

**CITY OF FERNDALE
WASTEWATER TREATMENT PLANT UPGRADE**

**ADDENDUM NO. 2 (55 pages total)
Issue Date: December 16, 2019**

General: Recitations of each and every section of the bid documents impacted by this addendum are not given. The described changes impact all relevant portions of the bid documents whether specifically cited below or not.

PART 1 BIDDING REQUIREMENTS

REPLACE entire Section 00 22 13 – Supplemental Bidder Responsibility Criteria with attached.

REPLACE entire Section 00 41 00 – Bid Proposal with attached.

DELETE entire Section 00 43 36 Proposed Subcontractors Form

REPLACE entire Section 00 43 93 – Bid Submittal Checklist with attached.

REPLACE entire Section 00 45 33 – List of Subcontractors with attached.

SECTION 00 24 13 – SCOPE OF BIDS

- **ADD:**
 - 17. Electrical, Lump Sum (LS)
This includes all work shown on E and I sheets and in specifications Division 26 and 27. Detailed breakdowns are provided in Sections 26 05 00 and 26 80 00. Measurement and partial payments will be based on approximate percentage of completion of the time period needed for the Electrical work.
- **CHANGE:** Renumber items 17 through 30 to 18 through 31.
- **ADD** to item 4. Preparation of SWPPP: This work also includes transferring the NPDES General Permit to Contractor's name, and other requirements identified in Section 31 32 11.

SECTION 00 31 13 – PRELIMINARY PROJECT PHASES

- **CLARIFICATION** for work related to lagoons that have been taken out of service (North and South) and the lagoon that will be taken out of service (Middle):
The City has already mixed and pumped the solids and liquids out of the north and south lagoon. The City will mix and pump the solids and liquid out of the middle lagoon in Yr-2020, as shown on the schedule in Section 00 31 13.
However, minor accumulations of residuals will be present in all lagoons. Contractor is to use various techniques, as needed, to dry the residuals (wind row, plow, work, etc.) and carefully remove and landfill this material, including liner remnants, pipe remnants, concrete remnants, and other misc. appurtenances.
Once all residuals and remnants are properly disposed of, Contractor to confirm that remaining material is free of lagoon residuals and biosolids material. Contractor to coordinate with Owner, so confirmation testing can be performed, if needed.
- **CLARIFICATION** for work related to pumping clear liquid from west lagoon:
The Contractor is to plan to pump the west lagoon down to a depth of 4' (approx.); however, additional liquid removal may be necessary for the Contractor's access for replacing existing telescoping valve with new 6" telescoping valve as shown on sheet M1.04. Contractor to either pump additional liquid, or install a temporary water tight retaining structure, as needed, so that telescoping valve can be installed as specified.

PART 2 – CONTRACTING REQUIREMENTS

SECTION 00 73 00 – SUPPLEMENTARY CONDITIONS, 7. Survey, Permits, Regulations

ADD: Contractor is required to pick up the Building Permits from the City and fill-out remaining information required, prior to construction. The City is currently processing five (5) building permits for this project, including the new UV/Maintenance Building (Permit # 19013), the new Lab/Admin Building (Permit # 19007), the new Headworks Shelter (Permit # 19016), new Misc. Concrete Structures (Permit # 19018), and the existing Blower Building Improvements (Permit # 19017).

PART 3 – TECHNICAL SPECIFICATIONS:

REPLACE entire Section 40 05 59 – Slide Gates and Weir Gates with attached.

REPLACE entire Section 46 43 00 – Clarifier Equipment with attached.

REPLACE entire Section 43 23 59 – Screw Pump Equipment with attached.

SECTION 01 50 00 – TEMPORARY FACILITIES, 1.04, I. Temporary Wastewater Systems

ADD: Contractor shall maintain continuous oversight of bypass pumping operations, and other temporary process equipment, at all times using either onsite personnel or the implementation of an alarming system with an automatic cellular notification system, which informs the Contractor when an alarm is in progress.

The Contractor shall have personnel available for call out during problems or emergencies. Call out personnel shall be familiar and experienced with the bypass system, and sufficiently qualified to make necessary repairs or adjustments to ensure the operation performs suitably when backups or overflows occur. Call out personnel shall be available 24-hours per day, 7 days per week and able to respond on-site within 30 minutes of receiving an alarm.

Additionally, backup alarms and 'Normal' or 'Running' equipment status shall be wired to the City's existing PLC control system at the WWTP. This shall be via dry contact wired to spare discrete PLC I/O, located in RCP1 in the Main Electrical Building. Programming and other work related to the PLC and SCADA for these temporary status and alarm monitoring will be provided by the PLC/SCADA Programmer under the force account.

The call-out system will be needed for the 5 new temporary equipment units (bid items 10, 12, 13, 14, and 16):

1. Sediment filter
2. Simplex Pump System for Sediment Filter
3. Simplex Pump System for Existing Disc Filter Feed
4. UV System
5. Triplex Pump System for UV System

SECTION 03 01 30 – REPAIR OF HEADWORKS CONCRETE, 2.03

- **CHANGE** to "OVERCOATING (Class 2 Repair)"

SECTION 03 01 30 – REPAIR OF HEADWORKS CONCRETE, 3.03.E

- A. **CHANGE** to “Apply the repair mortar product per the existing screw pump’s installation manual as supplied with Addendum 2, and as per grout manufacturer’s instructions. Apply in thicknesses that are lie within the minimum to maximum range stated by the manufacturer. Apply smoothly and without creating voids or bugholes.

SECTION 03 01 30 – REPAIR OF HEADWORKS CONCRETE, 3.04

- **CHANGE** to “COATING (Class 2 work)”

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE, 3.03

- **ADD B.** Anchor bolts for steel columns, foundation bolts, and anchor rods for machinery (including but not limited to the skimmer on the clarifiers) shall be set to the tolerances of ANSI/AISC 303-16, Code of Standard Practice for Steel Buildings, Section 7.5, by a Registered Land Surveyor. The Owner’s designated representative for construction shall conduct a survey of the as-built locations of the other embedded items, and shall verify that all items covered in Section 7.5 meet the corresponding tolerances.

SECTION 40 05 71 – TELESCOPING VALVE, 2.01, 5

- **CHANGE** material from 304 to 316 Stainless Steel.

SECTION 26 05 00 – ELECTRICAL GENERAL

- **CHANGE** Section 260500.1.015.B reference to “ATS#1” to “MAIN ELECTRICAL ROOM SWITCHBOARD”. **Clarification:** This is the takeoff point for temporary equipment power, as shown on Sheet E10.03 and in specification 260500.1.015.

SECTION 26 80 00 – INSTRUMENTATION AND CONTROL

- **CLARIFICATION** Section 268000.1.05.D.1 requires the Motor Control Centers to be provided by the System Integrator, due to the customization requirements to tie into existing systems.

SECTION 31 32 11 – SOIL SURFACE EROSION CONTROL, 1.01, A.

- **ADD:**
 - 2. A National Pollution Discharge Elimination System General Permit will be acquired from the Department of Ecology for this project. The Stormwater Pollution Prevention Plan (SWPPP) provides all the requirements and details to comply with the General Permit.
 - 3. Upon execution of the contract, the NPDES General Permit shall be transferred to the Contractor’s name, and the Contractor shall be responsible for paying yearly fees as well as maintaining compliance with the permit from that point forward.

SECTION 09 91 00 – MISC. PLANT PAINTING, 2.01, I, 1, b, Applications, ADDENDUM 1:

- **CHANGE** to “All exposed metal piping (including exposed ductile iron piping), joints, fittings, valves, supports, bollards, yard hydrant accessories, runway beams, runway supports, fasteners, and misc. ferrous metal items for this project shall be painted. Copper, galvanized, aluminum, and stainless steel metal surfaces shall not be painted unless specifically specified. **Exposed piping shall be defined as all piping that is not backfilled. Exposed piping shall also be defined as all piping that is permanently or intermittently submerged within structures.** Exposed piping in vaults is considered to be exposed and shall be painted. All bollards are to be completely protected with shop coatings (primer and finish).

DRAWINGS:

- **REPLACE** Drawing G0.04 with attached.
- **REPLACE** Drawing C4.02 with attached.
- **REPLACE** Drawing C4.03 with attached.
- **REPLACE** Drawing C9.03 with attached.
- **REPLACE** Drawing M1.03 with attached.
- **REPLACE** Drawing M1.08 with attached.
- **REPLACE** Drawing M8.02 with attached.
- **REPLACE** Drawing M8.03 with attached.
- **REPLACE** Drawing S2.16 with attached.
- **REPLACE** Drawing A3.01 with attached.
- **REPLACE** Drawing A3.02 with attached.
- **REPLACE** Drawing A5.02 with attached.

DRAWING C2.06

- **ADD** sheet note 3) See M1.03 for Influent Piping connection to existing headworks.

