and end rings shall be ductile iron meeting or exceeding the requirements of ASTM A536. Gaskets shall be virgin styrene butadiene rubber (SBR) compounded for water or sewer service in accordance with ASTM D 2000 MBA 710. Bolts and nuts shall be high strength low alloy steel conforming to AWWA C111. Couplings shall be lined and coated with fusion bonded epoxy. Flexible couplings shall be Style "501" with a fusion bonded epoxy lining and coating as manufactured by Romac Industries, Inc. or approved equal.
2. Insulating flexible couplings shall meet the above specification and, in addition, shall include an insulating boot. The insulating boot shall be ethylene propylene diene methylene (EPDM) compounded for water and sewer service and insulating properties in accordance with ASTM D 2000 MBA 715. Insulating flexible couplings shall be Style "IC501" with a fusion bonded epoxy lining and coating as manufactured by Romac Industries, Inc. or approved equal.
3. All flexible couplings shall be constructed to diameters that properly fit the connecting pipes. CONTRACTOR is responsible for selecting sleeve lengths appropriate to the application, subject to review and approval of the ENGINEER, recognizing that longer sleeves allow for larger deflections and may ease installation.

F. Flanged Coupling Adaptors

All flanged coupling adaptors shall meet the requirements of AWWA C219. End rings and flanged bodies shall be ductile iron meeting or exceeding the requirements of ASTM A 536. Flange shall be compatible with ANSI Class 125 and 150 bolt circles. Gaskets shall be virgin styrene butadiene rubber (SBR) compounded for water or sewer service in accordance with ASTM D 2000 MBA 710. Bolts and nuts shall be high strength low alloy steel conforming to AWWA C111. Couplings shall be lined and coated with fusion bonded epoxy. All flanged coupling adaptors shall be constructed to diameters that properly fit the connecting plain end pipe and the flanged fitting. Flanged coupling adaptors shall be Style "FCA501" with a fusion bonded epoxy lining and coating as manufactured by Romac Industries, Inc. or approved equal.

G. Insulating Flanged Joints

A complete insulating flange kit shall be installed at each insulating flanged joint. The kit shall include a full faced gasket, a full-length pyrox insulating sleeve for each flange bolt and two pyrox insulating washers and two steel washers for each bolt. Gaskets shall be Garlock Style 3000 or approved equal.

H. Tapping Sleeves and Tapping Valves

Tapping sleeves shall have a stainless steel body and flanged outlet. Stainless steel to be thick gauge ASTM A240 Type 304/304L or equal. Bolts and nuts to be Type 304 stainless steel. Unit shall have a Type 304 stainless steel test plug. Outlet shall be SBR per ASTM D2000 and compounded for water and sewer service use. Flanges shall be stainless steel, ASTM A240 Type 304, per AWWA C228 Class D plate flange, ANSI Class 150 drilling, with proper recessing for tapping valves. Flanges shall accommodate tapping flanges per MSS SP-60 and meet the requirements of MSS SP-124 and AWWA C223. Tapping sleeves shall be Model STS 420 as manufactured by Romac Industries, Inc. or approved equal.

Valves for tapping sleeves shall be resilient wedge tapping valves as specified in Section 15101.

I. Marking Tape

Marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. The tape shall be a minimum of 6-inches in width. The tape shall

be blue and shall be imprinted continuously over its entire length in permanent black ink with the words "Caution Buried Water Line Below".

J. Flexible Expansion Joints

Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall be provided with end connections as shown on the plans. All flexible expansion joints shall consist of an expansion joint designed and cast as an integral part of a ball and socket-type flexible joint, having a minimum of 15 degrees of deflection per ball and 4-inch expansion capacity. Actual expansion and deflection requirements will be as shown on the drawings. Each flexible expansion joint shall be hydrostatically tested to the manufacturer's published pressure rating prior to shipment. All pressure-containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be holiday tested with a 1,500 volt spark test conforming to that specification. All flexible expansion joints shall be Flex-Tend as manufactured by EBAA Iron, Inc. or approved equal.

K. Polyethylene Encasement

All ductile iron pipe and fittings and any appurtenances associated with the system including valves, couplings, insulating joints and all other buried metallic items shall be encased in polyethylene sheets or tubes. The polyethylene film shall be 8-mil thick linear low-density polyethylene (LLDPE). The polyethylene film shall meet the requirements of AWWA C105.

L. Tracer Wire

Tracer wire shall be No. 12 AWG solid copper wire with high molecular weight polyethylene (HMWPE) insulation. The HMWPE insulated cover shall be blue and shall have a minimum thickness of 45 mils.

PART 3 EXECUTION

3.1 General

- A. All materials, workmanship and installation shall conform to referenced AWWA Standards and other requirements of these specifications. The methods employed by the CONTRACTOR in the storage, handling, and installation of pipe, fittings, valves, hydrants, equipment and appurtenances shall be such as to insure that the material, after it is placed, tested and

permanently covered by backfilling is in as good a condition as when it was shipped from the manufacturer's plant. Should any damage occur to the material, repairs or replacement shall be made to the satisfaction of the ENGINEER.

- B. Ductile iron pipe shall be installed in accordance with AWWA Standard C600, except as modified elsewhere in these specifications. Trench excavation and backfill of ductile iron piping system shall conform with the requirements of Section 02222, Excavating, Backfilling and Compacting for Utilities.
- C. Sanitary Sewer Separation: The CONTRACTOR shall furnish all labor, equipment and materials required to replace sections of existing sanitary sewers or encase existing sanitary sewers in reinforced concrete as required to comply with Oregon Health Authority – Drinking Water Program requirements for minimum separation of water mains from sanitary sewers.

3.2 Thrust Restraint

- A. All tees, plugs, caps, bends, offsets, as well as other appurtenances which are subject to unbalanced thrust, shall be properly braced with concrete thrust blocks. Concrete thrust blocks shall have a minimum 28-day compressive strength of 3,000 psi. The concrete blocking shall bear against solid undisturbed earth at the side and bottom of the trench excavation and shall be shaped so as not to obstruct access to the joints of the pipe or fittings.
- B. Where shown on the plans or specified elsewhere in the Technical Specifications, the CONTRACTOR shall provide internal or external joint restraint systems at the fittings and on all joints within the specified or shown distance on each side of the fitting or joint.

3.3 Marking Tape

Marking tape shall be installed over all ductile iron pipelines. Marking tape shall be installed approximately 1 foot above the top of the pipe for its full length with the written warning words facing up.

3.4 Polyethylene Encasement

Polyethylene encasement of ductile iron pipe and fittings and buried metallic items shall be accomplished in accordance with AWWA C105.

3.5 Testing and Disinfection of Ductile Iron Pipe Mains

- A. Testing and disinfection of ductile iron pipe mains shall be done in accordance with Section 01650, Pipeline Testing and Disinfection, AWWA Standard C600, and AWWA Standard C651.

- B. All chlorinated water used in disinfection of water mains shall either be discharged through an approved connection to a public sanitary sewer system or shall be dechlorinated to limits acceptable by the Oregon State Department of Environmental Quality (DEQ) prior to discharge into any storm drainage system or open drainageway. No chlorinated water shall be discharged into a storm drainage system or an open drainageway without a dechlorination plan meeting DEQ's requirements.

END OF SECTION

SECTION 02800

STEEL FENCES AND GATES

PART 1 GENERAL

1.1 Description

This Section covers all work necessary to construct new steel fencing and gates as shown on the Plans or specified elsewhere. All fences and gates shall be furnished with top rails and knuckled periphery edges.

1.2 Submittals

Submit shop drawings for steel fences and gates, including plan layout and details illustrating fence height, location, and sizes of posts, rails, braces, gates and footings, appurtenances, hardware list and erection procedures.

1.3 Reference Specifications, Codes and Standards

Comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric", and "Industrial Steel Specifications for Fence-Posts, Gates and Accessories", and as specified herein. Requirements stated herein take precedence. Provide each type of steel fence and gate as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings.

PART 2 PRODUCTS

2.1 Materials

A. Fabric

Fabric shall be continuous chain link fence, height as shown on the plans, having a 2-inch mesh, #9 gauge copper bearing steel wire. Top and bottom selvage shall be knuckled finish. It shall be galvanized after weaving and the zinc coating shall not be less than 1.2 ounces per square foot. Fabric shall be covered with a minimum 15 mils of PVC coating, colored black. All mesh shall have knuckled periphery to eliminate sharp appendages.

B. Line Posts

Line posts shall be hot dipped galvanized 2.375" O.D. hot dipped galvanized pipe, weighing 3.65 pounds per lineal foot, and coated with 10 to 15 mils of PVC, colored black. Line posts shall be spaced not further than 10-foot on-center.

C. Terminal Posts

End, corner and pull posts shall be hot dipped galvanized pipe 2.875 inches O.D. and weighing not less than 5.79 pounds per lineal foot and coated with 10 to 15 mils of PVC, colored black.

D. Top Rail

Top rail shall be hot dipped galvanized 1.660 inch O.D. pipe, weighing 1.806 pounds per lineal foot coated with 10 to 15 mils of PVC, colored black and shall be furnished in random lengths of approximately 20 feet. They shall be jointed using a pressed steel or malleable sleeve, not only allowing for expansion and contraction, but also providing a continuous brace from end to end of each stretch of fence.

E. Tension Wire

Bottom tension wire shall be #7 gauge heavy galvanized high carbon steel coil spring wire, securely fixed to the fabric, line posts and terminal posts.

F. Braces

All terminal posts shall be braced with 1.660 inch O.D. horizontal pipe bracing of the same material as the top rail, securely attached to the terminal and first line post with malleable iron fittings. They shall be truss braced from the first line post to the bottom of the terminal post, with a 3/8-inch galvanized truss rod assembly. Corner posts shall be braced in both directions.

G. Fittings

Hot dip galvanized. All fittings to be malleable, cast iron or pressed steel.

H. Fabric Ties

#11 gauge galvanized wire ties shall be used to tie the fabric to the line posts and rails. Space ties at 14 inches on-center (O.C.).

I. Gates

Gate frames to be made of heavy galvanized 1.90 inch O.D. pipe, weighing 2.72 pounds per lineal foot. Corner fittings, ball and socket hinges, catch stops and center rest to be heavy galvanized malleable iron. Hinges as required. Provide diagonal cross-bracing. Gates shall have 3-inch clearance above ground surface and sized for the application shown. Gate fabric, frame, and posts shall be covered with a minimum 15 mils of PVC coating, colored black.

J. Gate Posts

Posts shall be hot dipped galvanized pipe 2.875-inch O.D. weighing 5.79 pounds per lineal foot, and coated with 10 to 15 mils of PVC, colored black.

K. Framework Material

All posts, rails and braces to be heavy galvanized and coated with 10 to 15 mils of PVC, colored black.

L. Lock Assembly and Gate Stop

Provide for each gate one (1) double-hasp drive gate drop rod lock assembly set in concrete and one (1) gate stop set in concrete. All lock assemblies and gate stops shall be fabricated from heavy galvanized malleable iron. Provide one vandal-proof keyed lock and 3 keys for each gate assembly.

PART 3 EXECUTION

3.1 Installation

- A. All materials and workmanship shall be first class in all respects and shall be done in a neat and workmanlike manner. Installation shall be conducted in accordance with the requirements of the Chain Link Fence Manufacturers Institute and these plans and specifications.
- B. All line, terminal, gate stops, gate drop, and gate posts shall be fixed with a minimum of 3-foot embedment in concrete poured into a 1-foot diameter hole and plumb upon curing of the concrete.

END OF SECTION

SECTION 03400

PRECAST CONCRETE

PART 1 GENERAL

1.1 Description

- A. This section covers the furnishing and installation of precast vaults, manholes and wetwells.
- B. The drawings identify precast vaults by manufacturer and model number. This information is provided for dimensional information only. The CONTRACTOR shall provide precast items in accordance with these specifications.
- C. The CONTRACTOR shall construct all precast items as required in the Contract Documents, including all appurtenances necessary to make a complete installation.
- D. This section does not include prestressed or cast-in-place concrete items.

1.2 Codes and Standards

Comply with the provisions of the following codes, specifications and standards except as otherwise shown or specified.

- A. General: The latest edition of all specifications, codes, and standards listed herein shall be used.
- B. Codes: All design and construction shall meet the requirements of the Uniform Building Code except where local codes or the Contract Documents are more restrictive.

C. Commercial Standards

ACI 301	Specifications for Structural Concrete for Buildings
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete
ASTM C150	Specification for Portland Cement

ASTM A 48	Specification for Gray Iron Castings
ASTM C 478	Precast Reinforced Concrete Manhole Sections
ASTM C 923	Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes
CRD-C 621	Corps of Engineers - Specification for Non-Shrink Grout

1.3 Submittals

- A. The CONTRACTOR shall submit design calculation and shop drawings for all precast concrete items. Submitted drawings shall show all dimensions, location and type of lifting inserts, details of reinforcement, connection embeds, joints, covers or hatches, ladders and grating in accordance with the Contract requirements.
- B. CONTRACTOR shall submit design calculations stamped by a registered professional engineer for the wetwell top slab design.
- C. For all precast items which are manufactured, the CONTRACTOR shall also submit a list of the design criteria used by the manufacturer.

1.4 Quality Assurance

Quality assurance shall be in accordance with the standards identified in 1.2 C of this section.

PART 2 PRODUCTS

2.1 General

The design and construction of all precast items shall be in accordance with the recommendations and requirements of ACI 301, ACI 315 and ACI 318.

2.2 Precast Vaults

- A. Vaults covered by this section include, but are not limited to, valve vaults, meter vaults, electrical manholes and pull boxes.
- B. Size: Vault dimensions shall be as required by the Drawings.

- C. **Material:** Concrete used for manufactured vaults shall have a minimum 3,000 pounds per square inch (psi) compressive strength at 28 days. Cement used shall be ASTM C150, Type II. Concrete shall have a maximum water-cement ratio of 0.50 and an air content of four (4) to six (6) percent.
- D. **Construction:** The vaults may be formed with separate top and bottom slabs. Walls shall be cast so that all sides are continuous at corners and their full length with no blockouts or knockouts. Horizontal joints may be provided so that walls can be placed in horizontal segments. All horizontal joints shall be keyed to prevent offsets and shall be provided with a watertight gasket.
- E. **Finish:** Formed surfaces shall be smooth and uniform with no fins, bulges, or other irregularities. Any void greater in width than 1/2-inch or deeper than 3/8-inch shall be repaired. Unformed interior slab surfaces shall have a smooth steel trowel finish. Unformed exterior slab surfaces shall have a light broom finish applied to a steel trowel finish.
- F. **Access Hatches and Lids:** Unless noted otherwise elsewhere in the Contract Documents, vaults shall have concrete top slabs with access openings as shown on the plans. The vault manufacturer shall provide the access hatches. Lids shall have lifting holes. When leveling bolts are used to set the vault top sections, the CONTRACTOR shall ensure that the load from the top slab is transferred through grout to the vault walls so that the load is not carried by the leveling bolts.
- G. **Loadings**
1. **Vertical:** Vaults shall be designed for H-20 traffic loading. Where the vault is below grade, a dead load of 125 pounds per cubic foot (pcf) shall be added for the soil.
 2. **Lateral:** Lateral loads on all vault walls shall be as follows:

Static: $105 \times H$ (psf) triangular equivalent fluid pressure plus a surcharge of an additional three (3) feet of soil depth in areas subject to vehicular traffic (assume traffic load in all areas unless indicated otherwise by the Contract Documents).

Where H = depth of fill

Seismic acceleration: UBC Zone 3 requirements ($I = 1.25$) where I = importance factor, $I = 1.25$, but not less than 0.20 g acting on structure mass. Seismic loading need not be considered simultaneously with traffic surcharge.

3. Hatches: Unless indicated otherwise elsewhere in the Contract Documents, hatches shall be designed for H-20 traffic loading.
- H. Mechanical Details: Piping, electrical, and other details shall be as required by the Contract Documents. No blockouts or knockouts shall be cast into vault walls. All pipe penetrations shall be preformed or core drilled at the required locations.
- I. Accessories: Accessories such as ladders, floor grates at sumps, and other features shall be provided as shown on the drawings.
- J. Precast concrete vaults shall be by Utility Vault Company or approved equal.

2.3 Precast Concrete Manholes

- A. Precast concrete pipe manhole sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to ASTM C-478. Minimum wall thickness shall be four (4) inches. Cones shall have the same wall thickness and reinforcement as riser sections. Reinforcing in transition sections shall be equal to that specified for wall sections of the larger diameter.
- B. Precast manhole sections shall consist of circular sections in standard nominal inside diameters of 42, 48, 54, 60, 72, 84 or 96 inches. Heights of sections shall be in multiples of 12 inches. Diameter and type shall be as specified on the plans.
- C. Openings for connecting pipes in riser sections, bottom riser sections, and integral base sections, and for access in flat slabs shall be preformed or cored by the manufacturer. All rigid non-reinforced pipe entering or leaving the manhole (new or existing manhole) shall be provided with flexible joints within 1-foot of the manhole structure.
- D. Precast integral base sections shall be of monolithic construction, conforming to ASTM C-478.
- E. Specified manhole steps shall be factory installed to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall be placed in the forms and cast in pipe wall or placed immediately after the pipe is removed from casting and carefully mortared in place with non-shrink mortar to ensure a watertight joint. If the outer surface of the pipe wall is pierced, the patch shall be completely covered with a bituminous sealer.
- F. Where pressure tight manhole frames and covers are called for, threaded inserts shall be cast in eccentric cones or flat slab tops and holes formed or

cored in adjusting rings to match bolt size and spacing specified for manhole casting.

- G. Manhole Steps: Manhole steps shall be of polypropylene plastic reinforced with a 1/2-inch No. 60 grade reinforcing rod as specified elsewhere in this document.
- H. Manhole Frames and Covers
 - 1. Manhole covers shall be designed so they may be secured to the frames. Matching surfaces of covers and frames shall be flat to prevent any movement of covers within the frames. Covers and frames shall be interchangeable.
 - 2. Manhole cover and frame shall conform to ASTM A-48, Class 30B cast iron construction, machined flat bearing surface, removable lid with air vent, closed lid design, rated for H-20 loading and in accordance with manufacturer's specifications. The foundry shall certify as to the tensile and transverse properties and the Brinell hardness.

2.4 Precast Concrete Wetwells

- A. Precast concrete wetwell sections, transition sections, flat slab tops, and adjusting rings shall conform to ASTM C-478 and shall have a minimum 4,000 psi compressive strength at 28 days. Minimum wall thickness shall be eight (8) inches. Reinforcing in transition sections shall be equal to that specified for wall sections of the larger diameter concrete.
- B. Precast wetwell sections shall consist of circular sections in standard nominal inside diameters ranging from 48 inches in diameter to 144 inches in diameter. Heights of sections shall be in multiples of 12 inches. Diameter and type shall be as specified on the Plans.
- C. Openings for connecting pipes in riser sections, bottom riser sections, and integral base sections, and for access in flat slabs shall be preformed or cored by the manufacturer. No openings shall be made within six (6) inches of a wetwell joint. All rigid non-reinforced pipe entering or leaving the wetwell shall be provided with flexible joints within one foot of the wetwell structure.
- D. Precast integral base section shall be of monolithic construction, conforming to ASTM C-478. Base slab shall be a minimum of 12 inches thick. Dimensions shall be as shown on plans.

- E. Top slab shall be designed for H-20 loading and shall be a minimum of 12 inches thick. Top slab shall be designed and stamped by a registered Oregon Professional Engineer.

2.5 Joint Materials

- A. Mortar used for the structures herein specified shall conform to ASTM C-387. Admixtures may be used not exceeding the following percentages of weight of cement: hydrated lime, 10 percent; diatomaceous earth or other inert materials, five (5) percent. The consistency of the mortar shall be such that it will readily adhere to the precast concrete if using the standard tongue and groove type joint. Mortar mixed for longer than 30 minutes shall not be used.
- B. Non Shrinking Grout: Non-shrink grout shall be Preco-Patch, Sika 212, Euco N-S, Five-Star, or approved equal non-metallic cementitious commercial grout exhibiting zero shrinkage per ASTM C-827 and CRD-C-621. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.
- C. Non-shrink grout shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout used. Water shall not be used as a substitute for the commercial bonding agent.
- D. Rubber gaskets shall conform to ASTM C 443.
- E. Preformed mastic gaskets for vault, manhole and wetwell joints shall meet Federal Specification SS-S-00210 (210-A) and AASHTO M-198B.
- F. Waterproof sealant for vault pipe penetrations shall be Vulkem 921 or approved equal.

PART 3 EXECUTION

3.1 General

- A. The CONTRACTOR shall design the method of placement for all precast items and shall add all reinforcing steel, embedments, bracing, and other items necessary for such placement. All portions of embeds which remain embedded in the concrete shall be made of stainless steel.

- B. The CONTRACTOR shall safely install all precast items with no damage to the precast item or any other structure, piece of equipment, or appurtenance.
- C. Precast structures shall be installed in accordance with the manufacturer's recommendations, unless otherwise required by the Contract Documents.
- D. Subgrade Preparation: Subgrade shall be compacted to 95 percent of maximum density and covered with a minimum of six (6) inches of aggregate base which is also compacted to 95 percent of maximum density. The aggregate base shall be graded to a uniform, level surface to fully support the structure and to an elevation that will assure proper positioning of the top slab or lid.
- E. Joints: All joints for vaults, manholes and wetwells shall be sealed watertight by the use of rubber gaskets or preformed sealant. All joints shall then be filled with non-shrink grout inside and out to produce smooth interior and exterior surfaces.

3.2 Precast Vaults

Pipe Penetrations: Pipe penetrations shall be located and sealed as shown on the drawings. All pipe penetrations shall be preformed or core drilled to produce a smooth hole to allow for the installation of the specified sealing device. Where specified, pipe penetrations shall be sealed with a Link Seal as manufactured by Thunderline or approved equal. All such connections shall be watertight.

3.3 Precast Concrete Manholes and Wetwells

- A. All rigid non-reinforced pipe entering or leaving the manhole (new or existing manhole) or wetwell shall be provided with flexible joints within one foot of the structure and shall be placed on compacted bedding. Concrete pipe and ribbed HDPE pipe connections to manholes shall be grouted watertight with non-shrink grout. PVC pipe shall be connected to manholes using an approved adapter specifically manufactured for the intended service. Adapters shall be Kor-N-Seal or approved equal
- B. Concrete Base Installation
 - 1. Bases shall be set at the proper grade to allow pipe openings to match the grades for connecting pipes. The invert shall be constructed to a section identical with that of the sewer pipe. Where the size of sewer pipe is changed at the manhole, the invert shall be constructed to form a smooth transition without abrupt breaks or unevenness of the invert surfaces. Where a full section of concrete sewer pipe is laid through the

manhole, the top shall be broken out to the spring line of the pipe for the full width of the manhole, and the exposed edge of the pipe completely covered with mortar. During construction, the CONTRACTOR shall prevent sewage or water from contacting the new concrete or mortar surfaces to prevent damage to the fresh concrete or mortar until the initial set has been achieved.

2. Manhole and wetwell bases shall be set level so that base gravel fully and uniformly supports them in true alignment with uniform bearing throughout full circumference. Do not level the base sections by wedging gravel under the edges.
3. Flexible connectors shall be installed in the base section to form a permanently watertight seal.

C. Manhole and Wetwell Riser Sections

1. Precast manhole components may be used to construct standard, drop and carry-through manholes. Manholes less than four (4) feet in depth measured from the spring line of the pipe to the bottom of the lower riser ring shall be flat-top manholes.
2. Install manhole riser sections at the location shown on the plans. All sanitary sewer and pollution control manholes joints shall be watertight and shall use rubber gaskets or a preformed sealant. All joints shall then be filled with non-shrink grout inside and out so as to produce smooth interior and exterior surfaces. All manhole penetrations shall be watertight. Complete manholes shall be rigid. Compact backfill in accordance with the provisions stated elsewhere in this document.
3. All lift holes shall be thoroughly wetted, completely filled with mortar, and smoothed and pointed both inside and out to ensure watertightness.
4. The shortest length of riser section to be incorporated into the manhole shall be installed immediately below the flat slab top or cone.
5. Properly locate and plumb each manhole riser section.
6. Install manhole extensions and top slabs in accordance with manufacturer's specifications and as shown on the plans. Lay section risers with the sides plumb and the tops level. Make joints and penetrations watertight.

D. Grates, Frames, and Covers

1. Manhole frames, grates and covers shall be installed in such a manner as to prevent infiltration of surface or groundwater between the frame and the concrete of the manhole section. Use preformed rubber ring to form a watertight seal.
2. Manhole frames and covers shall be installed to grades shown on the drawings or as directed.
3. Adjustment of manhole castings shall be made using specified precast grade rings and approved rubber ring joints.
4. The maximum depth of adjustment below any manhole casting shall be 16 inches, and a minimum depth of adjustment shall be four (4) inches.

E. Manhole and Wetwell Hydrostatic Test

The hydrostatic testing of manholes and wetwells shall consist of plugging all inlets and outlets and filling the manhole or wetwell with water. The manhole or wetwell shall be filled to the rim at the start of the test. Leakage in the manhole or wetwell shall not exceed 0.2 gallons per foot of head above the invert after a one-hour test period. Leakage shall be determined by refilling to the rim using a calibrated known volume container. The manhole or wetwell may be filled 24 hours prior to the time of testing to permit normal absorption into the walls.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.1 Description

- A. The CONTRACTOR shall furnish all materials for grout in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished grout, in accordance with the requirements of the Contract Documents.
- B. Work covered in this section includes:
 - 1. Removal of loose and spalling grout and concrete.
 - 2. Anchoring, patching, grouting, and sealing.
- C. The following types of grout shall be covered in this section:

Non-shrink grout: This type of grout is to be used wherever grout is required in the Contract Documents, unless another type is specifically referenced.

1.2 Reference Specifications, Codes, and Standards

- A. Specifications, codes, and standards shall be as specified in Section 03100, "Concrete Work," and as referred to herein.
- B. Commercial Standards

CRD-C 621 Corps of Engineers Specification for Non-Shrink Grout

ASTM C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)

ASTM C 531 Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical - Resistant Mortars, Grouts, and Monolithic Surfacing

ASTM C 579 Test Methods for Compressive Strength for Chemical - Resistant Mortars and Monolithic Surfacing

ASTM C 827 Test Method for Early Volume Change of Cementitious Mixtures

1.3 Contractor Submittals

The CONTRACTOR shall submit certified test results verifying the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of non-shrink and epoxy grout used in the work.

1.4 Quality Assurance

Field Tests

- A. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the ENGINEER to insure continued compliance with these specifications. The specimens will be made by the ENGINEER or its representative.
- B. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the ENGINEER. A set of three specimens will be made for testing at seven (7) days, 28 days, and each additional time period as appropriate.
- C. All grout, already placed, which fails to meet the requirements of these specifications, is subject to removal and replacement at the cost of the CONTRACTOR.
- D. The cost of all laboratory tests on grout shall be borne by the CONTRACTOR and the CONTRACTOR shall obtain the specimens for testing. The CONTRACTOR shall also be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The CONTRACTOR shall supply all materials necessary for fabricating the test specimens.

PART 2 PRODUCTS

2.1 Prepackaged Grouts

Non-Shrink Grouts

- A. Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in

which the materials are packaged. The specific formulation of each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.

- B. Class A non-shrink grouts shall have minimum 28 day compressive strength of 5000 psi; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C-827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRDC 621.
- C. Class B non-shrink grouts shall have minimum 28 day compressive strength of 5000 psi and shall meet the requirements of CRD C621.
- D. Application
 - 1. Class A non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at all locations where grout is specified in the contract documents; except, for those applications for Class B non-shrink grout specified herein. Class A non-shrink grout may be used in place of Class B non-shrink grout for all applications.
 - 2. Class B non-shrink grout shall be used or the repair of all holes and defects in concrete members which are not water-bearing and not in contact with soil or other fill material, grouting under all base plates for structural steel members, and grouting railing posts in place.

2.2 Consistency

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where “dry pack” is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.
- B. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed four (4) inches.

2.3 Measurement of Ingredients

- A. Measurements for cement grout shall be made accurately by volume using containers approved by the ENGINEER. Shovel measurement shall not be allowed.

- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 EXECUTION

3.1 General

- A. All surface preparation, curing, and protection of cement grout shall be as specified by the manufacturer. The finish of the grout surface shall match that of the adjacent concrete.
- B. The manufacturer of Class A non-shrink grout shall provide on-site technical assistance upon request.
- C. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the ENGINEER.

3.2 Grouting Procedures

Prepackage Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution of prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

END OF SECTION

SECTION 09800

PROTECTIVE COATINGS

PART 1 GENERAL

1.1 The Requirement

- A. Work under this Section shall include the protective coating of all specified surfaces including all surface preparation, pretreatment, coating application, touch-up of factory coated surfaces, protection of surfaces not to be coated, cleanup, and appurtenant work, all in accordance with the requirements of the Contract Documents.
- B. The Coating System Schedules summarize the surfaces to be coated, the required surface preparation and the coating systems to be applied. Coating notes on the drawings are used to show exceptions to the schedules, to show or extend the limits of coating systems, or to clarify or show details for application of the coating systems.
- C. Related Work Specified in Other Sections -- Shop coatings and/or factory finishes on fabricated or manufactured equipment may be specified in other divisions. Some items with factory finishes, or corrosion resistant finishes may be scheduled or directed to be painted by the ENGINEER to unify a wall finish or color scheme, at the ENGINEER's discretion.
- D. Exclusions -- Do not coat the following surfaces unless specified or directed elsewhere: Stainless steel, aluminum, copper, brass, bronze and other corrosion-resistant material (except for valve bodies and piping); Electrical switch-gear and motor control centers having factory finish; Fencing; Multiple coated factory finished baked enamel or porcelain products; Concealed areas such as ducts, piping, conduits and items specified elsewhere for special linings and coatings.
- E. Damaged Factory Finish -- If directed by the ENGINEER, refinish the entire exposed surfaces of equipment chipped, scratched or otherwise damaged in shipment or installation.
- F. All coating coming in contact with potable water shall be NSF approved.

1.2 Reference Specifications, Codes and Standards

- A. Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified.
1. "Architectural Specification Manual" by the Painting and Decorating Contractors of America (PDCA), 333 Taylor Avenue North, Seattle, Washington 98109.
 2. "Systems and Specifications" - Volume 2 of Steel Structures Painting Council (SSPC).
 3. National Sanitation Foundation (NSF) Standard No. 61.
- B. References herein to "NACE" shall mean the published standards of the National Association of Corrosion Engineers, P.O. Box 986, Katy, TX 77450.
- C. Pipe Coating Commercial Standards
- | | |
|----------------|---|
| ANSI/AWWA C105 | Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids. |
| ANSI/AWWA C203 | Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied. |
| ANSI/AWWA C205 | Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4-inch and Larger - Shop Applied |
| ANSI/AWWA C209 | Cold Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Pipelines. |
| ANSI/AWWA C210 | Liquid Epoxy Coating for Exterior and Interior of Steel Pipe. |
| ANSI/AWWA C213 | Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines. |
| ANSI/AWWA C214 | Tape Coating systems for the Exterior of Steel Water Pipelines. |

D. Federal Specifications

DOD-P-23236A(SH) Military Specification, Paint Coating Systems,
Steel Ship Tank, Fuel and Salt Water Ballast.

1.3 CONTRACTOR Submittals

- A. Coating Materials List -- The CONTRACTOR shall provide a coating materials list which indicates the manufacturer and the coating number, keyed to the coating systems herein. The amount of copies to submit shall be as specified within Section 01100, Special Provisions.
- B. Coating Manufacturer's and Applicator Information -- For each coating system to be used the CONTRACTOR shall submit, the following listed data.
1. Manufacturer's data sheet for each product used, including statements on the suitability of the material for the intended use.
 2. Manufacturer's instructions and recommendations on surface preparation and application.
 3. Colors available for each product and each coat.
 4. Compatibility of shop and field applied coatings (where applicable).
 5. Material safety data sheet (MSDS) for each product used.
 6. The manufacturer's recommended products and procedures for field coating repairs and field preparation of field cut pipe ends.
 7. The name of the proposed coating applicator shop along with certification that the applicator shop is qualified and equipped to apply the coatings systems as specified.
 8. Certificate -- Submit manufacturer's certificate of compliance with the specifications and standards signed by a representative in the manufacturer's employ.
 9. Samples -- Provide painted surface areas at the job for approval of main color selections, or submit sample on 12-inch sample of substrate using required finish system at ENGINEER's discretion.

1.4 Quality Assurance

- A. The CONTRACTOR shall give the ENGINEER a minimum of 3 days advance notice of the start of any field surface preparation work of coating application work, and a minimum of 7 days advance notice of the start of any shop surface preparation work.
- B. All such work shall be performed only in the presence of the ENGINEER, unless the ENGINEER has granted prior approval to perform such work in its absence.
- C. Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the work, shall not relieve the CONTRACTOR of its responsibility to perform the work in accordance with these Specifications.
- D. Surface Preparation -- Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standard TM-01-70.
- E. Scaffolding shall be erected and moved to locations where requested by the ENGINEER to facilitate inspection. Additional illumination shall be provided by the CONTRACTOR to cover all areas to be inspected.
- F. Paint Products -- No request for substitution shall be approved which decreases the film thickness designated or the number of coats to be applied, or which offers a change from the generic type of coating specified. Painting shall be done at such times as the CONTRACTOR and ENGINEER may agree upon in order that dust-free and neat work be obtained. All painting shall be in strict accordance with the manufacturer's instructions and shall be performed in a manner satisfactory to the ENGINEER.
- G. Manufacturer's Representative -- Require coating manufacturer's representative to be at job site when the first day's coating application is in progress and periodically during progress of the work.
- H. Labels -- Deliver to the job site in the original sealed containers with manufacturer's name, product name, type of product, manufacturer's specification or catalog number or federal specification number, and instructions for reducing where applicable.
- I. Colors -- Colors will be selected from manufacturer's standard colors as reviewed by ENGINEER and approved by the OWNER. Colors for special coatings that are limited in their availability and color selection will be chosen on the basis of manufacturer's standard colors, provided that the manufacturer's

product line represents a color range comparable to similar products of other manufacturers.

- J. Flame Spread -- Provide paint materials which will result in a Class II finish for all coated surfaces in exit corridors, and a Class III finish for all other interior rooms or areas.
- K. Film Thickness Testing -- On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gage such as Mikrotest model FM, Elcometer model 111/1EZ, or approved equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using wet film gage readings and destructive film thickness tests.

1.5 Delivery, Handling and Storage

- A. Deliver in labeled containers as specified above and store in a locked room accessible for inspection. Comply with fire and health regulations.
- B. Provide adequate heat and forced mechanical ventilation for health, safety and drying requirements. Use explosion proof equipment. Provide face masks.
- C. Protect adjacent surfaces with suitable masking and drop cloths as required. Remove cloths or waste from the project daily.
- D. Apply to surfaces under recommended environmental conditions and within the limitations established by the material manufacturer. Do not apply coating in snow, rain, fog or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces, unless otherwise permitted by the coating manufacturer's printed instructions. Coating application may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

1.6 Protection

- A. Follow all safety recommendations of manufacturer regarding ventilation and danger from explosion or breathing paint fumes or skin exposure, and all applicable O.S.H.A. and other regulations.
- B. Protect surface adjacent to work being coated from overspray, drips or other damage.

1.7 Extra Stock

Provide one gallon of each type and color, fully labeled, at completion of job.

PART 2 PRODUCTS

2.1 General

- A. Definitions -- The terms "paint," "coatings" or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, tape and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness.
- B. General -- Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use.
- C. The CONTRACTOR shall use coating materials suitable for the intended use and recommended by their manufacturer for the intended service.
- D. Compatibility -- In any coating system only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the ENGINEER, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.
- E. Colors -- All colors and shades of colors of all coatings shall be as selected or specified by the ENGINEER. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the ENGINEER. Color pigments shall be lead free.
- F. Protective Coating Materials -- Products shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the CONTRACTOR shall provide the ENGINEER with the names of not less than 10 successful applications of the proposed manufacturer's products demonstrating compliance with this specification requirement.
- G. Substitute or "Or-Equal" Submittals -- Unless otherwise specified, materials are from the catalogs of the companies listed herein. Materials by other

manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the companies listed. The CONTRACTOR shall provide satisfactory documentation from the firm manufacturing the proposed substitute or "or equal" material that said material meets the specified requirements and is equivalent or better than the listed materials.

- H. The cost of all testing and analyzing of the proposed substitute materials that may be required by the ENGINEER shall be paid by the CONTRACTOR. If the proposed substitution requires changes in the contract work, the CONTRACTOR shall bear all such costs involved and the costs of allied trades affected by the substitution.

2.2 Industrial Coating Systems

A. General

Provide and apply the industrial coatings systems which follow as listed in the coating schedule, as required by these specifications and as directed by the ENGINEER. Coat all existing and new exposed interior or exterior surfaces and submerged and intermittently submerged surfaces as indicated, except as specifically excluded in Part 1 of this section or on the drawings or finish schedules. Coating System Numbers listed below shall be used as the Coating System code letter, and shall be used on any coating submittals or correspondence.

B. Industrial coating systems shall be as follows

1. Coating System 100

- a. Location -- Exposed, unprimed, non-galvanized, nonsubmerged metal surfaces, both interior and exterior including piping and structural steel.
- b. Surface Preparation -- As specified herein.
- c. Coating System -- Apply prime coat and topcoat, 4.0-6.0 mils each coat of Tnemec Series 66-2 Hi-Build Epoxoline, or approved equal. Color as selected by Owner.

2. Coating System 101
 - a. Location -- Exposed metal surfaces, shop primed, both interior and exterior including piping, railings, ladders, steel doors, and any other metal items not otherwise specified.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Apply shop prime coat 3.0 mils DFT Tnemec Series 90-97 Tneme-Zinc, one coat 4.0 - 6.0 mils DFT Tnemec Series 66 Hi-Build Epoxoline, and 3.0 - 4.0 mils DFT of Tnemec Series 175 Endura Shield, or approved equal. Color as selected by Owner.

3. Coating System 102
 - a. Location -- Unprimed or non-galvanized, continuously or intermittently submerged metal items, both interior and exterior including piping, structural steel and all other metal items not otherwise specified.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Prime, intermediate and topcoat, 4.0-6.0 mils each coat of Tnemec Series 20 Pota-Pox, or approved equal. Color as selected by Owner.

4. Coating System 103
 - a. Location -- Vertical concrete walls, exterior, below finish grade, not exposed to view.
 - b. Surface Preparation -- As specified herein.
 - c. Paint System -- Apply two coats 9.0-10.0 mils each, Carboline Bitumastic 50, or approved equal.

5. Coating System 104
 - a. Location - Nonsubmerged, exposed to view, PVC piping.
 - b. Surface Preparation -- As specified herein.

- c. Coating System -- Apply one coat, 4.0-6.0 mils Tnemec Series 66-2 Hi-Build Epoxoline, or approved equal. Color as selected by Owner.

2.3 Special Pipe and Severe Service Coating Systems

A. General

The following coatings are for buried pipe and surfaces used in severe service conditions. The manufacturers' products listed in this paragraph are materials which satisfy the material descriptions of this paragraph and have a documented successful record for long term submerged or severe service conditions. Proposed substitute products will be considered as indicated within the paragraph entitled " 'Or-Equal' Clause" in Section 01100, Special Provisions.

B. Special pipe and severe service coating systems shall be as follows

1. Coating System 200 -- Cement Mortar Coating

- a. Location -- Exterior surfaces of buried steel pipe and fittings, non-galvanized.
- b. Surface Preparation - As specified herein.
- c. Coating System -- A 1-1/2-inch minimum thickness mortar coating reinforced with 3/4-inch galvanized welded wire fabric shall be provided. The cement mortar shall contain no less than one part Type V cement to 3 parts sand. The cement mortar shall be cured by a curing compound meeting the requirements of "Liquid Membrane-Forming Compounds for Curing Concrete" ASTM C 309-81, Type II, white pigmented, or by enclosure in an 8-mil thick polyethylene sheet with all joints and edges lapped by at least 6 inches. At the ENGINEER's discretion, the hot applied coal tar epoxy coating may be used as the curing membrane for the mortar coating.

2. Coating System 201 -- Hot Applied Coal Tar Epoxy Coating

- a. Location -- Exterior surface of concrete pipe and cement-mortar coated pipe and fittings.
- b. Surface Preparation -- As specified herein.

- c. Coating System -- The hot applied coal tar epoxy shall be a solvent free 100 percent solids coal tar epoxy chemically compatible with hydrating cement and suitable for application on moist surfaces of freshly placed cement mortar or concrete and properly prepared cured surfaces. The coal tar epoxy coating material shall be Amercoat 1972B or approved equal. The finish coal tar epoxy coating shall have a minimum DFT of 26 mils.
3. Coating System 202 -- Coal-Tar Epoxy Coating System
- a. Location -- Exterior surface of buried steel pipe, fittings and other ferrous surfaces.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- High build, 2-component amine or polyamide cured coal-tar epoxy shall have a solids content of at least 68 percent by volume, suitable as a long term coating of buried surfaces, and conforming to AWWA C210. Prime coats are for use as a shop primer only. Prime coat shall be omitted when both surface preparation and coating are to be performed in the field. The coal-tar epoxy coating system shall include:
 - i. Prime coat (DFT = 1.5 mils), Amercoat 83HS, Tnemec P66, or equal.
 - ii. Finish coats (2 or more, DFT = 18 mils), Amercoat 78 HB, Tnemec 46 H-413, or equal.
 - iii. Total system DFT = 19.5 mils.
4. Coating System 203 -- Fusion Bonded Epoxy
- a. Location -- Ferrous surfaces of sleeve couplings, steel pipe and fittings.
 - b. Surface Preparation -- As specified herein.

- c. Coating System -- The coating material shall be a 100 percent powder epoxy applied in accordance with the ANSI/AWWA C213 "AWWA Standard for Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines". The coating shall be applied using the fluidized bed process.
 - i. Liquid Epoxy -- For field repairs, the use of a liquid epoxy will be permitted, applied in not less than 3 coats to provide a DFT 16 mils. The liquid epoxy shall be a 100 percent solids epoxy recommended by the powder epoxy manufacturer.
 - ii. Coating (DFT = 16 mils), Scotchkote 203, or equal.
 - iii. Total system DFT = 16 mils.

- 5. Coating System 204 -- Hot, Coal-Tar Enamel
 - a. Location -- Exterior surfaces of buried steel pipe and fittings, non-galvanized.
 - b. Surface Preparation - As specified herein
 - c. Coating System -- Coal-Tar Enamel materials and procedures shall be in accordance with ANSI/AWWA C203. This system shall consist of a primer layer, coal-tar enamel layer, coal-tar saturated nonasbestos felt outerwrap and a finish coat. Total system DFT = 188 mils.

- 6. Coating System 205 -- Hot Applied Tape
 - a. Location -- Exterior surfaces of buried steel pipe and fittings, non-galvanized.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Tape coating materials and procedures shall be in accordance with ANSI/AWWA C203. This system shall consist of a cold-applied liquid primer and heated coal-tar base tape. Total system DFT = 50 mils.

7. Coating System 206 -- Cold Applied Tape
 - a. Location -- Exterior surfaces of buried steel pipe and fittings, non-galvanized.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Tape coating materials and procedures shall be in accordance with ANSI/AWWA C209. Prefabricated tape shall be Type II. The system shall consist of a primer layer, inner layer tape of 35 mils, and an outer layer tape of 35 mils. Total system DFT = 70 mils.

8. Coating System 207 -- PVC Tape
 - a. Location -- Small galvanized steel pipe and fittings.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Prior to wrapping pipe with PVC tape, the pipe and fittings shall be primed using a primer recommended by the PVC tape manufacturer. After being primed, the pipe shall be wrapped with a 20-mil adhesive PVC tape, half lapped for a total thickness of 40 mils.

9. Coating System 208 -- Mastic
 - a. Location -- Pipe and fitting joints, and general buried surface coating repair and touch up.
 - b. Surface Preparation - As specified herein.
 - c. Coating System -- Mastic shall be a one-part solvent drying heavy bodied thixotropic synthetic elastomeric coating with chemically inert resins and fillers and an average viscosity of 650,000 CPS at 77 degrees Fahrenheit, thereby requiring generous applications by hand or trowel. Total coat thickness shall be 30 mils, minimum. Mastic shall be Protecto Wrap 160 H or approved equal and be fully compatible with pipeline coating systems.

10. Coating System 209 -- Polyethylene Encasement
 - a. Location -- Ductile iron, steel and concrete cylinder pipe and fittings
 - b. Surface Preparation -- None required.
 - c. Coating System -- Except as otherwise specified, application of polyethylene encasement shall be in accordance with ANSI/AWWA C105 using Method C.

2.4 Architectural Coating Systems

A. General

"Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or topcoat.

Fungus Control: Submit evidence for all paints attesting the passing of Federal Test Method Standard No. 141, Method 6271.1 showing no fungus growth or other approved test results.

Apply to surfaces under recommended environmental conditions and within the limitations established by the material manufacturer. Acrylics require 60 degrees Fahrenheit (°F) and above temperature and below 50 percent relative humidity. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50°F and 90°F unless otherwise permitted by the paint manufacturer's printed instructions.

B. Architectural coating systems shall be as follows

1. Coating System 300
 - a. Location -- Vertical, exterior concrete masonry unit walls exposed to view.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Apply prime, intermediate and top coat, 75 ft²/gal, 100 ft²/gal and 100 ft²/gal respectively for each coat of Tnemec Series 156 Envirocrete or approved equal. Color as selected by Owner.

2. Paint System 301
 - a. Location -- Vertical concrete exterior walls and flat concrete exterior roofs and slabs exposed to view.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Apply two coats 6.0-9.0 mils (100 ft²/gal) each coat, Tnemec Series 156 Envirocrete, or approved equal. Color as selected by Owner.

3. Paint System 302
 - a. Location -- Interior concrete masonry unit walls and interior and exterior wood walls, ceilings and other wood surfaces not otherwise specified, exposed to view.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Prime as specified by coating manufacturer. Apply two coats 6.0 - 9.0 mils (100 ft²/gal) each coat, Tnemec Series 156 Envirocrete, or approved equal. Color as selected by Owner.

4. Paint System 303
 - a. Location -- Wood surfaces not otherwise specified, exposed to view.
 - b. Surface Preparation -- As specified herein.
 - c. Coating System -- Apply an alkyd primer as recommended by the manufacturer, 2 mils. Apply finish coats (two or more coats 6 mils total) of single component, water based acrylic latex coating, Tnemec Series 6, Carboline 3350 or equal. Total DFT = 8 mils. Color as selected by Owner.

5. Paint System 304
 - a. Location -- Interior drywall surfaces not otherwise specified, exposed to view.
 - b. Surface Preparation - As specified herein.

- c. Coating System -- Apply two coats 2.0 - 3.0 mils each coat of single component, water based acrylic latex coating, Tnemec Series 6, Carboline 3350 or equal. Color as selected by Owner.
- 6. Paint System 305
 - a. Location -- Exterior brick surfaces not otherwise specified, exposed to view.
 - b. Surface Preparation -- Surfaces shall be cleaned with a manufacturers approved chemical cleaner and power washed. Surfaces shall be completely dry, free from efflorescence, oils, paint and other contaminants before the coating system is applied. Coating system shall be applied according to the manufacturers published recommendations. A manufacturer's representative shall be present during application of the coating system, if required by the manufacturer's warranty.
 - c. Coating System -- Apply two coats of masonry water retardant material. The system shall be clear, non-staining, silane-modified-siloxane, Fabrishield 161, Rainstopper 1500, or equal. The selected coating system shall provide a minimum of a five-year manufacturer's warranty.

PART 3 EXECUTION

3.1 Storage, Mixing and Thinning of Materials

- A. Manufacturer's Recommendations -- Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed.
- B. All protective coating materials shall be used within the manufacturer's recommended shelf life.
- C. Storage and Mixing -- Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.2 Surface Preparation Standards

- A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification.
1. Solvent Cleaning (SSPC-SP1) -- Removal of oil, grease, soil, salts and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.
 2. Hand Tool Cleaning (SSPC-SP2) -- Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.
 3. Power Tool Cleaning (SSPC-SP3) -- Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing and grinding.
 4. White Metal Blast Cleaning (SSPC-SP5) -- Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.
 5. Commercial Blast Cleaning (SSPC-SP6) -- Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.
 6. Brush-Off Blast Cleaning (SSPC-SP7) -- Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust and loose paint.
 7. Near-White Blast Cleaning (SSPC-SP10) -- Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.
 8. High- and Ultra High- Pressure Water Jetting (SSPC-SP12): Water jetting at high- or ultra high-pressure to prepare a surface for recoating using pressure above 10,000 psi.
 9. Surface Preparation of Concrete (SSPC-SP-13) - Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.
 10. Industrial Blast Cleaning (SSPC-SP14): Blast cleaning to remove all visible oil, grease, dust and dirt, when viewed without magnification

3.3 Corrections and Cleanup

At completion any damaged, de-laminated or defaced coated surfaces shall be touched up, restored and left in first class condition. Any coated or finished surfaces damaged in fitting or erection shall be restored. If necessary, an entire wall shall be refinished rather than spot finished. Upon completion and prior to final acceptance, all equipment and unused materials accumulated in the coating process shall be removed from the site and any spillage, spatter spots or other misplaced coating material shall be removed in a manner which will not damage surfaces. Perform required patching, repair and cleaning to the satisfaction of the ENGINEER. Cooperate and coordinate work with the work of other trades in the removal and replacement of hardware, fixtures, covers, switch plates, etc., as required for coating.

3.4 Surface Preparation

A. General

Prepare all surfaces scheduled to receive new coating systems, as required to provide for adequate bonding of the specified coating system to the substrate material. Request review of prepared surfaces by the ENGINEER prior to proceeding. For existing coated surfaces, hand wash with cleaner or product recommended by coating manufacturer to properly prepare existing surface and provide for bonding of coating specified to follow. Remove any loose, peeling or flaking coating, or mildewed areas. Surface preparation minimums shall be as follows:

1. Exposed metal items, nonsubmerged, unprimed, non-galvanized both interior and exterior, including: piping, structural steel and all other metal items not otherwise specified, shall undergo surface preparation in accordance with SSPC-SP6, "Commercial Blast Cleaning".
2. Exposed metal items, shop primed, both interior and exterior including: piping, steel doors, steel ladders to be painted, and railings, and all other metal items not otherwise specified, shall undergo surface preparation in accordance with SSPC-SP1, "Solvent Cleaning"; SSPC-SP2, "Hand Tool Cleaning"; and SSPC-SP3, "Power Tool Cleaning" as may be required to remove grease, loose or peeling or chipped paint.
3. Metal items, unprimed or non-galvanized, continuously or intermittently submerged, both interior and exterior including: piping, structural steel and all other metal items not otherwise specified, shall undergo surface preparation in conformance with SSPC-SP10, "Near-White Blast Cleaning".

4. Stainless Steel - Nonsubmerged and submerged, exposed piping and fittings, both interior and exterior shall undergo surface preparation in accordance with SSPC-SP1, "Solvent Cleaning".
5. Polyvinyl Chloride (PVC) - Nonsubmerged, both interior and exterior, process piping and plumbing, shall be lightly sanded prior to application of the specified coating system to follow.
6. Nonsubmerged Concrete - Clean all concrete surfaces of dust, form oil, curing compounds or other incompatible matter. Etch and prime if required by manufacturer for specified coating products to follow. Allow minimum 28-day cure of concrete prior to application of coating systems.

3.5 Prime Coating

- A. Exposed Steel -- Prime coat all exposed steel in accordance with SSPC PS 13.01 for epoxy-polyamide coating systems. Prime coats shall be applied following completion of surface preparation requirements as specified in paragraph 3.4.A.1 above.
- B. Galvanized Metal -- After surface preparation specified above, prime galvanized metal items receiving paints as specified with Tnemec Series 66 Hi-Build Epoxaline or equal, verifying with manufacturer before application the compatibility with coatings specified to follow.
- C. Shop Primed Metal -- Where indicated on the plans or coating schedule and following the surface preparation procedures specified in paragraph 3.4.A.2 above, the CONTRACTOR shall apply intermediate and topcoats of the specified paint system to shop primed metal. The CONTRACTOR shall verify with the manufacturer(s) representative of the item(s) to be painted, before application, the compatibility of shop primers with the specified intermediate and topcoat coating systems.
- D. Non-Shop Primed Metal and Piping -- Prime coat all exposed metal and piping, except stainless steel, received at job site following completion of surface preparation requirements as specified in paragraph 3.4.A.1 above. Prime paint in accordance with SSPC PS No. 13.01 for epoxy-polyamide primers. Epoxy-polyamide primers shall conform to the standards set forth in SSPC Paint Specification No. 22.

3.6 Field Prime

Wherever shop priming has been damaged in transit or during construction, the damaged area shall be cleaned and touched up with field primer specified herein or returned to the shop for resurfacing and repriming, at the ENGINEER's discretion. Metal items delivered to the job site unprimed shall be cleaned and primed as specified herein.

3.7 Application

- A. Thickness -- Apply coatings in strict conformance with the manufacturer's application instructions. Apply each coat at the rate specified by the manufacturer to achieve the dry mil thickness specified. If material must be diluted for application by spray gun, build up more coating to achieve the same thickness as undiluted material. Correct apparent deficiency of film thickness by the application of an additional coat.
- B. Porous Surfaces -- Apply paint to porous surfaces as required by increasing the number of coats or decreasing the coverage as may be necessary to achieve a durable protective and decorative finish.
- C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.
- D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.
- E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe coating for these areas.
- F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.
- G. Ventilation -- Adequately ventilate enclosed rooms and spaces during painting and drying periods.
- H. Drying Time -- Do not apply next coat of coat until each coat is dry. Test non-metallic surfaces with moisture meter. The manufacturer's recommended drying time shall mean an interval under normal condition to be increased to allow for adverse weather or drying conditions. Coating manufacturer's

representative shall verify by cure testing, complete cure of coatings systems used for immersion service.

3.8 Coating Schedule

The following schedule indicates the coating and paint systems previously specified that apply to the project. Additional comments are added which may modify or amend the specifications.

Coating Schedule

<u>Item</u>	<u>Location</u>	<u>Material</u>	<u>Coating System</u>
Piping and Pump	Inside Pump Stations (exterior surface)	Ductile Iron	Coating System 100
Piping	Inside Pump Stations (exterior surface)	Steel	Coating System 203

Color of new piping and pump to match the blue existing piping within pump station.

END OF SECTION

SECTION 11000

EQUIPMENT, GENERAL

PART 1 GENERAL

1.1 Description

- A. The CONTRACTOR shall provide all tools, supplies, materials, equipment and all labor necessary for the furnishing, construction, installation, testing and operation of equipment and appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents.
- B. The provisions of this Section shall apply to all equipment specified and where referred to, except where otherwise specified or shown.

1.2 Reference Specifications, Codes and Standards

- A. All equipment, products and their installation shall be in accordance with the following standards, as applicable and as specified in each section of these specifications:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Public Health Association (APHA)
 - 3. American National Standards Institute (ANSI)
 - 4. American Society of Mechanical Engineers (ASME)
 - 5. American Water Works Association (AWWA)
 - 6. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
 - 7. American Welding Society (AWS)
 - 8. National Fire Protection Association (NFPA)
 - 9. Federal Specifications (FS)
 - 10. National Electrical Manufacturers Association (NEMA)
 - 11. Manufacturer's published recommendations and specifications

12. Oregon Occupational Safety and Health Division (OR-OSHA)

B. The following standards have been referred to in this section of the specifications.

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy and Other Special Alloys
ANSI B46.1	Surface Texture
ANSI S12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protectors
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch)
ANSI/ASME B31.1	Power Piping
ANSI/AWWA D100	Welded Steel Tanks for Water Storage
AWWA C206	Field Welding of Steel Water Pipe
ASTM A48	Specification for Gray Iron Castings
ASTM A108	Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality

1.3 Submittals

- A. The CONTRACTOR shall furnish complete shop drawings for all equipment specified in the various sections, together with all piping, valves and controls for review by the ENGINEER in accordance with Section 01100 – Special Provisions.
- B. The CONTRACTOR shall supply one complete set of special tools where necessary for the assembly, adjustment and dismantling of the equipment. Tools shall be suitable for professional work and manufactured by a recognized supplier of professional tools such as Snap On, Crescent, Stanley, or equal.
- C. The CONTRACTOR shall obtain and submit from the manufacturer a list of suggested spare parts for each piece of equipment. CONTRACTOR shall also furnish the name, address and telephone number of the nearest distributor for

each piece of equipment. Spare parts shall be supplied by the CONTRACTOR when indicated in the appropriate equipment specification sections.

- D. Where required by the individual equipment sections, the CONTRACTOR shall submit to the ENGINEER a torsional and lateral vibration analysis of the equipment, in accordance with Section 01100 – Special Provisions. Equipment shall be designed and constructed such that the natural frequency of the drive train is avoided by a minimum of 25 percent throughout the entire operating range. The analysis shall be performed by a specialist experienced in this type of work and approved by the ENGINEER. The specialist or their assigned representative who shall similarly be experienced in this type of work and who shall be approved by the ENGINEER shall visit the project site during startup and testing of the equipment to analyze and measure the amount of equipment vibration, certify that the operating frequency avoids the natural frequency by 25 percent, and make a written recommendation for keeping the vibration at a safe limit.

1.4 Quality Assurance

- A. The CONTRACTOR shall demonstrate that all equipment meets the specified performance requirements. CONTRACTOR shall provide the services of an experienced, competent and authorized service representative of the manufacturer of each item of major equipment, who shall visit the project site to perform the following tasks.
1. Assist the CONTRACTOR in the installation of the equipment.
 2. Inspect, check, adjust if necessary and approve the equipment installation.
 3. Start-up and field-test the equipment for proper operation, efficiency and capacity.
 4. Perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the ENGINEER.
 5. Instruct the OWNER's personnel in the operation and maintenance of the equipment. Instruction shall include step-by-step trouble shooting procedures with all necessary test equipment.
- B. The costs of all inspection, startup, testing, adjustment and instruction work performed by said factory-trained representatives shall be borne by the

CONTRACTOR. When available, the OWNER's operating personnel will provide assistance in the field testing.

- C. Tolerances and clearances shall be as shown on the shop drawings and shall be closely adhered to. Machine work shall in all cases be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts.
- D. The type of finish shall be the most suitable for the application and shall be in accordance with ANSI B46.1.
- E. Unless otherwise noted, all equipment furnished shall have a record from the same manufacturer of at least 3 years successful, trouble-free operation in similar applications

PART 2 PRODUCTS

2.1 General Requirements

- A. At each high noise level location, where equipment produces noise exceeding 85 dBA at 3 feet or exceeding OR-OSHA noise level requirements for operator safety, the CONTRACTOR shall supply two pairs of high attenuation hearing protectors. The ear protectors shall meet the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, furnished by the CONTRACTOR and mounted in an approved location near the noise producing equipment.
- B. Unless otherwise specified or shown, all welding shall be by the metal arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. All sharp corners of material to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

- C. All equipment shall be painted or coated in accordance with Section 09800 – Protective Coatings, unless otherwise indicated. Non-ferrous metal and corrosion-resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly and shipping.
- D. All equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling and storage. All equipment shall be protected from exposure to corrosion and shall be kept thoroughly dry at all times.
- E. Each item of equipment shipped shall have a legible identifying mark corresponding to the equipment number shown or specified for the particular item.
- F. All equipment subject to vibration shall be provided with restrained spring type vibration isolators or pads per manufacturer’s written recommendations.
- G. Shop fabrication shall be performed in accordance with the Specifications and the ENGINEER-approved shop drawings.

2.2 Equipment Supports and Foundations

- A. All equipment supports, anchors and restraint shall be adequately designed for static, dynamic, wind and seismic loads. The design horizontal seismic force shall be the greater of that noted in the general structural notes or as required by the governing building code (10 percent of gravity minimum).
- B. Equipment foundations shall be as per manufacturer’s written recommendations. All equipment shall be mounted as shown on the manufacturer’s standard details, unless otherwise shown or specified.
- C. Shop drawings submitted to the ENGINEER for review in accordance with the requirements of Section 01100 – Special Provisions shall include calculations showing equipment anchorage forces and the capacities of the anchorage elements to be provided by the CONTRACTOR.

2.3 Pipe Hangers, Supports and Guides

All pipe connections to equipment shall be supported, anchored and guided to avoid stresses and loads on equipment flanges and equipment.

2.4 Flanges and Pipe Threads

All flanges on equipment and appurtenances provided under this section shall conform to ANSI B16.1, Class 125 or B16.5, Class 150, unless otherwise shown. All pipe threads shall be in accordance with ANSI/ASME B1.20.1 and with requirements of Section 15000 – Piping, General.

2.5 Couplings

- A. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float and to cushion shock loads. Where required for vertical shafts, three-piece spacer couplings or universal type couplings for extended shafts shall be installed.
- B. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.
- C. Taper-lock bushings may be used to provide for easy installation and removal on shafts of various diameters.
- D. Where universal type couplings are shown, they shall be equipped with grease fittings.

2.6 Bearings

- A. Bearings shall conform to the standards of the Anti-Friction Bearing Manufacturers Association (AFBMA).
- B. All field-lubricated type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.
- C. All lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.
- D. Except where otherwise specified or shown, all bearings shall have a minimum B-10 life expectancy of 5 years or 20,000 hours, whichever occurs first.
- E. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as specified or shown, or as recommended in the published standards of the manufacturer. Split type housings may be used to facilitate installation, inspection and disassembly.

- F. Sleeve type bearings shall have a Babbitt or bronze liner.

2.7 V-Belt Drives

- A. V-belts and sheaves shall be of the best commercial grade and shall conform to ANSI, MPTA and RMA standards.
- B. Unless otherwise specified, sheaves shall be machined from the finest quality gray cast iron.
- C. All sheaves shall be statically balanced. In applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.
- D. To facilitate installation and disassembly, sheaves shall be furnished complete with taper-lock or QD bushings as required.
- E. Finish bored sheaves shall be furnished complete with keyseat and set screws.
- F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.8 Drive Guards

All power transmission, prime movers, machines, shaft extensions and moving machine parts shall be guarded to conform with the OR-OSHA Safety and Health Standards (29CFR1910) requirements. The guards shall be constructed of minimum 10-gauge expanded, flattened steel with smooth edges and corners, galvanized after fabrication and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.9 Flexible Connectors

Flexible connectors shall be installed in all piping connections to engines, blowers, compressors and other vibrating equipment.

2.10 Gaskets and Packings

- A. Gaskets shall be in accordance with the requirements of Section 15000 – Piping, General.
- B. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron type “V” packing shall be Garlock No. 432, John Crane “Everseal” or equal.

- C. Packing around rotating shafts (other than valve stems) shall be “O” rings, stuffing boxes or mechanical seals, as recommended by the manufacturer and approved by the ENGINEER.

2.11 Nameplates

Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location. Nameplates shall contain the manufacturer’s name, model, serial number, size, characteristics and appropriate data describing the machine performance ratings.

PART 3 EXECUTION

3.1 Couplings

The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application. Installation shall be per equipment manufacturer’s printed recommendations.

3.2 Packaged Equipment

- A. When any system is furnished as pre-packaged equipment, the CONTRACTOR shall coordinate all necessary space and structural requirements, clearances, utility connections, signals and outputs with his subcontractors.
- B. If the packaged system has any additional features other than specified, the CONTRACTOR shall coordinate such features with the ENGINEER and furnish all material and labor necessary for a complete installation, as required by the manufacturer, at no additional cost to the OWNER.

