

CITY OF WOODBURN
PUBLIC WORKS PROJECTS & ENGINEERING DIV.

**BID PACKAGE
AND
CONSTRUCTION SPECIFICATIONS
FOR
MILL CREEK PUMP STATION
STANDBY GENERATOR AND PHASE 1 UPGRADES**

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**CITY OF WOODBURN
MILL CREEK PUMP STATION
STANDBY GENERATOR AND PHASE 1 UPGRADES**

PART I

BID PREPARATION DOCUMENTS

INVITATION TO BID
INSTRUCTIONS TO BIDDERS

INVITATION TO BID

CITY OF WOODBURN

MILL CREEK PUMP STATION **STANDBY GENERATOR AND PHASE 1 UPGRADES**

PROJECT No. 2018-006-38.1
BID No. 2019-01

Sealed bids for the **Mill Creek Pump Station Phase 1 Upgrades and Generator Replacement** will be received by the City of Woodburn, OR at City Hall Annex, 190 Garfield St. until **2:00 PM, Thursday April 2, 2020** and will thereafter be publicly opened and read.

Proposals shall be addressed to the City Engineer, City of Woodburn, 190 Garfield St., Woodburn, OR 97071. Bids shall be submitted in a plain sealed envelope bearing the Bidder's name, the name of the project and the date and time of the Bid opening, and shall be clearly marked "**Bid No. 2019-01**", and Bidders shall indicate on the Form of Proposal that "***Bidder will comply with the provisions of Chapter 279C.840, Oregon Revised Statutes***".

DESCRIPTION OF THE PROPOSED WORK:

The major part of the work will include: procuring and installing an 800kW standby generator in an all-weather enclosure, install the automatic transfer switch and all necessary electrical and an automatic fuel transfer system from the existing in ground fuel tank along with Wet well repairs including sluice gate replacement, low flow pump installation, and relining the wet well. .

Plans and specifications may be examined on or after **March 11, 2020** at the City Engineer's Office, 190 Garfield Street, Woodburn, OR and on line at <http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps> . Copies of the Contract Documents may be obtained from the City Engineer's Office upon deposit of a non-refundable fee of fifty dollars (\$50.00) for each set.

There will be an onsite prebid conference, 150 Newberg Hwy (State Hwy 214), at 9:00 AM, **March 17, 2020**. Refer to the Instructions to Bidders Section 5A.

Bidders must be pre-qualified in accordance with the laws of the State of Oregon. Prequalification Forms are available in PDF format off the ODOT website at <http://www.oregon.gov/odot/cs/construction/pages/prequalification.aspx>. **Only bids from pre-qualified Bidders will be opened.**

No bid for a construction contract shall be received or considered unless the bidder is registered with the Construction Contractors Board (CCB). The Contractor and every Subcontractor must have a Public Works Bond filed with the CCB before starting work on the project.

Bidders on this project need not be licensed for asbestos handling pursuant to ORS 468A.720.

Each bidder must indicate on the bid form whether they are a resident or nonresident bidder as defined in ORS 279A.120(b).

All proposals shall be made on the proposal forms. All proposals shall be accompanied by a Bid Bond, equal to ten percent (10%) of the total bid. Bid Bond shall be forfeited to the City if the Contractor fails to execute the contract within 7-days after acceptance of the bid and award of the Contract.

Pursuant to ORS 279C.370, bidders on public works projects with a contract value of \$100,000 or more are required to disclose, 2-hours after bid opening, the bidders first-tier subcontractors. The bidder shall provide the information as required on City of Woodburn first-tier disclosure form, provided in the contract documents.

At the discretion of the Project Manager Addenda(um) and Contract clarifications shall either be posted on the City, Engineering Division website or delivered to Plan Holders via facsimile. Potential Bidders should check the website on a daily basis the last week before the Bid Opening date. Website can be found at <http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps>. Addenda must be signed and submitted with the Proposal to be considered a responsive bid offer.

Although contract award is expected to be made by the City Council on **April 13, 2020** work on site is not expected to begin until late May or early June when the water table in the area drops to a safe level (as determined by City staff). The City of Woodburn reserves the right to reject any and all bids not in compliance with prescribed bidding procedures and requirements, and may reject for good cause any and all bids upon a finding of the Agency if it is in the public interest to do so. The three (3) lowest bidders may not withdraw or modify his bid prior to the lapse of 35-days after the bid opening.

The phase 1 Upgrades (Wet well refurbish) portion of the project must be completed within **one hundred and twenty (120)** calendar days after the dated "Notice to Proceed". The Generator portion must be completed **thirty (30)** calendar days after delivery of the Generator to the Contractor.

For further information on this project please contact:

Pete Gauthier P.E., Project Engineer

P 503.980.2429

F 503.982.5242

pete.gauthier@ci.woodburn.or.us

Heather Pierson
City Recorder
City of Woodburn, OR 97071

INSTRUCTIONS TO BIDDERS

BID #2019-01

1. GENERAL:

- A. SPECIFICATIONS – The Specifications that is applicable to the Work on this Project is the 2018 edition of the “Oregon Standard Specifications for Construction” and as modified by Special Provisions.
- B. This a formal procurement, Faxed bids will not be accepted.
- C. Bidding requirements and obligations shall comply and conform to Part 00100 of the General Conditions of the Standard Specifications or as modified by the Special Provisions or herein.

2. SECURING CONTRACT DOCUMENTS:

- A. Copies of the Contract Documents are available online at <http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps> and at the Public Works Department - Engineering Division, located at:

City Hall Annex
190 Garfield Street
Woodburn, OR 97071.

- B. Questions regarding bidding, materials or technical requirements should be directed to the Project Manager at:

Pete Gauthier,
190 Garfield St.
Woodburn, OR 97071
Phone: 503.980.2429
Email: pete.gauthier@ci.woodburn.or.us

Or

Eric Liljequist, PE, Public Works Director
190 Garfield St.
Woodburn, OR 97071
Phone: 503.982.5241
Email: Eric.Liljequist@ci.woodburn.or.us

- C. Bidder is responsible for completing and returning all page(s), attachment(s) which require a response.
- D. Plan Holder’s List – An electronic copy of the “Plan Holders List” is provided on the Agency website and will be periodically updated. Contractors, suppliers and others wishing to be added to this list should contact the Project Manager as identified in 2.B.
- E. Project Notifications – Addenda, clarifications, etc. shall be posted on the Agency website and are the responsibility of the Contractor to download before submission of bids. Contractor shall sign and submit with offer all Addenda associated (posted on website) with the project.

3. PROJECT FINANCING:

- A. This project is financed and paid for by the City of Woodburn.
- B. The Engineer's cost estimated range for the construction of this project is between \$650,000 and \$750,000.
- C. This project is subject to the prevailing wages rates under the Oregon Prevailing Wages Law (BOLI).
- D. This project is subject to prevailing wage rates available at:

www.oregon.gov/boli/WHD/PWR/Pages/pwr_state.aspx and listed as "[Prevailing Wage Rates for Public Works Contracts in Oregon effective January 1, 2020](#)".

4. CONSTRUCTION AGREEMENT

- A. The construction contract between Owner and Contractor shall be provided by The City of Woodburn. A sample Agreement is included in these documents.
- B. The Specifications that are applicable to the Work on this Project are: The 2018 edition of the "Oregon Standard Specifications for Construction", as modified by Special Provisions, and the Project Manual.

5. PREBID CONFERENCE:

- A. There is a pre-bid conference scheduled for 9:00 AM on **March 17, 2020** at 150 Newberg Hwy (State Hwy 214).

6. SUBMISSION OF BID

- A. All bids must be prepared on the forms provided by the Engineer and submitted in accordance with the Instructions to Bidders. A bid is invalid if it has not been deposited at the designated location prior to the time and date for receipt of bids indicated in the Advertisement to Bid, or prior to any extension thereof issued to the bidders.
- B. At the discretion of the Project Manager, Addenda (um) and Contract clarifications shall either be posted on the City, Engineering Division website or delivered to Plan Holders via email. Potential Bidders should check the website on a daily basis until the Bid Opening date. Website can be found at <http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps>. Addenda must be signed and submitted with the Bid Proposal to be considered a responsive offer.

Pete Gauthier
CITY OF WOODBURN
City Hall Annex

190 Garfield St.
Woodburn, OR 97071

[Bidder's Name]
[Bidder's Address]

Bid For: The City of Woodburn Mill Creek Phase 1 Upgrades and Generator Replacement.

7. AWARD OF THE CONTRACT:

- A. Award of the Contract, by the Contract Review Board (City Council), will be by recommendation of the Public Works Dept. - Engineering Division, based on the lowest cost offer of the responsive and responsible Bidders in accordance with Section 00130 of the Oregon Standard Construction Specifications and all modifications by Special Provisions.
- B. The successful bidder shall promptly furnish a Performance Bond, which shall be an Oregon Public Works Contract Bond, in compliance with the requirements of Chapter 279C.380, Oregon Revised Statutes, in an amount equal to 100 percent of the cost of the work, such bond to be written by properly qualified surety authorized to do business in the State of Oregon.

8. PERMITS LICENSES AND TAXES:

- A. The City will obtain and pay for the Building Permit, and permits and fees associated with land use and site development. The contractor or subcontractors will be responsible for Electrical, Mechanical and Plumbing permits. See Oregon Standard Specifications for Construction", Volume I (General Conditions) 00171.02 and 00170.03 for clarification.

EQUAL EMPLOYMENT COMPLIANCE REQUIREMENT

- C. Pursuant to ORS 279A.110, discrimination in subcontracting is prohibited. Any contractor who contracts with a public contracting agency shall not discriminate against minority, women or emerging small business enterprises in the awarding of contracts.
- D. By signature of the authorized representative of the bidder/proposer on the proposal, the bidder/proposer hereby certifies to the City of Woodburn that this bidder/proposer has not discriminated against minority, women, or emerging small business enterprises in obtaining any subcontracts; and, further, that if awarded the contract for which this bid or proposal is submitted, shall not so discriminate.
- E. All information and reports required by Oregon governments having responsibility for the enforcement of such laws shall be supplied to the Owner upon request, for purposes of investigation to ascertain compliance with such acts, regulations, and orders.

END OF DOCUMENT

**CITY OF WOODBURN
MILL CREEK PUMP STATION
STANDBY GENERATOR AND PHASE 1 UPGRADES**

PART II

BID FORMS

CERTIFICATION PAGE
FORM OF PROPOSAL
FIRST TIER SUBCONTRACTORS DISCLOSURE FORM
BID SUBMITTAL CHECKLIST

CERTIFICATION PAGE

Each Bidder (offeror) must read and comply with the following Sections. Failure to do so may result in bid/proposal (offer) rejection.

RESIDENCY INFORMATION

ORS 279A.120 (2) states "For the purposes of awarding a public contract, a contracting agency shall: (a) Give preference to goods or services that have been manufactured or produced in this state if price, fitness, availability and quality are otherwise equal; and (b) Add a percent increase to the bid of a nonresident bidder equal to the percent, if any, of the preference given to the bidder in the state in which the bidder resides."

"Resident bidder" means a bidder that has paid unemployment taxes or income taxes in this state during the 12 calendar months immediately preceding submission of the bid, has a business address in this state and has stated in the bid whether the bidder is a "resident bidder" [ORS 279A.120(1)(b)].

"Non-resident bidder" means a bidder who is not a "resident bidder" as defined above [ORS 279A.120 (1)(b)].

Check one: Bidder is a RESIDENT bidder NON-RESIDENT bidder.

CERTIFICATION OF COMPLIANCE WITH DISCRIMINATION LAWS

By my signature in Form of Proposal, I hereby attest or affirm under penalty of perjury that I am authorized to act on behalf of Contractor in this matter, and to the best of my knowledge the Contractor has not discriminated against minority, women or emerging small business enterprises certified under ORS 200.055, in obtaining any required subcontract or against a business enterprise that is owned or controlled by or that employs a disable veteran as defined in ORS 408.225.

CERTIFICATION OF COMPLIANCE WITH OREGON TAX LAWS

By my signature in Form of Proposal, I hereby attest or affirm under penalty of perjury that I am authorized to act on behalf of Contractor in this matter that I have authority and knowledge regarding the payment of taxes, and that Contractor is, to the best of my knowledge, not in violation of any Oregon Tax Laws.

For purposes of this certificate, 'Oregon Tax Laws' means those programs listed in ORS 305.380(4) which is incorporated herein by this reference. Examples include the state inheritance tax, personal income tax, withholding tax, corporation income and excise taxes, amusement device tax, timber taxes, cigarette tax, other tobacco tax, 9-1-1 emergency communications tax, the homeowners and renters property tax relief program and local taxes administered by the Department of Revenue.

VERIFICATION OF RESPONSIBILITY

The City reserves the right, pursuant to ORS 279C.375 and OAR 137-049-0390, to investigate and evaluate, at any time prior to award and execution of the contract, the lowest bidder's (apparent successful offeror's) ability to perform the contract. Submission of a signed offer shall constitute approval for the City to obtain any information the City deems necessary to conduct the evaluation. The City shall notify the apparent successful offeror, in writing, of any other documentation required. Being a responsible bidder may include having the appropriate financial, material, equipment, facility and personnel resources and expertise, or ability to obtain the resources and expertise to perform the contract. Contractor shall have a satisfactory record of contract performance. The Contractor shall also have a satisfactory record of integrity. An unsatisfactory record of integrity may include previous violations of state environmental laws or a false certifications made to any Public Agency. The Contractor is to be qualified legally to contract with the City of Woodburn. Failure to promptly provide any requested information may result in bid/proposal rejection.

The City may postpone the award of the contract after announcement of the apparent successful offeror in order to complete its investigation and evaluation. Failure of the apparent successful offeror to demonstrate responsibility, as required under ORS 279C.375 and OAR 137-049-0390, may render the offeror non-responsible and shall constitute grounds for offer rejection.

DRUG TESTING POLICY CERTIFICATION

DRUG-TESTING POLICY CERTIFICATION:

By my signature in Form of Proposal, I hereby attest or affirm under penalty of perjury that I am authorized to act on behalf of Contractor in the matter, and to the best of my knowledge the Contractor has a drug-testing program in place which applies to all employees. Contractor shall maintain a drug-testing program at all times during the performance of the Contract awarded. Failure to maintain such a program shall constitute a material breach of contract. [ORS 279C.505J

BID PROPOSAL

Honorable Mayor and City Council
City Hall
Woodburn, Oregon 97071

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Proposal are those named herein, that the Proposal is in all respects fair and without fraud, which it is made without any connection or collusion with any person making another Proposal on this Contract.

The Bidder further declares that he has carefully examined the Contract Documents for the construction of the proposed improvements; that he has personally inspected the site; that he has satisfied himself as to the quantities of materials, items of equipment, and conditions or work involved, including the fact that the description of work and materials as included herein, is brief and is intended only to indicate the general nature of such items and to identify the said quantities with the detailed requirements of the Contract Documents; and that this Proposal is made according to the provisions and the terms of the Contract Documents, which Documents are herein attached and are hereby made a part of this Proposal.

The Bidder further agrees to complete construction of all work in all respects in accordance with the Special Provisions incorporated herein.

In the event the Bidder is awarded the Contract and shall fail to complete the work within the time limit set under Specifications of this document or extended time limit agreed upon, as more particularly set forth in the Contract Documents, liquidated damages shall be paid to the City of Woodburn, Oregon, using the rate formula outlined in the Special Provisions, and not less than \$150.00 per day, until the work shall have been finished, as provided by the Contract Documents.

The Bidder further proposes to accept as full payment for the work proposed herein the amount computed under the provisions of the Contract Documents and based on the following unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved, that they represent a true measure of the labor and material required to perform the work, including all allowance for overhead and profit for each type and unit of work called for in these Contract Documents.

The amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

It is declared that the Bidder will comply with all the provisions of ORS 279C.840. The workmen on the project will be paid not less than the prevailing rates of wages.

It is agreed that if the Bidder is awarded the Contract for the work herein proposed and shall fail or refuse to execute the Contract and furnish the specified Performance Bond within ten (10) calendar days after receipt of notification of acceptance of his Proposal, then, in that event, the bid security in the sum of:

(In Words): _____

(In Numbers): \$ _____

deposited herewith according to the conditions of the Advertisement for Bids and Information to Bidders, shall be retained by the City of Woodburn, Oregon, as liquidated damages; and it is agreed that the said sum is a fair measure of the amount of damage the City of Woodburn will sustain in case the Bidder shall fail or refuse to enter into the contract for the said work and to furnish the Performance Bond as specified in the Contract Documents. Bid security in the form of a certified check shall be subject to the same requirements as a bid bond.

If the Bidder is awarded a construction contract on this proposal, the surety who will provide the Performance Bond will be:

_____ whose address is:

_____, _____, _____
Street City State Zip

Agents Name: _____ Phone No. _____

The address for all communications concerned with this Proposal and where the Contract shall be sent is:

Contractor: _____ doing business at:

_____, _____, _____
Street City State Zip

BID PROPOSAL

Mill Creek Pump Station Sluice Gate Replacement & Low Flow Pump Installation

Item No.	Description	QNTY.	UNITS	UNIT PRICE	TOTAL
1	Mobilization and Cleanup	1	LS	\$	\$
2	Maintain Existing Wastewater Flow	1	LS	\$	\$
3	Eqiupment Demolition & Salvage	1	LS	\$	\$
4	Install 24" & 30" Sluice Gates Complete	2	EA	\$	\$
5	Pump Installation Complete	1	LS	\$	\$
6	Misc Discharge Piping Complete	1	LS	\$	\$
7	Install new Wet well Access Hatch	1	LS	\$	\$
8	Repair Wet Well Surface	1	LS	\$	\$
9	Construct Generator pad/foundation per plans	1	LS	\$	\$
10	Install new utility sink with tankless water heater	1	LS	\$	\$
11	Provide and inastall Automatic Transfer Switch	1	LS	\$	\$
12	Provide and Install 800kW Generator per specifications	1	LS	\$	\$
13	Provide and install fuel transfer system	1	LS	\$	\$
14	General Electrical	1	LS	\$	\$
Total:				\$	\$

Bid Item 1 includes, but not limited to, all cost of bringing materials into and removing from the site, supplies, equipment, and manpower to the jobsite and leaving the site in as good or better condition than before work was started.

Bid Item 2 includes all equipment, material, and Labor to pump sewage from two (2) gravity manholes to the force main in the pig vault, bypassing wet well at the highest expected flow for the duration of the work in the wet well.

Bid Item 3 Include all equipment, material, and Labor to remove and discard all structures and components indicated on plans and/or required to do the work.

Bid Item 4 Includes all material and labor to install, complete and operational, two (2) owner provided sluice gates and actuators.

Bid Item 5 Includes all Labor and miscellaneous material and supplies to install owner provided Flyght pump including all appurtenances and mechanical connections.

Bid Item 6 Includes materials and labor to install and all discharge pipes, fittings, valves, supports and miscellaneous supplies to connect the Flyght pump to the 18" force main in the pig vault.

Bid Item 7 Includes all labor and materials to install the new access hatch per plans including concrete forms.

Bid Item 8 Include all equipment, material, and Labor to prepare for, and apply a high solids epoxy liner to the wet well per section 10700 of the project specifications.

Bid Item 9 Includes all equipment, labor and materials to construct the pad/foundation for

the generator/enclosure..

Bid Item 10. Include all equipment, materials, and labor to install the utility sink and point of use, tankless water heater shown on sheet E-2 of the drawings. This item also includes rerouting existing water lines as necessary to clear new electrical panels.

Bid Item 11 Includes all equipment, labor and materials to provide and install a suitable Transfer switch per the plans and specifications.

Bid Item 12 Includes all equipment, labor and materials to provide and install a suitable Generator and enclosure per the plans and specifications.

Bid Item 13 Includes all equipment, labor and materials to a fuel transfer system per the plans and specifications.

Bid Item 14 Include all equipment, material, and Labor, not included in other bid items, to connect and make fully operational, all electrical systems included in this contract.

The names of the principal officers of the corporation submitting this Proposal, or of the partnership, or of all persons interested in this Proposal as principals are as follows:

(If Sole Proprietor or Partnership)

In witness hereto the undersigned has set his (its) hand this ____ day of _____, 20__.

Signature of Bidder

Title (If Corporation)

In witness whereof the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this ____ day of _____, 20__.

Name of Corporation _____

By: _____

Title _____

Construction Contractor's Board No. _____

Attest: _____

Secretary

initial "Bidder will comply with the provisions of ORS 279C.840.

In accordance with ORS 279A.120(b) and as specified in the Invitation to Bid, I hereby affirm that I [__] am [__] am not (check appropriate box) a "resident bidder". Resident Bidder means a bidder that has paid unemployment taxes or income taxes to the State of Oregon during the 12-month period preceding submission of this bid and has a business address in this state.

Attest: _____

Bidder

CITY OF WOODBURN, OR
FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT NAME:	Mill Creek Pump Station, Standby Generator and Phase 1 Upgrades		
PROJECT No:	2018-006-38.1	BID No:	2019-01
BID CLOSING DATE:	April 02, 2020	TIME:	2:00 PM
DISCLOSURE DEADLINE DATE:	April 02, 2020	TIME:	4:00 PM

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

List below the name of each subcontractor that will be furnishing labor or 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. (IF NEEDED, ATTACH ADDITIONAL SHEETS.)

	<u>NAME</u>	<u>DOLLAR VALUE</u>	<u>CATEGORY OF WORK</u>
1		\$	
2		\$	
3		\$	
4		\$	
5		\$	

The above listed first-tier subcontractor(s) are providing labor and/or materials with a Dollar Value equal to or greater than:

- a. 5% of the total contract price or \$15,000 (including all alternates), whichever is greater; or
- b. \$350,000.00 regardless of the percentage of the total Contract Price.

FAILURE TO SUBMIT THIS FORM FILLED OUT 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:** _____
Deliver Form to Agency: _____ CITY OF WOODBURN
Person Designated to Receive Form: _____ CITY ENGINEER
Agency's Address: _____ 190 Garfield Street, Woodburn, OR 97071

**UNLESS OTHERWISE STATED IN THE ORIGINAL SOLICITATION,
THIS DOCUMENT SHALL NOT BE FAXED.**

BID SUBMITTAL CHECKLIST

The following is a checklist of the items that shall be submitted with the Bidder's bid Proposal

- Form of Proposal
- Bid Bond
- First Tier Subcontractor Disclosure Form (Submit within two hours after bid opening time)
- Certification Page
- Addendum(s)

**CITY OF WOODBURN
MILL CREEK PUMP STATION
STANDBY GENERATOR AND PHASE 2 UPGRADES**

PART III

CONTRACT FORMS

CERTIFICATE OF LIABILITY INSURANCE – (Sample)

CONSTRUCTION AGREEMENT – (Sample)

NOTICE OF AWARD – (Sample)

PREFORMANCE BOND FORM

PAYMENT BOND FORM

MAINTENANCE AND WARRANTY BOND FORM

NOTICE TO PROCEED – (Sample)

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

PRODUCER	FAX	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
		INSURERS AFFORDING COVERAGE	NAIC #
INSURED	INSURER A:		
	INSURER B:		
	INSURER C:		
	INSURER D:		
	INSURER E:		

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR ADD'L LTR	INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
		GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR Owners and Cont Prot GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC				EACH OCCURRENCE	\$
						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
						MED EXP (Any one person)	\$
						PERSONAL & ADV INJURY	\$
						GENERAL AGGREGATE	\$
						PRODUCTS - COMP/OP AGG	\$
						Fire Damage (any one fire)	
		AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT (Ea accident)	\$
						BODILY INJURY (Per person)	\$
						BODILY INJURY (Per accident)	\$
						PROPERTY DAMAGE (Per accident)	\$
		GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT	\$
						OTHER THAN EA ACC	\$
						AUTO ONLY: AGG	\$
		EXCESS/UMBRELLA LIABILITY <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE DEDUCTIBLE RETENTION \$				EACH OCCURRENCE	\$
						AGGREGATE	\$
							\$
							\$
							\$
		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below				WC STATU-TORY LIMITS	OTH-ER
						E.L. EACH ACCIDENT	\$
						E.L. DISEASE - EA EMPLOYEE	\$
						E.L. DISEASE - POLICY LIMIT	\$
		OTHER					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

The City of Woodburn, OR its elected and appointed officials, agents, employees and volunteers.

CERTIFICATE HOLDER



City of Woodburn
Public Works Dept.
190 Garfield St.
Woodburn, OR 97071

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

CONSTRUCTION AGREEMENT

THIS AGREEMENT, made this ____ day of _____, 20____, by and between _____, hereinafter called "CONTRACTOR" and the CITY OF WOODBURN, an Oregon Municipal Corporation, hereinafter called "City" or "Owner".

The Contractor, for the consideration hereinafter named, does hereby agree to furnish all materials, equipment, labor and necessary implements for the construction of _____ and doing such other work as is necessary to make an appropriate and complete improvement.

All of said work shall be done according to the terms, conditions, and requirements of the Contract Documents including the: Advertisement of Bids, Contractor's signed Proposal, information to bidders, special specifications, general conditions, standard specifications, general specifications, and plans and Addendum Nos. ____ for said improvement, which Contract Documents by this reference are made a part of this agreement.

Said improvement shall be completed by the date specified in said Contract Documents and if not so completed, unless said time for completion is extended, as provided in the Contract Documents, or if extended, if the same is not completed within time extended, the City will suffer liquidated damages as specified in the Contract Documents, which liquidated damages shall be retained out of any monies due or to become due under this agreement.

Payments shall be made as provided in the Contract Documents. The contract amount, as approved by the Council on _____, 20____, and agreed by the Contractor, is \$_____.

The City will pay the required fee to the Bureau of Labor and Industries equal to one-tenth of one percent (0.1 percent) of the price of this contract, minimum fee in the amount of \$250.00 and maximum fee of \$7,500.00.

The Contractor will pay the prevailing wage rates in accordance with ORS279C.830 and as amended by Davis Bacon and all current amendments as set forth in the Contract.

NOW, THEREFORE, in consideration of the faithful performance of the covenants and agreements hereinbefore made by the Contractor, the City hereby covenants and agrees to pay the Contractor as in said Contract Documents provided.

IN WITNESS WHEREOF, the respective parties hereto have each caused these presents to be executed in duplicate the day and year first above written.

CITY OF WOODBURN, OREGON

ATTESTED: _____
HEATHER PIERSON, *CITY RECORDER* KATHY FIGLEY, *MAYOR*

CONTRACTOR: _____
Organization

By: _____ . Title: _____

NOTICE OF CONTRACT AWARD

PROJECT DESCRIPTION: **Mill Creek Pump Station Standby Generator and Phase 1 Upgrades**

FILE No: **2018-006-38.1**

BID No: **2019-01**

The Owner has considered the bid submitted by you on **July 25, 2019** for the above described work in response to its Invitation to Bid.

You are hereby notified that on **August 12, 2019** the City Council accepted your bid for construction of the work in the amount of **\$XXX,XXX.00**

You are required under the terms of the Notice Inviting Bids and the Information for Bidders to execute the Agreement and furnish bonds and certificates of insurance within **14-calendar days** from the date of this Notice to you.

If you fail to execute said Agreement and furnish said bonds and certificates of insurance within 14-days of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your bid to be abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this **13** of **August, 2019**

By _____ Title _____

Contractor shall fill in all information below this line and return original signed copy

ACCEPTANCE OF NOTICE

Receipt of the foregoing Notice of Award is hereby acknowledged

By: _____

Title: _____

This: _____ day of _____ 2017.

Bond No. _____
Solicitation _____
Project BID#: **2019-01**

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that, _____,
as the Principal, and _____, a corporation organized and
existing under the laws of the State of Oregon, and duly authorized to transact a surety
business in the State of Oregon, as Surety, are held and firmly bound unto the City of
Woodburn, a municipal corporation of the State of Oregon, in the penal sum of
\$_____ Dollars \$_____, lawful money of the United States of
America, for the payment whereof well and truly to be made, we and each of us, jointly
and severally, bind ourselves, our and each of our heirs, executors, administrators
successors and assign, firmly by these presents.

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

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

WHEREAS, the Principal has agreed to perform the Contract in accordance with
the terms, conditions, requirements, plans and specifications, and all authorized
modifications of the Contract which increase the amount of the work, the amount of the
Contract, or constitute an authorized extension of the time for performance, notice of
any such modifications hereby being waived by the Surety,

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH:

That if the Principal herein shall faithfully and truly observe and comply with the
terms, conditions and provisions of the Contract, in all respects, and shall well and truly
and fully do and perform all matters and things undertaken by Contractor to be
performed under the Contract, upon the terms set forth therein, and within the time
prescribed therein, or as extended as provided in the Contract, with or without notice to
the Sureties, and shall indemnify and save harmless the City of Woodburn, the, its
officers, employees and agents, against any direct or indirect damages or claim of every
kind and description that shall be suffered or claimed to be suffered in connection with
or arising out of the performance of the Contract by the Principal or its subcontractors,
and shall in all respects perform said contract according to law, then this obligation is to
be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond nor shall the City
of Woodburn, be obligated for the payment of any premiums.

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

Contractor

BY: _____

TITLE: _____

Surety

By: _____

Attorney-In-Fact

Bond No. _____
Solicitation: _____
Project Bid#: **2019-01**

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that, _____,
as the Principal, and _____, a corporation organized and
existing under the laws of the State of Oregon, and duly authorized to transact a surety
business in the State of Oregon, as Surety, are held and firmly bound unto the City of
Woodburn, a municipal corporation of the State of Oregon, in the penal sum of
\$_____ Dollars \$_____, lawful money of the United States of
America, for the payment whereof well and truly to be made, we and each of us, jointly
and severally, bind ourselves, our and each of our heirs, executors, administrators
successors and assign, firmly by these presents.

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

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

WHEREAS, the Principal has agreed to perform the Contract in accordance with
the terms, conditions, requirements, plans and specifications, and all authorized
modifications of the Contract which increase the amount of the work, the amount of the
Contract, or constitute an authorized extension of the time for performance, notice of
any such modifications hereby being waived by the Surety,

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH:

That if the Principal shall faithfully and truly observe and comply with the terms,
conditions and provisions of the Contract, in all respects, and shall well and truly and
fully do and perform all matters and things by it undertaken to be performed under said
Contract and any duly authorized modifications that are made, upon the terms set forth
therein, and within the time prescribed therein, or as extended therein as provided in the
Contract, with or without notice to the sureties, including the conditions listed in ORS
279.310 to 279.320, and shall indemnify and save harmless the City of Woodburn, its
officers, employees and agents, against any claim for direct or indirect damages of
every kind and description that shall be suffered or claimed to be suffered in connection
with or arising out of the performance of the Contract by the Contractor or its
Subcontractors, and shall promptly pay all persons supplying labor, materials or both to
the Principal or its Subcontractors for prosecution of the work provided in the Contract;
and shall promptly pay all contributions due the State Industrial Accident Fund and the
State Unemployment Compensation Fund from the Principal or its Subcontractor in
connection with the performance of the Contract; and shall pay over to the Oregon

Department of Revenue all sums required to be deducted and retained from the wages of employees of the Principal and its Subcontractors pursuant to ORS 316.167, and shall permit no lien nor claim to be filed or prosecuted against the City of Woodburn on account of any labor or materials furnished; and shall do all things required of the Principal by the laws of this State, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond nor shall the City of Woodburn, be obligated for the payment of any premiums.

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

Contractor

BY: _____

TITLE: _____

Surety

By: _____

Attorney-In-Fact

Bond No. _____
Solicitation _____
Project Bid#: **2019-01**

MAINTENANCE/WARRANTY BOND

KNOW ALL MEN BY THESE PRESENTS that, _____,
as the Principal, and _____, a corporation organized and
existing under the laws of the State of Oregon, and duly authorized to transact a surety
business in the State of Oregon, as Surety, are held and firmly bound unto the City of
Woodburn, a municipal corporation of the State of Oregon, in the penal sum of
\$_____ Dollars \$_____, lawful money of the United States
of America, for the payment whereof well and truly to be made, we and each of us, jointly
and severally, bind ourselves, our and each of our heirs, executors, administrators
successors and assign, firmly by these presents.

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

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

WHEREAS, the Principal has agreed to perform the Contract in accordance with the
terms, conditions, requirements, plans and specifications, and all authorized modifications
of the Contract which increase the amount of the work, the amount of the Contract, or
constitute an authorized extension of the time for performance, notice of any such
modifications hereby being waived by the Surety,

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH:

That the Principal agrees to warrant to the City of Woodburn that the construction is,
and will remain for a period of one (1) year from the date of acceptance, free from defects
in materials and workmanship.

That if the Principal herein shall faithfully and truly observe the terms, provisions,
conditions, stipulations, directions, and requirements of the Contract and shall in all
respects, whether the same be enumerated herein or not, faithfully comply with the same
and shall assume the defense of indemnify and save harmless the City of Woodburn, its
officers, agents, and employees from all claims, liabilities, loss, damage or injury which may
have been suffered or claimed to have been suffered to persons or property directly or
indirectly resulting from or arising out of the operations or conduct of the Principal or any
subcontractor in the performance of the work under the Contract and shall indemnify and
make whole the City for any injury or damage to any street, highway, avenue, or road or
any part thereof, resulting from the operations or conduct of the Principal or any
subcontractor in connection with performance or conduct of the work under the Contract,

and shall in all respects faithfully keep and observe all of said terms, provision, conditions, stipulations, directions, and requirements, then this obligation is void, otherwise, it shall remain in full force and effect.

WITNESS our hand and seals this _____ day of _____, 2017.

Contractor

BY:

TITLE: _____

Surety

By: _____

Attorney-In-Fact

NOTICE TO PROCEED

**PUBLIC WORKS DEPT.
ENGINEERING DIV.**



PROJECT NAME:	Mill Creek Pump Station Standby Generator and Phase 1 Upgrades		
BID #:	2019-01	PROJECT No #:	2018-006-38
AMOUNT:	\$	BEGIN DATE:	
CONTRACTOR:		CCB #:	
ADDRESS:			

You are hereby notified to commence work on the referenced contract, and shall fully complete all of the work of said contract within 120 calendar days.

The completion date is therefore: XXXX, 2019

The contract provides for the assessment of liquidated damages for each consecutive calendar day after the above-established contract completion date that the work remains incomplete in the amount of: \$ _____ per day.

PM for THE CITY OF WOODBURN: Pete Gauthier

DATE: _____

Contractor: *Complete items below this line and return Document to Owner within seven (7) days:*

CONTRACTOR'S ACCEPTANCE OF THIS NOTICE

Receipt of the foregoing Notice to Proceed is hereby acknowledged:

SIGNED: _____

TITLE: _____

DATE: _____

**CITY OF WOODBURN
MILL CREEK PUMP STATION
STANDBY GENERATOR REPLACEMENT**

PART IV

SPECIFICATIONS

GENERAL CONDITIONS

SPECIAL PROVISIONS

APPENDIX A

SEC 00160.15 Common Products Requirements
SEC 00165.92 Special Inspections
SEC 00165.93 Manufactures Field Services
SEC 00165.94 Operation and Maintenance Data
SEC 00165.95 Seismic Anchorage and Bracing
SEC 00265.97 Equipment Testing and Facility Startup
SEC 02535 Metal Fabrication Specification
SEC 03030 Diesel Engine Genset with ATS
SEC 03035 ATS Contactor with Controller
SEC 10100 Flyght Pump Installation
SEC 10200 Piping Gages and Valves
SEC 10300 Sluice Gate Installation
SEC 10500 Maintain Wastewater Flow
SEC 10600 Equipment Demolition and Salvage
SEC 10700 Wet Well Liner

APENDIX B

MILL CREEK PUMP STATION STANDBY
GENERATOR REPLACEMENT

SPECIAL PROVISIONS

WORK TO BE DONE

The Work to be done under this Contract consists of the following at the Mill Creel Pump Station at 150 Newberg Hwy (OR Hwy 214), Woodburn, OR in Marion County:

1. Provide and install an 800kW diesel powered standby generator.
2. Provide a pad/foundation for the new Generator.
3. Provide and install all necessary electrical equipment and transfer switch.
4. Remove existing generator and all unnecessary associated electrical equipment, panels and conduit etc.
5. Provide and install a fuel transfer system to transfer fuel from the existing underground storage to the new Generator base storage tank.
6. Perform additional and incidental Work as called for by the Specifications and Plans.
7. Perform additional and incidental Work as called for by the Specifications and Plans.