DRAWING M4.04

- **CHANGE:** 1" PVC SPRAY RING SUPPLY PIPING to 1" **HDG** SPRAY RING SUPPLY PIPING.
- **CHANGE:** 1" PVC BALL VALVE BV-520 (NORTH) BV-521 (SOUTH) to 1" **SST** BALL VALVE BV-520 (NORTH) BV-521 (SOUTH)

DRAWING M4.05, DETAIL 2 & 3

- **CHANGE** note from “TWELVE (12) 1-1/4" ϕ X 19" LONG TYPE 316 STAINLESS STEEL HOOKBOLTS...” to “**EIGHT(8) 1" ϕ X 12" LONG TYPE 316 STAINLESS STEEL HOOKBOLTS...**”

DRAWING M4.06

- **CHANGE:** 1" ϕ SCH 80 PVC WATER SUPPLY PIPING to 1" ϕ **HDG** WATER SUPPLY PIPING.

DRAWING M6.02

- **CHANGE** reference drawing for SG-019 from HM1, HM9 to **M1.03**.

DRAWING M9.01, ADDENDUM 1

- **REMOVE:** PV-542 and PV-543

DRAWING S2.05

- **CHANGE** hatch pattern surrounding the mechanical screen channels should be a concrete hatch, not a grating hatch pattern.

DRAWING S3.0

- **DELETE** detail 6. Refer to M6.04 for all pipe penetration details.

DRAWING S5.01

- **REMOVE** elevated grating and note shown on Detail 2.

DRAWING S2.15

- **CLARIFICATION:** Diameter of existing screw pumps is 80-inches.
- **CLARIFICATION:** Contractor shall replace all bolts connecting the existing deflector shields to the concrete channels. Existing bolts shall be cut and ground flush with concrete. All new bolts and hardware shall be 316 stainless steel.

DRAWING E1.02, E1.03, E1.05, E1.06, E9.02

- **CHANGE** the two aerators (AR-W111 and AR-W114) and the two aerators (AR-W113 and AR-W116) to demo similar to the other aerators further to the west. Only two aerators (AR-W112 and AR-W115) are to remain and to be relocated in accordance with note D1. They shall be relocated to the locations shown on drawing C2.02. The other aerators shown further to the east on drawings E1.05 and E1.06 shall be disregarded. Section 1 of the MCC2 elevation shown on drawing E9.02 shall be removed and aerators AR-W112 and AR-W115 installed in locations 2A and 2D.

DRAWING E1.08

- **CHANGE** tag PV-251 to PV-250 and tag PV-250 to PV-251.

DRAWING E2.01

- **CHANGE** the location of the float switches LSH-201 and LSH-202 to be further to the north adjacent to the disconnects for sluice gates SG-201 and SG-202.

DRAWING E4.01-E4.02

- **REMOVE** conduits P-V540, P-V541, C-V540, C-V541 as well as the north clarifier scum wasting valve PV-540 and the south clarifier scum wasting valve PV-541. These two valves are manual valves with no actuator.
- **ADD** note: Contractor shall provide heat trace for the full length of 3W spray system piping and scum discharge piping. Heat trace shall be installed per the manufacturers requirements and shall be 8W/FT Raychem BTV series, or equal.

DRAWING E5.04

- **REMOVE** floats LSH-400 and LSL-400 and all associated conduits and wire.
- **ADD** an additional level transmitter. Provide level transmitter similar to LIT-400 with similar conduits and wire connected to MLPCP2. New transmitter shall be labeled "LIT-401".

DRAWING E5.06

- **REMOVE** the low level switch LSL-507 and all associated conduits and wire.

DRAWING E6.01, E9.02, E11.08

- **CHANGE** the valve label "PV-650" to "PV-601" and the conduit tag "P-V650" to "P-V601" on drawing E6.01.
- **CHANGE** the label of section 1G of MCC5 on drawing E9.02 from "3W AIR GAP VALVE" to "2W AIR GAP VALVE".
- **CHANGE** the conduit schedule ID on drawing E11.08 of conduit "P-V650" to "P-V601"

DRAWING E10.04

- **CHANGE** the 75KVA transformer indicated inside the MCC should be indicated outside of the MCC and installed outside of the MCC in available space inside the main electric building.
- **ADD** note: Contractor shall provide new 125A rated breaker bucket in existing MCC1.
- **ADD** note: the 70A MCC1 bucket for the effluent pump is existing.

DRAWING E11.08, E11.10

- **CHANGE** the "from" column for conduits P-V250 and P-V538 to say "MAIN DISTRUBTION PANEL 'MDP-4'" instead of "REMOTE CONTROL PANEL 'PLC-4'".
- **CHANGE** the "from" column for conduits C-V250 and C-V251 to say "CONTROL PANEL 'PLC-4'" instead of "REMOTE CONTROL PANEL 'PLC-4'".
- **CHANGE** medium voltage power cables "description" column from "MEDIUM VOLTAGE INTERLOCKED ARMORED CABLE" to "MEDIUM VOLTAGE INTERLOCKED ARMORED CABLE RATED FOR DIRECT BURIAL". Triplexed cable in 4" conduit is an acceptable alternative.

SECTION 00 22 13 – SUPPLEMENTARY BIDDER RESPONSIBILITY CRITERIA

Following the Bid opening, upon Owner's request, the apparent low bidder(s) must supply the requested information within one (1) business day of request by Owner. Withholding information or failure to submit all the information requested within the time provided shall render the bid non-responsive.

The Owner and Engineer will make the initial determination whether or not the apparent low Bidder is responsible taking into account all the information submitted by the apparent low Bidder(s) in response to the request. The Owner will notify the Bidder of the preliminary determination in writing, including the reasons for its determination.

Within three (3) days after receipt of the determination, if the Bidder is determined not responsible, the Bidder may withdraw its Bid or request an appeal hearing. The Bidder may also present additional information pursuant to RCW 39.04.350 (2)(d).

If the Bidder requests an appeal hearing, the Owner will schedule a hearing with Public Works staff, to be heard not later than two (2) weeks after receipt of Bidder's request. The appeal hearing members will be Public Works staff and the Engineer of Record. The hearing members will issue a Final Determination after reviewing information presented at the hearing. If the Final Determination affirms that the Bidder is not responsible, the Owner will not execute a Contract for the Project with any other Bidder until two (2) business days after the Bidder determined to be not responsible has received the Final Determination. The Final Determination is specific to this project, and will have no effect on other or future projects.

The following supplemental Bidder responsibility criteria and requested supporting documentation are established for this Project. To be responsible, a Bidder must substantially meet the responsibility criteria established below.

1.01 WORKLOAD CAPACITY

A. Criterion

1. The Bidder's concurrent and projected workload during the life of this Contract should not exceed 150% of the actual contracted workload over the previous 24 month period unless the Bidder can demonstrate to the Owner's satisfaction that it has the capacity to assume the additional work of this Project, provide adequate staffing, and meet Project demands.

B. Required Documentation

1. Provide a list of all construction contracts \$5,000,000 and above your firm has in progress and those projected to commence during the next 9 months, giving the name of the project; name, address, and phone number of owner and architect/engineer; contract amount; percentage complete, and

scheduled completion date. Failure to list all projects shall render the Bid non-responsive.

2. List the current and projected workload for the next 12 months including this Contract, expressed in total contract value. \$ _____.
3. List actual contracted workload for the previous 12 months expressed in total contract value. \$ _____.

1.02 PREVIOUS EXPERIENCE

A. Criterion

1. The Bidder should have experience over the most recent past ten (10) years with successfully completing public works projects similar in size and complexity to the current Project. The Contractor's Superintendent and Project Manager should also have experience within the past ten (10) years successfully managing to completion public works of similar size and complexity to the current Project.

B. Required Documentation

1. Experience of Contractor
 - a. Provide a list of public works construction contracts similar in size and complexity your firm has completed in each of the past ten (10) years, giving the name of the project, name, address, and phone number of the owner, and architect/engineer, contract amount, date of completion, and percentage of the cost of the work performed with your own forces. This information will be used for references.
 - b. During the preceding ten (10) years, the Contractor shall have successfully completed at least one public works project meeting each of the scope elements below. Contractor may submit multiple projects each demonstrating individual elements so long as the sum of the projects demonstrates all of the elements listed. The project(s) identified to demonstrate experience with each element must contain scope for that element similar to or larger than the scale of work required in these bid documents. The required scope elements are:

- (i) Final contract amount in excess of \$10,000,000,

- (ii) Construction of wastewater treatment facility improvements,
- (iii) Sewer force main and water main installation and testing of 12-inch diameter piping or larger,
- (iv) Trench excavation, shoring, and dewatering for pipeline/structure installation to a depth of 12-ft (min).
- (v) Design and installation of temporary wastewater bypass facilities.