END OF SECTION

SECTION 11100

PUMPS, GENERAL

PART 1 GENERAL

1.1 Description

- A. The provisions of this Section shall apply to all pumps and pumping equipment except where otherwise indicated.
- B. Where two or more pump systems of the same type or size are required, the pumps shall all be produced by the same manufacturer.

1.2 Submittals

- A. Submittals shall be furnished in accordance with Section 01300.
- B. Shop Drawings shall contain the following information
 - 1. Pump name, identification number and specification Section number.
 - 2. Performance data curves showing head, capacity, horsepower demand, net positive suction head (NPSH) required, and pump efficiency over the entire operating range of the pump. The pump manufacturer shall indicate separately the head, capacity, horsepower demand, overall efficiency and minimum submergence required at the design flow conditions and the maximum and minimum flow conditions. A family of performance curves at intervals of 100 rpm from minimum speed to maximum speed shall be provided for each centrifugal pump equipped with a variable speed drive, and a curve for each speed on two-speed pumps.
 - 3. The limits on the performance curves recommended for stable operation without surge, cavitation or excessive vibration.
 - 4. Assembly and installation drawings including shaft size, seal, coupling, bearings, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.
- C. Complete motor nameplate data as defined by NEMA, motor manufacturer and any motor modifications.

- D. Operation and Maintenance Manual containing the required information for each pump section.
- E. A spare parts list containing the required information for each pump section.
- F. Signed, dated and certified factory test data for each pump system which requires factory testing submitted before shipment of equipment.
- G. Certifications
 - 1. Manufacturer's certification of proper installation
 - 2. Contractor's certification of satisfactory field testing

PART 2 PRODUCTS

2.1 General

- A. Materials and equipment shall be standard products of a manufacturer and distributor regularly engaged in the manufacture and distribution of such products for at least 2 (two) years and shall be suitable for the service intended. All materials and equipment shall be new and unused except for the testing specified herein.
- B. Compliance with the requirements of the individual pump sections may necessitate modifications to the manufacturer's standard equipment.
- C. All centrifugal pumps shall have a continuously rising performance curve. In no case shall the required horsepower at any point on the performance curve exceed the rated horsepower of the motor or engine or encroach on the service factor.
- D. All components of each pump system provided under the pump sections shall be entirely compatible. Each unit of pumping equipment shall incorporate all basic mechanisms, couplings, electric motors or engine drives, variable speed controls, necessary mountings and appurtenances.
- E. The pumps shall be supplied by a distributor authorized to service them throughout the warranty period and beyond. The distributor shall be located within a 100-mile radius of the site.
- F. The pumps shall be warranted by the manufacturer for a minimum of one (1) year from the date of installation.
- G. All materials and coatings coming in contact with potable water shall be ANSI/NSF Standard 61 approved.

2.2 Materials

- A. All materials shall be suitable for the intended application; materials not specified shall be high-grade, standard commercial quality, free from all defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:
 - 1. Cast iron pump casings and bowls shall be of close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Casings, Class 30, or equal.
 - 2. Stainless steel pump shafts shall be Type 416 or 316. Miscellaneous stainless steel shall be of Type 316, except in a septic environment.
 - 3. Anchor bolts, washers, and nuts in non-corrosive applications shall be galvanized steel in accordance with the requirements of Section 5500 - Metal Fabrications. Anchor bolts, washers and nuts in corrosive service applications shall be stainless steel in accordance with that Section.

2.3 Pump Components, General

- A. Flanges -- Suction and discharge flanges shall conform to ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 12, 125, 250, and 800 or B16.5 - Flanges and Flanged Fittings dimensions.
- B. Handholes -- Handholes on pump casings shall be shaped to follow the contours of the casing to avoid any obstructions in the water passage.

2.4 Pump Appurtenances

- A. Nameplates -- Each pump shall be equipped with a stainless steel nameplate indicating serial numbers, rated head and flow, impeller size, pump speed and Manufacturer's name and model number.
- B. Gauges -- Provide and install pressure gauges as shown on the drawings.
 - 1. All pumps (except sample pumps, sump pumps, hot water circulating pumps and chemical metering pumps) shall be equipped with pressure gauges on the pump discharge. Pump suction lines shall be provided with compound gauges. Gauges shall be located in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings. Isolation diaphragms shall be provided for all gauges except where pumping potable water.

2. Where subject to shock or vibrations, the gauges shall be wall-mounted or attached to galvanized channel floor stands and connected by means of flexible connectors.

2.5 Factory Testing

- A. The following tests shall be conducted on each indicated pump system
 1. Pump Systems -- All centrifugal pump systems 10 horsepower and larger shall be tested at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests (ANSI/HI 1.6) or the American National Standard for Vertical Pump Tests (ANSI/HI 2.6) as approved by ANSI and published by the Hydraulic Institute. Tests shall be performed using the complete pump system to be furnished, including the motor. For motors smaller than 100 horsepower, the manufacturer's certified test motor shall be acceptable. The following minimum test data shall be submitted:
 - a. Hydrostatic test data
 - b. A minimum of five hydraulic test readings between shutoff head and 25 percent beyond the maximum indicated capacity, recorded on data sheets as defined by the Hydraulic Institute.
 - c. Pump curves showing head, flow, brake horsepower, efficiency, and NPSH requirements.
 - d. Certification that the pump horsepower demand did not exceed the rated motor horsepower beyond the 1.0 service rating at any point on the curve.
 2. Factory Witnessed Tests -- All pumps, variable speed drives and motors, 200 horsepower and larger shall be factory-tested as complete assembled systems and may be witnessed by the OWNER and ENGINEER. The Contractor shall give the ENGINEER a minimum of 2 weeks notice prior to the test. All costs for OWNER and ENGINEER shall be borne by the Contractor and shall be included in the bid price. Such costs shall include travel and subsistence for two people, excluding salaries. Test results shall be submitted to the ENGINEER and no equipment shall be shipped until the test data has been approved by the ENGINEER.
 3. Acceptance -- In the event of failure of any pump to meet any of the requirements, the Contractor shall make all necessary modifications, repairs or replacements to conform to the requirements of the Contract

Documents and the pump shall be retested at no additional cost to the OWNER until found satisfactory.

PART 3 EXECUTION

3.1. Services of Manufacturer

- A. An authorized service representative of the manufacturer shall visit the project site to witness the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted and readied for operation:
 - 1. Installation of the equipment
 - 2. Inspection, checking and adjusting the equipment
 - 3. Startup and field testing for proper operation
 - 4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements

- B. Instruction of the OWNER's Personnel
 - 1. An authorized training representative of the manufacturer shall visit the project site to instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.
 - 2. The representative shall have at least two year's experience in training.
 - 3. Training shall be scheduled a minimum of three weeks in advance of the first session.
 - 4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Comments shall be incorporated into the material.
 - 5. The training materials shall remain with the trainees.
 - 6. The OWNER may videotape the training for later use with the OWNER's personnel.

3.2 Installation

- A. General -- Pumping equipment shall be installed in accordance with the manufacturer's written recommendations.

- B. Alignment -- All equipment shall be field tested to verify proper alignment, operation as specified and freedom from binding, scraping, vibration, shaft runout or other defects. Pump drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.
- C. Lubricants -- The Contractor shall provide the necessary oil and grease for initial operation.

3.3 Field Tests

- A. Each pump system shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, cavitation or overheating of bearings.
- B. The following field testing shall be conducted
 1. Startup, check and operate the pump system over its entire speed range. Where vibration analysis and measurement is required, it shall be within the amplitude limits specified and recommended by the Hydraulic Institute Standards at a minimum of four pumping conditions defined by the ENGINEER.
 2. Obtain concurrent readings of motor voltage, amperage, pump suction head and pump discharge head for at least four pumping conditions at each pump rotational speed. Check each power lead to the motor for proper current balance.
 3. Determine bearing temperatures by contact type thermometer. A run time of at least 20 minutes shall precede this test, unless insufficient liquid volume is available.
 4. Electrical and instrumentation tests shall conform to the requirements of the Section under which that equipment is specified.
- C. Field testing will be witnessed by the ENGINEER. The Contractor shall furnish three days advance notice of field testing.
- D. In the event any pumping system fails to meet the test requirements, it shall be modified and retested as above until it satisfies the requirements.
- E. After each pumping system has satisfied the requirements, the Contractor shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the field tests, a listing of all persons present during the tests and the test data.

- F. The Contractor shall bear all costs of field tests, including related services of the manufacturer's representative. If available, the OWNER's operating personnel will provide assistance in field testing.

END OF SECTION

SECTION 11230

HORIZONTAL END SUCTION CENTRIFUGAL WATER PUMPS

PART 1 GENERAL

1.1 Description

Work covered in this section includes furnishing, installing, start-up and operation training for horizontal end suction centrifugal water pumps.

1.2 CONTRACTOR Submittals

The information listed below shall be submitted to the ENGINEER for review in accordance with Section 01300. The submittal shall, as a minimum, include the following data drawings and other descriptive materials.

1. AutoCAD shop drawings to describe and show pump construction and materials.
2. Pump performance curves showing the head, capacity, speed, efficiency, and brake horsepower required when operating at specified conditions. Pump curves shall show a minimum of four points including shut-off head and maximum capacity.
3. All pump motor information as outlined by this specification.
4. AutoCAD electrical schematic and wiring diagrams showing wiring, controls, and terminals.
5. Information on all pump station equipment outlined by this specifications.

PART 2 PRODUCTS

2.1 Pumps

The pump shall be a horizontally mounted, single stage, end-suction centrifugal water pump. The pump shall be designed for continuous operating service and shall be constructed as follows to meet the intended service. The pump shall be Cornell Model 6HH-F-18 horizontal frame as manufactured by Cornell Pump Company of Portland, Oregon without exception. The pump shall be similar to the existing two pumps inside the pump station so that the new pump matches them. The existing two

pumps have Serial Numbers 121858 and 121859, by Cornell Pump Company. The new pump shall be warranted for a period of two years after the date of shipment from the factory. The pump shall meet the following design conditions:

Design Capacity	2200 gpm
Design Total Head	215 feet
Maximum Speed	1785 rpm
Minimum Efficiency at Design Point	85 percent
Suction Size	8 inches
Discharge Size	6 inches
Minimum Motor Size	200 HP

The pump casing shall be of back-pullout design allowing for removal of the rotating element without disturbing piping connections. The casing shall be constructed of fine grain cast iron ASTM A48 Class 30. All casing sections shall have heavy wall thickness to provide long life under abrasive and corrosive operating conditions. Casing shall be capable of withstanding a hydrostatic pressure test of at least 125 percent of shutoff pressure or 150 percent of design head. All mating surfaces shall have register fits to ensure proper alignment. Piping connections shall be ASA 125# flat face drilled flange. Flange face surface finish shall be within a minimum of 250 micro-inches. Pump shall have bronze replaceable hub and suction wear rings. Impeller shall be bronze.

The pump backplate shall be constructed of ASTM A48 Class 30 grey iron. The pump shall be equipped with a double mechanical seal, John Crane Type 1 or 2.

The bearing frames shall be constructed of fine grain ASTM A48 Class 30 grey iron. The bearing frames shall be line bored for exact concentricity and be equipped with anti-friction style bearings. The bearings shall be either ball or roller style, properly sized to accommodate all thrusts, both mechanical and hydraulic, imposed upon them. The frames shall be designed for captured bearing positioning and shall not require any field axial adjustment. The bearings shall have a minimum calculated B-10 bearing life rating of 20,000 hours at the stated design condition. A complete bearing life stress and loading calculation shall be provided by the pump manufacturer to illustrate compliance with this requirement. Bearing lubrication shall be either grease or oil with proper provisions, drains, vents or reliefs to facilitate easy re-lubrication in the field. The pump end shall be connected to the bearing frame by a register fit ASTM A48 class 30 grey iron bracket.

The pump shafts shall be of high strength ANSI 1144 stressproof alloy steel. The shafts shall be accurately machined and polished and of sufficient size to transmit full driver output without excessive flexure or stressing. All steps in the shafts shall be radiused to reduce stress concentrations. Shaft deflection shall not exceed 0.008 inch, measured at end of shaft when operating at the specified design conditions. A

complete shaft stress analysis calculation shall be supplied by the pump manufacturer to illustrate conformance with this requirement. The shafts shall be protected by renewable bronze shaft sleeves which extend through the stuffing boxes.

The motor, bearing frame and pump shall be mounted on a steel base.

2.2 Spare Parts

For each pump, provide the following spare parts: mechanical seal, set of gaskets and o-ring seals, shaft sleeve, complete set of keys, dowels and pins, complete set of bearings, impeller, case wear ring, and impeller wear ring. Provide one complete set of any special tools required to dismantle the pump.

2.3 Motors

Motors shall be premium efficiency, TEFC, induction style. Motors shall be rated for continuous duty with a 1.15 service factor. Motors shall be suitable for 460 volts, 60 Hertz, 3-phase power. Motor bearings shall be greasable and sized to withstand thrust loads and have a minimum B-10 life of 20,000 hours. Calculations shall be provided showing the bearing loading. Motors shall conform to the requirements of Section 16150.

PART 3 EXECUTION

3.1 Installation

The CONTRACTOR shall furnish, install, test and adjust the pump in strict accordance with the manufacturer's recommendations. The manufacturer shall ensure proper installation and perform necessary tests to ensure that the pump is fully functional and operating as specified herein.

3.2 CONTRACTOR shall provide vibration analysis per Section 11000 - Equipment, General.

END OF SECTION

SECTION 15000
PIPING, GENERAL

PART 1 GENERAL

1.1 Description

Work under this Section applies to the furnishing and installation of piping inside a building, structure, enclosure piping and miscellaneous yard piping. All work shall conform to the standard construction specifications except as modified herein. In the case of discrepancy, the more stringent provision shall apply.

1.2 Requirements

- A. The CONTRACTOR shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, heat tracing, insulation, lining and coating, testing, disinfection, excavation, backfill and encasement, to provide a functional installation.
- B. The piping shown is intended to define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical drawings are not pipe construction or fabrication drawings. It is the CONTRACTOR's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

1.3 Reference Specifications, Codes and Standards -- Comply with the provisions of the following Codes, Specifications and Standards, Except as otherwise shown or specified.

Commercial Standards

ANSI/ASME B1.20.1 Pipe Threads, General Purpose (inch)

ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys

ANSI/AWWA C207 Steel Pipe Flanges for Water Works Service, Sizes 4 in through 144 in.

ANSI/AWWA C606 Grooved and Shouldered Joints

ANSI/AWS D1.1 Structural Welding Code

ASTM A 307 Specification for Carbon Steel Bolts and Studs, 6,000 psi Tensile

ASTM A 325 Specification for High-Strength Bolts for Structural Steel Joints

ASTM D 792 Test Methods for Specific Gravity and Density of Plastics by Displacement

ASTM D 2000 Classification System for Rubber Products in Automotive Applications

1.4 Submittals

- A. The CONTRACTOR shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the contract documents and as specified in the individual piping sections. The shop drawings shall include all necessary dimensions and details on pipe joints, fittings, fitting specials, valves, appurtenances, design calculations, and material lists. The submittals shall include detailed layout, spool, or fabrication drawings which show all pipe spools, spacers, adapters, connectors, fittings, couplings, and pipe supports necessary to accommodate the equipment and valves provided in a complete and functional system.
- B. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.
- C. The CONTRACTOR shall submit as part of the shop drawings a statement from the pipe fabricator certifying that all pipes will be fabricated subject to a recognized Quality Control Program. An outline of the program shall be submitted to the ENGINEER for review prior to the fabrication of any pipe.

1.5 Quality Assurance

- A. Inspection -- All pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, the ENGINEER shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.
- B. Tests -- Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable

Specifications and Standards. Welds shall be tested as specified. The CONTRACTOR shall perform all tests at no additional cost to the OWNER.

- C. Welding Requirements -- All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.
- D. Welder Qualifications -- skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used shall do all welding. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local approved testing agency prior to commencing work on the pipeline. Machines and electrodes similar to those used in the WORK shall be used in qualification tests. The CONTRACTOR shall furnish all material and bear the expense of qualifying welders.

1.6 Material Delivery, Storage and Protection

All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

PART 2 PRODUCTS

2.1 General

Unless specified otherwise or indicated differently on the plans, all piping systems and process piping materials shall be as listed in the table below or as shown on the drawings:

Service Conditions

<u>Service</u>	<u>Material</u>
Drainage/Sanitary Sewer	See Division 2.
Exposed \geq 4"	Class 52 Ductile Iron or Heavy Wall Welded Steel
Buried \geq 4"	Class 52 Ductile Iron
Submerged/Buried < 4"	Stainless Steel - Type 316 Schedule 40 Threaded - ASTM A 312 Fittings Welded or Threaded
Exposed < 4"	Brass - ASTM B 43, Fittings - Bronze - ASTM B 62 Threaded - ANSI/ASME B 16.15
Buried < 4"	Copper Tubing - ASTM B88 Type K Soft - Fittings - Wrought Copper - ANSI B16.22, Joints-Soldered
Miscellaneous Pipelines	As shown on drawings

2.2 Performance Requirements

- A. Ductile Iron Pipe and Fittings -- All ductile iron pipe shall conform to the current provisions of the American Water Works Association (AWWA)/American National Standards Institute (ANSI) C151/A21.51. Unless otherwise designated, ductile iron pipe shall be standard thickness Class Number 52 with cement mortar lining.
1. Pipe and fittings shall be flanged, mechanical joints or push-on as required, as shown on the drawings or as specified. Unless otherwise shown on the drawings or specified herein, mechanical joint pipe shall be used for underground installations. Joints of the push-on type may be used instead of mechanical joints after the ENGINEER has approved design. Thrust restraint shall be by thrust blocks or by pipe joint restraint as shown on the drawings. Restrained joints shall be the lock-type mechanical joint or approved equal at bends and for sufficient distance on each side of the bend to prevent pulling at the joint during testing. No set screw type retainer glands or joint harness systems will be allowed.
 2. The following is the approved list of restrained joint systems:
 - a. "LOC TYTE", Pacific States Cast Iron Pipe Company
 - b. "Fast Grip", American Cast Iron Pipe Company
 - c. "TR Flex", United States Pipe and Foundry Company
 - d. "Snap-Lok", Griffin Pipe Products Company
 - e. "Megalug", EBAA Iron, Inc

- f. “Field-Lok”, United States Pipe and Foundry Company
- g. “Super Lock”, Clow
- h. “Restrained Joint”, McWane
- i. “MJ-TJ” pipe with “Megalugs”, Pacific States Cast Iron Pipe Company
- j. “Lok-Ring”, American Cast Iron Pipe Company

3. Flanged pipe shall be flanged in accordance with AWWA/ANSI C115/A21.15 with Class 125 drilling and full-face gaskets equal to Garlock 3000 Blue Guard with Nitrile binder. All ductile iron pipe and fittings shall be cement-lined and seal-coated according to ANSI/AWWA C104/A21.4. The seal coat shall be coal tar. Fittings for ductile iron pipe shall conform to AWWA/ANSI C110/A21.10 or AWWA/ANSI C153/A21.53. Rubber gaskets shall conform to AWWA/ANSI C111/A21.11. Fittings for push-on pipe shall be mechanical joint.

B. Welded Steel Pipe and Fittings -- All welded steel pipe shall conform to the current provisions of AWWA C200 (Grade C, ASTM A283 steel plate). The pipe shall be heavy walled steel pipe. The wall thickness of welded steel pipe shall be 1/2-inch for 24-inch diameter and smaller unless shown otherwise on the drawings. Pipe shall be furnished to the indicated outside diameter unless shown otherwise on the drawings. Pipe shall be furnished with ends as shown on the plans or as required for the conditions of installation if not shown. Provide weldolets for taps where shown or required.

Steel fittings for pipe 24 inches in diameter and less shall be forged steel conforming to ANSI B16.9 and ASTM A234, Grade B. Mitered fittings will be permitted only where shown on the drawings. Fabricated elbows 0-30 degrees shall be two-piece, 30-60 degrees shall be three-piece, and 60-90 degrees shall be four piece unless shown otherwise on the drawings. All steel fittings shall be of schedule or wall thickness to match the pipe wall thickness. Mitered fittings shall be fabricated in accordance with the dimensions as shown in AWWA C208 if dimensions are not shown on the drawings.

Where design pressure is 150 psi or less, flanges shall conform to either ANSI/AWWA C207 Class D or ANSI B16.5 150-pound class. Where design pressure is greater than 150 psi, up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E, Class F, or ANSI B16.5 150-pound class. Where design pressure is greater than 275 psi, up to a maximum

of 300 psi, flanges shall conform to ANSI/AWWA C207 Class F. AWWA flanges shall not be exposed to test pressures greater than 125% of rated capacity.

Flanges for steel pipe 24 inches in diameter and less shall be welding neck or slip-on forged steel conforming to ANSI B16.5 and ASTM A181, Grade 1, flat-faced, as adjacent pipe and fittings may dictate. Slip-on flanges shall not be used adjacent to forged fittings unless the fitting is the long-tangent type.

Flanges for steel pipe larger than 24-inch diameter shall be fabricated in accordance with AWWA C207. Flanges shall be attached with bolt holes straddling the vertical axis unless otherwise shown. Gaskets for flanged pipe shall be full-faced gaskets equal to Garlock 3000 with Nitrile binder or approved equal.

Pipe shall be shop-fabricated to the extent possible. Any field welding shall conform to the current provisions of AWWA C206. Forged fittings shall be used for all line size laterals and tees unless otherwise shown on the drawings. Field welds shall be lap-welded slip joint, welded inside and outside, double-butt weld joint, or butt strap joint.

The interior of all welded steel pipes shall be given a white-metal blast cleaning conforming to SSPC-SP5 by the pipe manufacturer and given the protective coating specified hereinafter. Exterior of "wet" exposure piping shall be prepared per SSPC-SP5, white metal blast. Exterior of "dry" exposure piping shall be prepared per SSPC-SP10, near white metal blast. Exterior coating to be as described below.

Unless other linings or coatings are required elsewhere in the specifications or on the plans, steel pipe shall be lined and coated as follows (confirm per ENGINEER):

Lining	Fusion-bonded epoxy lined, AWWA C213 or liquid epoxy lined, in accordance with AWWA C210
Coating (Exposed)	Per Section 09800
Coating (Buried)	Per Section 09800

Before starting fabrication, the CONTRACTOR shall submit to the ENGINEER shop drawings for review. The shop drawings shall include a marking plan and details of standard pipe sections, special fittings, and bends. Dimensions, plate size, coating, and lining and other pertinent information shall be shown. The marking plan shall show the location of each pipe section and each special with each piece numbered or otherwise designated in sequence. All outlets and bends shall be attached on standard lengths of pipe or made up into special lengths so that, when installed, they will be located as

indicated. The CONTRACTOR shall furnish the pipe fabricated and designated so that, when installed according to the marking plan, the location of all outlets and specials will correspond to the details of the construction plans. Each pipe and fitting shall be marked on the outside to indicate the class of pipe and location number on the marking plan. Calculations supporting collar, crotch plate, and other reinforcing sizes shall also be submitted. Fitting and reinforcing design shall conform to AWWA manual M11, latest edition.

- C. Copper Pipe and Fittings -- Copper pipe unless specified elsewhere shall be Type "L", hard drawn, conforming to ASTM B88. Copper pipe under floor slabs, underground or cast in concrete shall be Type "K".

Connection of copper tubing to steel or other metallic piping shall be made using insulating couplings or fittings such as to provide complete electrical isolation. Care shall be taken that copper tubing or fittings are not permitted to come in contact with steel or other metallic piping, reinforcing steel, or other steel at any location. Electrical checks shall be made between copper tubing and metallic elements to assure that isolation is maintained. Wherever electrical contact is demonstrated by such tests, the CONTRACTOR shall locate the point or points of contact and correct this condition.

- D. Polyvinyl Chloride (PVC) Water Pipe and Fittings -- PVC pipe 4 inches and smaller shall be schedule 40, Type 1 Grade I normal impact PVC pipe conforming to ASTM D1785 and D2467 and shall be solvent welded.
- E. Flexible Tubing -- Flexible plastic pipe shall be standard weight polyethylene thermoplastic tubing conforming to ASTM D-1248 Type 1, Class A, Category 4, Grade E5.
- F. Galvanized Steel Pipe and Fittings -- Galvanized steel pipe shall be seamless, or electric resistance welded, ASTM A120, Schedule 40. Joints for galvanized steel pipe shall be threaded. Fittings shall be threaded, 150 lb. malleable iron, galvanized, ASTM A197 or ASTM A47, dimensions conforming to ANSI B16.3; Unions, 300 lb. malleable iron, galvanized with dimensions conforming to ANSI B16.3, brass to iron seat. Thread lubricant shall be Teflon tape or joint compound that is insoluble in water.

All buried galvanized pipes shall be spirally wrapped with polyvinyl chloride or polyethylene pressure sensitive tape, applied with a suitable primer. The wrap shall have a nominal thickness of 20 mils, consisting of either one layer of 20-mil tape or two separate layers of 10-mil tape.

Before the primer and wrap is applied, the piping shall be thoroughly cleaned so that all surfaces shall be dry and free of dirt, dust, rust, oil scale, oil, grease,

or other foreign matter. Any solvents used shall be totally volatile so as to leave no trace of oil. Weld spatters, burrs, or sharp points and edges shall be removed by chiseling, ball peening or filing. After thorough cleaning, the piping shall be coated with a primer applied in accordance with the tape manufacturer's recommendations. Spiral wrappings shall be applied with an overlap of at least 1-inch.

2.3 Couplings and Specials

A. Flexible Couplings

1. Flexible Couplings and Flanged Coupling Adapters -- Flexible couplings or flanged coupling adapters where shown on the drawings or where required shall be of the gasketed sleeve type with diameter to properly fit the pipe.
2. Flexible couplings for steel pipe and ductile iron pipe shall be provided where shown and shall be steel middle ring with steel followers. For exposed service, the coupling shall be lined with material equal to pipe lining material. Coupling shall be coated with primer compatible with the pipe painting system. For buried or inaccessible service, the coupling and bolts shall be epoxy coated and lined. Couplings shall be Dresser Style 38, Ford FICA series, Romac or Smith-Blair.
3. Flexible couplings for PVC pipe shall be Romac Model 501 or approved equal.
4. Flanged coupling adapters for steel piping shall be Dresser Style 128 or approved equal.
5. Couplings shall be assembled on the job in a manner to insure permanently tight joints under all reasonable conditions of expansion and contraction. Gasket and O-ring material to be as recommended by manufacturer for intended service.
6. All flexible couplings and flange coupling adapters as shown on the drawings shall be suitably harnessed or blocked. The flexible coupling harnesses shall be installed to allow the flexible coupling to be pushed clear of the joint and as detailed in the AWWA Manual M11, 2nd Ed. and approved by the ENGINEER. Flexible couplings shall have center pipe stop where noted on drawings. Flanged coupling adapters shall be harnessed as shown on drawings and details. Flexible couplings and flange coupling adapters shall be provided with stainless steel bolts where submerged.

7. All tie bolt diameters shall be designed using ASTM A7 or A373 steel. Design pressure shall be 150 psi.
- B. Tapping Sleeves -- Tapping sleeves shall be stainless steel conforming to 18-8 Type 304 stainless steel with a CF 8 cast stainless steel flanged end with ANSI 150 pound drilling. Bolts and hardware to be Type 304 stainless steel and the branch outlet shall be heavy stainless steel pipe. The gasket shall be full circumferential gasket. Tapping sleeve shall be JCM 432 or approved equal. Valve for tapping sleeve shall be cast iron body with fusion bonded epoxy coating. Tapping valve shall be AFC Series 500 NRS resilient wedge valve or approved equal. Provide insulated flange joint between tapping sleeve and valve.
- C. Restrained Flange Adapters for Ductile Iron Pipe

Restrained flange adapters for ductile iron pipe shall conform to the following specifications:

1. Restrained flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C115/A21.15. Restraint for the flange adapter shall consist of a plurality of individually actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of the gripping wedges.
2. The flange adapters shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum 0.6-inch gap between the end of the pipe and the mating flange without affecting the integrity of the seal. For ductile iron pipe, the flange adapter shall have a safety factor of 2:1 minimum.
3. Restrained flange adapters for ductile iron pipe shall be EBAA Iron Series 2100 Megaflange - flange adapter or approved equal.

D. Flanged Insulating Joints

Insulating flanged joints shall conform to the following specifications:

1. Flanged joints shall be assembled, lined, and coated in shop. The joint assembly shall be delivered to the job site as a complete unit.
2. After assembly, the joint shall be tested for continuity. Electrical resistance between flanges and between each bolt and each flange shall be not less than 100,000 ohms.

3. Each complete insulating flange set shall include a full faced gasket, a full length insulating sleeve for each flange bolt, and two insulating washers and two steel washers for each bolt. Insulating sleeves and washers to be G-10 glass epoxy as manufactured by Accurate Plastics, Inc., or approved equal.
 4. Gaskets shall be full face and conform to ANSI B16.21, suitable for the operating and test pressures of the pipe system. Gaskets shall be non-asbestos and non-phenolic compressed sheet packing with nitrile rubber binder. Gaskets shall be Garlock 3000, or equal.
 5. Insulating washers shall be 3mm (1/8-inch) thick G-10 epoxy glass. Insulating washers shall fit within the bolt facing on the flange over the outside diameter of the sleeve, grind as necessary. Insulating sleeves shall extend the full width of both flanges, except where one flange hole is threaded where the sleeve shall extend through one flange and the gasket.
 6. Washers shall be cadmium plated steel where buried and stainless steel where submerged. Washers shall fit within the bolt facing on the flange, grind as necessary.
 7. The complete assembly shall have an ANSI/AWWA pressure rating equal to or greater than that of the flanges between which is installed.
- E. Where required copper pipe to copper pipe connections shall be made with compression couplings. Couplings shall be Mueller Model 110 or approved equal.
- F. Cast-In Wall Pipe -- Cast-in wall pipe shall be cast ductile iron, or steel with pipe diameter and end types as shown on the plans.
- G. Cast-In Wall Sleeve -- Cast-in wall sleeves shall be fabricated from Schedule 40 galvanized steel pipe. The inside surface of all wall sleeves shall be coated with coal-tar. The annular space between the penetrating pipe and the wall sleeve shall be filled with an approved permanently flexible sealant. Diameter of wall sleeve shall be as shown on the plans.
- H. Cast-In Floor Pipe -- Cast-in floor pipe shall cast ductile iron or steel pipe as required by the plans and the intended service. Pipe diameter shall be as shown on the plans.
- I. Cast-in Floor Sleeves -- Cast-in floor sleeves shall be fabricated from Schedule 40 galvanized steel pipe. Sleeve diameter shall be as shown on the

plans. The annular space between the penetrating pipe and the sleeve shall be filled with an approved permanently flexible sealant.

- J. Cast-In Wall Sleeve -- Interior Wall Penetrations: Cast-in wall sleeves for interior wall penetrations shall be fabricated from 16-gauge galvanized steel. Sleeve diameter shall be as shown on the plans. The annular space between the penetrating pipe and the sleeve shall be filled with an approved permanently flexible sealant.
- K. Seep Rings -- Seep rings shall be fabricated from 3/8-inch thick steel plate conforming to ASTM A36 unless otherwise noted. The inside diameter of the seep ring shall be equal to the outside diameter of the pipe or sleeve to which it is attached plus 1/4-inch. The outside diameter of the seep ring shall be as shown on the plans. The seep ring shall be attached to the pipe or sleeve by means of a continuous seal weld located on both sides of the ring.
- L. Flexible Expansion Joints -- Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile-iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall be provided with end connections as shown on the plans. All flexible expansion joints shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum of 15 degrees deflection per ball and 4-inch expansion. Actual expansion and deflection requirements will be as shown on the drawings. Each flexible expansion joint shall be hydrostatically tested to the manufacturer's published pressure rating prior to shipment. All pressure containing parts shall be lined with a minimum of 15 mils of Fusion Bonded Epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be holiday tested with a 1500 volt spark test conforming to said specification. All flexible-expansion joints shall be Flex-Tend as manufactured by EBAA Iron, Inc. or approved equal.
- M. Flexible expansion joints for piping 2-inch and smaller shall be Brass Flex-Tend manufactured by EBAA Iron, Inc. or approved equal.
- N. Insulating Union

Where required, insulating unions shall conform to the following specifications:

Insulating unions shall be galvanized malleable iron with a ground joint. Iron pipe threads shall conform to ANSI B2.1. Joint connections to copper alloy pipe and tube shall be copper solder or threaded brass ground joints. Insulations shall be nylon, which is bonded and molded onto the metal body. Union shall be rated for the operating and test pressures of the pipe system.

O. Pipe to Structure Flexible Connector

A flexible pipe to manhole connector shall be used in the connection of sanitary and drain sewer pipe to precast manholes and buildings. The connector shall be the sole element relied on to insure a flexible watertight seal of the pipe to the manhole. No adhesives or lubricants shall be employed in the installation of the connector to the manhole. The rubber for the connector shall comply with ASTM C923 and consist of EPDM and elastomers designed to be resistant to ozone, weather elements, chemicals, including acids, alkalis, animal and vegetable fats, oils and petroleum products from spills. The connector shall be Kor-N-Seal or approved equal.

All stainless steel elements of the connector shall be totally non-magnetic, Series 304 Stainless, excluding the worm screw for tightening the steel band around the pipe which shall be Series 305 Stainless. The worm screw for tightening the steel band shall be torqued by a break away torque wrench available from the precast manhole supplier and set for 60-70 inch/lbs.

The connector shall be installed in the manhole wall by activating the expanding mechanism in strict accordance with the recommendation of the connector manufacturer.

The connector shall be of a size specifically designed for the pipe material and size being utilized on the project.

Rubber seals used in concrete sewer pipe and culvert joints must meet the requirements given in ASTM specification C923.

P. Elastomeric Pipe Connector

An elastomeric pipe connector (EPC) shall be installed as shown on the Drawings to help isolate vibration and noise in the piping system. The EPC shall be of single sphere design, constructed of neoprene and nylon with bias ply tire reinforcing cord to provide a 225 psi working pressure rating to a minimum of 120 degrees F. The EPC shall pass through the plate steel flanges designed to grip the connector so the connector seals without gaskets when the flange bolts are drawn up. A control joint limiting pipe connector movement shall be supplied with each pipe connector. The elastomer inner tube of the EPC shall be fabricated from EPDM. The EPC shall be Redflex J1 by Redvalve, or approved equal.

2.4 Pipe Coatings

See Division 9, Finishes, for coating of exposed pipe.

PART 3 EXECUTION

3.1 General

Pipe shall be installed in accordance with good trade practice. The methods employed in handling and placing of pipe, fittings, and equipment shall be such as to insure that after installation and testing they are in good condition. Should damage occur to the pipe, fitting or equipment, repairs satisfactory to the ENGINEER shall be made. The backfilling of buried pipe is specified in Division 2.

All piping and appurtenances shall be installed in the position and to accurate lines, elevations, and grades as shown on the plans or specified herein. Where possible, piping shall be sloped to permit complete drainage. Where grades are not shown, pipe shall be laid to grade between control elevations shown on the plans.

All buried non-ferrous piping shall be installed with detectable tracer tape. Tape shall be buried 12 inches below the ground and 12 inches above the top of the pipe or as recommended by manufacturer. Tape shall be continuous and labeled the same as the piping system.

3.2 Handling and Storage of Pipe

During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe or pipe lining. Any damaged pipe shall be replaced or repaired to the satisfaction of the ENGINEER. Where pipe is placed in stockpiles, it shall be neatly piled and blocked with strips between tiers.

3.3 Pipe Supports and Hangers

- A. All pipe shall be secured in place by use of blocking, hangers, brackets, clamps or other approved methods, and the weight thereof shall be carried independently of pump casings or equipment. Special hangers and supports are shown on the drawings. The CONTRACTOR shall be responsible for determining the location of and providing all additional supports.
- B. Supports for exposed piping shall conform to the latest requirements of the ANSI Code for Pressure Piping B31.10 and MSS Standard Practice SP-58, except as supplemented or modified by the requirements of this specification. Designs generally accepted as exemplifying good ENGINEERING practice by use of stock or production parts shall be utilized wherever possible.
- C. Hanger supports shall be as noted below with at least one support adjacent to the joint for each length of pipe, at each change in direction and at each branch connection. Sufficient hangers shall be provided to maintain proper slope

without sagging. Support spacing shall not exceed manufacturer's recommendations, nor as listed below.

<u>Pipe</u>	<u>Maximum Support Spacing (Feet)</u>
Steel Pipe	
Under 3 inches	6
3 inches and Over	12
Cast or Ductile Iron	
Under 4 inches	6
4 inches and Over	12
Stainless Steel and Galvanized Iron	
Under 1-1/2 inches	4
1-1/2 inches to 4 inches	6
Over 4 inches	12
Copper Pipe	
	6
PVC Pipe	
Under 2-1/2 inches	4
2-1/2 inches and Over	6

- D. Spacing of clamps for support of vertical piping shall be close enough to keep the pipe in alignment as well as to support the weight of the piping and contents unless other vertical support is shown, but in no case shall be more than 12-feet.
- E. Provide adjustable hangers for all pipes, complete with adjusters, swivels, rods, etc. Size hangers to clear insulation and guide where required, as well as support piping. All rigid hangers shall provide a means of vertical adjustment after erection. Hanger rods shall be machine-threaded. Continuous threaded rods will not be allowed.
- F. Clevis or band-type hangers (B-Line FIG B3100) or approved equal shall be provided by CONTRACTOR. Strap hangers not permitted.
- G. Provide floor stands, wall bracing, concrete piers, etc., for all lines running near the floors or near walls and which can not be properly supported or suspended by the walls or floors. Pipe lines near concrete or masonry walls may also be hung by hangers carried from wall brackets at a higher level than pipe. Hanging of any pipe from another is prohibited.
- H. Equipment shall be positioned and aligned so that no strain shall be induced within the equipment during or subsequent to the installation of pipework.

- I. When temporary supports are used, they shall be sufficiently rigid to prevent any shifting or distortion of the piping or related work.
- J. In erecting the pipe, a sufficient number of screwed unions or flanged joints shall be used to allow any sections or runs of pipe to be disconnected without taking down adjacent runs. Flexible couplings shall be installed where shown on the drawings and at such other points as may be required for ease of installation or removal of the pipe, subject to approval of the ENGINEER. Flexible couplings shall be of the positive lock type where necessary to prevent separation of pipe due to internal pressures.

3.4 Installation at Concrete Walls and Footings

- A. Whenever a pipe line of any material terminates at, or through a structural wall or sump, the CONTRACTOR shall install in advance of pouring of concrete the fittings or special casting required for the particular installation.
- B. Plastic pipe shall not be cast in concrete or masonry walls.
- C. Pipe other than concrete, to be cast in water-bearing walls or more than four feet below grade shall have seep rings.
- D. All buried piping entering structures shall have a flexible connection installed less than two feet outside the structure line or as close to the wall as practical.

3.5 Detailed Installation Requirements

- A. Mechanical Joint Ductile Iron Pipe -- Mechanical joints shall be made as follows: Gland shall be placed on spigot end of pipe with lip extension toward the joint. The rubber gasket shall then be slipped on the pipe with its thick edge toward the gland. The gasket and joint surfaces shall then be slipped on the pipe with its thick edge toward the gland. The gasket and joint surfaces shall then be thoroughly wetted using a soapy solution made with vegetable soap or similar soap as recommended by the manufacturer. The spigot end of the pipe shall then be inserted to full depth on the mechanical joint socket and the gasket pressed firmly into place in the bell in order to obtain an even "set" all around the joint. The gland shall then be moved into place, the bolts inserted, and the nuts taken up tightly with fingers. The nuts shall then be tightened gradually by a wrench, a half turn at a time, moving wrench from one nut to another repeating until all nuts are uniformly tight. Final tightness shall be with a torque wrench to the torque recommended by the pipe supplier. Retainer gland wedge screws shall be tightened in a similar fashion until nuts are twisted off.

- B. Flanged Pipe -- Flanged joints shall be made up square, with even pressure on the gaskets, and shall be watertight. Gaskets shall be non-asbestos and non-phenolic compressed sheet packing, best-quality full-face with nitrile rubber binder, one-sixteenth - (1/16) inch thick, conforming to ANSI B16.21 suitable for the operating and test pressures of the pipe system equal to Garlock 3000. Gaskets for 20 inches and larger flanged joints may be one-eighth -(1/8) inch thick.
- C. Threaded Joints -- Threaded joints shall be made using the best quality TFE thread seal tape. All screwed joints shall be made tight with tongs and wrenches; caulking of any kind will not be permitted. Use of thread cement or caulking to make joints tight is prohibited. All cut ends shall be reamed to full bore before assembly.
- D. Welded Joints -- Pipe to be joined by welding shall have beveled ends or other suitable ends for welded joints as approved by the ENGINEER. Qualified welders certified in accordance with the latest requirements of the American Welding Society "Standard Qualifications Procedures" shall complete all welding in a workmanlike manner.

Where welded joints are in pipe with protective coating inside pipe, any coating damaged by welding shall be replaced to a condition equivalent to the factory-applied coating to the maximum practicable extent. When pipe is too small to enter, couplings shall be welded into pipe near ends to be welded to provide access for replacing protective coating inside pipe. The protective coating shall be replaced with a similar and equal coating. External protective coatings and wrapping shall be provided at joints similar and equal to the factory-applied pipe coating. Welded joints shall be wire-brushed and free of all scale and loose material before applying protective coating.

- E. Copper Piping -- Pipe joints shall be soldered with 95-5 wire solder, ASTM B32, Grade 95 TA, or as required by the UPC. Low temperature solder or screw joints permitted only at equipment subject to damage from heat or high temperature soldering. In making screwed joints, tin male threads with soft solder. Dielectric unions or insulated flanges shall be used for all connections between copper and ferrous materials.
- F. PVC Piping -- solvent cementing unless otherwise shown or described herein shall make Pipe joints. Connecting surfaces of pipe and fittings shall be cleaned with methyl ethyl ketone or acetone and then coated with solvent cement and joined. Joints shall be held together until cement takes hold and pipe shall be bottomed in fittings. Sufficient solvent shall be used so that a bead of cement is formed between the pipe and fitting at the socket entrance. Installation shall be in strict conformance with the manufacturer's recommendations.

- G. The joining of pipe lines other than specified above shall be by approved first class methods, using applicable procedures outlined above and/or manufacturer's recommended practices.

3.6 Testing

Testing of all water and field plant piping systems shall be performed as specified elsewhere in this document.

END OF SECTION

SECTION 15100

VALVES, GENERAL

PART 1 GENERAL

1.1 Description

- A. The CONTRACTOR shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, installing, adjusting, and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents. Where buried valves are shown, the CONTRACTOR shall install valve boxes to grade, with covers, and extensions.
- B. The provisions of this Section shall apply to all valves and valve operators specified in the various Sections of Division 15 of these Specifications except where otherwise specified in the Contract Documents. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other Sections of these Specifications.

1.2 Reference Specifications, Codes, and Standards

A. Commercial Standards

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch)
ASTM A 36	Specification for Structural Steel
ASTM A 48	Specification for Gray Iron Castings
ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 536	Specification for Ductile Iron Castings
ASTM B 61	Specification for Steam or Valve Bronze Castings

ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B 148	Specification for Aluminum Bronze Castings
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications
ANSI/AWWA C500	Gate Valves for Water and Sewerage Systems
ANSI/AWWA C502	Dry-Barrel Fire Hydrants
ANSI/AWWA C503	Wet-Barrel Fire Hydrants
ANSI/AWWA C504	Rubber-Seated Butterfly Valves
ANSI/AWWA C507	Ball Valves 6 Inches Through 48 Inches
AWWA C508	Swing-Check Valves for Waterworks Service, 2 Inches Through 24 Inches NPS
ANSI/AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
ANSI/AWWA C511	Reduced-Pressure Principle Backflow-Prevention Assembly
AWWA C550	Protective Interior Coatings for Valves and Hydrants
SSPC-SP1	Solvent Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP6	Commercial Blast Cleaning

1.3 Submittals

- A. Shop Drawings -- Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in the contract documents and if specified in the individual valve sections.
- B. Valve Labeling -- The CONTRACTOR shall submit a schedule of valves to be labeled indicating in each case the valve location and the proposed labeling for the label.

- C. Lining and Coating Data
- D. Manufacturer's handling, delivery, storage and installation requirements.
- E. Applicable material certifications and testing certifications and testing certificates.

1.4 Quality Assurance

- A. Valve Testing -- Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.
- B. Bronze Parts -- Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or, where not subject to dezincification, to ASTM B 584.
- C. Certification -- Prior to shipment, the CONTRACTOR shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, ASTM, etc.
- D. Unless otherwise noted, all water works materials provided for the project shall be new, of first class quality and shall be made by reputable manufacturers. All material of a like kind shall be provided from a single manufacturer unless otherwise approved by the ENGINEER. All material shall be carefully handled and installed in good working order free from defect in manufacture, storage and handling. Where an item is to be used but does not have its quality specified herein, it shall be equal to that specified in the appropriate American Water Works Association (AWWA) Standard Specification.

1.5 Material Delivery, Storage and Protection

All valves and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials at no cost to the OWNER.

PART 2 PRODUCTS

2.1 General

- A. Valve Flanges -- The flanges of valves shall be in accordance ANSI B16.1, ANSI B16.5 and ANSI/AWWA C115/A21.15 as required. CONTRACTOR

shall coordinate with pipe, valve and fitting suppliers to make certain that pipe, valve and fitting flanges match in bolt pattern.

- B. Valve Boxes -- White, Schedule 40, 8-inch Polyvinyl Chloride, (PVC), and valve box covers as shown on details installed as part of buried valve installations.
- C. Protective Coating -- The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not receive protective coatings.
- D. Valve Operators -- Valve operators shall be as shown or as specified for a valve type. Provide operator extensions to 12 inches below grade where depth to valve exceeds three (3) feet.
- E. Valve Labeling -- If required by the drawings and/or these specifications, a label shall be provided on all exposed (not buried) shut-off valves exclusive of hose bibbs. The label shall be of 1/16-inch plastic or stainless steel, minimum two (2) inches by four (4) inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve as directed by the ENGINEER.
- F. Bolts, Gaskets, Glands and Nuts -- Bolts, gaskets, glands, retainer glands, nuts and miscellaneous accessories required to install all valves shall be furnished and installed. Bolts and nuts for flanged connections shall be as specified elsewhere with American Standard regular unfinished square or hex heads. Gaskets for flanged connections shall be as specified elsewhere. Jointing materials for mechanical joints shall conform to AWWA C111.
- G. Actuators -- Unless otherwise indicated, all valves and gates shall be furnished with manual actuators. Valves in sizes up to and including four (4) inches shall have direct acting lever or handwheel actuators of the Manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the handwheel. Actuators shall be sized for the valve design pressure in accordance with AWWA C504. All gear-assisted valves that are buried, submerged or located in below grade vaults and all gates shall have the actuators hermetically-sealed and grease-packed. All valves six (6) inches to 30 inches in diameter may have traveling-nut actuators, worm-gear actuators, spur- or bevel-gear actuators, as appropriate for each valve. All buried valves shall be provided with 2-inch square operating nuts.

PART 3 EXECUTION

3.1 Valve Installation

- A. General -- All valves, gates, operating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as shown and specified. All gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe. Stem extensions shall be braced at no greater than 10 feet intervals and be provided with double universal joints to allow for misalignment.
- B. Access -- All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.
- C. Valve Accessories -- Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the CONTRACTOR to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.
- D. Valve boxes -- All buried valves shall be furnished with valve boxes. For valves installed out of paved or otherwise hard surfaced areas shall be set in a concrete pad at finished grade. Concrete valve box pads shall be 18 inches square and be not less than 6 inches thick. Valve boxes, except those of special design as required by the plans, shall be of cast iron of the two-piece extension type with a cast iron cover. Valve boxes shall have walls not less than 3/16-inch thick at any point, and the internal diameter shall be not less than 5 inches. Valve box covers shall have the word "WATER" cast into them as appropriate to their place of use. Valve box covers shall be of design and construction which prevents dislodging and rotation from traffic and shall be of the type which allows a hand held pry bar to be applied for easy removal. Valve boxes shall be constructed of high quality castings and shall be the product of a manufacturer approved by the ENGINEER and/or OWNER.

END OF SECTION

SECTION 15101

GATE VALVES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install gate valves, complete and operable, as shown and specified herein, including coatings and linings, appurtenances, operators, and accessories, in accordance with the requirements of the Contract Documents.

1.2 Submittals

As required by Section 15100.

PART 2 PRODUCTS

2.1 General

Gate valves shall be furnished and installed as shown and as specified herein.

2.2 Materials and Manufacturers

A. Gate Valves, 2 Inches and Under

Unless specified or shown otherwise on the drawings, gate valves two inches and under shall be Class 125 with bronze bodies and bonnets, non-rising stems, solid bronze discs and threaded ends. Valves shall be Figure B-103 as manufactured by Stockham, Model T-113 as manufactured by Nibco, Model 105 as manufactured by Milwaukee Valve, or approved equal.

B. Gate Valves, 3 Inches to 12 Inches

Gate valves for buried service shall be the resilient-seat type, with an iron body, non-rising stem, bolted bonnet, left opening and shall conform to AWWA Standard C509 or C515. Valves shall be lined and coated with a corrosion-resistant fusion bonded epoxy conforming to AWWA C550 and NSF 61. Valve ends shall be as shown on the plans. The CONTRACTOR, as specified elsewhere, shall furnish a valve box and cover, with all buried service valves installed. Gate valve stem extensions shall be furnished and installed on deep buried valves as specified in Section 15100.

Tapping valves shall comply with the above specifications and shall have an alignment ring dimension of the tapping flange that conforms to MSS SP 60 to ensure true alignment of the valve with the tapping sleeve. The outlet end of the valve shall be as indicated on the plans. Tapping valves shall include a minimum 3/8-inch diameter NPT pipe plug on the bonnet of the valve body to aid in field testing of the valve.

Acceptable gate valve manufacturers are as follows:

1. Clow Valve Company
2. M&H Valve
3. U.S. Pipe & Foundry Company
4. American AVK
5. American Flow Control
6. Mueller
7. Waterous
8. Or approved equal.

C. In-Plant Service

Gate valves for in-plant or exposed service shall meet the above specifications and shall be furnished with handwheel operators.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 15100 and the manufacturer's requirements.

END OF SECTION

SECTION 15102

BUTTERFLY VALVES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install butterfly valves, complete, as shown and specified herein, including coatings and linings, appurtenances, operators, and accessories, in accordance with the requirements of the Contract Documents.

1.2 Submittals

As required by Section 15100 and Section 01300.

PART 2 PRODUCTS

2.1 General

- A. Butterfly valves furnished under this section shall be of the rubber seated, tight-closing type. Metal to metal seating surfaces shall not be used. Butterfly valves shall be bubble-tight at the rated pressure with flow in either direction, and shall be satisfactory for operation following long periods of inactivity. Valve discs shall rotate a full 90 degrees from the open position to closed position. Class 150 valves shall meet the full requirements of AWWA Standard C504 for Class 150B. Class 250 valves shall conform to the requirements of AWWA Standard C504 subject to the requirements herein.
- B. Valve shafts shall consist of the one-piece type or "stub-shaft" type. "Stub-shaft" type valve shafts shall be inserted a minimum of one and one-half (1-1/2) shaft diameters into the valve disk hub. Valve shafts shall have a minimum diameter extending through the valve bearings and into the valve disc, as specified in AWWA Standard C504. Valve shafts shall be full size for that portion of the shaft extending through the valve bearings, valve disc and shaft seal. Any portion of the shaft turned down for any reason shall have fillets with radii equal to the offset to minimize stress concentrations at the junction of the different shaft diameters. The turned down portion of the shaft shall be capable of transmitting the maximum operator torque without exceeding a torsional steel stress of 11,500 pounds per square inch (psi). Valve shafts shall be constructed of wrought stainless steel, model or carbon-steel, with stainless steel journals. When carbon-steel shafts and stainless steel

journals are used, static seals shall be provided to isolate the interior of the disc and the shaft from water.

- C. Valve discs shall be of cast design with no external ribs transverse to the flow. The design shall be such to sustain full differential pressure across the closed valve disc without exceeding a working stress to one fifth of the tensile strength of the disc material. Valve discs shall be constructed from cast iron, alloy cast iron or ductile iron.
- D. Rubber seats applied to either the body or the disc, shall be constructed from new, natural or synthetic rubber, secured to the valve body or disc, and designed to provide tight shut-off and facilitate removal and replacement at the site. Rubber seats shall mate with the following acceptable surfaces: stainless steel, monel, bronze Grade A, D or E, or alloy cast iron. Rubber seats that are applied to the valve body and are penetrated by the valve shaft shall be adequately reinforced and clamped, mechanically secured, bonded or vulcanized to the valve body to prevent the seat from being inflated by pressure behind the valve seat. Rubber seats shall be resistant to microbiological attack, copper poisoning and ozone attack. All clamps and retaining rings for rubber seats shall be corrosion resistant.
- E. Valve bearings shall be of the sleeve type contained in the hubs of the valve body. Sleeve bearings fitted into the valve body shall be of self-lubricating materials approved for use with potable water.
- F. Valve shaft seals shall be designed for the use of standard split-v type packing, standard "O" ring seals or for pull down packing. "O" rings used for shaft seals shall be contained in a removable corrosion-resistant recess. Shaft seals shall be designed to allow seal replacement without removal of the valve shaft.
- G. Valve operators for in-plant valves shall conform to AWWA C504 and be of the manual type with handwheel operator unless specified otherwise below. Manual operators shall have all gearing totally enclosed and designed to produce the specified torque with a maximum pull of 60 pounds on the handwheel or chainwheel. Stop-limiting devices shall be provided in the operators for the open and closed positions. All operator components between the input and these stops shall be designed to withstand, without damage, a pull of 200 pounds for handwheel or chainwheel operators. All valves shall be equipped with adjustable mechanical stop limiting devices to prevent over-travel of the valve disc in the open and closed positions.
- H. Manual operators for buried service valves and valves in below grade vaults shall be of the traveling nut, self- locking type and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering. For buried services, operators shall be

equipped with a 2-inch square-operating nut (left opening) and shall be fully gasketed and grease-packed. For valves in below grade vaults, operators shall be equipped with a handwheel and shall be fully gasketed and grease-packed. A valve position indicator, if specified or shown, shall be furnished for all valves for installation in a valve box. The valve indicator shall be hermetically sealed for installation inside a cast iron valve box, and shall show valve-disc position, direction of rotation and number of turns from full open to full close. The valve manufacturer shall provide the indicator.

- I. Hydraulic Cylinder Actuators -- Cylinder actuators shall move the valve to any position from full open to fully closed when a maximum of 125 psi or a minimum of 60 psi is applied to the cylinder. All wetted parts of the cylinder shall be corrosion resistant and cylinder rods shall be chromium-plated stainless steel. Cylinders furnished with enclosed operating mechanisms shall have all wetted parts constructed of non-metallic materials except the cylinder rod which shall be chromium-plated stainless steel. Rod seats shall be of the non-adjustable wear-compensating type. A rod wiper for removing deposits inside the cylinder shall be provided in addition to the external dirt wiper. Cylinder actuators of this type shall be Pratt MDT with Dura-Cyl cylinder. Cylinder actuator shall come prepiped with speed controls, bleed cocks and solenoid valves required to open and close the valve. Actuator shall be supplied with a limit switch assembly for remote indication of open or closed valve position.
- J. All surfaces of the valve shall be clean, dry and free from grease before painting. For in-plant service, the valve surfaces except for disc, seating and finished portions shall be evenly coated with a primer compatible with paint systems specified elsewhere. For buried service valves and valves in below grade vaults, the interior and exterior valve surfaces shall be epoxy coated in accordance with AWWA Standard C550.
- K. Acceptable Butterfly Valve manufacturers are as follows:
 - 1. M&H
 - 2. Pratt
 - 3. Mueller
 - 4. Kennedy
 - 5. Dezurik
 - 6. Val-Matic
 - 7. Or approved equal

2.2 Class 150 Butterfly Valves

- A. Valve bodies shall be constructed of cast iron conforming to ASTM A-126 Class B (with integrally cast flanged or mechanical joint ends). Flange drilling

shall be in accordance with ANSI/B16.1 standard for cast iron flanges. Two trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be in strict accordance with AWWA C504.

- B. Valve shafts shall be turned, ground and polished. Valve shafts shall be constructed of 18-8 Type 304 or Type 316 stainless steel. Shaft diameters must meet minimum requirements established by AWWA C504 for Class 150B.

2.3 Class 250 Butterfly Valves

- A. Valve bodies shall be constructed of cast iron conforming to ASTM A-126 Class B (with integrally cast flanged or mechanical joint ends). Unless otherwise shown, Class 250 butterfly valve flanges shall have the same drilling as ANSI B16.1, Class 125 cast iron flanges and mechanical joint ends shall conform to ANSI 21.11. Two trunnions for shaft bearings shall be integral with each valve body.
- B. Valve shafts shall be turned, ground and polished. Valve shafts shall be constructed of stainless steel, ASTM A-564, Type 630 or 18-18 Type 304.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 15100 and manufacturer's requirements.

3.2 Testing

All valves 24-inches in diameter or larger, and all in-line transmission main valves, shall be pressure and leakage tested at the project site and shall pass the field testing prior to installation. Valves shall be tested at 1.5 times normal operating pressure, 150 psi minimum. No valve shall be accepted for installation that fails to pass the field pressure test. Any valves failing field pressure tests shall be replaced by CONTRACTOR at no additional cost to OWNER.

END OF SECTION

SECTION 15105
CHECK VALVES

PART 1 GENERAL

1.1 Scope

The CONTRACTOR shall furnish and install swing and silent check valves complete, as shown on the drawings and specified herein, including coating and lining, appurtenances, operators, and accessories.

1.2 Submittals

As required by Section 15100

PART 2 PRODUCTS

2.1 Materials

A. Swing Check Valves

1. Swing check valves (1-inch through 4 inches) -- Swing check valves 4 inches and under shall be Y-pattern check style and have a body constructed of 85-5-5-5 bronze conforming to ASTM B62. Check valves shall be capable of functioning in the vertical position. Swing check valve connections shall be standard threaded or threaded for fire hose connection where shown on plans.
2. Swing check valves (4-inch through 24 inches) -- Swing check valves shall be full waterway, rubber or metal seated, with end conditions as shown on the drawings. Swing check valves shall conform to all applicable provisions of AWWA C508. Swing check valves shall close tightly when the pressure downstream of the valve disc exceeds the upstream pressure.
3. Swing check valves shall be constructed of heavy cast iron conforming to ASTM A126 Class B; malleable iron castings conforming to ASTM A47 Grade 32510 or ASTM 197; ductile iron conforming to ASTM A395 or A536; or steel conforming to ASTM A108 or A307 Grade B. Swing check valves shall have bronze or composition rubber seat rings. The valve must be tight seating, shockless in operation and absolutely

prevent the return of water back through the valve. The body seat ring must be renewable.

4. Swing check valve discs shall be constructed of cast iron or cast steel and shall be suspended from a non-corrosive hinge pin shaft constructed of stainless steel passing through a stuffing box. Swing check valves shall be furnished with NSF approved epoxy lining and coating conforming to AWWA C210.

B. Silent Check Valves

1. The silent check valve shall be ANSI Class 250 and globe-style. The valves shall be of the silent operating type that begins to close as the forward flow velocity diminishes and be fully closed at zero velocity preventing flow reversal and resultant water hammer or shock.
2. The valve design shall incorporate a center guided, spring loaded poppet, guided at opposite ends and having a short linear stroke that generates a flow area equal to the pipe. Valve interior shall be contoured and unrestricted to achieve maximum flow capacity along with minimum pressure drop.
3. The operation of the valve shall not be affected by the position of installation. It shall be capable of operating in the horizontal or vertical position with the flow up or down.
4. All component parts shall be field replaceable without the need of special tools. A replaceable guide bushing shall be provided and held in position by the valve's spring. The spring shall be designed to withstand 100,000 cycle without failure and exert a force which allows the valve to start opening at a differential pressure of .5 PSI (.04 KG/CM²) and to fully open at a flow velocity of 4 FPS (1.22 meters per second).
5. The valve disc shall be concave to the flow direction providing for disc stabilization, maximum strength and minimal flow velocity to fully open the valve.
6. The valve disc and seat shall be field replaceable and have a seating surface finish of 32 micro-inch or better to insure positive seating at all pressures. The leakage rate shall not exceed one-half the allowable rate allowed by the AWWA C508, or .4 oz. (15 milliliters) per hour per inch (millimeter) of valve size.

7. A Buna-N seal shall be furnished to provide zero leakage. The seal design shall provide for both a metal to metal seal and a metal to Buna-N seal to achieve resilient sealing at both low and high pressures without over loading or damaging the Buna-N seal.
8. Ends shall be flanged and have a working pressure of 250 psi.
9. Valve shall be hydrostatically tested at 1.5 times the rated working pressure. Testing per AWWA, ANSI, MSS or API standards conducted when specified.

C. Manufacturers

Swing check valves 4 inches and larger shall be GA Industries, Inc. Fig. No. 220-D, Class 125, with flanged ends and lever and spring, or approved equal. Check valves 4 inches and under shall be red-white Toyo, or approved equal. Silent check valves shall be Val-Matic 1800 series, or approved equal.

D. Coatings

Furnish swing and silent check valves with liquid epoxy lining and coating conforming to AWWA C550.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 15100 and manufacturer's requirements.

3.2 Services Provided by Manufacturer's Representatives

The CONTRACTOR shall provide the services of the valve manufacturer's representative to verify proper installation of the valves and to adjust the valves when construction is complete.

END OF SECTION

SECTION 15107

MISCELLANEOUS VALVES

PART 1 GENERAL

1.1 Description

- A. The CONTRACTOR shall furnish and install miscellaneous valves complete, as shown on the drawings and/or specified herein, including coating and lining, appurtenances, operators, and accessories.
- B. Miscellaneous valves include non-freeze wall hydrant, combination air and vacuum valves, strainers, small swing check valves.

1.2 Submittals

As required by Section 15100 and Section 01300.

PART 2 PRODUCTS

2.1 Materials and Manufacturers

A. Bronze Swing Check Valves

Bronze swing check valves shall be brass bodied threaded cap with end conditions as shown or required for the application. Bronze swing check valves shall be pressure class 150, "Y" pattern as manufactured by Stockham valves and fittings, or approved equal.

B. Pressure Type Air Release Valves

Pressure type air release valves shall be float operated and shall incorporate a simple level mechanism to enable the valve to automatically release accumulated air from a fluid system while that system is pressurized and operating.

Air release valves shall close drop-tight, incorporating an easily renewable Viton seat, suitable for hot or cold water service. All internal metal parts shall be of stainless steel. The float shall be stainless steel, and be capable of withstanding a test pressure of 750 PSIG. The linkage/level mechanism shall be designed to prevent jamming.

The body and cover shall be of cast iron conforming to ASTM A126 Class B. Air release valves shall be designed to withstand a 450 PSIG test pressure.

Air release valves shall be as manufactured by GA Industries, Inc., Mars, PA, Figure #905 "Minimatic" or approved equal.