APPLICABLE SPECIFICATIONS

The Specifications that are applicable to the Work on this Project is the 2018 edition of the "Oregon Standard Specifications for Construction".

All number references in these Special Provisions shall be understood to refer to the Sections and subsections of the Standard Specifications bearing like numbers and to Sections and subsections contained in these Special Provisions in their entirety.

CLASS OF PROJECT

This is a Municipal Public Works Project.

SEQUENCE OF WORK

The sequence of the work will be the responsibility of the contractor with these exceptions:

1. Installation of the new Generator will be as complete as possible before the existing generator is disconnected and removed to minimize down time.
2. The City will provide a 200kW portable generator to be on standby during the transfer period. The contractor is to verify that it can be connected and is responsible for providing a means to connect it to the pump station prior to disconnecting the existing generator.
3. The contractor is responsible for coordinating, with assistance from the engineer, the work with the Wastewater Plant Supervisor.

Bidders shall modify the General Conditions and Specifications as follows:

PART 00100 – GENERAL CONDITIONS

**SECTION 00110 - ORGANIZATION, CONVENTIONS,
ABBREVIATIONS AND DEFINITIONS**

Comply with Section 00110 of the Standard Specifications modified as follows:

00110.05(a) Grammar - Add the following bullet to the bullet list:

- For the purposes of this Contract, the terms "sidewalk ramp" and "sidewalk ramps" shall respectively refer to and shall be read to mean "curb ramp" and "curb ramps".

00110.05(e) Reference to Websites - Add the following bullet list to the end of this subsection:

- City of Woodburn Public Works Department:
https://www.woodburn-or.gov/?q=public_works
- City of Woodburn Public Works Department Bids and RFPs:
<http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps>
- American Traffic Safety Services Association (ATSSA)
www.atssa.com
- ODOT Construction Section
www.oregon.gov/odot/construction/pages/index.aspx
- ODOT Construction Section - Qualified Products List (QPL)
www.oregon.gov/ODOT/Construction/Pages/Qualified-Products.aspx
- ODOT Estimating
www.oregon.gov/ODOT/Business/Pages/Steel.aspx
- Oregon Legislative Counsel
www.oregonlegislature.gov/lc
- ODOT Procurement Office - Conflict of Interest Guidelines and Disclosure Forms
www.oregon.gov/ODOT/Business/Procurement/Pages/PSK.aspx
- ODOT Procurement Office - Construction Contracts Unit Notice of Intent
www.oregon.gov/ODOT/Business/Procurement/Pages/NOI.aspx
- ODOT Procurement Office - Construction Contracts Unit prequalification forms
www.oregon.gov/odot/business/procurement/pages/bid_award.aspx
- Oregon Secretary of State: State Archives

MILL CREEK PUMP STATION STANDBY
GENERATOR REPLACEMENT

sos.oregon.gov/archives/Pages/default.aspx

- ODOT Traffic Control Plans Unit
www.oregon.gov/ODOT/Engineering/Pages/Work-Zone.aspx
- ODOT Traffic Standards
www.oregon.gov/ODOT/Engineering/Pages/Signals.aspx

00110.20 Definitions – Delete the “3D Engineering Model” and “3D Construction Model” definitions.

Replace the “Agency” definition with the following definition:

Agency – The City of Woodburn Public Works Department – Engineering Division.

Add the following definition:

Agency Website – This is the website of the Public Works Department, Engineering Division as owned, controlled and administrated by the City of Woodburn, OR. The URL being referenced when this term is used shall be the following:

<http://www.ci.woodburn.or.us/?q=blog-categories/bids-and-rfps>

Replace the "Bid Booklet" definition with the following definition:

Bid Booklet - The version that can be accessed and printed from the Agency website.

Replace the “Traveled Way” definition with the following definition:

Traveled Way - That part of the Highway for moving vehicles, exclusive of berms and Shoulders.

SECTION 00120 - BIDDING REQUIREMENTS AND PROCEDURES

Comply with Section 00120 of the Standard Specifications modified as follows:

00120.00 Prequalification of Bidders - Replace this subsection, except for the subsection number and title, with the following:

The Agency will prequalify Bidders according to ODOT's Oregon Administrative Rules and prequalification procedures. A Bidder must file for prequalification and **NO** fee. Prequalification must be renewed annually. Bidders shall make application for prequalification and for required renewals on standard forms available from the ODOT Procurement Office - Construction Contracts Unit website. Bidders shall return the completed application to the Dago Garcia at 190 Garfield St. Woodburn, OR 97071 or e-mail to dago.garcia@ci.woodburn.or.us. No facsimile of Prequalification will be accepted.

Contracts will only be awarded to Bidders who, at the time of Bid Opening, are prequalified in the Class or Classes of Work specified in the Special Provisions, except that a Bidder whose prequalification has been revoked or revised as provided in ORS 279C.430(4) may also be eligible for Award under that statute if the Project was advertised prior to the revocation or revision. The Agency will consider a Bid from a Bidder whose complete application for prequalification has been received by the Public Works Department – Engineering Division Office at least 3 Calendar Days before the opening of Bids. Bidders shall submit Bids in the same company name used on the prequalification application; provided however, if Bidder's legal name has changed since the submittal of its application for prequalification, it shall submit its Bid under its current legal name with the former name referenced by "formerly known as".

The Agency will regularly evaluate the performance of Contractors on its projects for purposes of responding to reference checks, future prequalification and determinations of responsibility.

00120.01 General Bidding Requirements - In the paragraph that begins "Bidders may submit ...", replace the paragraph with the following sentence:

Bidders may submit Bids by paper only. No electronic (e-mail or facsimile) Bids will be accepted.

00120.05 Request for Plans, Special Provisions, and Bid Booklets - Replace this subsection, with the following subsection:

00120.05 Request for Plans, Special Provisions, and Bid Booklets:

(a) Informational Plans and Special Provisions - Informational Project Plans and Special Provisions are available, free of charge, on the Agency's website.

(b) Bidding Plans, Special Provisions, and Bid Booklets - Bidders must submit paper Bids.

(1) Paper Bids - Bidders submitting bids shall access and print Plans, Special Provisions, and Bid Booklets from the Agency's website. Bidders obtaining Plans, Special Provisions,

MILL CREEK PUMP STATION STANDBY
GENERATOR REPLACEMENT

and Bid Booklets must register on Agency's list of "Holders of Bidding Plans". Bids will be considered responsive only if Bidders are registered as "Holders of Bidding Plans".

Delete the paragraph that begins with the following;

"(2) Electronic Bids - Bidders ..."

The Plans, which are applicable to the Work to be performed under the Contract, are included in these Special Provisions.

00120.10 Bid Booklet - In the paragraph that begins "The Bid Section includes all pages after...", add the following bullet to the bullet list:

- Certificate of nondiscrimination regarding ORS 279A.110 and certificate regarding policy and practice against sexual harassment, sexual assault and discrimination against employees who are members of a protected class as required by Chapter 212, Oregon Laws 2017 (House Bill 3060)

00120.30 Changes to Plans, Specifications, or Quantities before Opening of Bids - Replace all "ODOT eBids website" wording in this section with "Agency's website".

Delete "(see 00110.05(e))" wording in this section.

00120.40(a-1) Paper Bids - Replace this subsection, except for the subsection number and title, with the following:

Bidders shall not alter, in any manner, the (paper) documents within the Bid Section that are accessed and printed from the Agency's website. Bidders shall complete the certifications and statements included in the Bid Section of the Bid Booklet according to the instructions. Signature of the Bidder's authorized representative thereon constitutes the Bidder's confirmation of an agreement to all certifications and statements contained in the Bid Booklet. Entries on paper documents in the Bid Section shall be in ink or typed.

The Bidder shall properly complete and bind all the paper documents in the Bid Section, as specified in 00120.10, together with all other required documents that are part of the Bid Booklet, between the front and back covers of the Bid Booklet, except that the Bid Bond is not required if another permissible type of Bid guaranty is provided. (see 00120.40(e))

00120.40(a-2) Electronic Bids – Delete this subsection in its entirety.

00120.40(c-2) Electronic Bid Schedule Entries – Delete this subsection in its entirety.

00120.40(e-2) Bid Guaranty with Electronic Bids - Delete this subsection in its entirety.

00120.40(f) Disclosure of First-Tier Subcontractors - Replace this subsection, except for the subsection number and title, with the following:

Without regard to the amount of a Bidder's Bid, if the Agency's cost range for a public improvement Project in the "Invitation to Bid", or in other advertisement or solicitation documents, exceeds \$100,000, the Bidder shall, within 2 working hours of the time Bids are due

MILL CREEK PUMP STATION STANDBY
GENERATOR REPLACEMENT

to be submitted, submit to the Agency, on a form provided by the Agency, a disclosure identifying any first-tier Subcontractors that will furnish labor or labor and Materials, and whose contract value is equal to or greater than:

- 5% of the total Project Bid, but at least \$15,000; or
- \$350,000, regardless of the percentage of the total Project Bid.

For each Subcontractor listed, Bidders shall state:

- The name of the Subcontractor;
- The dollar amount of the subcontract; and
- The category of Work that the Subcontractor would be performing.

If no subcontracts subject to the above disclosure requirements are anticipated, a Bidder shall so indicate by entering "NONE" or by filling in the appropriate check box. For each Subcontractor listed, Bidders shall provide all requested information. An incomplete form will be cause for rejection of the Bid.

The Subcontractor Disclosure Form may be submitted for a paper Bid (See 00120.05(b-1) either:

By filling out the Subcontractor Disclosure Form printed from the Bid Booklet on the Agency's Engineering Division's website.

Subcontractor Disclosure Forms will be considered late if not received by the Agency within 2 working hours of the time designated for receiving Bids.

The Agency is not responsible for partial, failed, illegible or partially legible facsimile (FAX) transmissions or submittals, and such forms may be rejected as incomplete.

In the event that multiple Subcontractor Disclosure Forms are submitted, the last version received prior to the deadline will be considered to be the intended version.

Bids not in compliance with the requirements of this Subsection will be considered non-responsive.

00120.45 Submittal of Bids – Replace subsections (a) with the following:

00120.45 Submittal of Bids – Bids may be submitted by mail, parcel delivery service, or hand delivery to the office and address and at the time given in the Bid Booklet. Submit Bids in a sealed envelope and marked on the outside of the envelope as required by the Invitation to Bid. Closing time for acceptance of Bids is 2:00:00 p.m. local time on the day of Bid Opening. Bids submitted after the time set for receiving Bids will not be opened or considered. The Agency assumes no responsibility for the receipt and return of late Bids.

00120.45(b) Electronic Bids - Delete this subsection in its entirety.

MILL CREEK PUMP STATION STANDBY
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00120.60(a) Paper Bids - In the paragraph that begins "Information entered into...", replace the words " ODOT Procurement Office" with the words "Agency".

In the paragraph that begins "A Bidder may withdraw...", replace the words "ODOT Procurement Office " with the words "Agency".

00120.60(b) Electronic Bids – Delete this subsection in its entirety.

00120.70 Rejection of Nonresponsive Bids - Add the following bullets to the end of the bullet list:

- The Bidder has liquidated and delinquent debt owed to the State or any department or agency of the State.

SECTION 00130 - AWARD AND EXECUTION OF CONTRACT

Comply with Section 00130 of the Standard Specifications modified as follows:

00130.10 Award of Contract - Replace the paragraph that begins "The Agency will provide Notice of Intent to Award..." with the following bullet:

The Agency will provide Notice of Intent to Award on the Agency's website.

00130.15 Right to Protest Award - Replace this subsection number and title and replace the sentence that begins "Before the Agency will..." with the following number and title and sentence:

00130.15 Right to Protest Award - Adversely affected or aggrieved Bidders, limited to the here apparent lowest Bidders and any other Bidder directly in for Contract Award, may submit to the Agency a written protest of the Agency's intent to Award within 3 working days following posting of the Notice of Intent to Award on the Agency's website. The protest shall specify the grounds upon which it is based.

The Agency is not obligated to consider late protests.

00130.50(a) By the Bidder - In the paragraph that begins "The successful Bidder...", replace the words "ODOT Procurement Office – Construction Contract Unit" with the words "Agency's Project Manager".

SECTION 00140 - SCOPE OF WORK

Comply with Section 00140 of the Standard Specifications.

SECTION 00150 - CONTROL OF WORK

Comply with Section 00150 of the Standard Specifications modified as follows:

00150.15 Construction Stakes, Lines, and Grades: - Replace this subsection number and title with the following number and title subsection:

00150.15 Construction Stakes, Lines, and Grades: The Contractor will provide the Construction Surveying and perform line, grade, cross sections and earthwork slope staking including intersections and match lines and set stakes defining limits for clearing which approximate right-of-way and easements.

Section 00150.15 Construction Stakes, Lines, and Grades: All new construction is relative to existing fixed pipes and structures. The Engineer will assist in defining the location of the reference points, but the Contractor shall be responsible for final location and fit of all equipment. Survey work, if any, will be considered incidental to the Contract

The Contractor shall perform slope staking including intersections and set stakes defining limits for clearing which approximate right-of-way and easements.

The Agency will provide a copy of the design survey to the Contractor.

00150.30 Delivery of Notices - Add the following to the end of this subsection:

For purposes of this subsection, the time zone is Pacific Standard Time (PST) to determine time of receipt of notices and other documents. For purposes of this subsection, non-business days are Saturdays, Sundays and legal holidays as defined by ORS 187.010 and 187.020.

Following Notice to Proceed, all notices and other documents submitted to the Contractor by the Engineer, or to the Engineer by the Contractor, electronically under 00170.08:

- If recorded in Doc Express® as received before 5:00 p.m. PST on a business day it shall be considered as received on the business day on which it was actually received in Doc Express®.
- If recorded in Doc Express® as received on a non-business day, or after 5:00 p.m. PST on a business day, it shall be considered as received at 8:00 a.m. PST on the next business day.

Claims must be submitted on paper documents according to Section 00199.

00150.35 Plans, 3D Engineering Models, Working Drawings, and 3D Construction Models: Remove all of the following words from this subsection "3D Engineering Models, 3D Construction Models.

00150.50(c) Contractor Responsibilities - Add the following subsection:

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00150.50(f) Utility Information:

Contact those Utilities having buried facilities and request that they locate and mark them for their protection prior to construction.

<u>UTILITY</u>	<u>CONTACT PERSON</u>	<u>PHONE NUMBER</u>
Century Link	Josh Fallin	503.399.4931
AT&T	Tom Normoyle	503.588.1899
NWN Gas	Daniel Kizer	503.226.4211ext8166
PGE	Darrin Perkins	503.463.4325
DataVision	Dennis Weddle	503-949-9701
Wave Cable/Internet	Derek Anderson	503.798-6651
City Water	Byron Brooks	503.980.2435
City Sewer Collections and Streets	Curtis Stultz	503.982.5268

<u>UTILITY</u>	<u>CONTACT PERSON</u>	<u>PHONE NUMBER</u>
Republic Services - Solid Waste	Dispatch	503.981.1278
US Postal Service	Kevin McGrory	503.982.0186
First Student - School Bus	Delores Stubblefield	503.982.1427
911 - Non Emergency	Operator/Dispatch	503.982.2340

This Project is located within the Oregon Utility Notification Center area which is a Utilities notification system for notifying owners of Utilities about Work being performed in the vicinity of their facilities. The Utilities notification system telephone number is 811 (or use the old number which is 1-800-332-2344).

Further notify and coordinate with the following:

SECTION 00160.15 – COMMON PRODUCTS REQUIREMENTS

Add this section, see Appendix A

SECTION 00165 - QUALITY OF MATERIALS

Comply with Section 00165 of the Standard Specifications.

SECTION 00165.92 SPECIAL INSPECTIONS

Add this Section, see Appendix A

SECTION 00165.93 MANUFACTURER’S FIELD SERVICES

Add this Section, see Appendix A

SECTION 00165.94 OPERATIONS AND MAINTENANCE DATA SPECIFICATION

Add this Section, see Appendix A

SECTION 00165.95 SEISMIC ANCHORAGE AND BRACING

Add this Section, see Appendix A

SECTION 00165.97 EQUIPMENT TESTING AND FCILITY STARTUP

Add this Section, see Appendix A

SECTION 00170 - LEGAL RELATIONS AND RESPONSIBILITIES

Comply with Section 00170 of the Standard Specifications modified as follows:
Add the following subsection:

00170.04 Patents, Copyrights, and Trademarks - Replace the paragraph that begins " Prior to use of designs, devices, materials, or processes..." with the following paragraph:

Prior to use of designs, devices, materials, or processes protected by patent, copyright, or trademark, the Contractor shall obtain from the Entity entitled to enforce the patent, copyright, or trademark all necessary evidence of Contractor's legal right to use such design, device, material, or process.

00170.05 Assignment of Antitrust Rights - Replace the bullet that reads "ORS 646.725; and" with the following bullet:

- ORS 646.725; or

00170.07 Record Requirements - In the paragraph that begins "For purposes of this Subsection, the term...", replace the words "OAR 731-005-0780" with the words "OAR 734-010-0400".

00170.07(a) Records Required - In the paragraph that begins "These records shall include...", replace the bullet that begins "Contracts or documents of other...", with the following bullet:

- Contracts or documents of other arrangements with any Related Entity as defined in OAR 734-010-0400.

In the paragraph that begins "The Contractor shall include...", replace the words "OAR 731-005-0780" with the words "OAR 734-010-0400".

00170.07(b) Access to Records - In the paragraph that begins "The Contractor shall provide...", replace the words "OAR 731-005-0780(9)" with the words "OAR 734-010-0400(9)".

00170.62 Labor Nondiscrimination - Add the following sentence to the end of this subsection:

It is a material term of this Contract that the Contractor certifies by entering into this Contract that the Contractor has a written policy and practice that meets the requirements described in Chapter 212, Oregon Laws 2017 (House Bill 3060) for preventing sexual harassment, sexual assault and discrimination against employees who are members of a protected class and that the Contractor shall maintain the policy and practice in force during the entire term of this Contract.

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00170.60 Safety, Health and Sanitation Provisions – Add the following paragraph to the end of this subsection:

The Contractor is responsible to require each subcontractor at every tier to comply with the requirements of OAR 437-002-0146, Oregon OSHA’s Confined Space Rule including a copy of all closed permit entry forms to the Agency Project Manager within 24 hours of closing the permit.

00170.70(a) Insurance Coverages - The following insurance coverages and dollar amounts are required pursuant to this subsection:

Insurance Combined Single Limit Annual Aggregate

Coverages	per Occurrence	Limit
Commercial General Liability	\$1,000,000.00	\$2,000,000.00
Commercial Automobile Liability	\$1,000,000.00	(aggregate limit not required)

00170.70(c) Additional Insured - Add the following paragraph and bullet to the end of this subsection:

Add the following as Additional Insureds under the Contract:

- The City of _Woodburn, OR and its officers, agents, representatives, volunteers and employees

00170.72 Indemnity/Hold Harmless - Add the following paragraph and bullets to the end of this subsection:

Extend indemnity, defense and hold harmless to the Agency and the following:

- The City of _Woodburn, OR and its officers, agents, representatives, volunteers and employees

SECTION 00180 - PROSECUTION AND PROGRESS

Comply with Section 00180 of the Standard Specifications modified as follows:

00180.40(a) In General – Add the following bullets to this subsection:

- Street Closures are not allowed in this project.
- Provided and maintain access to all homes, School and Business at all times.
- All work shall be accomplished between 7:00 AM and 7:00 PM every day from Monday through Friday, excluding Legal Holidays.

Add the following subsection:

00180.40(c) Specific Limitations - Limitations of operations specified in these Special Provisions include, but are not limited to, the following:

Limitations	Subsection
Cooperation with Utilities	00150.50
Cooperation with Other Contractors	00150.55
Railways	00170.01(e)
On-Site Work	00180.40(b)
Contract Time	00180.50(h)
Right-of-Way and Access Delays	00180.65
Closed Lanes	00220.40(e)(1)
Special Events	00220.40(e)(2)(b)
Limited Duration Road Closure	00220.40(f)
Road Closure Using Rolling Slowdown Method	00220.40(g)
Regulated Work Areas	00290.34(a)
Noise Control	00290.32
Maintenance Under Traffic	00620.43
Opening Sections to Traffic	00744.51
Opening Sections to Traffic	00745.51

00180.41 Project Work Schedules - After the paragraph that begins "One of the following Type..." add the following paragraph:

In addition to the "look ahead" Project Work schedule, a Type _____ schedule as detailed in the Standard Specifications is required on this Contract.

00180.42 Preconstruction Conference - Add the following paragraph to the end of this subsection:

The Contractor shall conduct a group Utilities scheduling meeting with representatives from the Utility companies involved with this Project and the Engineer before the preconstruction conference. The Contractor shall incorporate the Utilities time needs into the Contractor's schedule submitted at the preconstruction conference.

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00180.50(c) Beginning of Contract Time - Replace this subsection, except for the subsection number and title, with the following:

When the Contract Time is stated in Calendar Days, counting of Contract Calendar Days will begin on the day the Contractor begins On-Site Work as defined in 00110.20.

Add the following subsection:

00180.50(h) Contract Time - There is one Contract Time on this Project as follows:

Complete all Work to be done under the Phase 1 portion of the Contract within 120 calendar days of the "Notice to Proceed" and absolutely not later than August 31, 2020. The Generator portion of the contract is to be complete 30 calendar days after the Contractor receives the generator.

00180.85(b)(1) Single Contract Time - Replace this subsection, except for the subsection number and title, with the following:

The Liquidated Damages per Calendar Day* are 15.0 percent of C divided by T as defined in this Section.

C = The Contractor's Bid amount for the Contract.

T = The total Calendar Days between the latest completion date or time listed under 00180.50(h) in the Solicitation Documents and the Bid Opening that will result in the greatest value for T.

* Calendar Day amounts are applicable when the Contract time is expressed on the Calendar Day or fixed date basis.

SECTION 00190 - MEASUREMENT OF PAY QUANTITIES

Comply with Section 00190 of the Standard Specifications.

SECTION 00195 - PAYMENT

Comply with Section 00195 of the Standard Specifications modified as follows:

00195.10 Payment for Changes in Materials Costs - Replace this subsection with the following subsection:

00195.10 Payment for Changes in Materials Costs – There are no changes in payments for escalation/De-Escalation of materials in this Contract.

Additional work required by the Agency will be negotiated on a case by case basis for all changes in materials costs and shall be agreed upon, in writing, before the work is accomplished.

All materials are subject to change in costs and conditions, as specified in subsection 00195.20 Changes in Plans or Character of Work, including but not limited to:

- Steel Materials Price Adjustment
- Asphalt Cement Price Adjustment
- Fuel Price Adjustment

The Agency reserves all of its rights under the Contract, including, but not limited to, its rights for suspension of the Work under 00180.70 and its rights for termination of the Contract under 00180.90, and this escalation/de-escalation provision shall not limit those rights.

00195.12 Steel Material Price Escalation/De-Escalation – Remove this subsection in its entirety.

00195.50 (1) Progress Payments - Replace the paragraph that begins with “At the same time each month...” of this subsection with the following:

At the same time each month, the Contractor will make an estimate of the amount and value of the Pay Item Work completed. The Contractor will submit this estimation of quantities to the Engineer for agreement on the number of estimated units completed for unit price Pay Items plus the estimated percentage completed of lump sum Pay Items.

00195.50 (2) Value of Materials on Hand – Replace the paragraph that begins with “The Engineer will...” of this subsection with the following:

The Contractor will also make an estimate of the amount and value of acceptable Materials on hand, i.e., already delivered and stored according to 00195.60(a), to be incorporated into the Work and submit this estimation to the Engineer for agreement for Pay Items for this progress payment.

00195.50(b) Retainage - Replace the paragraph that begins "The amount to be retained..." with the following paragraph:

The amount to be retained from progress payments will be 5% of the value of Work accomplished, and will be retained by the Agency until completion of the Work as specified in (c) below.

00195.50(c) Forms of Retainage - Replace this entire subsection through and including 00195.50(3) Bonds, Securities, and Other Instruments with the following:

The Agency will withhold payment of 5% of all progress payments until completion of the project as is described in (c) below.

Insert the following:

00195.50 (c) Release of Retainage – The Agency will make payment to the Contractor after the Contractor has made application for payment to the Engineer upon issuance of the Third Notification.

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00195.50 (e) Withholding Payments – Change (e) to (d) in the title of this subsection.

00195.50 (f) Prompt Payment Policy – Change the (f) to (e) in the title of this subsection.

00195.90(c) No Waiver of Right to Make Adjustment - Replace this subsection, except for the subsection number and title, with the following:

The fact that the Agency has made any measurement, estimate, determination or certification either before or after completion of the Project, Final Acceptance, Agency assumption of possession of the Project Site, determination of satisfactory completion of Pay Items or Work or release of retainage under 00195.50(c) or payment for any part of the Work, shall not prevent either party from:

- Showing the true amount and character of the Work;
- Showing that any measurement, estimate, determination or certification is incorrect;
- Recovering from the other party damages that may have been suffered because the other party failed to comply with the Contract.

SECTION 00196 - PAYMENT FOR EXTRA WORK

Comply with Section 00196 of the Standard Specifications.

SECTION 00197 - PAYMENT FOR FORCE ACCOUNT WORK

Comply with Section 00197 of the Standard Specifications modified as follows:

SECTION 00210 - MOBILIZATION

Comply with Section 00210 of the Standard Specifications.

SECTION 00310 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Comply with Section 00310 of the Standard Specifications.

SECTION 00320 - CLEARING AND GRUBBING

Comply with Section 00320 of the Standard Specifications modified as follows:

00320.40(b)(3) Trees To Be Saved - Replace this subsection with the following subsection:

00320.40(b)(3) Vegetation and Materials to be Saved - The Engineer will designate no work zones and identify and mark trees, existing landscaping, vegetation, or other natural materials to be saved, as shown. Provide and place work zone fencing, from section 00225.12 of the QPL, around designated no work zones and critical root zones of marked trees, as directed. Do not begin construction activity or move equipment into existing landscaped or vegetated areas until the work zone fencing is in place to designate and protect no work and critical root zones.

Do not work within the no work zones or critical root zone of marked trees unless written approval is obtained from the Engineer. Be responsible for all damage to and removal of trees, landscaping, vegetation or other natural materials designated to be saved. Damage will be determined by a specialist selected by the Engineer.

00320.90 Payment - Replace the paragraph that begins "No separate or additional payment..." with the following paragraph:

No separate or additional payment will be made for work zone fencing.

SECTION 00330 - EARTHWORK

Comply with Section 00330 of the Standard Specifications modified as follows:

00330.41(a)(5) Waste Materials - Replace this subsection, except for the subsection number and title, with the following:

Unless otherwise specifically allowed and subject to the requirements of 00280.03, dispose of materials, classed as waste materials in 00330.41(a)(3), outside and beyond the limits of the

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Project and Agency controlled property according to 00290.20. Do not dispose of materials on wetlands, either public or private, or within 300 feet of rivers or streams.

00330.41(a)(9) Excavation Below Grade - Delete subsection 00330.41(a)(9)(c).

SECTION 00331 - SUBGRADE STABILIZATION

Comply with Section 00331 of the Standard Specifications.

SECTION 00405 - TRENCH EXCAVATION, BEDDING, AND BACKFILL

Comply with Section 00405 of the Standard Specifications modified as follows:

00405.12 Bedding - Replace the bullet that begins "3/8" - 0 PCC Fine Aggregate..." with the following bullet:

- 3/8" - 0 PCC fine Aggregate conforming to 02690.30(g).

00415.40 (f) Recording Format and Labeling – Replace this subsection with the following:

SECTION 00440 - COMMERCIAL GRADE CONCRETE

Comply with Section 00440 of the Standard Specifications modified as follows:

Add the following subsection:

00440.01 Terminology - According to 00110.05(a), for the purposes of this Contract, the terms "sidewalk ramp" and "sidewalk ramps" shall respectively refer to and shall be read to mean "curb ramp" and "curb ramps".

Add the following subsection:

00440.02 Abbreviations and Definitions:

ASTV – Actual Strength Test Value – See 02001.02 for definition.

00440.12 Proportions of Commercial Grade Concrete - Replace the bullet that begins "Compressive strength..." with the following bullet:

- **Compressive Strength** - ASTV minimum of 3,000 psi at 28 days

00440.14(d) Hardened CGC - Add the following to the end of this subsection:

The ASTV at 28 Days is the average compressive strength of the three cylinders tested. Discard all specimens that show definite evidence, other than low strength, of improper sampling, molding, handling, curing, or testing. The average strength of the remaining cylinders shall then be considered the test result.

SECTION 00641 - AGGREGATE SUBBASE, BASE, AND SHOULDERS

Comply with Section 00641 of the Standard Specifications

SECTION 02001 - CONCRETE

Comply with Section 02001 of the Standard Specifications modified as follows:

02001.02 Abbreviations and Definitions - Replace this subsection, except for the subsection number and title, with the following:

- ASTV** - Actual Strength Test Value - average of test cylinder compressive strengths
- f'_c - Minimum Specified Compressive Strength at 28 days
- f'_{cr} - Average Compressive Strength Over-design. The average strength required to assure that, with normal variations, the concrete will meet f'_c
- GGBFS** - Ground Granulated Blast Furnace Slag
- HPC** - High Performance Concrete
- HRWRA** - High-Range Water-Reducing Admixture (super-plasticizer)
- PPCM** - Precast prestressed concrete member
- SCM** - Supplementary Cementitious Materials
- SSD** - Saturated Surface-Dry
- w/cm Ratio** - Water-Cementitious Material Ratio
- WRA** - Water Reducing Admixture

Cementitious Materials - Portland cement and supplementary cementitious materials.

High Performance Concrete - Concrete designed for enhanced durability and performance characteristics. High performance concrete is identified on the Plans by the letters "HPC" in front of the concrete class designation (for example, HPC4500 - 1 1/2).

Moderate Exposure - Elevations below 1,000 feet.

Pozzolans - Fly ash, silica fume, and metakaolin.

Severe Exposure - Elevations 1,000 feet and above.

Supplementary Cementitious Materials - Fly ash, silica fume, metakaolin, and ground granulated blast furnace slag.

02001.10 Materials - Replace this subsection, except for the subsection number and title, with the following:

Furnish Materials meeting the requirements of the following:

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Aggregates	02690
Cement.....	02010
Chemical Admixtures.....	02040
Concrete Modifiers	02035
Supplementary Cementitious Materials.....	02030
Synthetic Fiber Reinforcing	02045
Water.....	02020

02001.20(a) Strength - Replace this subsection, except for the subsection number and title, with the following:

Provide concrete meeting the required Classes shown in the Contract Documents. The class of concrete designates the minimum required compressive strength, f'_c at 28 days.

Table 02001-1

Concrete Strength and Water/Cementitious Material (w/cm) Ratio		
Type of Concrete	Strength (PSI)	Maximum w/cm Ratio
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	HPC4500	0.40
	5000 and Above	0.40 ¹
	HPC5000 and above	0.40
Drilled Shaft	4000	0.48
Paving	4000	0.44
¹ PPCM's with cast-in-place decks and no entrained air may have w/cm as follows: 5000 psi - 0.48; 5500 psi - 0.44; 6000 psi and up - 0.42		

02001.30 Concrete Mix Design - Replace the bullet that begins "Cementitious material with modifiers proportioned according..." with the following bullet:

Cement with SCM proportioned according to 02001.31(b) and with trial batches performed to demonstrate that the proposed alternate mix design provides a maximum of 1,000 coulombs at 90 days when tested according to AASTHO T 277.

02001.31 Concrete Constituents - Replace this entire subsection with the following subsection:

02001.31 Concrete Constituents:

(a) Portland Cement - Use AASHTO M 85 or ASTM C150, Type I or II cement for structural or paving concrete. Use AASHTO M 85 or ASTM C150, Type III cement for precast prestressed concrete. Provide all cement from the QPL.

(b) Supplementary Cementitious Materials - SCM may be used separately or in combinations up to the specified maximum percentage by mass according to the following:

Separate SCM	Maximum
Fly Ash + Other Pozzolans	25%
GGBFS	50%
Silica Fume	5%
Combined SCM	Maximum
Fly Ash + Other Pozzolans + GGBFS + Silica Fume	50%*
Fly Ash + Other Pozzolans + Silica Fume	30%*

* Fly ash + other pozzolans shall constitute no more than 25% and silica fume shall constitute no more than 5% of the total weight of cementitious materials.

When silica fume is added to truck mixed concrete, mix the batch a minimum of 100 revolutions at the mixing speed specified by the manufacturer before leaving the batch plant.

(c) Blended Hydraulic Cement - Blended hydraulic cement may be used subject to the limits of 02001.31(b) and 02010.20.

(d) Chemical Admixtures - Use chemical admixtures according to the manufacturer's recommendations. Use WRA in all seal concrete and in Class 5000 concrete or greater. Use HRWRA in all HPC.

Use a superset extender from the QPL in all concrete for bridge decks. Use an appropriate amount to extend the initial set time of the concrete by 90 minutes.

(e) Aggregate - If the nominal maximum size of the coarse Aggregate is not included as a part of the class of concrete, or shown on the Plans, any size from 1 1/2-inch to 3/8-inch nominal maximum size Aggregate may be used according to ACI guidelines except:

Use 1 1/2 inch nominal maximum size Aggregates in bridge deck concrete.

Use 1 1/2 inch nominal maximum size Aggregates in paving concrete unless otherwise indicated.

Use 3/8 inch nominal maximum size Aggregates in drilled shafts unless otherwise indicated.

Proportion all HPC for a minimum coarse Aggregate absolute solid volume according to Table 02001-4:

Table 02001-4
Absolute Solid Volume

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Maximum Nominal Aggregate Size	Cu. Yd. (Aggregate) / Cu. Yd. (Concrete)
3/8"	0.36
1/2"	0.38
3/4"	0.40
1"	0.42
1 1/2"	0.44

Two or more Aggregate products or sources meeting Specifications may be blended to improve concrete properties. Blending non-specification Aggregate Materials, except for gradation, with specification Materials is not allowed.

02001.35 Required Submittals for Mix Designs - Replace this entire subsection with the following subsection:

02001.35 Required Submittals for Mix Designs - Submit the following information for each concrete mix design:

(a) Supplier's Information - Provide the supplier's unique mix design identification number and batch plant location.

(b) Mix Design Constituent Proportions:

- Weight per cubic yard (pounds per cubic yard) of cement, SCM, fine Aggregates and coarse Aggregates (SSD), mix water, concrete modifiers, and chemical admixtures
- Absolute volumes of cement, SCM, fine Aggregates and coarse Aggregates (SSD), mix water, air content, concrete modifiers, and chemical admixtures
- Dosage rates for chemical admixtures (ounces per cubic yard)
- w/cm ratio including all chemical admixtures

(c) Aggregates - Identify the Aggregate source by the ODOT source number. Report current values of the following:

- Bulk specific gravities (SSD)
- Fine Aggregate absorptions
- Coarse Aggregate absorptions
- Dry-rodded density of coarse Aggregates
- Average stockpile gradations
- Fineness modulus of sand used in the mix design calculations

(d) Cement - For each cement used, provide the following:

- Manufacturer
- Brand name
- Type

Source or location plant

QPL product number

(e) SCM - For each SCM used, provide the following:

- Manufacturer

Brand name

Source

Class

QPL product number

(f) Concrete Modifiers - For each concrete modifier used, provide the following:

- Manufacturer

Brand name

QPL product number

(g) Admixtures - For each admixture used, identify the following:

- Manufacturer

Brand name

Design dosage rate

QPL product number

(h) Synthetic Fiber Reinforcing - For each synthetic fiber reinforcing used, provide:

- Manufacturer

Brand name

Design dosage rate

QPL product number

(i) Water - Identify the source of water to be used and provide a certificate of compliance certifying that the water meets the requirements of 02020.10.