2. Experience of Superintendent

- a. Submit resume and references of the person proposed by the Bidder to superintend the work. Resumes and references should demonstrate Superintendent has managed public works projects of similar complexity and similar size, and successfully completed the project(s) within the last ten (10) years. At a minimum, the Superintendent's training and certifications shall include:

- (i) OSHA Confined Space Entry Training,
- (ii) OSHA Competent Person Training
- (iii) Certified Erosion and Sediment Control Lead

3. Experience of Project Manager

- a. Submit resume and references of the person proposed by the Bidder to manage the project. Resumes and references should demonstrate Project Manager has managed public works projects of similar complexity and similar size, and successfully completed the project(s) within the last ten (10) years. At a minimum, the Project Manager's experience shall include:

- (i) Critical Path Method (CPM) Scheduling,
- (ii) Specialty Subcontracts Management,
- (iii) Managed at least one public works project with a final contract amount in excess of \$10,000,000.

1.03 ABILITY TO PERFORM WITHIN TIME SPECIFIED

A. Criterion

1. The project must be completed no later than **December 10th, 2021**. Bidder should have a demonstrable recent track record of completing public works projects on time and be able to show that the project field work will begin no later than **March 2nd, 2020**.

B. Required Documentation

1. Provide a list of public works construction contracts similar in size and complexity by title, original contract time, and change order time extensions completed within the past ten (10) years. Bidders shall document that it achieved substantial completion of these projects of similar size and scope within no more than 105% of the originally allowed contracted duration adjusted for change orders. References and current contact information for owners and architects/engineers on each project should be provided.

*****END OF SECTION*****

SECTION 00 41 00 – BID PROPOSAL

Name of Bidder: _____

To: City of Ferndale
2095 Main Street
Ferndale, Washington 98248

Project: Ferndale WWTP Upgrade

BASE BID – WWTP Upgrade

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
1	WWTP Upgrade	1	LS		
	BASE BID ITEM 1				

UNIT QUANTITY BID ITEMS

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
2	Trench Safety Excavation Provisions	1	LS		
3	Bollards	10	EA		
4	SWPPP Preparation	1	LS		
5	Maintenance Work for SWPPP	1	LS		
6	City SCADA/PLC Programmer Services	1	FA	\$635,014.00	\$635,014.00
7	18" Diameter Auger Cast Piles. 16 Total. Avg Depth = 65 LF	1,040	LF		
8	24" Diameter Auger Cast Piles. 123 Total. Avg Depth = 45 LF	5,535	LF		
9	West Lagoon Recirculation Pump System	1	LS		
10	Temporary Sediment Filter System	1	LS		
11	Additional On-Site Support Days from MFR for Temporary Sediment Filter System	14	DAYS		
12	Temporary Pumping System for Temporary Sediment Filter Sys.	1	LS		
13	Temporary Pumping System for Permanent WWTP Filter Sys.	1	LS		
14	Temporary UV Disinfection Sys.	1	LS		
15	Additional On-Site Support Days from MFR for Temporary UV Disinfection System	10	DAYS		
16	Temporary Pumping System for Temporary UV Disinfection Sys.	1	LS		
17	Electrical	1	LS		
	SUBTOTAL UNIT QUANTITY BID ITEMS 2-17				

EXTRA WORK ITEMS

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
18	Structural Concrete	20	CY		
19	Over Excavation	100	CY		
20	Crushed Surfacing Top Course	100	TN		
21	Crushed Surfacing Base Course	100	TN		
22	Gravel Base	100	TN		
23	Quarry Spalls	100	TN		
24	Gravel Backfill for Pipe Zone Bedding	100	TN		
25	Gravel Backfill for Drains	100	TN		
26	Sand	100	TN		
27	Capillary Break	100	TN		
28	Gravel Borrow	100	TN		
29	Gravel Borrow for Structural Earth Wall	100	TN		
30	Gravel Backfill for Walls	100	TN		
31	Bank Run Gravel for Trench Backfill	100	TN		
	SUBTOTAL EXTRA WORK ITEMS 18-31				

	SUBTOTAL ITEMS 1-31		\$
	8.7% SALES TAX (City of Ferndale)		\$
	TOTAL BID		\$

LIST OF MANUFACTURERS

The named manufacturer for some equipment items are listed below. Contractor is to circle his selected manufacturer, when a choice is available. Contractor's Base Bid Item #1 - WWTP Upgrade is to be based on the following:

<u>Equipment</u>	<u>Base Bid Manufacturer</u>
A. Rotary Drum Screen Equipment	<u>Huber Technology</u>
B. Biological Treatment Sys. Equipment	<u>Parkson Biolac</u>
C. Clarifier Equipment	<u>Ovivo USA</u>
D. UV Disinfection Equipment	<u>Trojan Technologies</u>
E. West Plant Drain Pump Equipment	<u>Flygt</u>
F. Mixed Liquor Pump Equipment	<u>Flygt</u>
G. Effluent Pump Equipment	<u>Flygt</u>
H. Generator	<u>Cummins Onan or Caterpillar</u>

EQUIPMENT ALTERNATES:

Contractors may submit an approval package for equipment of alternate manufacturers to the base bid manufacturer for review with their bid and included as an Equipment Alternate on this Bid Proposal. A pre-approval review prior to bid will not be done. Contractors proposing alternate manufacturers will be responsible for all costs associated with system evaluation and redesign including all electrical, mechanical, and civil aspects of the installation.

- A. Furnish Rotary Drum Screen Equipment other than specified.
Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____
- B. Furnish Biological Treatment System Equipment other than specified.
Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____
- C. Furnish Clarifier Equipment other than specified.
Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____
- D. Furnish UV Disinfection Equipment other than specified.

Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____

- E. Furnish West Plant Drain Pump Equipment other than specified.

Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____

- F. Furnish Mixed Liquor Pump Equipment other than specified.

Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____

- G. Furnish Effluent Pump Equipment other than specified.

Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____

- H. Furnish Generator Equipment other than specified.

Lump Sum Deduction \$ - Deduction _____
Amount in Words: _____
Manufacturer & Model No. _____

Note 1: Mobilization items and partial payments for Mobilization shall be in accordance with WSDOT Standard Specifications Section 1-09.7.

Note 2: See Section 00 24 13 –Scopes of Bids for more description of each bid item.

Note 3: Payments will be made for actual quantities of bid items installed on the project. Estimated contract quantities provide contingencies with respect to rock and miscellaneous alignment adjustments; and to establish a not-to-exceed level of construction cost for Owner's planning purposes. If required by actual field conditions, bidders should be prepared to perform all expected and contingency work reflected in the estimated contract quantities and in the quantity ranges identified for additive and deductive unit prices. Bidders should not, however, expect to be paid the total contract price if the contingency quantities are not required to be installed by actual field conditions.

The Owner reserves the right to accept or reject any or all bid prices within sixty (60) days of the bid date.

Time for Completion

See Supplementary Condition 15 - Completion Date for completion time requirements.

Liquidated Damages

The undersigned agrees to pay the Owner as liquidated damages the sum as specified in the General Conditions for each consecutive calendar day that is in default after the Contract Time. Liquidated damages shall be deducted from the contract by change order or from the Contractor's application for payment as determined by Owner in its sole discretion.

Contractor is required to pay Washington State Prevailing Wages and Federal Prevailing Wages. All work performed on this project will be subject to the higher of the prevailing state or federal wage rates.

Receipt of Addenda

Receipt of the following addenda is acknowledged:

Addendum No. _____	Addendum No. _____	Addendum No. _____
Addendum No. _____	Addendum No. _____	Addendum No. _____

Name of Firm _____

NOTE: *If bidder is a corporation, write State of Incorporation; if a partnership, give full names and addresses of all parties below.*

Non-Collusion Declaration: By signing below, I hereby declare that I, firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action restraining free competitive bidding for this project.

Signed by _____, Official Capacity _____

Print Name _____

Address _____

City _____ State _____ Zip Code _____

Date _____ Telephone _____ FAX _____

State of Washington Contractor's License No. _____

Federal Tax ID # _____ e-mail address: _____

Employment Security Department No. _____

***** END OF SECTION *****

SECTION 00 43 93 – BID SUBMITTAL CHECKLIST

The bidder is advised to use the following list to assemble all forms required to be submitted with their bids. In accordance with RCW 39.30.060, bidders shall submit the required documentation listed below.

Bid must be received prior to **11:00 A.M. PST, Wednesday, January 8, 2020.**

Bid Submittal Checklist

Part 1 – (to be submitted with the bid)

- _____ Bid Proposal (Section 00 41 00 BID PROPOSAL).
- _____ Bid Guarantee (Section 00 43 13 BID BOND or other type of Bid Guarantee).
- _____ Contractors Qualifications (Section 00 45 13).
- _____ Non-Collusion Affidavit (Section 00 45 19).
- _____ Certification of Compliance with Wage Payment Statutes (Section 00 45 29).
- _____ Attachment 3 Certification of Non-Segregated Facilities (See Section 00 53 00, page 25 of 26).
- _____ Attachment 4 Notice to Labor Unions or Other Organization of Workers: Non-Discrimination in Employment (See Section 00 53 00, page 26 of 26).