C. Combination Air/Vacuum Valves

The air/vacuum valve shall be two (2) independent valves, an air/vacuum valve and an air release valve, combined in a dual housing designed to withstand 300 psi. The valve shall be designed to exhaust large volumes of air when filling the pipeline, to release small quantities of air during operation, and to admit large volumes of air upon impending vacuum during draining.

Body and cover materials shall be cast iron ASTM A126, Class B. Orifice floats and orifices shall be ASTM A240 stainless steel and designed to withstand 1,000 psi. Valve seats shall be Buna-N. Combination air/vacuum valves shall be as manufactured by APCO Series 1700, or approved equal.

D. Strainers (Metal Body)

1. Equipment Requirements -- Strainers shall be of the Y-pattern or basket type, with flush connections, bronze bodies and screwed ends for sizes 3-inch and smaller, and cast iron and flanged ends for sizes greater than 3-inch. They shall be designed for not less than 250 psi working pressure in sizes 3-inch and smaller, and 125 psi working pressure in sizes over 3-inch. Strainers shall be of the same size as the entering pipe and the screens shall have a free area of not less than three times the cross-sectional area of the pipe.

2. Screens -- Unless otherwise indicated or required by the service fluid, the screen shall be of type 316 stainless steel or monel construction, easily removable, with the following mesh or perforations:

<u>Strainer Size</u>	<u>Size of Perforations</u>
1/4 - through 2-inch	20 mesh
2 1/2 through 5-inch	20 mesh
6 through 8-inch	1/8-inch diameter
over 8-inch	3/16-inch diameter

3. Strainers shall be manufactured by the following or equal.

Spriax-Sarco, Type BT and IF-125

E. Flap Valves

Flap valves shall be of ASTM A-126 cast iron construction with a bronze seat and bronze hinge pin. The valve shall be provided with a spigot, flanged or hub body as shown on the drawings. Flanged flap valves shall have 125 pound flanged ends unless otherwise noted on the drawings. The valve shall have two pivot points. Valves 16-inches and larger shall have the hinge pin secured with nuts. Valves 14-inches and smaller shall have the hinge pin secured with cotter pins. Flap valves shall be M & H style 47 or approved equal.

F. Shear Gates

Shear gate valves shall be ASTM A-126 cast iron frame with a bronze to bronze seat, bronze latch, and bronze hinge pin. Valve shall be provided with a double wedge and latch. The wedges are to be cast iron with bronze facing. Wedges shall be field replaceable. The valve shall be equipped with a pull rod made of galvanized steel that is long enough to facilitate valve operation without entering manhole. Pull rods shall be equipped with an adjustable cast iron hook for positioning the valve. Flanged shear gates shall have 125 lb flanged ends unless otherwise noted on the drawings. Shear gates shall be M & H style 44 or approved equal.

G. Ball Valves, 2 Inches and Under

Ball valves 2 inches and under shall be 400 lb. WOG with bronze body and trim, unless otherwise shown on the Drawings, TFE seat ring, and fluorocarbon O-ring seals. The valve shall be of three-piece construction so that maintenance can be performed without distributing the valve body after installation. Valves shall be Nibco T-590-Y or equal.

H. TF500 Blow-off Assemblies

The TF500 blow-off assemblies, or hydrants, shall be the depth as show on the Drawings with 2-inch diameter vertical FIP threaded inlet and 2-inch diameter NPT nozzle outlet. Hydrant shall be non-freezing and self-draining. Hydrant shall be operated by turning a top mounted square operating nut. CONTRACTOR shall provide OWNER with TF500 operating wrench. Hydrant must seal the drain outlet in all positions from ¼ open to fully open. Hydrant shall be 100% low-lead brass construction. All working parts shall be serviceable from above with no digging required. All wear parts (O-rings and valve seats) shall be of commonly-available dimensions and materials. Hydrant shall be the Truflo Model TF500 as manufactured by the Kupferle Foundry Co., or equal.

PART 3 EXECUTION

3.1 General

- A. Valve installation shall be in accordance with Section 15100 and manufacturer's requirements.
- B. Unless otherwise indicated, strainers shall be provided ahead of any control valves, regulators, and where shown, and shall be preceded by shut-off valves.

END OF SECTION

SECTION 15111

PRESSURE REDUCING VALVES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install pressure reducing valves complete, as shown on the drawings and/or specified herein, including coating and lining, appurtenances, operators, and accessories.

1.2 Submittals

As required by Section 15100

PART 2 PRODUCTS

2.1 Pressure Reducing Valve (Type I Pump Station Valve). The pressure reducing valve shall match the existing two pressure reducing valves inside existing pump station.

A. Construction -- Valve shall be single seated, globe style, hydraulically operated and diaphragm actuated. Diaphragm assembly shall be guided top and bottom by a precision-machined stem. Resilient valve disc, retained on three sides by disc retainers, shall form a drip-tight seal with a renewable seat when pressure is applied above the diaphragm. Control of valve operation shall be by means of an externally mounted, hydraulic pilot system.

Main valve body and cover shall be ASTM A48 cast iron or ASTM A536 ductile iron, with flanged ends. Main valve trim shall be bronze. Pilot control components shall be ASTM B61 bronze or ASTM B283 brass with Type 303 stainless steel trim, and pilot tubing shall be copper. Rubber parts shall be BUNA N synthetic rubber.

B. Protective Coating -- Valve body and cover shall be lined and coated with an FDA approved fusion bonded epoxy coating system suitable for use with cast iron or ductile iron. The epoxy coating thickness and application shall be in accordance with AWWA C550.

C. Operating Conditions -- Inlet pressures to the valve may vary from 50 to 155 psig. Valve shall be capable of maintaining downstream pressure over a range

of 30 to 300 psig. The initial setting shall be 70 psig. Flow through the valve shall be one-way.

- D. Operating Requirements -- Pump Station PRV -- Pressure Reducing Control: A pressure reducing control, located in the pilot system, shall sense the main valve outlet pressure, and shall cause the main valve to modulate (open and close) as required to maintain a constant pressure at the main valve outlet at all times. Adjusting the spring force in the pressure reducing control shall set the desired constant pressure. The valve shall have a check feature to positively prevent return flow when pressure reverses.
- E. Accessories -- The following accessories shall be furnished with the valve:
 - 1. Self-cleaning strainer for pilot system
 - 2. Pilot system isolation valves on inlet, outlet, and cover lines
 - 3. Opening speed control
 - 4. Closing speed control
 - 5. Check control
 - 6. Limit switch to signal when valve is open or closed
- F. Pressure Rating -- Valves shall be suitable for a working water pressure of 250 psig.
- G. Manufacturer -- Valve shall be Model 91-01 as manufactured by Cla-Val Co., Newport Beach, CA, without exception.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 15100 and manufacturer's requirements.

3.2 Services Provided by Manufacturer's Representatives

The CONTRACTOR shall provide the services of the valve manufacturer's representative to verify proper installation of the valves and to adjust the valves when construction is complete.

END OF SECTION

SECTION 15115

DIAPHRAGM VALVES, ELECTRICALLY CONTROLLED

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install electrically controlled, diaphragm valves complete, as shown on the drawings and/or specified herein, including coating and lining, appurtenances, operators, and accessories.

1.2 Submittals

As required by Section 15100.

PART 2 PRODUCTS

2.1 General

- A. Construction -- Valve shall be single seated, globe style, hydraulically operated and diaphragm actuated. Diaphragm assembly shall be guided top and bottom by a precision machined stem. Resilient valve disc, retained on three sides by disc retainers, shall form a drip-tight seal with a renewable seat when pressure is applied above the diaphragm. Control of valve operation shall be by means of an externally mounted, solenoid pilot system.

Main valve body and cover shall be ASTM A48 cast iron or ASTM A536 ductile iron, with flanged ends. Main valve trim shall be bronze. Pilot control components shall be ASTM B61 bronze or ASTM B283 brass with Type 303 stainless steel trim, and pilot tubing shall be copper. Rubber parts shall be BUNA N synthetic rubber.

- B. Protective Coating -- Valve body and cover shall be lined and coated with an FDA approved fusion bonded epoxy coating system suitable for use with cast iron or ductile iron. The epoxy coating thickness and application shall be in accordance with AWWA C550.
- C. Valve Control Operating Requirements --The valve shall be opened or closed in response to the operation of the two solenoid pilot controls. The solenoids will receive their electrical signals from a separate control system.

- D. Pump Control Discharge Valves (Type II Pump Station Valve). Pump control discharge valve shall match the existing two discharge valves inside pump station.

Accessories

1. Self-cleaning strainer for pilot system
 2. Pilot system isolation valves on inlet, outlet, and cover lines
 3. Solenoid control valves with bypasses
 4. Pilot check valves
 5. Valve position indicator/transmitter
 6. Opening speed control
 7. Closing speed control
- E. Pressure Rating -- Valve shall be suitable for a working water pressure of 250 psig.
- F. Manufacturer -- Valve shall be Model 131-01/631-01 as manufactured by Cla-Val Co., Newport Beach, CA, without exception.

PART 3 EXECUTION

3.1 General

Valve installation shall be in accordance with Section 15100 and manufacturer's requirements.

3.2 Services Provided by Manufacturer's Representatives

The CONTRACTOR shall provide the services of the valve manufacturer's representative to verify proper installation of the valves and to adjust the valves when construction is complete.

END OF SECTION

SECTION 15221

PRESSURE GAUGES

PART 1 GENERAL

1.1 Description

The CONTRACTOR shall furnish and install pressure gauges as specified below and as shown on the Drawings.

1.2 Submittals

As required by Section 01300

PART 2 PRODUCTS

2.1 General

Pressure gauges shall be bourdon tube type and shall have a 4.5-inch dial and stainless steel case and ring. The gauges shall be stem mounted with a 1/4-inch NPT connection at the bottom of the case. The bourdon tube shall be bronze and the socket material shall be brass. All gauges shall be provided with a 1/4-inch NPT stop valve for isolation from the measured fluid. The pressure range shall be as shown on the Drawings or specified elsewhere. Pressure gauges shall be Ashcroft Model 1009 or approved equal.

END OF SECTION

SECTION 15400

PLUMBING

PART 1 GENERAL

1.1 Scope

This section covers the work necessary to furnish materials, labor equipment and services necessary to provide all plumbing fixtures, equipment and specialties as shown on the drawings and specified herein.

1.2 Quality Assurance

Install plumbing to meet requirements of local and states codes and provide manufacturer's certification that materials meet or exceed minimum requirements as specified.

1.3 Submittals

Submittals shall include manufacturers certificate of conformance; certified copies of test reports; documentation on plumbing fixtures; fabrication drawings for roof flashing and counterflashing; layout showing type, spacing, maximum loads and materials for hangers and supports and manufacturers warranty statements.

PART 2 PRODUCTS

2.1 Plumbing Fixtures

A. Water closet -- Floor-mounted, tank type

Water closet, floor-mounted with elongated siphon jet bowl; low silhouette flush tank with cover; solid white plastic seat; and chrome-plated angle supply with wheel handle stop.

B. Mop Sink

Kohler, K-2054 "Jamestown" wall-mount lavatory in white with "Finesse" faucet in polished chrome with ADA compliant K-13885 offset drain or approved equal.

2.2 Plumbing Specialties

A. Floor Drains

1. Floor drains shall be of cast iron with sediment buckets. Floor drains shall be sized to match the outlet piping as shown on the plans.
2. All floor drains will have a connection for a 3/8-inch copper line from the trap primer.

B. Trench Drains

1. Trench drain channels shall be made of precast polymer concrete with a top width of 6.1-inches and radiused bottoms. All channels shall interlock with tongue and groove connections with adjoining channels. Each channel shall have four horizontal anchoring ribs to mechanically lock the channel into the floor slab. Channels shall have knockouts for 4 or 6-inch discharge lines. Channels shall have a built in bottom slope of .6% or be non-sloping, as shown on the plans.
2. Channel grates shall be made of galvanized steel and shall be designed for a load of H-20 traffic at a minimum. Grates shall be securely locked down with built in channel lock blocks. Locking mechanism shall be designed so as to provide an obstruction free trench for maintenance and cleaning. All trench drains will have a connection for a 3/8-inch copper line from the trap primer. Manufacturer of trench channels and grates shall be PolyDrain, Inc, or approved equal.

C. Trap Primer

1. Trap primers shall be provided with an automatic self drip floor drain trap primer and trap primer lines. The trap primer shall operate on pressure drop and incorporate vacuum breakers and 0-pressure safety seals. The manifold will have a valved distribution manifold to allow flow equalization to each trap.
2. Trap primers shall protect all floor drains connected to the sanitary sewer. 3/8-inch copper tubes shall be run from the primers to the traps of the floor drains.

D. Cleanouts

1. All cleanouts shall be heavy plugs with tapered shoulders against caulked lead or heavy brass plugs. Where underground or concealed,

cleanouts shall be brought to floor level and to accessible locations with access covers and frames.

2. Manufacturer's, or Equal: The following cleanouts, or equal, shall be furnished:

	<u>Josam</u>	<u>J.R.Smith</u>	<u>Zurn</u>
Exposed locations	58500-20	4405	Z-1440-A
Underground	53010-30	4143	ZN-1400-2
Walls, concealed	58790-20	4535	ZN-1445-1-A
Traffic areas	56070	4240	Z-1420-27

E. Reduced-Pressure Backflow Preventer

Reduced-pressure assemblies ¾-inch through 2-inch shall consist of a differential pressure relief valve located between two independently acting "Y" pattern check valves, two full ported ball valve shut-offs and four test cocks. Mainline valve body and caps, including relief valve body and cover, shall be bronze. Check valves shall be center stem guided. All seat discs shall be reversible. The relief valve shall have a removable seat ring. Assemblies shall be certified in compliance with ASSE 1013, AWWA C511-89, and CAN/CSA B64.4, and should be approved by the Washington State Department of Health. The reduced-pressure assembly shall be Febco Model 825Y, or approved equal.

F. Hose Bibbs and Hydrants

1. General: All hose bibbs and hydrants in exposed locations subject to freezing shall be of the non-freeze type. Where hose bibbs are connected to a non-potable water supply, they shall be provided with plastic or stainless steel warning signs "DO NOT DRINK," in clearly-legible letters and permanently attached at the hose bibb. Where shown, hose bibbs shall be provided with vacuum breakers as furnished by Crane Co.; American Standard; or equal.

2. Manufacturers, or Equal

- a. Non-Freeze Post-Type

Exposed bronze hydrant, post-type, depth of bury to suit local conditions, minimum 3 feet.

- i. Josam Mfg. Co., Series 71700

- ii. J. R. Smith Mfg. Co., Series 5910
- iii. Zurn Industries, Inc., Fig. Z-1385 or 1390

b. Non-Freeze Wall-Type

Heavy-duty bronze hydrant with nickel-bronze face, hinged cover, recessed box and key. Length to suit wall.

- i. Josam Mfg. Co., Series 71000
- ii. Jay R. Smith Mfg. Co., Fig. 5510/5511
- iii. Zurn Industries, Inc., Fig. Z-1300

G. Expansion Tank

If an expansion tank is required, it shall have a maximum allowable working pressure of 125 psi. Acceptance volume shall be 2.4 gallons and total volume shall be 4.7 gallons. Expansion tank shall be constructed per ASME Code Section VIII.

H. Pressure-Reducing and Relief Valves

A. Pressure-reducing and relief valves shall be of the spring-loaded diaphragm type with a minimum pressure rating of 250 psi, bronze body, nickel alloy or stainless steel seat and threaded ends. These valves are limited to use in interior plumbing systems. See Sections 15111 and 15112 for valves to be used in water main installations.

B. Manufacturer's, or Equal

- 1. A.W. Cash Valve Mfg. Corp
- 2. Fisher Controls Company
- 3. Mueller Company
- 4. Masoneilan
- 5. Watts Regulator Company
- 6. Wilkins Regulator

I. Wall-Mounted Hose Racks

The CONTRACTOR shall install wall-mounted hose racks at locations shown. Racks shall be of all welded steel construction, of minimum 8-gage sheet steel, hot dip galvanized after fabrication, and shall have a capacity to hold 100 feet of 3/4-inch or 1-1/2-inch hose.

J. Strainers (Metal Body)

1. Equipment Requirements: Strainers shall be of the Y-pattern or basket type with flush connections, bronze bodies and screwed ends for sizes 3-inch and smaller; and cast iron with flanged ends for sizes greater than 3-inch. They shall be designed for not less than 250 psi working pressure in sizes 3-inch and smaller, and 125 psi working pressure in sizes over 3-inch. Strainers shall be of the same size as the entering pipe and the screens shall have a free area of not less than three times the cross-sectional area of the pipe.
2. Screens: Unless otherwise indicated or required by the service fluid, the screen shall be of Type 316 stainless steel or monel construction, easily-removable, with the following mesh or perforations:

<u>Strainer Size</u>	<u>Size of Perforations</u>
1/4- through 2-inch	20 mesh
2 1/2- through 5-inch	20 mesh
6- through 8-inch	1/8-inch diameter
over 8-inch	3/16-inch diameter

3. Strainers shall be manufactured by the following or equal

Spriax-Sarco, Type BT and IF-125

K. Pressure Gauges

Pressure gauges shall be 3-1/2 inch diameter with stainless steel case, polycarbonate glass window, stainless steel movement, blowout disc and 1/4-inch NPT stainless steel lower connection. Gauges shall be Ashcroft Type 1009, glycerine-filled, or approved equal. Supply gauges complete with 1/4-inch Type 1095 stainless steel gauge cock and Type 11125 pressure snubber of porosity designation E.

The CONTRACTOR shall select the range of the pressure gauge such that under normal operating conditions the gauge will read from 40 to 70 percent of full scale.

2.3 Plumbing Equipment

Electric Water Heaters--Electric water heaters shall have a 19-gallon capacity, complete with electric, cold and hot water connections; 3/4-inch drain valve piped to drain; 3/4-inch temperature and pressure-relief valve, piped to floor sink or drain; and aquastat. The tank shall be of welded steel construction of working pressure of not

less than 150 psi, with magnesium anode, glass lining, minimum 1-inch fiberglass insulation, enameled steel jacket. The burners shall be of the electric immersion type. Electric water heaters shall be UL listed and shall be Champion Model E51-19L-045D or approved equal.

2.4 Insulation

- A. All hot and cold water piping valves and fittings and vent piping shall be provided with one-inch thick insulation.
- B. All components of the insulation, including covering, mastics and adhesives shall have a flame spread rating of not over 25, and a smoke development rating of not over 50. Ratings shall be as established by tests in accordance with ASTM E 84 and Federal Specification standards. Insulation shall be applied in strict accordance with the manufacturer's instructions.
- C. Pipe insulation shall be molded-type pipe covering made of fibrous glass with a minimum K-factor of 0.23 at 75°F mean temperature.
- D. Insulation shall have a factory-applied white fire-retardant vapor-barrier jacket of Kraft paper and aluminum foil laminated together and reinforced with fiberglass yarn. Fittings and valves shall be covered with the same material as the pipe, cut in segments to fit snugly without open spaces, held in place with copper wire or cement, and then covered with the same jacketing material as the pipe. Insulated fittings adjacent to vapor-barrier insulation shall be sealed with an acceptable vapor-barrier cement before installation of the finish jacket. Pipe insulation and vapor-barrier shall be continuous through hangers and supports. Where insulation protection shields are provided, the top half section of pipe insulation at support locations shall be of the same specified density; and the bottom half insulation segments provided between the pipe and the insulation protection shields shall have a density of not less than 6 lb./cu. ft. All insulation shall be covered with smooth aluminum weatherproof metal or plastic performed jacketing with a factory-attached moisture barrier. The jacket for the fittings shall consist of precision-formed smooth-sided sections and shall be sized to cover and protect the insulated fitting. Each section shall be manufactured from aluminum or PVC and all joints shall be sealed with silicon mastic or solvent welding to provide a continuous, air and weathertight joint. Strapping shall be 1/2-inch wide Type 3003 aluminum or stainless steel.
- E. Manufacturer, or Equal
 - 1. Armstrong Contracting and Supply Corporation
 - 2. Certain-Teed Corporation
 - 3. Manville

4. Owens-Corning Fiberglass Corporation
5. PPG Industries, Inc.

PART 3 EXECUTION

3.1 Fixture Installation

- A. Each fixture shall be installed with trap, easily removable for servicing and cleaning, and vented in accordance with the applicable plumbing code.
- B. The CONTRACTOR shall provide chrome-plated rigid or flexible supplies to fixtures with angle stops, reducers and escutcheons.
- C. All fixtures shall be installed and secured in place with wall supports, wall carriers, floor carriers and bolts.
- D. Fixtures shall be sealed to wall and floor surfaces with sealant as indicated in section 07920 - Sealants and Caulking. Color shall match fixture.
- E. All fixtures shall be mounted to the following heights above finished floor:

Water closet	15 inches to top of bowl rim
Lavatory	31 inches to top of basin rim
Water closet flush valves	11 inches above bowl rim

3.2 Plumbing Specialties Installation and Application

- A. The CONTRACTOR shall coordinate the work of roughing-in, wall and floor sleeves, pipe inserts, cutting of roof and floor construction to receive drains to required invert elevations. Pipes below ceilings shall be held as high as possible without interfering with other trades.
- B. The CONTRACTOR shall install all plumbing specialties in accordance with manufacturer's printed instructions to permit intended performance.
- C. Cleanouts shall be extended to finished floor or wall surface. Threaded cleanout plug shall be lubricated with mixture of graphite and linseed oil. The CONTRACTOR shall ensure sufficient clearance at cleanouts for rodding of drainage system.
- D. Exterior cleanouts shall be encased in concrete flush with pavement or they shall be extended to above finished grade in unpaved locations.

3.3 Water Heater Installation

- A. The CONTRACTOR shall install water heaters in accordance with manufacturer's printed instructions.
- B. Water heater shall be securely fastened or braced using stainless steel straps or by bolting the frame to the floor in order to prevent overturning during a seismic event.
- C. The work hereunder shall be coordinated with plumbing, piping and related electrical work to achieve operating system.
- D. Tank shall be cleaned and flushed after installation. All openings shall be sealed until pipe connections are made.

END OF SECTION

SECTION 16010
GENERAL PROVISIONS

PART 1 GENERAL

1.1 Description of Work

- A. The work consists of furnishing all labor, materials, services, tools and other equipment necessary for the construction, installation, connection and testing of all electrical work for this project as shown on the drawings or specified herein.
- B. This project includes the complete electrical installation for reservoir security and obstruction lighting.

1.2 Intent of Drawings and Specifications

- A. Riser and other diagrams are schematic only and shall not be used for obtaining quantities.
- B. The electrical drawings do not show complete details of the site conditions. The Contractor shall check actual conditions.

1.3 Coordination of Work

- A. The Contractor shall plan his work in coordination with the City Operations.
- B. The Contractor shall field verify all dimensions of equipment to be installed or provided by others or by this contract so that correct clearances and connections may be made between the work installed by the Contractor and equipment installed or provided by others.
- C. The Contractor shall arrange all conduit runs so that they do not interfere with duct work, structural members, equipment access openings, etc.
- D. All working measurements shall be taken from the sites, checked with those shown on the drawings, and if they conflict, reported to the Engineer at once, and before proceeding with the work. Should the Contractor fail to comply with this procedure, he shall alter his work at his own expense as directed by the Engineer.
- E. No extra payments will be allowed where obstructions in the work of other trades, or work under this contract requires offsets to conduit runs.

- F. The Contractor is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.

1.4 Supervision

The Contractor shall maintain adequate supervision of the work and shall have a responsible person in charge at the site during all times that work under this contract is in progress, or when necessary for coordination with other work.

1.5 Codes

Work shall conform to the National Electrical Code, State codes, and other applicable codes, even though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality for materials and workmanship.

1.6 Workmanship

- A. All work shall be performed by personnel skilled in the particular trade. Workmanship shall conform to the standards of the NEC.
- B. The Engineer shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgement any material or equipment has not been properly installed or finished, the Contractor shall replace the material or equipment whenever required, and reinstall it in a manner entirely satisfactory to the Engineer without any increase in cost to the Owner.

1.7 Permits, Fees and Service Charges

The Contractor shall obtain all permits and pay all fees, including any line extension fees from any utility company.

1.8 Contractor's Record Drawings

The Contractor shall maintain a neatly marked set of record drawings. In addition, the locations of panels, field mounted instruments and panels, terminal boxes, junction boxes and any other materials included in this contract shall be shown. Drawings shall be kept current with the work as it progresses and shall be subject to inspection by the Engineer at any time.

PART 2 PRODUCTS

2.1 Materials

See subsequent electrical sections and the drawings for specified materials.

2.2 Portable or Detachable Parts

- A. The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adaptors, blocking chips, and inserts until completion of his work.
- B. These parts shall be delivered to the Engineer and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the Contractor's request for final payment.
- C. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendations.

PART 3 EXECUTION

3.1 Support Backing

Provide any necessary backing required to properly support all fixtures and equipment installed under this contract.

3.2 Cutting, Patching and Framing

- A. The Contractor shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.
- B. Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-shrink grout.
- C. Cutting, fitting, repairing and finishing of carpentry work, metal work, or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around the holes.

3.3 Tests

- A. The Contractor shall furnish all labor, material, instruments and tools to make all connections for testing of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly prior to the acceptance of the work. All protective devices shall be operative during testing of equipment. The tests shall be made under the supervision of the Engineer. All deficiencies or unsatisfactory conditions as determined by the Engineer or

inspecting authorities shall be corrected by the Contractor in a satisfactory manner at his own expense.

- B. After visual inspection of joints and connections and the application of tape and other insulating materials, all sections of the entire wiring system shall be thoroughly tested for shorts and grounds. A log of results for each circuit shall be kept by the Contractor and presented to the Engineer.
- C. A phase rotation check shall be made to demonstrate that all power receptacles, service feeders, and main power feeders have the same A-B-C phase rotation and ground relationships.
- D. Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc. sufficiently to demonstrate proper installation and electrical connections. Control and emergency conditions shall be artificially simulated where necessary for complete system or subsystem test.
- E. Insulation resistance measurements of each circuit shall be made with loads connected and contactors, if any, blocked closed to give complete circuits. Insulation resistance of complete circuit shall be measured from the circuit breaker load terminals with the breaker open. A log of complete results shall be prepared by the Contractor and presented to the Engineer. Values of resistance shall be 10 megohms or greater.

END OF SECTION

SECTION 16100

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.1 Description of Work

The work consists of furnishing all labor, materials and equipment required for electrical work shown on the drawings and as further described in these specifications.

1.2 Regulations and Permits

- A. The Contractor shall comply with all applicable codes, ordinances, and regulations, including the National Electrical Code, National Electrical Safety Codes, and the State of Oregon.
- B. The Contractor shall obtain a Certificate of Electrical Inspection from the local inspecting authority and submit to the owner upon completion of the project.

1.3 Excavation and Backfill

- A. Perform all necessary excavation and backfilling for buried conduits and conductors as specified.
- B. No backfilling shall be done until all direct burial cables, conduits and penetrations to be covered have been inspected and approved.

PART 2 PRODUCTS

2.1 Quality of Materials

All contract materials shall be new, of proven quality, and without imperfections or blemishes. All material not specifically detailed in this specification required to accomplish the completion of this contract shall be of compatible quality to the item specified and be approved by the Engineer. All materials shall be products of manufacturers regularly engaged in production of such equipment and shall be of the manufacturer's latest design. Where 2 or more units of the same classes of equipment are required, these units shall be of the same manufacture. All material and equipment shall be per NEMA, ANSI, IEEE or ICEA Standards as applicable, except as modified by these specifications. All material shall be UL labeled as applicable.

2.2 Raceways

- A. All raceways shall be UL approved for the application.
- B. Rigid steel conduit -- Provide zinc-coated rigid steel conduit conforming to Federal Specification WW-C-581.
- C. Flexible metallic conduit -- Provide liquid tight flexible conduit, zinc-coated steel core, extruded gray PVC cover, UL approved, Sealtite type "UA" or Liqueflex type "LA", or equal. Where permitted by local inspection authority, sizes larger than 3-inch shall be Sealtite type "EF", or Liqueflex type "LT", or equal.
- D. Rigid PVC conduit -- Provide rigid polyvinyl chloride (PVC) conduit, schedule 40, UL listed for concrete encased and direct burial underground. Rigid PVC conduit, including couplings, elbows and nipples, shall conform to the requirements of the latest edition of Federal Specification WW-C-1094, and NEC.

2.3 Conduit Fittings

Provide conduit fittings as follows unless otherwise noted or detailed. Catalog numbers shown are RACO//Appleton Electric Company unless otherwise noted. Similar products of other manufacturers are equally acceptable.

Rigid Conduit Insulating Bushings	Series 1400//Series BBU
Rigid Conduit Set Screw Fittings	3010-3022, 3102-3116// Series SRNTC and SNTCC
Flexible Metallic Conduit Fittings	Pylets (Pyle-National)//Unilets
Expansion Joints	Adalet Type STR//OZ Type AX or TX
Conduit Wall Entrance Sealing	OZ Type FSK-GALV Fittings
Conduit Seal-Offs	OZ Type FSK-GALV

2.4 Outlet Boxes

Provide outlet boxes as follows unless otherwise noted or detailed. Catalog numbers shown are Appleton Electric Company. Similar products of other manufacturers are equally acceptable.

Lighting Outlet Boxes	FS/FD Series
Same (exterior and damp locations)	As required by fixture
Switch, Receptacles, Telephone and Junction Boxes	FS/FD Series with cast cover and gasket

Provide extension rings as required and increase the above specified minimum box sizes to conform to allowable fill permitted by the code.

For boxes installed in concrete or flush in walls or ceilings below finished grade, provide cast FS/FD series boxes.

2.5 Pull Boxes

Provide code gage galvanized sheet steel pull boxes as shown on the drawings. Provide removable screw cover on the largest access side of the box unless otherwise detailed. Where cast boxes are indicated or specified, provide conduit entrances with threaded hubs. Provide stainless steel screws at all exterior and damp locations. Where pull boxes are required but not shown, provide pull boxes as specified above sized per NEC requirements.

2.6 Conductors

- A. This specification covers all conductors not specified in other sections. All conductors and cable shall conform to UL, Federal Specification J-C-30, or ICEA as applicable. Provide new cable manufactured within one year of installation.
- B. 600 volt power, lighting and control cable -- Provide stranded copper conductors unless otherwise specified, conforming to Federal Specification J-C-30. For cable type TW or THW, provide insulation conforming to Federal Specification J-C-30. FOR types THHN or THWN, provide insulation conforming to UL-83.

For type RHW and RHH, provide insulation conforming to ICEA S-19081. For type XHHW, provide insulation conforming to ICEA S-66-524. Provide neoprene jacket on RHW-RR type cables in accordance with ICEA S-19-81 specifications.

Provide control cable with 600 volt TW type insulation for all multi-conductor, Class 1 remote control and signal wiring unless otherwise specified. Provide overall jacket complying with ICEA S-61-402. Color code control cable in accordance with ICEA S-61-402, Table 5-1.

- C. Minimum conductor size -- Provide No. 12 AWG minimum branch circuit wire size. Provide No. 14 AWG control circuits unless otherwise specified or required by over-current protection. Provide smaller conductor sizes for

specific application where shown on the drawings.

- D. Class 2 remote control and signal conductors -- Provide cables UL approved for such use. Voltage rating shall be not less than 600 volts. Utilize multi-conductor cables with like or related functions generally grouped together. Unless otherwise specified or shown on the drawings, utilize No. 14 AWG conductors.
- E. Instrumentation cables -- Multi-conductor cables shall have the quantity and size of conductors shown on the plans. Individual conductors shall be bare soft annealed copper Class B, 7-strand concentric per ASTM B-8. Individual conductor insulation shall be flame-retardant per UL 13, 15 mils nominal thickness, with a 105 degree C temperature rating. Conductor pairs shall be uniquely identified according to manufacturer's standard method. Overall cable assembly shall have 2.35 mils (minimum) aluminum-polyester tape shield overlapped for 100% coverage and provided with a 7-strand tinned copper drain wire the same size as an individual conductor. The jacket shall be flame-retardant per UL 13, with a 105°C temperature rating and a rip cord laid longitudinally under the jacket to facilitate removal. Conductors shall be twisted pairs and the cable shall be rated for operation to 300 volts.
- F. Twisted shielded pairs (TSP) shall be 7 or 19-strand, No. 18 AWG, tinned-copper conductors, 600 volt, individually insulated with color-coded cross-linked polyethylene, insulated conductors twisted into a pair, pair-shielded with a spirally applied aluminum/mylar tape shield and a 7-strand drain wire. Cable to have an overall 45 mil jacket.

PART 3 EXECUTION

3.1 Conduit Installation

- A. Conduit buried in earth -- Install raceways to provide not less than 24 inches cover to finished grade. Pitch to drain away from buildings; avoid trapped runs. Grade trenches and place pipe bedding material to provide uniform trench bottom for raceway support. Buried raceway shall not be smaller than 1 inch and shall be Schedule 40 PVC as specified.
- B. Provide rigid steel conduit for raceways embedded in structural reinforced concrete; in hazardous areas; in exposed locations; for sizes 1-1/4-inch and larger; and at all locations not otherwise specified.
- C. Provide flexible metallic conduit connections at all motors and transformers plus other equipment connections subject to vibration. Utilize suitable fittings,

keep route neat, at nominal right angles, and in conformance with equipment lines.

- D. Exposed conduit shall be run in straight lines parallel to column lines, walls, or beam. Where conduit is grouped, the bends and fittings shall be installed to present an orderly appearance. Unnecessary bending or crossing shall be avoided.
- E. Supports for exposed conduit runs shall be furnished and installed within 3 feet of each box. Supports shall be secured by means of expansion inserts in concrete.
- F. Conduit and fittings shall be properly protected during the construction period against mechanical injury from any cause. Conduit which extends out of floors, walls or slabs shall be boxed or otherwise protected and ends shall be capped with metal pipe plugs.
- G. Rigid conduit joints and connections shall be made thoroughly watertight and rustproof by means of thread compound which will not insulate the joint. Each threaded joint shall be thoroughly cleaned to remove all the cutting oil before the compound is applied. Running threads will not be allowed. Erickson couplings may be used in dry and exposed locations provided that they are installed with fixed threaded connection at the top of vertical runs.
- H. Size -- Use raceways no smaller than $\frac{3}{4}$ -inch except that $\frac{1}{2}$ -inch or larger may be used for switch legs; and control circuit wiring specified to be No. 14 AWG wire.
- I. Raceways in plain concrete -- Do not place raceways in cement toppings on structural floors without special approval. Install, however, in nonreinforced concrete headers and similar locations provided for their installation and in cement fill on precast concrete roofs.
- J. Raceways in reinforced concrete -- Do not displace reinforcing steel to accommodate the installation of raceways and outlet boxes. In general, locate all embedded conduits in the physical center of the particular section of concrete. Wooden plugs inserted in concrete or masonry are not acceptable as a base for raceway fastenings. Provide raceways embedded in reinforced concrete in conformance with the following usual types of conditions unless otherwise instructed by the Engineer. Particular attention is called to the fact that there are many extenuating conditions where the Contractor may be instructed during the course of the project not to place embedded conduits in certain areas, generally due to the possibility of unsightly cracking or for structural reasons. This instruction does not entitle the Contractor to extra compensation. Special approval will be required for any condition not covered by the following usual conditions.

<u>Location</u>	<u>Maximum Allowance</u>
Columns	Displacement of 4% of plan area of column
Floors and walls	Displacement of 1/3 of thickness of concrete, spaced not less than three diameters o.c.
Beams and joists	Displacement of 1/3 of least dimension, spaced not less than three diameters o.c.
Sleeves through floors and walls	Two-inch maximum pipe size, not less than three diameters o.c.

- K. Raceways entering the facility below grade -- Provide raceways with galvanized cast iron wall entrance seals having a watertight sealing gland assembly.

3.2 Wire and Cable Installation

- A. Conduit shall be thoroughly cleaned of all foreign material just prior to pulling the wire or cable. Lubricants shall be compounds specifically prepared for cable pulling and shall not contain petroleum or other products which will affect cable insulation. Lubrications shall be UL approved.
- B. Splicing of conductors No.8 AWG or smaller shall be by preinsulated spring-pressure connectors, such as "Scotchlok" Types Y, R and B, Ideal "Wingnut" or equal. All uninsulated splices, joints and free ends of conductors shall be covered with rubber and friction tape or high-dielectric strength, plastic tape. All splices in underground boxes or direct buried shall be insulated and waterproofed, using scotchcast epoxy splicing compounds suited for the purpose.
- C. Terminal strips in panels shall be identified throughout the equipment utilizing a unique numbering system.
- D. Wires terminating on terminal strips shall be tagged with the designation of the terminal strip and the number of the terminal to which they are connected. Wires shall be numbered with Brady nylon wire markers at all accessible locations. Wire markers shall be permanent type. Submit shop drawings of the type to be used for approval.
- E. Wiring diagram shall show the terminal strips, terminals, and their identifying designations.

F. Color code

1. All secondary service, feeder, and branch circuit conductors shall be color coded as follows:

<u>240/120 Volt</u>	<u>Phase</u>
Black	A
Red	B
White or Gray	Neutral

<u>24 Volt DC</u>	
Blue	(+)
Yellow	(-)

2. All No. 12 and No. 10 branch circuit conductors shall have solid color compound or solid color coating. All neutral sizes shall have solid color compound or solid color coating.
3. No. 8 AWG and larger phase conductors shall have either
 - a. Solid color compound or solid color coating.
 - b. Stripes, bands, or hashmarks of colors specified above.
 - c. Colored pressure-sensitive plastic tape. Tape shall be applied in half overlapping turns for a minimum of 3 inches for all terminal points, and in all junction boxes, pull boxes, troughs, manholes, and handholes. Tape shall be 3/4 inch wide with colors as specified above. The last two laps of tape shall be applied with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.

G. Installation -- Keep all conductors within the allowable tension limits during installation. Lubricants for wire pulling, if used, shall be approved for the insulation and raceway material. Observe cable manufacturer's and industry standard cable bending radius recommendations. For type THHN/THWN conductors, avoid abrasion and damage to outer jacket. Wiring showing damage after installation shall be replaced.

H. 600 volt conductors -- Provide one of the conductor types indicated for the function and location listed below unless otherwise indicated on the drawings or approved by the Engineer. Provide ground and neutral wires identical to circuit wires.

- I. Observe code restrictions with respect to wet and dry locations. At the Contractor's option, conductors with insulation systems rated for high operating temperatures may be substituted for lower temperature rated conductors. However, no reduction in conductor size will be permitted from that indicated. When using small diameter wire, do not reduce conduit size below that required for Type THW as shown in NEC Table 3A.

<u>Location</u>	<u>Insulation Type</u>	
	<u>THW, THWN</u>	<u>RHH, THHN, XHHW</u>
Lighting circuits, interior		
General	x	x
Special fixture requirements	x	x
Within 3 inches of ballast		x
Receptacle and single-phase	x	
Motor circuits		
Interior	x	

3.3 Equipment Installation

- A. Boxes and cabinets shall be installed on the surface level and plumb and affixed to the surface with expansion inserts in concrete and machine screws to tapped holes in metal surfaces.
- B. Interconnections between equipment shall be made per manufacturer's wiring diagram. All wiring shall be clearly labeled and external connections in control panel and remote cabinet brought out to terminal blocks. All equipment connected to telephone lines shall be protected against voltage transients.

END OF SECTION

SECTION 16150

MOTORS

PART 1 GENERAL

1.1 Description of Work

This section covers motors which are supplied with and as part of connected equipment specified in other sections of this specification.

1.2 Standards and Codes

- A. All materials and equipment specified herein shall within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. All materials and equipment specified herein shall conform with all applicable NEMA, ANSI and IEEE standards.
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electric Code, N.E.C.

1.3 Submittals

- A. In accordance with the "submittals" requirements in Section 16010, project data on motors for all equipment shall include the following with the submittal for the equipment:
 - 1. Drawings and Data: Catalog information and complete name-plate and efficiency information.
 - 2. Motor wiring and connection diagrams for all provided external connections including power, overtemp contacts, space heaters, moisture sensors, etc.
 - 3. Physical drawing showing electrical connection.
 - 4. Motor terminal connection box size
 - 5. Refer to individual equipment specification requirements.

6. Submit the motor manufacturer's certification of conformance to the specified bearing life on all motors 20 horsepower and larger. Also submit, upon the Engineer's request, certification of bearing life on smaller motors.
7. For motors provided with cords, provide complete information on the cord including:
 - a. Length, number and size of conductors, overall diameter, materials, ratings, etc.
8. For motors with special requirements for protection such as overtemp, moisture, overtorque, etc. from electrical controls or components, submit detailed information on equipment, installation, and control wiring requirements.

PART 2 PRODUCTS

2.1 General

- A. Unless specifically excepted, all motors shall be of the "energy efficient" or "energy saver" type which meet the minimum efficiencies required by the Oregon State energy codes and the Energy Policy Act of 2005. Normal efficiency motors shall not be supplied. In addition, all motors shall have a minimum power factor rating of .85 at full load, motors rated at a lower power factor shall not be supplied.
- B. Provide motors in accordance with standard NEMA type classifications as specified. The use of industry standard sub classifications such as "Mill and Chemical" motors and similar "standard" heavy-duty designs are encouraged where they meet or exceed the specified minimum requirements.
- C. All Motors shall be suitable both electrically and mechanically to drive the connected equipment under any and all modes of operation. The speed, horsepower, torque, base, bearing, shaft, insulation, and enclosure shall be closely coordinated with equipment requirements specified herein and in other portions of this specification so as to provide a satisfactory, efficient drive without overloading, overheating, abnormal noise or vibration.

- D. All Motors shall be designed and built for long, trouble-free life in industrial service and shall be capable of operating successfully under the following application conditions:
1. 40 degrees centigrade maximum ambient temperature to -20 degrees centigrade minimum ambient temperature.
 2. 3,300 ft. maximum altitude
 3. Voltage variations to plus or minus 10% of nameplate rating.
 4. Frequency variations to plus or minus 5% of nameplate rating.
 5. Variable speed motors shall be suitable for use with variable speed controller.
 6. .85 minimum full load power factor.
- E. All motors shall be rated for full voltage starting, NEMA Design B, normal torque, normal starting current, unless otherwise required by the driven equipment or specified.
- F. All motors shall be suitable for the environment in which they are to be installed. The environment in which motors will be installed in this project will be 100% humidity continuously.

2.2 Enclosures

- A. Totally enclosed fan cooled (TEFC) unless otherwise specified.
- B. Hazardous areas, scheduled in 16110-1.04 - explosion proof non-ventilated - (XPNV) or fan cooled (XPFC).
- C. Cast iron stator frames and end shields, rigid construction.
- D. Heavy fabricated steel, or cast iron for single phase motors.

2.3 Motor Accessories

- A. Conduit Entrance: Provide conduit entrance box on the left-hand side of all horizontal motors, when facing motor end opposite shaft extension unless otherwise detailed on the drawings or required by the unique characteristics of the equipment served. Provide conduit entrance box size and drilling to conform to the conduit or wiring requirements indicated on the electrical

drawings. Include motor leads and all accessory leads in a common conduit entrance box.

- B. Motor Leads: Provide motor leads compatible with motor insulation system, permanently identified.
- C. Eyebolts: Provide drilling and tapping for eyebolts on all motors weighing more than 83 pounds.
- D. Nameplates: Provide two engraved stainless steel stamped metal nameplates (one for the motor and one for mounting in the MCC starter bucket), with the information required by NEMA-MG1-10.38 and the following additional information:
 - 1. Maximum ambient temperature for which motor is rated.
 - 2. Class of insulation.
 - 3. Service factor.
 - 4. Bearing number.
 - 5. Motor connection diagram if more than three leads.
 - 6. Power rating in kW if driven equipment ratings are given in metric units.
 - 7. Voltage and wattage of internal space heaters
- E. All single-phase motors shall be self-protected unless specified "for separate protection", and the self-protection characteristic shall be indicated on the motor nameplate. Protection shall be manual or automatic-reset type as specified or required by safety considerations of the equipment served.
- F. Single phase motors shall be provided with start capacitors if necessary for proper operation of the motor. The start capacitors shall be located within the motor housing.
- G. Enclosed Motors: Provide drain plugs for non-explosion proof motors and drain and breather for explosion proof motors.
- H. Finish: Provide a prime and final finish of the manufacturer's standard colors.
- I. Provide imbedded thermostats for thermal alarm or motor cut out for all motors 40 Hp and above unless otherwise shown.

J. Provide space heaters for the motors identified in the drawings. Space heaters shall be 120V single phase. Bring heater leads into conduit entry box. Space heater sizes shall be as follows:

1. 3 - 7.5 Hp - 45 Watts
2. 10 - 50 Hp - 60 Watts
3. 60 - 100 Hp - 100 Watts
4. 125 - 250 Hp - 145 Watts
5. Above 250 Hp - 350 Watts

2.4 Motor Terminal Connection Box

Provide a terminal connection box two sizes larger than normal to allow extra room for motor feeder splices.

2.5 Insulation Class

- A. Provide NEMA Class B insulation with additional nonhygroscopic moisture protection which will maintain a minimum resistance of 1.0 megohms after 168 hours of exposure at 100% humidity.
- B. Class F insulation with additional nonhygroscopic moisture protection as specified above may be utilized at the Contractor's option, however, the temperature rise as measured by resistance when operating at rated service factor and load shall conform to the limiting observable temperatures in NEMA-MGI, for class B insulation.
- C. Class A insulating materials shall not be utilized.

2.6 Service Factor

- A. The rated nameplate horsepower of the motor, when operating at a service factor of 1.0, shall be equal to or greater than the horsepower required to drive the connected equipment under any and all modes of operation.
- B. Provide motors with a 1.15 service factor at maximum motor operating load.

2.7 Submersible Motors

- A. Definite purpose submersible motors shall conform to the following:
 1. Motor shall be designed for service in a liquid temperature of 25 degrees centigrade. Set controls to permit operation only when fully submerged unless specifically rated for non submerged duty.

2. Motor shall have two mechanical seals; the lower one outside the motor and protecting the upper one which shall be in an oil filled chamber.
3. Provide imbedded thermostats for thermal alarm or motor cut-out.
4. Provide water detector probes in seal oil chamber.
5. Provide one or more multiconductor cables of approved construction and suitable length to extend from the motor to the indicated receptacle or junction box. Provide strain relief for the cable.
6. Separate cables shall be provided for power and alarm conductors.
7. Provide control wiring connection diagram and all necessary components, relays, etc. for the required and proper control and shutdown of the motor. Provide descriptive information to the Engineer and System Integrator on the control of the equipment.

2.8 Power Ratings

- A. Motor horsepower, if indicated in the detailed equipment specifications, are minimum size acceptable.
- B. Ratings indicated on the electrical drawings are for guidance only and do not limit the equipment size.
- C. Frame/hp relationships shall conform to the latest NEMA standards for "T" or "U" frames, and all dimensions shall meet NEMA standards.

2.9 Synchronous Speed

In general, the motor speed indicated is the rated synchronous speed. Provide motor rated full-load speeds which are compatible with the specified performance of the driven equipment.

2.10 Standard Rated Voltage Phase and Frequency

- A. Provide motors nameplate-rated for 60 hertz power supply as follows unless otherwise specified or shown on the drawings:
 1. Motors less than 1/6 hp, single-phase, 115 volts.
 2. Motors 1/6 hp to 1/2 hp, single-phase, 115/230 volts.
 3. Motors 1/2 hp through 100 hp, three-phase 230/460 volts.

4. Multi-speed and part winding start motors may have single voltage rating if manufacturer's standard.
- B. Conform to the specified service conditions and the equipment specifications without reduction in the service factor.

2.11 Bearings & Shafts

- A. All bearings shall be anti-friction-type AFBMA standard sizes. All motors shall provide a minimum bearing life of 20,000 hours. All motors shall have thrust ratings not less than the combined static and dynamic loads to be imposed.
- B. Shafts shall be in accordance with NEMA "T" or "TS" dimensions. Long shafts shall be suitable for belt, chain or gear drive within limits established by good industrial practice and documented by NEMA. Short shafts shall be used for direct connection. Vertical motors shall be the solid-shaft type except where application requires a hollow-shaft design.
- C. Balance and Vibration: Conform to NEMA standard, MG1, latest revision.

2.12 Duty Cycle

Provide motors rated for continuous duty unless otherwise specified.

2.13 Lubrication

- A. Horizontal polyphase motors shall be grease lubricated. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent re lubrication but facilities shall be provided for adding new grease and draining out old grease without major motor disassembly. Motors 180T frame and smaller may utilize grease release fitting in lieu of grease drain plug. The bearing housing shall have long, tight, running fits or rotating seals to protect against the entrance of foreign matter into the bearings or leakage of grease out of the bearing cavity.
- B. Vertical polyphase motor lubrication shall conform to the motor manufacturer's recommendations. Except as otherwise recommended, guide bearings shall be ball bearings, grease lubricated; thrust bearings shall be grease lubricated through frame 280T, oil lubricated in larger frame sizes.

2.14 Efficiency

Efficiency shall be determined by testing production motors with a dynamometer at rated output, voltage and frequency in accordance with IEEE Specification 112A, paragraph B.

2.15 Shop Tests

- A. Each polyphase motor shall be given a routine test to determine that it is free from electrical or mechanical defects and provide assurance that it meets the specifications. The routine test shall conform to applicable NEMA and IEEE standards latest revision and shall be as generally defined as "Standard Commercial Test."
- B. Copies of the test report will not be required unless actual operation and installation suggest the motors' performance should be verified, in which case certified copies of the test report shall be submitted upon the Engineer's request.

PART 3 EXECUTION

3.1 Installation

- A. Motors shall be factory installed on common bases, stands, etc., with the driven equipment. Provide suitable couplings and guards between motor and driven equipment.
- B. Align and connect to driven equipment.
- C. Provide suitable personnel guards over all shafts, couplings, or others exposed moving parts.
- D. Connect motors to power supply and controllers.
- E. Verify correct rotation of equipment.
- F. Connect motor leads with a splice kit specifically designed for motor lead connection as described in Section 16920.

3.2 Installation Check

- A. Provide services of an experienced, competent, and authorized representative of manufacturer to visit site of work and inspect, check, adjust if necessary, and approve equipment installation for motors.

- B. Assure that equipment manufacturer's representative is present when equipment is placed in operation.
- C. Verify that equipment representative revisits job site as often as necessary until all trouble is corrected and equipment installation and operation are satisfactory, in opinion of Engineer.
- D. Verify that motor overcurrent protection is in accordance with the N.E.C.
- E. Verify the motor protection and control is in accordance with the equipment manufacturers requirements.
- F. The Contractor shall open each motor terminal box for inspection by the Engineer.

3.3 Tests

- A. The Contractor shall simulate all motor alarm and shutdown conditions to test that the motor control is operating correctly. These tests shall be witnessed and verified by the Engineer.
- B. The Contractor shall perform voltage, current and resistance tests as required to complete the Motor Test Report form included herein. The Contractor shall inform the Engineer a minimum of 3 days in advance of testing and shall only perform tests with the Engineer or Owners representative present.
 - 1. Voltage, current and circuit and winding resistance readings shall be taken with a volt ohm meter.
 - 2. Insulation resistance readings shall be taken with a 500 volt megger for 30 seconds with the circuit conductors connected to the motor.
- C. Test reports must be submitted to the Engineer prior to final acceptance by the Owner.
- D. If the test results indicate corrective measures are required, the Contractor shall undertake all such corrective measures until the electrical system is accepted by the Engineer. No additional compensation will be paid for corrective measures.

END OF SECTION

ATTACHMENT - MOTOR TEST REPORT

16150 - MOTOR DATA AND TEST REPORT

EQUIPMENT NAME AND NUMBER: _____

EQUIPMENT SPECIFICATION SECTION: _____

MOTOR STARTER LOCATION _____

CONTRACTORS REPRESENTATIVE _____ DATE _____

MOTOR NAMEPLATE DATA

MFR Name/Model No. _____
Voltage/Phase/HP _____
FLA/LRA _____
Service Factor _____
Efficiency Index (or percent) _____
NEMA Design _____
Code Letter _____
Insulation Type _____
Temperature Rise _____
Ambient Temperature _____
RPM _____
Enclosure _____
Thermal Trip Setting _____
Space HTR: Watts/Volts _____
Other Data _____

MOTOR STARTER INFORMATION

Manufacturer/Type _____
Overload Heater No _____

* RECORDED FULL LOAD DATA VOLTS A-G _____ B-G _____ C-G _____
FULL LOAD OPERATING VOLTAGE VOLTS A-B _____ B-C _____ C-A _____
FULL LOAD OPERATING CURRENT AMPS A _____ B _____ C _____

INSULATION RESISTANCE MEGOHMS A-G _____ B-G _____ C-G _____
(de-energized)

MOTOR CIRCUIT RESISTANCE OHMS A-B _____ B-C _____ C-A _____

* VOLTAGE & CURRENT READINGS SHALL BE TAKEN AT THE CLOSEST
ACCESSIBLE POINT TO THE LOAD

SECTION 17000

INSTRUMENTATION/CONTROL AND TELEMETRY SYSTEMS

PART 1 GENERAL

1.1 Summary

- A. This section covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting-up the Instrumentation and Control (I&C) and Telemetry System.
- B. Major elements of this system include, but are not limited to, all materials, equipment, and work required to implement a complete and operating system as described herein. The system shall include primary elements for process variable measurements, analog display, control elements, and all hardware and software required for the Programmable Logic Controllers (PLCs), and Graphical User Interface (GUI) SCADA computers.
- C. The I&C and Telemetry System provided as part of this contract is an addition and modification to the Owner's existing system, which was designed and furnished by S&B Inc. For compatibility with their comprehensive system, I&C design and system integration will be provided by the Owner's I&C Consultant/Integrator, S&B Inc.
- D. Conduit and wiring between all devices and equipment is to be provided by the Contractor. See Section 16000 Electrical Work.

1.2 Definition of Terms

- A. **System Integrator:** A single firm, pre-selected by the Owner, who shall design and furnish the system, assemble and test the instrument panels, and program PLCs, computers, and other instrument components and provide start-up and training services. The System Integrator is S&B Inc.
- B. **Contractor:** The Contractor, as distinct from the System Integrator, shall install the panels, and other materials furnished by the System Integrator and provide all additional materials and work necessary and thereby, satisfy all requirements that are within the scope of this section.

1.3 Special Requirements

- A. The Contractor shall install components including those assembled and programmed by the System Integrator at the locations shown in the plans.

- B. The System Integrator shall be responsible for making all modifications and additions at the Owner's Control Center and Offices at 4100 Norfolk Street.

1.4 Submittals

A. Hardware Submittals

- 1. The System Integrator shall prepare a complete hardware submittal in electronic format. The City shall receive this submittal in electronic format (Adobe pdf file format), including fully detailed shop drawings, catalog cuts, wiring connections, and such other descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these Specifications. Catalog information shall be submitted for all components and equipment, regardless of whether or not it is of the same manufacture as that listed in the Specifications.

B. System Drawing Submittals

- 1. The System Integrator shall prepare complete system interconnect wiring diagrams and panel layout drawings for approval. Interconnect wiring diagrams with equipment supplied under separate Section may show the terminal numbers as 'unknown' prior to construction, but must be provided in As-Built format with wire numbers identified.

1.5 Documentation

A. Operation and Maintenance Manuals

- 1. Provide three (3) complete sets of Operation and Maintenance Manuals. These 1-inch loose-leaf manuals shall include paper copies of the operating description, wiring diagrams and presentations. In addition, the manual shall have an optical media sleeve to hold an optical disk (DVD or CD) with comprehensive copies of all hardware descriptive materials as well as electronic copies of the hard copy materials described above. Access to manuals and drawing information on the optical media disks shall be hyperlinked using html and designed for use with Internet Explorer v6 or later and Adobe reader version 8 or later.
- 2. The manuals shall include operating and maintenance literature for all components provided in this section. The submitted literature shall be in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration, and maintenance of each component provided under this section.

B. Record Drawings

1. Block Diagrams: These diagrams shall be in the same format and style as those provided in these Contract Documents.
2. Schematic and Interconnecting Wiring Diagrams: 'As-Built' drawings submitted to the City following successful function acceptance testing shall indicate terminations as tested. Diagrams shall show all equipment (panels, field elements, etc.) and all terminations provided under this section. Wiring diagrams shall clearly show all terminal block number designations and wire numbers. Diagrams, device designations, and symbols shall be in accordance with the Owner's Telemetry System record drawings. Thirty days shall be allowed following the test for documenting these terminations.

PART 2 PRODUCTS

2.1 General

- A. The Instrumentation and Control and Telemetry System is designed to function as an integral part of the Owner's comprehensive Water Telemetry, Control and Management Reporting System in place at other facilities.

This system is designed to allow new facilities to be constructed or existing facilities to be modified and then to be fully integrated as part of this overall system. Products have, therefore, been selected to be fully compatible and when possible, to match existing systems.

At the Owner's Control Center, the Master Telemetry Unit and SCDA Systems shall be modified by the System Integrator to accommodate the new facilities specified and indicated in the drawings.

- B. The System Integrator shall furnish the following equipment for installation by the Contractor.
1. For location at the Intertie Pump Station Site:
 - a. One 200hp Motor Controller for connection to existing Siemens System 89 MCC (DJ1C3). Unit includes splice kit for connection to existing Section 05FA. MCC section includes RVSS motor starter with network connected overload, key panel.

- b. One replacement Remote Telemetry Unit (RTU) model 6000-P71 and 9” touch screen designed to replace backpanel in existing RTU enclosure.
- c. Field Instruments and Sensors

Tag #	Description	Mfg	Model
LSHH-3	Vault High Level Switch	Anchor Sci	G-SI-20-NO
ZS-3	Hatch Entry Limit Switch	Siemens	3SE03-AR16P / 3SX03-KL201
PIT-3	Pressure Zone Transmitter	Siemens	7MF4033-1DA10-1AC6-Z+A01+B21
FIT-3	8” flowmeter with remote mount electronics display, 24Vdc	Siemens	7ME6580-4PJ14-2AA2 7ME6910-1AA30-1AA0

- 2. At the Control Center, S&B shall furnish all software and make all system modifications.

2.2 Operations Narrative

A. General

- 1. The Instrumentation, Control and Telemetry system is existing and upgraded as part of this scope of work to provide monitoring and control of the pumping station.
- 2. Valve Control uses new flowmeter as process controlling feedback. Remove flow estimation software and replace with flowmeter.
- 3. The block diagrams illustrate each of the instrument loops and the major instrument components involved. The System Integrator shall be responsible for the design of the system and developing all software for the PLCs and GUI Systems.
- 4. Alarms are annunciated at the City Operations Center for both on-duty and off-duty time periods.

PART 3 - EXECUTION

3.1 General

- A. Install materials and equipment in a workman-like manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance.

- B. Coordinate Instrumentation and Control work with the System Integrator, Owner, Contractor and work of other trades to avoid conflicts, errors, delays and unnecessary interference with system operations during construction.

3.2 Coordination with System Integrator

- A. The Contractor shall coordinate directly with the System Integrator to insure all requirements within the scope of this Section are satisfied.

- B. System Simulation

1. To the degree possible, the entire I&C and Telemetry System shall be simulated at the System Integrator's facility. The Engineer, Contractor and Owner personnel shall be invited to witness simulation and approve test results prior to shipment to Contractor.
2. The testing shall include factory floor demonstration using supplied RVSS and flowmeter equipment prior to shipment to jobsite.

- C. Communication Testing and Simulation

1. Prior to start-up of the system, all communication facilities shall be tested by System Integrator. Signals shall be simulated and circuit performance verified prior to system start-up. The Contractor shall be responsible for installing cables and wires for connecting the RTU as shown on the drawings.

- D. Field Acceptance Test

1. S&B shall conduct acceptance tests and provide operator training for the I&C and Telemetry System.

- E. Schedule

1. System integration work shall begin upon receipt of approved Hardware Submittals. Delivery to the Contractor of completed panels and any system elements shall be made to meet Contractor's schedule but not less than thirty days following System Integrator's receipt of all materials required. Field acceptance tests shall be completed within thirty days following installation by the Contractor.

3.3 Protection during Construction

- A. Throughout this Contract, the Contractor shall provide protection for materials and equipment against loss or damage and the effects of weather. Prior to

installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Specific storage requirements shall be in accordance with the manufacturer's recommendations.

3.4 Material and Equipment Installation

- A. Follow manufacturer's installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturer's instructions and these Contract Documents, follow Engineer's decision, at no additional cost to the Owner. Keep copy of manufacturer's installation instructions on the jobsite available for review at all times.

3.5 Tests

- A. A witnessed FUNCTIONAL ACCEPTANCE TEST shall be performed on the complete system of Instrumentation and Controls. Each function shall be demonstrated to the satisfaction of the Engineer on a loop-by-loop basis. The actual testing program shall be conducted in accordance with the prior approved procedures, and shall be witnessed and signed off by both the Contractor and the Engineer upon satisfactory completion.
- B. All special testing materials and equipment shall be provided under the SCOPE of this Section. Where it is not practical to test with real process variables, provide suitable means of simulation. These simulation techniques shall be subject to the approval of the Engineer.
- C. Coordinate all testing with other associated suppliers and subcontractors.
- D. The Contractor shall notify the Engineer at least two weeks prior to the date of the FUNCTIONAL ACCEPTANCE TEST. Acceptance tests shall be performed as described elsewhere in these specifications.