(j) Plastic Concrete Tests - Report the temperature, slump, density, air content, yield, and w/cm ratio of the trial batch or the average of these values for the cylinder sets presented for evaluation of a current mix design.

For drilled shaft concrete, report the following additional information:

- The total time estimate from initial batching through drilled shaft placement, including haul time, placing concrete, and temporary casing extraction.

Initial slump test results and subsequent results at 15-minute intervals, verifying a minimum slump of 4 inches is maintained for the total time estimated for drilled shaft

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placement, including temporary casing extraction. Report data in a table or graph format.

(k) Compressive Strength Test Results - Report the individual test results and the ASTV of cylinders from the trial batch for new mix designs. For current designs, provide the individual tests and the average of the cylinder sets presented for evaluation.

(l) Strength Analysis - Provide an analysis, showing all calculations, demonstrating that the mix design meets the requirements of 02001.33.

(m) Quality Control Personnel - Provide the name and certification number of the CCT who prepared the mix design, the QCT who performed the plastic concrete tests and cast the test cylinders, the CSTT who tested the cylinders, and the ODOT certification number of the laboratory where the cylinders were tested.

SECTION 02535 – METAL FABRICATION

Add this Section, see Appendix A

SECTION 03030 – DIESEL ENGINE GENSET WITH ATS

Add this Section, see Appendix A

SECTION 03035 –ATS CONTACTOR AND CONTROLLER

Add this section, see Appendix A

SECTION 03040 – AUTOMATIC FUEL TRANSFER SYSTEM

Add this Section, see Appendix A

SECTION 10100 – FLYGHT PUMP INSTALLATION

Add this Section, see Appendix A

SECTION 10200 – PIPE, GAGES AND VALVES

Add this Section, see Appendix A

SECTION 10300 – SLUICE GATE INSTALLATION

Add this Section, see Appendix A

SECTION 10500 – MAINTAIN WASTEWATER FLOW

Add this Section, see Appendix A

SECTION 10600 – WQUIPMENT DEMOLITION AND SALVEGE

Add this Section, see Appendix A

SECTION 10700 – WET WELL LINER

Add this Section, see Appendix A

Submittals of the following shall be delivered to the Engineer in accordance with Article D(13) of the General Conditions. *NOTE: This list is intended to be a useful guide to the Contractor and not necessarily a definitive list of all items that a submittal may be required on. If requested by the Engineer additional item(s) shall be delivered in the format outlined for review and approval.*

General Conditions:

- Signed Contract
- Signed Notice To Proceed
- Contractor's personnel's contact information & 24-hour emergency number
- Contractors Insurance Certificate(s)
- Schedule of work in flow chart format
- List of Subcontractors
- Copies of government permits (building, electrical, plumbing ODOT right of way, etc.)
- Performance, Payment, Labor and Materials Bonds

Division 2 – Sitework:

- Dust control plan

Division 3 – Concrete:

- Concrete mix design(s)
- Non shrink grout/dry pack
- Debris dumping site location/permit

Division 4 – Streets – NOT USED

Division 5 – Water – NOT USED

Division 6 – Sanitary Sewers

- Maintain existing wastewater flow plan

Division 7 – Storm Sewers – NOT USED

Division 8 – Structures – NOT USED

Division 9 – Miscellaneous – NOT USED

Division 10 – Equipment

- Gages
- Valves
- SS Pipe and fittings
- DI Pipe and Fittings
- Pipe and fittings

**CITY OF WOODBURN
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STANDBY GENERATOR REPLACEMENT**

APPENDIX - A

SPECIAL PROVISIONS SPECIFICATIONS

SPECIAL PROVISIONS

SEC 00160.15 Common Products Requirements
SEC 00165.92 Special Inspections
SEC 00165.93 Manufactures Field Services
SEC 00165.94 Operation and Maintenance Data
SEC 00165.95 Seismic Anchorage and Bracing
SEC 00265.97 Equipment Testing and Facility Startup
SEC 02535 Metal Fabrication Specification
SEC 03030 Diesel Engine Genset with ATS
SEC 03035 ATS Contactor with Controller
SEC 10100 Flyght Pump Installation
SEC 10200 Piping Gages and Valves
SEC 10300 Sluice Gate Installation
SEC 10500 Maintain Wastewater Flow
SEC 10600 Equipment Demolition and Salvage
SEC 10700 Wet Well Liner

SECTION 01165.15
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.2 DESIGN REQUIREMENTS

- A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of latest edition of International Building Code (IBC) by International Code Council.
- B. Wind, snow, seismic, earth, and other design loads shall be shown on the General Structural Note Sheets on the Drawings.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 180 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 110 to 10 degrees F.

SECTION 00165.92
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.1 SUMMARY

- A. This Section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2014 International Building Code, and is in addition to supplement requirements included in Statement of Special Inspections (Plan) shown on Drawings.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. International Code Council (ICC):
 - a. 2014 International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.
 2. American Society of Civil Engineers (ASCE): 7 -05, Minimum Design Loads for Buildings and Other Structures.

1.3 DEFINITIONS

- A. Agencies and Personnel:
1. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 2. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the Project is to be constructed.
 3. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of the building official for inspection of a particular type of construction or operation requiring Special Inspection.
- B. Special Inspection:
1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections

- requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work is being performed.
 3. Special Inspection, Periodic: Part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work has been or is being performed, and at the completion of the Work.
- C. Structural Systems and Components:
1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
 2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of a diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
 3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
 4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
 5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.
- D. Nonstructural Components:
1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to the structure, including braces, frames, struts, and attachments.
 2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
 3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

E. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.4 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1707: None required.
2. Wind-force-resisting systems designated under IBC Section: None required.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection under IBC Section 1707 for Seismic Resistance: Standby Generator.

B. Statement of Special Inspections (Plan): As included in Drawings and in support of the building permit application, the Project specific plan was prepared by the registered design professional in responsible charge. The following identifies elements of the inspection, observation and testing program to be followed in construction of the Work:

1. Special Inspection and testing required by IBC Section 1704 and Section 1708, and other applicable sections and referenced standards therein.
2. Type and frequency of Special Inspection required.
3. Type and frequency of testing required.

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4. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
 5. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
 6. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform Special Inspection and associated testing.
- D. Owner's plan for code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections (Plan) on Drawings and further provided in this Section, is for the sole benefit of Owner and does not:
1. Relieve Contractor of responsibility for providing adequate quality control measures.
 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 3. Constitute or imply acceptance.
 4. Affect continuing rights of Owner after acceptance of completed Work.
- E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor, and Special Inspectors and Professional Observer are on Site but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required due to rejection of materials of in place Work that cannot be made compliant to Contract Document without additional Site visits or testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Provide access to shop or Site for Special Inspection and Testing and Professional Observation.
- B. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 72 hours prior to date of Special Inspection and Professional Observation.
- C. Materials and systems, inclusive, shall be inspected during placement where Continuous Special Inspection is required.
- D. Materials and systems shall be inspected during or at completion of their placement where Periodic Special Inspection is allowed.
 - 1. Periodic Special Inspection shall be performed so that Work inspected after, but not during, its placement can be corrected prior to other related Work proceeding and covering inspected Work.
 - 2. Periodic Special Inspection does not allow sampling of a portion of the Work. All Work shall be inspected.

END OF SECTION

1.4 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by Individual Specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site.
 - 5. Notify Engineer upon arrival for transfer of materials.
 - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.5 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.6 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.
- E. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to

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avoid condensation.

- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.

- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction(AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with finish as approved by Owner.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.

2.2 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil- changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.3 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.1 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing

such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.2 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- G. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.3 FIELD FINISHING

- A. In accordance with individual specification sections.

3.4 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

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3.5 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

END OF SECTION

**SECTION 00165.93 MANUFACTURERS' FIELD
SERVICES**

PART 1 GENERAL

1.1 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.2 SUBMITTALS

- A. Informational Submittals:
- I. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.
 2. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than 21 days prior to scheduled training and revise as necessary for acceptance.
 3. Training Session Recordings: Furnish Owner with two complete sets of recordings fully indexed and cataloged with printed label stating session and date recorded.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.
- B. Representative subject to acceptance by Owner and Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this Section.
- B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time

required to perform specified services shall be considered incidental.

- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.
- F. When specified in individual specification sections, manufacturer's onsite services shall include:
 - I. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 - 3. Providing, on a daily basis, copies of manufacturers' representative field notes and data to Engineer.
 - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.
 - 5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
 - 6. Assistance during functional and performance testing, and facility startup and evaluation.
 - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.

3.2 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When so specified, a Manufacturer's Certificate of Compliance, a copy of which is attached to this Section, shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

3.3 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this Section, shall be completed and signed by equipment manufacturer's representative.
- B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.4 TRAINING

A. General:

- 1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, and component) and as may be required in applicable Specifications.
- 2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 00165.94, Operation and Maintenance Data.
- 3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
- 4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:

- 1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
- 2. Allow for multiple sessions when several shifts are involved
- 3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representative. Adjust schedule for interruptions in operability of equipment.

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- C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
 - 1. Title and objectives.
 - 2. Recommended attendees (such as, managers, engineers, operators, maintenance).
 - 3. Course description, outline of course content, and estimated class duration.
 - 4. Format (such as, lecture, self-study, demonstration, hands-on).
 - 5. Instruction materials and equipment requirements.
 - 6. Resumes of instructors providing training.

- D. Prestartup Training:
 - 1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 00165.94, Operation and Maintenance Data.
 - 2. Complete at least 14 days prior to beginning of facility startup.

- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.

- F. Recording of Training Sessions:
 - 1. Furnish audio and color recording of prestartup and post-startup instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions.
 - 2. Video training materials shall be produced by a qualified, professional video production company.
 - 3. Use DVD format suitable for playback on standard equipment available commercially in the United States. Blu-ray® DVD format is not acceptable without Engineer's prior approval.
 - 4. DVD may contain multiple training sessions. If multiple training sessions included on a DVD, provide with on-screen menu for playback selection.

3.5 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are part of this Specification.
1. Manufacturer's Certificate of Compliance.
 2. Manufacturer's Certificate of Proper Installation.

END OF SECTION

**SECTION 00165.94 OPERATION
AND MAINTENANCE DATA**

PART I GENERAL

1.1 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual specification sections.

1.2 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.3 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.4 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format and on electronic media.

SECTION 00165.95
SEISMIC ANCHORAGE AND BRACING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section covers requirements for seismic anchorage and bracing for equipment and nonstructural components required in accordance with the International Building Code (IBC).

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Institute of Steel Construction (AISC).
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 - 3. International Code Council (ICC): International Building Code (IBC).
 - 4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Seismic Restraint Manual: Guidelines for Mechanical Systems.

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Contractor shall be responsible for designing code required seismic attachments, braces, and anchors to the structure for elements of the architectural, mechanical, and electrical systems included in the Work in accordance with this Section unless a design is specifically provided within the Contract Documents.
 - 2. Contractor shall also be responsible for designing seismic anchorage for modified existing architectural, mechanical, or electrical systems where code requirements would dictate design for similar new components.
- B. Design Requirements:
 - 1. In accordance with 2014 IBC, Section 1613 and Chapter 13 of ASCE 7.
 - 2. Architectural, mechanical, electrical and other nonstructural systems, components, and elements permanently attached to the structure shall be designed to transfer the component seismic forces specified in ASCE 7 Section 13.3.1 to the structure.

3. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2.
4. Seismic anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of Oregon.
5. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of the effective seismic weight of the overall structure.
6. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
7. Design seismic attachments, braces, and anchorages for parts or elements of the architectural, mechanical, and electrical systems in accordance with the provisions of the International Building Code and the following site-specific seismic criteria, unless noted otherwise on the Drawings.
 - a. Site-Specific Spectral Response Coefficients :
 - 1) Short Period Mapped Maximum Considered Earthquake, 5 Percent Damped: S_S equals 0.861g.
 - 2) 1 Period Mapped Maximum Considered Earthquake, 5 Percent Damped: S_1 equals 0.327g.
 - 3) Short Period Design Spectral Response Acceleration, 5 Percent Damped: S_{DS} equals 0.664g.
 - 4) 1 Second Period Design Spectral Response Acceleration, 5 Percent Damped: S_{D1} equals 0.381g.
8. Site Class: D.
9. Seismic Design Category (SDC): D, unless noted otherwise. Same as supporting structure's SDC, as shown on Drawings.
10. Occupancy Category: III, unless noted otherwise. The anchorage and bracing Occupancy Category shall be the same as that for supporting structure as shown on Drawings.
11. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component $I_p = 1.5$.
12. Component Important Factor:
 - a. $I_p = 1.0$, unless noted otherwise.
 - b. I_p shall be taken as 1.5 for components needed for or whose failure could impair continued operation of hazardous or essential facilities.
 - c. I_p shall be taken as 1.5 for components that contain hazardous materials or that are required for life safety to be functional after a seismic event.
 - d. In accordance with ASCE 7, the following are exempt from the requirements of the section for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment.

13. Mechanical and electrical components with I_p equals 1.0 that weigh 400 pounds or less and are mounted 4 feet or less above adjacent finished floor elevation, or are provided with flexible connections between the components and associated ductwork, piping, or conduit.
 14. Mechanical and electrical components with I_p equals 1.0 that weigh 20 pounds or less, are mounted at any height, and are provided with flexible connections to attached ductwork, piping, and conduit.
 15. Distribution systems with I_p equals 1.0 weighing 5 pounds per foot or less.
- C. Support drawings and calculations for electrical distribution components shall be provided if any of the following conditions apply:
1. I_p is equal to 1.5 and conduit diameter is greater than 2.5-inch trade size.
 2. I_p is equal to 1.5 and the total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
 3. Supports are cantilevered up from floor.
 4. Supports include bracing to limit deflection and are constructed as rigid welded frames.
 5. Attachments utilize spot welds, plug welds, or minimum size welds as defined by AISC.
- D. Existing components, systems, and equipment that are modified by the Project requirements and are not exempted by the above section in their final condition shall require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
- E. Other seismic design and detailing requirements identified in ASCE 7, Chapter 13 are required to be provided for new and modified architectural, mechanical and electrical component, system, or equipment.

1.4 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Submit shop drawings with supporting calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.
 - b. Submitted anchorage drawings and calculations are identified as IBC deferred submittals and will be submitted to and accepted by permitting agency prior to installation of component, equipment or distribution system.
 - c. List of architectural, mechanical, and electrical equipment weighing more than 20 pounds, and electrical, piping, and mechanical distribution systems weighing more than 5 pounds per foot shall be anchored, unless specifically exempted hereinafter.

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- d. Manufacturers' engineered seismic hardware product data.
 - e. Seismic attachment assemblies' drawing; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
 - f. List of existing architectural, mechanical, and electrical equipment or component required to be modified by Work required in the Project weighing more than 20 pounds and electrical, piping, or mechanical distribution systems weighing more than 5 pounds per foot in the final retrofitted condition.
 - g. Seismic attachment assemblies' drawing; include connection hardware, braces, and anchors or anchor bolts for modified, nonexempt existing components, equipment, and systems where combination of new and existing systems or component's final condition would require seismic anchorage or bracing under this Specification for new equipment.
 - h. Submittals will be rejected if proposed anchorage method would create an overstressed condition of supporting member. Revise anchorages and strengthening of structural support so there is no overstressed condition.
- B. Informational Submittals:
- 1. Seismic Anchorage and Bracing Calculations: For seismic attachments, braces, and anchorages. Include IBC and project specific criteria as noted on General Structural Note Sheets on Drawing, in addition to manufacturer's specific criteria used for the design; sealed by a civil or structural engineer registered in the State of Oregon.
 - 2. Manufacturer's seismic hardware installation requirements.

PART 2 PRODUCTS

2.1 GENERAL

- A. Attachments and supports transferring seismic loads to structure shall be constructed of materials and products suitable for the application and be designed and constructed in accordance with the design criteria shown on Drawings and nationally recognized standards.
- B. In accordance with Section, 00160.15 Common Product Requirements and, 02530 Metal Fabrications. Source quality control shall be in accordance with the referenced section.
- C. Provide anchor bolts, and concrete and masonry anchors for anchorage of equipment in concrete or masonry in accordance with Section 02530, Metal Fabrications. Size of anchor bolts and anchors, and required minimum embedment and spacing shall be based on calculations submitted by Contractor.
- D. Powder actuated fasteners and sleeve anchors shall not be used for seismic

attachments and anchorage where resistance to tension loads is required. Expansion anchors, other than undercut anchors, shall not be used for nonvibration isolated mechanical equipment rated over 10 hp.

PART 3 EXECUTION

3.1 GENERAL

- A. Make seismic attachments, bracing, and anchorage in such a manner that component seismic force is transferred to the lateral force resisting system of the structure through a complete load path.
- B. Overall seismic anchorage system shall provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Components mounted on vibration isolation systems shall have snubbers in each horizontal direction and vertical restraints where required to resist overturning.
- D. Anchor piping in such a manner as to ensure piping system has adequate flexibility and expansion capabilities at flexible connections and expansion joints. Piping and ductwork suspended more than 12 inches below the supporting structure shall be braced for seismic effects to avoid significant bending of the hangers and their attachments, unless high-deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet.
- E. Tall and narrow equipment such as motor control centers and telemetry equipment shall be anchored at the base and within 12 inches from the top of the equipment, unless approved otherwise by Engineer.
- F. Architectural, mechanical, or electrical components shall not be attached to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Such attachments shall also not be made across building expansion and contraction joints.

3.2 INSTALLATION

- A. Do not install components or their seismic anchorages or restraints prior to review and acceptance by Engineer and permitting agency.
- B. Notify Engineer upon completion of seismic restraints in accordance with Section 00165.92, Special Inspection, Observation, and Testing.

3.3 FIELD QUALITY CONTROL

- A. Field Quality Control shall be in accordance with Section 00165.35, Metal Fabrications.

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END OF SECTION

B. Instructional Manual Format:

1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
2. Size: 8-1/2 inches by 11 inches, m i n i m u m .
3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. Project title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of separate structure as applicable.
 - d. Identify volume number if more than one volume.
 - e. Identity of general subject matter covered in manual.
Identity of equipment number and Specification section.
4. Spine:
 - a. Project title.
 - b. Identify volume number if more than one volume.
5. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
6. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
7. Paper: 20-pound minimum, white for typed pages.
8. Text: Manufacturer's printed data, or neatly typewritten.
9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.

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C. Data Compilation Format:

1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO.OF_", and list:
 - 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:
 - 1) Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

D. Electronic Media Format:

1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on CD.

- b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
- c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.

1.5 SUBMITTALS

A. Informational:

- 1. Data Outline: Submit two copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
- 2. Preliminary Data:
 - a. Submit two copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Resident Project Representative.
 - 3) One copy will be retained in Engineer's file.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in Engineer's file.
 - 3) Resubmit two copies revised in accordance with Engineer's comments.
- 3. Final Data: Submit one data compilation format hardcopy and one electronic media format specified herein.

1.6 DATA FOR EQUIPMENT AND SYSTEMS

A. Content For Each Unit (or Common Units) and System:

- 1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, and terminals).
- 2. As-installed, color-coded piping diagrams.
- 3. Charts of valve tag numbers, with the location and function of each valve.

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4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 - d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
 5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.
 - 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 5) Shutdown instructions for both short and extended duration.
 - 6) Summer and winter operating instructions, as applicable.
 - 7) Safety precautions.
 - 8) Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
 6. Guarantee, Bond, and Service Agreement: In accordance with Section 00195 as modified by special conditions, Closeout Procedures.
- B. Content for Each Electric or Electronic Item or System:
1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.

- d. Interconnection wiring diagrams, including control and lighting systems.
2. Circuit Directories of Panelboards:
3. Electrical service.
4. Control requirements and interfaces.
5. Communication requirements and interfaces.
6. List of electrical relay settings, and control and alarm contact settings.
7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
8. As-installed control diagrams by control manufacturer.
9. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
10. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
11. Manufacturer's printed operating and maintenance instructions.
12. List of original manufacturer's spare parts, manufacturer's current Prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
 - a. Use Maintenance Summary Form bound with this Section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

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1.7 DATA FOR MATERIALS AND FINISHES

- A. Content for Architectural Products, Applied Materials, and Finishes:
 - 1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
 - 2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

- B. Content for Moisture Protection and Weather Exposed Products:
 - 1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 - 2. Instructions for inspection, maintenance, and repair.

1.8 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is part of this Specification.
 - 1. Maintenance Summary Form.

PART2 PRODUCTS (NOT USED)

PART3 EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

Reference Symbol	Shell	Exxon Mobile	Chevron Texaco	BP Amoco	Or Equal
List symbols used in No. 7 above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost
Note: Identify parts provided by this Contract with two asterisks.				

SECTION 00165.97
EQUIPMENT TESTING AND FACILITY STARTUP

PART 1 GENERAL

1.1 DEFINITIONS

- A. Facility: Entire Project, or an agreed-upon portion, including all of its unit processes.
- B. Functional Test: Test or tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- C. Performance Test: Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual sections.
- D. Unit Process: As used in this Section, a unit process is a portion of the facility that performs a specific process function, such as aeration basin, irrigation pump station, wetland lagoon, and blower system.
- E. Facility Performance Demonstration:
 - 1. A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
 - 2. Such demonstration is for the purposes of (i) verifying to Owner entire facility performs as a whole, and (ii) documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Facility Startup and Performance Demonstration Plan.
 - 2. Functional and performance test results.
 - 3. Completed Unit Process Startup Form for each unit process.
 - 4. Completed Facility Performance Demonstration/Certification Form.

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1.3 FACILITY STARTUP AND PERFORMANCE DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with Owner's operations personnel; to include the following:
1. Step-by-step instructions for startup of each unit process and the complete facility.
 2. Unit Process Startup Form (sample attached), to minimally include the following:
 - a. Description of the unit process, including equipment numbers/nomenclature of each item of equipment and all included devices.
 - b. Detailed procedure for startup of the unit process, including valves to be opened/closed, order of equipment startup, etc.
 - c. Startup requirements for each unit process, including water, power, chemicals, etc.
 - d. Space for evaluation comments.
 3. Facility Performance Demonstration/Certification Form (sample attached), to minimally include the following:
 - a. Description of unit processes included in the facility startup.
 - b. Sequence of unit process startup to achieve facility startup.
 - c. Description of computerized operations, if any, included in the facility.
 - d. Contractor certification facility is capable of performing its intended function(s), including fully automatic operation.
 - e. Signature spaces for Contractor and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Facility Startup Meetings: Schedule, project meetings to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement.
- B. Contractor's Testing and Startup Representative:
1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
 2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.

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- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- D. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. Owner will:
 - 1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated.
 - 2. Operate process units and facility with support of Contractor.
 - 3. Provide labor and materials as required for laboratory analyses.

3.2 EQUIPMENT TESTING

- A. Preparation:
 - 1. Complete installation before testing.
 - 2. Furnish qualified manufacturers' representatives, when required by individual Specification sections.
 - 3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certificate of Proper Installation Form, in accordance with Section 00165.93, Manufacturers' Field Services, when required by individual Specification sections.
 - 4. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:
 - a. Owner/Project Name.
 - b. Equipment or item tested.
 - c. Date and time of test.
 - d. Type of test performed (Functional or Performance).
 - e. Test method.
 - f. Test conditions.
 - g. Test results.
 - h. Signature spaces for Contractor and Engineer as witness.
 - 5. Cleaning and Checking: Prior to beginning functional testing:
 - a. Calibrate testing equipment in accordance with manufacturer's instructions.
 - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - c. Lubricate equipment in accordance with manufacturer's instructions.
 - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.

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- e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
 - f. Check power supply to electric-powered equipment for correct voltage.
 - g. Adjust clearances and torque.
 - h. Test piping for leaks.
6. Ready-to-test determination will be by Engineer based at least on the following:
- a. Acceptable Operation and Maintenance Data.
 - b. Notification by Contractor of equipment readiness for testing.
 - c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
 - d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested.
 - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
 - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
 - g. Equipment and electrical tagging complete.
 - h. Delivery of all spare parts and special tools.

B. Functional Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Owner and Engineer in writing at least 10 days prior to scheduled date of testing.
- 3. Prepare Equipment Test Report summarizing test method and results.
- 4. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on .Equipment Test Report.

C. Performance Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Engineer and Owner in writing at least 10 days prior to scheduled date of test.
- 3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
- 4. Type of fluid, gas, or solid for testing shall be as specified.
- 5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.

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6. Prepare Equipment Test Report summarizing test method and results.
7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.

3.3 STARTUP OF UNIT PROCESSES

- A. Prior to unit process startup, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.
- B. Startup sequencing of unit processes shall be as chosen by Contractor to meet schedule requirements.
- C. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- D. Startup shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended for 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- E. Significant Interruption: May include any of the following events:
 1. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
 2. Failure to meet specified functional operation for more than 2 consecutive hours.
 3. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
 4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
 5. As determined by Engineer.
- F. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from beginning again.

3.4 FACILITY PERFORMANCE DEMONSTRATION

- A. When, in the opinion of Engineer, startup of all unit processes has been achieved, sequence each unit process to the point that facility is operational.
- B. Demonstrate proper operation of required interfaces within and between individual unit processes.

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- C. After facility is operating, complete performance testing of equipment and systems not previously tested.
- D. Document, as defined in Facility Startup and Performance Demonstration Plan, the performance of the facility including its computer system.
- E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic and computerized operation.

3.5 SUPPLEMENTS

- A. Supplements listed below, following "End of Section," are a part of this Specification:
 - 1. Unit Process Startup Form.
 - 2. Facility Performance Demonstration/Certification Form.

END OF SECTION

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UNIT PROCESS STARTUP FORM

OWNER: _____ **PROJECT:** _____

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.): _____

Evaluation Comments: _____

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FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM

OWNER: _____ PROJECT: _____

Unit Processes Description (List unit processes involved in facility startup):

Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):

Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor: _____ Date: _____ 20__

Engineer: _____ Date: _____ 20__
(Authorized Signature)

SECTION 02535
METAL FABRICATIONS

PART 1 GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. The Aluminum Association, Inc. (AA): The Aluminum Design Manual.
 2. American Galvanizers Association (AGA): Inspection of Products Hot-Dip Galvanized After Fabrication.
 3. American Institute of Steel Construction (AISC): S329, Allowable Stress Design Specification for Structural Joints using ASTM A325 or A490 Bolts.
 4. American Iron and Steel Institute (AISI): Stainless Steel Types.
 5. American Ladder Institute (ALI): A14.3, Ladders - Fixed - Safety Requirements.
 6. American National Standards Institute (ANSI).
 7. American Society of Mechanical Engineers (ASME): B1.1, Unified- inch Screw Threads (UN and UNR Thread Form).
 8. American Society of Safety Engineers (ASSE): A10.11, Safety Requirements for Personnel and Debris Nets.
 9. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - b. D1.2, Structural Welding Code - Aluminum.
 - c. D1.6, Structural Welding Code - Stainless Steel.
 10. ASTM International (ASTM):
 - a. A36/A36M, Specification for Carbon Structural Steel.
 - b. A48, Specification for Gray Iron Castings.
 - c. A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - d. A108, Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.
 - e. A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - f. A143, Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - g. A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - h. A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

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- i. A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
- J. A240/A240M, Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
- k. A276, Specification for Stainless Steel Bars and Shapes.
- l A278, Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650 Degree.
- m. A283/A283M, Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- n. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
- o. A325, Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
- p. A380, Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- q. A384, Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- r. A385, Practice for Providing High-Quality Zinc Coatings (Hot- Dip).
- s. A489, Specification for Carbon Steel Lifting Eyes.
- t. A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- u. A501, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- v. A563, Specification for Carbon and Alloy Steel Nuts.
- w. A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- x. A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- y. A786/A786M, Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- z. A793, Specification for Rolled Floor Plate, Stainless Steel.
- aa. A967, Specification for Chemical Passivation Treatments for
Stainless Steel Parts.
- bb. A992/A992M, Specification for Steel for Structural Shapes for Use in Building Framing.
- cc. B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B308/B308M, Specification for Aluminum-Alloy 6061-

- T6 Standard Structural Profiles.
- ee. B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 - ff. B632/B632M, Specification for Aluminum-Alloy Rolled Tread Plate.
 - gg. D1056, Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - hh. F436, Specification for Hardened Steel Washers.
 - ii. F468, Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - JJ. F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - kk. F594, Specification for Stainless Steel Nuts.
 - ll. F844, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
 - mm. F1554, Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 - 11. International Code Council (ICC): Evaluation Reports for Concrete and Masonry Anchors.
 - 12. NSF International (NSF).
 - 13. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.27, Fixed Ladders.
 - b. 29 CFR 1926.105, Safety Nets.
 - c. 29 CFR 1926.502, Fall Protection Systems Criteria and Practices.
 - 14. Specialty Steel Industry of North America (SSINA):
 - a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.2 DEFINITIONS

- A. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- B. Exterior Area: Location not protected from the weather by a building or other enclosed structure.
- C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, nor where wall or roof slab is common to a water-holding or earth-retaining structure.
- D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.

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- E. Submerged: Location at or below top of wall of open water-holding structure, such as a basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior below grade wall or roof surface of water-holding structure, open or covered.

1.3 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Metal fabrications, including welding and fastener information.
 - b. Specific instructions for concrete anchor installation, including drilled hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

B. Informational Submittals:

- 1. Concrete and Masonry Drilled Anchors:
 - a. Manufacturer's product description and installation procedures.
 - b. Current test data or ICC Evaluation Report.
 - c. Adhesive Anchor Installer Certification.
- 2. Passivation method for stainless steel members.
- 3. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Adhesive Anchor Installers: Trained and certified by manufacturer.
- 2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as practical, factory assemble items specified herein. Assemblies that due to necessity have to be shipped unassembled shall be packaged and tagged in manner that will protect materials from damage and will facilitate identification and field assembly.
- B. Package stainless steel items in a manner to provide protection from carbon impregnation.

- C. Protect painted coatings and hot-dip galvanized finishes from damage due to metal banding and rough handling. Use padded slings and straps.
- D. Store fabricated items in dry area, not in direct contact with ground.

1.6 SPECIAL GUARANTEE

- A. Manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of sidewalk doors and floor hatches found defective during a period of 5 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

1.7 EXTRA MATERIALS

- A. Delivery: In accordance with Section 00160.15, Common Product Requirements in special

PART2 PRODUCTS

2.1 GENERAL

- A. For hot-dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for A36 steel), limit the maximum silicon content to 0.21 percent and the phosphorous content to 0.03 percent.
- B. Unless otherwise indicated, meet the following requirements:

<u>Item</u>	<u>ASTM Reference</u>
Steel W Shapes	A9926/A9926M
All other Steel Shapes and Plates	A36/A36M
Steel Pipe	A501 or A53/A53M, Type E or S, Grade B
Structural Steel Tubing	A500, Grade B
Stainless Steel:	
Bars and Angles	A276, AISI Type 316(316L for welded connections)

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<u>Item</u>	<u>ASTM Reference</u>
Shapes	A276, AISI Type 304 (304L for welded connections)
Steel Plate, Sheet, and Strip	A240/A240M, AISI Type 316 (316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316, Condition CW
Nuts	F594, AISI Type 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	F1554, Grade 55, with weldability supplement S1.
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436
Aluminum Plates and Structural Shapes	B209 and B308/B308M, Alloy 6061-T6 F468,
Aluminum Bolts and Nuts	Alloy 2024-T4

- C. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Fastener Schedule at end of this Section.

2.2 ANCHOR BOLTS

A. Cast-in-Place Anchor Bolts:

1. Headed type, unless otherwise shown on Drawings.
2. Material type and protective coating as shown in Fastener Schedule at end of this Section.

2.3 CONCRETE AND MASONRY DRILLED ANCHORS

A. General:

1. AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of this section.
2. Current evaluation and acceptance reports by ICC or other similar code organization.
3. Acceptable for use in potable water structures by EPA and local health agencies or NSF.

B. Wedge Anchors:

1. Manufacturers and Products:
 - a. ITW Ramset/Red Head, Addison, IL; Trubolt Wedge Anchor.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Bolt-TZ (KB-TZ) Anchor.
 - c. Powers Fasteners, New Rochelle, NY; Power-Stud +SDI or +SD2 Anchor.
 - d. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt Anchor.
 - e. Wej-It Corp., Tulsa, OK; ANKRtite CCAT Wedge Anchor.

C. Undercut Anchors:

1. Manufacturers and Products:
 - a. USP Structural Connectors; DUC Undercut Anchor.
 - b. Hilti, Inc., Tulsa OK; HDA Undercut Anchor.

D. Adhesive Anchors:

1. Threaded Rod:
 - a. ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.
 - b. Length as required, to provide minimum depth of embedment.
 - c. Clean and free of grease, oil, or other deleterious material.
2. Adhesive:
 - a. Two-component, designed to be used in adverse freeze/thaw environments, with gray color aftermixing.
 - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
 - c. Nonsag, with selected viscosity base on installation temperature and overhead application where applicable.

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3. Packaging and Storage:
 - a. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
 - b. Store adhesive cartridges on pallets or shelving in covered storage area, in accordance with manufacturer's written instructions.
 - c. Cartridge Markings: Include manufacturer's name, product name, material type, batch or serial number, and adhesive expiration date.
 - d. Dispose of cartridges if shelf life has expired.
4. Manufacturers and Products:
 - a. No "fast set" products may be used. Wedge or undercut anchors approved for use in cracked concrete shall be used for sustained direct tension applications such as overhead or cantilevered conditions. Adhesive anchors meeting the requirements of ICC-ES AC308 in long-term creep may be used for direct tension only where approved by Engineer.
 - b. Hilti, Inc., Tulsa, OK; HIT HY 150 MAX-SD Adhesive Anchor System.
 - c. Hilti, Inc., Tulsa, OK; HIT RE 500-SD Adhesive Anchor System.
 - d. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-XP Epoxy-Tie Adhesive.
 - e. Dewalt Powers Fasteners, Brewster, NY; PE1000+ Epoxy Adhesive Anchor System.

2.4 EMBEDDED STEEL SUPPORT FRAMES FOR FLOOR PLATE AND GRATING

- A. Steel angle support frames to be embedded in concrete shall be stainless steel, ASTM A276, AISI Type 316, unless indicated otherwise.
- B. Welded anchors for stainless steel support frames shall also be stainless steel.

2.5 SIDEWALK DOORS

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span. Provide H-20 highway loading capacity where indicated on Drawings.
- B. Component Fabrication:
 1. Access Door Leaf(s): 1/4-inch aluminum diamond pattern plate.
 2. Channel Frame: 1/4-inch thick extruded aluminum trough frame with continuous anchor flange around perimeter. Weld 1-1/2-inch diameter drain coupling to frame trough at front right corner, unless indicated otherwise on Drawings.

3. Safety Grate: Aluminum grating with 300 psf live load capacity, 5-inch by 5-inch grate openings, permanent hinging system that locks grate in 90-degree position, and opening arm with vinyl grip handle and locking device.

C. Door Hardware:

1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed.

- D. Aluminum shall be mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.

E. Manufacturers and Products:

1. Bilco Co., New Haven, CT; J Series.
2. Nystrom Products Co., Minneapolis, MN; FG Series.
3. U.S.F. Fabrication, Hialeah, FL; T Series.
4. ITT Flygt Corporation, Trumbull, CT; FDRN Series.
5. Thompson Fabricating Co., Birmingham, AL; TE Series.
6. Halliday Products, Orlando, FL; WS Series.