Part 2 – (to be submitted either with the bid or within 1-hour of the bid)

- _____ List of Subcontractors (Section 00 45 33).
- _____ Complete Bidders List (as described in Section 00 53 00, page 6 of 26).
- _____ DBE Subcontractor Performance Form (WA Ecology Form 6100-3, Included in Part 4 Appendix G)
- _____ DBE Subcontractor Utilization Form (WA Ecology Form 6100-4, Included in Part 4 Appendix G)

Statement of Qualifications (within 24 hours of the bid opening)

Within 24 hours of the bid opening, the apparent low bidder shall furnish the Engineer with the Statement of Qualifications for the Contractor (Section 00 22 13 SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA) and listed Subcontractors (Section 00 45 43 SUBCONTRACTOR QUALIFICATIONS). The second and third low bidders shall furnish this information only when requested by the Engineer.

***** END OF SECTION *****

SECTION 00 45 33 – LIST OF SUBCONTRACTORS - BIDS ON PUBLIC WORKS - IDENTIFICATION, SUBSTITUTION OF SUBCONTRACTORS

The prime contractor shall submit as part of the bid, or within one hour after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: HVAC (heating, ventilation, and air conditioning); plumbing; and electrical, or to name itself for the work. The prime contract bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the prime contract bidder's bid nonresponsive and, therefore, void.

HVAC Subcontractor: _____

Address: _____ **Phone:** _____

Plumbing Subcontractor: _____

Address: _____ **Phone:** _____

Electrical Subcontractor: _____

Address: _____ **Phone:** _____

Contractor shall also provide a list of all subcontractors whose work exceeds ten (10) percent of the bid and the name of the Control System Integrator. Additional sheets may be used if necessary. This combined subcontractor list must be submitted with the bid OR within one-hour of the bid as described in Section 00 43 93 – BID SUBMITTAL CHECKLIST.

Control System Integrator:

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

City SCADA/PLC Programmer:

Name: Technical Systems Incorporated (TSI)

Address: 2303 196th Street SW, Lynnwood, WA 98036

Telephone Number: 425-320-7632, contact: Mitch Stewart

Portion of Work: Services as defined in Part 4 – Appendix F

Subcontractors performing more than 10% of the bid price:

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

Name: _____

Address: _____

Telephone Number: _____

Portion of Work: _____

***** END OF SECTION *****

SECTION 40 05 59 – SLIDE GATES & WEIR GATES

PART 1. GENERAL

1.01 GENERAL CONDITIONS

A. SCOPE.

1. This section covers Stainless Steel Slide Gates and Operators.

B. GENERAL.

1. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer unless exceptions are noted by the engineer.
2. Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete, properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of fabricated water control gates.
3. Unit Responsibility: To insure compatibility of all components directly related to the slide gates, unit responsibility for the slide gates, actuators and accessories as described in this section shall be the responsibility of the slide gate manufacturer unless specified otherwise.
4. Gates supplied under this section shall be Model SS-250 Series Fabricated Slide Gates as manufactured by Waterman Industries, Golden Harvest, or equal.

C. GOVERNING STANDARDS.

1. Except as modified or supplemented herein, all gates and operators shall conform to the applicable requirements of AWWA C561 for a minimum of 100,000 cycles, latest edition.

D. QUALITY ASSURANCE

1. The manufacturer shall have relevant experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 20 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of AWS Sections D1.1, 1.2 and 1.6.
2. The fully assembled gates shall be shop inspected, tested for operation and leakage, and adjusted before shipping. There shall be no assembling or adjusting on the job sites other than for the lifting mechanism.
3. Gates shall be shop inspected for proper operation before shipping.
4. The manufacturer shall be ISO 9001: 2000 certified or proven quality control plan.

E. SUBMITTALS.

1. The manufacturer shall submit for approval by the purchaser, drawings showing the principal dimensions, general construction, installation certificate, equipment's warranty and materials used in the gate and lift mechanism.

2. The manufacturer shall submit for approval by the purchaser, complete engineering design calculations in compliance with AWWA standards latest edition.

1.02 Performance

A. LEAKAGE.

1. Slide gates shall be substantially watertight under the design head conditions. Under the design seating head, the leakage shall not exceed 0.05 U.S. gallon per minute per foot of seating perimeter. Under the design unseating head, the leakage for heads of 20 feet (6m) or less shall not exceed 0.05 U.S. gallon per minute per foot of perimeter. For unseating heads greater than 20 feet (6m), the allowable leakage shall not exceed the rate per foot (meter) of perimeter specified by the following equations:

Maximum allowable leakage

Gallons per minute per foot of perimeter:

$$= 0.10 + (0.0025 \times (\text{unseating head in feet} - 20))$$

Liters per minute per meter of perimeter:

$$= 1.25 + (0.1025 \times (\text{unseating head in meters} - 6.1))$$

Example: If we have a gate with 35 feet head, the leakage for the unseating head will be: $0.10 + (0.0025 \times (35 - 20)) = 0.1375$ US gpm/ft of perimeter

- B. DESIGN HEAD. The slide gates shall be designed to withstand the design head shown in the schedule.
- C. SEAL PERFORMANCE TEST. The gate's sealing system should have been tested through a cycle test in an abrasive environment and should show that the leakage requirements are still obtained after 100,000 cycles with a minimum deterioration.

PART 2. PRODUCTS

2.01 STOP GATES

A. Materials

1. Guides: The gate frame shall be a rigid, welded unit with a clear opening the same size as the waterway, unless otherwise specified. The guides shall be of aluminum extrusions. The gate frame shall be aluminum – ASTM B-209 and B-211 alloy 6061-T6. All aluminum surfaces are to have mill finish. Guides to be channel mounted, or contractor's preference. **Frames in contact with concrete shall have bitumastic coating.**

Additional members to be added to the frame as required for flushbottom closure, spigots, and "J" Bulb seals.

2. Slide: The slide shall be plate reinforced with structural shapes welded to the plate. The slide shall not deflect more than 1/360 of the span of the gate under maximum head. Slide shall be equipped with pipe grip handles. The slide shall be

of aluminum extrusions. The slide shall be aluminum – ASTM B-209 and B-211 alloy 6061-T6. All aluminum surfaces are to have mill finish.

3. Flushbottom Closure: When indicated on the plans or in the gate schedule, gates shall be furnished with a flush seal arrangement. A resilient neoprene seal shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove. Flushbottom seals shall be Rubber – ASTM D-2000 or other suitable composition for extended use in water and sewage.
4. “J” Bulb Seals: The gates shall be provided with “J” Bulb seals along the sides of the gate. Seals shall be mounted either on the frame or slide, such that seals do not protrude into the specified opening of the gate. “J” Bulb seals shall be Rubber – ASTM D-2000 or other suitable composition for extended use in water and sewage.

Gates are to be furnished complete with ultra high molecular weight (U.H.M.W.) polymer seats which contact the slide face.

Ultra high molecular weight bearing strips shall be mechanically retained to lock seat in place.

5. Fasteners and Anchor Bolts: Fasteners and anchor bolts are to be Stainless Steel – ASTM A-276, Type 304 or 316. All stainless steel surfaces are to have mill finish.
6. Manufacturer: Stop gates shall be manufactured by Waterman Industries, Inc, Golden Harvest, or equal.

2.02 SLUICE GATES

A. GENERAL DESIGN.

1. Gates shall be either self-contained or non-self-contained of the rising stem, non-rising or telescopic stem configuration as indicated on the drawings or gate schedule. All parts of the gate shall have a minimum thickness of ¼ inch.

B. WALL THIMBLE.

1. The wall thimble shall be stainless steel and supplied by the gate manufacturer. Refer to the gate schedule for type and applicable locations. Material thickness should be according to the manufacturer's recommendations and be of sufficient resistance to handle the operating forces.

C. FRAME.

1. The gate frame shall be constructed of structural members or formed plate welded to form a rigid one-piece frame. The frame shall be of the flange back design suitable for mounting on a concrete wall (CW), concrete wall with extra-wide flange (CWX), round manhole (RM), round manhole with extra-wide flange (RMX), a wall thimble (WT), or a standard flange (SF). The guide slot shall be made of UHMWPE (ultra-high molecular weight polyethylene).
2. The gate frame shall be stainless steel and designed for maximum rigidity.
3. The frame configuration shall be of the flush-bottom type and shall allow the replacement of the top and side seals without removing the gate frame from the concrete or wall thimble.

D. SLIDE:

1. The slide shall consist of stainless steel plate reinforced to limit its deflection to 1/720 of the gate span under the design head.

E. GUIDES AND SEALS.

1. The guides shall be provided with ultra-high molecular weight polyethylene seats on both sides of the slides and shall be of such length as to retain and support at least two thirds (2/3) of the vertical height of the slide in the fully open position..
2. Side and top seals shall be made of resilient neoprene or UHMWPE (ultra-high molecular weight polyethylene) of the self-adjusting type. A continuous compression cord shall ensure contact between the UHMWPE guide and the gate in all positions. The sealing system shall maintain efficient sealing in any position of the slide and allow the water to flow only in the opened part of the gate, flat or winged UHMW slide gate seals will not be considered.
3. The flush bottom resilient neoprene seal shall be mounted to bottom of disc or invert as required and seal against the invert portion of the frame.