END OF SECTION

END OF TECHNICAL SPECIAL PROVISIONS

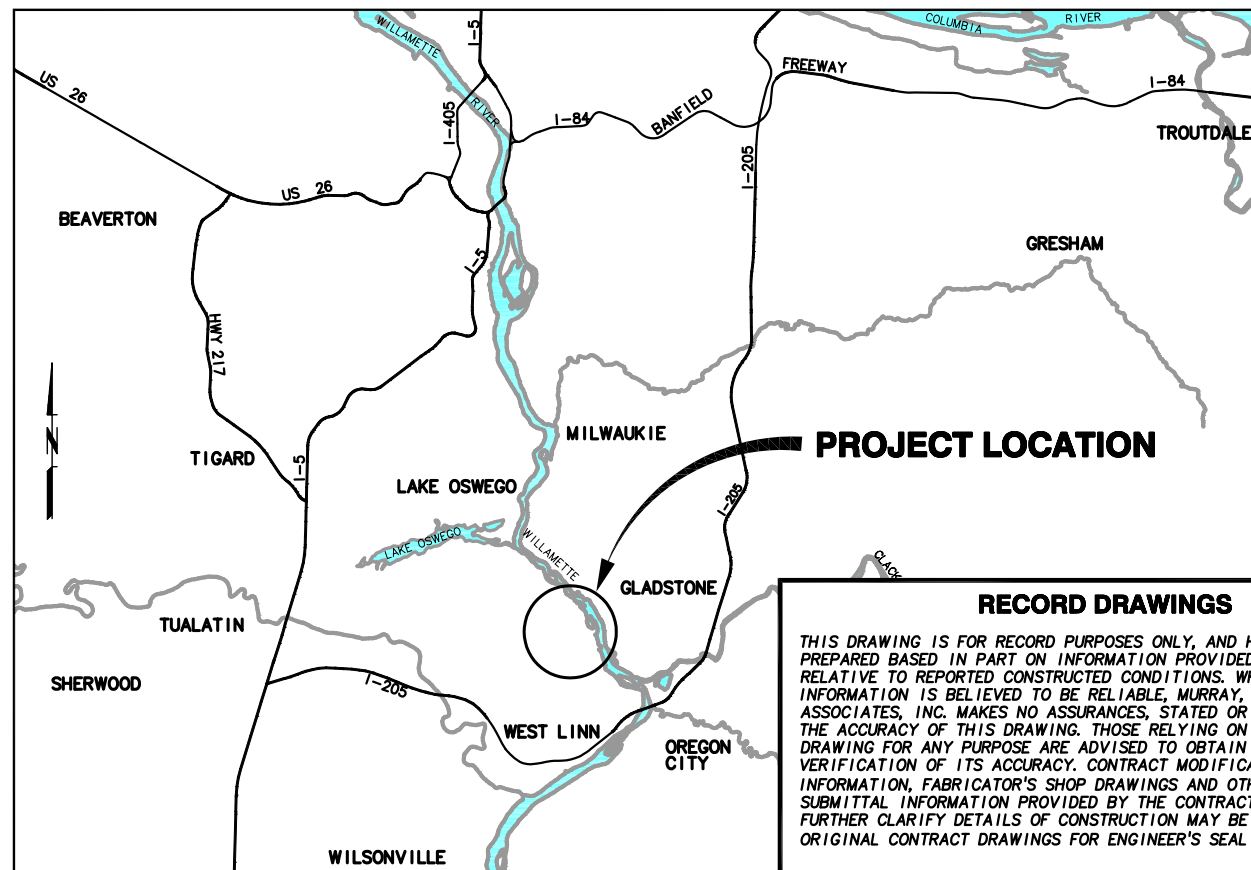
SUPPLEMENTARY INFORMATION

West Linn

EMERGENCY INTERTIE WATER PUMP STATION

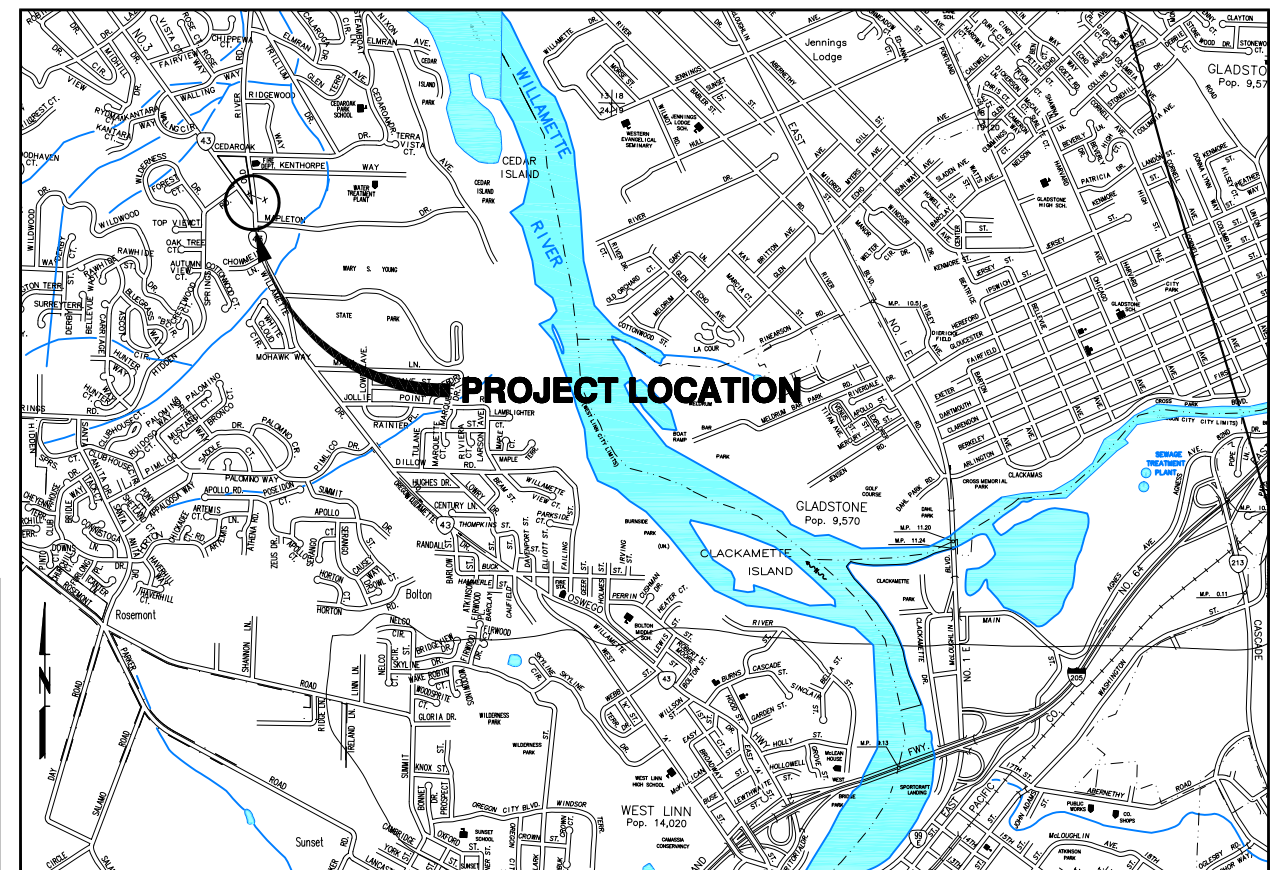
APRIL 2002

RECORD DRAWING



VICINITY MAP
SCALE: 1"=10,000'

RECORD DRAWINGS
THIS DRAWING IS FOR RECORD PURPOSES ONLY, AND HAS BEEN PREPARED BASED IN PART ON INFORMATION PROVIDED BY OTHERS RELATIVE TO REPORTED CONSTRUCTED CONDITIONS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, MURRAY, SMITH & ASSOCIATES, INC. MAKES NO ASSURANCES, STATED OR IMPLIED, AS TO THE ACCURACY OF THIS DRAWING. THOSE RELYING ON THIS RECORD DRAWING FOR ANY PURPOSE ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY. CONTRACT MODIFICATION INFORMATION, FABRICATOR'S SHOP DRAWINGS AND OTHER PROJECT SUBMITTAL INFORMATION PROVIDED BY THE CONTRACTOR WHICH FURTHER CLARIFY DETAILS OF CONSTRUCTION MAY BE ON FILE. SEE ORIGINAL CONTRACT DRAWINGS FOR ENGINEER'S SEAL AND SIGNATURES.
VERSION 4.0 12-9-97



LOCATION MAP
SCALE: NTS

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- 4 OF 4 SCHEMATIC
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®	AT
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
AB	ANCHOR BOLT
ABAN	ABANDON(ED)
ABC	AGGREGATE BASE COURSE
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACP	ASPHALTIC CONCRETE PAVING
ACU	AIR CONDITIONING UNIT
ADJ	ADJUSTABLE
ADJC	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHR	ANCHOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALM	ALARM
ALT	ALTERNATE
AM	AUTO-MANUAL
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APPVD	APPROVED
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARV	AIR RELEASE VALVE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASPH	ASPHALT
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
ATM	ATMOSPHERE
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BOLT CIRCLE
BETW	BETWEEN
BF	BOTH FACES
BFILL	BACK FILL
BHP	BRAKE HORSEPOWER
BTF	BOTTOM FACE
BFV	BUTTERFLY VALVE
BKGD	BACKGROUND
BL	BASE LINE
BLDG	BUILDING
BLK	BLOCK
BLT	BOLT
BLVD	BOULEVARD
BLW	BELOW
BM	BENCH MARK/BEAM
BMP	BEST MANAGEMENT PRACTICE
BO	BLOWOFF
BOC	BACK OF CURB
BOT	BOTTOM
BRG	BEARING
BSMT	BASEMENT
BSTL	BLACK STEEL
BS	BOTH SIDES
BTF	BOTTOM FACE
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BW	BOTH WAYS
C	CELSIUS DEGREES
C TO C or C/C	CENTER TO CENTER
CAB	CABINET
CARV	COMBINATION AIR RELEASE VALVE
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHAN	CHANNEL
CHEM	CHEMICAL
CHFR	CHAMFER
CHKV	CHECK VALVE
CI	CAST IRON
CIMJ	CAST IRON MECHANICAL JOINT
CIP	CAST IRON PIPE
CIPC	CAST IN PLACE CONCRETE
CIR	CIRCULAR
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
® or C	CENTER LINE
CL2	CHLORINE
CLG	CEILING

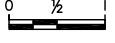
CLJ	CONTROL JOINT
CLO	CLOSE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CO	CLEANOUT
COAG	COAGULANT
COL	COLUMN
COMB	COMBINATION
COMPL	COMPLETE
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS(ATION)
CONTR	CONTRACT(OR)
COORD	COORDINATE
COP	COPPER
CORP	CORPORATION
CORR	CORRUGATED
CP	CONTROL POINT
CPC	CLEAR PLASTIC COVER
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CRN	CROWN
CR	CRUSHED ROCK
CSP	CONCRETE SEWER PIPE
CT	CLEAR TUBING
CU	CUBIC
CUH	CABINET UNIT HEATER
CULV	CULVERT
CV	CONTROL VALVE
CW	CLOCKWISE/COLD WATER
CY	CUBIC YARDS
CYL	CYLINDER LOCK
D	DRAIN
DC	DIRECT CURRENT
DEFL	DEFLECTION
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIR	DIRECTION
DIST	DISTANCE
DN	DOWN
DR	DRIVE
DR MH	DRAIN MANHOLE
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
DWV	DRAIN WASTE AND VENT
DWY	DRIVEWAY
EA	EACH
ECC	ECCENTRIC
EFC	EACH FACE
EF	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
or E	ENCLOSURE
ENCL	ENCLOSURE
EOP	EDGE OF PAVEMENT
EQL SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EQ	EQUIVALENT
ESMT	EASEMENT
EW	EACH WAY
EWH	ELECTRICAL WATER HEATER
EXC	EXCAVATE
EXH	EXHAUST
EXP	EXPANSION
EXP BT	EXPANSION BOLT
EXP JT	EXPANSION JOINT
EXIST	EXISTING
EXIST GR	EXISTING GRADE
EXT	EXTERIOR
F TO F or F/F	FACE TO FACE
F	FAHRENHEIT DEGREES
FL	FLOOR LINE
FAB	FABRICATE
FB	FLAT BAR
FCA	FLANGED COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FCP	FILTER CONTROL PANEL
FD	FLOOR DRAIN
FDN	FOUNDATION
FDR	FEEDER
FEXT	FIRE EXTINGUISHER
FF	FAR FACE
FGL	FIBERGLASS
FH	FIRE HYDRANT

FIN FL	FINISH FLOOR
FIN GR	FINISH GRADE
FIPT	FEMALE IRON PIPE THREAD
FLEX C	FLEXIBLE COUPLING, FLEXIBLE CONNECTION
FLG	FLANGE
FL	FLOW LINE
FLR	FLOOR
FM	FORCE MAIN
FN	FENCE
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FORWARD-REVERSE
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET, FOOT
FITG	FITTING
FTG	FOOTING
FUT	FUTURE
FXTR	FIXTURE
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GROOVED COUPLING
GFA	GROOVED FLANGE ADAPTER
GI	GALVANIZED IRON
GIP	GALVANIZED IRON PIPE
GJ	GRIP JOINT
GL	GLASS
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
GR	GRADE
GR LN	GRADE LINE
GRTG	GRATING
GV	GATE VALVE
GVL	GRAVEL
GYP	GYPSSUM
HB	HOSE BIBB
HC	HOLLOW CORE
HDPE	HIGH DENSITY POLYETHYLENE
HDR	HEADER
HDWE	HARDWARE
HGR	HANGER
HGT	HEIGHT
HH	HANDHOLD
HM	HOLLOW METAL
HNDRL	HAND RAIL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HIGH PRESSURE/HORSEPOWER
HPG	HIGH PRESSURE GAS
HPT	HIGH POINT
HR	HOUR
HSB	HIGH STRENGTH BOLT
HV	HOSE VALVE
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HWL	HIGH WATER LINE
HWY	HIGHWAY
HYD	HYDRANT
HYDR	HYDRAULIC
I AW	IN ACCORDANCE WITH
IB	INLET BASIN
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IMPVT	IMPROVEMENT
IN	INCH
INCC	INCLUDE(D)(ING)
IND	INDICATOR
INJ	INJECTION
INSTL	INSTALLATION/INSTALL
INSTR	INSTRUMENT
INSUL	INSULATION
INTER	INTERCEPTOR
INTLK	INTERLOCK
INTR	INTERIOR
INV	INVERT
IP	IRON PIPE
IPT	IRON PIPE THREAD
IR	IRON ROD

JT	JOINT
KPL	KICK PLATE
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWY	KEYWAY
L	LENGTH OF CURVE
LAB	LABORATORY
LAV	LAVATORY
LC	LONG CHORD
LF	LINEAL FOOT
LIN	LINEAL, LINEAR
LN	LANE
LOC	LOCATION
LONG	LONGITUDINAL
LOS	LOCKOUT STOP
LP	LOW PRESSURE
LPT	LOW POINT
LP-X	LOCAL PANEL NO. X
LR	LOCAL REMOTE
LRG	LARGE
LS	LUMP SUM
LT	LEFT
LVL	LEVEL
LVR	LOUVER
LWL	LOW WATER LINE
MA	MANUAL AUTO
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMUM
MC	MODULATE CLOSE
MCC	MOTOR CONTROL CENTER
MCC-X	MOTOR CONTROL CENTER NO. X
MCP	MASTER CONTROL PANEL
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MIPT	MALE IRON PIPE THREAD
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MOD	MOTOR OPERATED DAMPER
MON	MONUMENT/MONOLITHIC
MOT	MOTOR
MP	MILEPOST
MS	MILD STEEL
MSL	MEAN SEA LEVEL
MTD	MOUNTED
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN/NUMBER
NOM	NOMINAL
NRC	NON REINFORCED CONCRETE PIPE
NRS	NON-RISING STEM
NTS	NOT TO SCALE
O TO O or O/O	OUT TO OUT
OBS	OBSERVATION
O/C	OPEN-CLOSE
OC	ON CENTER
OCA	OPEN-CLOSE-AUTO
OD	OUTSIDE DIAMETER
OF	OVERFLOW, OUTSIDE FACE
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OSC	OPEN-STOP-CLOSE
OVHD	OVERHEAD
PB	PUSHBUTTON
PC	PIECE
PCC	POINT OF COMPOUND CURVE
PCVC	POINT OF CURVATURE ON VERTICAL CURVE
PE	PLAIN END
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
PG	PRESSURE GAGE
PH	PIPE HANGER
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE

P & ID	PROCESS & INSTRUMENTATION DIAGRAM
PJ	PUSH-ON JOINT
PL or PL	PROPERTY LINE, PLATE
PLBG	PLUMBING
PNL	PANEL
PNT	PAINT
POC	POINT ON CURVE
POLY	POLYETHYLENE
POT	POINT ON TANGENCY
PP	POWER POLE
PRC	POINT OF REVERSE CURVE
PRCST	PRECAST
PREP	PREPARATION
PRESS	PRESSURE
PRKG	PARKING
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PSPT	PIPE SUPPORT
PSIG	POUNDS PER SQUARE INCH GAGE
PSL	PIPE SLEEVE
PT	POINT
PTVC	POINT OF TANGENCY ON VERTICAL CURVE
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
RAD	RADIUS
RBR	RUBBER
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN, RAIN DRAIN
RDCR or RED	REDUCER
REF	REFERENCE
REINF	REINFORCE(D)(ING)(MENT)
REQ'D	REQUIRED
RESTR	RESTRAINT, RESTRAINED
RFG	ROOFING
RHB	RECESSED HOSE BIBB
RLG	RAILING
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
ROW OR R/W	RIGHT OF WAY
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RST	REINFORCING STEEL
RT	RIGHT
RV	ROOF VENTILATOR
SA	SAMPLE
SALV	SALVAGE
SAN	SANITARY
SC	SOLID CORE
SCD	STREAMING CURRENT DETECTOR
SCHED	SCHEDULE
SD	STORM DRAIN
SDL	SADDLE
SDR	STANDARD DIMENSION RATIO
SECT	SECTION
SF	SLOWER-FASTER
SHLDR	SHOULDER
SHEET	SHEET
SIM	SIMILAR
SLP	SLOPE
SLV	SLEEVE
SOC	SOCKET
SOLN	SOLUTION
SP	SOIL PIPE
SPCL	SPECIAL
SPEC(S)	SPECIFICATION
SPG	SPACING
SPL	SPOOL
SPRT	SUPPORT
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SS	SANITARY SEWER/START STOP
SSC	SUPERVISORY SET POINT CONTROL
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STN	STRAINER
STOR	STORAGE
STP	SEWAGE TREATMENT PLANT
STR	STRAIGHT
STRUCT	STRUCTURE

SUBMG	SUBMERGED
SUCT	SUCTION
SV	SOLENOID VALVE
SW	SIDEWALK
SWD	SIDEWATER DEPTH
SWGR	SWITCHGEAR
SYMM	SYMMETRICAL
SYS	SYSTEM
T	TANGENT
T & B	TOP & BOTTOM
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
T & G	TONGUE & GROOVE
TC	TOP OF CONCRETE/TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICKNESS
THRD	THREAD(ED)
THRU	THROUGH
TOT	TOTAL
TP	TEST PIT/TOP OF PAVEMENT
TR	TOP OF RIM
TRANS	TRANSITION
TSL	TOP OF SLAB
TSP	TRI-SODIUM PHOSPHATE
TST	TOP OF STEEL
TURB	TURBIDITY
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UN	UNION
UNIF	UNIFORM
UON	UNLESS OTHERWISE NOTED
USGS	UNITED STATES GEOLOGIC SURVEY
V	VENT/VOLT
VAC	VACUUM
VB	VACUUM BREAKER/VALVE BOX
VC	VERTICAL CURVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VTR	VENT THROUGH ROOF
W/	WITH
W/O	WITHOUT
W/W	WALL TO WALL
WD	WOOD/WIDTH
WF	WIDE FLANGE
WH	WALL HYDRANT
WHTR	WATER HEATER
WI	WROUGHT IRON
WLD	WELD(ED)
WP	WORKING POINT, WATERPROOFING
WS	WATER STOP, WELDED STEEL,
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WT	WEIGHT
WTP	WATER TREATMENT PLANT
WWTP	WASTE WATER TREATMENT PLANT
WTR	WATER
or W	WATER
WTRT	WATERTIGHT
WWF	WELDED WIRE FABRIC
X SECT	CROSS SECTION
XFMR	TRANSFORMER
YD	YARD DRAIN
YH	YARD HYDRANT

NOTICE

 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DWW DESIGNED
 MNP DRAWN
 MLH CHECKED

RECORD DRAWING
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 VERSION 4.1
 12-9-97

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West Line
EMERGENCY INTERTIE WATER PUMP STATION

ABBREVIATIONS
 PROJECT NO.: 99-0427.202 SCALE: NONE DATE: APRIL 2002

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PIPE SYMBOLS

PLANT	SCHEMATIC	
		WELDED JOINT
		FLANGED JOINT
		GROOVED END JOINT
		MECHANICAL JOINT
		PUSH-ON JOINT (RUBBER GASKET)
		FLANGED COUPLING ADAPTER
		DOUBLE BALL FLEXIBLE EXTENSION COUPLING
		FLEXIBLE COUPLING W/THRUST RING
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		BLIND FLANGE
		CAP
		LONG SLEEVE
		FLEXIBLE COUPLING
		CAPPED END OR PLUGGED END
		FITTING

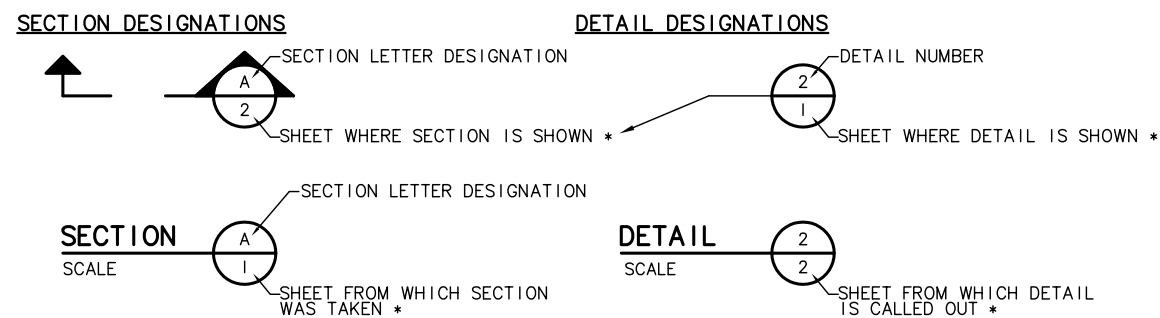
VALVE SYMBOLS

BURIED	PLANT	SCHEMATIC	
			BUTTERFLY VALVE
			GATE VALVE
			GLOBE VALVE
			BALL VALVE
			BALANCING VALVE
			DIAPHRAM VALVE
			PLUG VALVE (TOP)
			PLUG VALVE (SIDE)
			3-WAY PLUG VALVE
			SWING CHECK VALVE
			DOUBLE CHECK ASSEMBLY
			BALL SWING CHECK
			SILENT CHECK VALVE
			PRESSURE REDUCING VALVE
			ALTITUDE CONTROL VALVE
			SOLENOID VALVE
			RELIEF VALVE
			NEEDLE VALVE
			HOSE VALVE
			REDUCED PRESSURE BACKFLOW PREVENTER W/GATE VALVES
			HOSE BIBB

TOPOGRAPHIC LEGEND & NOTES

	EXISTING	PROPOSED
WATERLINE	--- 16"W ---	— 16"W —
ELECTRICITY	--- E ---	— E —
GAS	--- 4"G ---	— 4"G —
TELEPHONE/TELEMETRY	--- T ---	— T —
CABLE TELEVISION	--- CATV ---	— CATV —
SANITARY SEWER LINE	--- 8"SS ---	— 8"SS —
SANITARY SEWER FORCE MAIN	--- 6"FM ---	— 6"FM —
STORM DRAIN	--- 8"SD ---	— 8"SD —
DRAINAGE DITCH	---	---
CULVERT	---	— 18"D —
FENCE	-x-x-x-x-x-x-	-x-x-x-x-x-x-
CENTERLINE	---	---
EASEMENT/PROPERTY LINE	---	---
EDGE OF PAVEMENT/AC	---	---
CURB	---	---
STRUCTURE OR FACILITY	---	---
TREE/BUSH LINE	---	---
GUARDRAIL	---	---
ROCK WALL	---	---
RAILROAD TRACKS	---	---
CONTOUR MINOR	---	---
CONTOUR MAJOR	--- 200 ---	--- 200 ---
MANHOLE	○	○
MAILBOX	⌂	⌂
BLOW-OFF ASSEMBLY	⌂	⌂
AIR RELEASE ASSEMBLY	⌂	⌂
FIRE HYDRANT ASSEMBLY	⌂	⌂
THRUST BLOCK	△	△
UTILITY POLE	○	○
GUY WIRE	→	→
CATCH BASIN/FIELD INLET	⌂	⌂
WATER METER	⌂	⌂
SIGN	+	+
CLEAN-OUT	○	○
PULL BOX/JUNCTION BOX	⌂	⌂
BENCH MARK	⊕	⊕
TREE DECIDUOUS	⊙	⊙
TREE CONIFEROUS	⊙	⊙
LIGHT POST	☆	☆
SURFACE ELEVATION	+ 176.63	+ 176.63
FINAL GRADING SLOPES	Y 4H:1V Y	Y 4H:1V Y
SIDEWALK	---	---

SECTION AND DETAIL DESIGNATIONS



* NOTE: IF PLAN AND SECTION FOR DETAIL CALL-OUT AND DETAIL ARE SHOWN ON THE SAME DRAWING, DRAWING NUMBER IS REPLACED WITH A DASH.

MISCELLANEOUS PIPING SYMBOLS

	STRAINER
	SIGHT GLASS
	PRESSURE GAUGE W/COCK
	PRESSURE SWITCH W/COCK
	THERMOMETER
	ROTAMETER
	METER

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NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWING

NOTICE

0 1/2 1

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DWW DESIGNED
MNP DRAWN
MLH CHECKED

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VERSION 4.1
12-9-97



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**EMERGENCY
INTERTIE WATER
PUMP STATION**

SYMBOLS AND LEGEND

SHEET

G3

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PROJECT NO.: 99-0427.202 SCALE: NONE DATE: APRIL 2002

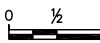
GENERAL NOTES:

1. THE CONTRACTOR SHALL POTHOLE & VERIFY LOCATIONS, EL'S, TYPES & SIZES OF ALL EXIST UTILITIES PRIOR TO CONSTRUCTING NEW PIPING FAR ENOUGH IN ADVANCE TO ALLOW NECESSARY ADJUSTMENTS IN GRADE & SHALL NOTIFY ENGINEER OF NEED TO ADJUST PIPING INSTALLATION ACCORDINGLY. POTHOLING SHALL SUFFICIENTLY PRECEDE LAYING OF PIPE TO ALLOW REQ'D EL ADJUSTMENTS TO BE ACCOMPLISHED WITHOUT REWORK. EL ADJUSTMENTS SHALL BE EXPECTED & ARE INCIDENTAL TO THE WORK. DEFLECT PIPE AS REQ'D & WITHIN MFR'S TOLERANCES TO AVOID EXIST UTILITIES & COMPLETE TIE-INS.
2. ALL PIPING TO BE RESTR JT PIPING UNLESS OTHERWISE SPECIFICALLY IDENTIFIED AS: (R) FOR RESTR JT PIPING; (SP) FOR STD PUSH-ON JT PIPING. SEE SPECS FOR TYPES OF RESTR.
3. BFILL & SURFACING REQUIREMENTS ARE IDENTIFIED ON THE DWGS. ALL BEDDING & PIPE ZONE BFILL TO BE GRANULAR. SEE SPECS & STANDARD WEST LINN DETAIL WL-200. BACKFILL FOR PIPE TRENCHES UNDER PAVED AREAS SHALL BE CLASS B. BACKFILL FOR PIPE TRENCHES IN NON-PAVED AREAS SHALL BE CLASS A UNLESS OTHERWISE NOTED.
4. GEOTECHNICAL INVESTIGATION REPORT IS INCLUDED IN SUPPLEMENTAL INFORMATION. THIS REPORT IS INCLUDED AS SUPPLEMENTARY INFORMATION & IS FOR CONTRACTORS REFERENCE ONLY & IS NOT A PART OF THE CONTRACT DOCUMENTS.
5. NOT USED.
6. ALL CONC SHALL BE A MIN OF 3000 PSI STRENGTH.
7. SEE STANDARD WEST LINN DETAIL WL-406 FOR THRUST BLOCKS.
8. LOCATIONS OF EXIST UTILITIES ARE BASED ON INFORMATION SUPPLIED BY THE UTILITIES & CONSIDERED APPROX ONLY. AS REQ'D BY STATE LAW, THE CONTR SHALL OBTAIN UTILITY LOCATES PRIOR TO COMMENCING CONST, CONTACT UTILITIES PRIOR TO CONST & COMPLY W/ PROVISIONS OF ORS 757.541 TO 757.571.
9. RESTRAIN ALL VALVES, TEES, BENDS, & FITGS UNLESS OTHERWISE NOTED.
10. ALL FLG CONNECTIONS TO BE PROVIDED W/FULL-FACE GASKETS.
11. PROVIDE POLYETHYLENE ENCASMENT FOR ALL PIPING WITHIN TEN (10) FT OF EXIST GAS MAIN ACCORDING TO ANSI/AWWA C105/A21.5.
12. HYDROSTATIC TEST PRESSURE FOR ALL WATER PIPING SHALL BE 1.5 TIMES THE OPERATING PRESSURE MEASURED AT THE LOWEST POINT OF THE PIPE LINE BEING TESTED. UNLESS OTHERWISE NOTED MIN TEST PRESSURE SHALL BE 240 PSI.
13. UNLESS NOTED ON THE DWGS OR SPECIFIED OTHERWISE, ALL WORK IS TO BE CONSTRUCTED IN ACCORDANCE W/THE MOST RECENT VERSION OF CITY OF WEST LINN STANDARDS & THE OREGON ADMINISTRATIVE RULES (OAR), CHAPTER 333.
14. COMPLY W/ OAR CHAPTER 333 RULES FOR REQ'D WATERLINE - SEWERLINE SEPARATION & CROSSING REQUIREMENTS.
15. CONTR SHALL PROVIDE TEMP TAPS & BLOW OFFS & THRUST BLOCKING AS REQ'D TO FACILITATE FLUSHING, TESTING, & DISINFECTION OF WATERLINES. AT COMPLETION OF DISINFECTION, REMOVE TEMP TEST TAPS & REPLACE W/PERMANENT PLUGS. TEMPORARY BLOW OFF TO BE PER WEST LINN STANDARD DETAIL WL-404B.
16. CONNECTIONS TO EXIST WATERLINES MAY REQUIRE TEMPORARY SHUTDOWNS OF EXIST FACILITIES. THE CONTR SHALL COORDINATE THIS WORK W/WEST LINN, THE CITY OF LAKE OSWEGO & SOUTH FORK WATER BOARD & PROVIDE A MIN OF 72 HOURS ADVANCE NOTICE PRIOR TO PERFORMING WATERLINE TIE-IN WORK. CONTR TO VERIFY W/WEST LINN, LAKE OSWEGO & SOUTH FORK WATER BOARD IF EXIST LINES ARE TO BE DEPRESSURIZED PRIOR TO PERFORMING THIS WORK. SEE SPECS FOR SEQUENCE OF CONST REQUIREMENTS. OPERATION OF VALVES SHALL BE BY CITY OF WEST LINN OR LAKE OSWEGO OR SOUTH FORK WATER BOARD ONLY.
17. ALL STRUCTURES, LOTS, CURBS, SIDEWALKS, FENCES, WALLS, GUY WIRES, PIPING & UTILITIES DISTURBED DURING CONST SHALL BE RESTORED TO EXIST CONDITION UNLESS OTHERWISE SPECIFIED.
18. CONTR TO OBTAIN & COMPLY W/CITY OF WEST LINN, CLACKAMAS COUNTY AND ODOT PERMITS & REQUIREMENTS FOR WORK IN, & RESTORATION OF, COUNTY, CITY, AND STATE ROADWAYS.
19. ALL PIPING SHALL HAVE A MIN OF 3 FT OF COVER FROM TOP OF PIPE TO STREET GRADE OR OTHER FIN GR, UNLESS OTHERWISE SHOWN OR APPVD BY ENGINEER.
20. DO NOT REMOVE TREES (GREATER THAN 6" DIA) UNLESS THEY HAVE BEEN PREVIOUSLY IDENTIFIED IN THE FIELD FOR REMOVAL PER ENGINEER.
21. FINAL LOCATIONS OF ALL VALVE BOXES SHALL BE FIELD LOCATED PER ENGINEER.
22. PROVIDE "AS CONSTRUCTED" DRAWINGS INDICATING ALL CHANGES IN GRADE, ALIGNMENT, FITGS & MATLS INSTALLED & ANY OTHER UTILITIES OR OBSTACLES NOT SO INDICATED ON THESE PLANS.
23. ELEVATIONS ARE BASED ON CITY OF LAKE OSWEGO BENCH MARK NO. 22R-1 (184.574' NGVD 29). A BRASS DISK IN CURB AT THE NE CORNER OF THE INTERSECTION OF STATE HIGHWAY NO. 43 AND SOUTH CEDAR OAK DRIVE.
24. AT THE END OF EACH WORK DAY ALL OPEN TRENCHES SHALL BE BACKFILLED & ALL TRENCHES WITHIN STREETS SHALL BE TEMPORARILY PAVED OR COVERED TO THE SATISFACTION OF THE ENGINEER.
25. NOT USED.
26. REMOVE & DISPOSE OF EXISTING ASBESTOS CEMENT PIPE TO BE REMOVED FOR WATERLINE CONSTRUCTION ACCORDING TO STATE AND LOCAL REQUIREMENTS.

27. ATTACH CONFINED SPACE WARNING SIGNS TO THE UNDERSIDE OF EACH VAULT ACCESS DOOR. EACH SIGN SHALL BE PAINTED ALUMINUM WITH A YELLOW BACKGROUND AND BLACK LETTERING. EACH SIGN SHALL CONTAIN THE FOLLOWING WORDING: "DANGER, FOLLOW CONFINED SPACE ENTRY PROCEDURES BEFORE ENTERING". MINIMUM SIGN SIZE SHALL BE 7"x10".
28. ATTACH LOAD CAPACITY SIGNS ADJACENT TO LIFTING EYES IN PUMP STATION VAULT. EACH SIGN SHALL BE PAINTED ALUMINUM WITH A YELLOW BACKGROUND AND BLACK LETTERING. EACH SIGN SHALL CONTAIN THE FOLLOWING WORDING: "CAUTION MAXIMUM LIFTING CAPACITY 2000 LBS. MINIMUM SIGN SIZE SHALL BE 7"x10".


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NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWIN


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DRAWN
 MLH
CHECKED

RECORD DRAWING
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 12-9-97



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EMERGENCY INTERTIE WATER PUMP STATION



GENERAL NOTES			
PROJECT NO.:	99-0427.202	SCALE:	NONE
DATE:	APRIL 2002		

SHEET
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 4 OF 22

EROSION CONTROL NOTES:

1. CONTRACTOR SHALL DEVELOP & SUBMIT AN EROSION & SEDIMENTATION CONTROL PLAN TO THE CITY OF WEST LINN IN ACCORDANCE WITH WEST LINN STANDARDS & THE "EROSION PREVENTION & SEDIMENT CONTROL PLANS TECHNICAL GUIDANCE HANDBOOK" AS PUBLISHED BY THE CLACKAMAS COUNTY DEPARTMENT OF UTILITIES.
2. THE IMPLEMENTATION OF THE EROSION SEDIMENTATION CONTROL PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT & UPGRADING OF THESE FACILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
3. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROTECTION OF ALL WORK, ADJACENT PROPERTIES AND DOWNSTREAM FACILITIES FROM EROSION & SILTATION DURING THE COURSE OF THE WORK. ANY DAMAGE RESULTING FROM SUCH EROSION & SILTATION SHALL BE CORRECTED AT THE SOLE EXPENSE OF THE CONTRACTOR.
4. THE EROSION AND SEDIMENTATION CONTROL FACILITIES SHOWN ON THE PLANS PRESENT BASIC CONCEPTS ONLY AND ARE FOR INFORMATIONAL PURPOSES ONLY.
5. THE FOLLOWING REFERENCED DETAILS ARE FROM THE ABOVE REFERENCED HANDBOOK:
 - a. SEDIMENT FENCE - DETAIL 3-2
 - b. BIOFILTER BAGS - DETAIL 3-3D
 - c. GRAVEL CONSTRUCTION ENTRANCE 3-1A

EROSION CONTROL LEGEND

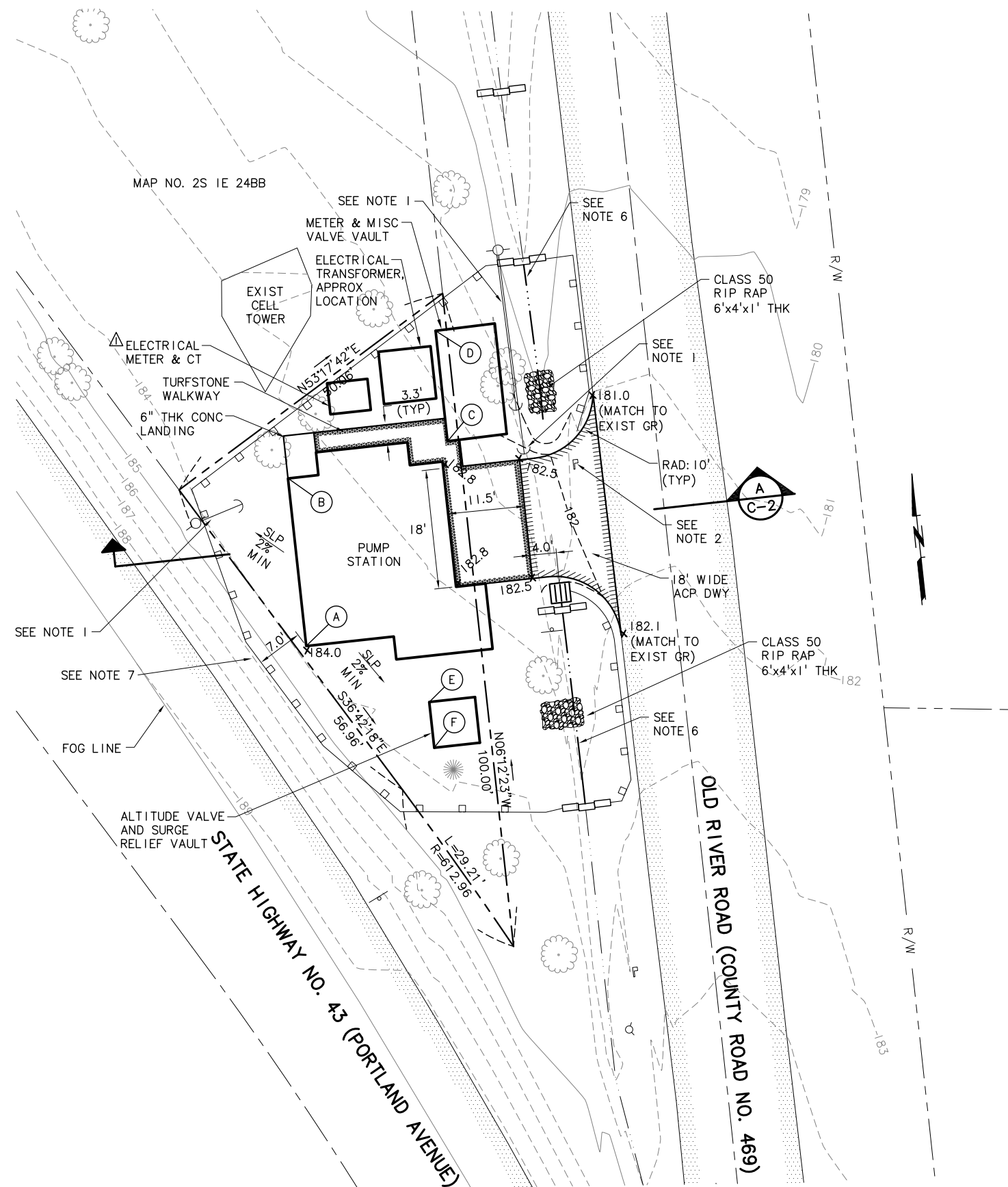
-  BIOFILTER BAGS
-  SEDIMENT FENCE

NOTES:

1. COORDINATE WITH PGE AND QWEST FOR TEMPORARY RELOCATION OR REMOVAL OF GUY WIRE ANCHORS AND OVERHEAD LINES.
2. RELOCATE EXISTING MAIL BOX APPROXIMATELY 11 FEET NORTH. VERIFY LOCATION WITH MAILBOX OWNER.
3. CLEARING AND GRADING LIMITS CORRESPOND WITH LIMITS OF EROSION CONTROL FENCING SHOWN ON THIS SHEET.
4. DESIGN AND CONSTRUCT TEMPORARY SHORING TO MAINTAIN CONSTRUCTION CUT SLOPES WITHIN GRADING LIMITS, SEE SPECS.
5. TEMPORARY CUT SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS. SEE GEOTECHNICAL REPORT IN SPECIFICATIONS FOR EXISTING SOIL CONDITIONS.
6. GRADE EXISTING DRAINAGE DITCH TO MAINTAIN A MINIMUM 2% SLOPE WITHIN 25 FEET OF ENTRANCE AND DISCHARGE OF DRAINAGE CULVERT.
7. CONTRACTOR TO OBTAIN PERMITS FOR WORKING IN ODOT RIGHT-OF-WAY.

VAULT COORDINATES

- (A) N4884.80 E4971.41
- (B) N4910.32 E4968.64
- (C) N4915.97 E4992.94
- (D) N4932.79 E4991.11
- (E) N4876.27 E4990.16
- (F) N4869.31 E4990.91



SITE PLAN
SCALE: 1"=10'

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NOTICE
0 1/2 1
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DWW DESIGNED
MNP DRAWN
MLH CHECKED

RECORD DRAWING
SEE DISCLAIMER, SHEET 1.
VERSION 4.1
12-9-97

MSA Murray, Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900 Phone 503-225-9010
Portland, Oregon 97204 Fax 503-225-9022

West Linn
EMERGENCY INTERTIE WATER PUMP STATION

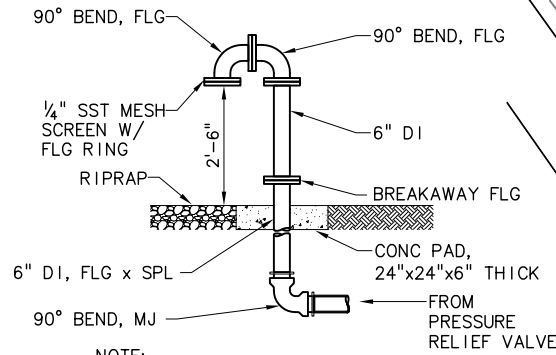
SITE GRADING AND EROSION CONTROL PLAN
PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002

DRAINAGE SCHEDULE

- ① N4863.96 E5018.49
3" DRAIN FROM SUMP
CONNECT TO EXIST SS
IN ACCORDANCE W/STD DETAIL WL-303
- ② N4891.57 E5011.77
INSTALL:
FIELD INLET PER STD DETAIL WL-603
RIM EL=180.0
IE 12" OUT=180.3%
IE 1 1/2" IN=181.25%
- ③ N4919.80 E5007.45
12" CULVERT OUTLET
IE=179.85%
- ④ N4915.01 E5007.83
INSTALL:
12" CULVERT LENGTH=25.5',
SLOPE=0.026 FT/FT ASTM C76 CLASS V
- ⑤ N4919.00 E4987.48
SS CO #1
RIM EL=182.3%
IE=173.2
- ⑥ N4882.05 E4992.05
SS CO #2
RIM EL=183.7%
IE=172.8
- ⑦ N4861.35 E4994.62
SS CO #3
RIM EL=184.0%
IE=178.0
TRANSITION TO GRAVITY
DRAINAGE PIPE

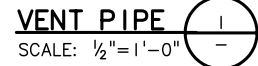
NOTES:

- 1. DEFLECT PIPE VERTICALLY TO CONNECT TO EXIST 18" WATERLINE.
- 2. CUT AND CAP ABANDONED WATERLINE AS REQ'D. DISPOSE OF REMOVED WATERLINE.
- 3. PERIMETER DRAINS FOR PUMP STATION VAULT ARE SHOWN ON SHT M1.
- 4. MAINTAIN POSITIVE SLP FROM SUMP PUMP TO FIELD INLET OR GRAVITY TRANSITION.
- 5. CONNECT WATER SERVICE TO 12" LINE WITH 1" CORP STOP INSIDE CONTROL VALVE VAULT. INSTALL SERVICE IN ACCORDANCE W/STD DET WL-402.
- 6. ANY ADDITIONAL LONG SLEEVES, FITTINGS OR TIE-INS NOT SHOWN SHALL BE INCIDENTAL TO PIPELINE WORK.



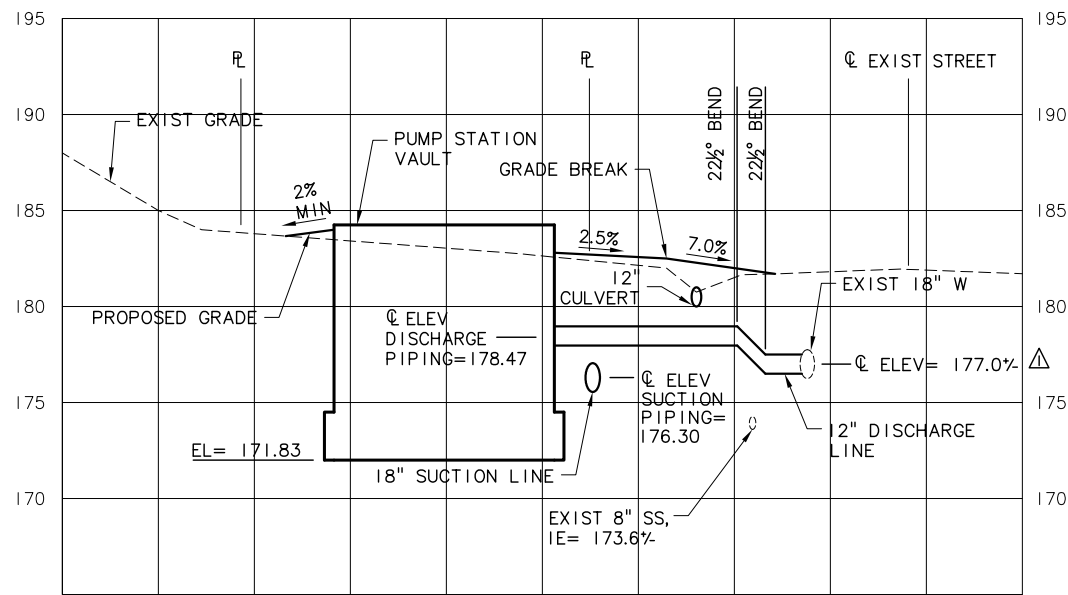
NOTE:

PAINT VENT PIPE PER SPECIFICATIONS.



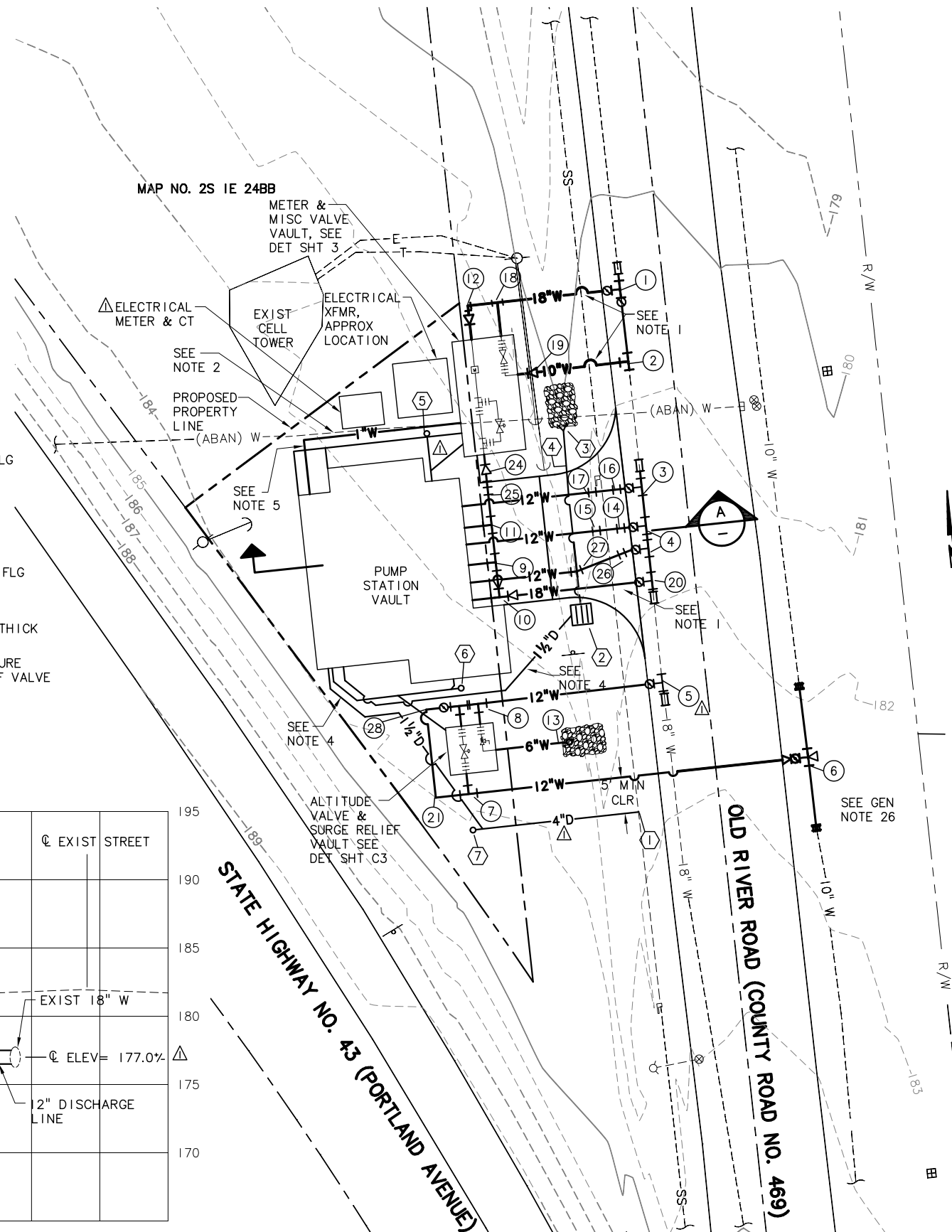
NOTE:

OTHER PIPING PROFILES SIMILAR.



SECTION

SCALE: 1"=10' HORIZ; 1"=5' VERT



SITE PLAN

SCALE: 1"=10'

WATER PIPING SCHEDULE

- ① N4940.54 E5015.73
CONNECT TO EXIST 18" W
INSTALL:
1-18"x18" TEE, MJ
2-18" BFV, MJ
1-18" SPOOL, LENGTH AS REQ'D
1-18" LS, MJ
- ② N4929.96 E5016.95
CONNECT TO EXIST 18" W
INSTALL:
1-18"x10" TEE, MJ
- ③ N4911.59 E5018.90
CONNECT TO EXIST 18" W
INSTALL:
1-18"x12" TEE, MJ
1-12" BFV, MJ
1-18" LS, MJ
1-18" SPOOL, LENGTH AS REQ'D
- ④ N4905.89 E5019.53
CONNECT TO EXIST 18" W
INSTALL:
2-18"x12" TEE, MJxMJ, FLG
2-12" BFV, MJ
1-18" SPOOL, LENGTH AS REQ'D
- ⑤ N4882.90 E5021.94
CONNECT TO EXIST 18" W
INSTALL:
1-18"x12" TEE, MJ
1-18" LS, MJ
1-12" BFV, MJ
- ⑥ N4871.99 E5043.29
CONNECT TO EXIST 10" W (ASBESTOS CEMENT).
REMOVE APPROX 20' OF EXIST AC PIPE AND REPLACE W/10" DI PIPING
INSTALL:
1-10"x10" TEE, MJ
1-10" BFV, MJ
1-10"x12" RDCR, MJ
2-10" FLEXIBLE COUPLING ADAPTERS
2-10" SPOOL, LENGTH AS REQ'D
1-THRUST BLOCK, PER STD DET WL-406
- ⑦ N4866.58 E4993.56
VIEW DRIVE SUPPLY PIPING
INSTALL:
1-12"x10" TEE, MJ
- ⑧ N4879.78 E4994.93
VIEW DRIVE SUPPLY PIPING
INSTALL:
1-12"x10" TEE, MJ
1-12"x6" TEE, MJ
1-12" SPOOL, LENGTH AS REQ'D
1-12" BFV, MJ
- ⑨ N4900.55 E4997.53
SUCTION PIPING
INSTALL:
1-18"x12" TEE, MJ
- ⑩ N4895.41 E4998.09
SUCTION PIPING
INSTALL:
1-12"x12" TEE, MJ
2-18"x12" RDCR, MJ
- ⑪ N4906.01 E4996.94
SUCTION PIPING
INSTALL:
1-18"x12" TEE, MJ
- ⑫ N4938.11 E4993.45
SUCTION PIPING
INSTALL:
1-18" 90° BEND, MJ
1-18"x12" RDCR, MJ
- ⑬ N4874.18 E5007.89
SURGE RELIEF PIPING
INSTALL:
1-6" VENT PIPE, SEE DET I THIS SHT
- ⑭ N4905.45 E5015.30
DISCHARGE PIPING
INSTALL:
1-12" 22 1/2° BEND VERT, MJ
- ⑮ N4905.07 E5011.73
DISCHARGE PIPING
INSTALL:
1-12" 22 1/2° BEND VERT, MJ
- ⑯ N4911.13 E5014.70
DISCHARGE PIPING
INSTALL:
1-12" 22 1/2° BEND VERT, MJ
- ⑰ N4910.74 E5011.13
DISCHARGE PIPING
INSTALL:
1-12" 22 1/2° BEND VERT, MJ
- ⑱ N4938.59 E4997.77
SUCTION PIPING
INSTALL:
1-18"x8" TEE, MJ
- ⑲ N4928.22 E5002.23
PRESSURE RELIEF PIPING
INSTALL:
1-10"x8" RDCR, MJ
- ⑳ N4897.69 E5020.43
CONNECT TO EXIST 18" W
INSTALL:
1-18"x18" TEE, MJ
1-18" BFV, MJ
1-18" LS, MJ
- ㉑ N4866.06 E4988.75
VIEW DRIVE SUPPLY PIPING
INSTALL:
1-12" 90° BEND, MJ
- ㉒ NOT USED
- ㉓ NOT USED
- ㉔ N4914.84 E4995.98
INSTALL:
1-18" 1 1/4° BEND, MJ
1-18"x12" RDCR, MJ
- ㉕ N4910.45 E4996.46
INSTALL:
1-18" 1 1/4° BEND, MJ
- ㉖ N4901.61 E5015.56
INSTALL:
1-12" 22 1/2° BEND ROLLED, MJ
- ㉗ N4899.20 E5009.42
INSTALL:
1-12" 22 1/2° BEND ROLLED, MJ
- ㉘ N4878.95 E4987.35
VIEW DRIVE SUPPLY PIPING
INSTALL:
1-12" 90° BEND

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NOTICE

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VERSION 4.1
12-9-97

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Engineers/Planners

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Fax 503-225-9022

West Line

EMERGENCY INTERTIE WATER PUMP STATION

YARD PIPING PLAN AND PROFILE

PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002

SHEET

C2

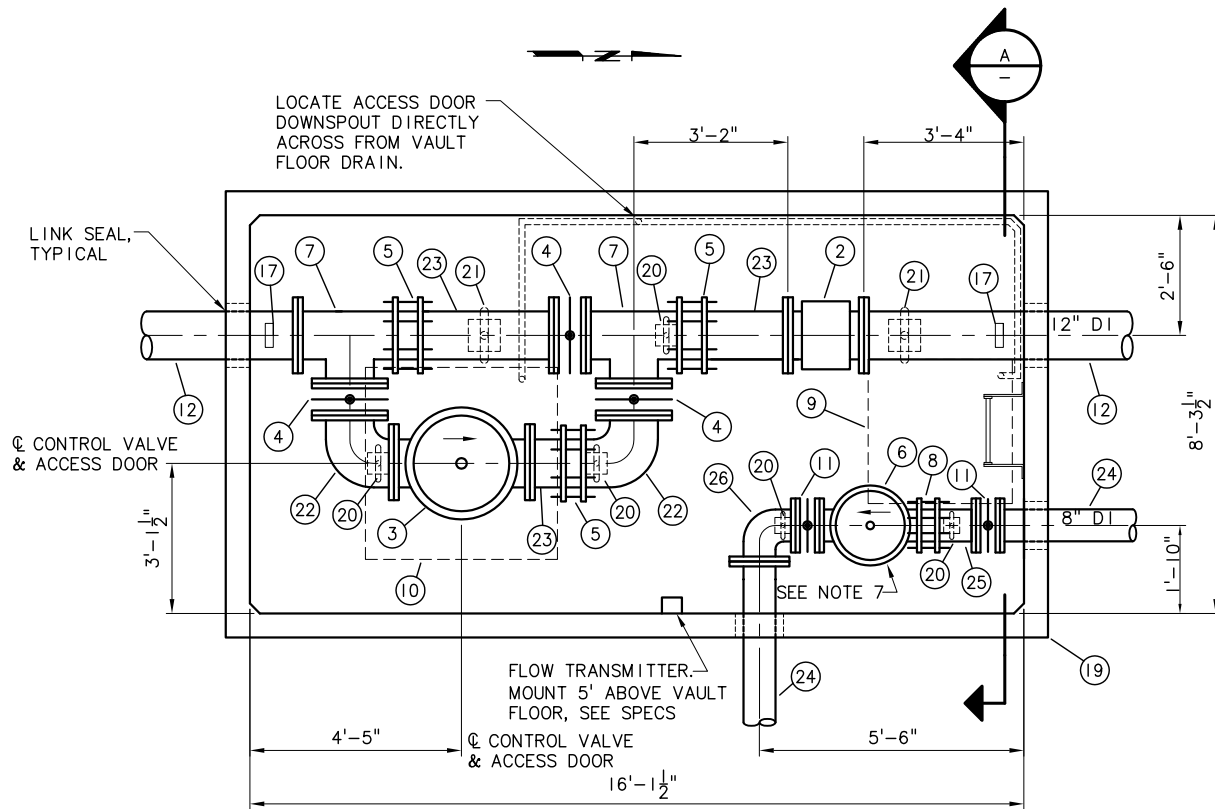
6 of 22

NOTES:

- ROUTE ACCESS DOOR DRAIN OUTLET TO 3" ABOVE VAULT FLR.
- INSTALL PIPE/FL SUPPORTS ACCORDING TO THE MFR'S REQUIREMENTS.
- PROVIDE RESTR MJ ON PIPING, 2' FROM OUTSIDE EDGE OF VAULTS, TYP.
- LIMITED PIPING SHOWN IN SECTIONS FOR CLARITY.
- PROVIDE ALL IN VAULT BUTTERFLY VALVES WITH HAND WHEELS PER MFR REQUIREMENTS, SEE SPECS.
- VAULT PIPE PENETRATIONS SHALL BE SIZED TO BE COMPATIBLE PIPE SIZE WITH LINK SEAL ACCORDING TO MFR'S REQ'S.
- INSTALL EPOXY MOUNTED EYE HOLT OVER PRESSURE RELIEF VALVE. SEE STRUCTURAL DRAWINGS FOR REQUIREMENTS.