2.6 FLOOR HATCHES

- A. Load Capacity: 150 psf minimum with maximum deflection of $\frac{1}{150}$ th of span.

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B. Component Fabrication:

1. Access Door Leaf(s): 1/4-inch thick aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
2. Angle Frame: 1/4-inch thick extruded aluminum angle frame with concrete anchors and integral neoprene gasket strip.

C. Door Hardware:

1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins, through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts. And lockouts.
2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed.

D. Aluminum shall be mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.

E. Manufacturers and Products:

1. New Construction:
 - a. Bilco Co., New Haven, CT; K Series.
 - b. Nystrom Products Co., Minneapolis; MN; FH Series.
 - c. U.S.F. Fabrication, Hialeah, FL; A Series.
 - d. ITT Flygt Corporation, Trumbull, CT; FLE Series.
 - e. Thompson Fabricating Co., Birmingham, AL; TI Series.
 - f. Halliday Products, Orlando, FL; SS Series.
2. Retrofit Construction:
 - a. U.S.F. Fabrication, Hialeah, FL; A-Retrofit Series.
 - b. Nystrom Products Co., Minneapolis, MN; FDE Series.

2.7 LADDERS

A. Flat Bar Ladders:

1. Punch rails, pass rungs through rails, and weld on outside.
2. Weld brackets to the ladder for fastening ladder to wall.

B. Ladder Safety Post:

1. Telescoping tubular, spring balanced and automatically locking in raised position, with release lever for unlocking.
2. Post: Stainless steel, AISI Type 316.
3. Spring Mechanism: Stainless steel.
4. Furnish dissimilar metal protective coatings at connections.
5. Manufacturer and Product: Bilco Co., New Haven, CT; "Ladder Up" to fit ladder rungs.

2.8 ACCESSORIES

A. Antiseizing Lubricant for Stainless Steel Threaded Connections:

1. Resists washout.
2. Manufacturers and Products:
 - a. Bostik, Middleton, MA; Neverseez.
 - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.

B. Neoprene Gasket:

1. ASTM D1056, 2Cl, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on Drawings.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.
4. Manufacturer and Product: Rubatex Corporation, Bedford, VA; Rubatex No. R-411-N.

2.9 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.

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4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Fit and assemble in largest practical sections for delivery to Site.

B. Materials:

1. Use steel shapes, unless otherwise noted.
2. Steel to be hot-dip galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 and 0.25 percent.
3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures - Allowable Stress Design.

C. Welding:

1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
2. Welded fabrications shall be free from twisting or distortion caused by improper welding techniques.
3. Steel: Meet fabrication requirements of AWS D1.1, Section 5.
4. Aluminum: Meet requirements of AWS D1.2.
5. Stainless Steel: Meet requirements of AWS D1.6.
6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D1.1, Section 7, and manufacturer's instructions.
7. Complete welding before applying finish.

D. Painting:

1. Shop prime with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.
2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

E. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143, ASTM A384, and ASTM A385. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.

2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385.
3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A123/A123M.
6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM A153/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
7. Galvanized steel sheets in accordance with ASTM A653.
8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.

- F. Watertight Seal: Where required or shown, furnish neoprene gasket of a type that is satisfactory for use in contact with sewage. Cover full bearing surfaces.
- G. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make comers square and opposite sides parallel.
- H. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.10 SOURCE QUALITY CONTROL

- A. Visually inspect all fabrication welds and correct any deficiencies.
1. Steel: AWS D1.1, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
 2. Aluminum: AWS D1.2.
 3. Stainless Steel: AWS D1.6.
- B. Hot-Dip Galvanizing:
1. An independent testing agency, will be retained by Owner to inspect and test hot-dip galvanized fabricated items in accordance with ASTM A123/A153M and ASTM A153/A153M.
 2. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123/A123M and ASTM A153/A153M.

3. Reject and retest nonconforming articles in accordance with ASTM A123/A123M and ASTM A153/A153M.

PART 3 EXECUTION

3.1 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Install manufactured products in accordance with manufacturer's recommendations.
4. Obtain Engineer approval prior to field cutting steel members or making adjustments not scheduled.

B. Aluminum:

1. Do not remove mill markings from concealed surfaces.
2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
3. Fabrication, mechanical connections, and welded construction shall be in accordance with the AA Aluminum Design Manual.

C. Pipe Sleeves:

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide a center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide a rubber caulking sealant or a modular mechanical unit to form a watertight seal in the annular space between pipes and sleeves.

3.2 CAST-IN-PLACE ANCHOR BOLTS

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.
- B. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.3 CONCRETE AND MASONRY DRILLED ANCHORS

- A. Begin installation only after concrete or masonry to receive anchors has attained design strength.
- B. Install in accordance with manufacturer's instructions.
- C. Provide minimum embedment, edge distance, and spacing as indicated by anchor designer's instructions or shown otherwise on Drawings.
- D. Use only drill type and bit type and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air.
- E. For undercut anchors, use special undercutting drill bit and rotary hammer drill and apply final torque as recommended by anchor manufacturer.
- F. When embedded steel or rebar is encountered in the drill path, slant drill to clear obstruction. If drill must be slanted more than 10 degrees to clear obstruction, notify Engineer for direction on how to proceed.
- G. Adhesive Anchors:
 - 1. Do not install adhesive anchors when temperature of concrete is below 40 degrees F (25 degrees F for Simpson Strong-Tie Acrylic-Tie Adhesive) or above 100 degrees F.
 - 2. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry where required by manufacturer's instructions.
 - 3. For hollow-unit masonry, install screen tube in accordance with manufacturer's instructions.
 - 4. Do not disturb anchor during recommended curing time.
 - 5. Do not exceed maximum torque as specified in manufacturer's instructions.

3.4 ACCESS COVERS

- A. Install access covers, including sidewalk doors, floor hatches, and hinged manhole covers in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor surface.
- C. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.

3.5 ELECTROLYTIC PROTECTION

A. Aluminum and Galvanized Steel:

1. Concealed aluminum, galvanized, and nonferrous alloy surfaces (behind building panels or walls) do not require painting.
2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals.
 - Use Epoxy Primer.
 - Follow coating manufacturer's recommendation for preparation.
 - Apply intermediate and finish coats appropriate for exposure unless indicated otherwise.
3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
4. Allow coating to dry before installation of the material.
5. Protect coated surfaces during installation.
6. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.

B. Stainless Steel:

1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
3. Remove contamination in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

3.6 PAINTING AND REPAIR OF GALVANIZED STEEL

A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.

B. Repair of Damaged Hot-Dip Galvanized Coating:

1. Conform to ASTM A780.
2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780.
3. For flame cut or welded areas, use zinc-based solder, or zinc sticks, conforming to ASTM A780.
4. Use magnetic gauge to determine that thickness is equal to or greater than the base galvanized coating.

3.7 FIELD QUALITY CONTROL

- A. Concrete and Masonry Drilled Anchors: Special inspection and testing will be provided by Owner where indicated on Drawings.

3.8 MANUFACTURER'S SERVICES

- A. Adhesive Anchors: Conduct site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify Engineer of time and place for sessions.

3.9 FASTENER SCHEDULE

- A. Unless indicated otherwise on the Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Anchor Bolts Cast Into Concrete for Structural Steel, Metal Fabrications and Castings		
Interior Dry Areas	Hot-dip galvanized steel headed anchor bolts, unless indicated otherwise	
Exterior and Interior Wet Areas	Hot-dip galvanized or stainless steel headed anchor bolts	
Submerged and Corrosive Areas	Stainless steel, headed anchor bolts with fusion bonded coatings	
2. Anchor Bolts Cast Into Concrete for Equipment Bases		
Interior Dry Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	

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Service Use and Location	Product	Remarks
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating, unless otherwise specified with equipment	
3. Drilled Anchors for Metal Components to Cast-in-Place Concrete (e.g., Ladders, Handrail Posts, Electrical Panels, and Equipment)		
Interior Dry Areas	Zinc-plated or stainless steel wedge or expansion anchors	Use zinc-plated undercut anchors for overhead and ceiling installations
Submerged, Exterior, Interior Wet, and Corrosive Areas	Adhesive stainless steel anchors	Use stainless steel undercut anchors for overhead and ceiling installations
4. Anchors in Grout-Filled Concrete Masonry Units		
Exterior and Interior Wet and Dry Areas	Hot-dip galvanized steel headed anchor bolts, zinc-plated or stainless steel sleeve anchors, or stainless steel adhesive anchors	
5. Anchors in Hollow Concrete Masonry Units		
Exterior and Interior Wet and Dry Areas	Zinc-plated or stainless steel sleeve anchors, or stainless steel adhesive anchors with screen tube	
6. Connections for Steel Fabrications and Wood Components		
Exterior and Interior Wet and Dry Areas	Hot-dip galvanized carbon or Stainless steel bolted connections	

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Service Use and Location	Product	Remarks
7. Connections of Aluminum Components		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	
8. All Others		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on all stainless steel threads.
- C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

**SECTION 03030 DIESEL ENGINE
GENERATOR SET**

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM): A335/A335M, Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service.
2. California Air Resources Board (CARB).
3. Code of Federal Regulations (CRF): Title 40 Volume 18, Control of Emissions from New and In-Use Non-road Compression-Ignition Engines.
4. International Organization for Standardization (DIN/ISO): 9001, Quality Management Systems-Fundamentals and Vocabulary.
5. National Electric Manufacturer's Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - b. MG 1, Motors and Generators.
6. National Electrical Contractors Association (NECA): 404, Recommended Practice for Installing Generator Sets.
7. National Fire Protection Association (NFPA):
 - a. 37, Installation and Use of Stationary Combustion Engines and Gas Turbines.
 - b. 70, National Electric Code.
 - c. 110, Emergency and Standby Power Systems.
8. SAE International (SAE): 11074, Engine Sound Level Measurement.
9. Underwriters Laboratories, Inc. (UL):
 - a. 142, Steel Aboveground Tanks for Flammable and Combustible Liquids.
 - b. 508, Industrial Control Equipment.
 - c. 1236, Battery Chargers for Charging Engine-Starter Batteries.
 - d. 2085, Protected Aboveground Tanks for Flammable and Combustible Liquids.
 - e. 2200, Stationary Engine Generator.

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1.2 SUBMITTALS

A. Action Submittals:

1. Dimensioned outline drawing showing plan and elevations of engine generator set and drive system.
2. Dimensioned outline drawing of generator access platforms, including supporting structural calculations.
3. Paragraph by paragraph specification compliance statement, describing differences between specified and proposed equipment.
4. Engine and generator weight, and anchoring requirements.
5. Catalog information and technical description; include materials for block, heads, valves, rings, cylinders, pistons, crankshaft, and major bearings and wear surfaces.
6. Complete list of accessories provided.
7. Performance curves showing engine efficiency (fuel consumed per kWh output), gross fuel consumption rate, and kW output at design rated output, one-half load, and one-quarter load. Account for design altitude, temperature corrections, and engine parasitic loads.
8. Transient and subtransient reactances per unit.
9. Output waveform and telephone interference factor (TIF).
10. Circuit breaker data, including make model, catalog number, settings, and time current curves.
11. Control panel instrument identification inscriptions.
12. Sample guarantee.
13. Electrical schematic and wiring diagrams for the following:
 - a. Generator control panel.
 - b. Main generator.
 - c. Voltage regulator.
 - d. Battery charging system.
 - e. Governing system.
 - f. Enclosed electrical components.
14. Engine generator set motor starting capability and percent voltage dip curve.
15. Block heater size and voltage.
16. Subbase tank size and dimensions.
17. Noise data for enclosed engine generator at 50 percent, 75 percent, and full load.
18. Seismic anchorage and bracing drawings and cut sheets, as required by Section 00165.95, Seismic Anchorage and Bracing.

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B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 00165.95, Seismic Anchorage and Bracing.
2. Manufacturer's Certificate of compliance with specified EPA requirements in accordance with Section 00165.93, Manufacturers' Field Services.
3. Certification, copies of analyses, or test reports demonstrating appropriate vibration analysis and design in all modes.
4. Component and attachment testing seismic certificate of compliance as required by Section 00165.92, Special Inspection, Observation, and Testing.
5. Certified Factory Test Report.
6. Operation and Maintenance Data: As specified in Section 00165.94, Operation and Maintenance Data.
7. Description of parts and service availability.
8. Manufacturer's Certificate of Proper Installation, in accordance with Section 00165.93, Manufacturers' Field Services.
9. Special guarantee.
10. Air quality permit.

1.3 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.

B. Manufacturer Special Requirements:

1. Generator set shall be listed to UL 2200 or submitted to an independent third party certification process to verify compliance as installed.
2. Manufacturer of generator set shall be certified to ISO 9001 and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

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1.4 AIR QUALITY PERMIT

A. Obtain prior to releasing generator for production. Provided by Engineer.

1.5 SPECIAL GUARANTEE

A. Provide manufacturer's guarantee or warranty with no deductibles and including travel time, service hours, repair parts and expendables (oil, filters, antifreeze and other items required for the complete repair) with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction of the Work specified in this Specification section found defective during a period of 5 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in the General Conditions.

1.6 EXTRA MATERIALS

A. Furnish, tag, and box for shipment and storage the following spare parts and special tools:

<u>Item</u>	<u>Quantity</u>
Diesel fuel line filter elements	3 complete sets per unit
Lubricating oil filter elements with gasket	3 complete sets per unit
Air cleaner filter element	1 complete set
Auxiliary fuel and jacket water pump packing/seals	1 complete set
Cooling fan drive belt (if applicable)	2 complete sets
Hydrometer	1 each
Two-pronged battery voltmeter	1 each
Spare fuses, if used in control panel	1 complete set per unit
Spare indicating lamps (if applicable)	4 each type used per unit
Touch up paint	1 quart each color used
Special tools required to maintain or dismantle engine generator set	1 complete set for each different size unit

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Materials and equipment specified in this section shall be Tier 4i EPA Emissions Standard Compliant products of:
 - 1. Caterpillar.
 - 2. Cummins
 - 3. Generac
 - 4. Kohler

2.2 SERVICE CONDITIONS

- A. Ambient Temperature at Air Intake: 50 degrees C maximum.
- B. Ambient Temperature at Engine Generator Set: 50 degrees C maximum.

2.3 GENERAL

- A. Ratings:
 - 1. Operate at 1,800 rpm.
 - 2. Rated at 800 kW at 0.8 PF, based on specified service conditions.
 - 3. Voltage: 480Y/277 volts, three-phase, 4-wire, 60-Hz.
 - 4. Rated based on standby service.
- B. Emissions:
 - 1. Engines shall meet emission requirements specified in 40 CFR Chapter I Part 89 for off-highway Internal Combustion (IC) engines.
 - 2. Generator shall meet requirements of EPA Tier 4i emissions rating.
- C. Vibration Design:
 - 1. Use vibration analytical techniques to determine shaft critical speeds, and to develop bearing design and shaft balancing to mitigate vibration.
 - 2. Apply torsional analysis and design to mitigate torsional vibration.
 - 3. Engine and generator, individually, shall not exhibit vibration in any plane exceeding 10 mils at continuous rating point, when measured at attachment points to common steel subbase.

2.4 ENGINE

- A. General:
 - 1. Manufacturer's standard design, unless otherwise specified.
 - 2. Engine parts designed with adequate strength for specified duty.

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B. Type:

1. Diesel Cycle, 4-stroke type with unit mounted radiator and fan cooling.
2. Minimum displacement shall be as recommended by generator manufacturer.
3. Minimum number of cylinders shall be as recommended by generator manufacturer.

C. Starting System:

1. Type: Automatic, using 12-volt or 24-volt battery-driven starter acting in response to control panel.
2. Starter shall be capable of three complete cranking cycles without overheating.
3. Batteries:
 - a. Sized as recommended by engine manufacturer.
 - b. Lead-acid type.
 - c. Capable of providing 15 seconds minimum of cranking current at 0 degree C and three complete 15-second cranking cycles at 40 degrees C.
 - d. Housed in acid-resistant frame isolated from engine generator main frame.
 - e. Located such that maintenance and inspection of engine is not hindered.
 - f. Complete with battery cables and connectors.
4. Battery Charger:
 - a. UL 1236 listed and labeled.
 - b. 10-amp automatic float, taper and equalize charge type, with plus or minus 1 percent voltage regulation over a plus or minus 10 percent input voltage variation.
 - c. Temperature compensated to operate over an ambient range of minus 30 degrees C to 50degrees C.
 - d. Locate charger in automatic transfer switch, generator control panel, or wall mounted in generator enclosure. Generator manufacturer shall coordinate location.
 - e. Include:
 - 1) Ammeter and voltmeter.
 - 2) Fused ac input and de output.
 - 3) Power ON pilot light.
 - 4) AC failure relay and light.
 - 5) Low and high de voltage alarm relay and light.
 - f. Alarm relay dry contacts rated 4 amps at 120V ac.
 - g. Wire battery charger status and alarm contacts back to generator control panel, terminate and identify contacts.

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D. Fuel System:

1. Engine driven, mechanical, positive displacement fuel pump.
2. Fuel filter with replaceable spin-on canister element.

E. Governing System:

1. Electro-mechanical or electro-hydraulic type.
2. Regulates speed as required to hold generating frequency within tolerable limits and within 5 percent of nominal design speed.
3. Accessories:
 - a. Manual speed control device.
 - b. Positive overspeed trip switch.

F. Jacket Water Cooling System:

1. Radiator:
 - a. Consisting of jacket water pump, fan assembly, fan guard, and duct flange outlet.
 - b. Cooling System: Rated for full load operation as specified in Article Service Conditions.
 - c. Fan: Suitable for use in a system with 0.5 in H₂O restriction.
 - d. Sized based on a core temperature that is 20 degrees F higher than rated operation temperature.
2. Engine Thermostat: As recommended by manufacturer to regulate engine water temperature.
3. Jacket Water Heater:
 - a. Suitable for operation on 120 volt, single-phase, 60-Hz current.
 - b. Maintain engine water temperature at 120 degrees F with an ambient temperature of 50 degrees F.
 - c. Thermostatically controlled.
4. Engine Cooling Liquid: Fill cooling system with a 50/50-ethylene glycol/water mixture prior to shipping.

G. Lubrication System:

1. Type: Full-pressure.
2. Accessories:
 - a. Pressure switch to initiate shutdown on low oil pressure.
 - b. Oil filter with replaceable element.
 - c. Bayonet type oil level stick.
 - d. Valved oil drain extension

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3. Oil Cooling System: Water-cooled heat exchanger utilizing jacket water.

H. Exhaust System:

1. Muffler: Rated as recommended by generator manufacturer to meet noise requirements specified under Article Sound Attenuation.
2. Wrap exposed length of exhaust pipe and silencer with thermal insulating wrap.
3. Exhaust Pipe: ASTM A335, Grade Pl 1, standard wall, with fittings selected to match piping materials.
4. Pipe Connections: Welded.
5. Engine Connection:
 - a. Flanged, flexible, corrugated, Type 321 stainless steel expansion fitting, specifically suited for diesel exhaust service.
 - b. Length as required for flexibility and expansion in piping arrangement shown on Drawings.

- I. Air Intake System: Equip with dry type air cleaner with filter service (restriction) indicator.

2.5 GENERATOR

A. General:

1. Meet requirements of NEMA MG 1.
2. Synchronous type with 2/3 pitch, revolving field, drip-proof construction, air cooled by a direct drive centrifugal blower fan.
3. Stator Windings:
 - a. Skewed for smooth voltage waveform.
 - b. Reconnectable, 12 lead.
4. Overspeed Capability: 125 percent.
5. Waveform Deviation from Sine Wave: 5 percent maximum.
6. Telephone Interference Factor: 50 maximum.
7. Total Harmonic Current and Voltage Distortion: 5 percent maximum, measured at generator main circuit breaker.

B. Insulation System:

1. Class H, with a maximum rise of 125 degrees Cover 40 degree C ambient in accordance with NEMA MG 1.
2. Vacuum pressure impregnated (VPI).

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- C. Excitation System:
 - 1. Field brushless type or permanent magnet generator (PMG) exciter.
 - 2. PMG and Controls: Capable of providing regulated current, at a rate of 300 percent of nameplate current, to a single-phase or three-phase fault for 10 seconds.

- D. Voltage Regulation:
 - 1. Solid state, three-phase sensing type.
 - 2. Adjustable output voltage level to plus or minus 5 percent.
 - 3. Provisions for proper voltage regulation for existing or future adjustable frequency drives as part of generator load.
 - 4. Conformal coating environmental protection.

- E. Voltage and Frequency Regulation Performance:
 - 1. Steady State Voltage Regulation: Less than plus or minus 1 percent from no load to continuous rating point.
 - 2. NEMA MG 1 Defined Transient Voltage Dip:
 - a. Less than 20 percent at rapid application of rated load.
 - b. Recovery to rated voltage and frequency within 2 seconds following initial load application.
 - 3. Steady State Frequency Regulation: Plus or minus 1.5-Hz overload range.

- F. Short Circuit Capabilities: Sustain 300 percent of rated current for 10 seconds for external three-phase bolted fault without exceeding rated temperatures.

- G. Main Circuit Breaker:
 - 1. Type: Molded case.
 - 2. Current Rating: As recommended by generator manufacturer.
 - 3. Interrupt Rating: 65,000 amps RMS symmetrical at 480 volts.
 - 4. Trips:
 - a. Solid state, RMS sensing.
 - b. Adjustable Functions:
 - 1) Long-time current pickup.
 - 2) Long-time delay.
 - 3) Normal range instantaneous short-time delay.
 - 4) Short-time delay with I²t function.
 - 5) Ground fault delay.
 - 5. Enclosure:
 - a. Rating: NEMA 250, Type 3R.

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- b. Mounted with vibration isolation from engine generator set.

2.6 BASEPLATE

- A. Mount engine generator set on a rigid common steel base frame.
- B. Base frame shall be stiffened to minimize deflections.

2.7 INTEGRAL SUBBASE FUEL TANK

A. General:

1. 2,000-gallon subbase tank for each generator.
2. UL 142 listed and labeled.
3. UL 2085 listed and labeled.
4. Installation shall be in compliance to NFPA 37.
5. Double-walled, steel construction and shall include the following features:
 - a. Emergency tank and basin vents.
 - b. Mechanical level gauge.
 - c. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by engine manufacturer and in compliance to UL 2200 and NFPA 37 requirements.
 - d. Leak detection provisions, wired to generator set control for local and remote alarm indication.
 - e. High and low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.
 - f. Basin drain.
 - g. Integral lifting provisions.

2.8 VIBRATION ISOLATORS

- A. Performance: To meet code requirements specified in Section 00160.15, Common Product Requirements.
- B. Provide vibration isolators, spring/pad type.
- C. Include seismic restraints if required by Site location.

2.9 AUTOMATIC LOAD TRANSFER CONTROL

- A. Automatic run controls shall be suitable for remote interface and control by master load controller. Engine generator set shall start and run upon closure of

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a remote dry contact provided in Section 03035, ATS Contactor with Controls.

2.10 CONTROL SYSTEM

A. Control Panel:

1. Rating: Type 3R.
2. Material: Steel.
3. Instrument Identification: Face label or engraved, black, laminated plastic nameplate with white 1/4-inch-high letters, attached with Type 422 stainless steel screws.
4. UL 508 listed.
5. Tested to meet or exceed IEEE 587 requirements for voltage surge resistance.
6. Controls shall be solid-state, microprocessor based. Control panel shall be designed and built by generator manufacturer and shall provide operating, monitoring, and control functions for generator set.
7. Control Panel mounting height shall not exceed 6 feet 6 inches above where personnel will access panel, Manufacturer shall modify mounting height if a sub-base fuel tank is used.

B. Instrumentation:

1. Type: Suitable for engine-mounted vibration environment.
2. Mounting: Nonshock mounted.
3. Alarm and Signal Contacts: Rated 5 amps at 120V ac, dry.
4. Fault Indication Lamps: Manufacturer's standard. Push-to-test type.

C. Operator Controls and Indicators:

1. HANDCRANK/STOP/AUTO/ENGINE TEST selector switch.
2. Generator voltage adjustment.
3. Voltmeter PHASE SELECTOR switch.
4. Ammeter PHASESELECTOR switch.
5. Voltmeter.
6. Ammeter.
7. FREQUENCY meter.
8. Engine OILPRESSURE indicator.
9. Engine jacket WATER TEMPERATURE indicator.
10. Engine SPEED indicator(RPM).
11. Engine OIL TEMPERATURE indicator.
12. RUNNING TIME indicator.
13. DC battery voltage.

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14. Emergency Stop button.

D. Alarm Indicators with Manual Pushbutton RESET:

1. Low oil pressure.
2. High jacket water temperature.
3. Engine overspeed.
4. Engine overcrank.
5. Low/high de voltage.

E. External Interfaces:

1. Furnish a single, common DPDT relay output upon occurrence of alarm condition.
2. Output: Dry contact rated 5 amps at 120V ac.
3. Accept remote dry start contact closure from automatic transfer switch, rated 10 amps at 32V de.

F. Functional Requirements:

1. Recracking Lockout: When engine fires, starting control shall automatically disconnect cranking control to prevent recracking for a preset period of time after engine stop.
2. Overcranking Lockout: Initiate after four cranking cycles of 10 seconds on and 10 seconds off or provide continuous cranking cycle with crank time limiter.
3. Cooldown timer, adjustable from 5 minutes to 60 minutes.
4. Alarms:
 - a. Low coolant level.
 - b. Low fuel level.
 - c. Low battery voltage
 - d. High battery voltage.
 - e. Battery charger failure.
5. Engine shutdown upon any of the following conditions:
 - a. Engine overspeed.
 - b. Emergency stop button depressed.
 - c. High jacket water temperature alarm setpoint and shutdown setpoint.
 - d. Low oil pressure alarm setpoint and shutdown setpoint.
6. Air Inlet Damper Opening:
 - a. Upon engine start sequence initiation, a normally closed, dry contact, rated 5 amps at 120V ac, from engine start circuit shall open to provide a signal to open air inlet dampers.
 - b. Air inlet dampers shall fail open.

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- G. Special Requirements:
 - 1. Mount battery charger adjacent to control panel facing the same direction.
 - 2. Mount battery charger instrumentation on face of control panel and match generator instrumentation.

- H. Power Requirements: Manufacturer's stands internally connected.

- I. External Engine and Generator Monitoring Points:
 - 1. Provide for analog and discrete signal hardwire connection to the Switchgear Paralleling Controls PLC.
 - 2. Engine and fuel supply monitoring points shall include, but not be limited to:
 - a. RPM.
 - b. Water temperatures.
 - c. Exhaust temperatures.
 - d. Oil pressure and temperature.
 - e. Control system alarms for abnormalities.
 - f. Low fuel level.
 - g. Battery voltage.
 - h. Battery charger alarm.
 - i. Engine running status.
 - J. Remote start warning/horn.
 - k. Run hours.
 - 4. Generator monitoring points shall include, but not be limited to:
 - a. Watts.
 - b. kWhr.
 - c. Vars.
 - d. Amps.
 - e. Generator voltages.
 - f. Exciter alarms.
 - g. Percent load.
 - h. Frequency.

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2.11 OUTDOOR WEATHER-PROTECTIVE ENCLOSURE

A. General:

1. Provide generator set with outdoor enclosure, with generator listed under UL 2200.
2. Package shall comply with requirements of NEC for wiring materials and component spacing.
3. Design total assembly of generator set, enclosure, and subbase fuel tank to be lifted into place using spreader bars.
4. Housing:
 - a. Provide ample airflow for generator set operation at rated load in ambient temperature as specified in Article Service Conditions.
 - b. Doors:
 - 1) Hinged access doors as required to maintain easy access for operating and service functions.
 - 2) Lockable and include retainers to hold door open during service.
5. Roof: Cambered to prevent rainwater accumulation.
6. Openings: Screened to limit access of rodents into enclosure.
7. Electrical power and control interconnections shall be made within perimeter of enclosure.
8. Finishes:
 - a. Prime sheet metal for corrosion protection and finish painted with manufacturer's standard color using a two-step electrocoating paint process, or equal meeting performance requirements specified below.
 - b. Prime and paint surfaces of metal parts. Painting process shall result in coating that meets the following requirements:
 - 1) Primer: 0.5 mil to 2.0 mils thick.
 - 2) Top Coat: 0.8 mil to 1.2 mils thick.
 - 3) Gloss:
 - a) Per ASTM D523, 80 percent plus or minus 5 percent.
 - b) Gloss retention after 1 year shall exceed 50 percent.
 - 4) Crosshatch Adhesion: Per ASTM D3359, 4B-5B.
 - 5) Impact Resistance: Per ASTM D2794, 120-inch to 160-inch pounds.
 - 6) Salt Spray: Per ASTM B117, plus 1,000 hours.
 - 7) Humidity: Per ASTM D2247, plus 1,000 hours.
 - 8) Water Soak: Per ASTM D2247, plus 1,000 hours.
 - c. Painting of hoses, clamps, wiring harnesses, and other nonmetallic service parts shall not be acceptable.

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- d. Fasteners used shall be corrosion-resistant and designed to minimize marring of painted surface when removed for normal installation or service work.
9. Enclosure shall be constructed of minimum 12-gauge steel for framework and 14-gauge steel for panels.
10. Hardware and hinges shall be austenitic stainless steel.
11. Exhaust Silencer:
 - a. Install factory-mounted exhaust silencer inside enclosure.
 - b. Exhaust shall exit enclosure through a rain collar and terminate with a rain cap.
 - c. Exhaust connections to generator set shall be through seamless flexible connections.
12. Maintenance Provisions:
 - a. Flexible coolant and lubricating oil drain lines that extend to exterior of enclosure, with internal drain valves.
 - b. External radiator-fill provision.
 - c. External fuel fill provision (if equipped with a subbased fuel tank).
13. Provide motorized louvers to minimize air flow through enclosure when generator set is not operating. Louvers shall include provisions to prevent accumulation of ice or snow that might prevent operation.
14. Inlet ducts shall include rain hoods.
15. Provide external emergency stop switch that is protected from accidental actuation.
16. Provide alarm horn and strobe at generators. Both alarm for 10 seconds before generator starts.
17. Provide factory mounted and wired electrical distribution panel to serve generator set and enclosure. Provisions required include:
 - a. 100-amp distribution panelboard connected to a 120/240V ac utility service.
 - b. Two duplex GFI receptacles, one inside enclosure, and one weatherproof receptacle on outside of enclosure.
 - c. Two three-way switches controlling three ac lamps mounted in vapor tight and gasketed fixtures.
 - d. Factory-wired normal ac service from panelboard to engine coolant and alternator heaters, and battery charger.
18. Sound Attenuation:
 - a. Provide with sound-attenuated housing which allows generator set to operate at full rated load in an ambient temperature of up to 100 degrees F.
 - b. Enclosure shall reduce sound level of generator set while operating at full rated load to a maximum of 85 dBA at any location 23 feet from generator set in a free field environment when tested in accordance with SAE 11074.
 - c. Insulate enclosure with nonhydroscopic materials.

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2.12 LOAD BANK

- A. Provide temporary portable load bank for testing of generators during startup.

2.13 GENERATOR ACCESS PLATFORMS

- A. Provide access platforms for each generator. Contractor shall design platforms, and submit to engineer for review prior to start of work.

2.14 FACTORY FINISHING

- A. Engine Generator Set and Instrument Panel: Factory-applied primer and two finish coats of manufacturer's standard heat-resistant engine paint.

2.15 FACTORY TESTS

- A. General: Conform to NFPA 110.
- B. Steady Load Test: Test engine generator set at steady load run of 60 minutes minimum duration at 100 percent full-rated load.
- C. Transient Load Test: Conduct transient load test to demonstrate ability to meet load pickup and load release requirements specified.
- D. Harmonic Test: Conduct at full load conditions.
- E. Record and Report:
 - 1. Strip chart recording and full harmonic analysis measuring up to 50th harmonic for both voltage and current and three phases simultaneously.
 - 2. Transient response.
 - 3. Load/speed stability.
 - 4. Engine fuel consumption.
 - 5. Power output.
 - 6. Harmonic analysis.

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PART 3 EXECUTION

3.1 INSTALLATION

- A. Level and securely mount engine generator set in accordance with manufacturer's recommendations.
- B. Install in accordance with NECA 404.
- C. Where applicable, mount engine generator set on vibration isolators in accordance with isolator manufacturer's recommendations.

3.2 FIELD FINISHING

- A. Touch up damaged coating with paint system compatible to existing.

3.3 FIELD TESTS

- A. General: Conform to NFPA 110.
- B. Performance Test:
 - 1. Perform upon completion of installation.
 - 2. Operate 2 hours minimum on load bank prior to energizing plant distribution system.
 - 3. Operate 2 hours minimum on plant distribution system.
 - 4. Manufacturer's representative shall make necessary adjustments.
 - 5. Demonstrate ability of engine generator set to carry specified loads.
 - 6. Demonstrate engine generator set safety shutdowns.
- C. Test Report: Record and report the following:
 - 1. Electric load on generator.
 - 2. Fuel consumption.
 - 3. Exhaust temperature.
 - 4. Ambient air temperature.
 - 5. Safety shutdown performance results.
 - 6. Noise levels at 23 feet.
- D. Post-test Requirements:
 - 1. Make final adjustments.

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2. Replace fuel and oil filters.
3. Check belt drive tensions.
4. Demonstrate proper operation of equipment, including automatic operation with control from automatic transfer switch, to Engineer and Owner.

3.4 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative: Present at Site or classroom designated by Owner for minimum person-days listed below, travel time excluded:
 1. 3 person-days for installation assistance and inspection.
 2. 1 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
 3. 1 person-day for prestartup classroom or Site training.
 4. 1 person-day for facility startup.
 5. 1 person-day for post-startup training of Owner's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by Engineer.
- B. See Section 00165.93, Manufacturers' Field Services.

END OF SECTION

SECTION 03035
ATS CONTACTOR WITH CONTROLLER

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install the low voltage automatic transfer switches having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
1. UL 1008 – Transfer Switches
 2. UL 991 - Tests for Safety-Related Controls Employing Solid-State Devices
 3. NFPA 70 – National Electrical Code
 4. NFPA 99 – Essential Electrical Systems of Health Care Facilities
 5. NFPA 110 – Emergency and Standby Power Systems
 6. NEMA ICS 10 – AC Transfer Switch Equipment
 7. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
1. Front view and plan view of the assembly
 2. Schematic diagram
 3. Conduit space locations within the assembly.
 4. Assembly ratings including:
 - a. Withstand and Closing rating
 - b. Voltage
 - c. Continuous current rating
 - d. Short-Time rating if applicable
 - e. Short-circuit rating if ordered with integral protection
 5. Cable terminal sizes
 6. Product Data Sheets.
- B. Where applicable, the following additional information shall be submitted to the Engineer:
1. Busway connection
 2. Connection details between close-coupled assemblies
 3. Composite front view and plan view of close-coupled assemblies

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1.05 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
 - 1. Final as-built drawings and information for items listed in section 1.04
 - 2. Wiring diagrams
 - 3. Certified production test reports
 - 4. Installation information
 - 5. Seismic certification as specified
- B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

1.06 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Provide Seismic tested equipment as follows:
 - 1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest International Building Code (IBC).
 - 2. The IP rating of the equipment shall be 1.5
 - 3. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
 - a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
 - b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
 - c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

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1.07 REGULATORY REQUIREMENTS

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment

1.08 DELIVERY, STORAGE AND HANDLING

1.09

1.01 FIELD MEASUREMENTS

- A. Verify space is adequate

1.02 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

1.10 EXTRA PRODUCTS

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton
- B. Schneider Electric
- C. Kohler/Square D
- D. Cummins/Onan
- E. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer ten (10) days prior to bid date.