2.03 OPERATORS AND STEM

A. STEM AND COUPLINGS.

1. The operating stem shall be of stainless steel designed to transmit in compression at least 2 times the rated output of the operating manual mechanism with a 40 lbs (178 N) effort on the crank or handwheel.
2. The stem shall have a slenderness ratio (L/r) less than 200. The threaded portion of the stem shall have Acme type cold rolled threads with a maximum surface of 16 micro inches.
3. Where a hydraulic, pneumatic or electric operator is used, the stem design force shall not be less than 1.25 times the output thrust of the hydraulic or pneumatic cylinder with a pressure equal to the maximum working pressure of the supply, or 1.25 times the output thrust of the electric motor in the stalled condition. Stems in more than one piece shall be joined together with solid stem sections and couplings.
4. Gates having a width equal to or greater than two times their height shall be provided with two lifting mechanisms connected by a tandem shaft.
5. For stems in more than one piece and with a diameter of 1¾ inches (45 mm) and larger, the different sections shall be joined together by solid bronze couplings. Stems with a diameter smaller than 1¾ inches (45 mm) shall be pinned to an extension tube.
6. The couplings shall be grooved and keyed and shall be of greater strength than the stem.
7. Gates having a width greater than two times their height shall be provided with two lifting mechanisms connected by a tandem shaft.

B. STEM GUIDES.

1. Stem guides shall be fabricated from stainless steel. The guide shall be equipped with a UHMWPE bushing. Guides shall be adjustable and spaced in accordance with the manufacturer's recommendation. The L/r ratio shall not be greater than 200.

C. STEM COVER.

1. Rising stem gates shall be provided with a clear polycarbonate stem cover. The stem cover shall have a cap and condensation vents and a clear mylar position indicating tape. The tape shall be field applied to the stem cover after the gate has been installed and positioned.

D. LIFTING MECHANISM.

1. Manual operators of the types listed in the schedule shall be provided by the gate manufacturer.
2. Gearboxes shall be provided when required to maintain the operating force below 40 lb. All bearings and gears shall be totally enclosed in a weather tight housing. The pinion shaft of crank-operated mechanisms shall be constructed of stainless steel and supported by roller or needle bearings. The operating shaft shall be fitted with a 2-in.
3. Each manual operator shall be designed to operate the gate under the maximum specified seating and unseating heads by using a maximum effort of 40 lbs (178 N) on the crank or handwheel, and shall be able to withstand, without damage, an effort of 80 lbs (356 N).
4. The crank shall be removable and fitted with a corrosion-resistant rotating handle. The maximum crank radius shall be 15 inches (381 mm) and the maximum handwheel diameter shall be 24 inches (610 mm).

E. YOKE AND PEDESTAL.

1. The yoke, to support the operating bench stand, shall be formed by two structural members welded at the top of the guides to provide a one piece rigid frame.
2. Self-contained gates shall be provided with a yoke to support the operating bench stand. The yoke shall be formed by two structural members welded at the top of the guides to provide a one piece rigid frame. The maximum deflection of the yoke shall be 1/720 of the gate's span.
3. Non-self-contained gates shall be provided with pedestal mounted lifts. Pedestal shall be cast iron or mild steel.
4. All carbon steel components shall be provided with 2-part epoxy coating per SSPC-10 standard.

2.04 MATERIALS

COMPONENTS	MATERIALS
Frame, Yoke, Cover Slide, Wall Thimbles	Stainless Steel ASTM A240, Type 316
Seat/Seals & Stem Sleeves	Ultra High Molecular Weight Polyethylene (UHMWPE) ASTM D-4020
Cord Seal / Resilient	Neoprene ASTM D 2000

Flush Bottom Seals	Neoprene ASTM D 2000
Stems	Stainless Steel: ASTM A-276, AISI Type 316
Stem cover	Clear Butyrate With Mylar Strip
Stem Guides	Stainless Steel (ASTM A-240 – Type 316L) UHMW Bushed
Wall Brackets	Stainless Steel: ASTM A-240, AISI Type 316L
Pedestals	Stainless Steel: ASTM A-240/A-312, AISI Type 316
Fasteners and Anchor Bolts	Stainless Steel: ASTM A-593 and 594, Type 316 CW
Finish	Polyamide Epoxy

2.05 GATE SCHEDULE

- A. See Drawing M6.02 Detail 4 for Gate Schedule.

2.06 IDENTIFICATION TAGS

- A. Each gate shall be provided with a 1 ½ inch minimum diameter heavy stainless steel tag. Tags shall bear the Gate ID as listed on the gate schedule.
- B. Numbers and letters shall be block type with ½ inch high font stamped on the tags and filled with black enamel.
- C. Attach tags to the gate by split-key rings soldered so that the ring and tag cannot be removed.
- D. Submit to the Engineer for approval, a drawing and a neatly typed gate directory listing each gate number and its location.

PART 3. EXECUTION

A. INSTALLATION

- 1. Gates and appurtenances shall be handled and installed in accordance with the manufacturer's recommendations.
- 2. The CONTRACTOR shall review the installation drawings and installation instructions prior to installing the gates.
- 3. The gate frames shall be installed in a true vertical plane, square and plumb, with no twist, convergence, or divergence between the vertical legs of the guide frame.
- 4. The CONTRACTOR shall fill any void between the guide frames and the structure with non-shrink grout as shown on the installation drawing and in accordance with the grout manufacturer's recommendations.
- 5. The frame cross rail shall be adjusted as required to maintain consistent seal compression across the full width of the gate.

B. FIELD TESTS

- 1. Following the completion of each gate installation, the gates shall be operated through at least two complete open/close cycles. If an electric or hydraulic operator is used, limit switches shall be adjusted following the manufacturer's instructions.
- 2. Gates should be checked for leakage by the contractor (refer to the "Performance" section for approval criteria).

*****END OF SECTION*****

SECTION 43 23 59 – SCREW PUMP EQUIPMENT

PART 1. GENERAL

1.01 GENERAL CONDITIONS

A. SCOPE

1. This section covers existing equipment for the three screw pump assemblies located in the headworks. Equipment to be replaced includes the lower bearing assemblies, gear boxes, and lubricating systems. The existing screw pumps were manufactured by Siemens (Model # PE-21 Plus Type R6ZESD, 150 HP, 460 V, 3 PH). The existing motors have been replaced recently, and do not need to be refurbished with this project. The existing screw assemblies are to be recoated.

B. REFERENCES

1. Antifriction Bearing Manufacturers Association (AFBMA).
2. American Gear Manufacturer's Association (AGMA)
3. American Society of Testing and Materials (ASTM).
 - a. A 36 / DIN ST-37- Specification for Structural Steel.
 - b. A 325 - Specification for High-Strength Bolts for Structural Steel Joints.
4. American Welding Society (AWS).
 - a. D1 .1 - Structural Welding Code - Steel.
5. National Electrical Manufacturers Association (NEMA)

C. GENERAL

1. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer unless exceptions are noted by the engineer.
2. Unit Responsibility: To insure compatibility of all components directly related to the screw pumps, unit responsibility for the lower bearings, gear box and lubricating system as described in this section shall be the responsibility of the manufacturer unless specified otherwise.
3. All the products supplied under this section shall be as manufactured by Evoqua water part or equal.

D. QUALITY ASSURANCE

1. The manufacturer shall have relevant experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 20 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of AWS Sections D1.1, 1.2 and 1.6.
2. The manufacturer shall be ISO 9001: 2000 certified and/or AISC certified.

E. SUBMITTALS

1. Submit as specified in Section.

2. Shop Drawings and Product Data: A complete set of drawings, specifications, catalog cut-sheets, and detailed descriptive material. This information shall identify all technical and performance requirements stipulated on the drawings and in the specification.
 - a. General arrangement drawings of the pumping equipment.
 - b. Drawings of the lower bearing assemblies.
 - c. Gear reducer dimensional drawings and rating data.
 - d. Motor drawings and performance characteristics.
 - e. Low speed coupling drawings and rating data, if applicable.
 - f. Lubrication system drawings, component descriptions, and operating data.
 - g. Screw pump/gear box painting schedule.
 - h. Bearing life calculations.