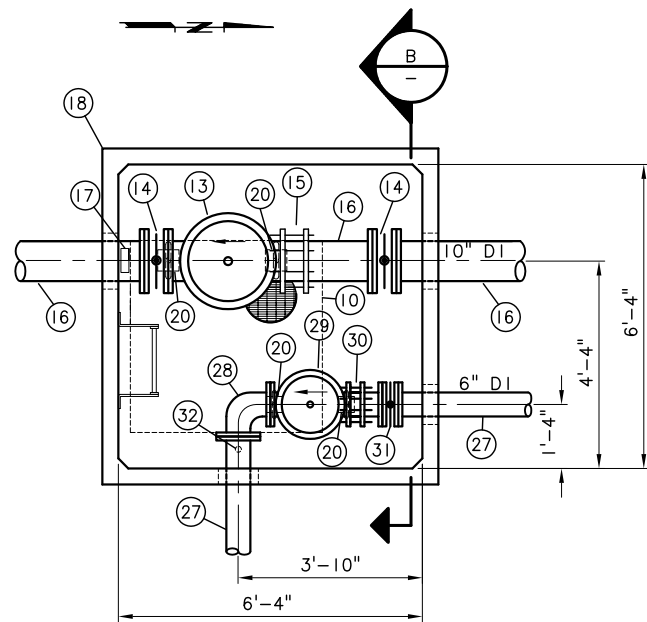
MATERIAL LIST

- ① NOT USED
- ② 12" BIDIRECTIONAL ELECTROMAGNETIC FLOW METER, FLG, SEE SPECS
- ③ 12" CONTROL VALVE, ELECTRONICALLY CONTROLLED, SEE SPECS
- ④ 12" BFV, FLG
- ⑤ 12" MEGAFLANGE
- ⑥ 8" PRESSURE RELIEF VALVE, ELECTRONICALLY CONTROLLED, SEE SPECS
- ⑦ 12"x12" TEE FLG
- ⑧ 8" MEGAFLANGE
- ⑨ 3'-0"x3'-0" ACCESS DOOR WITH DRAIN CHANNEL. UTILITY VAULT NO. 3636AL OR APPVD EQUAL
- ⑩ 4'-0"x4'-0" ACCESS DOOR WITH DRAIN CHANNEL. UTILITY VAULT NO. 4848AL OR APPVD EQUAL
- ⑪ 8" BFV, FLG
- ⑫ 12" SPL, FLGXPE, LENGTH AS REQ'D
- ⑬ 10" ALTITUDE VALVE (OWNER SUPPLIED) SEE SPECS
- ⑭ 10" BFV, FLG
- ⑮ 10" MEGAFLANGE
- ⑯ 10" SPL, FLGXPE, LENGTH AS REQ'D
- ⑰ PRESSURE GAUGE, SEE DET 3 SHT M2
- ⑱ PRECAST CONC VAULT, "UTILITY VAULT" MODEL 776-LA-7 OR APPVD EQ
- ⑲ PRECAST CONC VAULT, "UTILITY VAULT" MODEL 816 LA OR APPVD EQ
- ⑳ FLANGE SUPPORT, STANDON MODEL S89 OR APPVD EQ, SIZE AS REQ'D, SEE NOTE 2
- ㉑ PIPE SUPPORT, STANDON MODEL S92 OR APPVD EQ, SIZE AS REQ'D, SEE NOTE 2
- ㉒ 12" 90° BEND, FLG
- ㉓ 12" SPL, FLGXPE, LENGTH AS REQ'D
- ㉔ 8" SPL, FLGXPE, LENGTH AS REQ'D
- ㉕ 8" SPL, FLGXPE, LENGTH AS REQ'D
- ㉖ 8" 90° BEND, FLG
- ㉗ 6" SPL, FLGXPE, LENGTH AS REQ'D
- ㉘ 6" 90° BEND, FLG
- ㉙ 6" PRESSURE RELIEF VALVE, SEE SPECS
- ㉚ 6" MEGAFLANGE
- ㉛ 6" BFV, FLG
- ㉜ INSTALL 1/2" CORP STOP UNDERSIDE OF PIPE



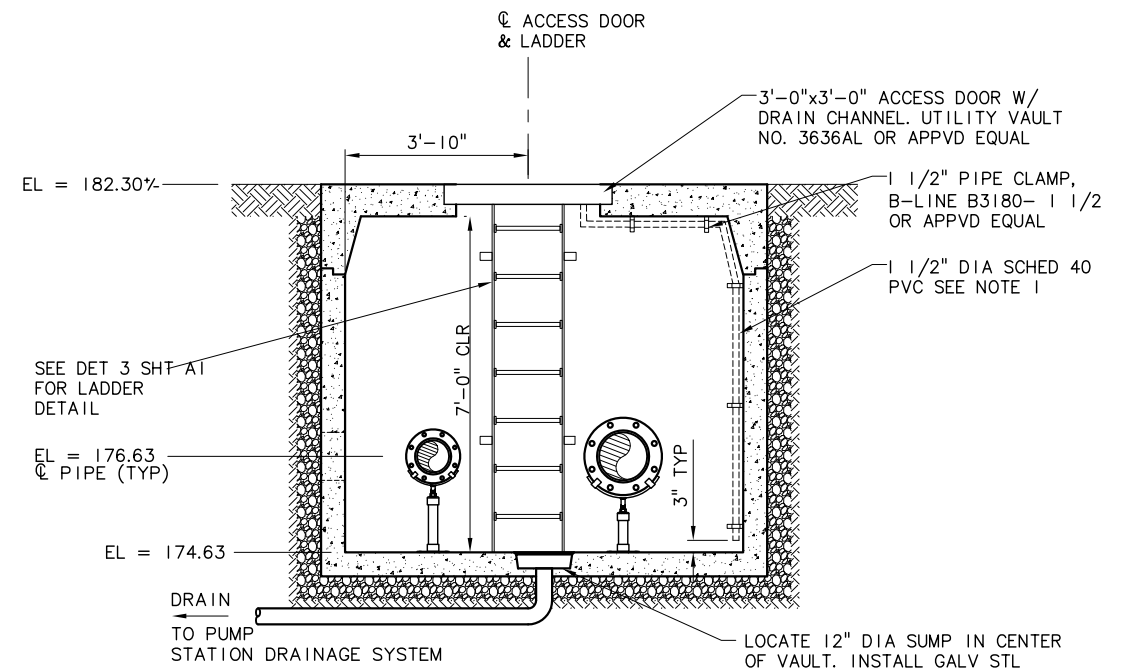
METER & MISC VALVE VAULT - PLAN

SCALE: 1/2" = 1'-0"



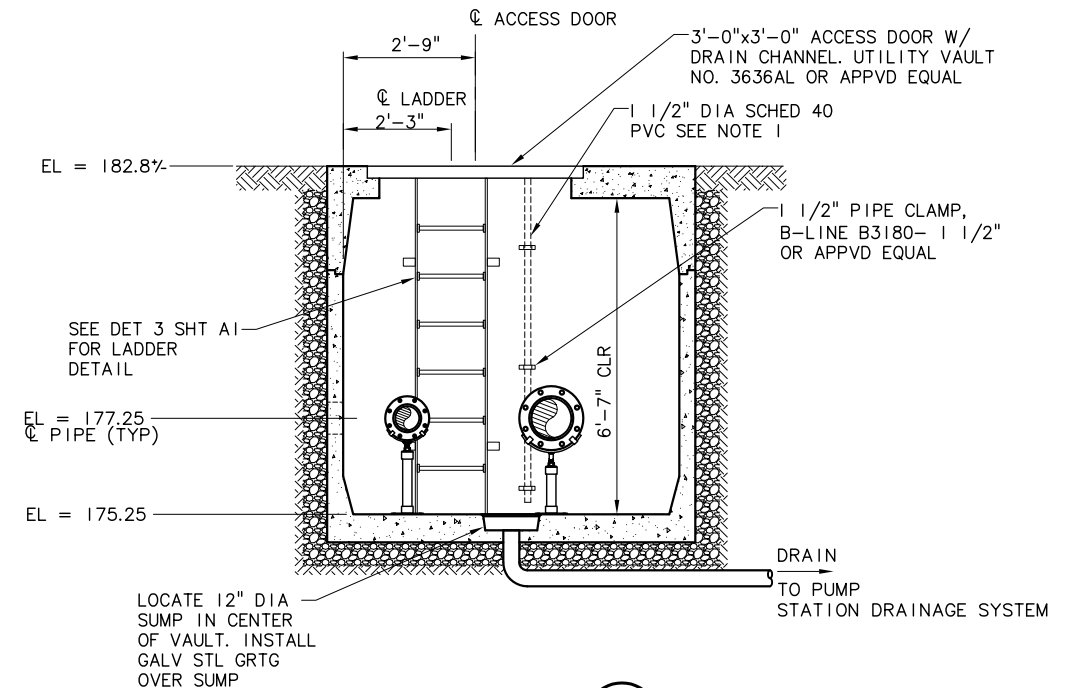
ALTITUDE & SURGE RELIEF VALVE VAULT - PLAN

SCALE: 1/2" = 1'-0"



SECTION A

SCALE: 1/2" = 1'-0"

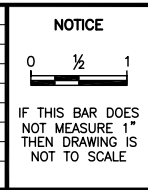


SECTION B

SCALE: 1/2" = 1'-0"

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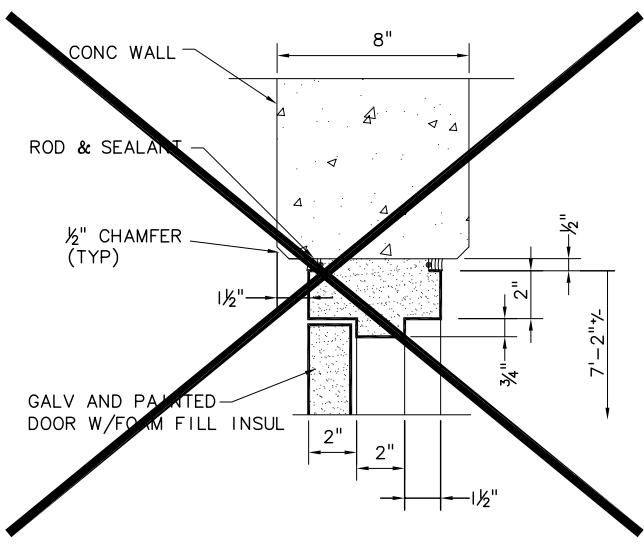
DW
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MNP/MBE
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MLH
CHECKED

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12-9-97

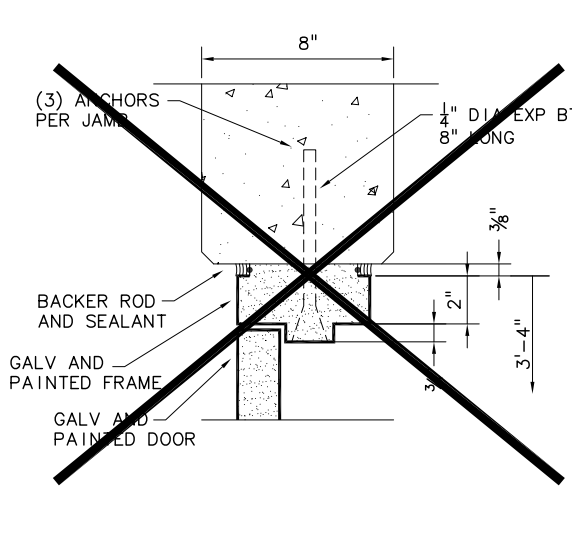
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Portland, Oregon 97204
Phone 503-225-9010
Fax 503-225-9022

West Line
**EMERGENCY
INTERTIE WATER
PUMP STATION**

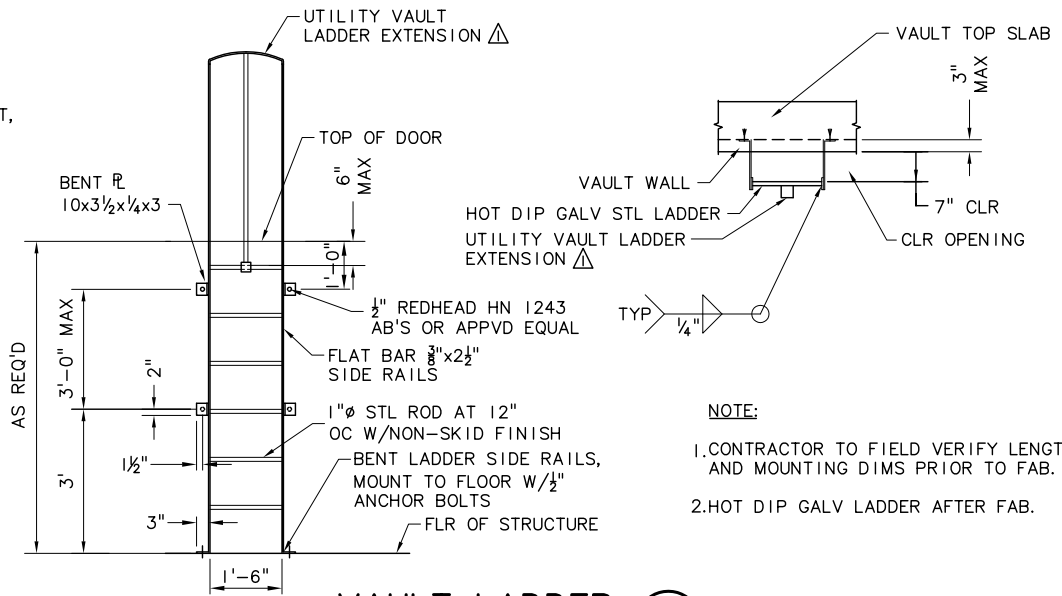
**VAULTS
PLAN AND SECTION**
PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002



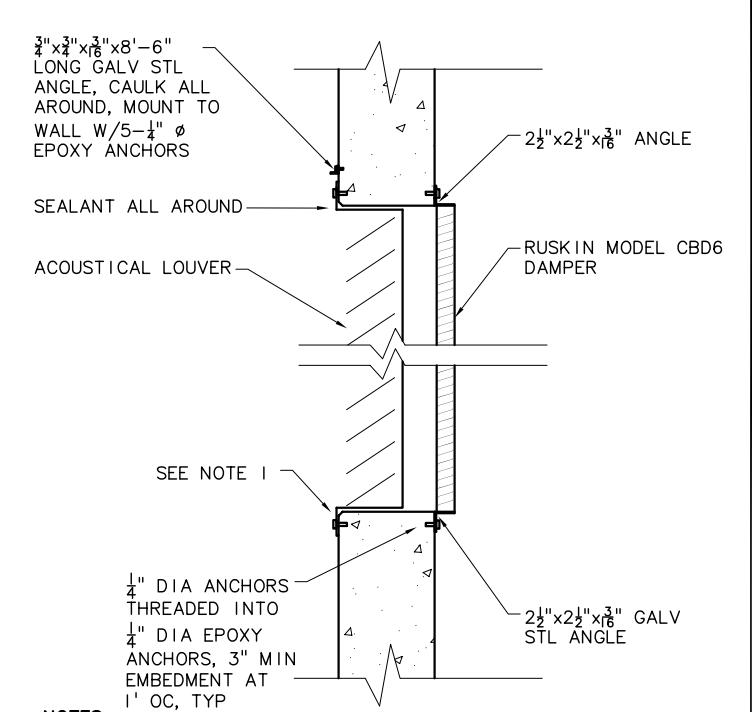
△ NOT USED
DOOR HEAD (1)
 SCALE: 3"=1'-0"



△ NOT USED
DOOR JAMB (2)
 SCALE: 3"=1'-0"



VAULT LADDER (3)
 SCALE: 1/2"=1'-0"



NOTES:
 1. CONTRACTOR TO FIELD VERIFY LENGTH AND MOUNTING DIMS PRIOR TO FAB.
 2. HOT DIP GALV LADDER AFTER FAB.

NOTES:
 1. CONNECT LOUVER FLANGE TO FACE OF CONCRETE WALL WITH 1/4" DIA ANCHORS THREADED INTO 1/4" DIA EPOXY INSERTS, 3" MIN EMBEDMENT AT 1' O.C.
 2. MAINTAIN 4" BETWEEN LOUVER FRAME AND DAMPER FRAME.

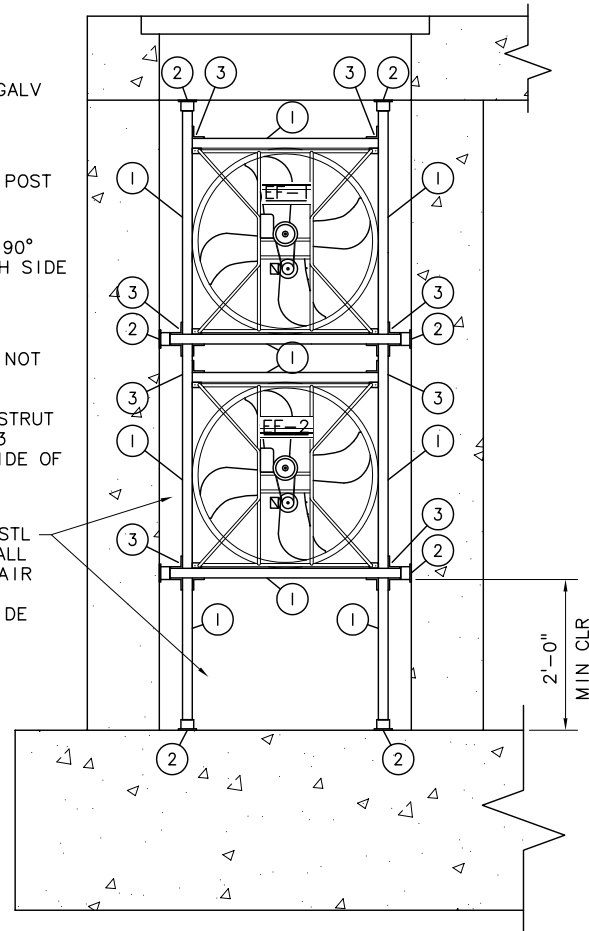
ACOUSTICAL INTAKE LOUVER (4)
 SCALE: 1"=1'-0"

MATERIAL LIST

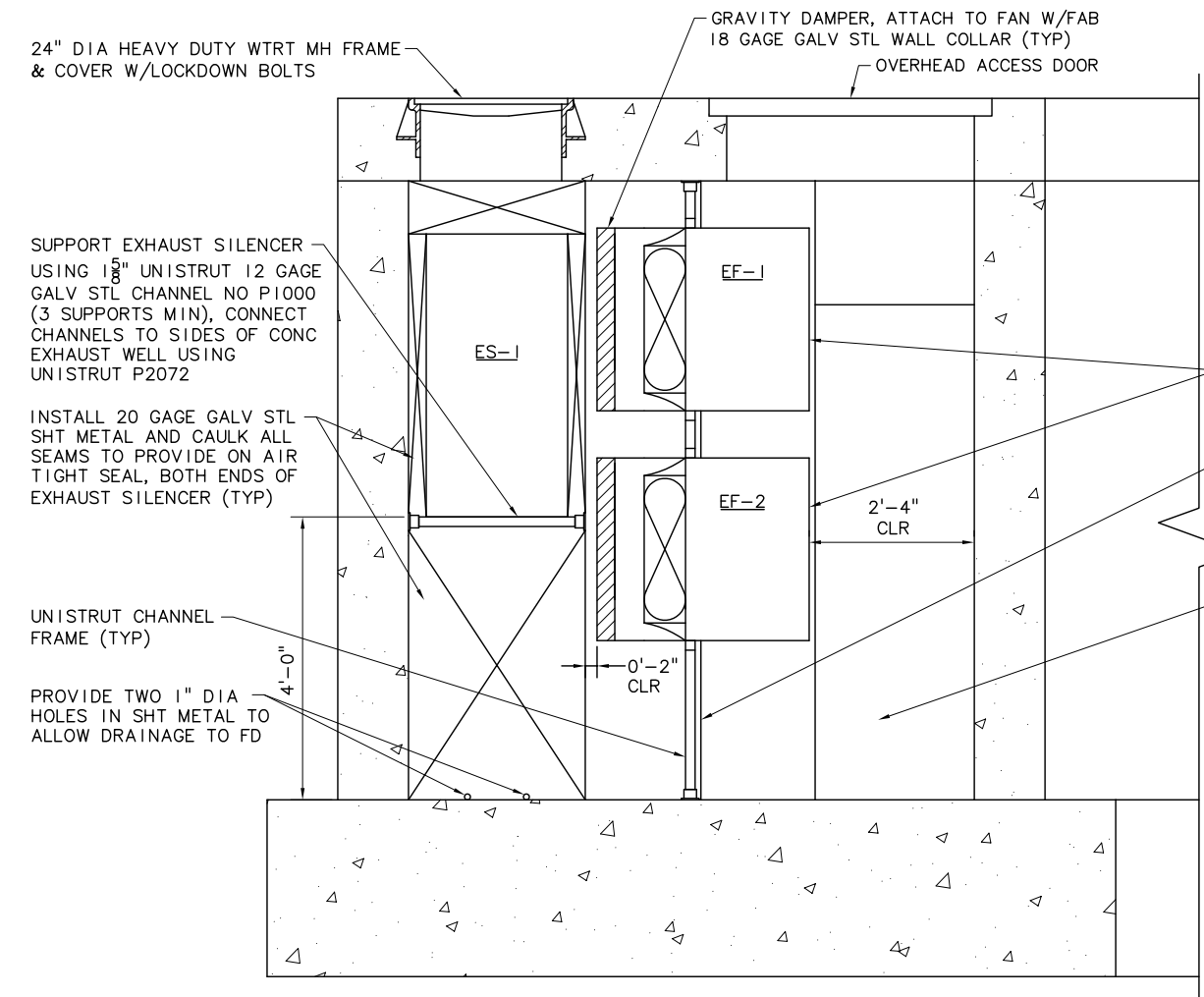
- (1) 1 5/8" UNISTRUT 12 GAGE GALV STL CHANNEL NO P1000, LENGTH AS REQ'D
- (2) 1 5/8" UNISTRUT GALV STL POST BASE NO P2072
- (3) 1 5/8" UNISTRUT GALV STL 90° FITTING NO P1026, EACH SIDE OF CONNECTION, TYP

NOTES:

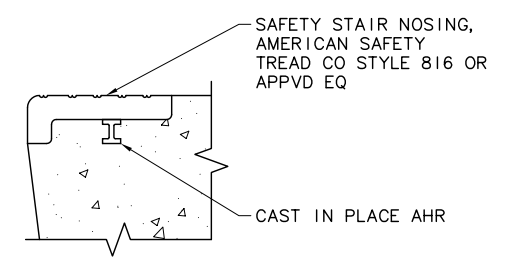
- 1. SHT METAL FLASHING NOT SHOWN FOR CLARITY.
- 2. FASTEN FANS TO UNISTRUT CHANNEL FRAME USING 3 FASTENERS MIN EACH SIDE OF FAN.
- INSTALL 20 GAGE GALV STL SHT METAL AND CAULK ALL SEAMS TO PROVIDE AN AIR TIGHT SEAL BETWEEN EXHAUST AND SUPPLY SIDE OF FANS



SECTION B
 SCALE: 3/4"=1'-0" MI



SECTION D
 SCALE: 3/4"=1'-0" MI



STAIR NOSING (5)
 SCALE: NTS

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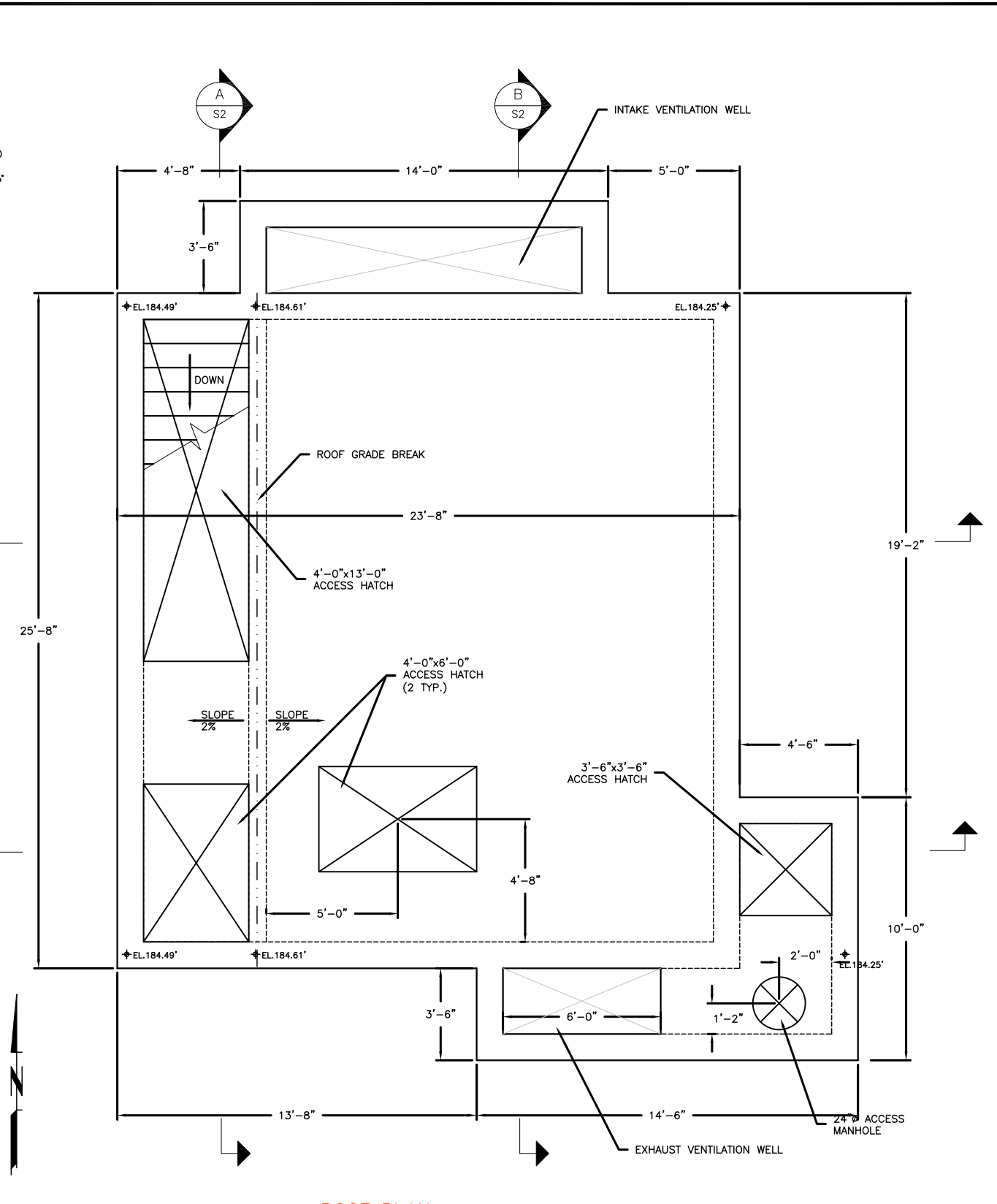
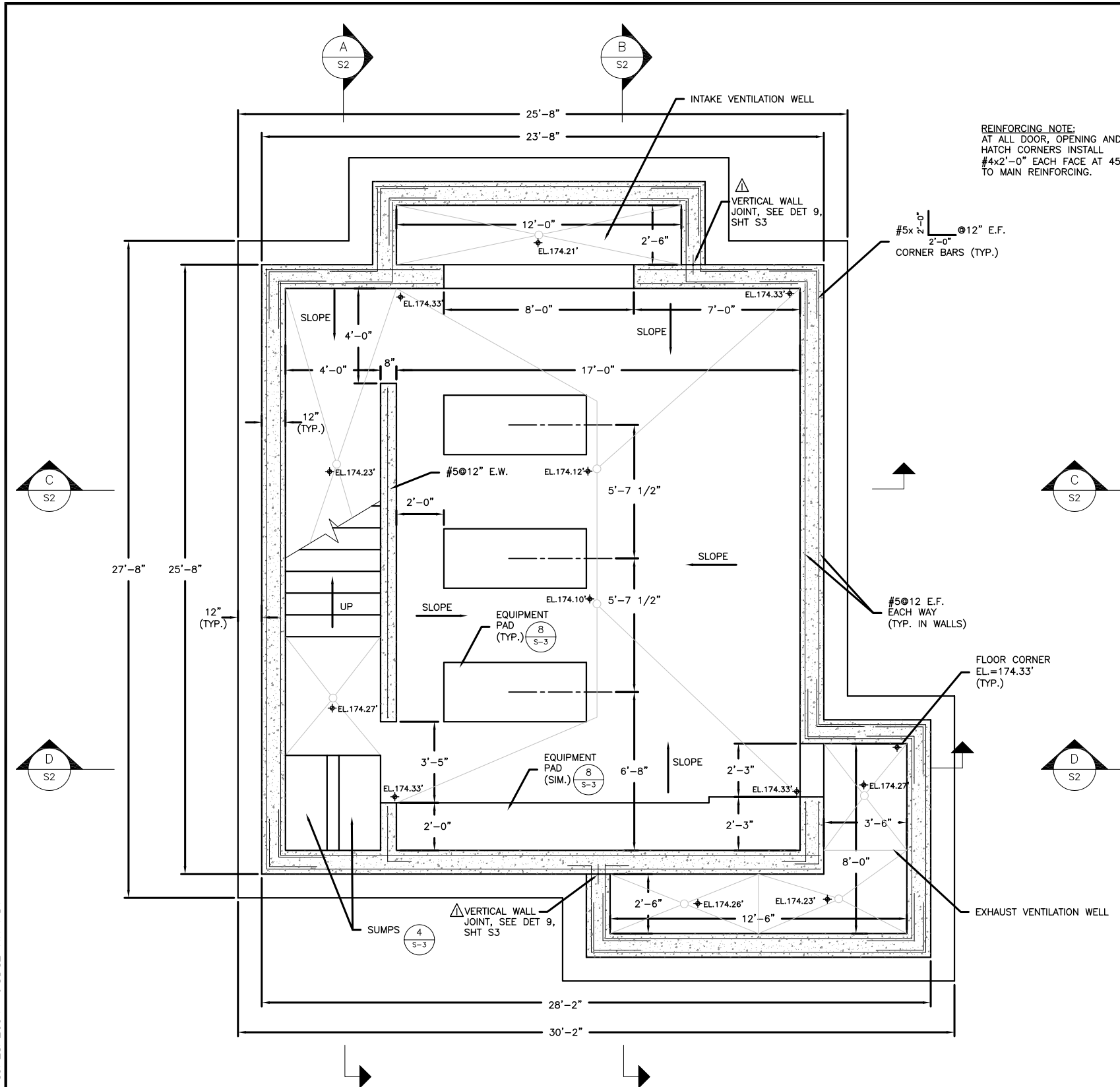
MSA Murray, Smith & Associates, Inc.
 Engineers/Planners
 121 S.W. Salmon, Suite 900
 Portland, Oregon 97204
 Phone 503-225-9010
 Fax 503-225-9022

EMERGENCY INTERTIE WATER PUMP STATION

ARCHITECTURAL DETAILS
 PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002

SHEET
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 8 of 22

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EWBP DRAWN
CGP CHECKED

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VERSION 4.1
12-9-97

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Fax 503-225-9022

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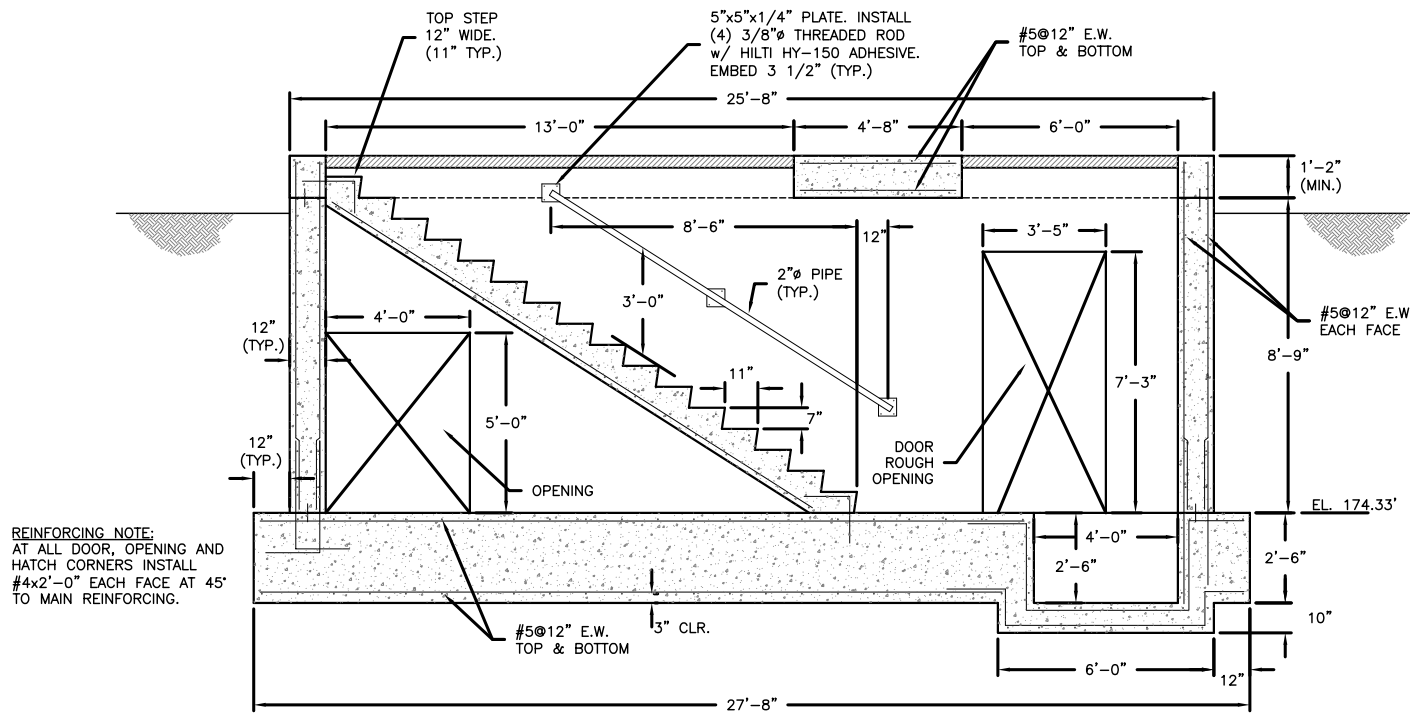
EMERGENCY INTERTIE WATER PUMP STATION
CITY OF WEST LINN,
OREGON

PUMP STATION FLOOR & ROOF PLANS

PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002

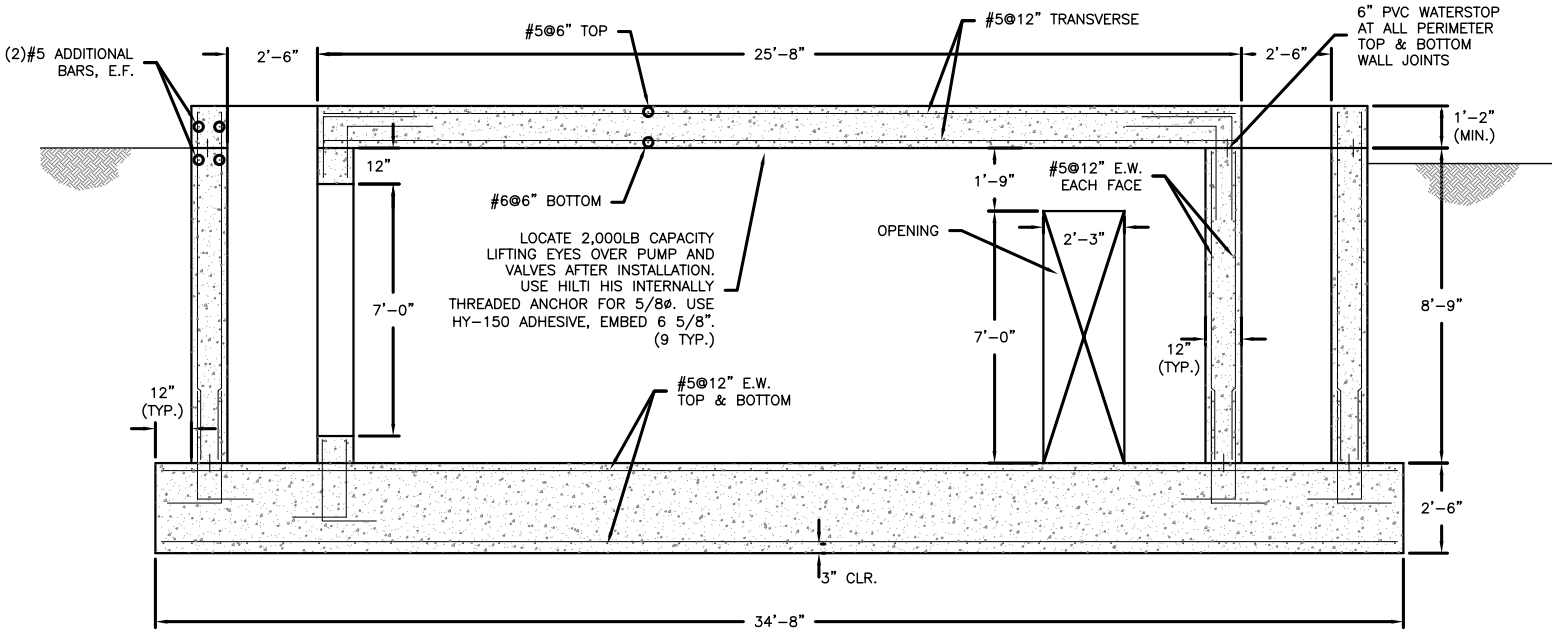
SHEET
SI
9 of 22

PSE
Peterson Structural Engineers, Inc.
5319 S.W. Westgate Dr., Suite 215
Portland, Oregon 97221
(503) 292-1635

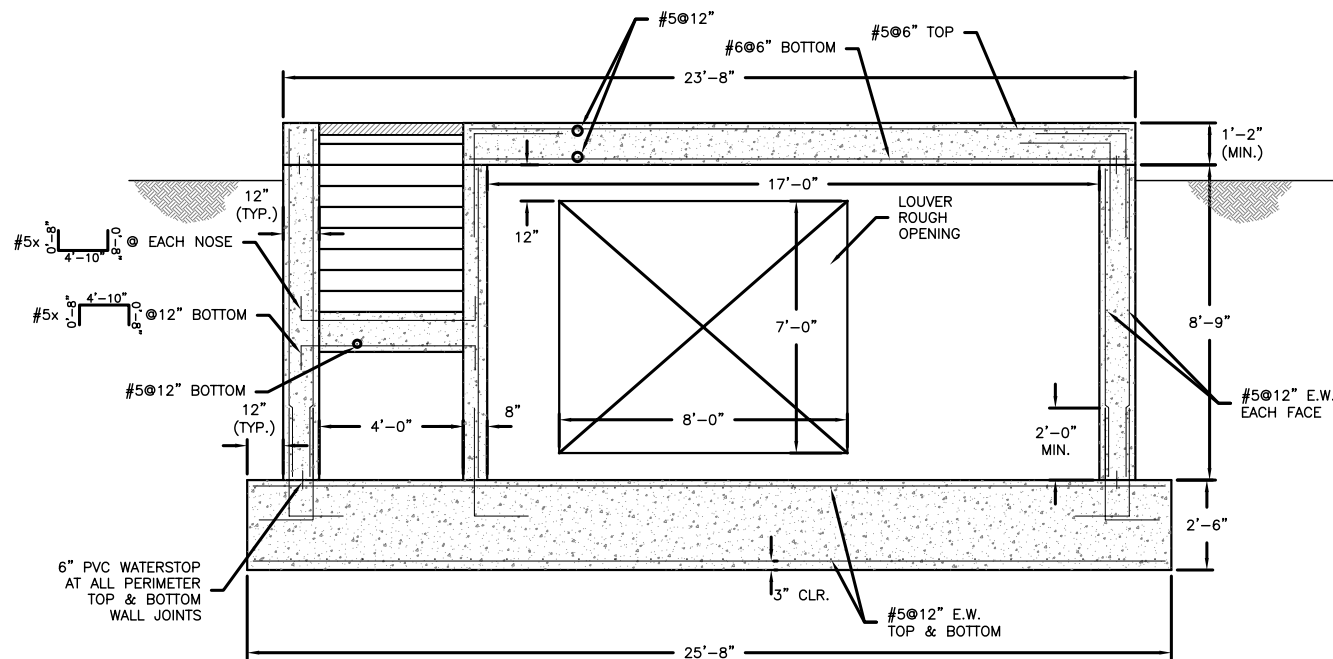


REINFORCING NOTE:
AT ALL DOOR, OPENING AND
HATCH CORNERS INSTALL
#4x2'-0" EACH FACE AT 45°
TO MAIN REINFORCING.

SECTION A
SCALE: 3/8" = 1'-0"

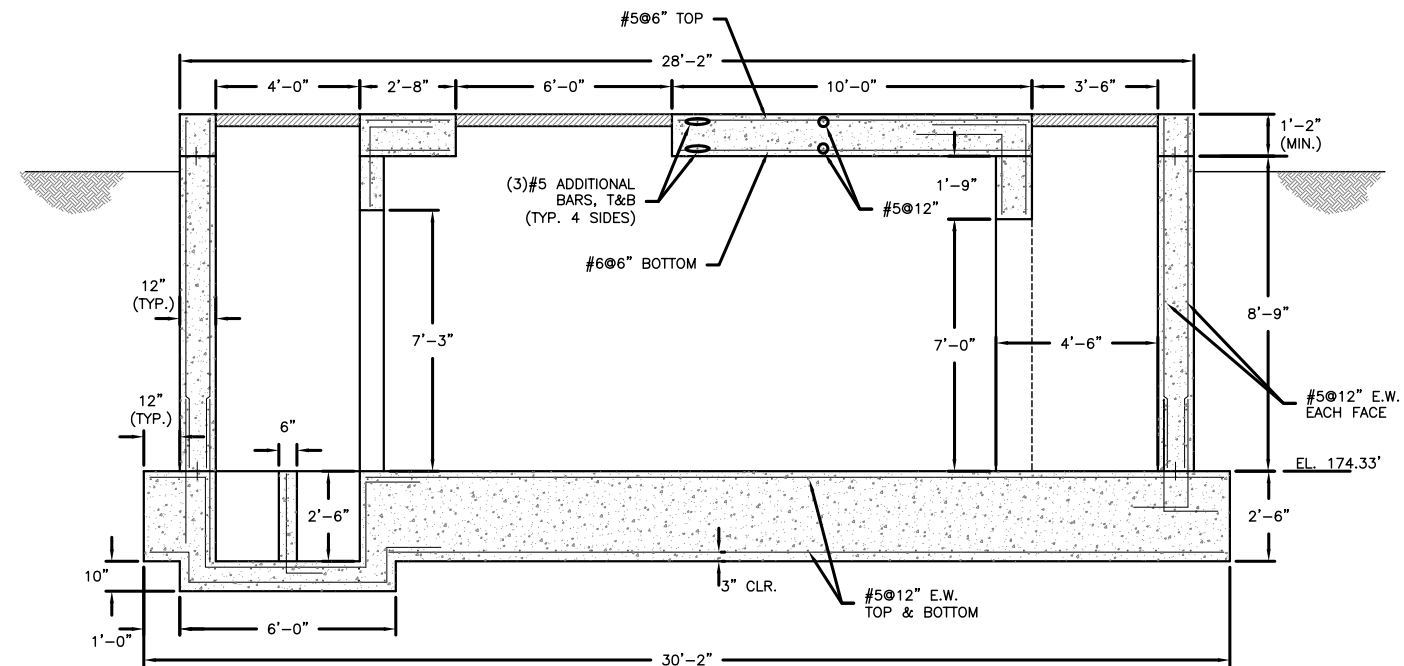


SECTION B
SCALE: 3/8" = 1'-0"



NOTE:
VERIFY ALL ROUGH OPENING
DIMENSIONS TO ACCOMMODATE
DOOR & LOUVERS

SECTION C
SCALE: 3/8" = 1'-0"



SECTION D
SCALE: 3/8" = 1'-0"

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EWBP DRAWN
CGP CHECKED

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**EMERGENCY INTERTIE
WATER PUMP STATION
CITY OF WEST LINN,
OREGON**

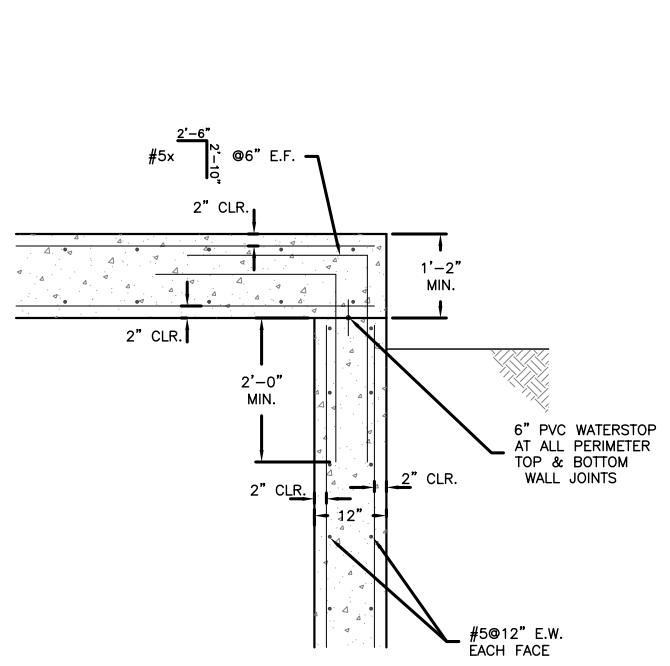
**PUMP STATION
SECTIONS**

PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: APRIL 2002

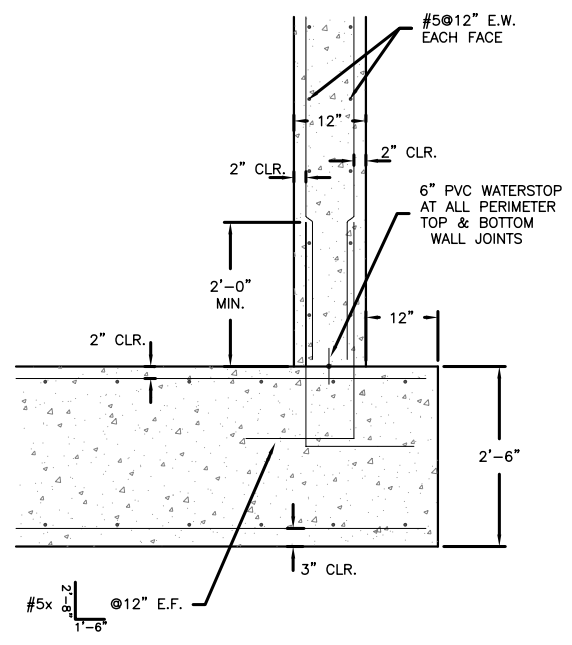
SHEET
S2
10 of 22

PSE
Peterson Structural Engineers, Inc.
5319 S.W. Westgate Dr., Suite 215
Portland, Oregon 97221
(503) 292-1655

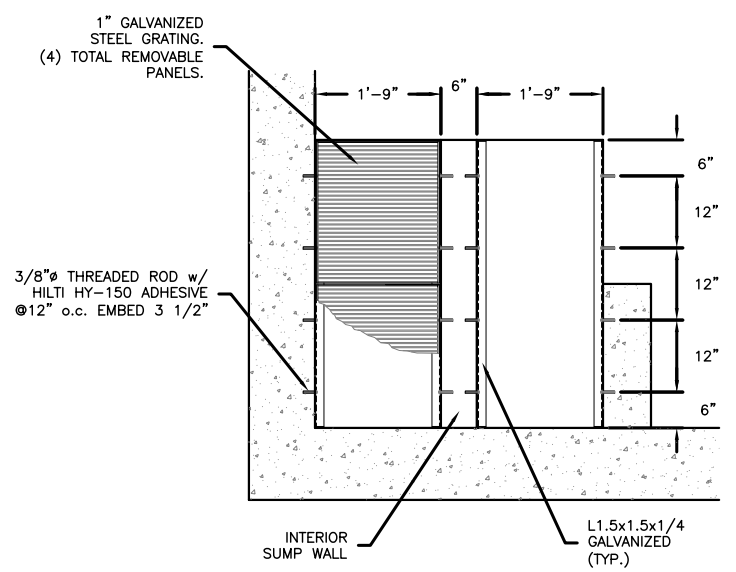
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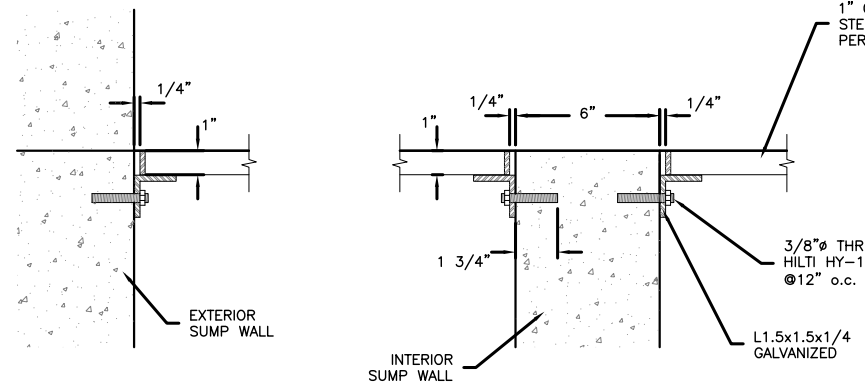
WALL TOP DETAIL 1
SCALE: 3/4" = 1'-0"



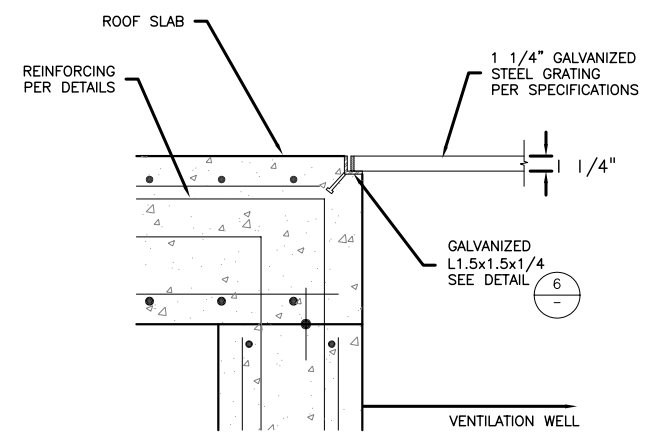
WALL BASE DETAIL 2
SCALE: 3/4" = 1'-0"



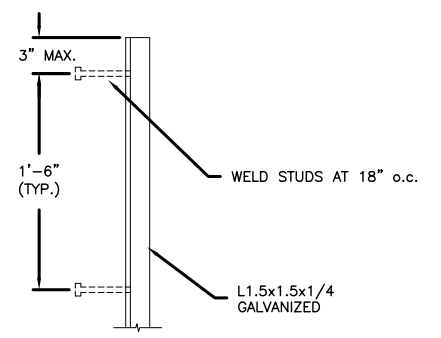
SUMP GRATING PLAN 3
SCALE: 3/4" = 1'-0"



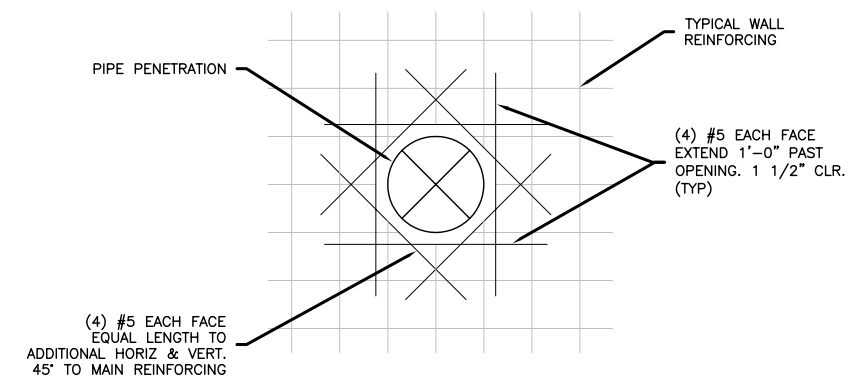
SUMP GRATING DETAILS 4
SCALE: 3" = 1'-0"



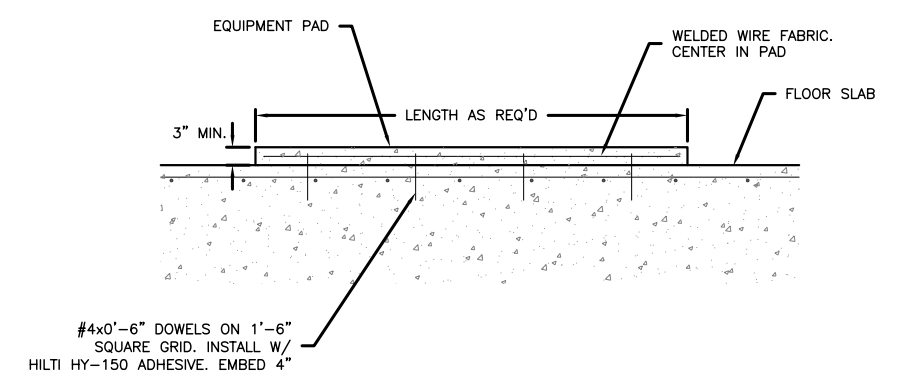
GRATE SUPPORT DETAIL 5
SCALE: 1 1/2" = 1'-0"



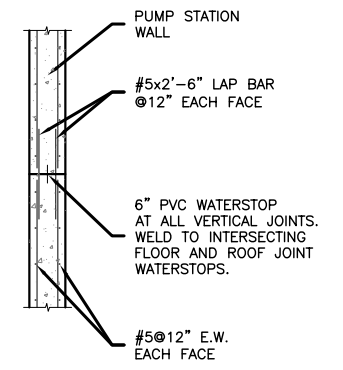
GRATE SUPPORT PLAN 6
SCALE: 1 1/2" = 1'-0"



WALL PENETRATION DETAIL 7
SCALE: 1" = 1'-0"



EQUIPMENT PAD DETAIL 8
SCALE: 3/4" = 1'-0"



VERTICAL WALL JOINT DETAIL 9
SCALE: 3/8" = 1'-0"

- GENERAL NOTES:**
- CONCRETE shall attain a minimum compressive strength of 4000 psi in 28 days. All concrete shall contain 5% (±) 1% air entrainment. Slump shall be 1" to 3" for foundations and 1" to 4" for other uses. Chamfer all exterior corners 1/2" unless shown otherwise.
 - REINFORCING STEEL shall conform to ASTM A615, Grade 60. Grade 40 may be used for #3 and smaller ties and stirrups. Detail and place according to ACI Manual SP-66. Unless otherwise noted, minimum cover shall be 1 1/2" for #5 and smaller bars, 2" for #6 and larger bars and 3" when poured against earth. Unless otherwise noted, bend all horizontal reinforcing a minimum of 2'-0" at corners and wall intersections.
 - STRUCTURAL STEEL shall conform to ASTM A53, Grade B for pipe sections, ASTM A500, Grade B for tube sections and ASTM A36 for other structural shapes. Weld according to current AWS Standards with E70XX electrodes.
 - LIVE LOADS
 Roof.....100 psf or AASHTO H-20
 Soil Unit Weight.....110 pcf (Assumed)
 Soil Active Pressure.....35 pcf (Assumed)

PSE
 Peterson Structural Engineers, Inc.
 5319 S.W. Westgate Dr., Suite 215
 Portland, Oregon 97221
 (503) 292-1635

NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWING

NOTICE
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 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

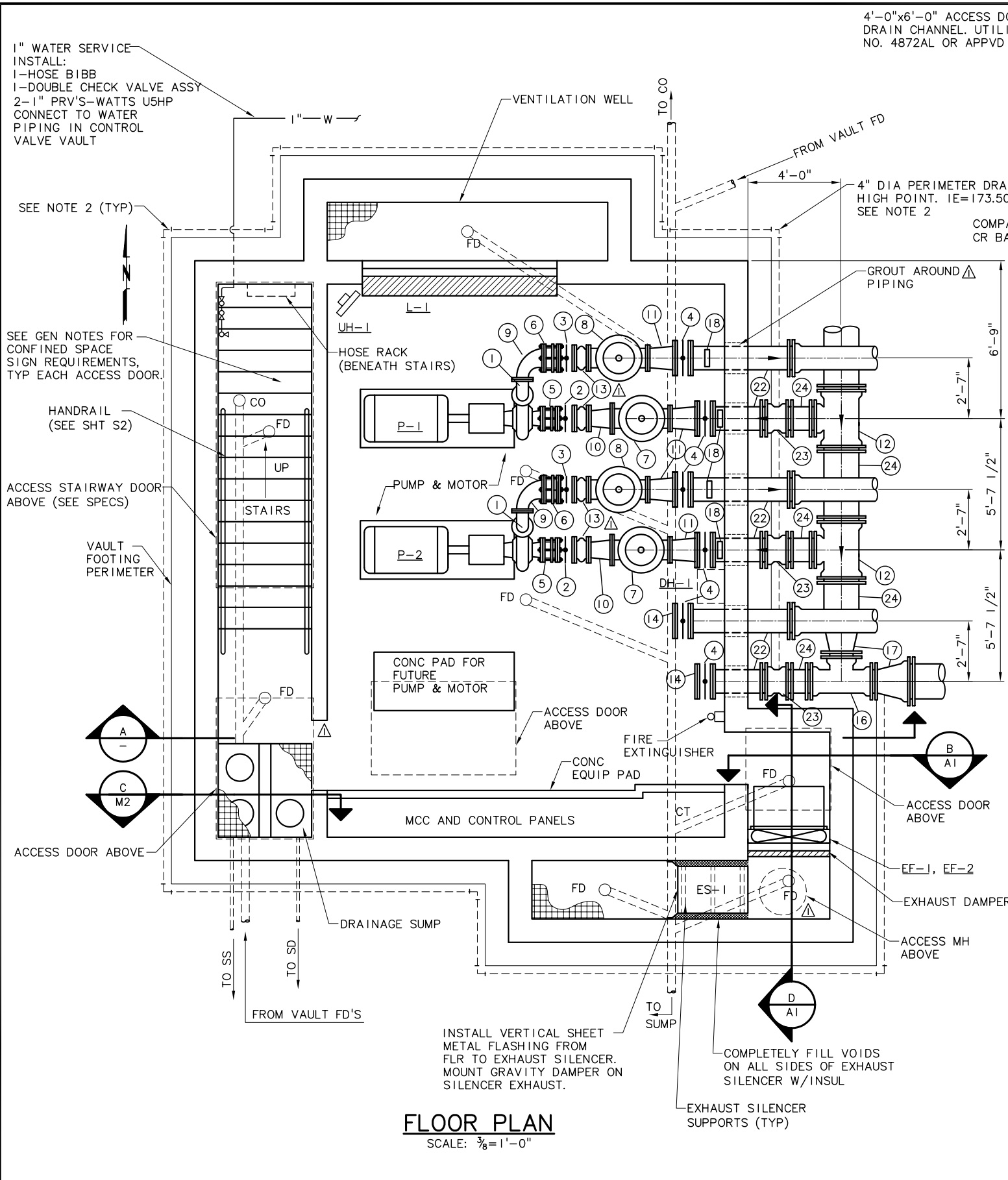
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MSA Murray, Smith & Associates, Inc.
 Engineers/Planners
 121 S.W. Salmon, Suite 900
 Portland, Oregon 97204
 Phone 503-225-9010
 Fax 503-225-9022

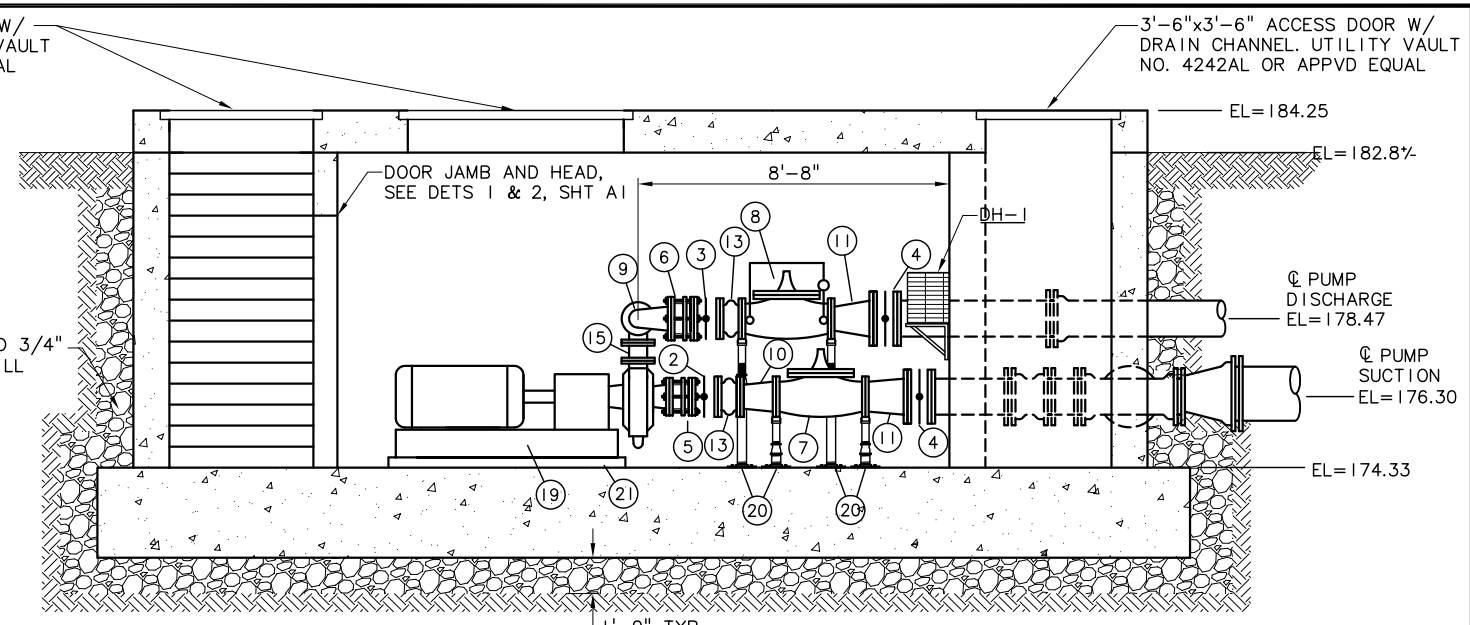
West Linn
EMERGENCY INTERTIE WATER PUMP STATION
CITY OF WEST LINN, OREGON

PUMP STATION DETAILS
 PROJECT NO.: 99-0427.202
 SCALE: AS SHOWN
 DATE: APRIL 2002

SHEET
S3
 11 of 22



FLOOR PLAN
SCALE: 3/8"=1'-0"



SECTION A-A
SCALE: 3/8"=1'-0"

HVAC SCHEDULE

LABEL	DESCRIPTION	SIZE	COMMENTS	MFR & MODEL
L-1	PUMP STATION LOUVER	96"Wx84"H	WALL MOUNTED ACOUSTICAL W/GRAVITY DAMPER, SEE DET, SHT A1	RUSKIN MODEL NO. ACL845 ACOUSTICAL LOUVER AND CBD6 COUNTER BALANCED BACKDRAFT DAMPER OR APPVD EQUAL
EF-1	PUMP STATION EXHAUST FAN	3/4 HP	5,900 CFM, 0.25 SP 5,300 CFM, 0.375 SP W/GRAVITY DAMPER AND WIRE GUARD	COOK, HEAVY DUTY WALL EXHAUST FAN 24 XMW OR APPVD EQUAL
EF-2	PUMP STATION EXHAUST FAN	3/4 HP	5,900 CFM, 0.25 SP 5,300 CFM, 0.375 SP W/GRAVITY DAMPER AND WIRE GUARD	COOK, HEAVY DUTY WALL EXHAUST FAN 24 XMW OR APPVD EQUAL
ES-1	PUMP STATION EXHAUST SILENCER	36"Lx24"Wx48"H	W/GRAVITY DAMPER 18 GAGE GALV STL CASING	INDUSTRIAL ACOUSTICS COMPANY QUIET-DUCT SILENCER TYPE L OR APPVD EQUAL
DH-1	PUMP STATION DEHUMIDIFIER	21"Lx14"Wx17"H	PROVIDE WALL BRACKET MOUNTING SYSTEM	EBAC CD60 DEHUMIDIFIER OR APPVD EQUAL
UH-1	PUMP STATION HEATER		PROVIDE WALL MOUNT BRACKET	CHROMALUX LUH-04-21 OR APPVD EQUAL

MATERIAL LIST

- 1 6" 90° BEND, FLG
- 2 8" BFV, FLG
- 3 10" BFV, FLG
- 4 12" BFV, FLG
- 5 8" DISMANTLING JT
- 6 10" DISMANTLING JT
- 7 10" CONTROL VALVE TYPE I SEE SPECS
- 8 10" CONTROL VALVE TYPE II SEE SPECS
- 9 10"x6" REDUCING 90° BEND, FLG
- 10 10"x8" RDCR, FLG
- 11 12"x10" RDCR, FLG
- 12 18"x12" TEE, MJ
- 13 MOLDED RBR SPHERE EXP JT, SEE SPECS
- 14 12" BLIND FLG
- 15 6" SPL, LENGTH=6"
- 16 12"x12" TEE, MJ
- 17 18"x12" RDCR, MJ
- 18 PRESSURE GAGE, SEE DETAIL 3 SHT M2
- 19 GALV STL PUMP FRAME. MOUNT TO EQUIP PAD AND PACK W/GROUT ACCORDING TO MFR'S RECOMMENDATIONS
- 20 FLANGE SUPPORT, STANDON MODEL S89 OR APPVD EQUAL
- 21 CONC EQUIPMENT PAD
- 22 12" DI SPOOL, FLxPE, LENGTH AS REQ'D
- 23 12" LONG SLV, MJ
- 24 DI SPOOL, PEXPE, LENGTH AS REQ'D

NOTES:

1. ROUTE DISCHARGE FROM PUMPS AND DEHUMIDIFIER TO NEAREST FLOOR DRAIN USING PVC OR COPPER TUBING. TUBING MAY BE FASTENED TO DISCHARGE AND SUCTION PIPING AS REQ'D.
2. SLOPE 4" DIA PERIMETER DRAIN FROM HIGH POINT TO SUMP AT 1%. SEE DET 1 SHT M2.
3. LOCATE HOSE RACK AND FIRE EXTINGUISHER PER ENGINEER.
4. PROVIDE RESTR MJ ON PIPING WITHIN 2' FROM OUTSIDE EDGE OF PUMP STATION VAULT.
5. INSTALL PIPE/FL SUPPORTS ACCORDING TO THE MFR'S REQUIREMENTS.