2.02 CONSTRUCTION

- A. Power Switching Device
 1. Switching devices shall be momentarily energized solenoid operated contactor type mechanisms. All Contactors shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating.
 2. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. Main contacts shall be mechanically held in position in both normal and emergency positions.
- B. Transfer switches shall be open transition and provided with an in-phase monitor feature which will permit a transfer or re-transfer between two live sources that have

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a phase angle difference of +/- 8 degrees or less. In the event that the switch cannot transfer in-phase, the switch will default to a time delay in neutral transfer adjustable 0-120 seconds.

- C. The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized.
- D. Contactors or components not specifically designed, as an automatic transfer switch will not be acceptable.
- E. The switching panel shall consist of the contactor assembly and a separate control or transformer panel. The transformer shall be multi-tap for ease of voltage adjustment in the field. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.
- F. Transfer switches will be supplied with a manual-operating handle. Manual operation, using handle, shall only be performed with the switch de-energized.
- G. On transfer switches requiring a fourth pole for switching the neutral, the neutral shall be identical to the other power poles. Switched neutral poles which are add-on or overlap, or that are not capable of breaking full rated load current are not acceptable.
- H. On transfer switches requiring a solid neutral, the neutral shall be fully rated.

2.03 MICROPROCESSOR LOGIC

- A. The transfer switch shall be equal to an Eaton ATC-900 type microprocessor-based controller. The controller shall be hardened against potential problems from transients and surges. Operation of the transfer switch and monitoring of both sources shall be managed by the controller.
- B. The automatic transfer switch controllers shall meet or exceed the following standards in addition to the basic switch standards:
 - 1. IEC 61000-4-2 - EMC Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
 - 2. IEC 61000-4-3 - EMC Testing and Measurement Techniques - Radio-frequency, Electromagnetic Field Immunity Test
 - 3. IEC 61000-4-4 - EMC Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test
 - 4. IEC 61000-4-5 - EMC Testing and Measurement Techniques - Surge Immunity Test
 - 5. IEC 61000-4-6 - EMC Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields
 - 6. IEC 61000-4-11 - EMC Testing and Measurement Techniques - Voltage Dips, Short Interrupts and Voltage Variations Immunity Tests
 - 7. CISPR11, Class B - Industrial, Scientific and Medical Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement.
 - 8. FCC Part 15, Subpart B, Class B

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2.04 ENCLOSURE

- A. Transfer switch shall be provided in a NEMA 3 enclosure suitable for use in environments indicated in the drawings.
- B. NEMA 3 enclosure shall be painted with the manufacturer's standard light gray ANSI 61 paint.

2.05 CONTROLLER DISPLAY AND KEYPAD

- A. The microprocessor-based controller display shall be UV resistant and include a 4.3 inch Color TFT (480x272), backlit display. The controller shall be capable of displaying transfer switch status, parameters, and diagnostic data. All set point parameters shall be password protected and programmable using the controller keypad, USB port, or remotely using serial port access. Limited abbreviations or codes shall be used for transfer switch functions.
- B. The microprocessor-based controller shall include a mimic bus display consisting of six (6) individual LED's (3mm) for indicating the following:
 - 1. Availability status of source 1
 - 2. Availability status of source 2
 - 3. Connection status of source 1
 - 4. Connection status of source 2
 - 5. Source 1 Preferred
 - 6. Source 2 Preferred

2.06 VOLTAGE AND FREQUENCY SENSING

- A. The controller shall have a voltage range of 0-790 volts (50/60 Hz) with an accuracy of +/- 1% of the reading and a frequency range of 40-70 Hz with an accuracy of +/- .3 Hz.
- B. Voltage and frequency dropout and pickup parameters are set as a percentage of the nominal voltage as indicated in the table below.

Setpoint	Sources	Dropout	Pickup
Undervoltage	Source 1 and 2	70 – 97%	(DO + 2%) - 99%
Overvoltage	Source 1 and 2	105 – 110%	103% - (DO – 2%)
Underfrequency	Source 1 and 2	90 – 97%	(DO + 1Hz) – 99%
Overfrequency	Source 1 and 2	103 – 105%	101% - (DO – 1Hz)
Voltage Unbalance	Source 1 and 2	5 – 20%	(UNBAL DO% - 2) – 3%

- C. The normal and emergency sources shall include phase reversal protection. The preferred rotation is programmable as ABC or CBA.

2.07 TIME DELAYS

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- A. A time delay shall be provided on transfer to source 2, adjustable from 0 to 166 minutes.
- B. A time delay shall be provided to override a momentary power outage or voltage fluctuation, adjustable from 0 to 120 seconds.
- C. A time delay shall be provided on retransfer from source 2 to source 1, adjustable from 0 to 166 minutes.
- D. A time delay shall be provided after retransfer that allows the generator to run unloaded prior to shutdown, adjustable from 0 to 166 minutes.
- E. A time delay shall be provided for engine failure to start, adjustable 0- 6 seconds.
- F. All delays shall be field adjustable from the microprocessor-based controller without the use of special tools.

2.08 ADDITIONAL FEATURES

- A. One Form C contact for closure of the source 1 generator start circuit for optional use with a dual generator system. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- B. One Form C contact for closure of the source 2 generator start circuit. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- C. The controller shall include two independently programmable Engine Exercisers, selectable as disabled, 7, 14, or 28 day interval, or by calendar date. Run time shall be adjustable for 0-600 minutes, with or without load. Upon loss of source 2 power, the ATS shall automatically return to source 1. Transfer time delays shall also be independently programmable for test events.
- D. The controller shall include a keypad pushbutton to initiate a system test.
- E. The controller shall include 4 user configurable inputs. Each input provides 50 volts at 10ma and can be user configured to one of the following features:
 - 1. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
 - 2. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
 - 3. Input to accept a remote contact which opens to inhibit transfer to source 2.
 - 4. Input to enable monitor mode to disable automatic operation of the transfer switch while continuing to display status. Monitor mode allows set point programming at the controller display.
 - 5. Input to enable lockout feature to disable automatic operations of the transfer switch following an overcurrent trip of an integral circuit breaker.
 - 6. Input to enable or disable manual retransfer to source 1.
 - 7. Input to initiate manual retransfer to source 1.
 - 8. Input to initiate a remote engine test. The test will run using the programmed engine test set points.
 - 9. Input to select source 1 or source 2 as the preferred source.

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10. Input to initiate a remote load test.
 11. Input to indicate the bypass transfer switch is closed on a source.
 12. Input to bypass time delays
 13. Input to receive engine start signal from a master controller in a three source application.
- F. The controller shall include 4 user configurable outputs rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc. Each input can be user configured to one of the following features:
1. Source 1 connected
 2. Source 2 connected
 3. ATS in test
 4. ATS not in automatic mode (Monitor Mode)
 5. General Alarm indication for failure to transfer, mechanical fault, or electrical fault.
 6. Engine Test Aborted
 7. Engine cool down in process
 8. Engine start contact status
 9. Emergency inhibit on
 10. Load sequence – Output used to signal select loads to disconnect prior to transfer and reconnect 0-120 seconds after. Loads are reconnected sequentially.
 11. Selective load shed – Output used to shed low priority loads when the load reaches a programmed threshold value. A load shed and load restore set point (measured in kW) are associated with this feature.
 12. Load bank control – Output to disconnect a load bank during an engine run test if a transfer to a source 2 generator is required.
 13. Pre and/or post transfer signal - A pre and or post transfer time delay output adjustable from 0-120 seconds.
- G. One Form C auxiliary contact to indicate Source 1 position and one Form C contact to indicate source 2 position. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- H. One Form C contact for Source 1 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- I. One Form C contact for Source 2 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- J. Data Logging
1. Historical Data Storage to include:
 - a. Engine Run Time
 - b. Source 1 Available time
 - c. Source 2 Available time
 - d. Source 1 Connected time
 - e. Source 2 Connected time
 - f. Source 1 Engine Run Time
 - g. Source 2 Engine Run Time
 - h. Load Energized Time
 - i. Number of Transfers

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2. Event Summary shall include up to 100 date and time stamped events. All metered values are logged for each event. Event summaries include:
 - a. Transfer events
 - b. Alarms
 - c. Changes to the set points
 - d. Changes to the time/date
 - e. Resetting a historical counter
 - f. Engine Run test
3. Event Details shall include up to 350 date and time stamped events. All metered values are logged for each event. Event details include detailed sequence of operations of a transfer event.
4. Event recording shall capture 4 seconds of metered data, stored every 20 msec for certain events. The data is captured 2 seconds before and 2 seconds after the event. Oscillographic data for 10 events is stored and may be downloaded over USB. Events Include:
 - a. Source unavailability actions that initiate a transfer sequence (Undervoltage, Overvoltage, etc.)
 - b. Successful transfers (at the point of breaker/contactors closure)
 - c. Unsuccessful transfers (at the point of breaker/contactors failure to close or open)

2.01 OPTIONAL ACCESSORIES

- A. Non-Automatic Control: Provide a 2-Position Selector Switch, maintained contact, marked: "Automatic" and "Non-Automatic". The transfer switch shall be transferred by actuating a two position maintained selector switch labeled "Source 1" and "Source 2". A 30mm pilot light shall be provided labeled "Not in Automatic".
- B. Device panel mounted selector switch to initiate a load transfer to source 2. This operation shall be failsafe to initiate an automatic retransfer upon loss of source 2 power.
- C. Communications Interface to be Modbus TCP/IP.
- D. Where indicated on the drawings, provide a 50KA surge protection device on source 1.
- E. Integrated Load Metering – The controller shall include integral load metering. When included, metered values shall be viewable from the controller LCD display.
 1. Source 1 Voltages (3Φ)
 2. Source 2 Voltages (3Φ)
 3. Load Voltages (3Φ)
 4. Source 1 Frequency
 5. Source 2 Frequency
 6. Load Frequency
 7. Load Currents (3Φ)
 8. Load kW

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9. Load kVar
10. Load kVA
11. pF

PART 3. ADDITIONAL REQUIREMENTS

3.01 WITHSTAND AND CLOSING RATINGS

- A. The transfer switch shall have a specific breaker withstand and closing rating of 65 KA at 480 volts.

PART 2 EXECUTION

4.01 EXAMINATION

4.02 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. Insulation check to ensure the integrity of insulation and continuity of the entire system
2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards
3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances
4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic.

- B. The manufacturer shall provide a certified copy of factory test reports.

- C. Transfer switch shall include a label indicating order number, catalog number and date

1. Insulation check to ensure the integrity of insulation and continuity of the entire system
2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards
3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances
4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic

4.03 INSTALLATION

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- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings
- B. All necessary hardware to secure the assembly in place shall be provided by the contractor

4.04 FIELD QUALITY CONTROL

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the contractor in installation and start-up of the equipment specified under this section for a period of 2 working days. The manufacturer's representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

4.05 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. The Contractor shall provide a copy of the manufacturer's representative's certification.

4.06 TRAINING

- A. The Manufacturer's qualified representative shall conduct a training session for up to five (5) owner's representatives for one (1) normal workdays at a jobsite location determined by the owner. The training program shall consist of the instruction on the operation of the transfer switch and the major components within the assembly.

4.07 FIELD SERVICE ORGANIZATION

- A. The manufacturer of the ATS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.

END OF SECTION

SECTION 03040

AUTOMATIC FUEL TRANSFER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Conditions including Special Provisions of the Contract, apply to this Section.

1.2 WORK INCLUDED

- A. Provide an integrated emergency power fuel system with a minimum capacity of 100gph or 1.5 time the rated consumption of the generator engine at full load and located outside the building next to the generator enclosure. Detailed system design, equipment, installation inspection, startup, and training to be the responsibility of a single specialized fuel system supplier. The specification section includes responsibility for mechanical, electrical, and control systems.
- B. The system shall be in accordance with design standards and shall be designed and built to N+1 redundancy against failure.
- C. Shall include
 1. Connection to existing 2000 gallon in ground fuel storage tank.
 2. Connection to fuel day tank, 2000 gallon generator base tank.
 3. Fuel distribution pipe, valves and fittings.
 4. Fuel transfer and control - duplex pump sets.
 5. Tank level and leak monitoring system.
 6. Tank fill with spill containment.
 7. Fuel filtration system.
 8. Heating system.
 9. Provide an exterior enclosure
- D. All work shall be installed in accordance with all local and State codes.

1.3 RELATED SECTIONS

- A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.4 REFERENCES

- A. ASME B31 - American National Standard Code for Power Piping.
- B. API 650 - Welded Steel Tanks for Oil Storage.
- C. API 2000 - Venting atmospheric and Low Pressure Storage Tanks.
- D. NFPA 30 - Flammable and Combustible Liquids Code.
- E. NFPA 70 - National Electric Code.

- F. PEI/RP100- Recommended Practices for Installation of Underground Liquid Storage Systems
- G. PEI/RP200- - Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling
- H. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids.
- I. UL 508A - Standard for Industrial Panels of 600 V or less.
- J. UL 2085 - Protected Aboveground Tanks for Flammable and Combustible Liquids.
- K. Uniform Fire Code: Article 52, Article 79 and Appendix II-F.
- L. BOCA Fire Prevention Code

1.5 SUBMITTALS

- A. Mechanical System Design: Indicate system layout, pipe sizes, and location of supports, elevations, and equipment mounting details. . Provide a piping and instrument diagram for the system including a complete bill of material/ equipment list including exterior enclosure specifications.
- B. Control System Design: Provide control system designs including job specific electrical drawings, panel physical layout, and field wiring diagrams.
- C. Structural Design: Provide drawings of reinforced concrete tank foundation slabs. Provide drawings of structural steel for walkways or pipe trestles where required.
- D. Calculations: Provide calculations for pump selection, pipe sizes, and pipe support requirements. Provide calculations for size and thickness of tank hold down slab and straps.
- E. Equipment Data: Provide manufacturer's information for all equipment.
- F. Permit Applications: Provide copies of all permit applications.
- G. Schedule: Provide a design and installation schedule.
- H. Commissioning: Provide a detailed commissioning plan.
- I. Project Record Documents
 - 1. Record and submit actual location of piping system, storage tanks, wiring, conduit runs and system components.
- J. Operation and Maintenance Manuals
 - 1. Operation Data: Include installation instructions and exploded assembly views.
 - 2. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.7 QUALITY ASSURANCE

- A. Comply with NFPA 30 "Flammable and Combustible Liquids Code" for design and construction, installation, inspection, and testing of fuel system components and accessories.
- B. Comply with NFPA 31 "Installation of Oil Burning Equipment" for the same as item A. above.
- C. Comply with NFPA 70 "National Electric Code" for equipment, wiring, and conduit installed under this section.
- D. For Industrial Electrical Panels, comply with UL 508A.
- E. Provide equipment and accessories that are listed and labeled.

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- F. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

1.8 QUALIFICATIONS

- A. The transfer pump supplier shall provide evidence of sufficient experience designing and building fuel transfer systems, professional liability and pollution liability insurance.

1.9 REGULATORY REQUIREMENTS

- A. Comply with requirements of the EPA and other state and local authorities having jurisdiction. Include permitting and registering of fuel storage tank.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading and transporting units.
- B. Protect all equipment from damage after arrival at site.

PART 2 - PRODUCTS

2.2 FUEL DISTRIBUTION PIPE- ABOVEGROUND (in areas not specified to be double wall).

- A. General
 - 1. Provide and install steel piping aboveground as indicated on the drawings:
 - a. In areas not specified to be double wall.
 - b. In areas specifically noted to be single wall.
 - 2. Fuel pipe connections shall be welded except where required to be threaded at tanks or specialized valves.
- B. Design Criteria
 - 1. Steel Pipe: ASTM A53, Schedule 40 black.
 - 2. Fittings: ASTM B16.3, 150 lb. threaded malleable iron, or A105, forged steel welding type.
 - 3. Finish: Prime and finish paint with industrial enamel.
- C. Accessory Equipment
 - 1. Unions: 300 lb. malleable iron threaded unions.
 - 2. Ball Valves: Bronze construction, two piece body, stainless steel ball and stem.
 - 3. Motorized Ball Valves: Bronze body, stainless steel ball and stem, proof of closure and open switches.
 - 4. Swing Check Valves: Bronze body, bronze swing disc, threaded ends.
 - 5. Anti-Siphon Valves: Bronze body, bronze poppet, factory set non-field adjustable spring loaded, threaded ends, size to pump flow rate, UL Listed only.

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6. Solenoid Valves: Forged Brass, Minimum 5 PSIG pressure differential, normally closed or open per plans, similar to Preferred Utilities # 13240-1.
7. Anti-Siphon Valve: Furnish and install at the high point of the oil suction line a UL listed and labeled Anti-Siphon Valve. Valves that do not have an Underwriters Laboratory certification, listing and label and do not conform to Local, State and Federal Fire Codes shall not be acceptable. The valve shall automatically shut off the oil flow in the event of a broken or inadvertently left open oil suction line. The Anti-Siphon Valve body material must be bronze. Valve spring shall be factory set. Anti Siphon valves that are field adjustable are not allowed. The valve shall be factory set to meet the flow and vertical pipe height requirements of the system.
8. Foot valve: Where foot valve is 1.5" or smaller, provide a Foot valve extractor fitting to prevent loss of prime due to air leakage and ease of removal of a clogged foot valve.
9. Vent protector: Install at the vent pipe termination, a standard vent protector. Vent protector shall be the full size of the pipe according to NFPA 30 Flammable and Combustible liquids Code and NFPA 31 Standard for the Installation of Oil Burning Equipment..
10. Main storage tank high level switch: Provide in the tank a tank fill alarm switch for alarming of a high level in the tank (90% tank capacity). Switch shall be float-operated, installed through the top of the tank, using a single 1.25" tapping and be suitable for pressures up to 150 PSIG, manufactured entirely of non-ferrous material, and complete with a switch rated at 100 watts. Electrical connections shall be made external to the tank in an explosion-proof head assembly approved by Underwriters Lab for Class 1, Groups C and D applications. Switch shall be wired through the main pump set control panel and also alarm at the overfill station when tank has reached high level.
11. Emergency Shut-Off Valves: Provide a fusible link lever gate valve, with an automatic fuel shut-off limit switch assembly. Switch assembly shall be wired to the main pump set control panel to provide "fire" and "loss of fuel Supply" alarms and provide interlock with fuel oil pump set operation (shutting off pump).

2.4 FUEL OIL PUMPING AND STRAINING SET

- A. Acceptable manufacturers subject to compliance with the specifications:
 1. Preferred Utilities
 2. Viking Pump
 3. IMO Pump
 4. NECO Syatems
 5. Industrial Fuel Systems
 6. Critical Fuel Systems , a Division of BSF Industries LLC
 7. This is not a complete list. Other manufacture may be considered.
- B. Provide and install a factory assembled "Packaged" Automatic Fuel Oil Transfer and Monitoring System to ensure a reliable supply of fuel oil to the standby generator included in this project. System to be factory fabricated/tested and certified as a complete unit. Field assembled units are not acceptable..

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- C. The system shall include automatic pump set lead/lag, storage tank and day tank level monitoring, leak monitoring, LCD operator display, manual back-up stations, time and date stamped alarm and event summary, and the system shall include the capability to simultaneously communicate with a Data Acquisition System (DAS), building Automation System (BAS), or Building Management System (BMS) via Modbus protocol, and dial out to an alphanumeric pager system via field installable plug-in option modules in the future. The control system shall be a microprocessor based design with field expandable plug-in Input/Output modules.
- D. Provide a duplex pump and straining set that is factory assembled with components piped and mounted on a common base plate. Pipe shall be schedule 40 ASTM A-53 Grade "A" with ANSI B16.3 Class 150 malleable iron threaded fittings. Base plate shall include minimum 3" steel side rails, and be continuously welded out of minimum 1/4" plate steel for containment. Base pan assembly shall have inverted steel channel supports welded to the bottom of the base pan for anchoring. Provide a 1/2" containment basin plugged drain connection. The basin shall also be sized to contain potential leaks from all factory installed piping and components. The Automatic Fuel Oil Transfer Pump and Straining Set shall have a minimum rate of 100 GPH of No. 2 oil against a discharge pressure of 50 PSIG.
- E. Positive Displacement Pumps
The pumpset shall include two (2) positive displacement, with cast iron housing. The pump shall be capable of developing 25" Hg. Vacuum at 0 PSIG discharge pressure as factory tested. However, for normal operation, vacuum shall not exceed 15" Hg. Pump and motor combination to be rigidly, direct mounted to ASTM-A36 channel.
- F. Motors
The pumpset shall include two (2) TEFC, rigid base, standard NEMA frame motors. Motors sized to develop no less than 1/3 HP at 1725 RPM using 480 V, 1 P, 60 Hz electrical service. Motor shall have copper windings; a dynamically balanced rotor, ball bearings and a heavy gauge steel NEMA frame.
- G. Pump and Motor Assembly
The pumps shall be connected to the piping in the set through stainless steel flexible metallic braided jackets, Pumps and motors shall equipped with flexible coupling and full OSHA approved coupling guard. Pumps and motors shall be mounted with bolts threaded into the steel channel for ease of maintenance. Mounting bolts shall not penetrate the secondary containment basin.
Flexible coupling general: the pump shall be connected to the motor by an elastomeric jaw type flexible coupling that does not require lubrication. The coupling wear member shall be replaceable without disturbing the alignment of either the pump or motor. Sizing of the flexible coupling shall be based on motor horsepower and rpm. Materials of construction: the coupling body shall be sintered iron and cast iron. The elastomeric wear member shall be NBS rubber.
- H. Pump Isolation and Check Valves
The pumpset shall include four (4) pump isolation valves located on the suction and discharge side of each pump. Isolation valves will allow off-line pump maintenance without system loss of availability. Isolation valves shall be ball type, rated 600 WOG, include stainless steel ball and Teflon seat. Valves to provide full flow while open and positive shutoff when closed.
- I. Fuel Oil Strainer
The pumpset shall include one (1) factory install duplex strainer, basin mounted, on the

suction side of the pumps. Strainer to be sized for less than 1/2 psi of mercury drop through a clean strainer basket with the maximum anticipated flow in the suction line. Strainer shall be one-piece cast iron body and shall be suitable for 200 psi. Strainer baskets shall be 40-mesh stainless steel. Strainer shall come complete with lever wrench handle and be bolted in place without bolting through pan.

- J. Strainer shall be equipped with a factory mounted and wired differential pressure switch to indicate that the basket needs to be cleaned. Indicating scale plate shall be three-position color-coded for easy indication of strainer basket flow status. Switch shall provide indication on the main pump set control cabinet to alert operators.
- K. Relief Valves
The pumpset shall include a relief valve downstream of each pump sized to relieve the full outlet flow of the pump without causing the pump motor to overload or any component's pressure rating to be exceeded if the discharge is inadvertently valved off. Relief valves must be externally mounted from the pumps and piped to the return line in the field according to NFPA 30. Pump internal relief valves shall not be accepted.
- L. Compound And Pressure Gauges
The pumpset shall include a compound gauge on the common suction header feeding the pumps. The gauge shall read 30" vacuum -15 psig. A second pressure gauge shall be included on the discharge side of each pump. Each gauge shall be equipped with an isolation ball valve.
- M. Containment Basin Leak Detection Switch
Provide a factory mounted and wired, float-operated containment basin leak detection switch, to shut off the pumps and energize an audible and visual alarm should a leak be detected. The leak sensor shall be a plasma welded stainless steel construction. The leak sensor shall be internally mounted within the pump basin. Electrical connections shall be contained in a factory installed weatherproof junction box.
- N. Pump Set Control Cabinet
Provide two fuel oil management control cabinets factory mounted on the fuel oil pump set. One cabinet shall include all the motor voltage components and shall include a disconnect switch that must be opened before the enclosure door can be opened. The other enclosure shall house the low voltage (120V or less) control hardware. The control cabinets shall be completely pre-wired and factory programmed and tested to ensure job site reliability. The pump set and control cabinets shall be the product of one manufacturer for single source responsibility. Cabinets to be manufactured by nationally recognized trade union personnel and is approved by a nationally recognized independent testing laboratory, equal to UL 508A. Provide a factory assembled NEMA 4 rated steel enclosure with operator interface keypad mounted on the door. All PLC indicators, manual back-up control switches and indicators must be protected from unauthorized operation by a door. All PLC indicators, manual back-up control switches and indicators must be protected from unauthorized operation by a door. Pump set control cabinet shall have undergone, and passed, seismic shake table testing, and shall hold Office of Statewide Health Planning and Development (OSHPD) Special Seismic Certification Preapproval (OSP) status, to ensure and maintain structural integrity and full functionality during or after a seismic event..
- O. Control and Interface
 - 1. Supply a distributed control system composed of up to ten individual microprocessor-based PLCs communicating via a redundant master-less digital

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network. Individual controllers shall be programmed using function block language. Devices mounted in close proximity to each controller shall be hard-wired to the controller's analog inputs, analog outputs, digital inputs, or relay outputs. Multiple controllers shall communicate digitally using a pair of redundant two-wire communication networks. If either communication network loses communication, the other network will resume communication and provide uninterrupted control to the entire network. If any controller, or node, in the network shuts down or stops communicating, an alarm will sound and the other controllers will continue to operate. The control system logic and calibration data shall be stored in a non-volatile memory that does not require battery backup.

2. Each microprocessor controller shall include, but not be limited to, the following inputs and outputs:
 - i. (24) 120 VAC digital inputs
 - ii. (5) 2 A relay outputs
 - iii. (5) 1/2 HP (10 A) relay outputs
 - iv. (8) loop-powered 4-20 mA analog inputs
 - v. (3) 4-20 mA analog outputs
 3. Each microprocessor controller may be equipped with a 4" color touchscreen Operating Interface Terminal (OIT). The touchscreen communicates to the controller via RS-485 Modbus protocol. The touchscreens shall be pre-programmed at the factory with graphic pages for operation, setup, trouble-shooting, and alarm indication. Each touchscreen shall be capable of displaying information from any of the controllers in the distributed control system. The touchscreens can communicate to an external controller, building automation system, or energy management system via RS-485 Modbus, Ethernet TCP/IP, or BacNet MS/TP protocol.
- P. Alarm and event Logs
- The control system shall include 200 alarms, events and operator actions memory minimum. Provide an alarm display page for viewing the most recent 8 alarms/events with scrolling capability to view the complete 200-point alarm/event memory. Each event and alarm condition must be displayed with a distinct, descriptive, English language description and time and date stamp. New alarms shall trigger the common alarm output relay. Events shall be recorded, but shall not trigger an alarm. A dedicated alarm silence button shall silence the alarm output. The control system shall record and annunciate the following alarms: Pump Thermal Overload, Pump Loss Of Flow, Pump Set Failure, Riser leak, Containment pipe leak (each sensor), Day Tank Leak, Day Tank High level, Day Tank Low level, Day Tank (and main tank) Vent, main tank overflow. The control system shall record the following events: Pump Started, Pump Control Switch in "Off" position, Pump Set Prime Test OK, return pump and levels switches Test OK, and Pump Selected as Lead.
- Q. Fuel Pump Alternation and Lead-Lag Operation
- Provide automatic, microprocessor-based day tank level control. The lead fuel pump shall be energized when Day Tank oil level falls below the Supply Pump On Level (50% full condition). The lead pump shall continue to operate until the day tank level reaches the Supply Pump Off Level (80% full condition). Upon the next call for fuel, the lead pump shall be automatically alternated. The control system shall automatically energize the back-up pump upon detecting a low level condition (40% full condition). Both pumps shall then continue to operate until the level of oil reaches the Supply Pump Off level (80% full

condition). Upon detection of loss of flow or lead pump thermal overload the control system shall automatically energize the backup pump and de-energize the lead pump. Should the level reach the High Level (90% full condition), then both pumps shall be disabled.

R. Automatic Pump Prime, Suction Line, and Day Tank Level Switches Integrity Safety Check Test.

The control system shall include a battery backed, real time clock and must be capable of automatically energizing the lead pump once every day. This safety check is to verify the suction piping integrity, pump prime, and to verify pump operation including the day tank level switches operational readiness. Once the lead pump has proven satisfactory operation, the lag pump shall be energized and run through the same test. These tests shall be recorded in the controller memory with a Time/Date stamp for later verification or diagnosis. If either lead or lag pump fails any of these tests, the control system shall generate an audible and visual alarm and log the "Failed Pump" condition. The day tank return pump(s) shall be similarly tested whereby each return pump shall be activated and return oil back to the main tank continuing until the day tank low level switch is activated. The return pump shall stop and the lead supply pump will restart. The Supply pump will refill the day tank up to the 90% level, activating that switch again. The supply pump will shut off and the return pump restart until the day tank level has dropped to the supply pump-off level. The supply pump will finally restart and fill the tank back to the pump-off (80%) level and then stop. This test sequence will demonstrate that not only the supply and return pumps, but also all level switches in the day tank are functioning properly. If during this sequence, any pump or level switch shall prove faulty, the control system shall generate an audible and visual alarm and log such event as a "failure" condition.

S. Pump Automatic Sequencing Flow Switch

Provide a time delayed flow sensing switch on the discharge of the pump set to bring on the lag pump should the lead pump fail to maintain flow. Flow switch shall be vane operated to actuate a single double throw snap switch. Switch shall be ship loose for alarm and backup pump operation. Switch shall be rated for 1450 psig. Provide a flow switch outlet isolation valve for maintaining the flow switch without draining the fuel system.

T. Main Storage Tank Monitoring

The control system shall include main storage tank level sensor and discriminating leak sensor monitoring. Provide a continuous display of tank content, in both gallons and inches of product, within the main storage tank. Tank alarm displays shall not interfere with the display of the tank content. Provide data recall of the instantaneous display of tank content at the time of leak alarm condition and "last delivery" indication. The control system shall include an overfill alarm circuit test pushbutton to provide instantaneous proving of audible and visual alarm circuitry associated with instrument overfill alarm contact. The controller must be field expandable using plug-in input modules to monitor up to 2 storage tanks and 6 discriminating leak sensors. Provide all equipment capabilities specified in this paragraph even if a connecting level and leak sensors are not included in this project.

U. Quality Assurance

The Control Cabinet shall be manufactured and labeled in accordance with UL508A. Simply supplying UL recognized individual components are not sufficient. The assembled control cabinet, as a whole, must be inspected for proper wiring methods, fusing, etc., and must be labeled as conforming to UL508A. Inspection and labeling shall be supervised by

UL or other OSHA approved Nationally Recognized Test Lab (NRTL). Lack of an NRTL certified UL508A wiring methods inspection and label will be grounds for rejection.

V. Factory Testing

Pump Sets must be fully tested prior to shipment as follows: testing shall include both a pressure and vacuum testing period. First, the complete pump set shall be pressure tested to rated pressure using an air pressure source. The test shall confirm that the pump set piping system can maintain rated pressure for 4 hours. Next, the complete pump set shall be brought to a vacuum greater than 25"Hg. The test shall confirm that the pump set piping system can maintain vacuum for 4 hours. Following a pressure and vacuum test the pump set shall be given a full operational test. The pump set shall be connected to a fuel oil supply and return. The pump set shall be operated normally. Motor amps shall be noted at no load and full load for each motor. The motor amps shall be within 10% of rated motor amps. During the test the relief valve shall be set and tested. Operation of pump set instrumentation shall be tested. A copy of the test procedures shall be sent to the consulting engineer and owner. The owners and or the consulting engineer, at their discretion, shall observe this and all other tests. A certificate of factory testing, together with a copy of the wiring and arrangement diagrams shall be placed in the control cabinet prior to shipment.

2.5 TANK GAUGING AND LEAK MONITORING SYSTEM

A. Acceptable manufacturers subject to compliance with the specifications:

1. Preferred Utilities TG-EL-D4
2. Tidel Engineering, Inc.
3. Andover Controls/Schneider Electric
4. This is not a complete list. Other manufacture may be considered.

B. General

1. Provide a storage tank monitoring system capable and sensing leaks in the tank and the associated piping.

C. Design Criteria

1. Tank Level Transmitter: the system shall include a probe capable of detecting the fuel level in the tank. Provide a float type level sensor to provide accurate level monitoring that is unaffected by changes in the specific gravity of the tank liquid, and is suitable for use with non-corrosive fluids and fuels up to and including No. 6 fuel oil. The level sensor shall consist of a NEMA 6P rated, 1/4" cast aluminum head, connected to a float assembly by a flexible stainless steel cable. The sensor head assembly shall mount to the tank through a standard 4" 125/150 lb. flat face flange opening, with standard bolt pattern and must be capable of operating in a submerged manhole environment without damage. The unit shall be capable of easy installation and maintenance. The unit must be able to be mounted, stand, and be subsequently removed for service with only 14" of clearance between the flange and any overhead obstructions. Vertically mounted floats that take up more height to either insert or remove shall be rejected. The sensor's operation shall be unaffected by internal tank obstructions located outside of a 14" diameter cylinder extending from the top of the tank to the bottom, and centered on sensor's mount. Tank gauge calibration shall be possible at any tank fluid level (empty, part full or full). The sensor shall include an external test mechanism to allow overfill alarm and full tank

calibration checks without removal of the sensor from the tank. Tests that electronically simulate a high tank level, instead of physically moving the float, are not acceptable. Where applicable, an ultrasound device can be substituted for the above tank float.

2. Monitoring Panel: provide a microprocessor-based tank gauging, leak detection, and overflow prevention system per NFPA 30 Flammable and Combustible Liquids Code, NFPA 31 Standard for the Installation of Oil-Burning Equipment, and NFPA 110 Standard for Emergency and Standby Power Systems. The tank gauge shall be provided complete with printer and RS485 Modbus interface to the BAS for each storage tank indicated on the drawings. The indicator, printer, level sensors, leak sensors, and overflow alarm station shall be supplied by one manufacturer. The indicator and sensors shall be intrinsically safe for Class 1, Division 1, Group D hazardous locations as defined by the National Electric Code. The monitoring panel shall display the tank volume in gallons. The panel shall indicate alarm conditions for fuel high level, fuel low level, tank leak and containment pipe leak. The indicator shall have a bright 4" bargraph display that is clearly visible from 20 foot viewing distance and shall be able to monitor either 1 or 2 tanks. All sensors signals shall be either 4-20 mA or contact closure for easy interchangeability of field devices. All leak sensors shall be automatically tested by the indicator on a daily basis with the result shown on the printed reports. Continuous sensor wiring fault detection (open or shorted) shall be provided. Automatic delivery detection logic shall trigger a printed, and data logged, report displaying the time, date, and amount delivered for delivery verification. The system shall be field upgradeable to dual sensors for higher accuracy delivery reporting and/or density shift detection in the event that delivery "shorting" is suspected. Provide idle tank theft alarming capability for standby tanks or emergency generator tanks as required. The system shall be fully field configurable. The system shall be able to automatically generate a stick chart based on measured delivery flow and measured level if an accurate stick chart is not available for the tank.

The printer shall automatically, or manually, print:

- Current inventory
- Time/date
- Gallons of the last 7 deliveries
- Last 7 daily consumptions
- Last 5 weekly consumptions
- Last 10 time/date stamped alarms

2.6 Leak Detection

Engineering Note: Review the design to meet codes including leak detectors to be located properly. Insure coverage but eliminate redundancy. Revise item A. to reflect exactly how many leak detectors are needed and where to be located.

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- A. Provide and install leak detectors in the annular space within the double wall tank (the piping sump and/or floor or vault below the storage tank as shown on the drawing). The leak detectors shall be solid state and discriminate between oil and water, display the leak with (2) LED's on its indicating transmitter, and send an appropriate alarm signal to the Tank Gauge. All leak detectors shall be intrinsically safe, have continuous electronic checking, fail safe to an alarm condition, and have indicating transmitters with a magnetic test mechanism at grade level to exercise the sensors and check the Tank Gauge response. Tests that bypass the sensors or rely only on electronic simulation are unacceptable

EDIT AS REQUIRED NOTE: Used for underground tanks.