PART 2. PRODUCTS

2.01 LOWER BEARING ASSEMBLY

- A. The lower bearing assembly shall include a heavy weight cast iron or steel constructed base with anchor bolt holes as shown on the drawings. Bolted to the base shall be a machined ductile iron journal which shall receive a bronze sleeve bearing fastened to the lower end plate. The lower bearing shall carry no thrust load. The use of roller or ball bearings will not be acceptable.
- B. The bronze sleeve shall have a ratio of the length of the sleeve bearing to the diameter of the sleeve bearing not to exceed 1.5 : 1. The load pressure generated by the screw pump body, acting on the sleeve bearing shall not exceed 175 psi. The bronze bushing shall incorporate a "figure eight" or "double figure eight" interlocked grease access passageway to promote consistent grease disbursement across the entire bearing surface.
- C. The center axis of the journal shall be hollow to serve as the grease access port for the lower bearing. The grease shall enter the lower bearing on the opposite end of the bronze bushing that grease exits the bearing, thereby forcing grease across the entire bronze bushing. Bearing assembly shall accommodate all static and operating deflections of the screw.
- D. Bearing assemblies shall be supplied with a split non-rotating shield installed on the fixed journal side of the bearing. Lower bearings shall be suitable for continuous or intermittent operation when submerged in water or running in air.
- E. The bearing assembly shall accommodate thermal expansion and contraction of the screw within the bearing housing, and shall have fully lubricated surfaces to prevent corrosion or seizure. The lower bearing housing shall be specifically designed to exclude water and shall contain not less than two lip seals.
- F. The bearing assembly must be removable for maintenance purposes without disturbing the screw pump body. To ensure proper installation, the bearing must include a machined index fit.
- G. Lower Bearing to be manufactured by Evoqua water part number LB 1000/38 or similar.

2.02 DRIVE ASSEMBLY

- A. The drive assembly shall be designed and constructed for the maximum specified screw rotational speed of 27.42 rpm nominal. The drive assembly shall consist of a base-mounted, parallel-shaft gear reducer, belts and sheaves, motor, and flexible coupling.
- B. The gear reducer shall be a parallel-shaft, triple reduction, foot-mounted unit suitable for outdoor operation. Gear reducer sizing shall be based on the latest AGMA standards using a minimum service factor of 1.5 based on the maximum torque requirements of the screw of 438,417 in-lb, or a minimum of 1.25 service factor based on the full motor horsepower, whichever is greater.
- C. The gear reducer housing shall be manufactured from high quality cast iron accurately machined for perfect alignment of all shafts and gearing, and shall be complete with dual downside seals, oil level indicator, and drain-plug.
- D. Gearing shall meet the AGMA quality class 12 requirements. The reducer shall be designed for 24-hour continuous operation in the angular mounting position corresponding to the inclination angle of the screw pump of 38° (Contractor to verify) without leaking oil. Reducer shall have a minimum efficiency of 96%.
- E. The gearing and bearings shall be splash-lubricated. If the uppermost bearings cannot be adequately splash lubricated, they shall be force lubricated by a shaft-driven oil pump. If a shaft-driven oil pump is provided, it shall have an oil flow switch wired to the outside of the gear reducer housing. Oil cooling shall be accomplished by convection and shall not require an external cooling source.
- F. An internal backstop shall be provided with the reducer to prevent reverse rotation of the screw. The gears shall have a minimum L-10 life rating of not less than 100,000-hour rating based on the reducer horsepower rating. The bearings shall have a minimum B-10 life rating of not less than 100,000 hours based on the reducer mechanical horsepower rating.
- G. The upper shaft shall be connected to the drive assembly by means of a flexible coupling. The coupling shall be designed with a 1.5 service factor based on the brake horsepower and shall be keyed and bored to suit the reducer slow speed shaft and the screw pump upper stub shaft. Guards meeting OSHA standards will be supplied with the coupling.
- H. Existing motors are in fair condition.
No motor work specified.

2.03 AUTOMATIC LUBRICATION SYSTEM

- A. Each screw pump shall be furnished with a positive displacement piston pump, automatic lubrication pump and 3/8-inch minimum diameter stainless steel grease tubing and fittings.
- B. The automatic lubrication pump shall have the capacity of 3,600-psi working pressure and be able to pump No. 2 grease.
- C. The lubrication pump shall consist of a single positive displacement piston pump with a 3/4-hp, 480-volt, three phase motor.
- D. Each lubrication pump system shall have the ability to adjust the amount of lubricant to the bearing.
- E. The lubrication pump system shall be interlocked with the screw pump drive system so

the lubrication pump system will continually feed grease to the bearing while the screw pump is in operation, and if the lubrication pump system should fault, the screw pump will be shut down.

- F. The grease reservoir shall have a minimum capacity of 15-lbs of grease.
- G. The lubrication system shall be factory assembled on a steel base plate.

2.04 SCREW ASSEMBLY

- A. Each screw assembly is to be removed, dried, prepared, coated and reinstalled as per the screw pump equipment manufacturer's instructions, and as per the existing screw pump's installation manual as supplied with Addendum 2. Coordinate coating work with concrete rehabilitation work in screen channel. See structural notes. Schedule Screw Assemblies to maintain a minimum of one screw assembly on line for pumping needs.

PART 3. EXECUTION

A. EXAMINATION

- 1. Verification of conditions: Inspect all components for shipping damage and conformance to specifications.

B. INSTALLATION

- 1. Install products in accordance with the manufacturer's instructions, the existing screw pump's installation manual as supplied with Addendum 2, and as specified in this section.

C. TESTING

- 1. After complete installation of the pump(s), the unit(s) shall be field tested to confirm the following:
 - a. Equipment has not been damaged in transport and installation.
 - b. Equipment is properly installed.
 - c. All components are properly connected and established tolerances are observed.
 - d. Equipment is free of objectionable vibrations and overheating parts.
 - e. The screw pump is operating freely.
 - f. Equipment is not overloading any part.
 - g. Equipment has no electrical or mechanical defects.

D. MANUFACTURER' S FIELD SERVICES

- 1. The manufacturer shall schedule two (2) trips to the project site of a factory trained, qualified representative to provide technical assistance to the contractor during erection of the equipment, placement of the grout and including start-up and operator training. Trips shall be coordinated with the Contractor to allow manufacturer's examination of each screw pump installation after the equipment has been rehabbed and replaced.

*****END OF SECTION*****

SECTION 46 43 00 – CLARIFIER EQUIPMENT

PART 1. GENERAL

1.01 SCOPE

- A. The work included in this section of the specifications consists of furnishing and installing new center column supported hydraulic differential type sludge collector mechanisms with separate scum removal. Collector mechanisms shall be installed within the two (2) new 85'-0" diameter Secondary Clarifier concrete basins as shown on the Drawings. The equipment shall be constructed such that all rotating elements of the mechanism shall be supported above the water surface.
- B. Generally, the units furnished shall include a stationary center pier column supporting a turntable gear drive, access truss bridge with drive service platform, rotating drive cage frame, rake arm frames, sludge suction pipes, return sludge manifold troughs, separate skimming trough, influent feed well, and flocculation baffle. Accessory items also covered under this section include scum curtains, submersible scum pump, foam suppression rings, and local control panel.
- C. General Requirements: The clarifier equipment specified below shall be the Model SS-3.5-P sludge collector as manufactured by Ovivo USA, LLC (formerly Enviroquip) or equal.
- D. Detailed Requirements: The sizes and capacities of the major items of equipment for each clarifier shall be as follows:
1. Basin Dimensions:
 - a. Basin: 85'-0" inside diameter
 - b. Side Water Depth: 15'-0"
 - c. Total Wall Height: 17'-0"
 - d. Floor Slope: 0.25":12"
 - e. Influent Feed Pipe: 30" dia.
 - f. Effluent troughs: Concrete inboard troughs
 2. Equipment Dimensions:
 - a. Center Pier Column: 36" dia.
 - b. Return Sludge Pipe: 16" dia.
 - c. Influent Feed Well: 18'-0" dia. x 6'-0" deep
 - d. Sludge Suction Pipes: 5" diameter
 - e. No. of Suction Pipes: (3) per side / (6) total
 - f. Return Sludge Troughs: 12" wide x 15" deep
(stepped to 21" deep)
 - g. V-Notch Weirs: 9" tall, 2"-90 degree, FRP

1.02 QUALITY ASSURANCE

- A. Standardization: All mechanism components, including the center pier column, access truss bridge, drive service platform, spur gear drive assembly, drive cage frame, return sludge/skimming troughs, suction pipes, influent feed well, and drive / pump controls to be the product of one (1) manufacturing organization.
- B. Coordination: The contract documents provide details of a complete equipment installation for the purpose specified. It shall be the Contractor's responsibility to coordinate all the details required for a complete operating system such as protective coating and electrical requirements, as well as provide all work needed to properly install, adjust, and place in operation a complete working system.
- C. Manufacturer's Quality Control: All fabrication shall be carefully inspected at the site of fabrication by factory inspectors who shall use whatever means necessary to assure the proper fit of all field connections and compliance with all material and fabrication requirements of the specifications.