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NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWING

NOTICE	DW DESIGNED
0 1/2 1	MNP/MBE/DKH DRAWN
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	MLH CHECKED

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12-9-97

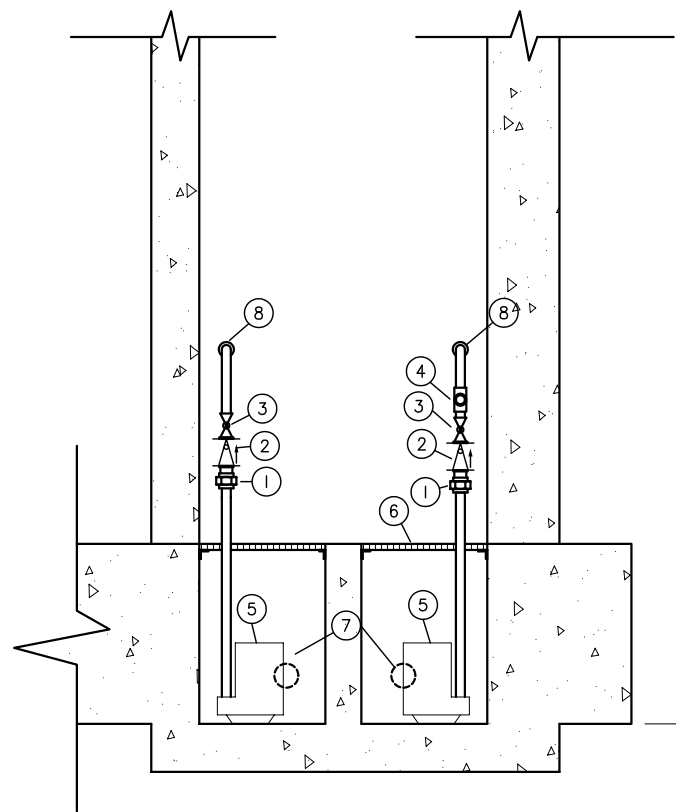
MSA Murray, Smith & Associates, Inc.
Engineers/Planners

121 S.W. Salmon, Suite 900
Portland, Oregon 97204

Phone 503-225-9010
Fax 503-225-9022

West
EMERGENCY INTERTIE WATER PUMP STATION

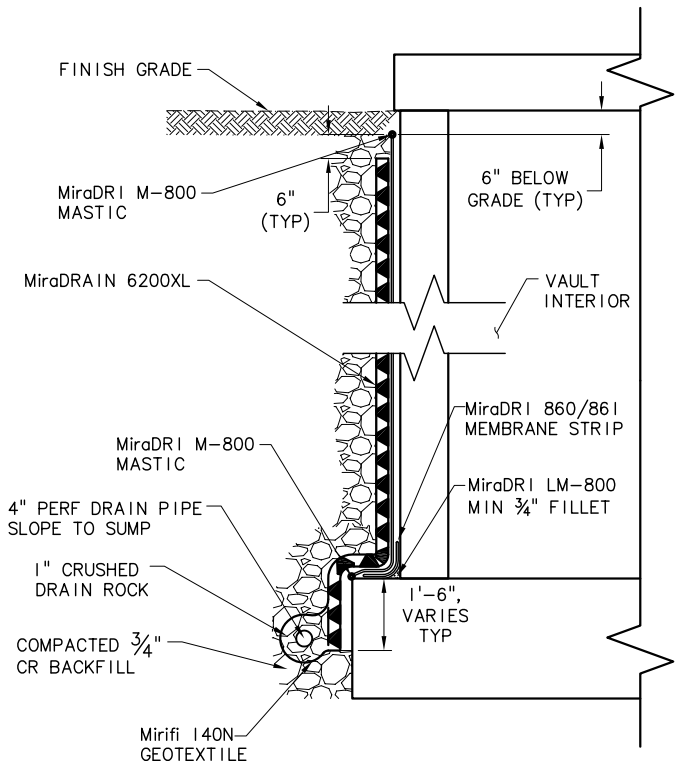
PIPING PLAN AND SECTION	
PROJECT NO.: 99-0427.202	SCALE: AS SHOWN
DATE: APRIL 2002	



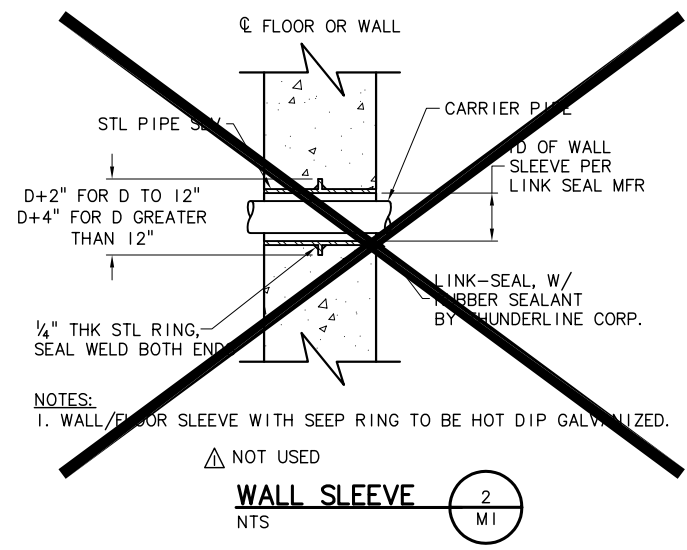
SECTION
SCALE=3/4"=1'-0"
C
M-1

MATERIAL LIST

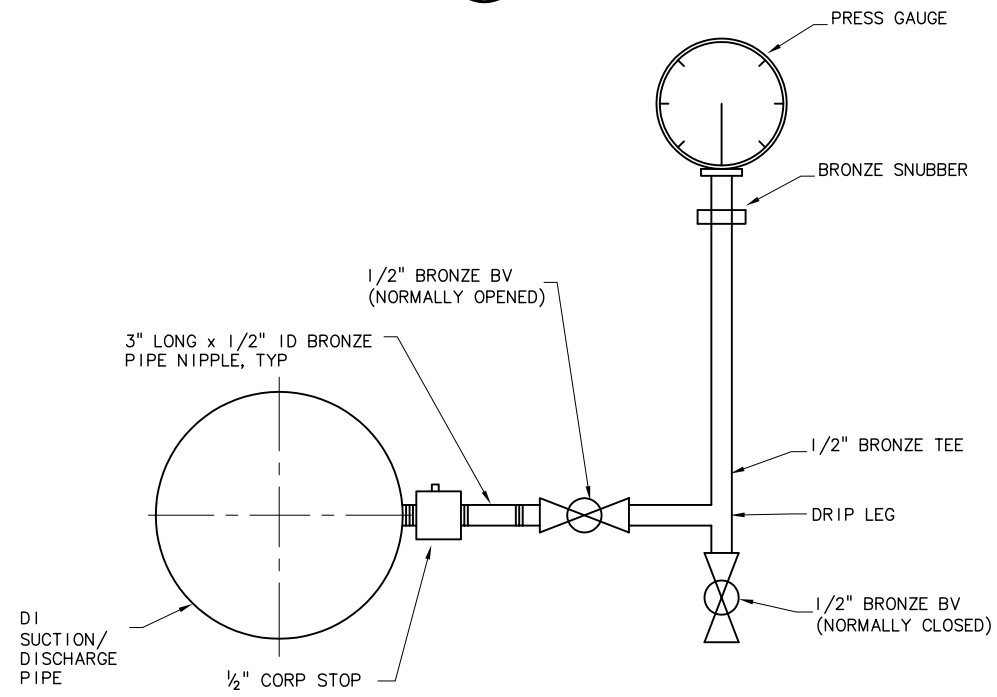
- ① 1 1/2" UN
- ② 1 1/2" CHKV
- ③ 1 1/2" BV
- ④ 1 1/2" TEE, INSTALL 1 1/2" BV, CHKV, AND UN ON VERTICAL DISCHARGE OF DUPLEX PUMP.
- ⑤ SUMP PUMP (QTY=3), SEE SPECS
- ⑥ GALV STL GRTG. PROVIDE 4 PANELS APPROX 2'x2'. SEE DETAIL 4 SHT S3. PROVIDE CUTOUTS FOR PIPING.
- ⑦ 4" DRAIN PIPE PENETRATION. PROVIDE WTRT SEAL W/GROUT. IE= 172.5
- ⑧ 1 1/2" PIPE PENETRATION. PROVIDE WTRT SEAL W/GROUT. IE= 177.0



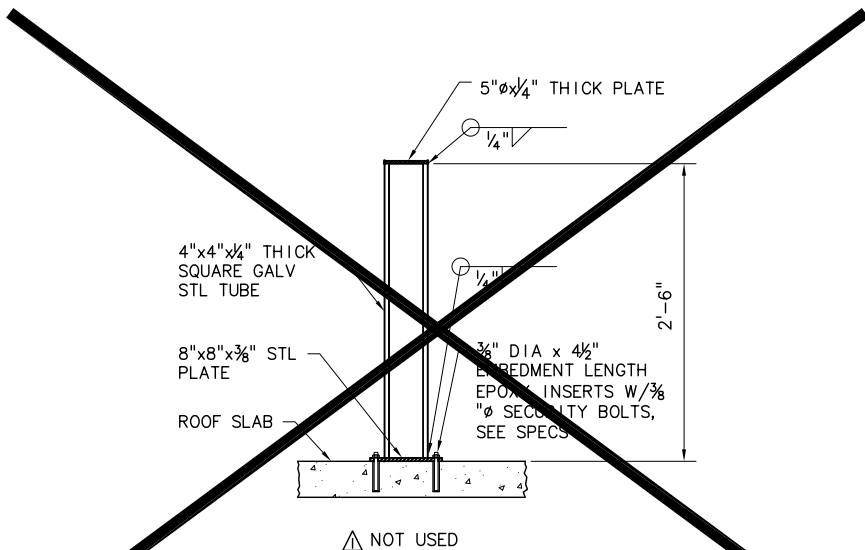
PUMP STATION FOOTING DRAIN
SCALE: 1/2"=1'-0"
1
MI



WALL SLEEVE
SCALE: 1/2"=1'-0"
2
MI



PRESSURE GAUGE
NTS
3
MI



GENERATOR RECEPTACLE SUPPORT POST
NTS
1
MI

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1	4/24/02	MLH	RECORD DRAWING

NOTICE
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Engineers/Planners
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Portland, Oregon 97204
Phone 503-225-9010
Fax 503-225-9022

West Line
EMERGENCY INTERTIE WATER PUMP STATION

MECHANICAL DETAILS			
PROJECT NO.: 99-0427.202	SCALE:	AS SHOWN	DATE: APRIL 2002

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SYMBOL		DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	ABBREVIATIONS
SCHEMATIC	PLAN						
		GROUND ROD IN GROUND ROD BOX		FLUORESCENT LIGHTING FIXTURE, SURFACE. "F1" INDICATES TYPE PER FIXTURE SCHEDULE. "2" INDICATES CIRCUITING. "a" INDICATES SWITCHING.		CONDUIT CONCEALED	A,AMP AMPERE
		BATTERY.		FLUORESCENT LIGHTING FIXTURE, RECESSED. ● INDICATES FIXTURE ON EMERGENCY CIRCUIT.		CONDUIT EXPOSED.	AF AMPERE FRAME
		TRANSFORMER, PLAN VIEW SHOWN TO SCALE		FLUORESCENT WRAPAROUND FIXTURE, SURFACE SURFACE OR PENDANT AS INDICATED IN FIXTURE SCHEDULE.		EXISTING CONDUIT ROUTED UNDERGROUND.	AFF ABOVE FINISHED FLOOR
		CURRENT TRANSFORMER, NUMBER INDICATES NUMBER OF C.T.'S.		FLUORESCENT LIGHTING FIXTURE FOR HAZARDEOUS AREAS. CLASS. AND DIV. AS INDICATED IN FIXTURE SCHEDULE		CORD	AI ANALOG INPUT POINT (PLC)
		MOTOR, NUMBER INDICATES HORSEPOWER		FLUORESCENT STRIP, SURFACE OR PENDANT AS INDICATED IN FIXTURE SCHEDULE.		CONDUIT TURNED UP OR TOWARD.	AIC AMPERES INTERRUPTING CAPACITY
		GENERATOR WITH EXHAUST DUCTING		INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE, WALL MOUNTED.		CONDUIT TURNED DOWN OR AWAY.	AIL AMBER INDICATING LIGHT
		MOTOR STARTER W/DISCONNECT		INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE, CEILING MOUNTED.		CONDUIT CAPPED.	AL ALARM
		PACKAGED POWER AND CONTROL PANEL		INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE, POLE MOUNTED.		CONDUIT SEALS, CLASS 1, DIV.1 EXPLOSION PROOF OR DRAWING NOTES	ALT ALTERNATOR
		DISCONNECT SWITCH, NON FUSED (60A) INDICATES AMPERAGE RATING		EXIT LIGHT, ↓ INDICATES DIRECTION OF ARROW		CONDUIT HOME RUN 3/4"C, 2#12 & 1#12 GND. TO PANEL L, CKT. 7 UNLESS SHOWN OTHERWISE.	AM AMMETER
		DISCONNECT SWITCH, FUSED 200=SWITCH RATING, 100=FUSE RATING		EMERGENCY WALL PACK.		CONDUIT RUNNING NOTES	AO ANALOG OUTPUT POINT (PLC)
		UTILITY METERING		H.I.D. LIGHTING FIXTURE, POLE MOUNTED.		THERMAL MAGNETIC CIRCUIT BREAKER, RATING/NO. POLES MO = MAGNETIC ONLY	AOR HANDS OFF REMOTE
		INDICATING LIGHT: A = AMBER B = BLUE G = GREEN R = RED W = WHITE		SINGLE POLE SWITCH		SURGE ARRESTOR	AS AMPERE SWITCH
		LIGHTED PUSHBUTTON WITH LENS COLOR ABOVE		DOUBLE POLE SWITCH		ATS - AUTOMATIC TRANSFER SWITCH	AT AMPERE TRIP
		SELECTOR SWITCH: FR = FORWARD/REVERSE HOR = HAND/OFF/REMOTE HOA = HAND/OFF/AUTO RO = RUN/OFF POT = POTENTIOMETER		THREE WAY SWITCH		MTS - MANUAL TRANSFER SWITCH	ATS AUTOMATIC TRANSFER SWITCH
		HAND STATION - (MAY INCLUDE HOA, POT, FR, ETC.)		FOUR WAY SWITCH		POWER CAPACITOR WITH KVAR RATING	ATS AUTOMATIC TRANSFER SWITCH
		LOCAL CONTROL PANEL		OTHER SWITCHES: P - WITH PILOT LIGHT K - KEY OPERATED M - MOTOR RATED SWITCH WP - WEATHER PROOF T - TIMER		FULL VOLTAGE STARTER, NEMA SIZE 1	AT AUTOMATIC TRANSFER SWITCH
		PUSHBUTTON SWITCH, MOMENTARY ON.		PHOTO ELECTRIC RELAY		CURRENT TRANSFORMER	BAT BATTERY
		PRESSURE SWITCH, NORMALLY CLOSED.		TIME CLOCK, VERIFY TYPE FROM PLANS.		CHECK VALVE	BC BATTERY CHARGER
		FLOW SWITCH, NORMALLY CLOSED.		CONDUIT JUNCTION BOX		THERMAL OVERLOAD RELAY	BH BLOCK HEATER
		LIMIT SWITCH, NORMALLY OPEN.		EXHAUST OR SUPPLY FAN, NUMBER INDICATES H.P.		VARIABLE FREQUENCY DRIVE	BIL BLUE INDICATING LIGHT
		LEVEL SWITCH, CLOSES ON RISING LEVEL		SURFACE METAL RACEWAY WITH RECEPTACLE AT X" O.C.		REDUCED VOLTAGE AUTO-TRANSFORMER STARTER NEMA SIZE 1	BP BYPASS CONTRACTOR
		TEMP SWITCH, CLOSES ON FALLING TEMP.		DUPLEX RECEPTACLE, 2 INDICATES CIRCUITING, GFI INDICATES GROUND FAULT PROTECTION		SOLID STATE STARTER, REDUCED VOLTAGE WITH ISOLATION & BYPASS CONTRACTORS	CCR REMOTE PLC I/O CABINET
		THERMOSTAT		FOURLEX RECEPTACLES		FUSE WITH AMPERE RATING	CKT CIRCUIT
		CONTROL RELAY		SINGLE RECEPTACLE		AM - AMMETER	CNT START COUNTER
		POTENTIOMETER		SPECIAL PURPOSE RECEPTACLE, AS NOTED		AS - AMMETER AND VOLT METER	CONT CONTINUED
		LEVEL TRANSMITTER		DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTER BACKSLASH.		VS - VOLTMETER SWITCH	CP CONTROL PANEL
		PRESSURE TRANSMITTER		DATA OUTLET		CONDUCTORS NOT CONNECTED.	CPT CONTROL POWER TRANSFORMER
		SPEED INDICATOR		INTERCOM		CONDUCTORS CONNECTED.	CR CONTROL RELAY
		FLOW TRANSMITTER		SPLIT TELEPHONE DATA OUTLET		PULL OUT SWITCH/PLUG-RECEPTACLE CONNECTION	CT CURRENT TRANSFORMER
		TEMPERATURE TRANSMITTER		TELEPHONE OUTLET		TERMINAL IN MCC	CV CHECK VALVE
		HEAT DETECTOR/SMOKE DETECTOR		PANELBOARD		TERMINAL IN CONTROL PANEL	DB DIRECT BURIED
		SOLENOID VALVE.		HANDHOLE WITH DESIGNATION P - POWER C - CONTROL S - SIGNAL MH - MAN HOLE V - VAULT		TERMINAL ON PLC I/O	DEM DEMAND
		ELECTRIC HEATER		ELECTRIC HEATER WALL OR BASEBOARD		TERMINAL IN REMOTE DEVICE OR PANEL	DF DEMAND FACTOR
		THERMOSTAT		PHASE FAIL RELAY & FUSE			DI AC DIGITAL INPUT POINT (PLC)
		TIME DELAY RELAY TDOE = TIME DELAY ON ENERGIZATION TDOO = TIME DELAY ON DE-ENERGIZATION		RUN TIME METER			DO AC DIGITAL OUTPUT POINT (PLC)
		DOOR SECURITY SWITCH		START COUNT METER			DWG DRAWING
		VIBRATION SENSOR		BLOWN FUSE INDICATOR			E,EXIST EXISTING
		LEAK DETECTION FOR SUBMERSIBLE PUMPS		NORMALLY OPEN CONTACT. (WHEN DE-ENERGIZED)			EF EXHAUST FAN
		RESISTANCE TEMPERATURE DEVICE (RTD)		NORMALLY CLOSED CONTACT. (WHEN DE-ENERGIZED)			F FUSED
		OVER TEMPERATURE CUTOUT		HEATER - HEAT TRACE			FACP FIRE ALARM CONTROL PANEL
		HORN					FS FLOW SWITCH
		UNIT HEATER - SHOWING BLOWER DIRECTION					FT FLOW TRANSMITTER
		PULL BOX					FVNR FULL VOLTAGE NON-REVERSING
		VFD - VARIABLE FREQUENCY DRIVE					FVR FULL VOLTAGE REVERSING

WIRE DIAGRAMS, ONELINES, INST. DWGS

--- LIGHT DASHED LINE = EXISTING
 — NEW WORK/EQUIPMENT

REFERENCE SYMBOLS

P1 POWER CONDUIT TAG
 C1 CONTROL CONDUIT TAG
 S1 SIGNAL CONDUIT TAG
 T1 TELEPHONE CONDUIT & WIRE TRAG
 R1 SPARE CONDUIT
 1 SHEET NOTE

SEE SPEC 16000.1-07

EQUIPMENT DESIGNATION
 PPC001

DETAIL NUMBER
 A XX
 SCALE
 SHEET WHERE DETAIL IS TAKEN FROM.

SECTION LETTER
 A XX
 SCALE
 SHEET WHERE SECTION IS TAKEN FROM.

DETAIL AREA
 SHEET ON WHICH DETAIL APPEARS

SECTION LETTER
 A XX
 SHEET ON WHICH SECTION APPEARS.

INSTRUMENT TYPE
 LIX DSL317
 INSTRUMENT DESIGNATION

SYSTEM ABBREVIATION
 LIX DSL317

NO.	DATE	BY	REVISION
4	4/24/02	MLH	RECORD DRAWING

NOTICE

0 1/2 1

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 RAF DRAWN
 VMF CHECKED

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Portland, Oregon 97204

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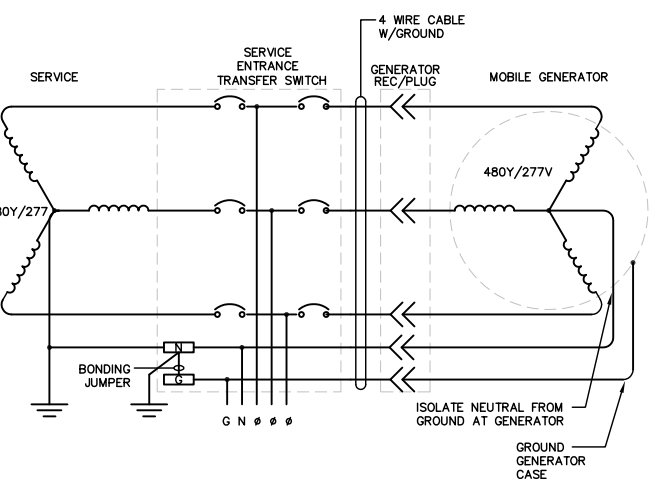
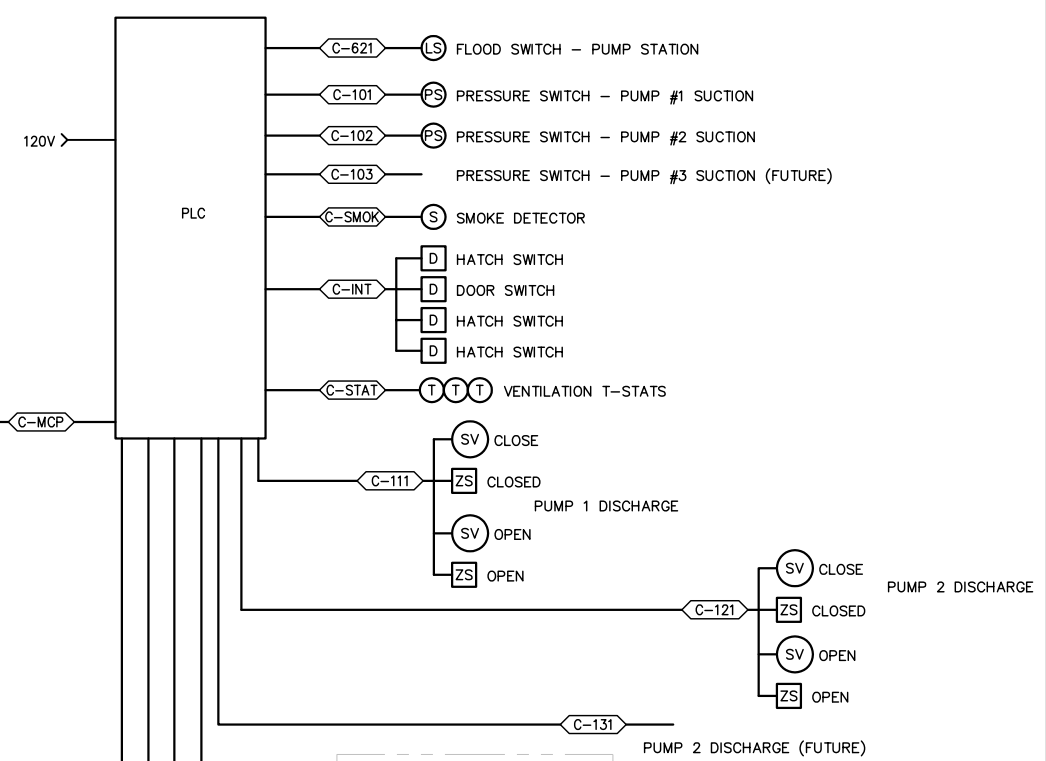
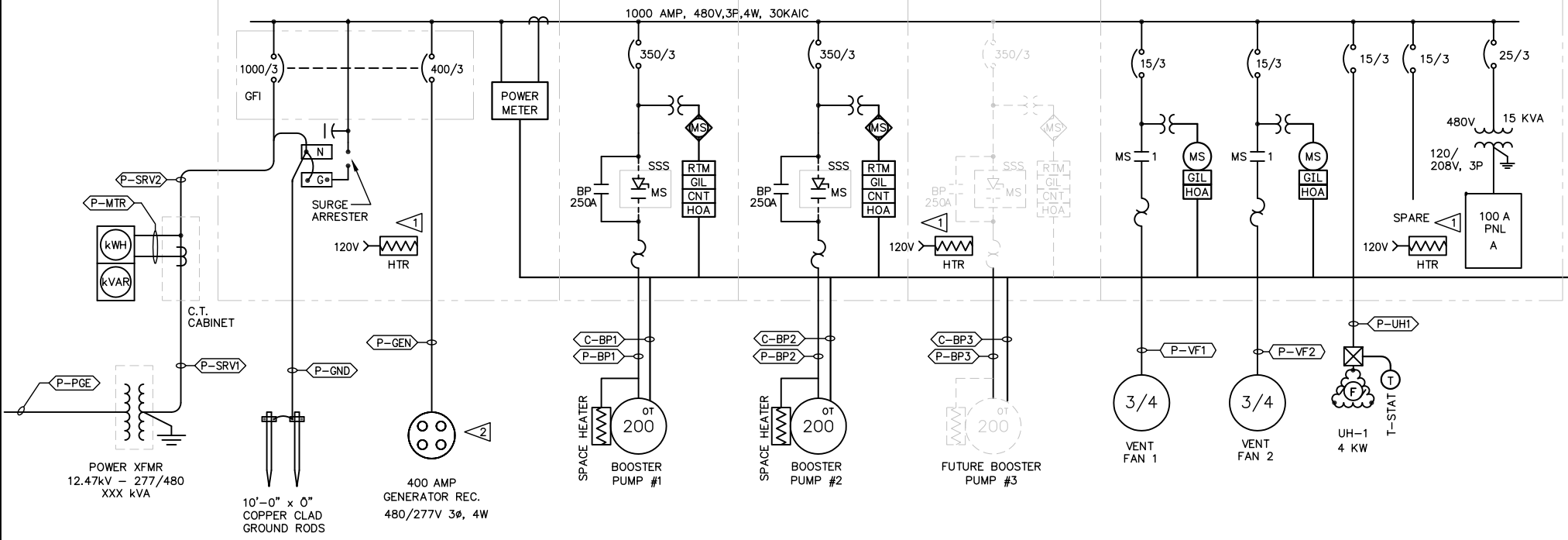
EMERGENCY INTERTIE WATER PUMP STATION

ELECTRICAL SYMBOLS AND ABBREVIATIONS

PROJECT NO.: 00055.301 SCALE: NONE DATE: APRIL 2002

C:\99\0427\305\CAD\DOR\00055e02.dwg Model Sep/6/2002 09:15:28

1000 AMP SE RATED
MANUAL TRANSFER SWITCH
480V, 3P, 4W



GENERATOR/TRANSFER SWITCH CONNECTION DIAGRAM

CONDUIT & WIRE SCHEDULE						
COND#	CONDUIT		WIRE	FROM	TO	NOTES
	SIZE	TYPE				
P-PGE	4"	PVC	BY UTILITY	UTILITY POLE	TRANSFORMER	
P-SRV1	(4) 4"	PVC	3#350, #3/0 GND (EA)	TRANSFORMER	CT SWITCHBOARD	
P-SRV2	(4) 3-1/2"	GRS	3#350, #3/0 GND (EA)	CT SWITCHBOARD	MCC	
P-GND	1"	GRS	#3/0 GND	MCC	GND RODS	
P-MTR	2"	GRS	BY UTILITY	CT SWITCHBOARD	METER	
P-GEN	(2) 3"	GRS	(3) 4/0, #4/0N, #2 GND (EA)	MCC	GEN RECEPTACLE	
P-VF1	3/4"	GRS	3#12, 1#12 GND	MCC	VENT FAN 1	
P-VF2	3/4"	GRS	3#12, 1#12 GND	MCC	VENT FAN 2	
P-BP1	3-1/2"	GRS	3#350, 1#3G, 3#12	MCC	BOOSTER PUMP 1	
P-BP2	3-1/2"	GRS	3#350, 1#3G, 3#12	MCC	BOOSTER PUMP 2	
P-BP3	3-1/2"	GRS	PULL CORD	MCC	BOOSTER PUMP 3 (FUTURE)	
P-UH1	3/4"	GRS	3#12, #12 GND	MCC	UNIT HEATER	
P-LOV	3/4"	GRS	2#12, #12 GND	PANEL A	LAKE OSWEGO VAULT	FLOW TRANSMITTER
C-621	3/4"	GRS	2#14	MCP	FLOOD SWITCH	
C-101	3/4"	GRS	4#14	MCP	PRESSURE SW, PUMP 1	
C-102	3/4"	GRS	4#14	MCP	PRESSURE SW, PUMP 2	
C-103	3/4"	GRS	PULL CORD	MCP	PRESSURE SW 3 (FUTURE)	
C-SMOK	3/4"	GRS	4#14	MCP	SMOKE DETECTOR	
C-INT	3/4"	GRS	2#14	MCP	INTRUSION SWITCHES	
C-STAT	3/4"	GRS	8#14	MCP	T-STATS	
C-111	3/4"	GRS	10#14	MCP	PUMP 1 DISCHARGE VALVE	
C-121	3/4"	GRS	10#14	MCP	PUMP 2 DISCHARGE VALVE	
C-131	3/4"	GRS	PULL CORD	MCP	PUMP 3 VALVE (FUTURE)	
C-BP1	3/4"	GRS	2#14	MCC	BOOSTER PUMP 1	OVERTEMP
C-BP2	3/4"	GRS	2#14	MCC	BOOSTER PUMP 2	OVERTEMP
C-BP3	3/4"	GRS	PULL CORD	MCC	BOOSTER PUMP 3 (FUTURE)	
C-411	1-1/2"	GRS	20#14	MCP	VIEW DRIVE VAULT	
C-401	1-1/2"	GRS	22#14	MCP	LAKE OSWEGO VAULT	
C-MCP	2"	GRS	30#14	MCP	MCC	
S-411	1-1/2"	GRS	(3) TSP	MCP	VIEW DRIVE VAULT	
S-301	1"	GRS	(4) TSP	MCP	LAKE OSWEGO VAULT	FLOW, PRESS. XMTR

LOAD CALCULATIONS								
LOAD DESCRIPTION	HP	KVA	TOTAL		FUTURE TOTAL		GEN LOAD	
			DF	DEMAND	DF	DEMAND	DF	DEMAND
PUMP 1	200	200	1.25	250	1.25	250	1	200
PUMP 2	200	200	1	200	1	200	0	
PUMP 3 FUTURE	200	200	0		1	200	0	
SUMP PUMP #1	0.33	0.9	1	0.9	1	0.9	1	0.9
SUMP PUMP #2	0.33	0.9	1	0.9	1	0.9	1	0.9
SUMP PUMP #3	0.33	0.9	1	0.9	1	0.9	1	0.9
VENT FAN 1	0.75	1.3	1	1.3	1	1.3	1	1.3
VENT FAN 2	0.75	1.3	1	1.3	1	1.3	1	1.3
HEAT	4	4	1	4	1	4	1	4
MISC. 120/208V LOAD	6	6	1	6	1	6	1	6
TOTAL	602	615		465		665		215
AMPS AT 480V 3 PH				amps 560		amps 801		amps 259

- NOTES:**
- 1 PROVIDE SPACE HEATER IN EACH MCC SECTION.
 - 2 PROVIDE RECEPTACLE TO MATCH CITY'S GENERATOR PLUG.

NO.	DATE	BY	REVISION
4	4/24/02	MLH	RECORD DRAWING

NOTICE

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REH DESIGNED
RAF DRAWN
VMF CHECKED

RECORD DRAWING

SEE DISCLAIMER SHEET 1.

VERSION 4.1
12-9-97

MSA Murray, Smith & Associates, Inc.
Engineers/Planners

121 S.W. Salmon, Suite 900
Portland, Oregon 97204

Phone 503-225-9010
Fax 503-225-9022

EMERGENCY INTERTIE WATER PUMP STATION

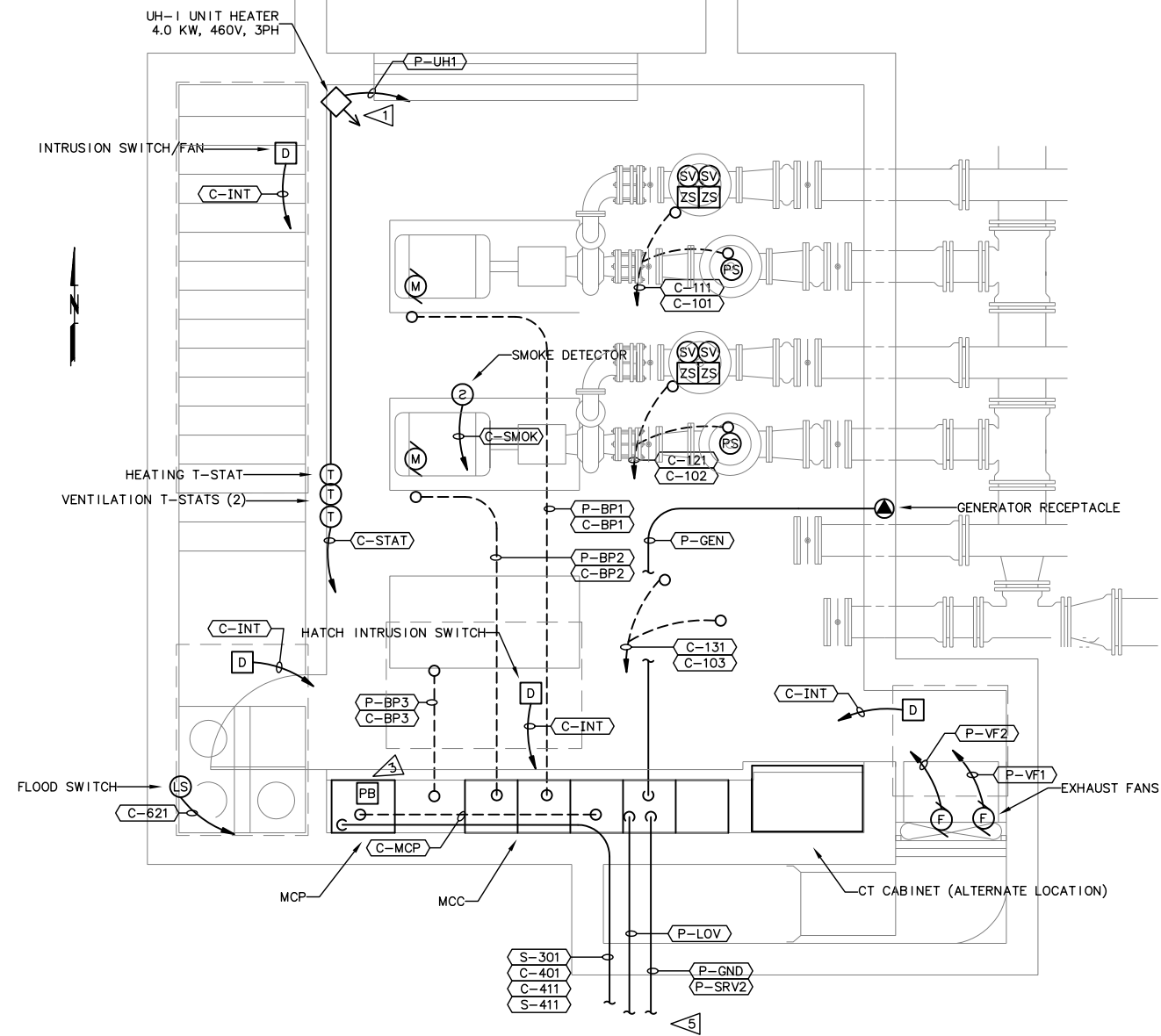
ELECTRICAL ONE-LINE, LOAD CALCULATION AND CONDUIT & WIRE SCHEDULE

PROJECT NO.: 00055.301 SCALE: NONE DATE: APRIL 2002

SHEET **E-2**

15 of 22

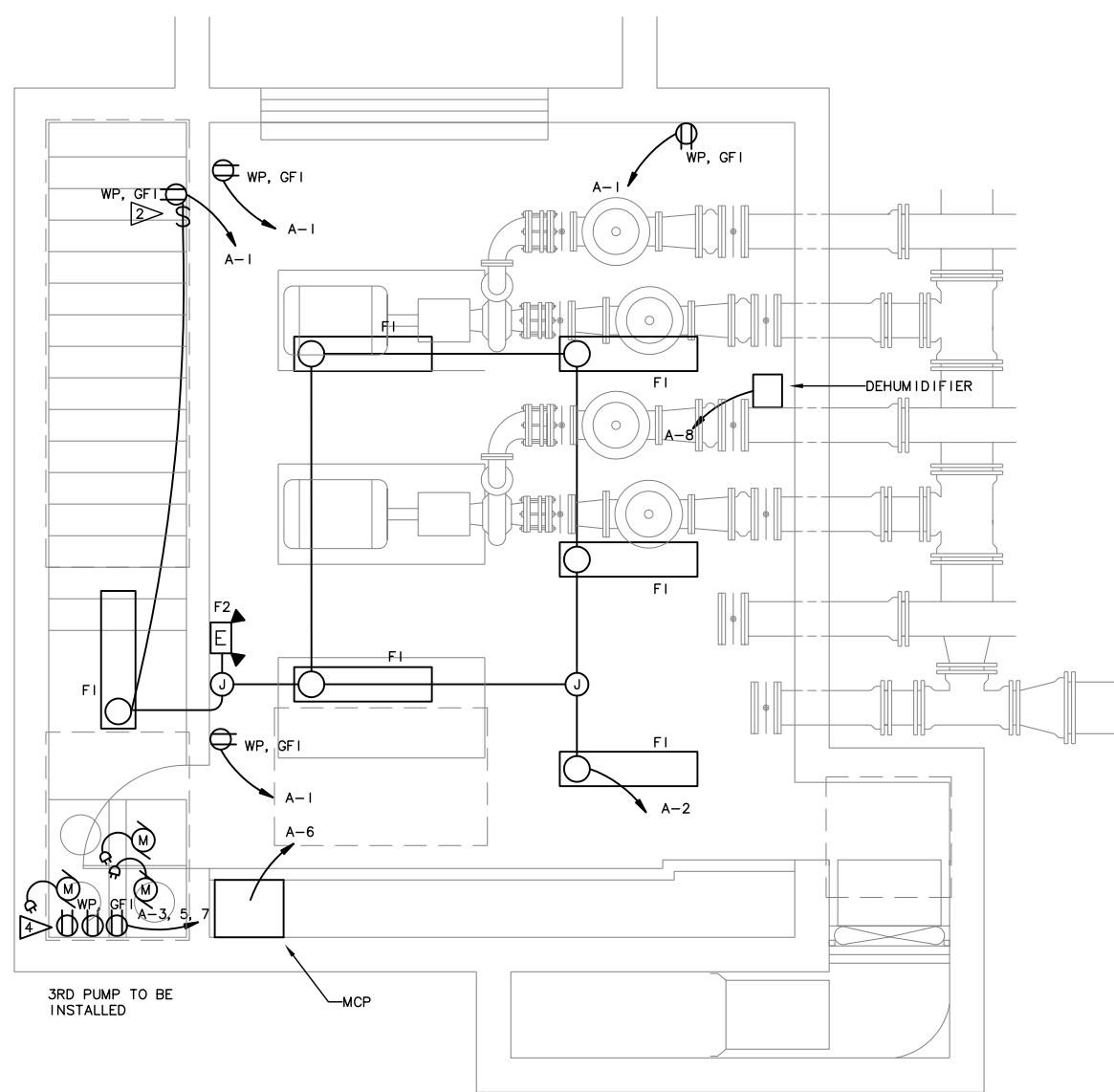
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CONTROL AND 480V POWER PLAN
SCALE: 3/8"=1'-0"

MAIN CB	400A	3 PH	PUMP #1	PUMP #2
1000A	BRKR	120/208V	200 HP SSS	200 HP SSS
GFI		PANEL		
		BREAKERS		
POWER		BREAKERS		
METER		120/208V		
FAN 1		TRANSFRMR		
FAN 2				

MOTOR CONTROL CENTER ELEVATION
SCALE: NONE



LIGHTING & 120V POWER PLAN
SCALE: 3/8"=1'-0"

PANEL SCHEDULE		120/208V, 3 PHASE, 4 WIRE WITH 100 AMP MAIN BREAKER		120/208V, 3 PHASE, 4 WIRE WITH 100 AMP MAIN BREAKER			
NO.	LOAD DESCRIPTION	KVA	TRIP AMPS	TRIP AMPS	KVA	LOAD DESCRIPTION	NO.
1	RECEPTACLES	0.4	20/1	20/1	0.6	INDOOR LIGHTS	2
3	SUMP RECEPTACLE	0.9	20/1	20/1	0	SPARE	4
5	SUMP RECEPTACLE	0.9	20/1	20/1	0.6	CONTROL PANEL POWER	6
7	SUMP RECEPTACLE	0.9	20/1	20/1	0.3	DEHUMIDIFIER	8
9	SMOKE DETECTOR	0.05	20/1	20/1	0	SPARE	10
11	MCC SPACE HEATERS	0.3	20/1	20/1	0	SPARE	12
13	SPARE	0	20/1		0	SPARE	14
15	SPARE	0	20/1		0	SPARE	16
17	SPARE	0	20/1		0	SPARE	18
SUB TOTAL KVA		7.15			1.5		
				TOTAL KVA		8.65	
				AMPS AT 120/208V, 3 PHASE		24.0	

- NOTES:**
- INSTALL REMOTE THERMOSTAT FOR UNIT HEATER AND VENTILATION THERMOSTATS ON WALL AT 5' ELEVATION.
 - MOUNT PERMANENT LABEL AT SWITCH: "STAIR LIGHTS".
 - INSTALL OPERATOR IN TROUBLE PUSH BUTTON ON MCP.
 - PROVIDE WEATHERPROOF, GFI RECEPTACLES ON SEPARATE CIRCUITS FOR SUMP PUMPS.
 - SEE SHEET E-4 FOR CONTINUATION.

LIGHTING FIXTURE SCHEDULE			
FIX.	MFG.CAT#	LAMPS	DESCRIPTION
F1	LITHONIA DMW-232	(2) F32T8	4', 2 LAMP FLUORESCENT WITH IMPACT AND UV RESISTANT GASKETED POLYESTER HOUSING, ACRYLIC DIFFUSER. PROVIDE WITH WET LOCATION FITTINGS.
F2	EXIDE F 100 2HV	HALOGEN	EMERGENCY WALL PACK, 2 LAMP RECHARGEABLE BATTERY, VOLTMETER

NOTICE
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REH DESIGNED
RAF DRAWN
VMF CHECKED

RECORD DRAWING
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VERSION 4.1
12-9-97

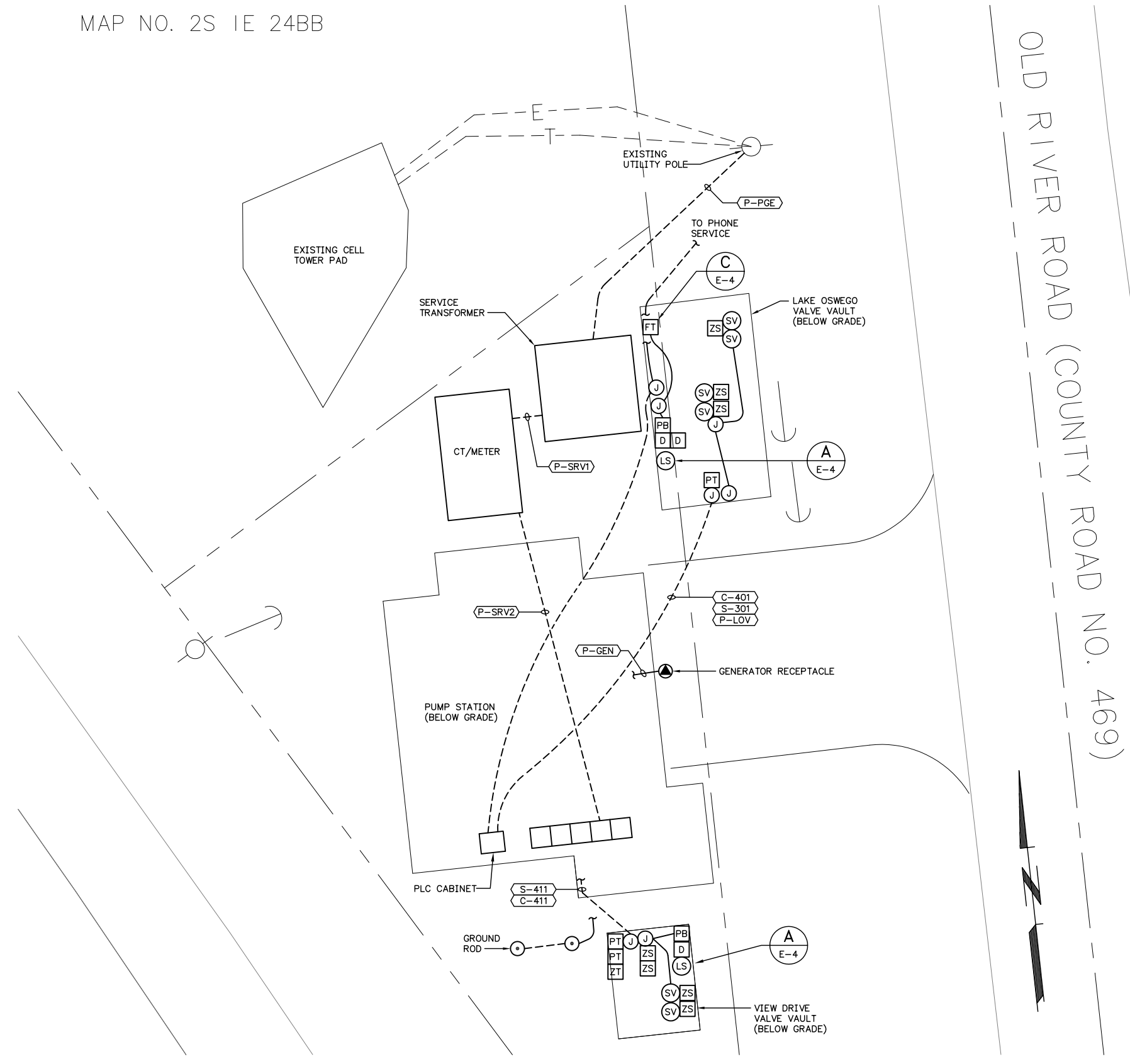
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Portland, Oregon 97204
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Fax 503-225-9022

West Line
EMERGENCY INTERTIE WATER PUMP STATION

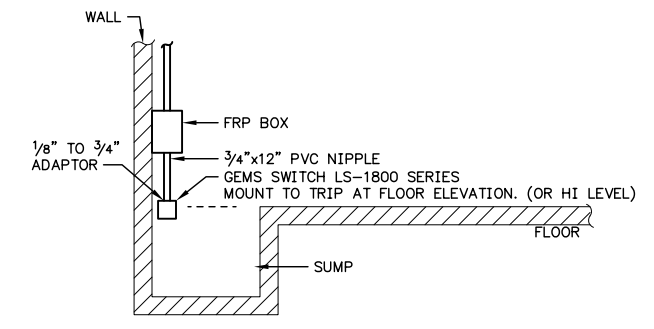
ELECTRICAL POWER PLAN AND PANEL SCHEDULE
PROJECT NO.: 00055.301 SCALE: 3/8"=1'-0" DATE: APRIL 2002

SHEET
E-3
16 of 22

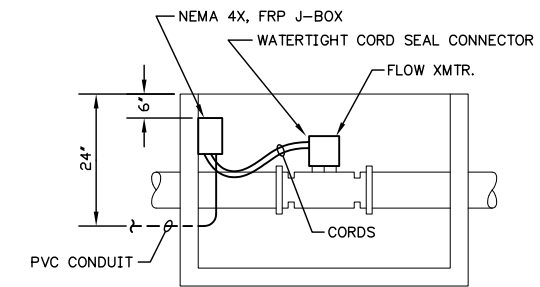
MAP NO. 2S 1E 24BB



SITE PLAN
SCALE: 1"=5'



A FLOOD SWITCH MOUNTING DETAIL
SCALE: NONE



C FLOW TRANSMITTER INSTALLATION DETAIL
SCALE: NONE

CASNE ENGINEERING, INC.
ELECTRICAL ENGINEERING CONSULTANTS
350 114TH AVE., SE, SUITE 100 650 N. ARGONNE RD., SUITE B
BELLINGHAM, WA 98225 SPOKANE, WA 99212
PHONE: (425) 434-3555 PHONE: (509) 922-7897

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Engineers/Planners
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Portland, Oregon 97204 Fax 503-225-9022



**EMERGENCY
INTERTIE WATER
PUMP STATION**

**ELECTRICAL SITE PLAN
AND DETAILS**

SHEET
E-4
17 of 22

NOTICE	
0 1/2 1	
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	
REH DESIGNED	
RAF DRAWN	
VMF CHECKED	

**RECORD
DRAWING**
SEE DISCLAIMER SHEET 1.
VERSION 4.1
12-9-97

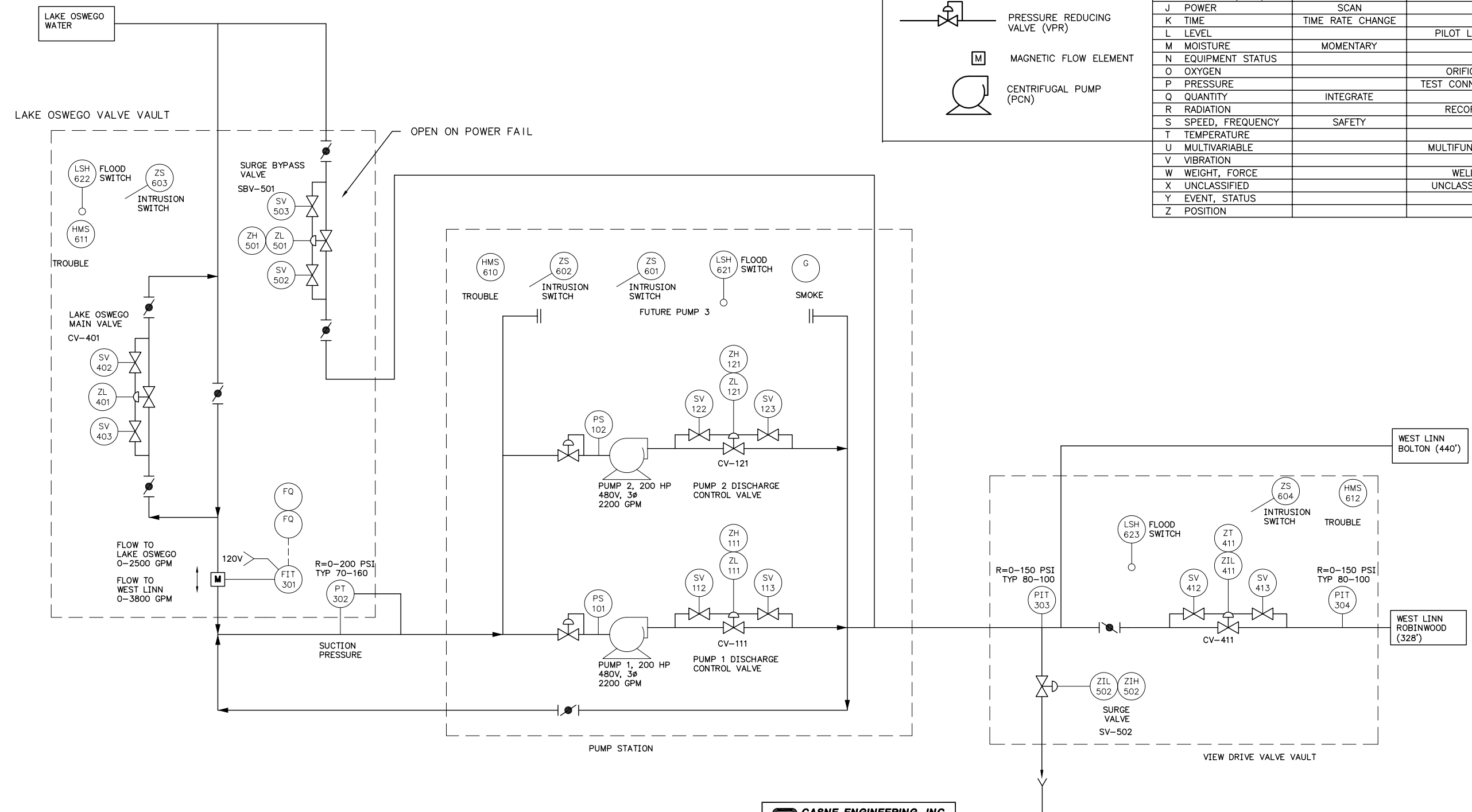
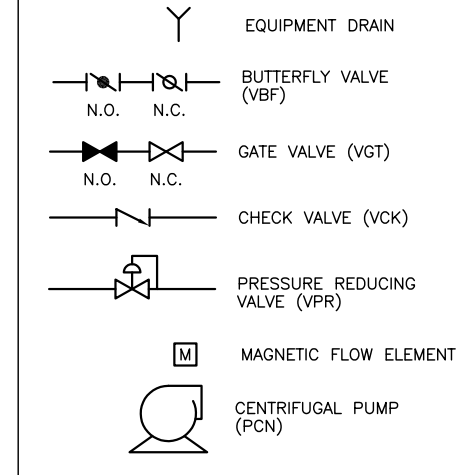
NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWING

PROJECT NO.: 00055.301 SCALE: 1"=5'-0" DATE: APRIL 2002

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SYMBOLS & ABBREVIATIONS

FUNCTION IDENTIFICATION				
FIRST LETTER(S)		SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM	
B	BURNER (FLAME)			
C	CONDUCTIVITY		CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL		
E	POTENTIAL (ELEC)		PRIMARY ELEMENT	
F	FLOW RATE	RATIO		
G	FIRE, SMOKE		GLASS	
H	HAND			HIGH
I	CURRENT (ELEC)		INDICATE	
J	POWER	SCAN		
K	TIME	TIME RATE CHANGE	CONTROL STATION	
L	LEVEL		PILOT LIGHT	LOW
M	MOISTURE	MOMENTARY		MIDDLE
N	EQUIPMENT STATUS			OPEN
O	OXYGEN		ORIFICE	
P	PRESSURE		TEST CONNECTION	
Q	QUANTITY	INTEGRATE		
R	RADIATION		RECORD	
S	SPEED, FREQUENCY	SAFETY		SWITCH
T	TEMPERATURE		UNCLASSIFIED	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION		MULTIFUNCTION	VALVE, DAMPER
W	WEIGHT, FORCE		WELL	
X	UNCLASSIFIED		UNCLASSIFIED	
Y	EVENT, STATUS		TRANSMIT	
Z	POSITION		RELAY, COMPUTE	MISC. ACTUATOR



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NO.	DATE	BY	REVISION
1	4/24/02	MLH	RECORD DRAWING

NOTICE
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VMF DESIGNED
 RAF DRAWN
 VMF CHECKED

RECORD DRAWING
 SEE DISCLAIMER SHEET 1.
 VERSION 4.1
 12-9-97

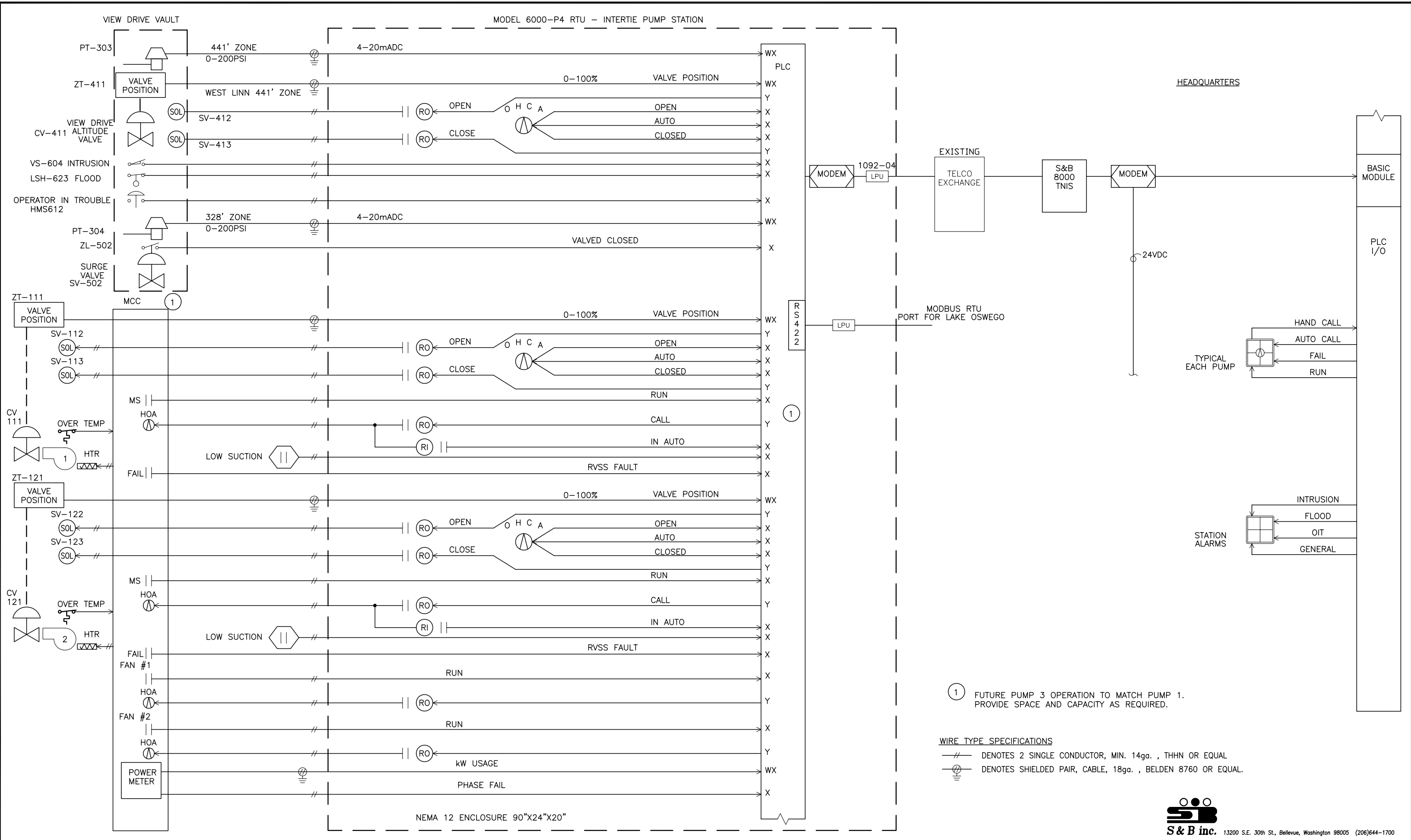
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 Phone 503-225-9010 Fax 503-225-9022

West Linn
EMERGENCY INTERTIE WATER PUMP STATION

P&ID DIAGRAM
 PROJECT NO.: 00055.301 SCALE: NONE DATE: APRIL 2002

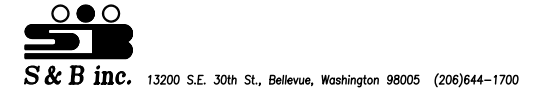
SHEET I-1
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① FUTURE PUMP 3 OPERATION TO MATCH PUMP 1. PROVIDE SPACE AND CAPACITY AS REQUIRED.

WIRE TYPE SPECIFICATIONS
 // DENOTES 2 SINGLE CONDUCTOR, MIN. 14ga. , THHN OR EQUAL
 ⊕ DENOTES SHIELDED PAIR, CABLE, 18ga. , BELDEN 8760 OR EQUAL.



NO.	DATE	BY	REVISION

NOTICE

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

RTS DESIGNED
 RTM DRAWN
 - CHECKED

RECORD DRAWING
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 VERSION 4.1
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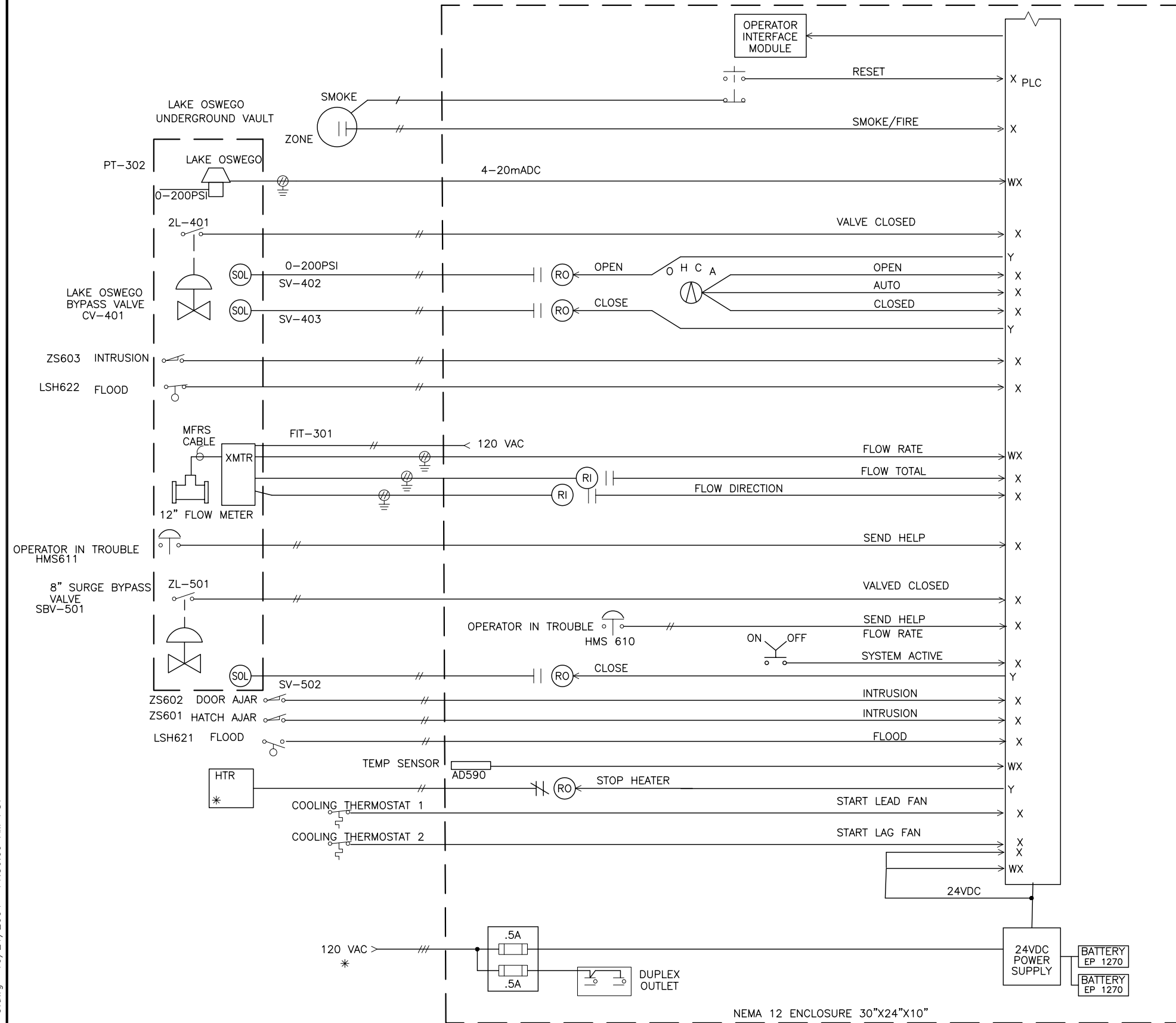
**EMERGENCY
 INTERTIE WATER
 PUMP STATION**

**BLOCK DIAGRAM
 LAKE OSWEGO INTERTIE
 PUMP STATION**

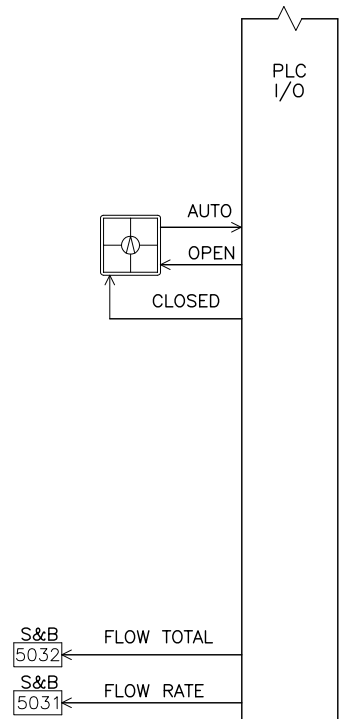
PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: NOVEMBER 2000

SHEET
 1-2
 19 of 22

MODEL 6000-P4 RTU - INTERTIE PUMP STATION

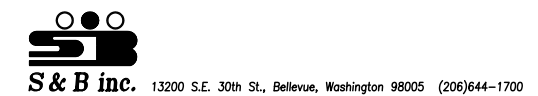


HEADQUARTERS



* DENOTES BY OTHERS.