Piping Sump Sensor: A sensor shall be provided for installation in the piping sump to detect a leak in the fuel piping system. The sensor shall set off an audible and visual alarm on the control panel. Sensor to be able to discriminate between oil and water.

- B. Provide and install an overflow alarm station for 1-3 tanks that will alarm when signaled from one of the above tank gauges when an overflow condition has been reached. The overflow alarm panel shall contain a 4" weatherproof alarm horn with automatic silencing, 180 degree flashing lamp, bell silencing pushbutton, and alarm test pushbutton. Optional gallons display can be added. Alarm can be instantly silenced with the silencing pushbutton or in 90 seconds automatically if silencing pushbutton is not activated.
- C. Provide and install an Overflow Caution Sign near the Overflow Alarm Station. The sign shall be 20"W by 14"H of 18 gauge steel with porcelain baked enamel finished bright yellow background and minimum 2"H black lettering. The Caution Sign shall read: CAUTION WHEN ALARM BELL SOUNDS OIL TANK FILLED TO CAPACITY DO NOT OVERFILL.

Engineers note. Fuel oil filtration systems are REQUIRED to be used for #2 heating oil and diesel generator fuel loops or in combination boiler and generator systems, where the fuel is not guaranteed to be completely turned over and replaced with fresh oil within 3 months (example dual fuel boilers where the stand-by fuel sits in the storage tank(s) for more than 3 months).

2.7 FUEL FILTRATION SYSTEM

- A. Acceptable manufacturers subject to compliance with the specifications:
1. Preferred Utilities
 2. Pall Corporation
 3. FuelTec
 4. Fuel Technologies USA (FTI)
 5. Authorized Services of New England (ASNE)
 6. This is not a complete list. Other manufacture may be considered.
- B. General: Provide a packaged pump and filter set to provide filtration of stored fuel on a timed cycle. The pump and filter set shall be integrated with a control panel to provide motor control, system status, and alarm indication. The main storage tank filtration system

shall utilize the main fuel transfer pumps. Filtration for individual generator tanks shall have an independent transfer pump. Filtration unit and PLC controller shall have undergone, and passed, seismic shake table testing, to ensure and maintain structural integrity and full functionality during and/or after a seismic event.

C. Design Criteria: Enclosure, Piping and Mounting

Provide a Fuel Oil Filtration System that is factory assembled with components piped and mounted inside a continuously welded steel enclosure. The enclosure shall be constructed of 14 gauge steel as minimum, continuously welded and constructed to NEMA 4 standards and have an integral 12" steel containment basin with plugged drain connection. The basin shall be sized to contain (capture) potential leaks from all factory installed piping and components. Doors shall be fully gasketed with a turned edge, piano hinges, and a three point lockable latching mechanism. The enclosure interior and exterior shall be primed and finished in a durable, chemical resistant, textured gray enamel, suitable for industrial environments. Pipe shall be schedule 40 ASTM A-53 Grade A with ANSI B16.3 Class 150 malleable iron threaded fittings.

1. Containment Basin Leak Detection Switch

Provide, mount and wire a float operated Containment Basin Leak detection Switch to shut off the pumps and energize an audible and visual alarm should a leak be detected. The level sensor shall be a plasma welded stainless steel construction. Electrical connections shall be contained in a weatherproof junction box.

2. Strainer

Oil strainer shall have cast iron body, threaded connection; size shall be suitable for the required flow and suitable for working pressures to 150 psi. Clamped cover and handle shall permit easy removal of the basket. Basket shall be constructed of 100 mesh stainless steel.

3. Pump Automatic Sequencing Flow Switch

Provide a time delayed flow sensing switch on the discharge of the pump. Flow switch shall be vane operated to actuate a single double throw snap switch. Switch shall be ship loose for alarm. Switch shall be rated for 1450 psig. Provide a flow switch outlet isolation valve for maintaining the flow switch without draining the fuel system.

4. Pump and Motor Assembly

A TEFC motor and positive displacement pump with cast iron housing shall be provided. Pumps that have aluminum, brass, or bronze housing or rotors or centrifugal pumps are not acceptable. The pump shall be an industrial type intended for continuous heavy-duty service.

5. Filtration

One filter element shall provide both particulate and water removal. Filtration provided to 10 micron.

6. Element Replacement

No special tools are required to change the filter.

7. Filter Monitoring

Filter shall have a differential pressure switch piped across it to indicate when the filter needs to be changed. The switch shall provide indication on the main filtration control cabinet to alert operators and sound a horn. The differential pressure switch shall provide clear indication of strainer basket status with the use of a Tri-Colored

Scale Plate with GREEN denoting Clean, YELLOW denoting Change and RED denoting dirty strainer. This shall have one piece cast-iron body and shall be suitable for pressure to 200 psi.

8. Control Hardware

The control strategy shall be microprocessor-based. RELAY LOGIC SHALL NOT BE ACCEPTABLE. The control strategy shall be factory configured and stored on an EEPROM, and shall be safeguarded against re-configuration by un-authorized / un-qualified personnel. Control hardware shall include combination magnetic motor starter with overload protection and circuit breaker. The control cabinet shall have the ability of simultaneously communicating to a Data Acquisition System (DAS), Building Automation System (BAS) or Building Management System (BMS) via RS485 Modbus protocol and to a Personal Computer.

Automatic Operation

In order to ensure automatic fuel maintenance the filtration system shall have an adjustable automatic start and run time. The operator shall be able to set the system to run at a certain time every day or week.

9. Safety Interlocks

Provide safety interlocks to shutdown pump when a leak is detected.

10. Operator Interface

Operator interface shall be cabinet front door mounted and be presented by a touch screen. Touch screen shall have a bright TFT display with full 256-color support. Image resolution shall be a minimum of 480 x 272 pixel display. As a minimum, the following indications, alarms, control switches and pushbuttons shall be provided:

- Alarm Silence, Manual Reset, Lamp/Alarm Test Pushbuttons
- Pump Hand-off-Auto control switch
- Pump On, indicator
- Filter Saturated, Filter Water Level High and System Basin Leak Detected Alarms

11. Automatic Pump Safety Integrity Check Test

The Control system shall include a battery backed, real time clock and must be capable of automatically energizing the filtration pump once every day with a test. This is to verify filtration suction piping integrity, pump prime, and verify pump operation. Once the pump has been operated and proved operational, the test shall be recorded in the controller memory with a Time/Date stamp for later verification. If the pump fails the test, the control system shall generate an audible and visual alarm and log the Failed Pump condition.

12. Quality Assurance Inspection, Labeling and Testing

The Control Cabinet shall be manufactured in accordance with UL508A. Simply supplying UL recognized individual components are not sufficient. The assembled control cabinet as a whole must be inspected for proper wiring methods, fusing, etc., and must be labeled as conforming to UL508A. Inspection and labeling shall be supervised by UL or other OSHA approved Nationally Recognized Test Lab (NRTL). The system must be manufactured by a nationally recognized. Lack of an

NRTL certified UL508A wiring methods inspection and label will be grounds for rejection.

- D. Accessory Equipment: Use where a skid mounted waste water holding tank and chemical fuel treatment is needed. Use generally when the fuel stored is to remain undisturbed for beyond three months time.
1. Waste Water Holding and Removal System: A gear pump shall automatically pump water from the secondary filter housing to a 15 gallon holding tank based on an integral filter water detector signal. Automatic isolating valves prevent water leakage into the fuel or fuel into the water holding tank when the system is idle. The holding tank is equipped with a high level switch to alarm and shutdown the fuel maintenance system until the tank is emptied. A hand pump is provided for periodic removal of waste water from the holding tank.
 2. Chemical Additive Holding Tank & Injection System: A 15 gallon chemical additive holding tank with a gear metering pump which injects additives into the oil while the oil is circulating in order to ensure complete mixing. The additive feed pump operating cycle will run biannually, or it can be activated when new fuel is delivered.
 3. NEMA 4 Weatherproof Enclosure

PART 3 - EXECUTION

3.2

3.3 ABOVEGROUND PIPING INSTALLATION

- A. Install in accordance with the manufacturer's instructions.
- B. Inspect all materials for signs of damage, and confirm compliance with specifications.
- C. Avoid damage to piping materials or coatings during handling, installation and testing.
- D. Provide adequate support for piping on 10" centers minimum.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction so that pipe, joints, or connected equipment will not be stressed.
- G. Provide clearance for access to valves and fittings.
- H. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of the completed system.
- I. Install unions, couplings, valves, and flexible connectors in accordance with manufacturers' recommendations.

3.4 UNDERGROUND PIPING INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Inspect all materials for signs of damage, and confirm compliance with specifications.
- C. Avoid damage to piping materials or coatings during handling, installation and testing.
- D. Secondary containment piping must slope to piping sump at a minimum 1/8" per foot.
- E. Trench and backfill per manufacturer's instructions.

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- F. Test primary and secondary pipe for integrity using pressurized air per manufacturer's instructions.
- G. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of the completed system.

3.5 TANK LEVEL AND LEAK MONITORING SYSTEM INSTALLATION

- A. Install in strict accordance with the manufacturer's recommendations, National Electrical Code NFPA 70, and NFPA 30A.
- B. Electrical work shall be rated for hazardous area as required.
- C. Install the tank level transmitter and the interstitial leak probe in the proper locations in the fuel tank. Install the piping sump sensor in the piping sump.

3.6 FIELD QUALITY CONTROL

- A. Test fuel distribution system according to NFPA 30. Replace leaking joints and connections with new materials.
- B. Test and adjust fuel management and leak monitoring systems controls and devices. Replace damaged and malfunctioning controls and devices.
- C. Submit reports of test and procedures in writing to the Engineer.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.
- B. Representatives of equipment suppliers for the fuel tanks, fuel pumps, day tanks, and leak monitoring system shall provide necessary training and technical support to the Owner so that the Owner may properly operate and maintain the systems.

3.8 COMMISSIONING

- A. Before activating the system perform these steps:
 - 1. Flush system piping with grade of fuel to be used by owner to remove any debris and foreign matter in piping prior to filling tank for the first time. Service all system filters and screens and dispose of fuel in accordance with EPA and NFPA regulations after flushing.
- B. Perform a complete system commissioning in accordance with the approved commissioning plan.

END OF SECTION

**SECTION 10100
FLYGT PUMP INSTALLATION**

PART 1 GENERAL

1.1 SCOPE:

- A. This Section covers the work necessary to install owner's Flygt pump and to furnish associated materials and supplies.

1.2 GENERAL:

- A. The Owner will provide the submersible Flygt pump to be installed. The pump is a model NT 3171 095. The close-coupled electric motor is rated at 30 horsepower, 460 volts, 4 pole, 60 Hertz service with 250 A starting current . The pump is capable of delivering 1050 gpm at about 73 feet Total Dynamic Head.
- B. The Contractor shall provide all labor and materials not specifically indicated as supplied by Xylem-Flygt or the Owner in this specification.

1.3 MANUFACTURER'S SERVICES

- A. A manufacturer's representative for the equipment specified will be available for installation assistance, inspection and certification of the installation.

PART 2 PRODUCTS

2.1 PUMP:

- A. PUMP MOTOR AND VOLUTE (provided by owner)
 - 1. NP 3171.095 rated at 30 horsepower, 480 volts, 4 pole, 60 Hertz service.
- B. PUMP STAND (provided by owner)
 - 1. Xylem Flygt standard for this model.
 - 2. Guide rails and appurtenances.
- C. POWER AND SIGNAL CABLE (provided by owner)
 - 1. 40 foot power and signal cable Flygt standard for this pump model.

2.2 OTHER ACCESSORIES

- 1. Install Adjustable Speed Control/Local Control Panel cabinet (provided by owner) on inside North wall.
- 2. Sink and/or workbench may have to be removed to make room for above cabinet.

MILL CREEK PUMP STATION STANDBY
GENERATOR AND PHASE 1 UPGRADES

3. Install conduits, conductors, and other appurtenances as shown on plans but not provided by owner for a complete and operating system.
- A. ANCHOR BOLTS
1. Four (4) ¾" x 10" SS anchor bolts and bolt pattern as shown on plans or recommended by Xylem Flygt.
 2. Anchor bolts to be adhesive anchored Simpson Strong-Tie SET-3G or approved equal.
 3. Discharge pipe support anchors to be: SET-3G – SET-3G w/ ½"Ø A193 GR. B6 with min 4" embedment, Strong-Bolt® 2 Stainless Steel – ½"Ø SS Strong-Bolt 2 w/ minimum 3¾" embedment or approved equals.
- C. GROUT
1. Non-shrink as specified in section 02080.30
- D. MISCELLANEOUS
1. Associated bolts and other fasteners and miscellaneous supplies appropriate for installing the pump as recommended by Xylem Flygt.

PART 3 EXECUTION

3.1 GENERAL

- A. Install the pump base and other accessories as shown on the Plans and as recommended by Xylem Flygt.

3.2 CONCRETE ANCHORS

- A. Cast in place is the preferred method of installation. Adhesive anchor system may be used.
If an adhesive system is chosen, installation shall not begin until the concrete receiving the anchors has attained its design strength and has been thoroughly cleaned. An anchor shall not be installed closer than six times its diameter to either an edge of the concrete, or another anchor, unless specifically detailed otherwise on the Plans. Install in strict conformance with manufacturer's instructions
- B. Approved Anchors:
1. Simpson Strong-Tie SET-3G (wet or dry conditions).
 2. Or approved equal epoxy for anchors.

3.3 ADDITIONAL OWNER SERVICES

MILL CREEK PUMP STATION STANDBY
GENERATOR AND PHASE 1 UPGRADES

- A. The Owner will deliver the pump, pump base, power and signal cable, and miscellaneous items to the pump station.
- B. The Owner will supply drawings, including installation instructions, for the following:
 - 1. Pump motor and volute
 - 2. Pump Base
 - 3. Guide bars
 - 4. Power and signal cable
 - 5. Controls and control cabinets
- C. A Flygt representative will be present at the job site for the minimum person days listed for the services hereunder, travel time excluded.
 - 1. 1 person day for installation assistance, inspection, and certification of the installation.
 - 2. 1 person day for functional testing.
 - 3. 1 ½ person days of programming assistance.

PART 4 TESTING

4.1 FUNCTIONAL TEST

- A. Prior to pump station start up, all equipment described shall be inspected for proper alignment, quiet operation, proper connection, and satisfactory performance by means of functional test.

4.2 FIELD TESTS

- A. Start up and operational field tests shall be conducted by the pump manufacturer's representative. The start up and operational tests shall be conducted in the presence of the owner's representative and the Contractor.

PART 5 GUARANTEE

5.1 GENERAL

- A. Contractor shall guarantee all Contractor supplied products, materials, and workmanship for a period of one (1) year.

MILL CREEK PUMP STATION STANDBY
GENERATOR AND PHASE 1 UPGRADES

PART 6 SUBMITTALS

6.1 GENERAL

- A. Refer to special provisions for required submittals.

PART 7 MEASUREMENT AND PAYMENT

7.1 LUMP SUM BASIS

- A. Payment for the work in this section will be made based on the “Lump Sum” price amount listed in the bid schedule, and will be payment in full for all materials, equipment, labor, fittings, appurtenances and other incidental items required to complete the work as specified.

END OF SECTION

**SECTION 10200
PIPING, GAGES, AND VALVES**

PART 1 GENERAL

1.1 SCOPE:

- A. This Section covers the work necessary to furnish and install, complete piping, pressure gages, and valves specified herein.

PART 2 PRODUCTS

2.1 GENERAL

- A. The use of manufacturer's names and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers with similar equipment will be considered.

2.2 PRESSURE GAGES

- A. Gages shall be sanitary industrial pressure gages with diaphragm seal as manufactured by Ashcroft with 2 ½" dial and pressure range 0 – 100 psig.

2.3 PIPING

- A. SUCTION: Ductile Iron, class 250, Epoxy lined, and urethane primed coating.
- B. DISCHARGE: 304L Stainless steel, Schedule 80 meets ASTM A358.

2.4 CHECK VALVE, Swing Check V608

- A. AWWA C508, 125-pound flanged ends, cast-iron body, bronze body seat, bronze mounted cast-iron clapper with bronze seat, stainless steel hinge shaft.
- B. Rated 175-pound WWP. Valves to be fitted with adjustable outside lever and weight.
- C. Manufacturers and Products:
 - 1) M&H Valve; Style 59, 159, or 259
 - 2) Mueller Co.; No. A-2600 Series.

2.5 PLUG VALVE, Eccentric plug valve (V405)

- A. Nonlubricated type rated 175-psig CWP, drip-tight shutoff with pressure from either direction, cast-iron body, exposed service flanged ends per AWWA B16.1 or grooved ends in accordance with AWWA C606 for rigid joints, buried service mechanical joint ends, unless otherwise noted.

2.6 BALL VALVES, V304 for general water and Air service

- A. Three piece, full port, NPT threaded ends, bronze body and end pieces, hard-chrome plated solid bronze or brass ball, RTFE seats and packing, blowout-proof stem, zinc-plated steel hand lever operator with vinyl grip, rated 600 pond WOG, 150 psi SWP, complies with MSS SP-110.

2.7 AIR/VACUUM VALVE, V754

- A. Suitable for sewage service, combines the operating functions of both air and vacuum and air release valve. The air and vacuum portion shall automatically exhaust air during filling of a system and allow air to re-enter during draining or when vacuum occurs. Air release portion to automatically exhaust entrained air that accumulates in the system. Single body unit with air and vacuum valve and air release valve in a single housing.
- B. 80 psi operating pressure, 2-inch NPT inlet, 2-inch NPT outlet, 7/32-inch orifice venting 68 scfm.
- C. Rated working pressure of 150 psi, built and tested to AWWA 512.
- D. Materials: Cast-iron or ductile-iron body and covers, NPT threaded inlet and outlet, with concave or skirted stainless steel float and trim.
- E. Sewage air release valve fitted with blowoff valve, flushing valve with quick disconnect couplings, and a minimum of 5 feet of hose with quick disconnect couplings to permit backflushing after installation without dismantling valve.
- F. Manufacturers and Products;
 - 1) APCO Valve and Primer Corp.; Series 440 SCAV.
 - 2) Val-Matic Valve; Series 800

2.8 FLANGED COUPLING ADAPTER

- A. DI PIPE: Restrained flange adapters shall be used in lieu of threaded or welded flanged spool pieces. Flanged adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10 (125#/Class 150 Bolt Pattern). Restraint for flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges. 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. Pressure ratings shall be a minimum of those shown in the adjacent tables. The flange adapter shall be the Series 2116 MEGAFLANGE® Restrained Flange Adapter as produced by EBAA Iron, Inc. or approved equal.

2.9 STAINLESS STEEL PIPE:

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PHASE 1 UPGRADE

- A. PIPE: Schedule 10S: ASTM A778, “as welded” grade, TYPE 316L, pickled and passivated.
- B. FITTINGS; Butt-welded, ASTM A774/A774M Grade WP316L conforming to MMS PS 43, “as welded” grade, pickled and passivated, fitting wall thickness to match adjoining pipe, long radius elbows, unless shown otherwise.
- C. FLANGES:
 - a. Forged Stainless Steel: ASTM A182/A182M, Grade F316L, ASME B16.5 Class 150 or Class 300, slip on, weld neck, or raised face.
 - b. Blind flanges exposed to atmosphere and not buried or immersed in liquid, may be either stainless steel or Class 125 ductile iron or Class 150 carbon steel with gaskets as specified herein.
 - c. Flanged coupling adapter with thrust ties, as approved by the Engineer.
- D. BOLTING:
 - a. Forged Flanges: TYPE 316 stainless steel, ASTM A320/A320M Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex nuts.
 - b. Flanged Joints in Sumps, Wet Wells and Submerged and Wetted Installations: Type 316 stainless steel, ASTM A320/A320M, Grade B8M hex head bolts and ASTM A194/A194M, Grade 8M hex nuts.
- E. GASKETS:
 - a. Flanged, water and sewer service: 1/8” thick unless otherwise specified, red rubber (SBR), hardness 80 (shore A), rated at 200 degrees F, conforming to ASTM B16.21, AWWA C207, and ASTM D1330, Grade 1 and Grade 2.
 - b. Blind Flanges shall be gasketed covering entire interior face with gasket cemented to blind flange.

2.10 QUICK DISCONNECT COUPLING

- A. Stainless steel as manufactured by Ryan Herco, or equal.
 - 1. Associated bolts and other fasteners and miscellaneous associated supplies appropriate for installing the pump as recommended by Xylem Flygt.

2.11 EPOXY LINING MATERIAL

- A. Epoxy lining material, where required, shall be Protecto 401 Ceramic or approved equivalent.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with the manufacturer's recommendations and as shown on the Plans.
- B. Before Installation, carefully clean valves of all foreign material, adjust stuffing boxes, and inspect valves in OPEN and CLOSED positions. Install valves in accordance with applicable portions of these Specifications. Unless otherwise indicated, install valve with stem vertical. Mount horizontal valves in such a manner that adequate clearance is provided for operation. Installation practices shall conform to manufacturer's recommendations.
- C. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert the gasket and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen the nuts, reset or replace the gasket, retighten the nuts and retest the joint. Joints must be water tight at test pressures before acceptance.

PART 4 TESTING

4.1 FUNCTIONAL TEST

- A. Test gages in accordance with the manufacturer's recommendations. Make adjustments as necessary. Accuracy shall be $\pm 1.5\%$ of the gage reading.

PART 5 GUARANTEE

5.1 GENERAL

- A. Contractor shall guarantee all products, materials, and workmanship for a period of one (1) year.

PART 6 SUBMITTALS

6.1 SUBMITTAL REQUIREMENTS:

- A. Refer to SPECIAL PROVISIONS for required submittals.

PART 7 MEASUREMENT AND PAYMENT

7.1 LUMP SUM BASIS

MILL CREEK PUMP STATION
PHASE 1 UPGRADE

- A. Payment for the work in this section will be made based on the “Lump Sum” price amount listed in the bid schedule, and will be payment in full for all materials, equipment, labor, fittings, appurtenances and other incidental items required to complete the work as specified.

END OF SECTION

SECTION 10300
FABRICATED SLIDE GATES
INSTALLATION

PART 1 GENERAL

1.1 SCOPE

- A. This Section covers the work necessary to install owner supplied sluice gates and to furnish associated materials and supplies not specifically identified as provided by owner.

1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Provided by owner

B. Informational Submittals: provided by owner

1. Manufacturer's Certificate of Compliance.
2. Special shipping, storage and protection, and handling instructions.
3. Manufacturer's written/printed installation instructions.
4. Routine maintenance requirements prior to plant startup.
5. Operation and Maintenance Data.

PART 2 PRODUCTS

B.1 MATERIALS

A. ANCHOR ADHESIVE:

1. Simpson Strong-Tie, SET-3G (wet or dry conditions)
2. Or approved equal epoxy for anchors

B. NONSHRINK GROUT:

1. Nonmetallic nonshrink nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with ASTM c1107/C1107M:
 - a. Fluid consistency 20seconds to 30 seconds in accordance with ASTM C939.

MILL CREEK PUMP STATION,
PHASE 1 UPGRADES

- b. Temperatures of 40 degrees F, 80 degrees F, and 100 degrees F.
- 5. One hour after mixing, pass fluid grout through flow cone with continuous flow.
- 6. Minimum strength of fluid grout, 3500 psi at 1 day, 4,500 psi at 3 days, and 7,500 psi at 28 days.
- 7. Manufactures and Products.
 - a. BASF Building Systems Inc, Master Flow 928
 - b. Five Star Products Inc., Five Star Fluid Grout 100
 - c. Euclid Chemical Co., Hi Flow Grout
 - d. Dayton Superior Corporation, Sure Grip Hi Performance Grout
 - e. L&M Construction Chemicals Inc, Crystex

PART 3 EXECUTION

3.1 INSTALLATION

- A. In accordance with the manufacturer's written instructions.
- B. Mount gate in accordance with manufacturer's recommendations. Provide minimum 1-inch grout pad.
 - 1. Pressure wash, blast if necessary, and use compatible bonding agent on substrate
- C. Field mount operators after installing gates.
- D. Accurately place anchor bolts using templates furnished by the manufacturer.
- E. Lubricate stems before operating.

3.2 FIELD QUALITY CONTROL

- A. Functional Tests: Conduct on each slide gate.
- B. Performance Test:
 - 1. Conduct on each slide gate.
 - 2. Perform under actual or approved simulated operating conditions.
 - 3. Test for a continuous 3-hour period without malfunction.
 - 4. Adjust, realign, or modify units and retest if necessary.

3.3 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative: Present at Site or classroom designated by Owner, for minimum person-days listed below, travel time excluded:
 - 1. 1 person-day for installation assistance and inspection.

MILL CREEK PUMP STATION,
PHASE 1 UPGRADES

2. 1 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
 3. 1/2 person-day for prestart-up classroom or Site training.
 4. 1/2 person-day for facility startup.
 5. 1/2 person-day for post-startup training of Owner's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by Owner.
- B. See Section 01 43 33, Manufacturers' Field Services, and Section 01 91 14, Equipment Testing and Facility Startup.
- C. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection and certification of proper installation, equipment testing, startup assistance, and training of Owner's personnel for specified component, subsystem, equipment, or system.

END OF SECTION

SECTION 10500
MAINTAIN WASTEWATER FLOW

PART 1 GENERAL

1.1 SCOPE:

- A. This Section outlines the requirements for providing and operating the temporary pump system to pump sewage from the two influent gravity sewer lines that feed the pump station, to the treatment plant. The pumps shall be used by the contractor until Pump #4 is fully operational under the terms of this contract and all other work under this contract is substantially complete.

PART 2 PRODUCTS

2.1 GENERAL:

- A. Due to environmental conditions, bypass pumping shall not commence without approval of the Engineer. Approval may be delayed until Late April or early May and shall extend the project completion date to no more than Sixty (60) calendar day from such approval. In no case will bypass pumping continue beyond Sept 30, 2020 without increasing the capacity to 18 mgd.
- B. The use of manufacturer's name and model or catalog numbers is for the purpose of the standard of quality and general configuration desired only. Products of other manufacturers with similar equipment will be considered. Each pump shall be a standard raw sewage pump as recommended by Flygt, Gould, or PACO Pump Company.

2.2 PUMPS:

- A. A temporary pump system shall be capable of pumping raw sewage from the pump station site to and through the pig launcher/valve vault and the force main(s) to the treatment plant. The maximum total pumping requirement from the pump station to the treatment plant during the course of the project is anticipated to be 4 MGD at a total dynamic head of 70 feet plus additional head associated with temporary piping and the temporary pump system itself. About half the total flow enters the pump station wet well from each of the two influent gravity sewer lines.

2.3 DISCHARGE PIPING:

- A. Provide temporary discharge piping, as appropriate, with sufficient length, fittings, and adaptors to connect the pumps with a discharge location as appropriate.

2.4 ALARMS:

- A. The temporary pump system shall be equipped with an alarm system that alerts designated Contractor employees of failures, unsafe conditions, or required service. Alarms shall be responded to within fifteen minutes or as approved in the alarm system plan submitted per Sec 6.1.A5. The alarm system shall automatically notify the Wastewater Supervisor or his designee if the alarm is not acknowledged within 10 minutes and responded to per the approved plan.
- B. In the event that the Wastewater Supervisor is required to respond to an alarm, the Contractor will be responsible for all costs incurred or \$500 per occurrence, whichever is greater.

PART 3 EXECUTION

3.1 GENERAL:

- A. The Contractor shall be responsible for DEQ acceptance of the temporary pump system.
- B. Contractor shall transport the pump(s), piping, and other accessories to the Project site and maintain and operate them, as necessary, during construction until Project acceptance. The Contractor shall use the pump(s), as needed, or employ any other means necessary to ensure continuous pumping of raw sewage until Project acceptance.
- C. Following Project acceptance, the Contractor shall transport the pump(s), hoses, and other accessories away from the project site and return them to their owner(s) as appropriate. The Project site and all associated equipment and other facilities shall be restored to the condition as found prior to the installation of the temporary pump system.

3.2 EXISTING FACILITIES:

- A. All existing facilities as described in this Section are available for use by the Contractor to maintain the existing wastewater flow.
- B. The portable pump on site is not to be used in the temporary pump system scheme.

PART 4 TESTING – NOT USED

PART 5 GUARANTEE – NOT USED

PART 6 SUBMITTALS

6.1 SUBMITTAL REQUIREMENTS:

- A. Within 14 days of notice to proceed, The Contractor shall submit drawings and complete design data showing methods and equipment proposed to maintain sewer flow. The submittal shall include, but not limited to, the following.
 - 1. Drawings indicating the location of temporary sewer plugs and bypass discharge lines.
 - 2. Capacities of pumps, prime movers, and standby equipment
 - 3. Design calculations providing adequacy of the system and selected equipment.
 - 4. Refer to Special Provisions for required submittals.
 - 5. Alarm System Plan to include an after hours response plan including procedures, a communication plan, a list of designated responsible employees and an estimated response time.

PART 7 MEASUREMENT AND PAYMENT

7.1 LUMP SUM BASIS

- A. Payment for the work in this section will be made based on the “Lump Sum” price amount listed in the bid schedule, and will be payment in full for all materials, equipment, labor, fittings, appurtenances and other incidental items required to complete the work as specified.

END OF SECTION

SECTION 10600
EQUIPMENT DEMOLITION AND SALVAGE

PART 1 GENERAL

1.1 SCOPE:

- A. This item covers the work necessary for removing and disposing or salvaging existing equipment in the pump station.
- B. Reference Section 00140.90 Final Trimming and Cleanup in the General Conditions.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide all equipment, tools, labor, and materials and necessary for demolition and salvage operations.

2.2 DUST CONTROL

- A. The Contractor will be responsible for dust control in and around the Facility as it relates to the work of this contract, during the course of the Project. The Contractor shall furnish all equipment necessary to maintain air quality for protection of the workers, sensitive electrical and electronic equipment, and the environment.

2.3

PART 3 EXECUTION

3.1 GENERAL

- A. Contractor shall disconnect and remove all equipment and material items from the pump station and vicinity as shown on Plans, those specified herein, and those directed by the owner. In general, the following existing items shall be removed:
 - Existing access hatch to wet well
 - All remaining vortex Breakers
 - Existing Sluice gates (two)
 - Existing sluice gate actuators and shafts
 - Remove enough of the concrete fillet at the bottom of the wet well to install the new pump.
 - Remove Existing counter and sink.

MILL CREEK PUMP STATION
PHASE 1 UPGRADE

- B. Before removal from the wet well, components of piping system shall be cleaned inside and out.

3.2 SALVAGE ITEMS

- A. None of the removed items are to be salvaged on behalf of the Owner.

3.3 ITEMS TO DISPOSE

- A. All items to be removed shall be legally disposed of by the Contractor. Items shall be hauled off site immediately after removal and disposed at a location and in a manner appropriate for the action.

PART 4 TESTING – NOT USED

PART 5 GUARANTEE– NOT USED

PART 6 SUBMITTALS– NOT USED

PART 7 MEASUREMENT AND PAYMENT

7.1 LUMP SUM BASIS

- A. Payment for the work in this section will be made based on the “Lump Sum” price amount listed in the bid schedule, and will be payment in full for all materials, equipment, labor, fittings, appurtenances and other incidental items required to complete the work as specified.

END OF SECTION

**MILL CREEK PUMP STATION
PHASE 1 UPGRADES**

**SECTION 10700
WET WELL LINING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. This Section includes, but is not necessarily limited to, restoration and corrosion barrier composite liner for concrete and brick structures as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
- B. **Unless specifically noted, GENERAL CONTRACTOR shall procure the materials and services described in this section; therefore, all requirements of Part 1, Part 2 and Part 3 of this specification are the responsibility of the GENERAL CONTRACTOR.**
- C. **GENERAL CONTRACTOR is responsible for bypass pumping of the lift station during installation of the manhole lining system.**
- D. Related Sections:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to:
 - a. General Conditions, Supplementary Conditions and Sections in Division 00100 of these Specifications.

1.2 REFERENCES

- A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
 - 1. ASTM Standard Test Methods:
 - a. C78 - Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - b. C109 - Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
 - c. C157 - Length Change of Hardened Hydraulic-Cement, Mortar and Concrete.
 - d. C876 - Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete.
 - e. 04138 - Measurement of Dry Film Thickness of Protective Coating Systems by Destructive Means.
 - 2. International Concrete Repair Institute (ICRI) Technical Guideline:
 - a. No. 03730 - Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting From Reinforcing Steel Corrosion.
 - 3. ACI Standard:
 - a. 305R - Hot Weather Concreting.
 - b. 503R - Use of Epoxy Compounds for Coating Concrete.

1.3 SUBMITTALS

- A. Submit in accordance with Section 00160 – Source of Materials.
- B. Manufacturer's literature:

1. Submit for coating products.
 2. Required information:
 - a. Name of Manufacturer.
 - b. Physical properties.
 - c. Surface preparation.
 - d. Application instructions.
 - e. Curing instructions.
- C. Certification:
1. Manufacturer's statement that the applicator is trained and approved in the application of the specified products.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Fabrication and installation personnel:
 - a. Trained and experienced in the fabrication and installation of the materials and equipment.
 - b. Knowledgeable of the design and the reviewed submittals.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Receiving and storage:
1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.
 2. Handle and store materials:
 - a. In a manner which will prevent:
 - 1) Deterioration or damage.
 - 2) Contamination with foreign matter.
 - 3) Damage by weather or elements.
 - b. In accordance with Manufacturer's directions.
 - 1) Storage temperature of Corrosion Barrier Mortar: 40 to 80 degrees F.
- B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
 2. Replace rejected materials with new materials at no additional cost to OWNER.

1.6 WARRANTY

- A. Warrant liner against failure for a period of 10 years. "Failure" will be deemed to have occurred if the protective lining fails to (a) prevent the internal deterioration or corrosion of the structure (b) protect the substrate and environment from contamination by effluent or (c) prevent groundwater infiltration. If any such failure occurs within 10 years of initial completion of work on a structure, the damage will be repaired to restore the lining at no cost to the Owner within 60 days after written notification of the failure. "Failure" does not include damage resulting from mechanical or chemical abuse or act of God. Mechanical or chemical abuse means exposing the lined surfaces of the structure to any mechanical force or chemical substance not customarily present or used in connection with structures of the type involved.

MILL CREEK PUMP STATION PHASE 1 UPGRADES

PART 2 – PRODUCTS: the following systems are pre-approved. Other systems may be considered by the Engineer if submitted 7 business days before bid due date.