1.03 MANUFACTURER'S SERVICES

- A. Technical Representative: The Manufacturer shall furnish the services of trained technical representatives as needed to provide for a satisfactorily operating system. Service time, excluding travel time, to be included is as follows:
 - 1. Prior to equipment delivery, the Manufacturer shall furnish jointly to the Engineer and Contractor a minimum of three (3) sets of complete installation, operation, and maintenance manuals which shall include assembly/erection drawings, as built drawings of electrical equipment, parts lists, and detailed written instructions for the installation, operation, and maintenance of the equipment furnished.
 - 2. Not less than three (3) days on the job site, for the first clarifier only, to assist Contractor's personnel with initial installation after complete review of the assembly process.
 - 3. Not less than one (1) day per clarifier basin (two days total) on the job site for inspection of the completed equipment installation. The Contractor shall install all equipment in exact accordance with the Manufacturer's written instructions and assembly/installation drawings.
 - 4. Deviations from the Manufacturer's written or verbal instructions shall be subject to approval by the Engineer and discrepancies or unsatisfactory work shall be reported in writing by the equipment manufacturer's representative jointly to the Consulting Engineer and General Contractor.
 - 5. Not less than one (1) day on the job site for final inspection, final leveling, alignment, tensioning, check lubrication of the installed equipment, and a detailed check of the completed work prior to start-up.
- B. Certification: Within ten (10) days after the final inspection of the completed installation, the Manufacturer's representative shall furnish a detailed report jointly to the Engineer and Contractor which shall list any deficiencies found in the work and which shall recommend corrective action for each deficiency. Upon completion of any corrective action required, the Manufacturer shall furnish a letter certifying that the equipment is now properly installed and ready for the operation and beneficial use by the Owner.

1.04 SUBMITTALS

- A. Shop Drawings: All equipment and materials shall be new and shall be specially designed or selected for the function and service specified. No equipment or materials may be used in the project that has not been approved by the Engineer. Approval for incorporation into the project will be made only after the review of shop drawings, specifications, and data as required below:
1. Shop drawings complete with all dimensions, anchor locations, openings required in structures, details of connecting piping, and the size and location of any required electrical conduits and conduit openings.
 2. Specifications for the main spur gear drive, the torque monitor, all mechanical and electrical components, and complete wiring diagrams for all electrical equipment.
 3. Details of the major fabricated components showing the arrangement of devices and labeled with member sizes and materials of construction.
 4. AGMA torque and strength calculations for the main spur gear drive bearing.
 5. Structural calculations **including seismic design** for the access beam bridge, center pier column, **center column anchorage**, drive cage frame, return sludge trough, and rake arm frames. **Structural calculation shall be signed and sealed by a licensed Professional Structural Engineering.**
 6. Manufacturer's recommended procedures for jobsite equipment storage and handling.
- B. Operation and Maintenance Manuals: Prior to delivery of equipment and updated as required during installation of the equipment, the Manufacturer shall furnish complete and detailed installation, operation, and maintenance manuals which shall include the following information as a minimum requirement:
1. Name, address, and phone number of nearest competent service organization who can supply parts and service. If this is not the Manufacturer's own service department, then furnish letters confirming that the named organization has been factory authorized to represent the manufacturer of the equipment furnished.
 2. Complete descriptive literature and drawings of all material furnished. This is to include "as built" wiring diagrams of all electrical equipment, "as built" erection drawings providing up-to-date information on the actual construction of the equipment furnished, and any field modifications made during installation, start-up, and testing.
 3. Installation, operation, and maintenance brochures from the original manufacturers of all mechanical components such as gear reducers drive couplings, etc., incorporated into the completed installation.
 4. Recommended spare parts list.
 5. Drive motor and gear reducer guide to "troubleshooting".
 6. Assembly, installation, alignment, adjustment, and checking instructions.
 7. Operating instructions.

8. All required maintenance instructions including schedules of routine maintenance and lubrication checks.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment: All pieces shall be delivered in the largest pieces practical for field assembly by the Contractor. Individual pieces shall be tagged with erection marks or tags cross referenced with information on the Manufacturer's erection and assembly drawings. Gear boxes, mechanical, and electrical components shall be protected from the weather and suitably packaged to facilitate handling and storage. Special lubricating and rust preventative oils shall be provided to prevent internal corrosion of gear assemblies. All mechanical equipment shall be kept thoroughly dry at all times and shall be stored indoors.
- B. Storage of Equipment:
 1. All equipment stored on the job shall be protected and maintained in accordance with the Manufacturer's recommendations.
 2. Electrical equipment shall be stored in weatherproof, well ventilated enclosures.
 3. Structural materials may be stored outdoors on pallets or other wooden supports providing for the proper support and drainage. Equipment shall not be allowed to contact the ground directly.

PART 2. PRODUCTS

2.01 MANUFACTURER

- A. The physical layout of the system shown on the drawings and the equipment specified herein are based on the Model SS-3.5-P sludge collector mechanism as manufactured by Ovivo USA, LLC (formerly Enviroquip).
- B. The Ovivo System is the base bid system. The decision of the Engineer with respect to approval of any proposed alternate systems is final.
- C. Contractors may submit an approval package for equipment of alternate manufacturers for review with their bid and included as an Equipment Alternate on the Bid Proposal. A pre-approval review prior to bid will not be done. Contractors proposing alternate manufacturers will be responsible for all costs associated with system evaluation and redesign including all electrical, mechanical, and civil aspects of the installation.

2.02 GENERAL REQUIREMENTS

- A. **Structural Design:** Structural design of the drive cage, rake arms, and center pier shall be performed by the manufacturer, stamped by a licensed Structural Engineer, and submitted per Spec 01 33 00. Design loading for the structural analysis of the drive cage, rake arms, and center pier shall be taken as all dead loading resulting from the weight of all rotating equipment, plus a live load equal to 2.25 times the continuous output torque rating of the spur gear drive.

The maximum allowable combined stress in any member at this loading shall not exceed 20,000 psi. Structural design of the mechanism and access bridge, including allowable stresses and slenderness ratios where applicable, shall be in accordance with the American Institute of Steel Construction Specification for Steel Buildings, latest edition.
- B. **Hot Dip Galvanizing:** All fabricated carbon steel components of the access bridge, drive service platform, slide plates and scum piping and supports shall be A-36 carbon steel hot-

dip galvanized (HDG) after fabrication per ASTM A-123.

1. All structural components shall be designed and fabricated per ASTM A-143, A-384, and A-385. No field welding on hot-dip galvanized equipment will be permitted.
2. All welding techniques and sizes shall conform to the latest AWS Standards and shall be performed by qualified welders. All welding shall be a minimum of 3/16" fillets, and shall be the full length on all mating surfaces. Welds shall be free of porosity and cleaned for removal of weld flux and impurities that would prevent adhesion of the molten zinc during the hot dip galvanizing process.
3. Minor defects in the hot-dip galvanizing coating caused by shipping, handling, or installation shall be repaired after equipment installation. The defects shall be thoroughly cleaned and wire brushed to remove all foreign substances, wiped clean with a suitable solvent, thoroughly dried, and coated with at least 3 mils of a zinc rich compound (supplied by the Contractor) specifically formulated for touch-up of galvanizing and conforming to USN Specification MIL-P-21035 or USAF Specification MIL-P-26915A.
4. All fabricated members delivered to the project site shall be stored by the Contractor in a position where they are raised off of the ground and well separated to provide ventilation and drainage.

C. Stainless Steel Fabrication:

1. All wetted fabricated components of the clarifier mechanism excluding the effluent weirs and scum baffles shall be Type 316 stainless steel.
2. All field connections shall be bolted connections designed to resist all static, live, and erection loads. Field welded assembly will not be allowed. All bolted structural connections shall be gusseted as required to prevent deflection with minimum 3/16" thick stainless steel plate. Main structural connections shall use a minimum of two (2) 5/8" diameter bolts. Secondary structural connections shall use a minimum of two (2) 1/2" diameter bolts.

D. Anchorage and Fasteners:

1. All structural fasteners (including the tie rods) shall be type AISI 18-8 (300 series) stainless steel.
2. All cast-in-place equipment anchorage, including nuts and washers shall be of AISI Type 18-8 (300 series) stainless steel. The minimum size of any cast-in-place anchor shall be 3/4" diameter.
3. All installed anchors shall be drop-in style (hole size equals bolt size), and shall conform to Federal Specifications GSA FF-S-325, Group II, Type 4, Class 1. Anchor bolts to be Type 18-8 (300 series) SS with clips, nuts and washers to be Type 18-8 (300 series) stainless steel.

2.03 CONSTRUCTION AND MATERIALS

- A. Gear Drive Mechanism: The center drive assembly mounted to the center pier shall consist of a cast iron turntable base with ball race, and an internal forged steel spur gear designed such that the gear, bearing balls, and raceways can be removed for service or replaced without removing the access bridge, gear housing, or disconnecting the drive cage and anything attached thereto from the drive assembly. All repairs or replacement of drive components shall be capable of being performed without dewatering the collector basin or

disrupting the flow through the basin with the aid of only a one (1) ton capacity portable hoist. This disassembly procedure shall be demonstrated to the Owner and Engineer during the operator training of the clarifier equipment.