WIRE TYPE SPECIFICATIONS
 // DENOTES 2 SINGLE CONDUCTOR, MIN. 14ga., THHN OR EQUAL
 [Symbol] DENOTES SHIELDED PAIR, CABLE, 18ga., BELDEN 8760 OR EQUAL.



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NO.	DATE	BY	REVISION

NOTICE

0 1/2 1

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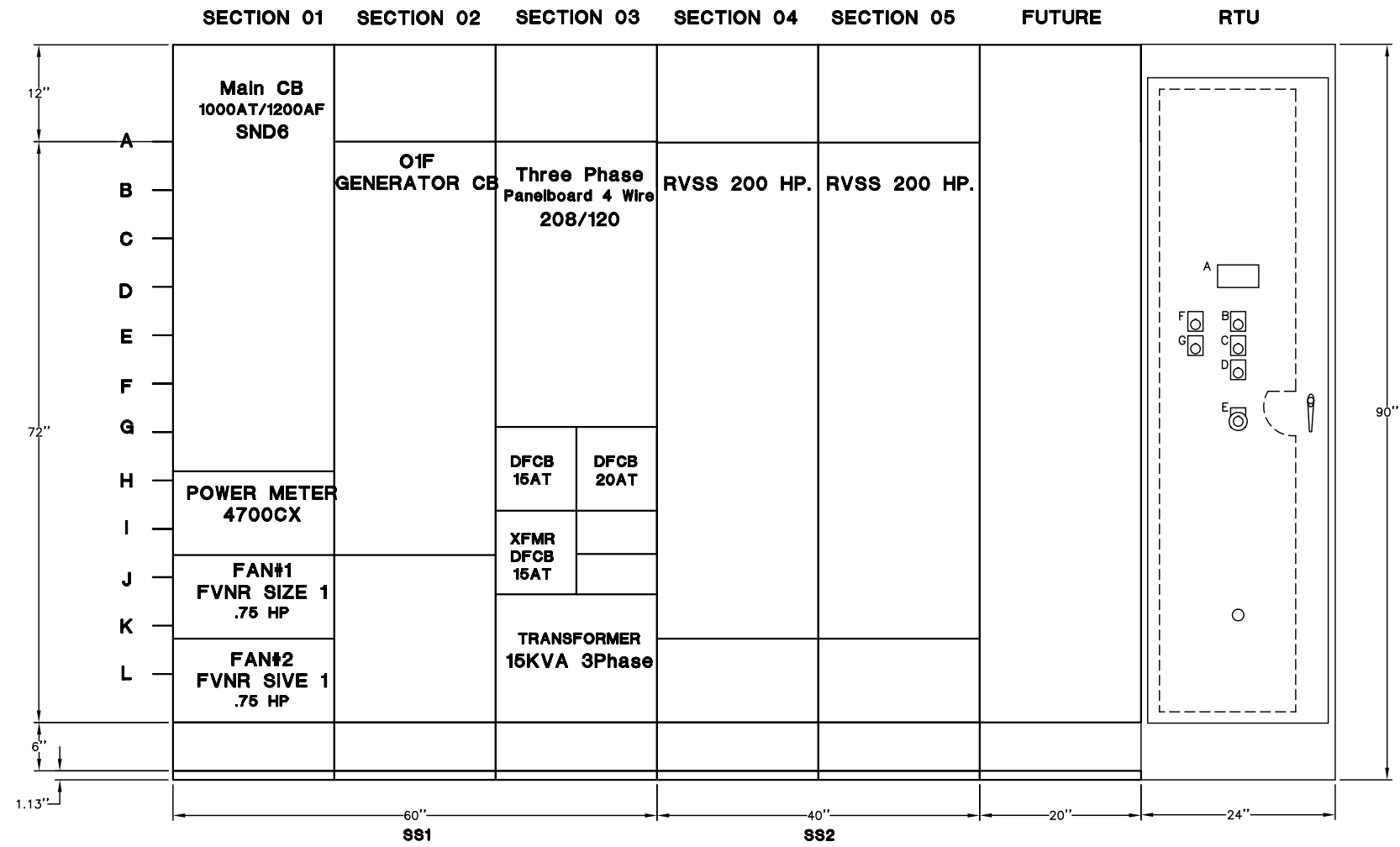
West

EMERGENCY INTERTIE WATER PUMP STATION

BLOCK DIAGRAM LAKE OSWEGO INTERTIE PUMP STATION

PROJECT NO.: 99-0427.202 SCALE: AS SHOWN DATE: NOVEMBER 2000

SHEET 1-3
 20 of 22



- A. OPERATOR INTERFACE MODULE
- B. RESET SWITCH
- C. LAKE OSWEGO MAIN VALVE
- D. VIEW DRIVE ALTITUDE VALVE
- E. QIT
- F. PUMP 1 VALVE CONTROL
- F. PUMP 2 VALVE CONTROL

CITY OF WEST LINN
EMERGENCY INTERTIE WATER PUMP STATION

ENGINEER: MURRAY, SMITH & ASSOCIATES, INC.
ELEC. ENGINEER: CASNE ENGINEERING, INC.
ELEC. CONTRACTOR: -
INTEGRATOR: S&B INC.

PROJECT NAMEPLATE
SCALE: NONE

C:\99\0427\305\CAD\DOR\1-4.dwg 10/21/2004 11:39:56 AM PST

NO.	DATE	BY	REVISION

NOTICE

0 1/2 1

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RTS DESIGNED
RTM DRAWN
RTS CHECKED

RECORD DRAWING

SEE DISCLAIMER, SHEET 1.

VERSION 4.1
12-9-97

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Engineers/Planners

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Portland, Oregon 97204 Fax 503-225-9022

West Linn

EMERGENCY INTERTIE WATER PUMP STATION

MCC AND RTU ELEVATION			
PROJECT NO.: 99-0427.202	SCALE: AS SHOWN	DATE: NOVEMBER 2000	

SHEET

1-4

21 of 22



CITY OF
**West
Linn**

PLANS

Solicitation Number: PW-14-12

Public Works Department
22500 Salamo Road
West Linn, Oregon 97068
Telephone: (503) 722-5500
Fax: (503) 656-4106

Appendix C

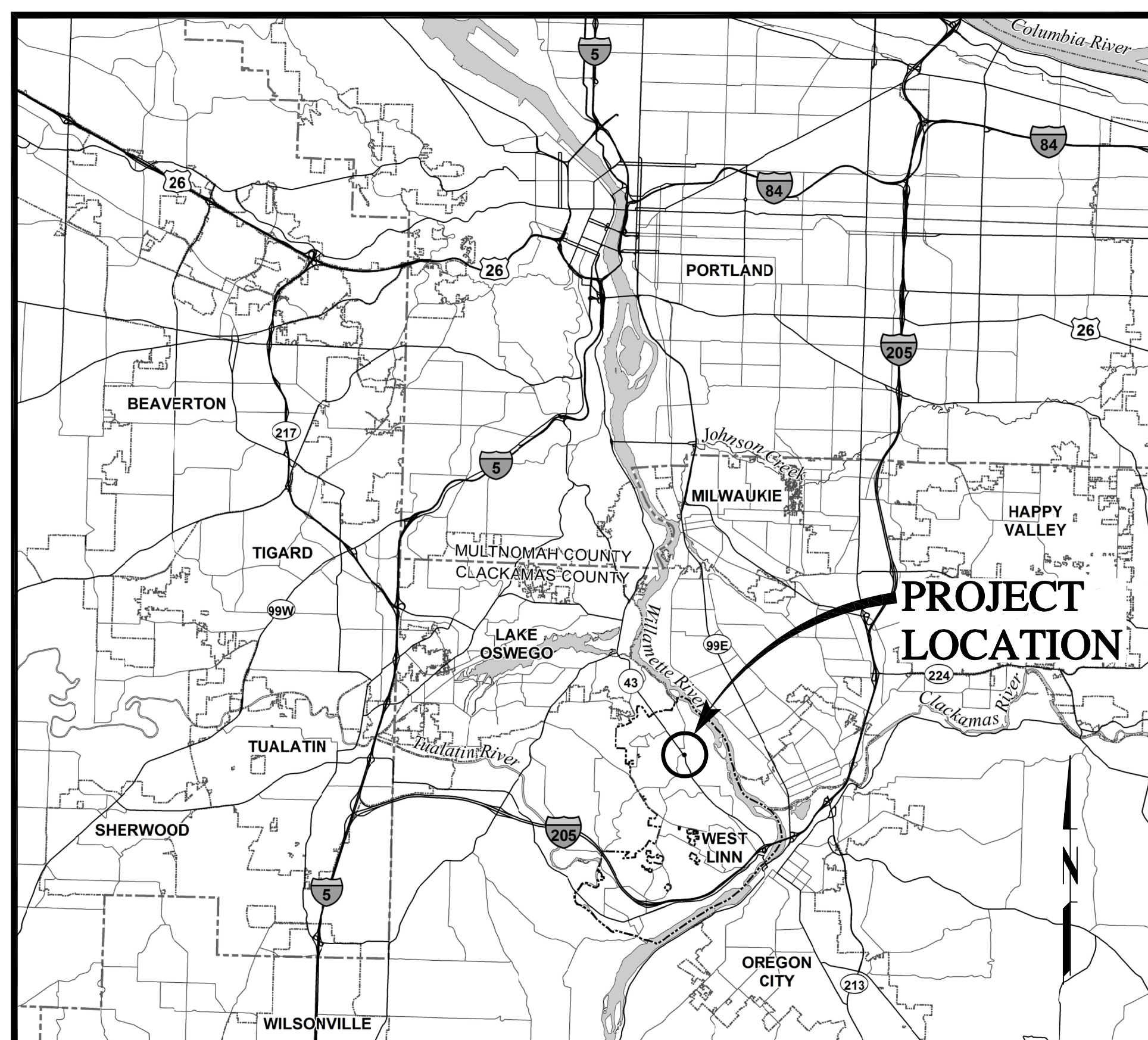
**SEE ATTACHED
PLANS**



CITY OF
**West
Linn**

EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS PROJECT NO. PW-14-12

FEBRUARY 2015



VICINITY MAP
SCALE: 1"=2 MILES

INDEX OF DRAWINGS

GENERAL

- | | | |
|---|-----|---|
| 1 | G-1 | TITLE SHEET/VICINITY MAP/LOCATION MAP/INDEX OF DRAWINGS |
| 2 | G-2 | ABBREVIATIONS |
| 3 | G-3 | SYMBOLS AND LEGEND |
| 4 | G-4 | GENERAL NOTES |

CIVIL

- | | | |
|---|-----|------------------------------------|
| 5 | C-1 | SITE PLAN AND EROSION CONTROL PLAN |
| 6 | C-2 | MISCELLANEOUS CIVIL DETAILS |

MECHANICAL

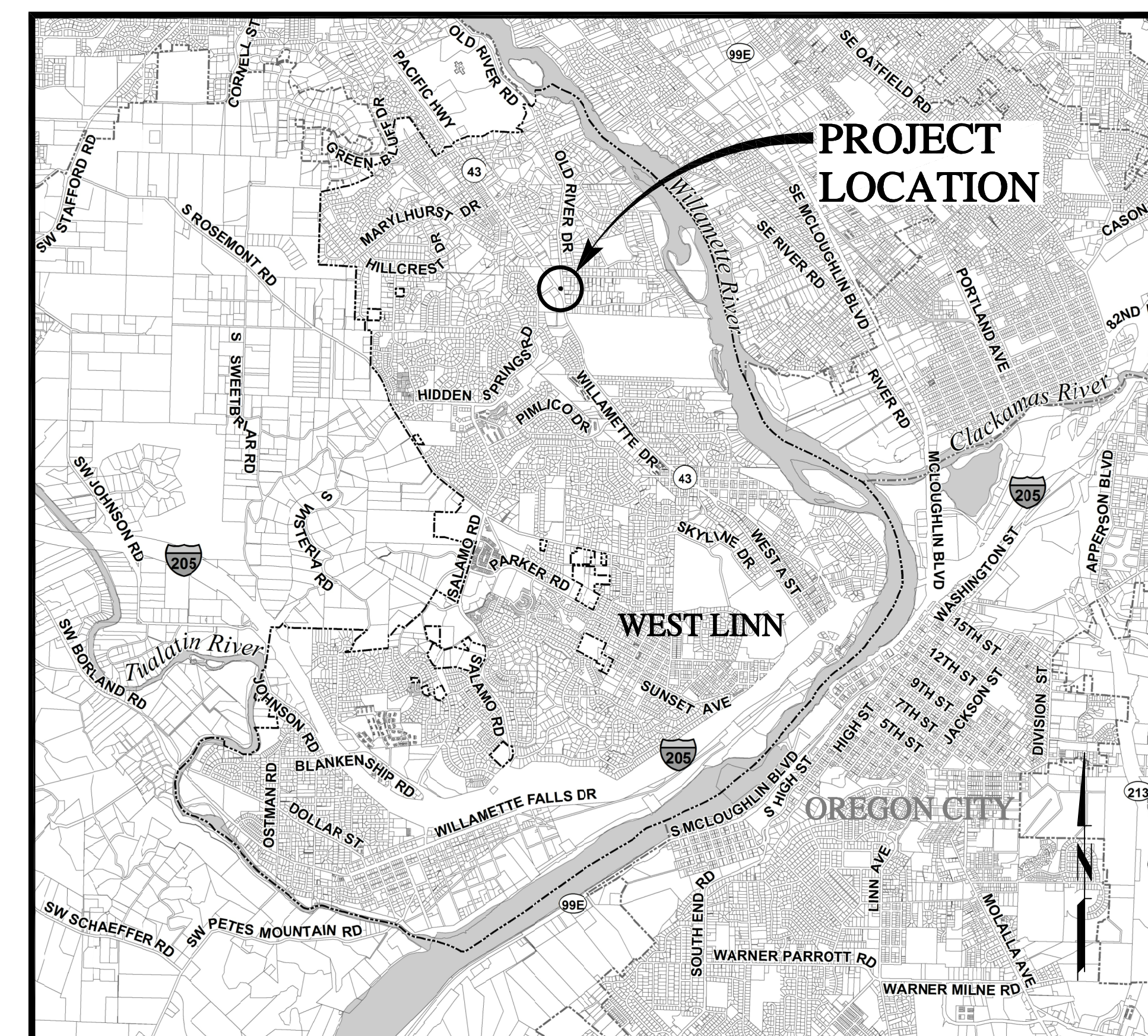
- | | | |
|---|-----|---|
| 7 | M-1 | PUMP PIPING PLAN AND SECTION |
| 8 | M-2 | FLOW METER VAULT AND MECHANICAL DETAILS |

ELECTRICAL

- | | | |
|----|-----|--------------------------|
| 9 | E-1 | ELECTRICAL SITE PLAN |
| 10 | E-2 | ELECTRICAL BUILDING PLAN |

INSTRUMENTATION & CONTROL

- | | | |
|----|-------|--------------------------------------|
| 11 | I&C-1 | EXISTING CONTROLS AT PUMP STATION |
| 12 | I&C-2 | EXISTING CONTROLS AT PUMP STATION |
| 13 | I&C-3 | CONTROLS ADDITIONS AND MODIFICATIONS |
| 14 | I&C-4 | CONTROLS PRESENTATION |



LOCATION MAP
SCALE: 1"=3,000'

MSA Murray, Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900 PHONE 503-225-9010
Portland, Oregon 97204 FAX 503-225-9022

ATTENTION: OREGON LAW REQUIRES THE CONTRACTOR TO FOLLOW THE RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. THE CONTRACTOR MAY OBTAIN COPIES OF THE RULES BY CALLING THE UTILITY NOTIFICATION CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-246-6699.)

AAASHTO	AT AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
AB	ANCHOR BOLT
ABAN (D)	ABANDON (ED)
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACP	ASPHALTIC CONCRETE PAVING
ADJ	ADJUSTABLE
ADJC	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHR	ANCHOR
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APPVD	APPROVED
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARCH	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS ASSOCIATION
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
ATM	ATMOSPHERE
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
B&S	BELL & SPIGOT
BC	BOLT CIRCLE
BD	BOARD
BETW	BETWEEN
BF	BOTH FACE
BFD	BACKFLOW PREVENTION DEVICE
BFILL	BACK FILL
BFV	BUTTERFLY VALVE
BHP	BRAKE HORSEPOWER
BKGD	BACKGROUND
BLDG	BUILDING
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCH MARK / BEAM
BMP	BEST MANAGEMENT PRACTICE
BO	BLOWOFF
BOC	BACK OF CURB
BS	BOTH SIDES
BSMT	BASEMENT
BTF	BOTTOM FACE
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BW	BOTH WAYS
C	CELSIUS
C TO C	CENTER TO CENTER
CARV	COMBINATION AIR RELEASE VALVE
CATV	CABLE TELEVISION
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHAN	CHANNEL
CHEM	CHEMICAL
CHFR	CHAMFER
CHKV	CHECK VALVE
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST IN PLACE CONCRETE
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CL or C	CENTER LINE
CL2	CHLORINE
CLG	CEILING
CLJ	CONTROL JOINT
CLR	CLEAR
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CO	CLEANOUT
COL	COLUMN
COMB	COMBINATION
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS / CONTINUATION
CONTR	CONTRACT (OR)
COORD	COORDINATE
COP	COPPER
CORP	CORPORATION
CORR	CORRUGATED
CP	CONTROL POINT
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CRUSHED ROCK
CS	COMBINED SEWER

CSP	CONCRETE SEWER PIPE
CT	COURT
CTR	CENTER
CU	CUBIC
CULV	CULVERT
CV	CONTROL VALVE
CW	CLOCKWISE / COLD WATER
CY	CUBIC YARDS
CYL	CYLINDER LOCK
D	DRAIN
DC	DIRECT CURRENT
DEFL	DEFLECTION
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIR	DIRECTION
DIST	DISTANCE
DN	DOWN
DR	DRIVE
DS	DOWNPOUT
DWG	DRAWING
DWL	DOWEL
DWV	DRAIN WASTE AND VENT DRIVEWAY
E	EACH
ECC	ECCENTRIC
EAF	EACH FACE
EL	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
ENCL	ENCLOSURE
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQ SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EW	EACH WAY
EXC	EXCAVATE
EXIST	EXISTING
EXIST GR	EXISTING GRADE
EXP	EXPANSION
EXP BT	EXPANSION BOLT
EXP JT	EXPANSION JOINT
EXT	EXTERIOR
F	FAHRENHEIT
F TO F	FACE TO FACE
FAB	FABRICATE
FB	FLAT BAR
FCA	FLANGED COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDN	FOUNDATION
FEXT	FIRE EXTINGUISHER
FF	FAR FACE
FGL	FIBERGLASS
FH	FIRE HYDRANT
FIN FL	FINISH FLOOR
FIN GR	FINISH GRADE
FIPT	FEMALE IRON PIPE THREAD
FITG	FITTING
FL	FLOOR LINE
FLEX	FLEXIBLE
FLG	FLANGE
FLL	FLOW LINE
FLR	FLOOR
FM	FORCE MAIN
FO	FIBER OPTIC
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET / FOOT
FTG	FOOTING
FUT	FUTURE
FXTR	FIXTURE
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GROOVED COUPLING
GFA	GROOVED FLANGE ADAPTER
GI	GALVANIZED IRON
GIP	GALVANIZED IRON PIPE
GJ	GRIP JOINT
GL	GLASS
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
GR	GRADE
GR LN	GRADE LINE
GRTG	GRATING
GV	GATE VALVE
GRVL	GRAVEL
GYP	GYPSUM

HB	HOSE BIBB
HC	HOLLOW CORE
HDPE	HIGH DENSITY POLYETHYLENE
HDR	HEADER
HDWE	HARDWARE
HGR	HANGER
HGT	HEIGHT
HH	HANDHOLD
HM	HOLLOW METAL
HNDRL	HAND RAIL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HIGH PRESSURE / HORSEPOWER
HPG	HIGH PRESSURE GAS
HPT	HIGH POINT
HR	HOUR
HSB	HIGH STRENGTH BOLT
HV	HOSE VALVE
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HWL	HIGH WATER LINE
HWY	HIGHWAY
HYD	HYDRANT
HYDR	HYDRAULIC
I&C	INSTRUMENTATION & CONTROL
I&W	IN ACCORDANCE WITH
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IMPVT	IMPROVEMENT
IN	INCH
INCC	INCLUDE (D) (ING)
INFL	INFLUENT
INJ	INJECTION
INSL	INSTALLATION / INSTALL
INSUL	INSULATION
INTER	INTERCEPTOR
INTR	INTERIOR
INV	INVERT
IP	IRON PIPE
IPT	IRON PIPE THREAD
IR	IRON ROD
IRRIG	IRRIGATION
JT	JOINT
JUNC	JUNCTION
KPL	KICK PLATE
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWY	KEYWAY
L	LENGTH OF CURVE
LAB	LABORATORY
LAV	LAVATORY
LB	POUND
LF	LINEAL FOOT
LIN	LINEAL / LINEAR
LANE	LANE
LOC	LOCATION
LONG	LONGITUDINAL
LP	LOW PRESSURE
LPT	LOW POINT
LRG	LARGE
LS	LONG SLEEVE / LUMP SUM
LT	LEFT
LVL	LEVEL
LWL	LOW WATER LINE
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MCP	MASTER CONTROL PANEL
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MIPT	MALE IRON PIPE THREAD
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MON	MONUMENT / MONOLITHIC
MOT	MOTOR
MP	MILEPOST
MSL	MEAN SEA LEVEL
MTD	MOUNTED
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO / NO.	NORMALLY OPEN / NUMBER
NOM	NOMINAL
NORM	NORMAL
NRS	NON-RISING STEM
NTS	NOT TO SCALE

O TO O	OUT TO OUT
OC	ON CENTER
OD	OUTSIDE DIAMETER
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
OF	OVERFLOW / OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OVHD	OVERHEAD
P&ID	PROCESS & INSTRUMENTATION DIAGRAM
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PCVC	POINT OF CURVATURE ON VERTICAL CURVE
PE	PLAIN END
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
PG	PRESSURE GAUGE
PH	PIPE HANGER
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE
PL or P	PROPERTY LINE / PLATE / PLASTIC
PLBG	PLUMBING
PNL	PANEL
POC	POINT OF CURVATURE
POLY	POLYETHYLENE
POT	POINT OF TANGENCY
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PRCST	PRECAST
PREP	PREPARATION
PRESS	PRESSURE
PRKG	PARKING
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PSIG	POUNDS PER SQUARE INCH GAGE
PSL	PIPE SLEEVE
PSPT	PIPE SUPPORT
PT	POINT OF TANGENCY
PTVC	POINT OF TANGENCY ON VERTICAL CURVE
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
QTY	QUANTITY
RAD	RADIUS
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD / ROOF DRAIN
RDCR	REDUCER
REF	REFERENCE
REINF	REINFORCE (D) (ING) (MENT)
REQ'D	REQUIRED
RESTR	RESTRAINED
RFCA	RESTRAINED FLANGE COUPLING ADAPTER
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
R/W	RIGHT OF WAY
RBPDP	REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RST	REINFORCING STEEL
RT	RIGHT
SALV	SALVAGE
SAN	SANITARY
SC	SOLID CORE
SCHED	SCHEDULE
SD	STORM DRAIN
SDL	SADDLE
SDR	STANDARD DIMENSION RATIO
SECT	SECTION
SHLDR	SHOULDER
SHT	SHEET
SIM	SIMILAR
SLP	SLOPE
SLV	SLEEVE
SOLN	SOLUTION
SP	SOIL PIPE / SEWER PIPE
SPCL	SPECIAL
SPEC (S)	SPECIFICATION (S)
SPG	SPACING
SPL	SPOOL
SPRT	SUPPORT
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE

STR	STRAIGHT
STRUCT	STRUCTURE / STRUCTURAL
SUBMG	SUBMERGED
SUCT	SUCTION
SV	SOLENOID VALVE
S/W	SIDEWALK
SWD	SIDEWATER DEPTH
SWGR	SWITCH GEAR
SYMM	SYMMETRICAL
SYS	SYSTEM
T or TEL	TELEPHONE
T&B	TOP & BOTTOM
TAN	TANGENCY
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE / TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE / TEMPORARY
T&G	TONGUE & GROOVE
THK	THICKNESS
THRD	THREAD(ED)
THRU	THROUGH
TP	TEST PIT/TOP OF PAVEMENT/TURNING POINT
TRANS	TRANSITION
TSP	TRI-SODIUM PHOSPHATE
TST	TOP OF STEEL
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UN	UNION
UON	UNLESS OTHERWISE NOTED
USGS	UNITED STATES GEOLOGIC SURVEY
V	VENT / VOLT
VAC	VACUUM
VB	VACUUM BREAKER
VBOX	VALVE BOX
VC	VERTICAL CURVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VCP	VITRIFIED CLAY PIPE
VTR	VENT THROUGH ROOF
W	WATER
W/	WITH
W/O	WITHOUT
W/W	WALL TO WALL
WD	WOOD
WF	WIDE FLANGE
WH	WALL HYDRANT
WHTR	WATER HEATER
WI	WROUGHT IRON
WM	WATER METER
WP	WORKING POINT / WATERPROOFING
WS	WATER SERVICE
WT	WEIGHT
WTP	WATER TREATMENT PLANT
WTRT	WATERTIGHT
WWF	WELDED WIRE FABRIC
WWTF	WASTEWATER TREATMENT FACILITY
WWTP	WASTEWATER TREATMENT PLANT
X SECT	CROSS SECTION
XFMR	TRANSFORMER
YD	YARD DRAIN/YARD
YH	YARD HYDRANT
YR	YEAR
ZN	ZINC

PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS	
SHEET TITLE: ABBREVIATIONS	
PROJECT: 14-1601-201	DATE: FEBRUARY 2015
Murray Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE: 503-225-9000 FAX: 503-225-9022	
BY:	REVISION:
DESIGNED: JHF	DRAWN: BAW
CHECKED: DAM	APPROVED: TLB
SHEET: G-2	2 OF 14

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PIPE SYMBOLS

PLANT	SCHEMATIC	
		WELDED JOINT
		FLANGED JOINT
		GROOVED END JOINT
		MECHANICAL JOINT
		PUSH-ON JOINT (RUBBER GASKET)
		FLANGED COUPLING ADAPTER
		DOUBLE BALL FLEXIBLE EXTENSION COUPLING
		FLEXIBLE COUPLING W/ THRUST RING
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		BLIND FLANGE
		CAP
		LONG SLEEVE
		FLEXIBLE COUPLING
		CAPPED END OR PLUGGED END
		FITTING

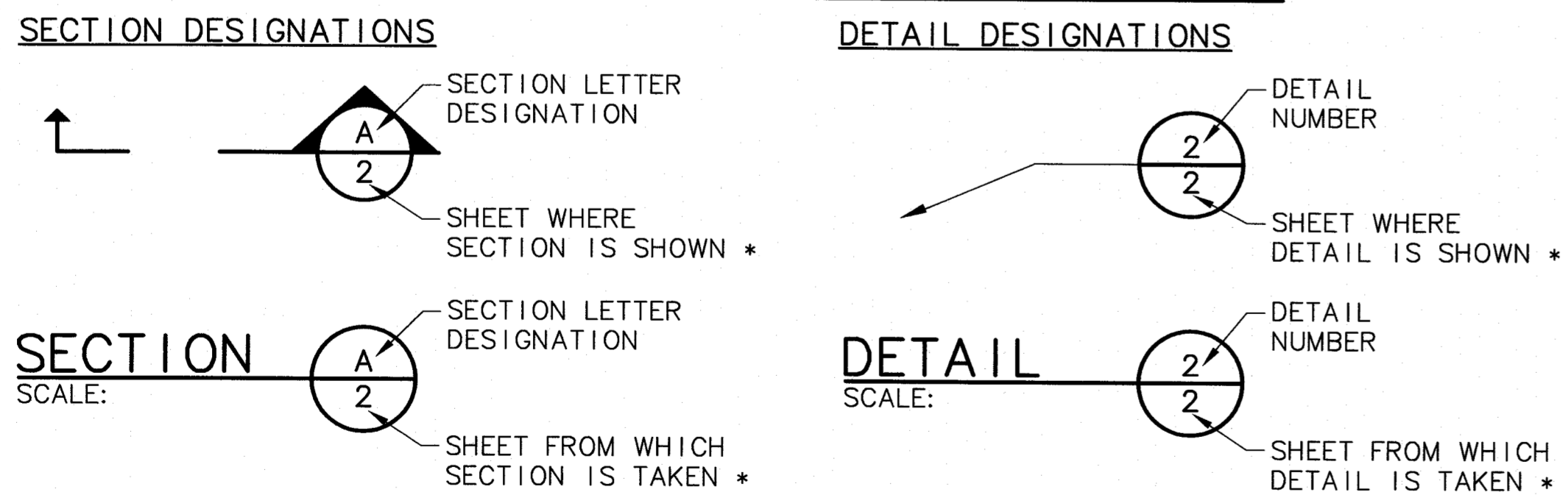
VALVE SYMBOLS

PLANT	SCHEMATIC	
		BUTTERFLY VALVE
		GATE VALVE
		GLOBE VALVE
		BALL VALVE
		BALANCING VALVE
		DIAPHRAGM VALVE
		PLUG VALVE (TOP)
		PLUG VALVE (SIDE)
		3-WAY PLUG VALVE
		SWING CHECK VALVE
		DOUBLE CHECK ASSEMBLY
		BALL SWING CHECK
		SILENT CHECK VALVE
		PRESSURE REDUCING VALVE
		ALTITUDE CONTROL VALVE
		SOLENOID VALVE
		RELIEF VALVE
		NEEDLE VALVE
		HOSE VALVE
		REDUCED PRESSURE BACKFLOW PREVENTER W/ GATE VALVES
		HOSE BIBB

TOPOGRAPHIC LEGEND

	EXISTING	PROPOSED
WATERLINE	---10"W---	—12" DI W—
ELECTRICITY	---E---	—E—
GAS	---4"G---	
TELEPHONE/TELEMETRY	---T---	
CABLE TELEVISION	---CATV---	
SANITARY SEWER LINE	---8"SS---	
SANITARY SEWER FORCE MAIN	---6"FM---	
STORM DRAIN	---8"SD---	—8"SD—
CULVERT		
ABANDON PIPE		+++++
DRAINAGE DITCH	-----	-----
FENCE	x x x	x x x
CHAIN LINK FENCE	o o o	o o o
TEMPORARY SILT FENCE		□ □
GUARDRAIL	
ROCK WALL	
TREE/BUSH LINE	~~~~~	
CENTERLINE	-----	
EASEMENT/PROPERTY LINE	-----	
RIGHT-OF-WAY	-----	
EDGE OF PAVEMENT/AC	-----	
EDGE OF GRAVEL	-----	
CURB	=====	
SIDEWALK	=====	
STRUCTURE OR FACILITY		
CONTOUR MINOR	-----	-----
CONTOUR MAJOR	200	200
MANHOLE	○	○
CLEAN-OUT	○	○
CATCH BASIN/FIELD INLET	□	□
THRUST BLOCK	△	▲
VALVE	⊗	⊗
AIR INJECTION ASSEMBLY	⊕	⊕
BLOW-OFF ASSEMBLY	⊕	⊕
AIR RELEASE ASSEMBLY	⊕	⊕
FIRE HYDRANT ASSEMBLY	⊕	⊕
WATER METER	⊕	⊕
PULL BOX/JUNCTION BOX	⊕	⊕
UTILITY POLE	○	○
GUY WIRE	↑	↑
LIGHT POST	★	★
MAILBOX	□	□
SIGN	↑	↑
BENCHMARK	⊕	⊕
TREE DECIDUOUS	☼	☼
TREE CONIFEROUS	☼	☼
TREE TO BE REMOVED	☼	☼
SURFACE ELEVATION	+ 176.63	+ 176.63

SECTION AND DETAIL DESIGNATIONS



* NOTE: IF PLAN AND SECTION FOR DETAIL CALL-OUT AND DETAIL ARE SHOWN ON THE SAME DRAWING, DRAWING NUMBER IS REPLACED WITH A DASH.

MISCELLANEOUS PIPING SYMBOLS

	STRAINER
	SIGHT GLASS
	PRESSURE GAUGE W/ COCK
	PRESSURE SWITCH W/ COCK
	METER
	SLIP-ON JOINT PIPE
	RESTRAINED JOINT PIPE

PROJECT NAME: CITY OF WEST LINN, OREGON
EMERGENCY INTERTIE
WATER PUMP STATION IMPROVEMENTS

PROJECT: 14-1601.201 DATE: FEBRUARY 2015

DESIGNED: JHF
DRAWN: BAW
CHECKED: DAM
APPROVED: TLB

SHEET: G-3
3 OF 14

REVISIONS:

SCALE: NONE
VERT: NONE
HORIZ: NONE

NOTICE: IF THIS BAR DOES NOT MEASURE AS SHOWN, THE DRAWING IS NOT TO SCALE.

REGISTERED PROFESSIONAL ENGINEER
STATE OF OREGON
NO. 12345
DATE: JULY 10, 2010
EXPIRES: JULY 10, 2016
RENEWS: 12-31-16

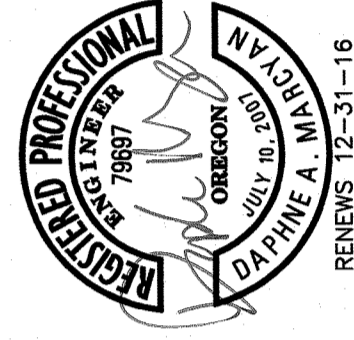
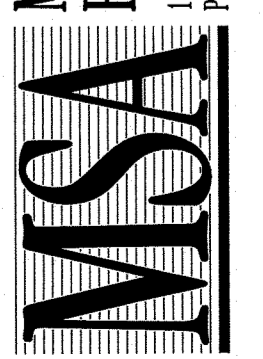
LEGEND

Murray Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900
Portland, Oregon 97204
PHONE: 503-225-9010
FAX: 503-225-9022

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GENERAL NOTES:

1. THE CONTRACTOR SHALL POTHOLE AND VERIFY LOCATIONS, ELEVATIONS, TYPES AND SIZES OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTING NEW PIPING FAR ENOUGH IN ADVANCE TO ALLOW NECESSARY ADJUSTMENTS IN GRADE AND SHALL NOTIFY ENGINEER OF NEED TO ADJUST PIPING INSTALLATION ACCORDINGLY. POTHOLING SHALL SUFFICIENTLY PRECEDE LAYING OF PIPE TO ALLOW REQUIRED ELEVATION ADJUSTMENTS TO BE ACCOMPLISHED WITHOUT REWORK. ELEVATION ADJUSTMENTS SHALL BE EXPECTED AND ARE INCIDENTAL TO THE WORK. DEFLECT PIPE AS REQUIRED AND WITHIN MANUFACTURER'S TOLERANCES TO AVOID EXISTING UTILITIES AND COMPLETE TIE-INS.
2. ALL PIPING TO BE RESTRAINED JOINT PIPING UNLESS OTHERWISE SPECIFICALLY IDENTIFIED AS: (R) FOR RESTRAINED JOINT PIPING; (SP) FOR STANDARD PUSH-ON JOINT PIPING. SEE SPECIFICATIONS FOR TYPES OF RESTRAINT.
3. BACKFILL AND SURFACING REQUIREMENTS ARE IDENTIFIED ON THE DRAWINGS. ALL BEDDING AND PIPE ZONE BACKFILL TO BE GRANULAR. SEE SPECIFICATIONS AND STANDARD WEST LINN DETAIL WL-200. BACKFILL FOR PIPE TRENCHES UNDER PAVED AREAS SHALL BE CLASS B. BACKFILL GRANULAR FOR PIPE TRENCHES IN NON-PAVED AREAS SHALL BE CLASS A NATIVE UNLESS OTHERWISE NOTED.
4. ALL CONCRETE SHALL BE A MINIMUM OF 3000 PSI STRENGTH.
5. LOCATIONS OF EXISTING UTILITIES ARE BASED ON INFORMATION SUPPLIED BY THE UTILITIES AND CONSIDERED APPROXIMATELY ONLY. AS REQUIRED BY STATE LAW, THE CONTRACTOR SHALL OBTAIN UTILITY LOCATES PRIOR TO COMMENCING CONST, CONTACT UTILITIES PRIOR TO CONSTRUCTION AND COMPLY WITH PROVISIONS OF ORS 757.541 TO 757.571.
6. RESTRAIN ALL VALVES, TEES, BENDS, AND FITTINGS UNLESS OTHERWISE NOTED.
7. ALL FLANGE CONNECTIONS TO BE PROVIDED WITH FULL-FACE GASKETS.
8. PROVIDE POLYETHYLENE ENCASEMENT FOR ALL PIPING WITHIN TEN (10) FEET OF EXISTING GAS MAIN ACCORDING TO ANSI/AWWA C105/A21.5.
9. HYDROSTATIC TEST PRESSURE FOR ALL WATER PIPING SHALL BE 1.5 TIMES THE OPERATING PRESSURE MEASURED AT THE LOWEST POINT OF THE PIPE LINE BEING TESTED. THE MINIMUM TEST PRESSURE IS 180 PSI PER WEST LINN STANDARD 403.14 (E AND F).
10. UNLESS NOTED ON THE DRAWINGS OR SPECIFIED OTHERWISE, ALL WORK IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE MOST RECENT VERSION OF CITY OF WEST LINN STANDARDS AND THE OREGON ADMINISTRATIVE RULES (OAR), CHAPTER 333.
11. COMPLY WITH OAR CHAPTER 333 RULES FOR REQUIRED WATERLINE - SEWERLINE SEPARATION AND CROSSING REQUIREMENTS.
12. CONTRACTOR SHALL PROVIDE TEMPORARY BLOW-OFFS AND THRUST BLOCKING AS REQUIRED TO FACILITATE FLUSHING, TESTING, AND DISINFECTION OF WATERLINES. AT COMPLETION OF DISINFECTION, REMOVE TEMPORARY BLOW-OFFS AND REPLACE WITH PERMANENT CONNECTIONS. TEMPORARY BLOW-OFFS SHALL BE CONSTRUCTED PER WEST LINN STANDARD DETAIL WL-404B.
13. CONNECTIONS TO EXISTING WATERLINES MAY REQUIRE TEMPORARY SHUTDOWNS OF EXISTING FACILITIES. THE CONTRACTOR SHALL COORDINATE THIS WORK WITH WEST LINN, THE CITY OF LAKE OSWEGO AND SOUTH FORK WATER BOARD AND PROVIDE A MIN OF 72 HOURS ADVANCE NOTICE PRIOR TO PERFORMING WATERLINE TIE-IN WORK. CONTRACTOR TO VERIFY WITH WEST LINN, LAKE OSWEGO AND SOUTH FORK WATER BOARD IF EXISTING LINES ARE TO BE DEPRESSURIZED PRIOR TO PERFORMING THIS WORK. SEE SPECIFICATIONS FOR SEQUENCE OF CONSTRUCTION REQUIREMENTS. OPERATION OF VALVES SHALL BE BY CITY OF WEST LINN OR LAKE OSWEGO OR SOUTH FORK WATER BOARD ONLY.
14. ALL STRUCTURES, LOTS, CURBS, SIDEWALKS, FENCES, WALLS, GUY WIRES, PIPING AND UTILITIES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITION UNLESS OTHERWISE SPECIFIED.
15. CONTRACTOR TO OBTAIN AND COMPLY WITH CITY OF WEST LINN, CLACKAMAS COUNTY AND ODOT PERMITS AND REQUIREMENTS FOR WORK IN, AND RESTORATION OF, COUNTY, CITY, AND STATE ROADWAYS.
16. ALL PIPING SHALL HAVE A MINIMUM OF 3 FEET OF COVER FROM TOP OF PIPE TO STREET GRADE OR OTHER FINISHED GRADE, UNLESS OTHERWISE SHOWN OR APPROVED BY ENGINEER.
17. DO NOT REMOVE TREES (GREATER THAN 6" DIAMETER) UNLESS THEY HAVE BEEN PREVIOUSLY IDENTIFIED IN THE FIELD FOR REMOVAL PER ENGINEER.
18. FINAL LOCATIONS OF ALL VALVE BOXES SHALL BE FIELD LOCATED PER ENGINEER.
19. PROVIDE "AS CONSTRUCTED" DRAWINGS INDICATING ALL CHANGES IN GRADE, ALIGNMENT, FITTINGS AND MATERIALS INSTALLED AND ANY OTHER UTILITIES OR OBSTACLES NOT SO INDICATED ON THESE PLANS.
20. ELEVATIONS ARE BASED ON CITY OF LAKE OSWEGO BENCH MARK NO. 22R-1 (184.574' NGVD 29). A BRASS DISK IN CURB AT THE NE CORNER OF THE INTERSECTION OF STATE HIGHWAY NO. 43 AND SOUTH CEDAR OAK DRIVE.
21. AT THE END OF EACH WORK DAY ALL OPEN TRENCHES SHALL BE BACKFILLED AND ALL TRENCHES WITHIN STREETS SHALL BE TEMPORARILY PAVED OR COVERED TO THE SATISFACTION OF THE ENGINEER.
22. IF ASBESTOS CEMENT PIPE IS ENCOUNTERED DURING EXCAVATION OPERATIONS, REMOVE AND DISPOSE OF EXISTING ASBESTOS CEMENT PIPE FOR WATERLINE CONSTRUCTION ACCORDING TO STATE AND LOCAL REQUIREMENTS.
23. ATTACH CONFINED SPACE WARNING SIGN TO THE UNDERSIDE OF THE FLOW METER VAULT ACCESS HATCH. THE SIGN SHALL BE PAINTED ALUMINUM WITH A YELLOW BACKGROUND AND BLACK LETTERING, AND SHALL CONTAIN THE FOLLOWING WORDING: "DANGER, FOLLOW CONFINED SPACE ENTRY PROCEDURES BEFORE ENTERING". MINIMUM SIGN SIZE SHALL BE 7"x10", AND LETTERS SHALL BE A MINIMUM 1/2" TALL.
24. ATTACH LOAD CAPACITY SIGNS ADJACENT TO NEW AND EXISTING LIFTING EYES IN PUMP STATION VAULT (8 TOTAL). EACH SIGN SHALL BE PAINTED ALUMINUM WITH A YELLOW BACKGROUND AND BLACK LETTERING. EACH SIGN SHALL CONTAIN THE FOLLOWING WORDING: "CAUTION - MAXIMUM LIFTING CAPACITY 2,000 LBS". MINIMUM SIGN SIZE SHALL BE 4"x8", AND LETTERS SHALL BE A MINIMUM 1/2" TALL.


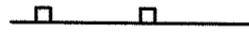
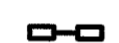
	BY						
REVISION	NO.	DATE	DESIGNED: JHF	DRAWN: BAW	CHECKED: DAM	APPROVED: TLB	SHEET G-4 4 OF 14
							
SCALE	VERT:	NONE	NOTICE				
SCALE	HORIZ:	NONE	IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE				
PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INERTIE WATER PUMP STATION IMPROVEMENTS SHEET TITLE: GENERAL NOTES							
			121 S.W. Salmon, Suite 900 Portland, Oregon 97204		PHONE: 503-236-9010 FAX: 503-236-9022		DATE: FEBRUARY, 2015
MSA PROJECT: 14-1601.201							

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EROSION CONTROL NOTES

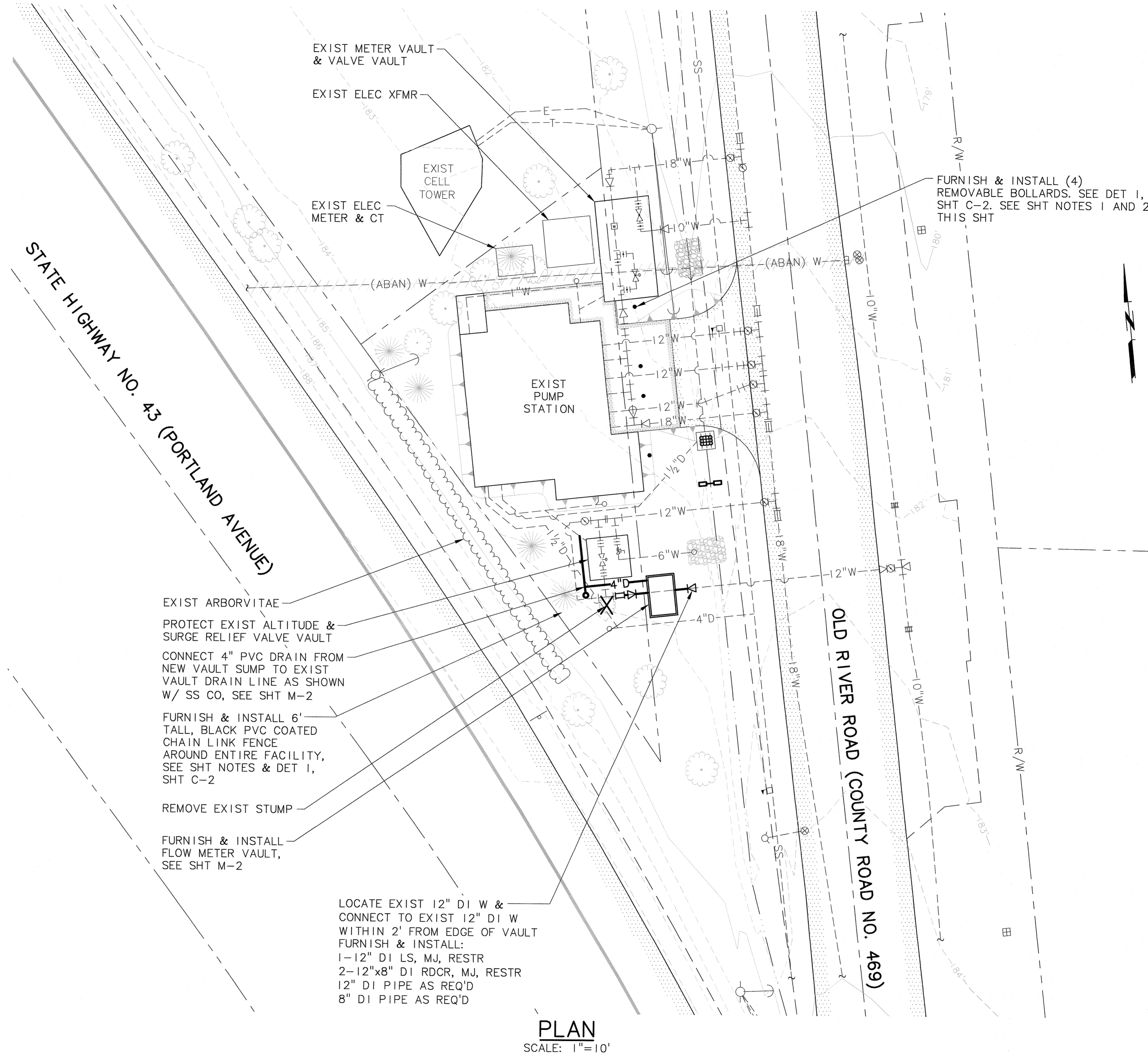
- CONTRACTOR SHALL FURNISH AND INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THE CITY OF WEST LINN "EROSION PREVENTION AND SEDIMENT CONTROL - PLANNING AND DESIGN MANUAL", REVISION DECEMBER 2008.
- THE IMPLEMENTATION OF THE EROSION AND SEDIMENTATION CONTROL PLAN, MEASURES AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE FACILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/ LANDSCAPING IS ESTABLISHED.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROTECTION OF ALL WORK, ADJACENT PROPERTIES AND DOWNSTREAM FACILITIES FROM EROSION AND SILTATION DURING THE COURSE OF THE WORK. ANY DAMAGE RESULTING FROM SUCH EROSION AND SILTATION SHALL BE CORRECTED AT THE SOLE EXPENSE OF THE CONTRACTOR.
- THE EROSION AND SEDIMENTATION CONTROL FACILITIES SHOWN ON THE PLANS PRESENT BASIC CONCEPTS ONLY AND ARE FOR INFORMATIONAL PURPOSES ONLY.
- THE FOLLOWING REFERENCED DETAILS ARE FROM THE ABOVE REFERENCED PLANNING AND DESIGN MANUAL:
 - SEDIMENT FENCE - DETAIL DRAWING 4-23
 - BIOFILTER BAGS - DETAIL DRAWING 4-12
 - BIOFILTER BAG CHECK DAM - DETAIL DRAWING 4-5
 - INLET PROTECTION TYPE 4 - DETAIL DRAWING 4-18

EROSION CONTROL LEGEND

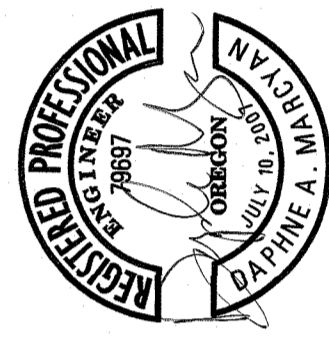
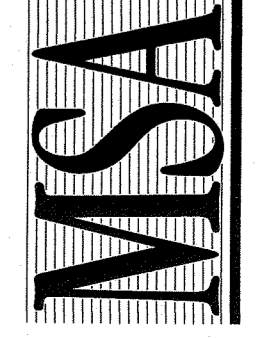
- INLET PROTECTION 
- SEDIMENT FENCING 
- BIOFILTER BAG CHECK DAM 

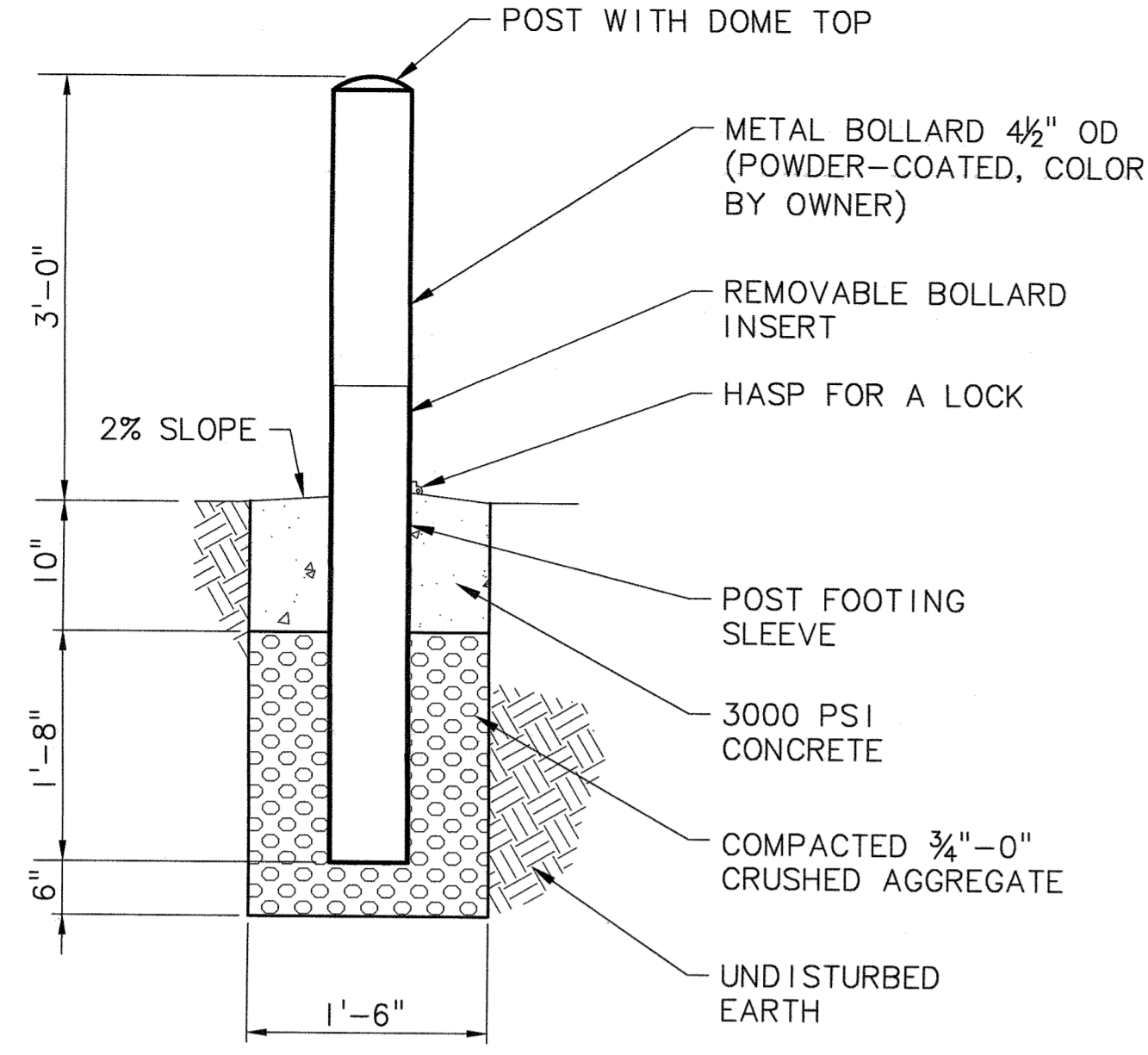
SHEET NOTES:

- CONTRACTOR SHALL STAKE OUT LOCATION OF NEW FLOW METER VAULT FOR OWNER REVIEW PRIOR TO INSTALLATION.
- NEW BOLLARDS SHALL BE LOCATED SO AS TO AVOID EXISTING BURIED UTILITIES AND PROVIDE ACCESS TO ALL VAULT HATCHES AND FACILITIES.



PLAN
SCALE: 1"=10'

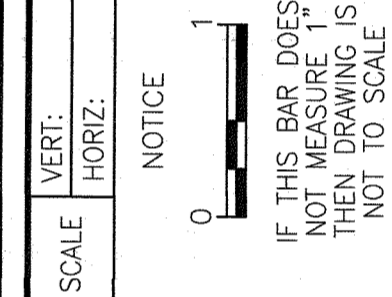
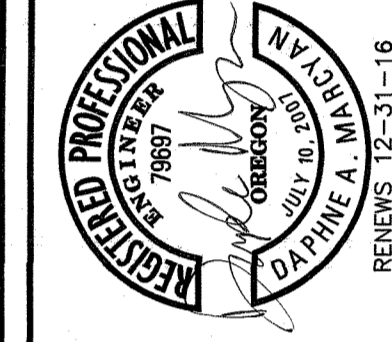
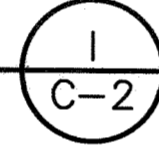
	NO.	DATE	REVISION	BY
	DESIGNED: JHF	DRAWN: BAW	CHECKED: DAM	APPROVED: TLB
PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS				SHEET C-1
SHEET TITLE: SITE PLAN AND EROSION CONTROL PLAN				5 OF 14
 MSA Murray, Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE: 503-225-9010 FAX: 503-225-9022	DATE: FEBRUARY 2015	PROJECT: 14-1601.201		



NOTES:

1. GENERAL LOCATION OF BOLLARDS SHOWN ON PLANS. LOCATE BOLLARDS WITH A MINIMUM 2' CLEARANCE FROM ALL UNDERGROUND PIPING, APPURTENANCES AND FROM ALL STRUCTURES. BOLLARD LOCATIONS SHALL BE AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

4" REMOVABLE BOLLARD
SCALE: NTS



NO.	DATE	REVISION	BY
DESIGNED:	JHF		
DRAWN:	BAW		
CHECKED:	DAM		
APPROVED:	TJB		
SHEET			C-2
			6 OF 14

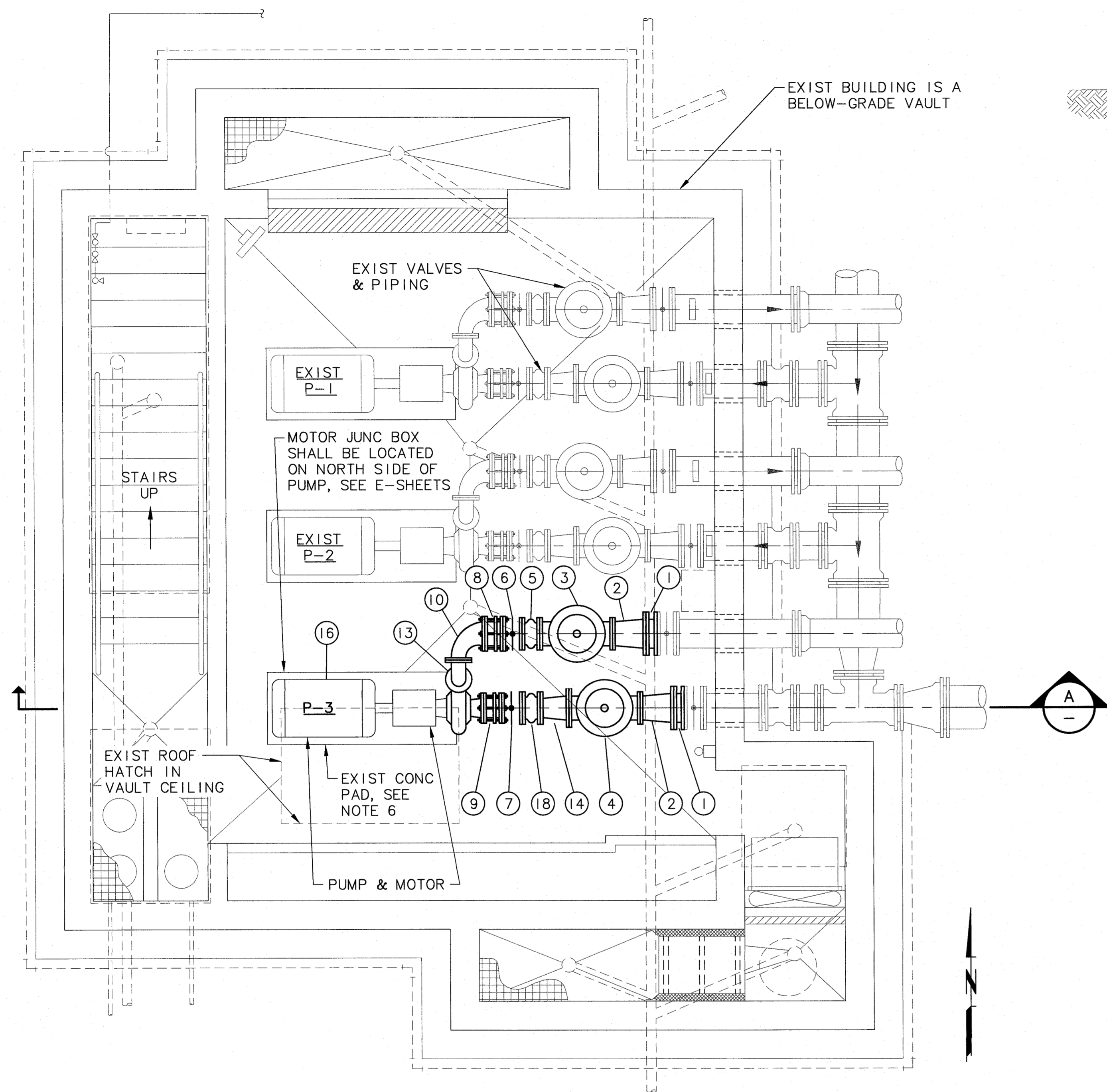
PROJECT NAME: CITY OF WEST LINN, OREGON
EMERGENCY INERTIE
WATER PUMP STATION IMPROVEMENTS

SHEET TITLE: **MISCELLANEOUS
DETAILS**

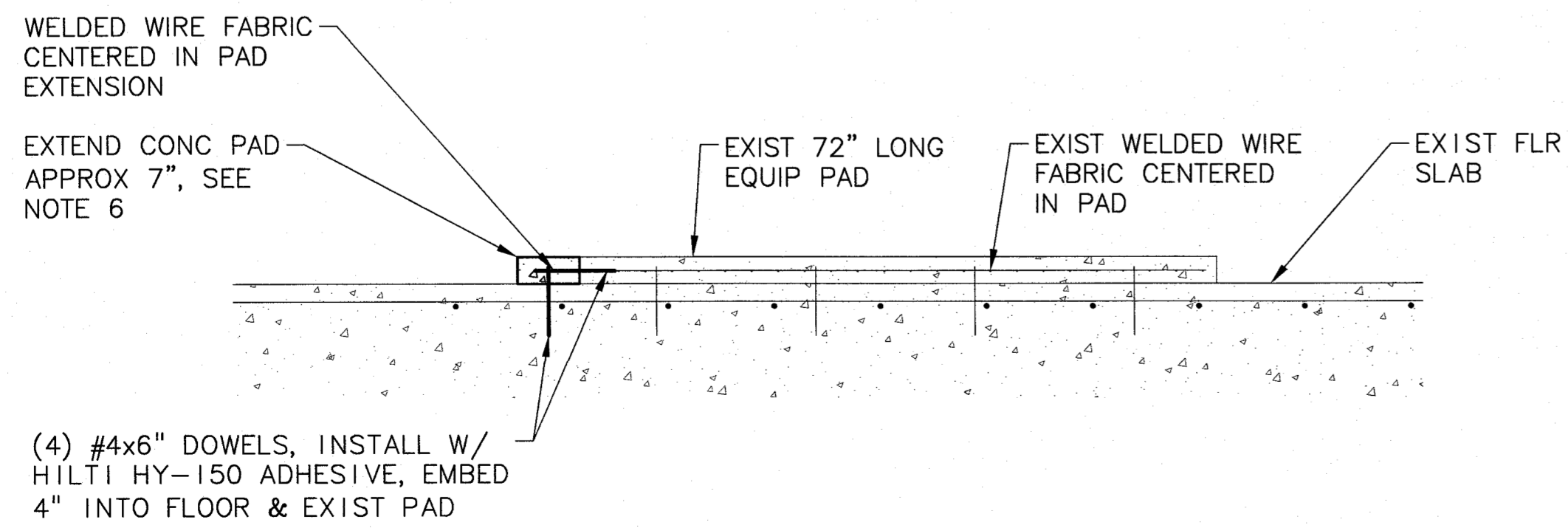
MSA Murray Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 800
Portland, Oregon 97204
PHONE: 503-225-9010
FAX: 503-225-9022