2.1 MAINSTAY COMPOSITE LINER SYSTEM and EPOXYTEC STRUCTURAL EPOXY SYSTEM

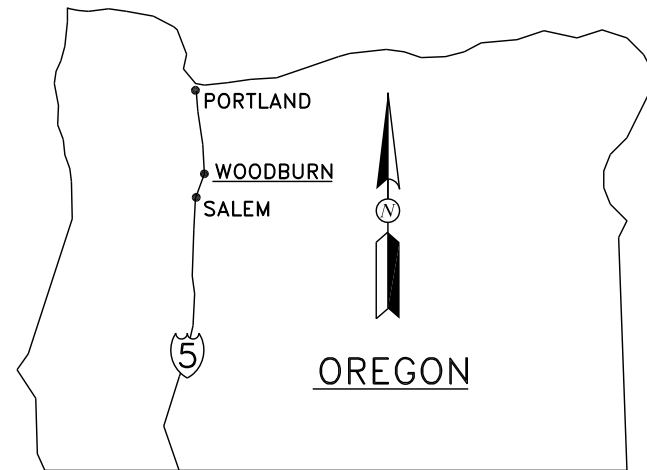
- A. Manufacturer:
1. Madewell Products Corporation, 7561 Industrial Court, Alpharetta, Georgia 30004. Phone (770) 475-8199.
 2. Epoxytec, 3000 N 29th Court, Hollywood, FL 33020. Phone (954) 961-2395
- B. Hydraulic Cement Mortar: Fast-setting mortar used to stop leaks through cracks and holes.
1. Composition: Blend of hydraulic cements and fillers.
 2. Compressive Strength, ASTM C109:
 - a. 1 Day: 1,500 psi.
 - b. 28 Days: 5,000 psi.
 3. Tensile Strength, ASTM C190:
 - a. 7 Days: 290 psi.
 - b. 28 Days: 575 psi.
 4. Working Time: 1 to 3 minutes at 77 degrees F.
- C. Restoration Mortar Sprayable silica Cement Mortar. Low shrinkage, high strength, sprayable silica mortar.
1. Composition: Blend of cements, silica, thermoplastic fibers, densifiers, and modifiers. Mortar shall not contain calcium aluminate cements or aggregates.
 2. Thickness: 1 inch minimum.
 3. Compressive Strength, ASTM C109:
 - a. 1 Day: 3,000 psi.
 - b. 28 Days: 5,000 psi.
 4. Flexural Strength, ASTM C293:
 - a. 1 Day: 535 psi.
 - b. 28 Days: 950 psi.
 5. Tensile Strength, ASTM C496:
 - a. 1 Day: 225 psi.
 - b. 28 Days: 300 psi.
 6. Shrinkage, ASTM C596:
 - a. 28 Days@ 90%: 0.05 percent.
- D. Corrosion Barrier Coating:
1. Composition: 100 percent solids, modified epoxy coating.
 2. Thickness: Minimum of 100 mils in 1 or 2 coats.
 3. Number of Components: 2.
 4. Finish: Gloss.
 5. Color: White.
- E. Manhole Frame Seal: Madewell 806 Flexible Epoxy
1. Composition: 100% solids, flexible epoxy trowel-grade mastic.
 2. Thickness: Minimum of 1/4 inch.
 3. Number of Components: 2.

MILL CREEK PUMP STATION STANDBY GENERATOR AND PHASE 1 UPGRADES

PROJECT No. 2018-005-38.1
 BID No. 2018-02

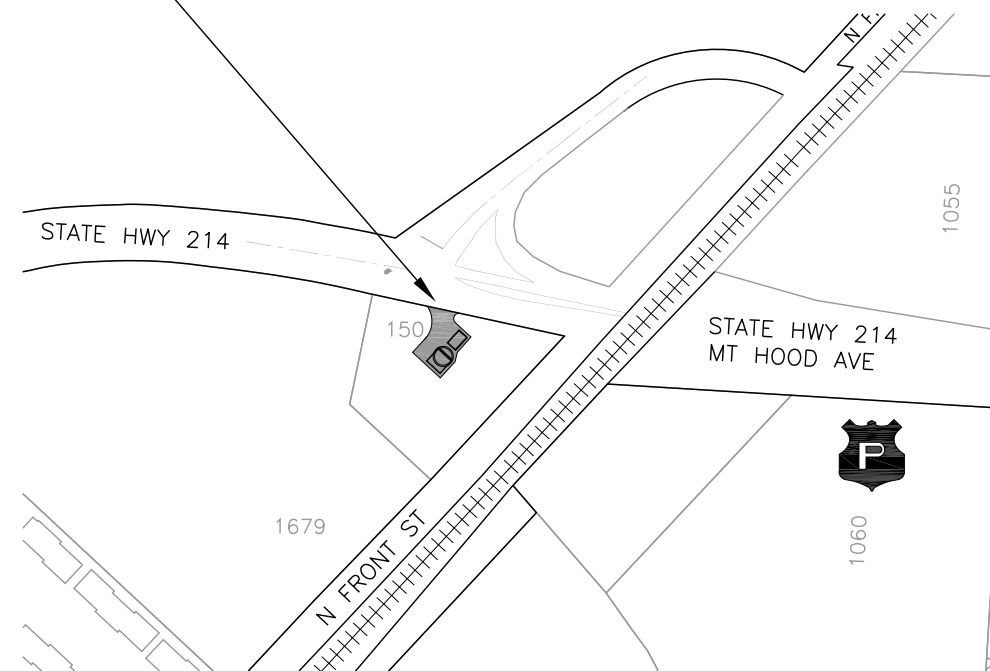
INDEX OF DRAWINGS

SHEET NO.	TITLE	DWG NO.
1	TITLE SHEET	G-1
2	SITE PLAN	C-1
3	DEMOLITION PLAN	D-1
4	PUMP NO. 4 PLAN & DETAIL	M-1
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6	SLUICE GATE INSTALLATION	M-3
7	MISC PLUMBING & PUMP ELECTRICAL PLAN	M-4
8	ELECTRICAL NOTES	E-1
9	GENERATOR INSTALLATION PLAN	E-2
10	GROUNDING PLAN	E-3



VICINITY MAP
 NTS

PROJECT
 LOCATION



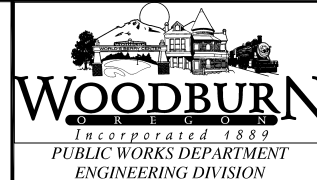
LOCATION MAP
 NTS

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PLOT DATE: 2/18/2020 3:47 PM

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 APPROVED: _____
 HORIZONTAL DATUM: LOCAL
 VERTICAL DATUM: LOCAL

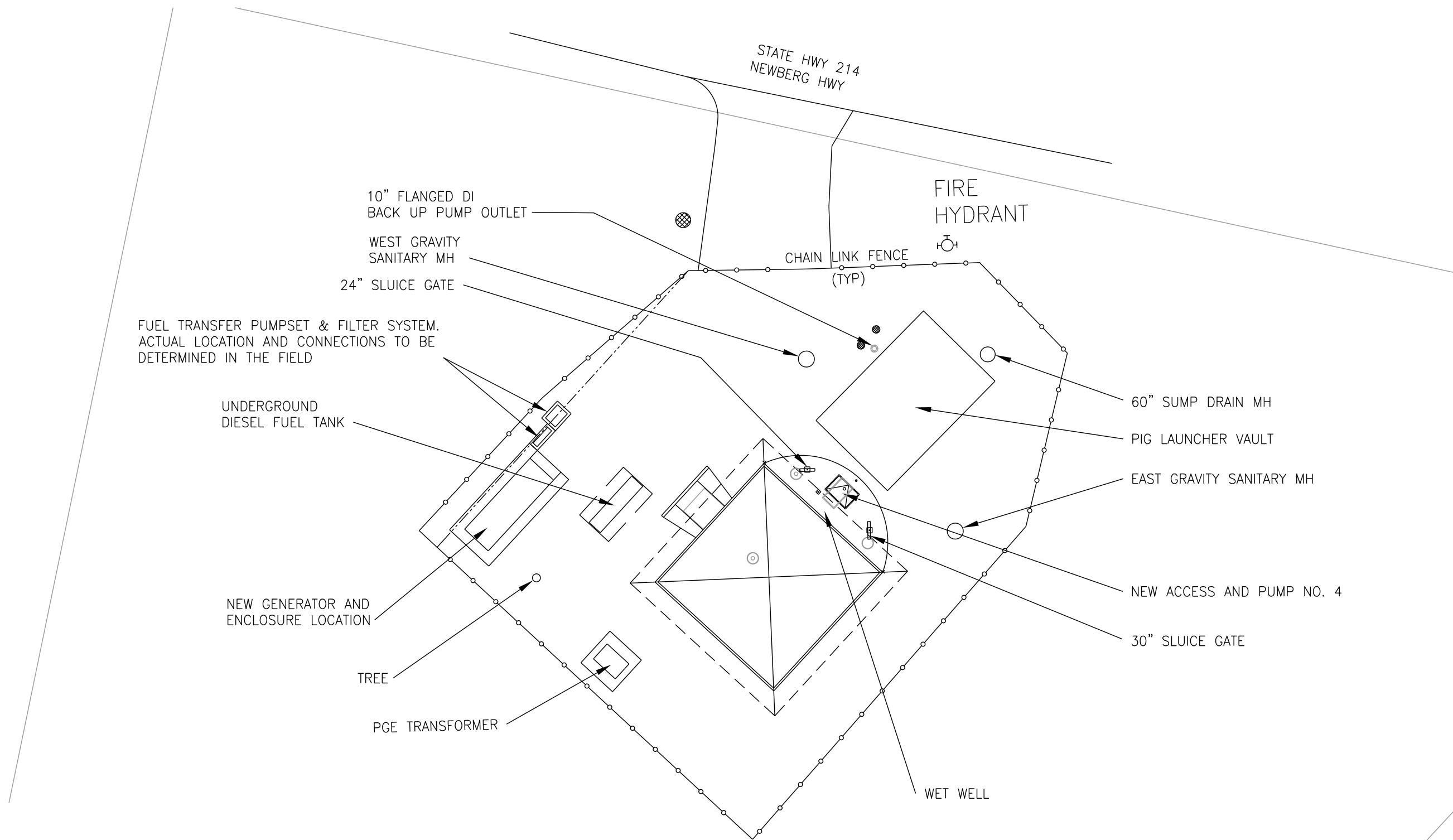


REVISIONS:	

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

TITLE SHEET

PROJECT NO. 2018-006-38.1
DATE 9/18/2019
DWG NO. G-1
SHEET 1 OF 10



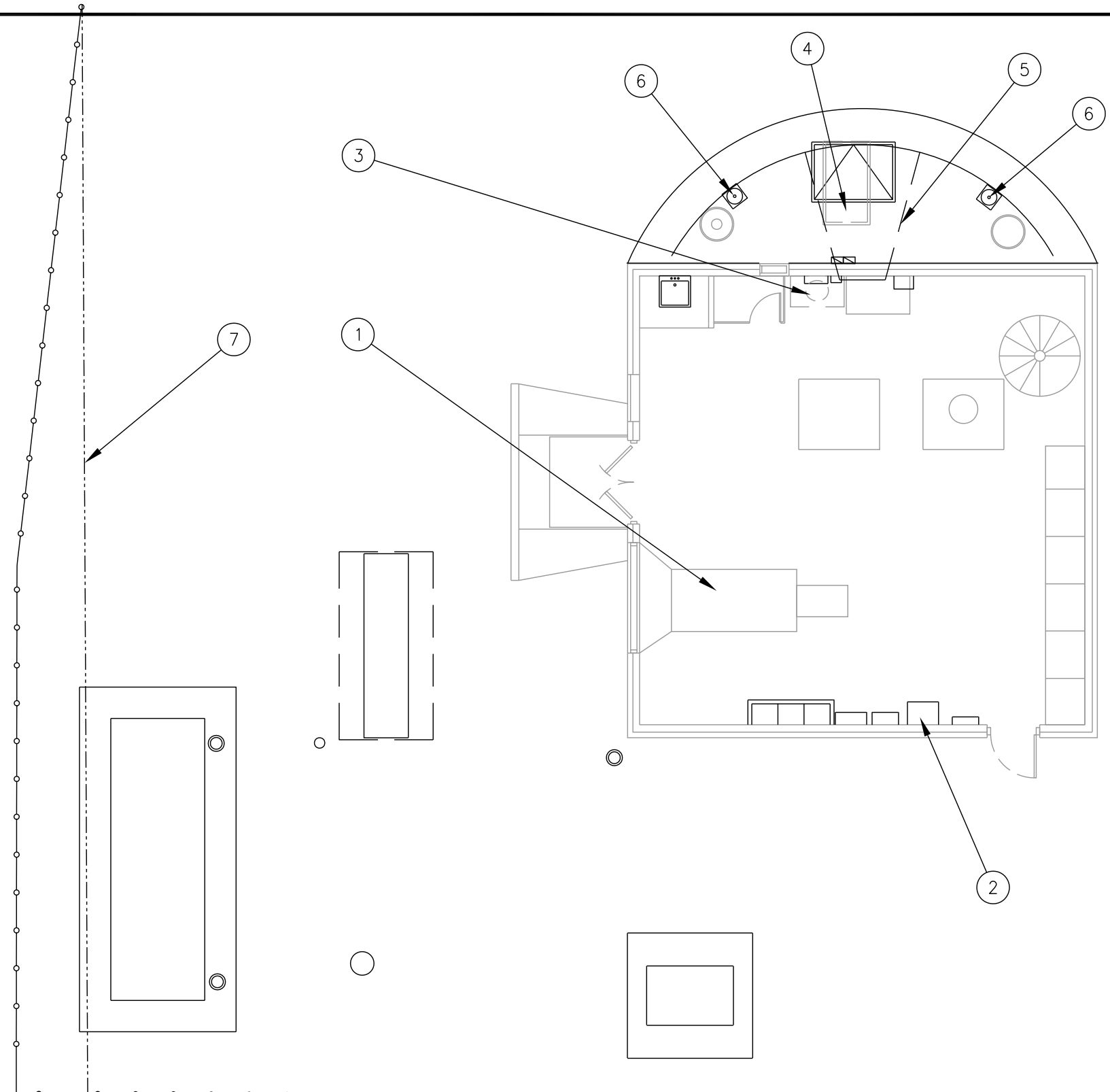
SITE PLAN
SCALE: 1"=20'-0"

<p>THIS BAR IS ONE-INCH ON ORIGINAL DRAWING.</p>	DESIGNED: <u>PJG</u>	<p>WOODBURN OREGON Incorporated 1889 PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION</p>	REVISIONS:	<p>MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES</p> <p style="text-align: center;">SITE PLAN</p>	PROJECT NO. 2018-006-38.1
	DRAWN: <u>PJG</u>				DATE 9/18/2019
	REVIEWED:				DWG NO. C-2
	APPROVED:				SHEET 2 OF 10
HORIZONTAL DATUM: <u>LOCAL</u>					
VERTICAL DATUM: <u>LOCAL</u>					

PLOT DATE: 3/4/2020 8:05 AM

DEMOLITION NOTES:

1. REMOVE AND DISCARD THE EXISTING GENERATOR AND ALL APPURTENANCES THAT REQUIRED FOR FOR REPLACEMENT GENERATOR SYSTEM.
2. REMOVE AND DISPOSE THE EXISTING AUTOMATIC TRANSFER SWITCH.
3. REMOVE AND DISCARD THE EXISTING SINK AND CABINET
4. REMOVE REMAINING VORTEX BREAKERS AND ALL SUPPORTING HARDWARE.
5. REMOVE ENOUGH OF THE CONCRETE FILLET AT THE BOTTOM OF THE WET WELL TO INSTALL PUMP #4 (THE LOW FLOW PUMP).
6. REMOVE AND DISCARD 24" AND 30" SLUICE GATE VALVES AND ACTUATORS AND ALL APPURTENANCES.
7. RELOCATE PERIMETER FENCE AS REQUIRED. REUSE AS MUCH OF THE EXISTING FENCE MATERIALS AS PRACTICAL.



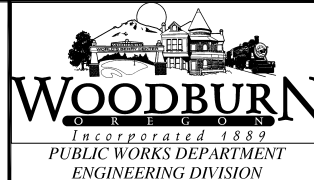
DEMO PLAN

SCALE: 1/4"=1'-0"

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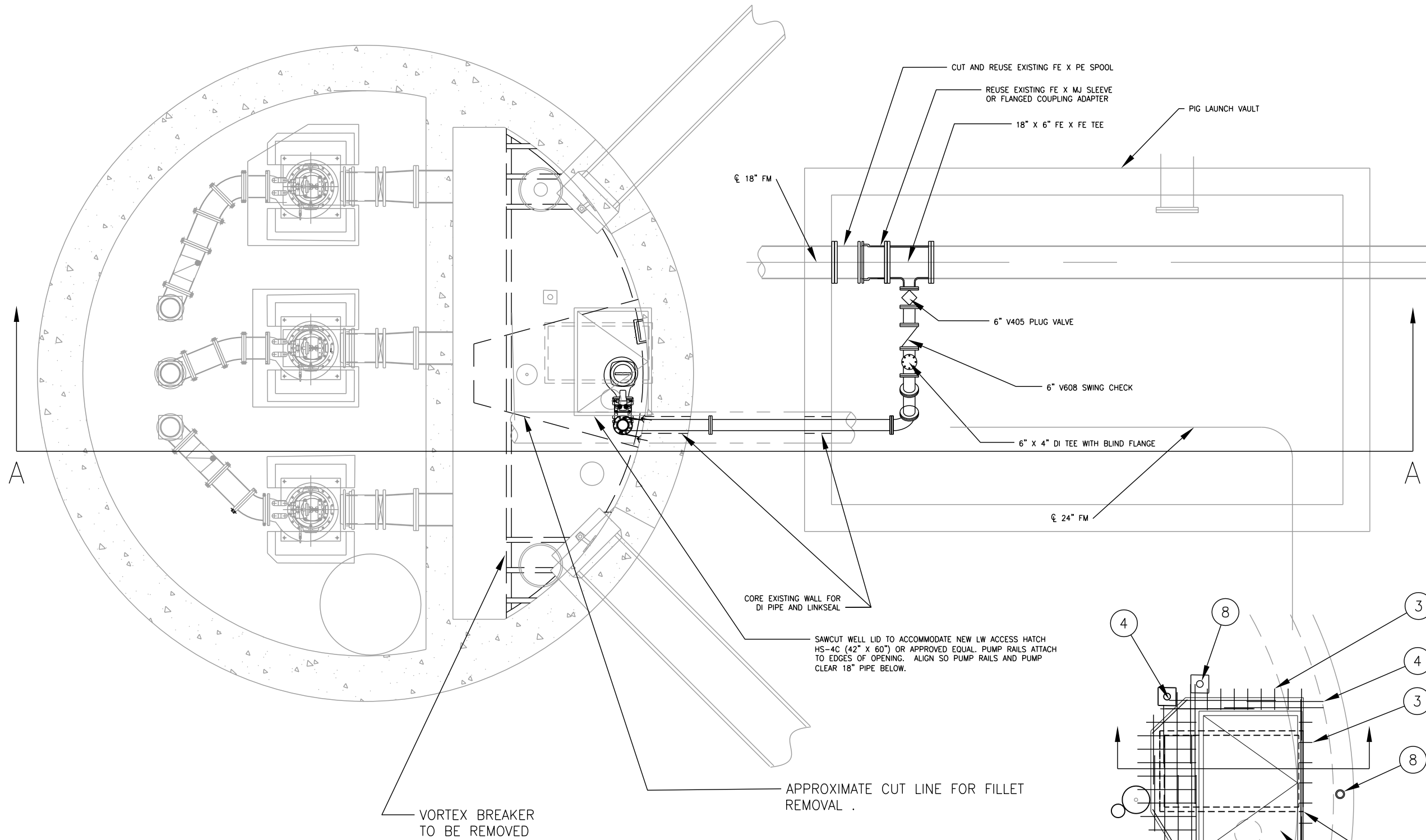


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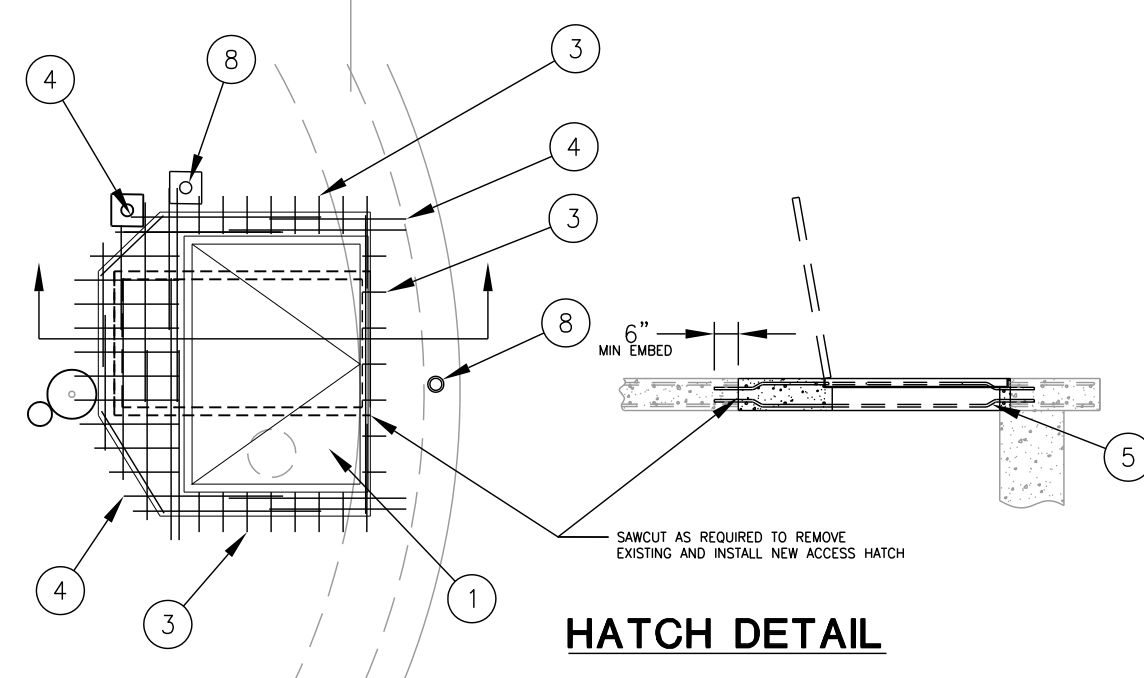
MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

DEMOLITION

PROJECT NO. 2018-006-38.1
DATE 9/18/2019
DWG NO. D-1
3 SHEET OF 10



- HATCH NOTES:**
1. LW PRODUCTS TYPE S-4C (42" X 60") OR APPROVED EQUAL.
 2. ALL REBAR IS #5 GRADE 60.
 3. MIN EMBED OF 4" FOR SHORT DOWELS ALONG ENDS AND SIDE OF HATCH OVER WALL.
 4. MIN EMBED FOR ALL OTHER BAR IS 9".
 5. OFF SET BARS AS REQUIRED TO AVOID EXISTING REBAR MATT WHEN DRILLING EMBED HOLES.
 6. USE HILTI HIT-RE 500-VE ADHESIVE OR SAME AS SLUICE GATE ANCHORS.
 7. MIN BAR LAP 20 DIAMETERS.
 8. NEW DAVIT BASE

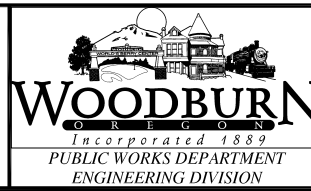


PLAN VIEW PUMP #4

HATCH DETAIL

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 APPROVED: _____
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 VERTICAL DATUM: LOCAL



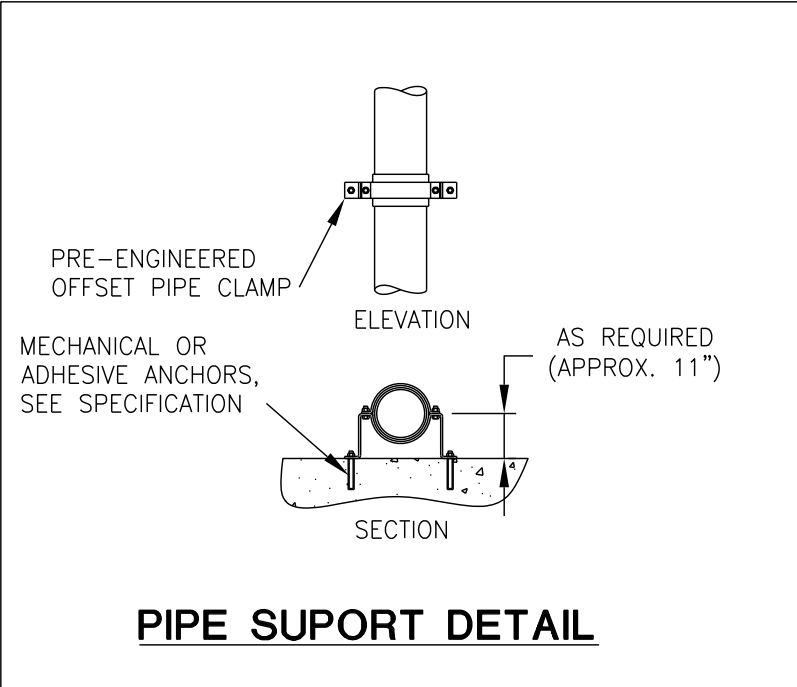
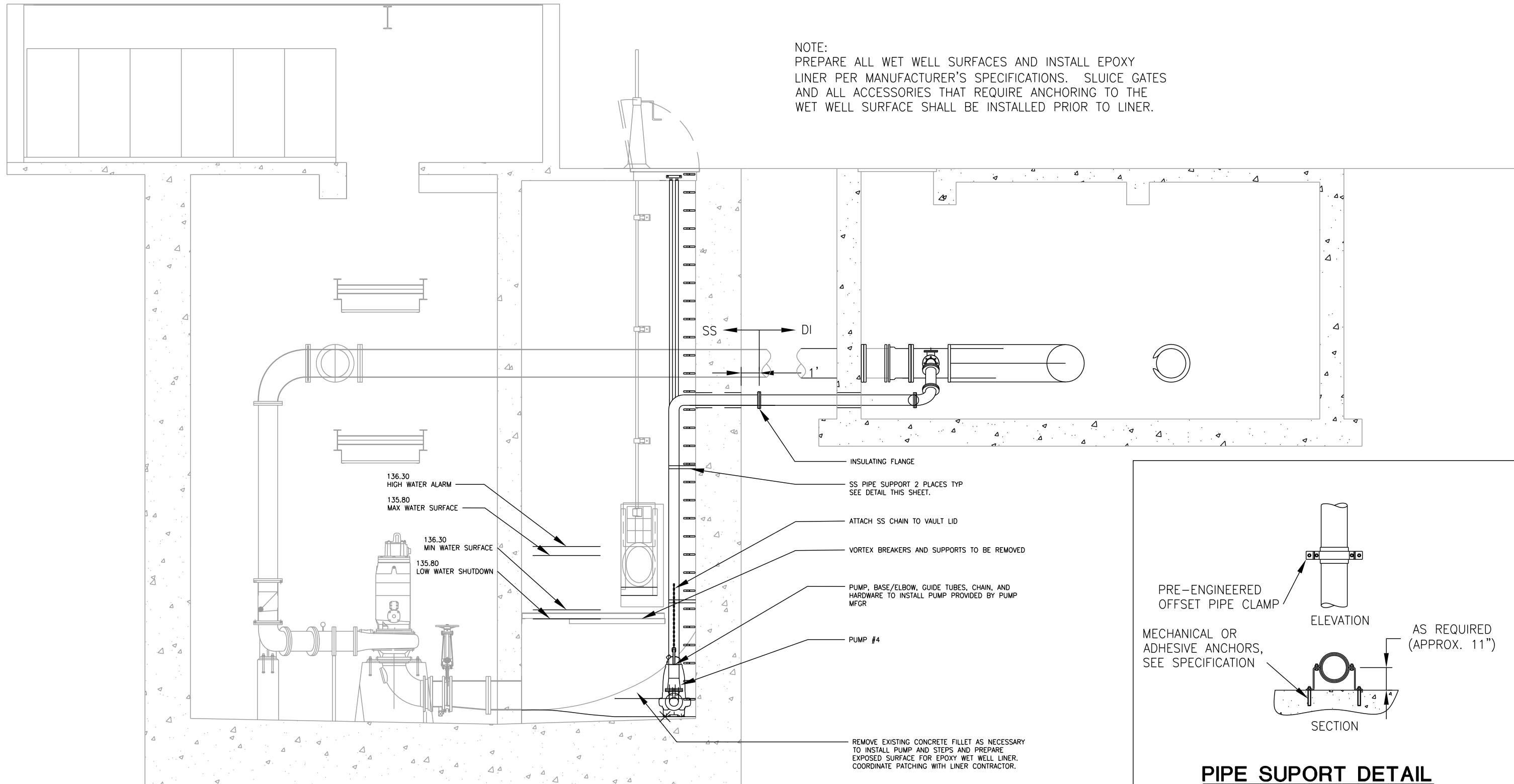
REVISIONS:

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

**PUMP NO. 4
PLAN AND DETAIL**

PROJECT NO.	2018-006-38.1
DATE	9/18/2019
DWG NO.	M-1
SHEET OF	4 OF 10

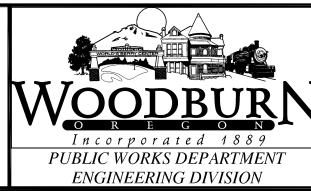
NOTE:
 PREPARE ALL WET WELL SURFACES AND INSTALL EPOXY LINER PER MANUFACTURER'S SPECIFICATIONS. SLUICE GATES AND ALL ACCESSORIES THAT REQUIRE ANCHORING TO THE WET WELL SURFACE SHALL BE INSTALLED PRIOR TO LINER.



SECTION A-A

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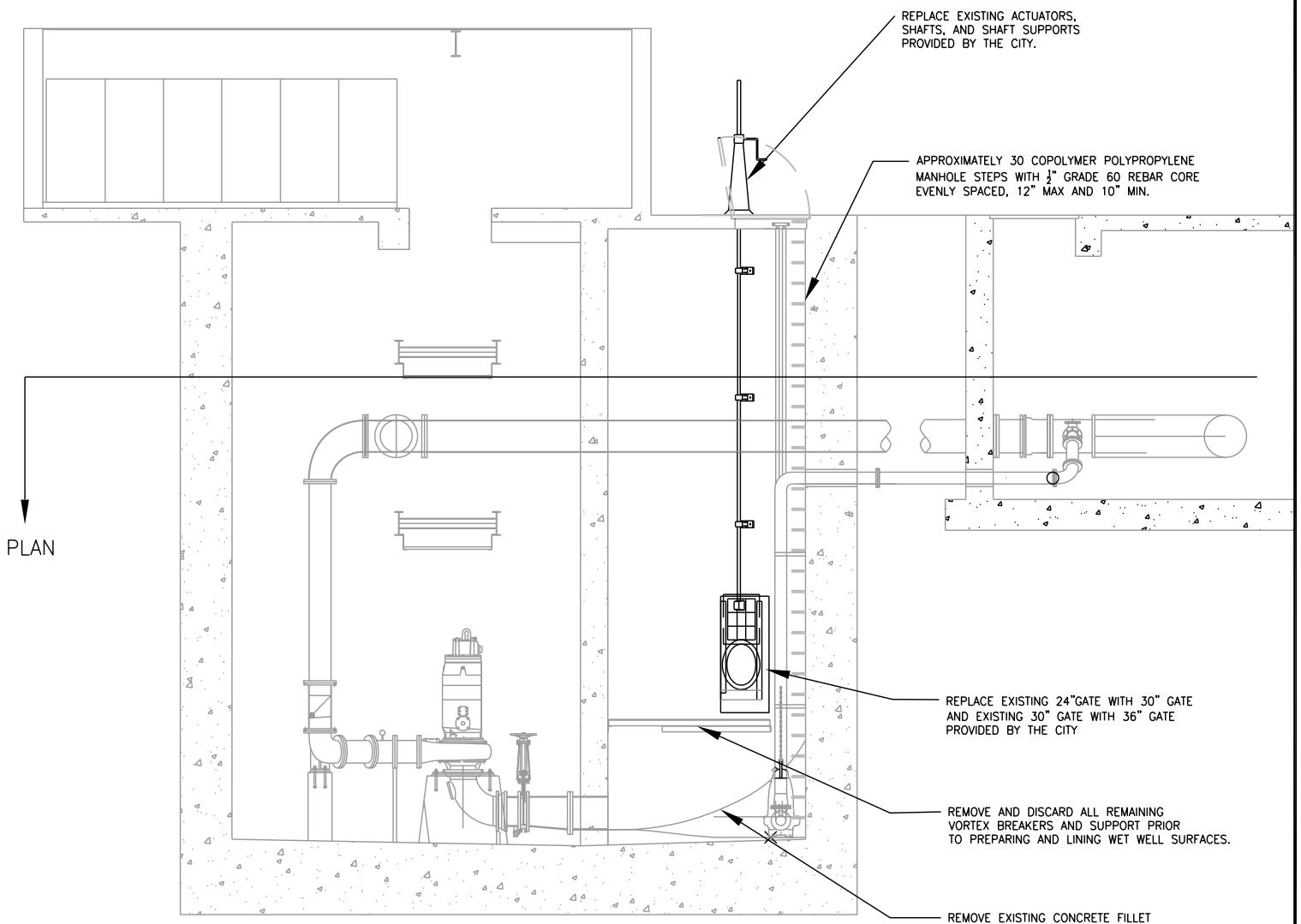
REVISIONS:

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

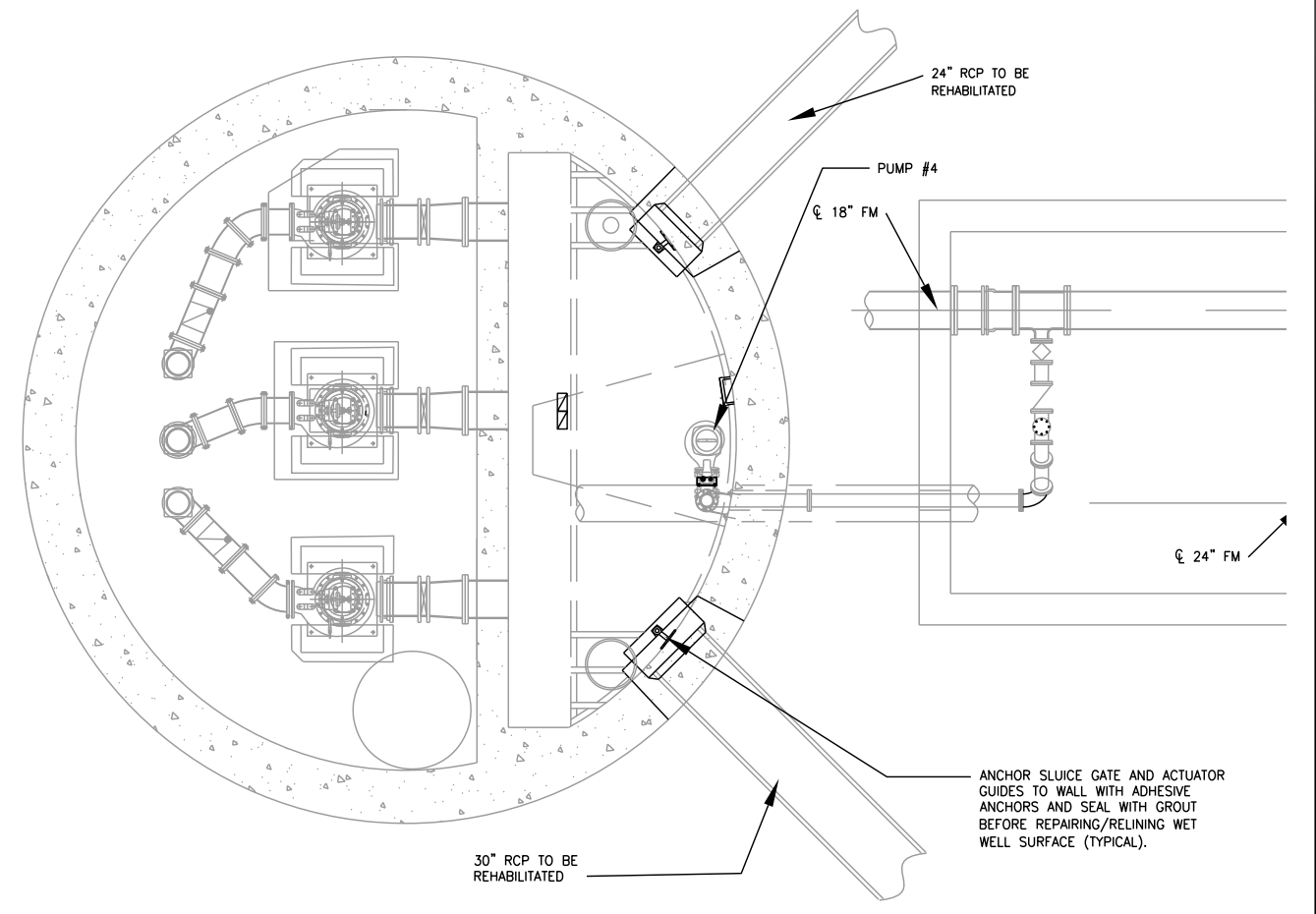
**PUMP NO. 4
 SECTION AND DETAIL**

PROJECT NO. 2018-006-38.1
DATE 9/18/2019
DWG NO. M-2
SHEET 5 OF 10

PLOT DATE: 2/18/2020 4:06 PM



SECTION

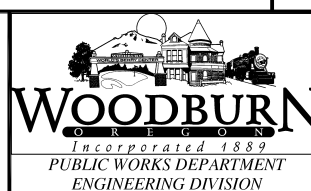


PLAN

NOTE:
 SURFACE AREA OF
 WET WELL IS
 APPROX. 2,140 FT²

THIS BAR IS ONE-INCH ON ORIGINAL DRAWING.

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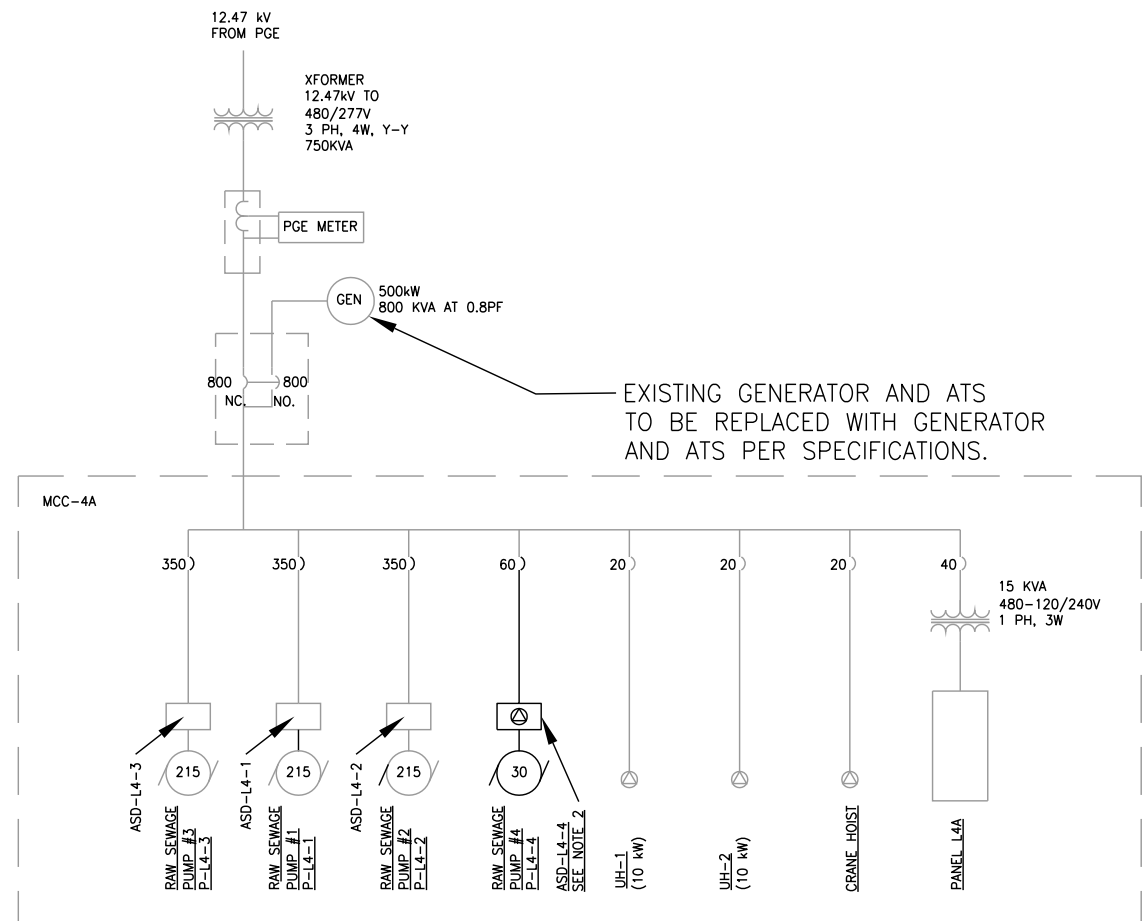


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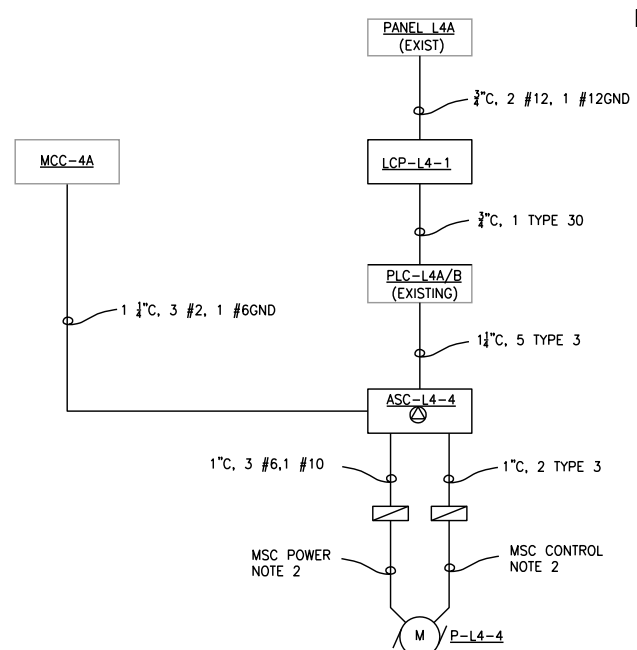
MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

**PLAN AND SECTION
 SLUICE GATE INSTALLATION**

PROJECT NO. 2018-006-38.1
DATE 9/18/2019
DWG NO. M-3
SHEET 6 OF 10

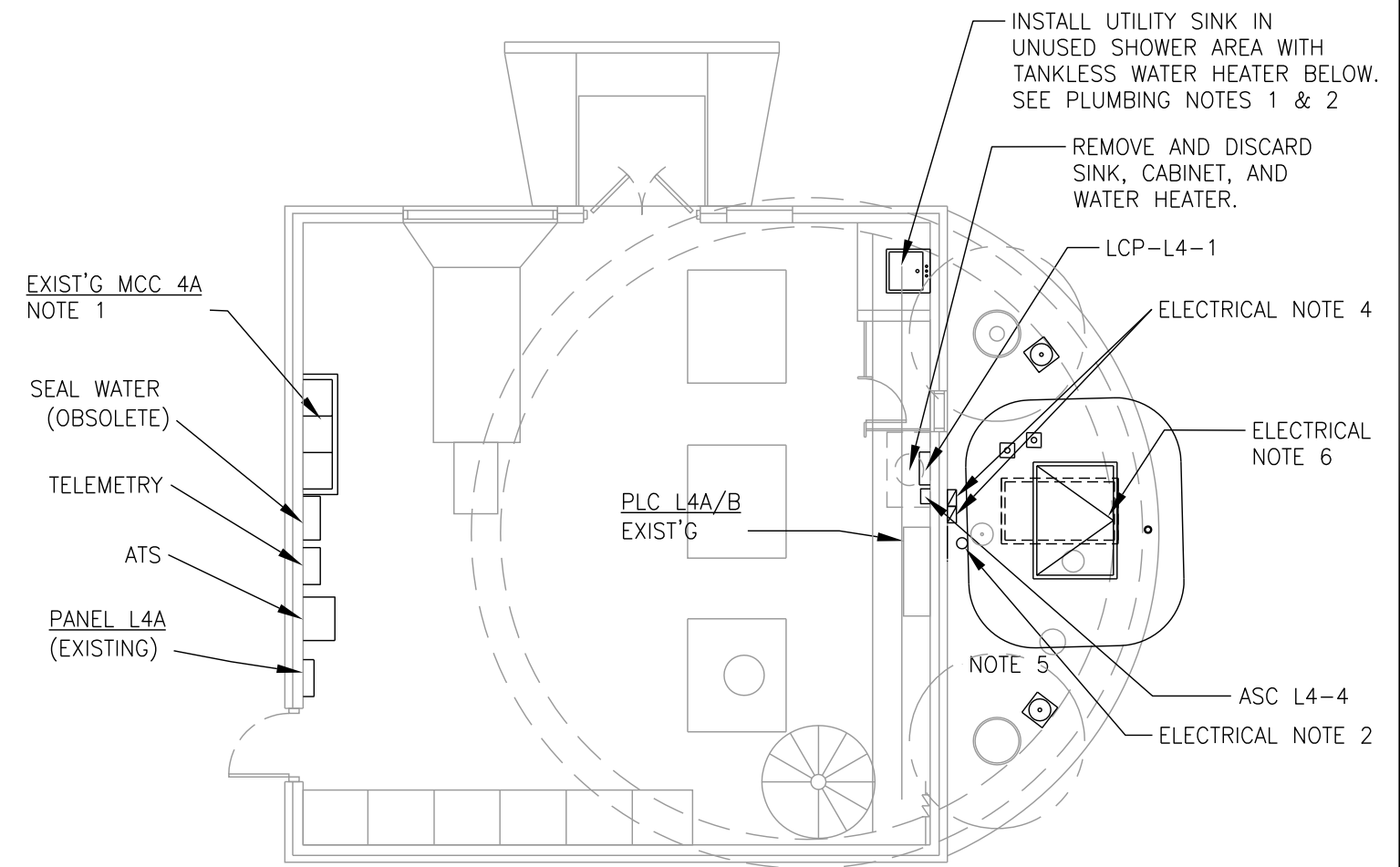


ONE-LINE DIAGRAM
(EXISTING)



CABLE BLOCK DIAGRAM

- NOTES:
1. PACKAGED CONTROL/ASC PROVIDED BY PUMP SUPPLIER.
 2. MANUFACTURERS SUPPLIED SUBMERGED CABLE. MAINTAIN A MINIMUM OVER
 3. CP=PLC-L4A/B.
 4. HAND MODE SPEED CONTROL BY SPEED POT OR DIGITAL KEYPAD.



- PLUMBING NOTES:**
1. INSTALL UTILITY SINK MUSTEE 19CF OR APPROVED SIMILAR IN UNUSED SHOWER AREA.
 2. INSTALL BOSCH US12 - 1.4 GPM AT 60°F RISE - 208-240V/1PH POINT OF USE WATER HEATER OR APPROVED EQUAL UNDER SINK.
 3. .
 4. .
 5. .
 6. .

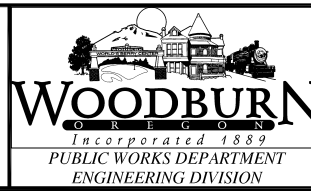
- ELECTRICAL NOTES:**
1. FOR LOCATION OF ASD AND PUMP SEE PROCESS MECHANICAL DRAWINGS.
 2. SIX INCH GRS SLEEVE ROUT SUBMERSIBLE CABLES THROUGH SLEEVE TO TJB'S. INSTALL BUSHINGS ON BOTH ENDS OF SLEEVE.
 3. SCREENED ITEMS ARE EXISTING TO REMAIN. BOLD ITEMS ARE NEW.
 4. WALL MOUNT NEMA 4X TJB'S A MINIMUM OF THREE FEET FROM HATCH AND ALL OTHER OPENINGS TO WETWELL.
 5. ENTIRE WETWELL IS CONSIDERED CLASS 1, DIVISION 1. ALL CONDUIT, WIRING, AND ELECTRICAL DEVICES SHALL BE INSTALLED TO MEET REQUIREMENTS OF NATIONAL ELECTRIC CODE.
 6. THE ENTIRE EXTERIOR WETWELL LID SHALL BE CONSIDERED CLASS 1, DIVISION 2. ALL CONDUIT, WIRING, AND ELECTRICAL DEVICES SHALL BE INSTALLED TO MEET REQUIREMENTS OF NATIONAL ELECTRIC CODE.

PLAN VIEW
SCALE: 1/4"=1'-0"

PLOT DATE: 2/18/2020 4:11 PM

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 VERTICAL DATUM: LOCAL




REVISIONS:

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

MISC PLUMBING & PUMP ELECTRICAL PLAN

PROJECT NO.	2018-006-38.1
DATE	9/18/2019
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LEGEND

ASD	ADJUSTABLE SPEED DRIVE (SAME AS "VFD")
GRC	GALVANIZED RIGID STEEL CONDUIT
CPT	CONTROL POWER TRANSFORMER
EXST	EXISTING
MIN	MINIMUM
MSC	MANUFACTURER SUPPLIED CABLE
NEC	NATIONAL ELECTRICAL CODE
SST	STAINLESS STEEL
	TERMINAL JUNCTION BOX (TJB)
TJB	TERMINAL JUNCTION BOX
VFD	VARIABLE FREQUENCY DRIVE (SAME AS "AFD")
MAS	MONITORING AND STATUS. PUMP MONITORING SYSTEM

SCOPE OF WORK:

A NEW SUBMERSIBLE PUMP AND TWO SLUICE GATES PROVIDED BY THE OWNER IS TO BE INSTALLED IN THE WETWELL AT THE MILL CREEK PUMP STATION ALONG WITH REHABING THE WET WELL AND INSTALLING A NEW STANDBY GENERATOR AND AUTOMATIC TRANSFER SWITCH. THE ELECTRICAL CONTRACTOR SHALL PERFORM THESE TASKS AS PART OF THE INSTALLATION:

1. CONTRACTOR TO SUBMIT DOCUMENTATION THAT ELECTRICIAN IS QUALIFIED TO PERFORM CLASS 1, DIVISION 1 & 2 WORK.
2. INSTALL THE ADJUSTABLE SPEED CONTROL (ASC) AND LCP-L4-1 ON NORTH WALL WHERE SINK AND CABINET ARE TO BE REMOVED.
3. ADD TWO TJBs ON OUTSIDE OF NORTH WALL NEAR THE ACCESS TO THE WET WELL.
4. INSTALL CONDUIT, CONDUCTORS AND CABLE AS SHOWN TO PROVIDE A COMPLETE OPERATING PUMP SYSTEM.
5. TEST INSTALLATION AND VERIFY PROPER OPERATION OF PUMP AND SAFETY FEATURES.
6. COORDINATE WITH FLYGT REPRESENTATIVE FOR STARTUP AND PROGRAMING.
7. INSTALL NEW GENERATOR IN ALL WEATHER ENCLOSURE SHOWN ON DRAWINGS.
8. INSTALL NEW ATS WITH ALL CONDUIT, CONDUCTORS AND COMPONENTS PER THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
9. GROUND EQUIPMENT PER CURRENT CODE, BEST PRACTICES, AND MANUFACTURERS REQUIREMENTS.
10. XX
XX
- 11.

GENERAL:

MATERIALS MANUFACTURED WITHIN SCOPE OF UNDERWRITERS LABORATORIES SHALL CONFORM TO UL STANDARDS AND HAVE AN APPLIED UL LISTING MARK.

CONDUITS, FITTINGS, AND SUPPORTS

CONDUITS, FITTINGS AND SUPPORTS SHALL SATISFY THESE REQUIREMENTS:

1. RIGID GALVANIZED STEEL CONDUIT AND FITTINGS.
 - A. MEET REQUIREMENTS OF ANSI C80.1.
 - B. FITTINGS: THREADED TYPE.
 - C. GALVANIZE BY HOT-DIPPING PROCESS INCLUDING FITTINGS.
2. WALL OR CEILING MOUNT CONDUITS. ONE-HOLE MALLEABLE IRON PIPE STRAPS FASTENED TO THE WALL OR CIELING. SUPPORT SPACING NOT TO EXCEED NEC REQUIREMENTS.
3. SUPPORT CHANNELS, ANCHORS, AND FITTINGS SHALL BE TYPE 316 SST, 12-GAUGE.

TERMINAL STRIPS AND BLOCKS

TERMINAL STRIPS AND BLOCKS SHALL SATISFY THESE REQUIREMENTS:

1. TYPE: COMPRESSION SCREW CLAMP WITH CURRENT BAR PROVIDING DIRECT CONTACT WITH WIRE AND YOKE.
2. SIZE COMPONENTS TO ALLOW INSERTION OF WIRE SIZES SHOWN.
3. RATED FOR 600VAC:
 - A. POWER: 300 AMPS
 - B. CONTROL: 20 AMPS
4. TERMINAL STRIP MANUFACTURERS:
 - A. WEIDMULLER
 - B. IDEAL
 - C. ELECTROVERT
5. TERMINAL BLOCK MANUFACTURERS:
 - A. SQUARE D
 - B. CUTLER HAMMER
 - C. GENERAL ELECTRIC

TJB NAMEPLATES

PROVIDE LAMINATED PLASTIC NAMEPLATES (WHITE WITH RED LETTERS) MOUNTE TO THE TJB DOOR WITH STAINLESS STEEL PANHEAD SCREWS. THE INSCRIPTIONS AND CHARACTER SIZES SHALL BE:


POWER TJB:	
LINE 1 (3/4" HIGH)	DANGER
LINE 2 (3/4" HIGH)	HIGH VOLTAGE
LINE 3 (3/4" HIGH)	PUMP #4
LINE 4 (3/4" HIGH)	3-PHASE 480V
LINE 5 (3/4" HIGH)	ASC-L4-1/MCC-4A
CONTROL TJB:	
LINE 1 (3/4" HIGH)	CAUTION
LINE 2 (1/2" HIGH)	PUMP #4
LINE 3 (1/2" HIGH)	CONTROL TERMINATION
LINE 4 (1/2" HIGH)	J-BOX

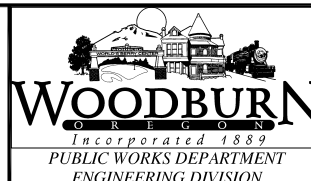
CONDUCTORS

CONDUCTORS SHALL SATISFY THESE REQUIREMENTS:

1. CONFORM TO APPLICABLE REQUIREMENTS OF NEMA WC 3, WC 5, AND WC 7.
2. CONDUCTOR TYPE: STRANDED COPPER.
3. INSULATION:
 - A. NO.8 AWG AND SMALLER: TYPE THHN/THWN.
 - B. NO.6 AWG AND LARGER: TYPE XHHW.
 - C. RATED 600 VOLTS.
 - D. MINIMUM SIZE: 14AWG
4. CONDUCTOR COLOR CODING: PROVIDE CONDUCTORS WITH COLORED INSULATION:

ALL SYSTEMS (EQUIPMENT GROUNDING)	- GREEN
480 VOLTS, 3-PHASE, 3-WIRE	
PHASE A	- BROWN
PHASE B	- ORANGE
PHASE C	- YELLOW
5. SINGLE CONTROL CONDUCTORS: PERMANENT SLEEVE TYPE MARKERS WITH WIRE NUMBERS APPLIED TO EACH END OF CONTROL CONDUCTORS.

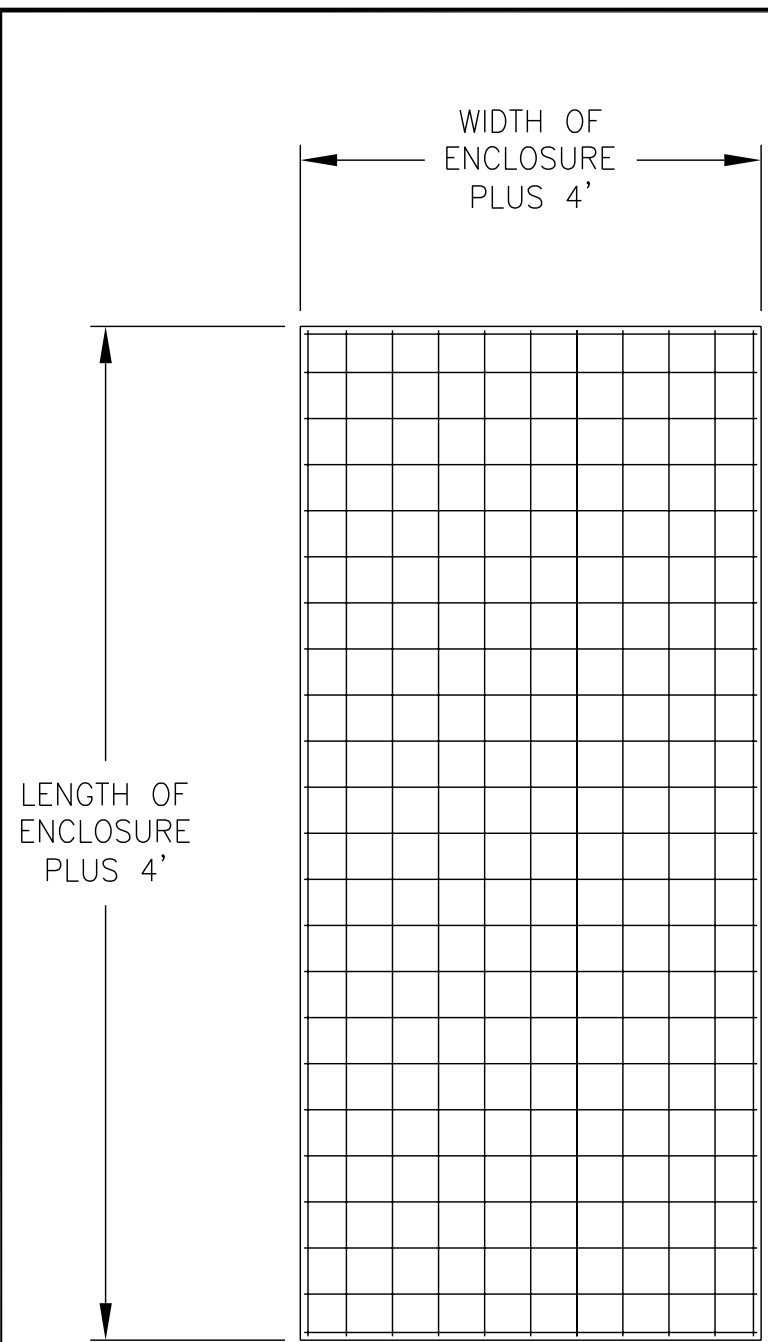
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	DRAWN: <u>PJG</u>
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	APPROVED: _____
	HORIZONTAL DATUM: <u>LOCAL</u>
VERTICAL DATUM: <u>LOCAL</u>	



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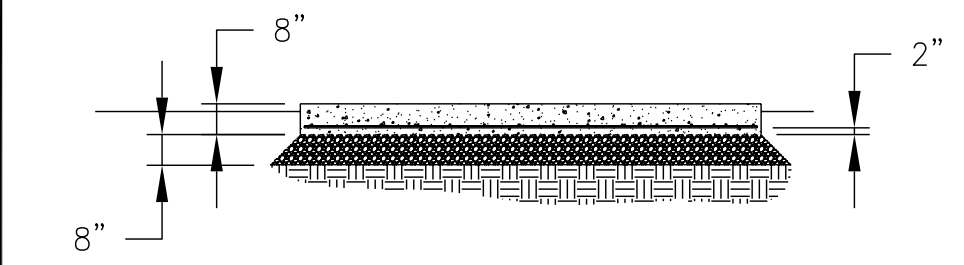
MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES
ELECTRICAL NOTES

PROJECT NO. 2018-006-38.1
DATE 9/18/2019
DWG NO. E-1
SHEET 8 OF 10

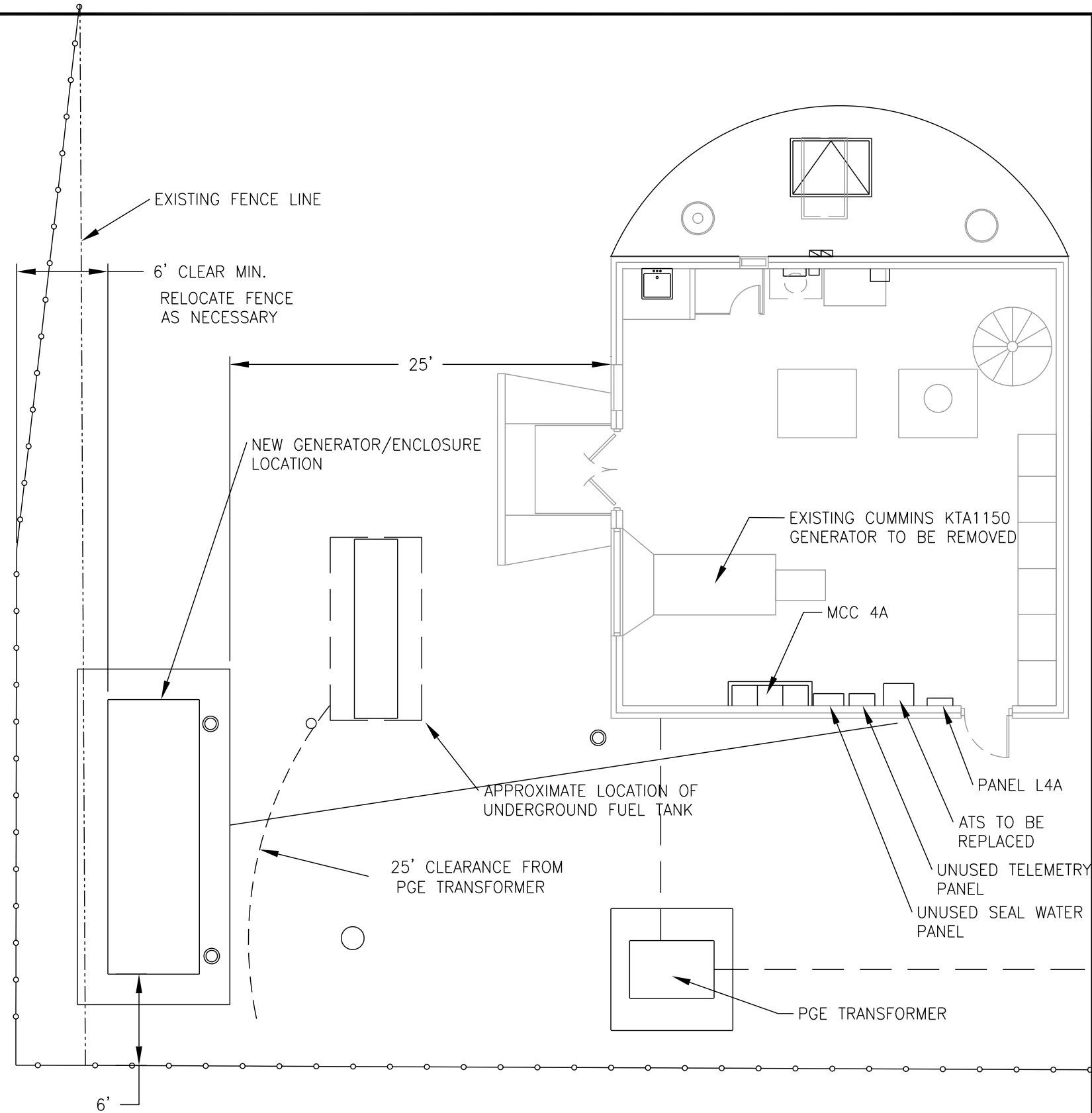


NOTES:

1. 8" THICK 4000 PSI CONCRETE
2. #4 REBAR EA WAY @ 12" OC.
3. 2" MIN EDGE AND BOTTOM CLEARANCE.
4. ANCHOR BOLTS FOR ENCLOSURE TO BE DESIGNED PER SECTION 00165.95 BY CONTRACTOR
5. MIN 8" COMPACTED AGGREGATE BASE.
6. ENCLOSURE TO BE CENTERED ON SLAB



GENERATOR PAD

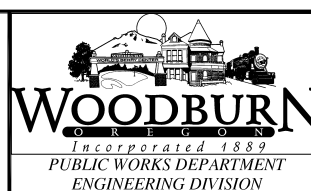


GENERATOR INST PLAN VIEW

SCALE: 1/4"=1'-0"

PLOT DATE: 2/18/2020 3:30 PM

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	DRAWN: PJG
	REVIEWED:
	APPROVED:
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VERTICAL DATUM: LOCAL	

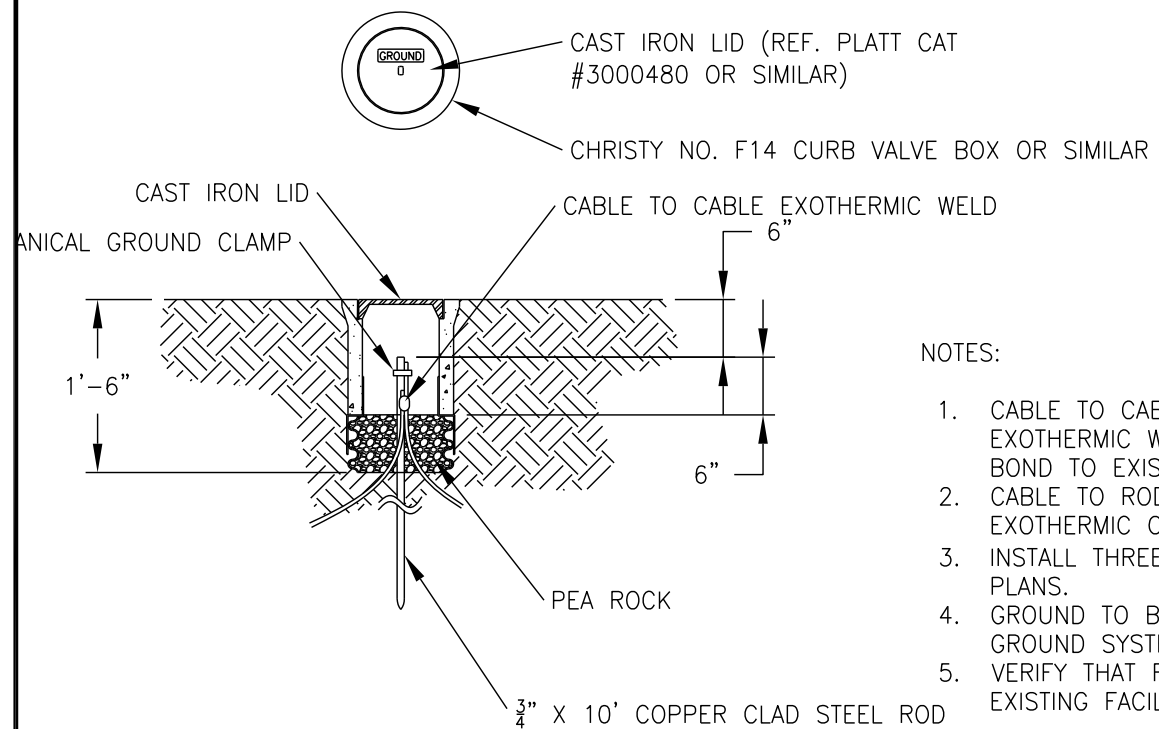


REVISIONS:	

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

GENERATOR INSTALLATION PLAN

PROJECT NO.	2018-006-38.1
DATE	9/18/2019
DWG NO.	E-2
SHEET OF	9 OF 10

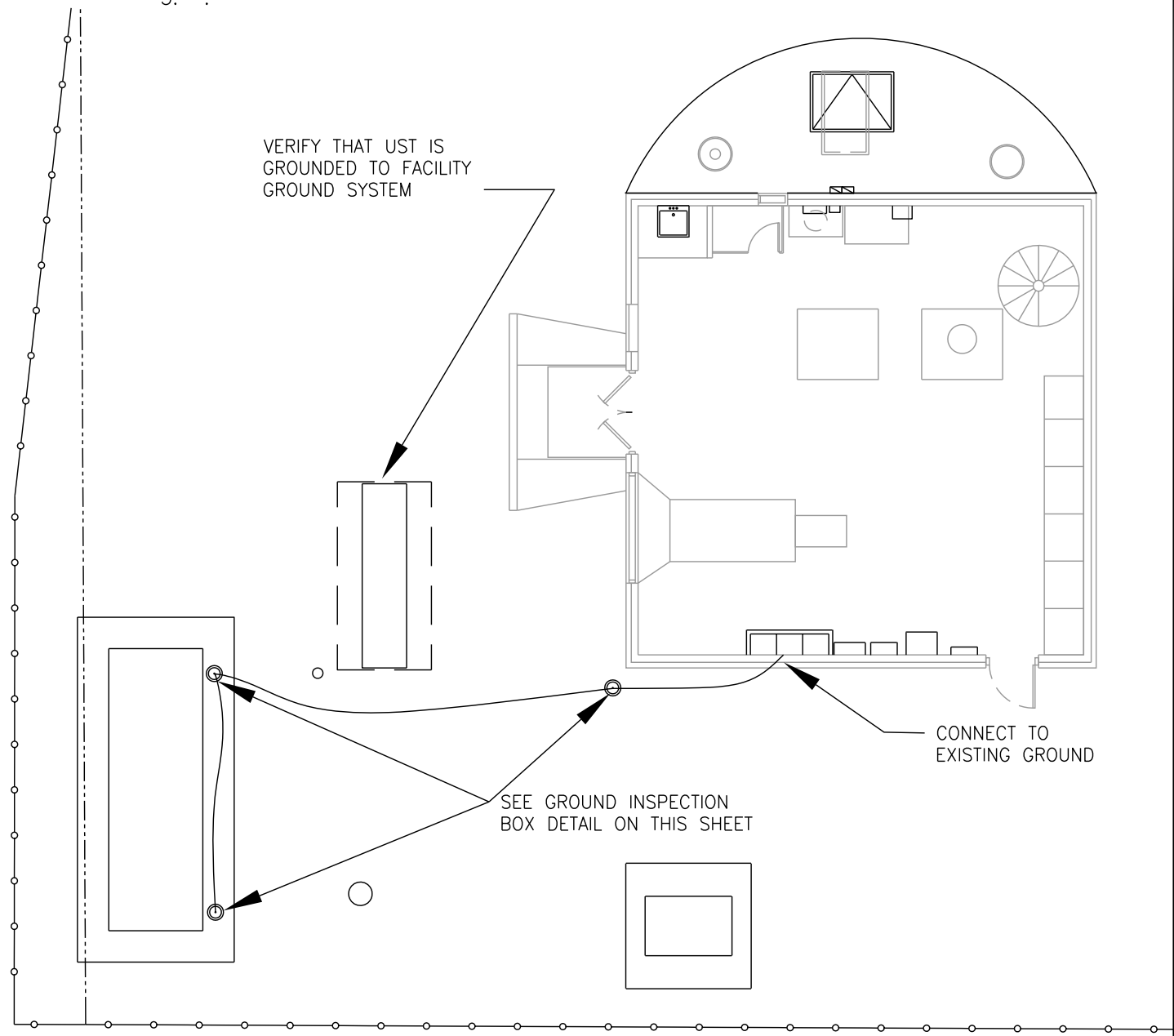


- NOTES:
1. CABLE TO CABLE CONFECTIONS TO BE EXOTHERMIC WELDS TO CREATE CONTINUOUS BOND TO EXISTING BUILDING GROUND.
 2. CABLE TO ROD CONNECTIONS MAY BE EXOTHERMIC OR MECHANICAL GROUND CLAMP.
 3. INSTALL THREE(3) GROUND RODS AS SHOWN ON PLANS.
 4. GROUND TO BE BONDED TO EXISTING FACILITY GROUND SYSTEM.
 5. VERIFY THAT FUEL TANK IS CONNECTED TO EXISTING FACILITY GROUND SYSTEM.

GROUND INSPECTION BOX DETAIL

GENERAL NOTES:

1. .
2. .
3. .



GROUNDING PLAN VIEW

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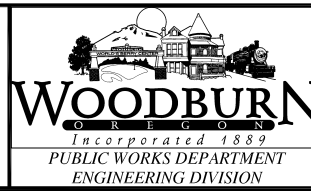
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VERTICAL DATUM: LOCAL



REVISIONS:

MILL CREEK STANDBY GENSET AND PHASE 1 UPGRADES

GROUNDING PLAN

PROJECT NO.	2018-006-38.1
DATE	9/18/2019
DWG NO.	E-3
SHEET	10
OF	10