DATE: FEBRUARY, 2015

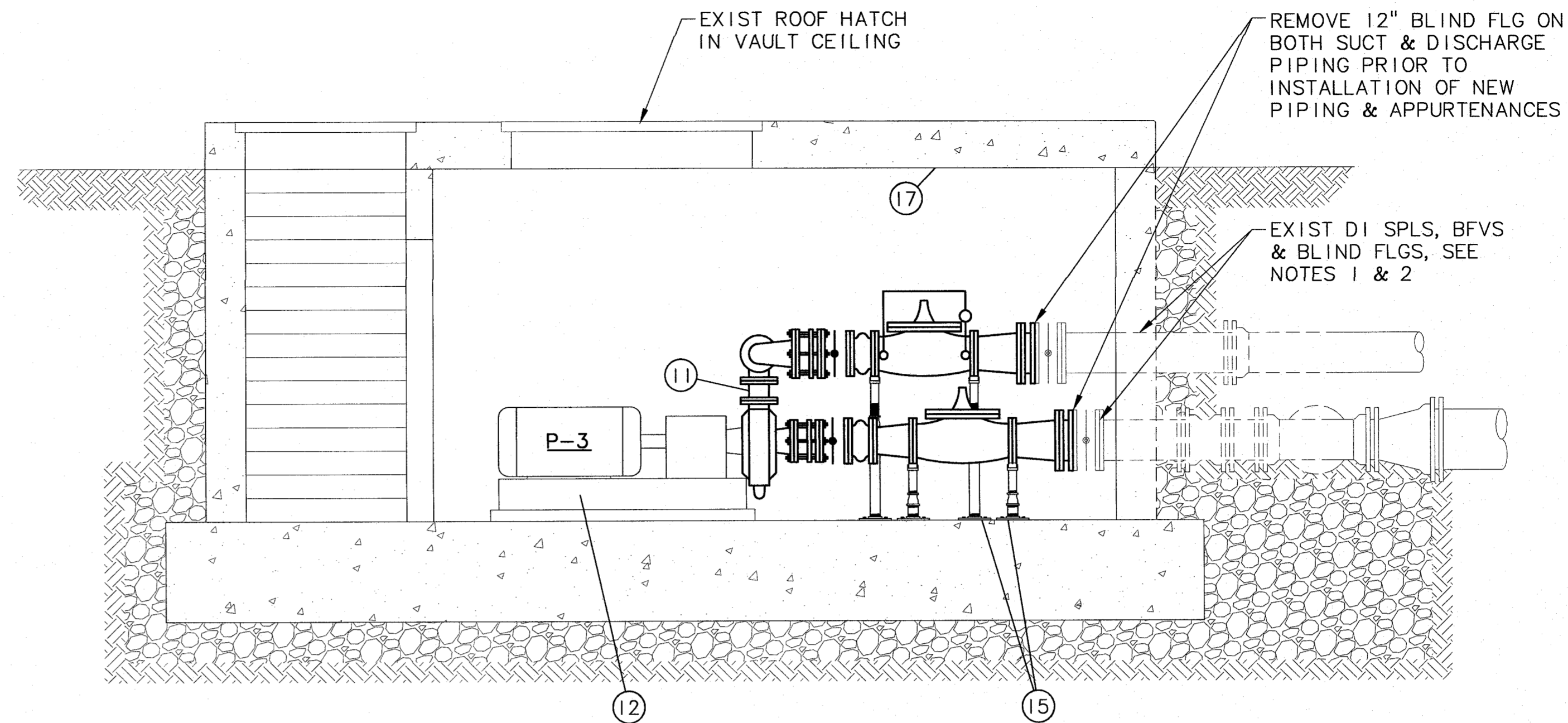
G:\PDX_Projects\14\1601 - Lake O Emergency Inertie Pump Station\CAD\Sheets\14-1601-202-OR-M.dwg M-1 2/2/2015 2:11 PM DKH 20.0s (LMS Tech)



FLOOR PLAN
SCALE: 3/8"=1'-0"



EQUIPMENT PAD EXTENSION DETAIL
SCALE: 3/4"=1'-0"



SECTION A-A
SCALE: 3/8"=1'-0"

MATERIAL LIST:

- | | |
|--|--|
| ① 12" STL CUSTOM FAB MAKEUP PIECE, SEE NOTES 1 & 2 | ⑫ GALV STL PUMP FRAME, MOUNT TO EQUIP PAD & PACK W/ GROUT ACCORDING TO MFR'S RECOMMENDATIONS |
| ② 12"x10" RDCR, FLG | ⑬ 6" 90° VERT BEND, FLG |
| ③ 10" CV TYPE 11, SEE SPECS | ⑭ 10"x8" RDCR, FLG |
| ④ 10" CV TYPE 1, SEE SPECS | ⑮ PIPE SUPPORTS, STANDON MODEL S89 FLG ADJUSTABLE OR APPVD EQ |
| ⑤ 10" EXP JT, SEE SPECS | ⑯ HORIZ FRAME MOUNTED END SUCTION CENTRIFUGAL PUMP W/ 200 HP HORIZ MOTOR, CORNELL MODEL 6HH, FRAME F18 |
| ⑥ 10" BFV, FLG | ⑰ 2,000 LB CAPACITY LIFTING EYES OVER CV TYPE I & CV TYPE 11 (2 TOTAL), SEE NOTE 4 |
| ⑦ 8" BFV, FLG | ⑱ 8" EXP JT, SEE SPECS |
| ⑧ 10" DISMANTLING JT | |
| ⑨ 8" DISMANTLING JT | |
| ⑩ 10"x6" REDUCING 90° BEND, FLG | |
| ⑪ 6" SPL | |

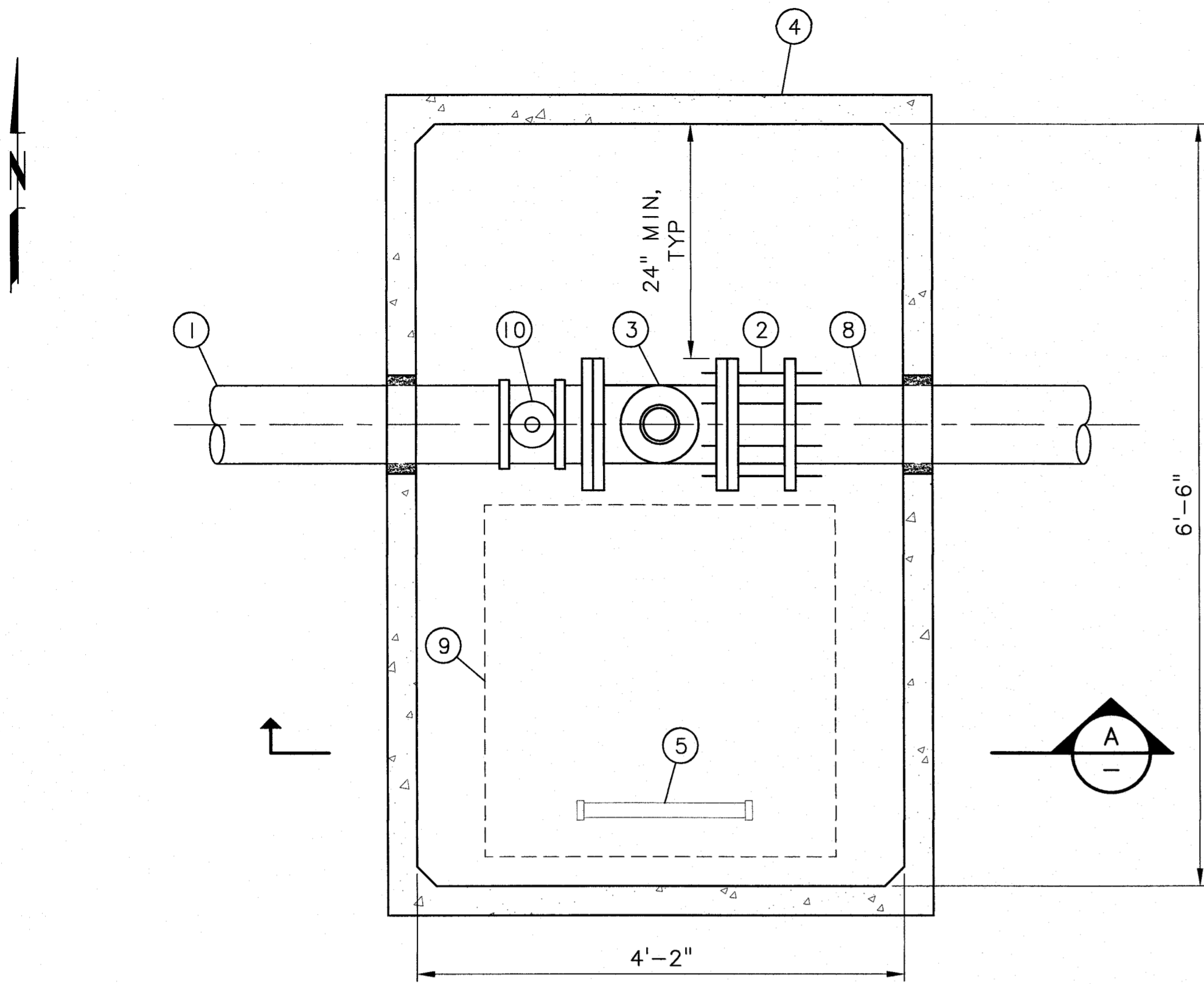
NOTES:

- EXISTING FLANGED DUCTILE IRON SPOOLS THAT TERMINATE WITH BUTTERFLY VALVES AND BLIND FLANGES ENTER THE VAULT AT AN ANGLE THAT IS SLIGHTLY MISALIGNED RELATIVE TO THE PROPOSED PIPING AND PUMP ASSEMBLY. THE SPOOLS ENTER THE VAULT WITH AN APPROXIMATE VERTICAL MISALIGNMENT OF 3/32" ACROSS THE FACE OF THE FLANGE. A HORIZONTAL MISALIGNMENT HAS NOT BEEN ASSESSED BUT MAY ALSO EXIST.
- CONTRACTOR SHALL FIELD VERIFY VERTICAL AND HORIZONTAL MIS-ALIGNMENT OF EXISTING PUMP DISCHARGE AND SUCTION PIPES. 12" STEEL CUSTOM FABRICATED MAKEUP PIECE(S) SHALL BE INSTALLED BETWEEN DUCTILE IRON FLANGES TO ALIGN FLANGE FACE TO COINCIDE WITH REQUIRED ALIGNMENT FOR PIPING ASSOCIATED WITH THE P-3 PUMP ASSEMBLY. NEW PIPING AND VALVING SHALL BE HORIZONTALLY AND VERTICALLY SQUARE FOR INSTALLATION OF NEW PUMP P-3.
- INSTALL PIPE SUPPORTS AS REQUIRED TO SUPPORT PIPING AND APPURTENANCES ACCORDING TO MANUFACTURER'S REQUIREMENTS.
- LOCATE TWO 2,000-POUND LIFTING EYES OVER CONTROL VALVES AFTER INSTALLATION. USE HILTI HIS-RN INTERNALLY THREADED ANCHOR FOR 3/8" DIAMETER WITH HILTI HIT-HY 150 MAX-SD ADHESIVE, EMBED 6 5/8".
- MOUNT ALUMINUM SIGN ADJACENT TO EACH LIFTING EYE (EXISTING AND NEW, 8 TOTAL) THAT READS "CAUTION - MAXIMUM LIFTING CAPACITY 2,000 LBS". MINIMUM SIGN SIZE SHALL BE 4"x8" AND LETTERS SHALL BE A MINIMUM 1/2" TALL.
- EXTEND EXISTING CONCRETE EQUIPMENT PAD APPROXIMATELY 7 INCHES FOR INSTALLATION OF PUMP FRAME. SEE DETAIL THIS SHEET.

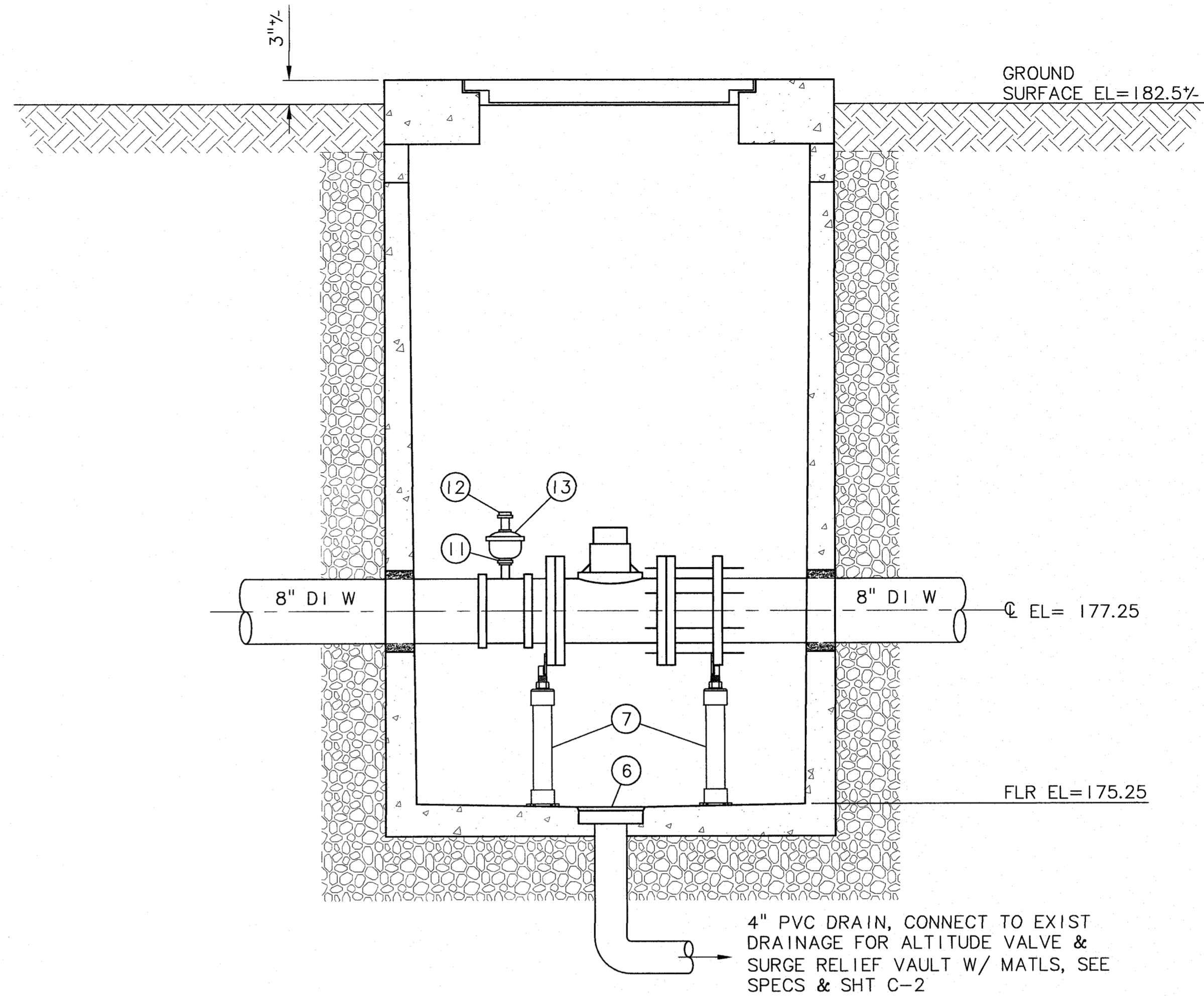
PROJECT NAME:	CITY OF WEST LINN, OREGON EMERGENCY INERTIE WATER PUMP STATION IMPROVEMENTS
SHEET TITLE:	PUMP PIPING PLAN AND SECTION
PROJECT:	14-1601.201
DATE:	FEBRUARY 2015
DESIGNED:	JHF
DRAWN:	BAW
CHECKED:	DAM
APPROVED:	TJB
NO. DATE:	
REVISION:	
BY:	
SHEET:	M-1
7 OF 14	

Murray Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900
Portland, Oregon 97204
PHONE: 503-255-9010
FAX: 503-255-9022

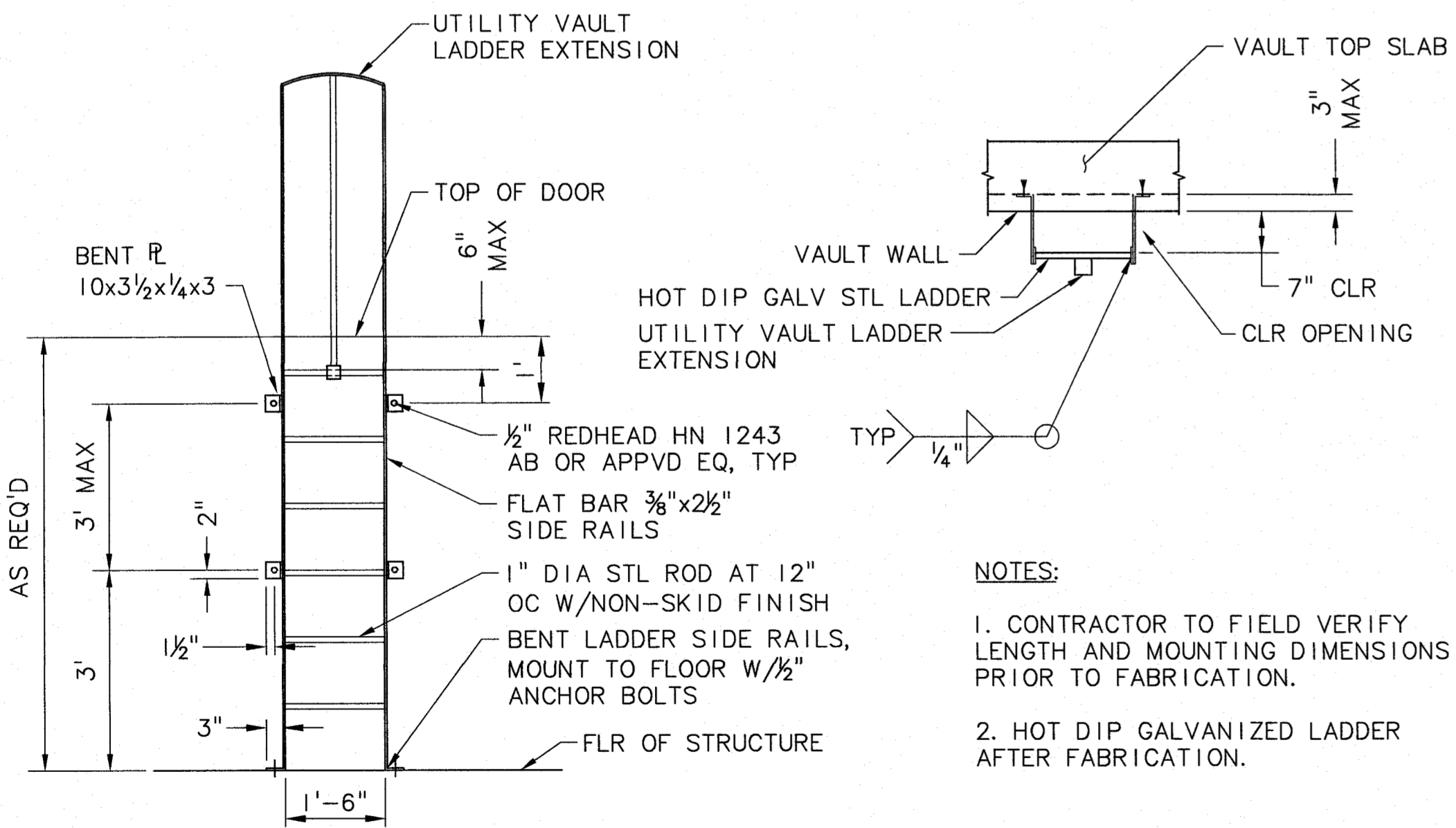
MSA



FLOW METER VAULT PLAN
SCALE: 1"=1'-0" (1)



SECTION
SCALE: 1"=1'-0" (A)



VAULT LADDER
SCALE: 1/2"=1'-0" (2)

NOTES:

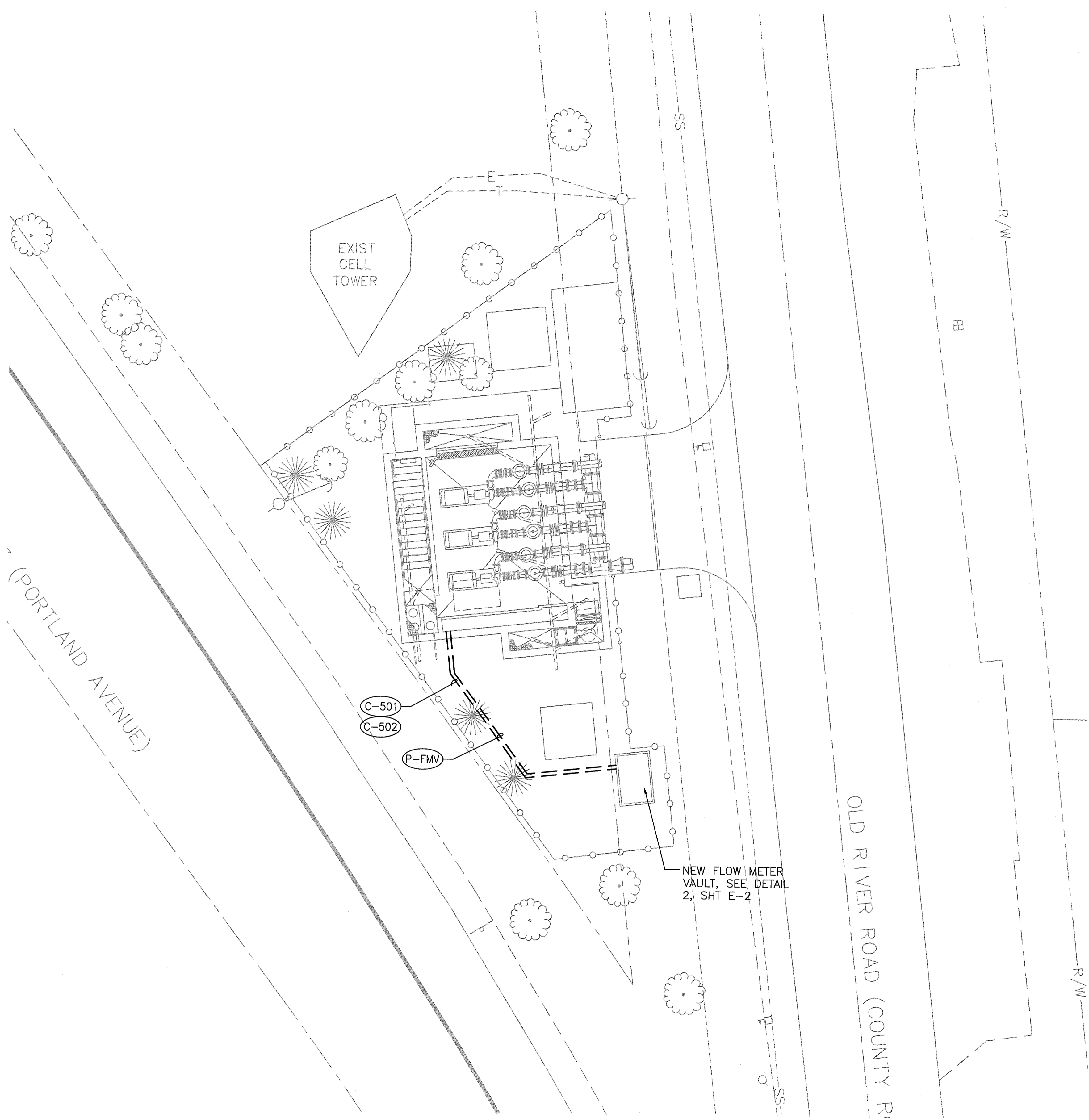
1. WALL PENETRATIONS FOR PIPING TO BE PRECAST IN VAULTS, PROVIDE LINK-SEAL OR NON-SHRINK GROUT AROUND PIPE PENETRATIONS.
2. ANCHORS FOR SMALL PIPING SUPPORTS IN VAULT TO BE EXPANSION BOLTS AND SIZED APPROPRIATELY FOR THE SPECIFIED SUPPORT (1/4" MINIMUM DIAMETER).
3. SUPPORT SMALL PIPING WITH UNISTRUT SUPPORTS OR APPROVED EQUAL. CHANNELS TO BE P1000 H3 MOUNTED TO CONCRETE WITH P2072 POSTBASE AND STRAP TO PIPE WITH P2038 CLAMP. CONNECT MEMBERS AS PER MANUFACTURER'S REQUIREMENTS.
4. ALL VALVES, METERS AND SPECIAL FITTINGS INSIDE VAULT TO RECEIVE SHOP-APPLIED, FUSION-BONDED EPOXY COATING.
5. FOR ALL FLANGES NEAR WALL PENETRATIONS FOR WHICH NO DIMENSION IS GIVEN, FLANGE FACE MUST BE 6" MINIMUM FROM WALL.
6. SPECIAL HANGERS AND SUPPORTS ARE SHOWN IN SOME LOCATIONS. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION AND NUMBER OF ALL ADDITIONAL SUPPORTS TO PROPERLY SUPPORT PIPING, VALVES AND EQUIPMENT CONNECTIONS TO PREVENT DEFLECTION AND STRESSES.
7. PROVIDE MINIMUM 6" THICKNESS OF COMPACTED CRUSHED ROCK UNDERNEATH AND ON ALL SIDES OF VAULT.
8. PRECAST VAULT SHALL MEET STANDARDS SET FORTH IN ASTM C857 AND C858.
9. MAXIMUM 2 FOOT HORIZONTAL DISTANCE FROM EXTERIOR EDGE OF VAULT TO NEAREST MECHANICAL JOINT FITTING.
10. CONTRACTOR SHALL VERIFY DEPTH OF EXISTING WATERLINE PRIOR TO ORDERING MATERIALS, AND INCLUDE RISER SECTIONS IN VAULT AS REQUIRED.
11. ATTACH CONFINED SPACE WARNING SIGN TO THE UNDERSIDE OF THE HATCH. THE SIGN SHALL BE PAINTED ALUMINUM WITH A YELLOW BACKGROUND AND BLACK LETTERING, AND SHALL CONTAIN THE FOLLOWING WORDING: "DANGER, FOLLOW CONFINED SPACE ENTRY PROCEDURES BEFORE ENTERING". MINIMUM SIGN SIZE SHALL BE 7"x10", AND LETTERS SHALL BE A MINIMUM 1/2" TALL.

MATERIAL LIST:

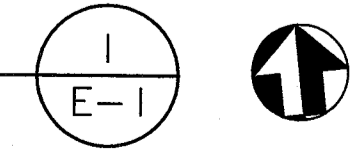
- 1 8" DI SPL, FLGxPE, LENGTH AS REQ'D
- 2 8" FLG ADAPTER MEGAFLANGE BY EBAA IRON OR APPVD EQ
- 3 8" ELECTROMAGNETIC FLOW METER, SIEMENS SITRANS FM MAG 5100 W, OR APPVD EQ
- 4 PRECAST CONC VAULT, OLDCASTLE PRECAST MODEL 577-LA W/ NO. 64-332P TOP, OR APPVD EQ, SEE NOTE 10
- 5 ACCESS LADDER, SEE DET 2, THIS SHEET
- 6 8" DIA FLR DRAIN KNOCKOUT
- 7 STANDON MODEL S89 FLG ADJUSTABLE PIPE SUPPORT OR APPVD EQ
- 8 8" DI SPL, PE, LENGTH AS REQ'D
- 9 SPRING ASSISTED GALV STL DIAMOND PLATE DOOR HATCH W/ LOCKING LATCH
- 10 8"x1" SERVICE SADDLE W/ 1" CORP STOP
- 11 1" DIELECTRIC UNION (FIPTxFIPT), WATTS 3004 OR APPVD EQ
- 12 VENT THRU SCREENED ASSY
- 13 1" COMBINATION AIR VALVE, KINETIC COMPACT FIG 945 BY GA INDUSTRIES OR APPVD EQ

	NO.	DATE	REVISION
	DESIGNED: JHF	DRAWN: BAW	CHECKED: DAM
PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INERTIE WATER PUMP STATION IMPROVEMENTS			SHEET: M-2 8 OF 14
SHEET TITLE: FLOW METER VAULT AND MECHANICAL DETAILS			DATE: FEBRUARY 2015 MSA PROJECT: 14-1601.201
MSA PROJECT: 14-1601.201			

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ELECTRICAL SITE PLAN
1/8" = 1'-0"

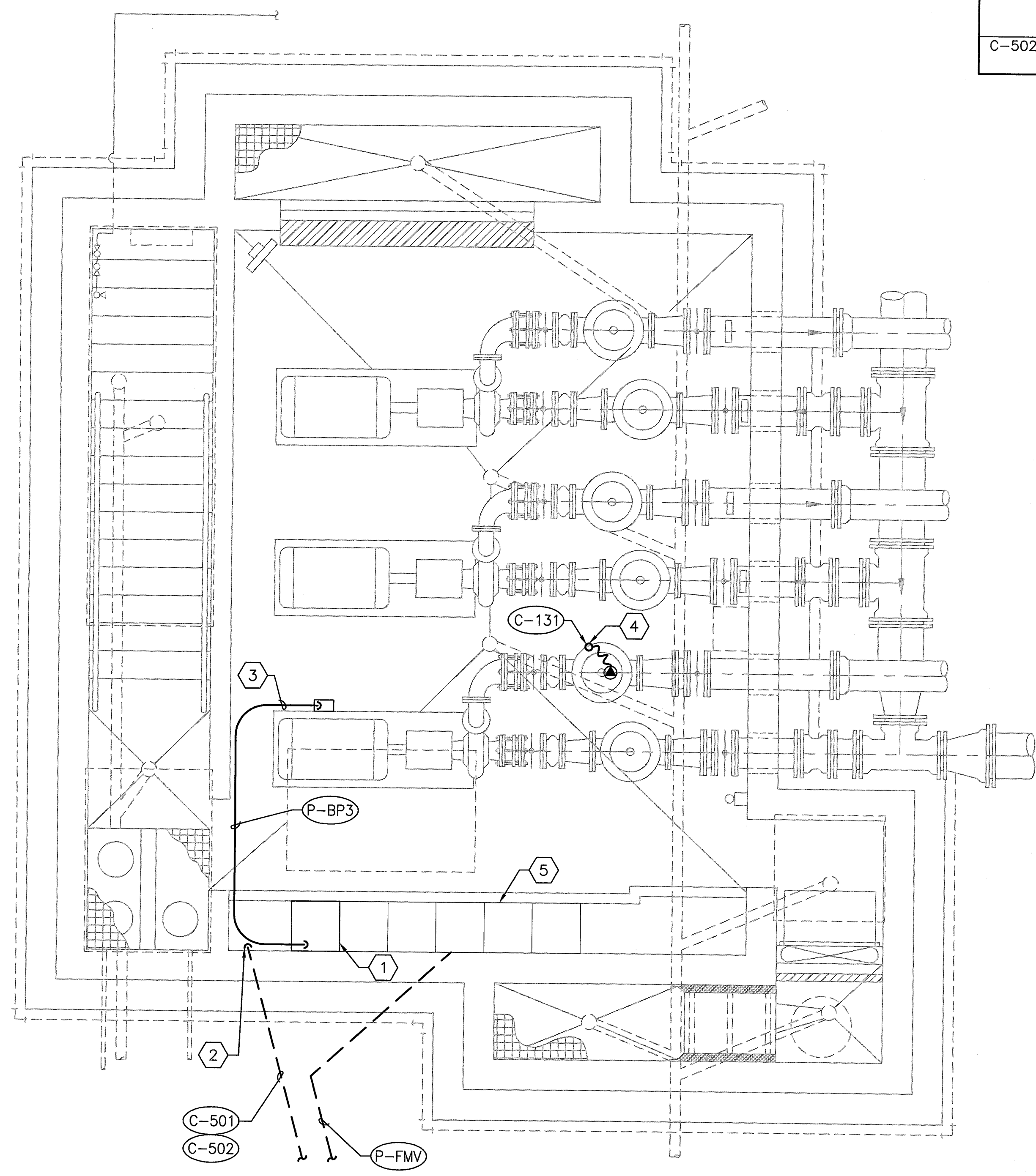


ELECTRICAL SYMBOL LIST			
D.B.	DIRECT BURIED	⊕	RECEPTACLE - DUPLEX, MOUNT 18" AFF, UON
F	FLEX CONDUIT	⊕	RECEPTACLE - DOUBLE DUPLEX, MOUNT 18" AFF, UON
G	GROUND WIRE	⊕	RECEPTACLE - DUPLEX, CEILING-MOUNTED
GFI	GROUND FAULT INTERRUPTER	⊕	RECEPTACLE - SINGLE, CEILING-MOUNTED, CONFIGURATION AS SHOWN
GND	GROUND	⊕	RECEPTACLE - DUPLEX ABOVE COUNTER, HORIZONTAL
IG	ISOLATED GROUND	⊕	RECEPTACLE - MOUNTED ABOVE COUNTER
OP	OVERHEAD POWER	⊕	RECEPTACLE - ISOLATED GROUND
OT	OVERHEAD TELCO	⊕	RECEPTACLE - SPECIAL PURPOSE
S-O	S-O CORD	⊕	RECEPTACLE - SINGLE, CONFIGURATION AS SHOWN
UP	UNDERGROUND POWER	⊕	RECEPTACLE - PENDANT DROP
UT	UNDERGROUND TELCO	⊕	SWITCH DESIGNATOR
WP	WEATHERPROOF	⊕	SWITCH - SINGLE-POLE, MOUNT 48" AFF, UON
---	CONDUIT - BELOW GRADE	⊕	SWITCH - THREE-WAY, MOUNT 48" AFF UON.
---	CONDUIT - CONCEALED	⊕	SWITCH - FOUR-WAY
---	CONDUIT - EXPOSED	⊕	SWITCH - WITH PILOT LIGHT, MOUNT 48" AFF, UON
---	CONDUIT - FLEXIBLE	⊕	SWITCH - DIMMER, MOUNT 48" AFF, UON
---	CONDUIT - STUB-DOWN	⊕	SWITCH - FUSED DISCONNECT
---	CONDUIT - STUB-OUT	⊕	SWITCH - NON-FUSED DISCONNECT
---	CONDUIT - STUB-UP	⊕	COMBINATION STARTER/DISCONNECT
---	HOME RUN. HASH MARKS INDICATE 2#12 WIRE UNLESS NOTED OTHERWISE	⊕	SWITCH - A/C SELECTOR
---	CONDUCTORS IN CONDUIT, (2)#12 OR AS NOTED (QUANTITY AS INDICATED BY HASH MARKS)	⊕	OUTLET - FLUSH FLOOR
---	GROUND WIRE	⊕	OUTLET - TELEPHONE, MOUNT 18" AFF UON & PROVIDE 3/4" TO CEILING OR TRUSS SPACE, UON
---	GROUND CONNECTION	⊕	OUTLET - DATA
⊗	EQUIPMENT CONNECTION	⊕	OUTLET - COMBINATION TELEPHONE/DATA
⊗	EXIT SIGN - CEILING-MOUNTED	⊕	TELEPHONE PEDESTAL
⊗	EXIT SIGN - WALL-MOUNTED	⊕	MOTOR CONNECTION
⊗	EXIT SIGN - DOUBLE FACED WITH DIRECTIONAL ARROWS	⊕	DOOR CONTACTS
⊗	LIGHT FIXTURE - RECESSED	⊕	INTERCOM OUTLET
⊗	LIGHT FIXTURE - SURFACE-MOUNTED	⊕	JUNCTION BOX - CEILING-MOUNTED
⊗	LIGHT FIXTURE - SURFACE-MOUNTED WITH PULL CHAIN	⊕	JUNCTION BOX - WALL-MOUNTED
⊗	LIGHT FIXTURE - WALL-MOUNTED	⊕	METER BASE - UTILITY COMPANY APPROVED
⊗	LIGHT FIXTURE - POLE MOUNTED	⊕	MOTION SENSOR
⊗	LIGHT FIXTURE - DOCK	⊕	OCCUPANCY SENSOR
⊗	LIGHT FIXTURE - BUG-EYE EMERGENCY	⊕	THERMOSTAT
⊗	LIGHT FIXTURE - FLUORESCENT	⊕	TRANSFORMER
⊗	LIGHT FIXTURE - INDIRECT FLUORESCENT	⊕	VOLUME CONTROL
⊗	LIGHT FIXTURE - ON EMERGENCY CIRCUIT	⊕	SPEAKER - INTERIOR PAGING
⊗	LIGHT FIXTURE - FLUORESCENT STRIP	⊕	SPEAKER - EXTERIOR PAGING
⊗	PANEL - FIRE ALARM	⊕	SERVICE WEATHERHEAD
⊗	PANEL - 208Y/120V BRANCH CIRCUIT (FLUSH-MOUNTED)	⊕	
⊗	PANEL - 208Y/120V BRANCH CIRCUIT (SURFACE-MOUNTED)	⊕	

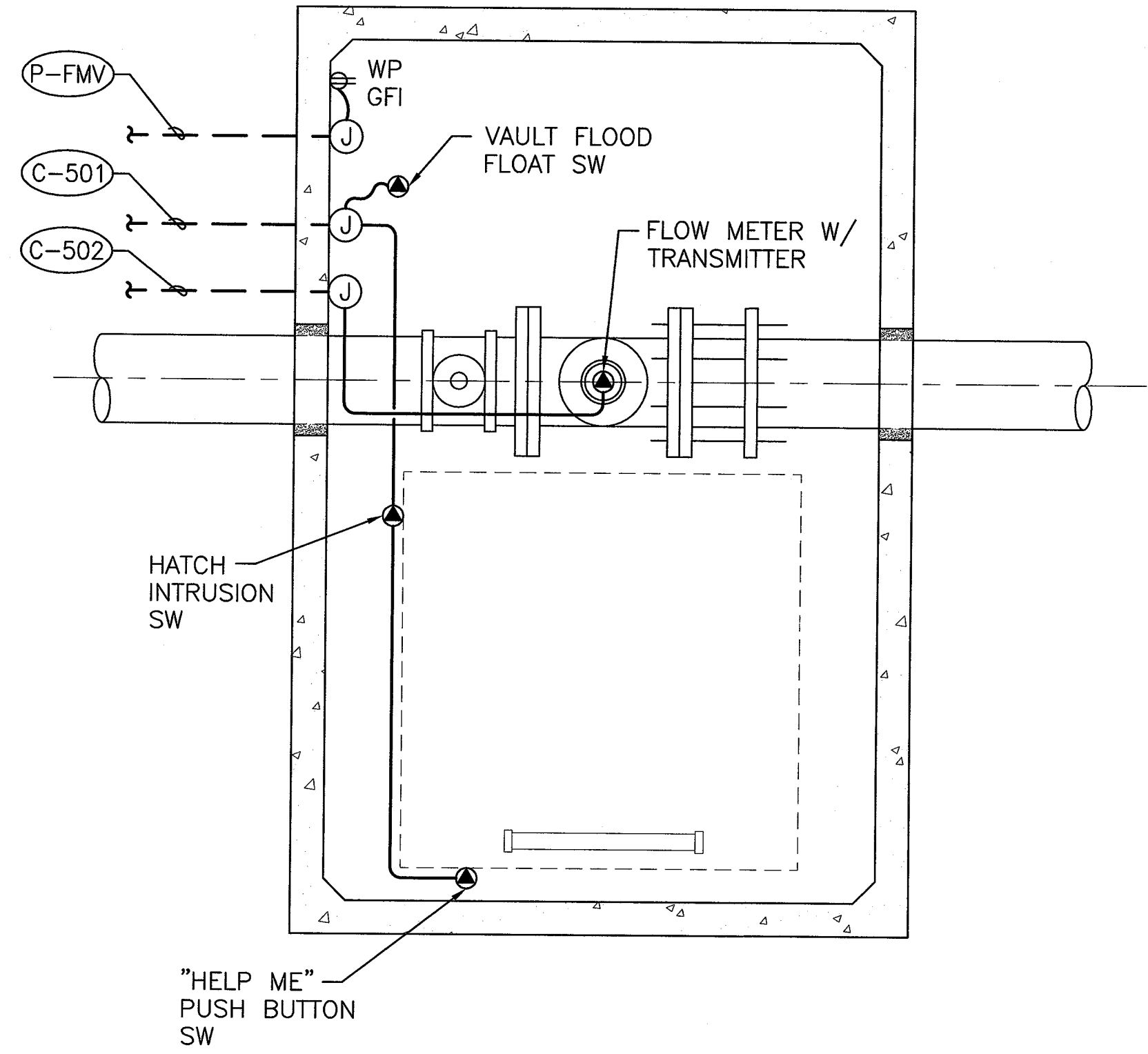
PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERFITE WATER PUMP STATION IMPROVEMENTS		SHEET TITLE: ELECTRICAL SITE PLAN	
PROJECT NO.: 14-1801.202		DATE: JANUARY 2015	
Murray, Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE: 503-225-9010 FAX: 503-225-0022			
9615 S.W. Allen Boulevard Suite 107 Beaverton, Oregon 97005 Phone: (503) 726-3331 Fax: (503) 726-3326 E-mail: rwin@rwineng.com		DESIGNED: GHS DRAWN: DPR CHECKED: GHS APPROVED: GHS	
NO. DATE		REVISION	
BY		SHEET E-1	
		9 OF 14	

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WEST LINN EMERGENCY INTERTIE PUMP STATION Electrical Circuit Schedule					
Ckt No.	From	To	Conductors	Raceway	Notes
P-BP3	RVSS	PUMP MOTOR 3	3 #350 kcmil, P 1 #4 AWG, G 4 #12 AWG, C	3	
P-FMV	MCC/PANEL A	FLOW METER VAULT	2 #12 AWG, P 1 #12 AWG, G	1	
C-131	VALVE CONTROLLER AT PLC CABINET	CONTROL VALVE	4 #12 AWG, C 2 #18 TSP, C 1 #12 AWG, G	(E) 3/4	
C-501	PLC	FLOW METER VAULT	6#14 AWG, C 1 #14 AWG, G	1	VAULT FLOOD, INTRUSION, "HELP ME" SWITCHES
C-502	FLOW TRANSMITTER AT PLC CABINET	FLOW SENSOR	2 #14 AWG, P 3 #18 TSP, C	1	



ELECTRICAL BUILDING PLAN
3/8" = 1'-0"
1
E-2



FLOW METER VAULT PLAN
1" = 1'-0"
2
E-2

- NOTES THIS SHEET**
- NEW MOTOR CONTROL SECTION INSTALLED BY CONTRACTOR. SEE INSTRUMENTATION AND CONTROL DRAWINGS FOR REFERENCE.
 - EXISTING PLC CABINET. SEE INSTRUMENTATION AND CONTROL DRAWINGS FOR CONNECTION.
 - NEW OVERHEAD CONDUIT TO MOTOR JUNCTION BOX. AVOID HATCH OPENING. SEE SCHEDULE FOR CONDUCTORS.
 - EXISTING CONDUIT FROM PLC CABINET FOR NEW CONTROL VALVE. EXTEND FROM FLOOR TO HEIGHT REQUIRED FOR VALVE. PULL NEW CONDUCTORS. SEE SCHEDULE.
 - EXISTING 120 V PANEL BOARD. CONNECT SPARE 20A CIRCUIT BREAKER FOR FLOW VAULT POWER.

NO.	DATE	REVISION	BY
DESIGNED:	GHS		
DRAWN:	DPR		
CHECKED:	GHS		
APPROVED:	GHS		

PROJECT NAME: CITY OF WEST LINN, OREGON
EMERGENCY INTERTIE
WATER PUMP STATION IMPROVEMENTS

SHEET TITLE: **ELECTRICAL BUILDING PLAN**

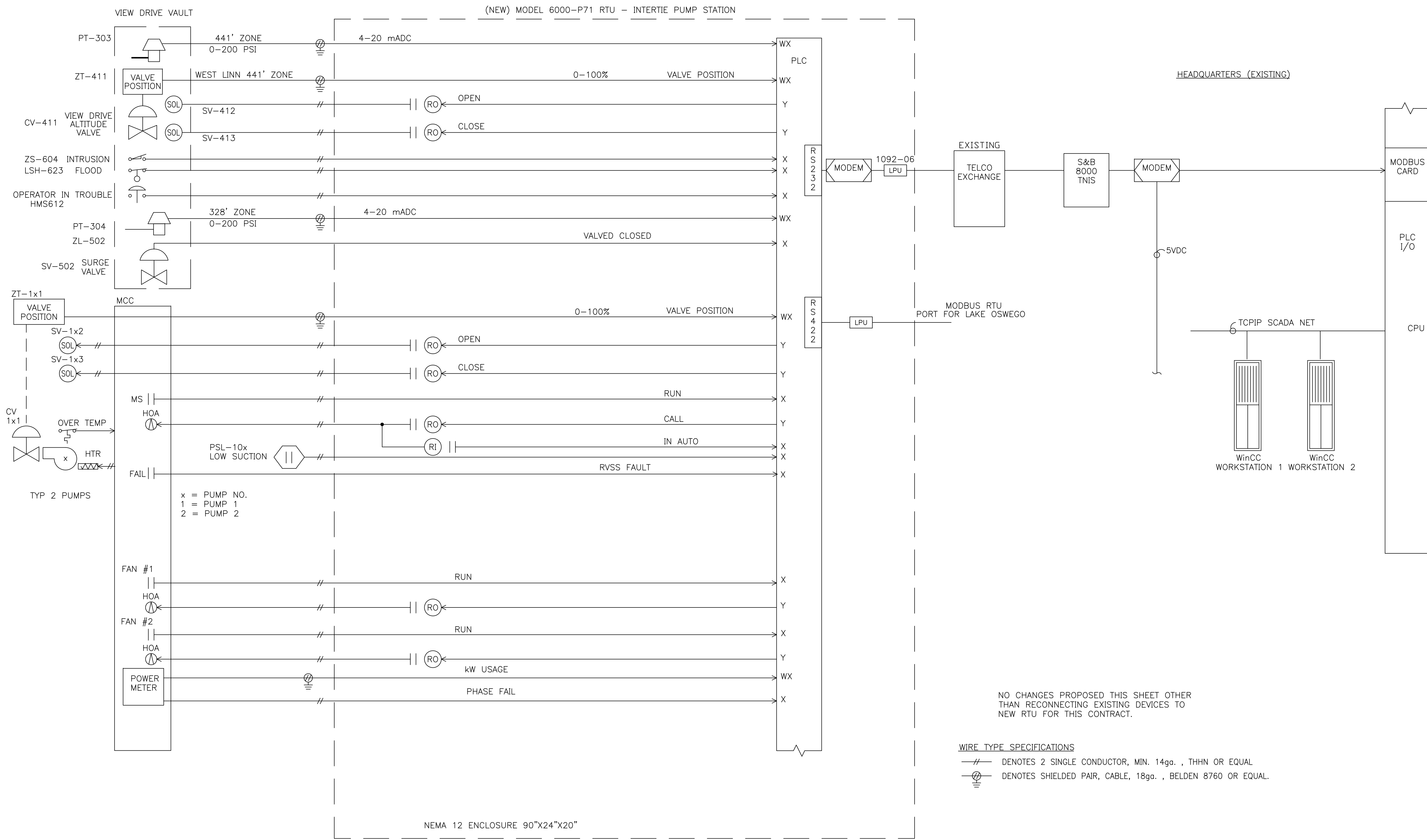
Murray, Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900
Portland, Oregon 97204
PHONE: 503-225-9010
FAX: 503-225-9022

DATE: JANUARY 2015

MSA PROJECT: 14-1801.002

10 OF 14

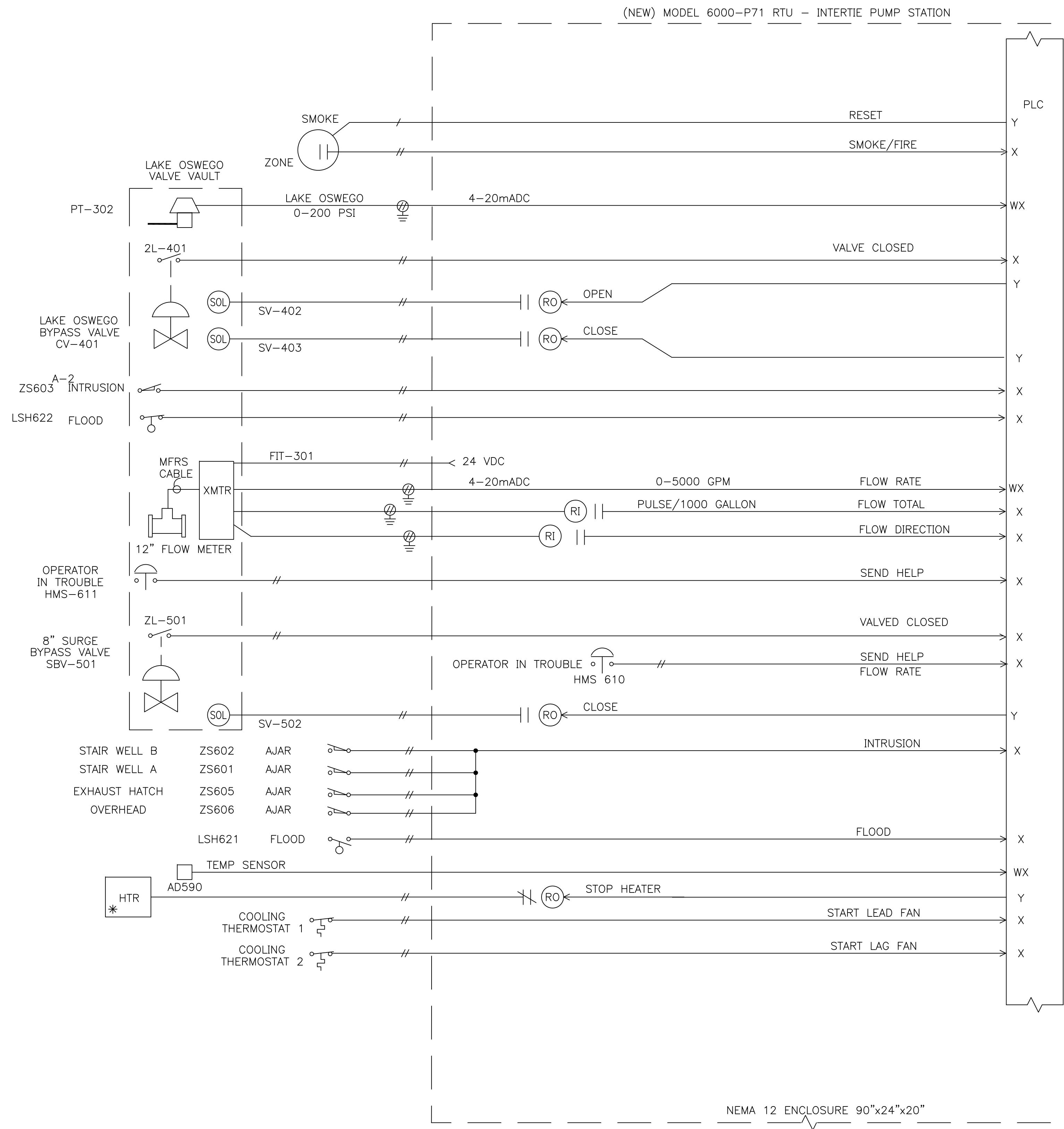




NO CHANGES PROPOSED THIS SHEET OTHER THAN RECONNECTING EXISTING DEVICES TO NEW RTU FOR THIS CONTRACT.

- WIRE TYPE SPECIFICATIONS**
- //— DENOTES 2 SINGLE CONDUCTOR, MIN. 14ga. , THHN OR EQUAL
 - [Shielded Symbol]— DENOTES SHIELDED PAIR, CABLE, 18ga. , BELDEN 8760 OR EQUAL.

<p>PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS</p>	<p>SHEET TITLE: EXISTING CONTROLS AT PUMP STATION</p>	<p>DATE: FEBRUARY 2015</p>	<p>BY: _____</p> <p>REVISION: _____</p>	<p>NO. DATE: _____</p> <p>DESIGNED: RTS</p> <p>DRAWN: JRB</p> <p>CHECKED: DGT</p> <p>APPROVED: RTS</p>	<p>SHEET I&C-1</p> <p>11 OF 14</p>
<p>SCALE: VERT: AS SHOWN HORIZ: AS SHOWN</p> <p>NOTICE: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE</p>		<p>REGISTERED PROFESSIONAL ENGINEER 14,157 OREGON RANDALL T. GIBB EXPIRATION DATE: 6/30/16</p>			
<p>MSA Murray Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE: 503-225-9010 FAX: 503-225-9022</p>					



THE RTU PLC IS REPLACED THIS CONTRACT.
ALL FIELD ITEMS ARE EXISTING.

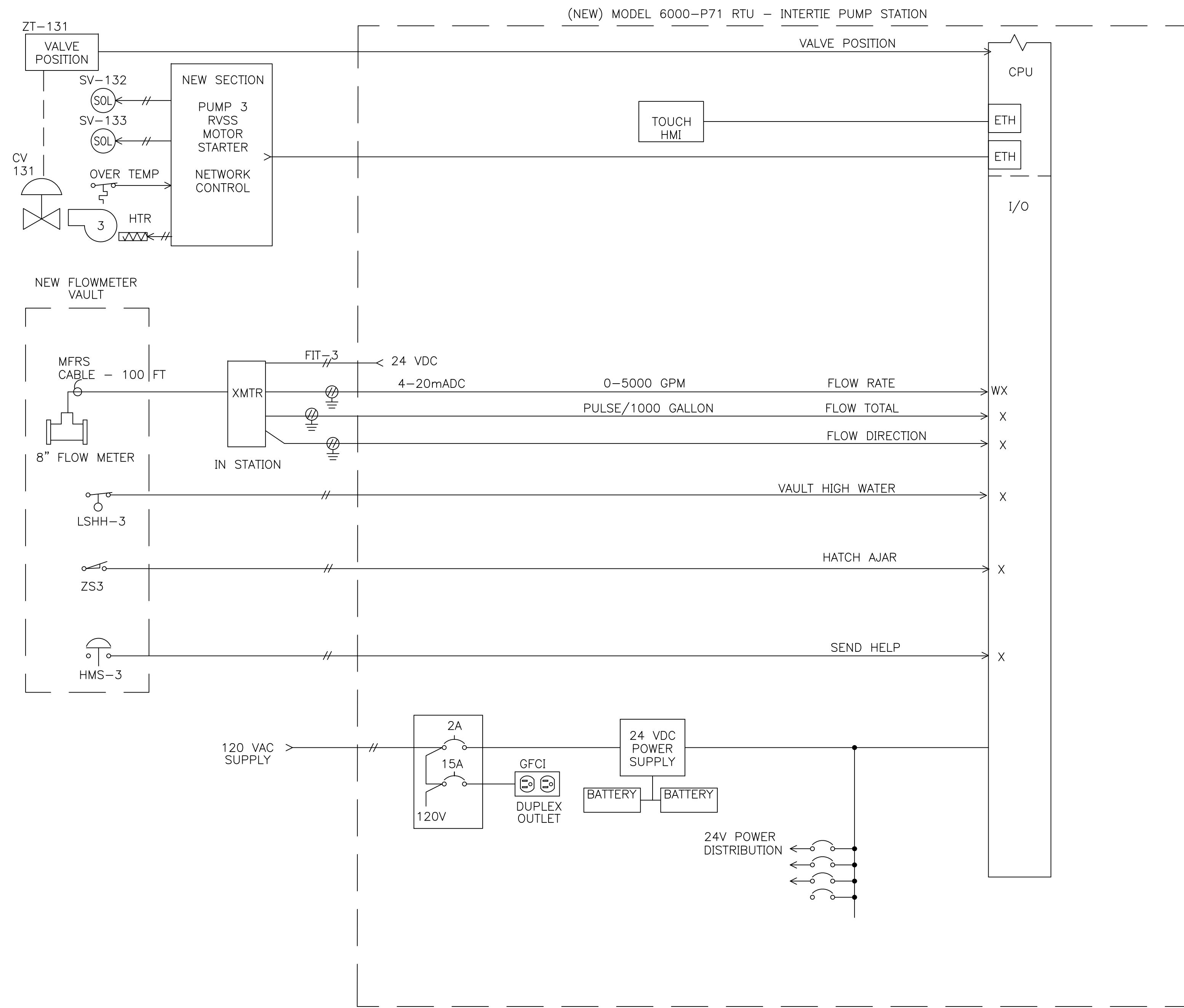
* DENOTES BY OTHERS.

WIRE TYPE SPECIFICATIONS
 // DENOTES 2 SINGLE CONDUCTOR, MIN. 14ga. , THHN OR EQUAL
 [Shielded Pair Symbol] DENOTES SHIELDED PAIR, CABLE, 18ga. , BELDEN 8760 OR EQUAL.

PROJECT NAME:	CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS EXISTING CONTROLS AT PUMP STATION		
SHEET TITLE:	WATER PUMP STATION IMPROVEMENTS EXISTING CONTROLS AT PUMP STATION		
PROJECT NO.:	14-1601-202		
DATE:	FEBRUARY 2015		
PROJECT:	MSA PROJECT: 14-1601-202		
SCALE:	VERT. AS SHOWN HORIZ. AS SHOWN NOTICE IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE		
NO.:	DATE:	REVISION:	BY:
DESIGNED:	RTS	DRAWN:	JRB
CHECKED:	DGT	APPROVED:	RTS
SHEET:			I&C-2

REGISTERED PROFESSIONAL ENGINEER
 14167
 Oregon
 RANDALL T. CREST
 EXPIRATION DATE: 6/30/16

MSA
 Murray Smith & Associates, Inc.
 Engineers/Planners
 121 S.W. Salmon, Suite 900
 Portland, Oregon 97204
 PHONE: 503-225-9010
 FAX: 503-225-9022



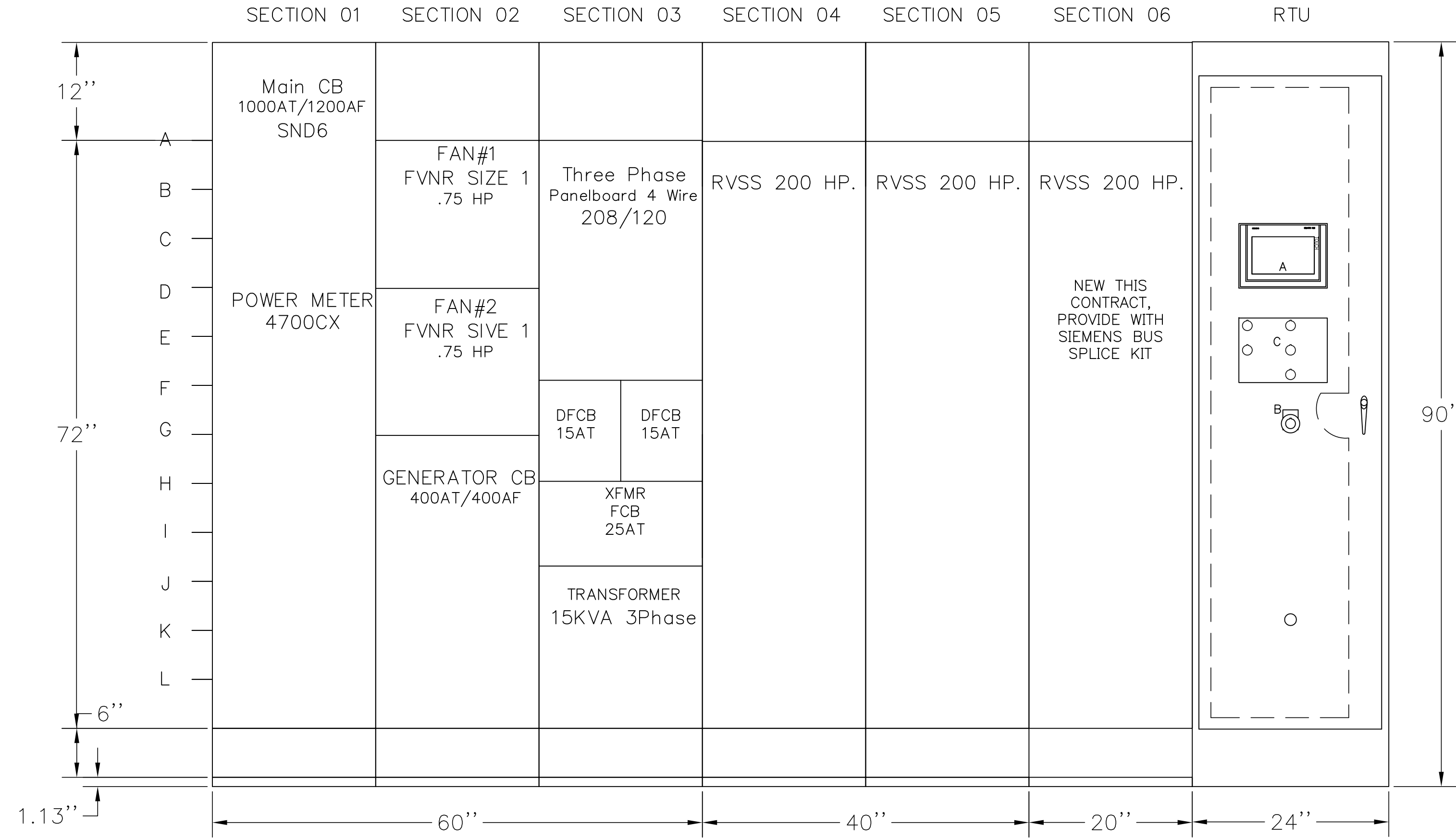
ALL FIELD EQUIPMENT THIS SHEET IS NEW THIS CONTRACT.

* DENOTES BY OTHERS.

WIRE TYPE SPECIFICATIONS

- //— DENOTES 2 SINGLE CONDUCTOR, MIN. 14ga. , THHN OR EQUAL
- /—/— DENOTES SHIELDED PAIR, CABLE, 18ga. , BELDEN 8760 OR EQUAL.

<p>PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS</p>	<p>SHEET TITLE: EXISTING CONTROLS AT PUMP STATION</p>	<p>DATE: FEBRUARY 2015</p>	<p>DATE: FEBRUARY 2015</p>	<p>BY: REVISION:</p>	<p>NO. DATE DESIGNED: RTS DRAWN: JRB CHECKED: DGT APPROVED: RTS</p>	<p>SHEET I&C-3 13 OF 14</p>
<p>REGISTERED PROFESSIONAL ENGINEER 14,157 istead OREGON RANDALL T.</p>		<p>SCALE VERT: AS SHOWN HORIZAS SHOWN NOTICE 0 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE</p>		<p>EXPIRATION DATE: 6/30/16</p>		
<p>MSA Murray Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE 503-225-9010 FAX 503-225-9022</p>						



- A. OPERATOR INTERFACE MODULE (NEW)
- B. SYSTEM SHUTDOWN
- C. GRAVOPLY COVERPLATE

INSTALL NEW RTU BACK PANEL IN EXISTING ENCLOSURE THIS CONTRACT. INSTALL ITEM A, INSTALL COVERPLATE C.

<p>MSA Murray Smith & Associates, Inc. Engineers/Planners 121 S.W. Salmon, Suite 900 Portland, Oregon 97204 PHONE: 503-225-9010 FAX: 503-225-9022</p>	<p>PROJECT NAME: CITY OF WEST LINN, OREGON EMERGENCY INTERTIE WATER PUMP STATION IMPROVEMENTS</p> <p>SHEET TITLE: CONTROLS PRESENTATION</p>	<p>SCALE: VERT: AS SHOWN HORIZAS SHOWN</p> <p>NOTICE: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE</p>	<p>REGISTERED PROFESSIONAL ENGINEER 14157 Richard T. Stead OREGON EXPIRES 12/31/16 RANDALL T. STEAD JULY 26 2015 EXPIRATION DATE: 6/30/16</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> <p>DESIGNED: RTS DRAWN: JRB CHECKED: DGT APPROVED: RTS</p>	NO.	DATE	REVISION									
NO.	DATE	REVISION														
<p>PROJECT: 14-1601.202 DATE: FEBRUARY 2015</p>		<p>SHEET: I&C-4 14 OF 14</p>														