Replacement of the clarifier main internally cut spur gear and main bearing, including the labor and crane time, shall be the responsibility of the clarifier manufacturer for the first ten (10) years of operation if the failure is due to poor quality materials, workmanship, or material fatigue under normal design operating and non-contaminated conditions.

1. The main gear shall be an internal cut spur gear of AISI 1045 forged steel, hardened to 280 to 320 BHN and having 99,000 psi yield strength. The main gear shall have teeth with a diametral pitch and length to produce up to 43,000 ft. lbs. continuous operating torque as calculated by AGMA 218.01. The gear shall have a minimum 35.0" pitch diameter. The gear teeth shall be stressed to no more than the allowable bending stress at the continuous rated output torque. Life factors shall be based on 1 million load cycles.
2. The main bearing shall have a 40" ball race diameter and 1 1/4" diameter chrome alloy balls with nylon spacers. The bearing balls shall run completely submerged in an oil bath protected by dust seals. The bearing balls shall be of Type 52100 steel hardened to 60/66 Rc. The bearing balls shall rotate in a full circle four (4) point contact raceway having a 60-degree contact angle for the transfer of large thrust and overturning moment loading. The raceway shall be induction hardened to 60 Rc for a depth of 3/16" and ground to shape.
3. A separate circular cast iron load and torque transfer ring with heavy cast iron mounting pads for the drive cage shall be bolted to the inner rotating race of the gear-bearing. Each of the mounting pads shall have provision for four (4) fasteners.
4. The main gear housing shall be a heavy casting of high strength Class 40B gray iron. The housing shall be adequately proportioned and stiffened to support the entire rotating weight of the mechanism, the access bridge, and all possible dead and live loads anticipated for the life of the equipment. The housing shall be circular in shape to conform to the general geometry of the spur gear bearing and load plate, and shall provide containment for the oil bath lubrication of the spur gear and bearing.
5. The main gear housing shall be fitted with one (1) oil fill port and one (1) oil level indicating site glass. One (1) drain shall be provided to assure the complete removal of spent oil and condensate from the housing. The main housing shall also be fitted with a minimum of eight (8) mounting/leveling bolts, one (1) inches in diameter.
6. The spur gear shall be driven by an internal pinion. The pinion shall be machined from AISI Type 4140 alloy steel, quenched and tempered to 350 to 400 BHN hardness. The pinion shall be keyed to and driven by a low speed shaft mounted between bearing assemblies to offset the overhung load produced by gear meshing.
7. The intermediate gear reducer housing shall be constructed of SAE Class 30 gray cast iron. Gears shall be manufactured from case hardened steel and hardened to 58-62 Rockwell C. All gear teeth are shaved or ground to ensure accurate tooth profile.

Minimum 95% gear efficiency shall be achieved regardless of ratio. The bearings shall be of ABEC-1 tolerance class. The shafting shall be of SAE 1045 steel or equivalent. The shaft seals shall be of Nitrile (Buna-N) rubber with double lip on the output seal. The reducer shall be rated for continuous duty at the mechanical capacity and shall not be thermally limited. The gearbox shall be designed with a high cross section modulus and a center wall for maximum rigidity.

The gear reducers shall be provided with stainless steel nameplates. The reducers shall be AGMA rated to provide a maximum Class 1 output torque required to achieve the required continuous operating torque. The reducer output shaft shall be direct coupled to the drive pinion with machined slip fit tolerances to effectively provide a continuous pinion shaft through the intermediate drive unit. The primary gear motor shall be constructed to the same specifications as the intermediate reducer with the exception of the integrally mounted motor and the hollow output shaft.

8. The motor shall be 3 phase TEFC, with NEMA B characteristics, and shall be rated for continuous duty at nameplate rating meeting electrical standards per NEMA publication MG1. The conduit box and output shaft end shield/flange shall be of SAE Class 30 gray cast iron. The motor shall have Class F winding insulation with Mylar phase separators and slot liners. The stator shall be copper wound. The motor shall have an oil seal at the shaft end shield and V-ring at the fan end shield.

The motor shall have double sealed or shielded bearings lubricated for life. The motor shall be fitted with stainless steel nameplates.

The motor stator shall be made of corrosion resistant aluminum alloy (Silafont-13). The internal surfaces, including stator bore, windings, end shields, and conduit box shall be coated with Dolph's Spray ER-41, Class F polyurethane red insulator. The end shields and conduit box shall be sealed at the joints. Fastener hardware shall be plated or stainless steel. The motor shall be painted with corrosion resistant paint. The motor shall be rated for a 1.15 service factor.

9. A spring-loaded torque arm shall be attached to the secondary reducer to restrict rotation of the primary reducer about the secondary reducer. The compression imposed upon the spring shall be proportional to the amount of torque transmitted between the primary and secondary reducers. The torque arm shall be fitted with adjustable, magnetically actuated proximity switches to signal alarm at 70% of the continuous output torque or shut-off when the load torque reaches 100% of designated continuous output torque value.

In addition to providing signals at specific load torque set points, continuous torque readout, as a percent of full load, shall be provided by a mechanical scale and pointer integral to the torque arm. The torque monitor unit shall be suitable for outdoor service including stainless steel or plated internal ports for corrosion resistance. The components shall be intrinsically safe for hazardous locations.

10. The complete spur gear drive assembly shall rotate the rake arm at a tip speed of approximately 7 to 10 feet per minute with the drive cage and rake arm assembly designed to withstand approximately twice the design torque of the drive unit. The continuous design torque capabilities of the clarifier mechanism shall be based on 10 pounds per feet arm loading factor multiplied by the radius squared of the

clarifier basin. At a minimum, the continuous output torque shall be 18,000 ft.-lbs.

B. Drive Control Panel: The Manufacturer of the sludge collector equipment shall provide a local drive control panel mounted to the clarifier handrail as shown. The interconnecting wiring and conduit shall be provided by the General Contractor.

1. The drive control panel shall be a NEMA Size 0 combination starter with 3 leg thermal overload protection and external reset, including a circuit breaker with flange mounted visible disconnect switch, all in a NEMA 4X stainless steel oversized enclosure. Additional devices mounted within the enclosure shall include: a fused 0.5 KVA control power transformer; overload relay, pending overload relay, and alarm silence relay; and, terminal strips for connecting the overload and alarm contacts located in the drive torque monitor.

External controls shall be weatherproof NEMA 4X corrosion resistant and shall include: pull-to-start, push-to-stop, illuminated run switch; alarm silence push-button; and, overload reset push-buttons. A weatherproof combination horn and light fixture with 100 watt bulb shall be mounted to the top of the enclosure.

2. The Contractor shall provide 460 volt, 3-phase, 60 hertz electrical power to the control panel and all interconnecting wire and rigid conduit between the control panel and the torque monitor mounted to the spur gear drive.
3. Scum pumps may also be operated manually from the control panel by switching the H-O-A switch to the Hand position and using the Start-Stop switches.

C. Center Pier Column: The Manufacturer shall provide a circular stainless-steel center pier with a concentric sludge return pipe with a sleeve style connector for making the connection to the imbedded sludge return piping as shown on the drawings. The top of the center pier shall provide a stable and accurate surface upon which the main gear may be mounted. The center pier shall support the main gear, access truss bridge, drive service platform, and the entire weight of the rotating mechanism.

1. The center pier shall be sized as indicated in Section 1.01 D and shall be constructed of minimum 3/16" thick stainless steel plate or pipe. The pier shall be provided with minimum 1" thick plate top and 1" thick bottom flange. The top flange shall have mounting holes matching the main spur gear drive. The bottom flange shall be provided for mounting to the center pier anchorage.

The equipment manufacturer shall provide eight (8) new 1" dia. x 12" long type 316 stainless steel all thread rods with nuts/washers and epoxy capsules for center column anchorage.

2. The area of the annular space between the outside diameter of the concentric sludge return pipe and the inside diameter of the center pier shall not be less than the area of the clarifier mixed liquor influent pipe. A minimum of four (4) outlet ports shall be provided at the upper end of the pier with the top edge of the port opening at least 1" below the bottom of the return sludge sight well. The total clear open area of these ports shall be determined by the equipment manufacturer, but as a minimum shall be greater than or equal to the area of the clarifier influent feed pipe.
3. The center pier shall be shop fitted with an inner concentric sludge return pipe, schedule 10-S, that is to be rigidly welded in position and shall prevent mixing of the basin influent flow with the return sludge flow. The concentric return sludge

pipe shall be designed to prevent vortexing at its entrance, and shall terminate in a sleeve type coupling located approximately flush with the bottom flange of the center pier for connection to the existing embedded sludge return pipe. The sleeve coupling shall present a smooth profile to avoid restricting the influent flow. Couplings with external flanges and fasteners are unacceptable. Two (2) access ports with bolted covers of gage stainless steel and neoprene shall be provided at the center pier to allow this connection to be made and completely close the access ports prior to putting the clarifier in operation.

4. Four (4) inlet ports for the return sludge shall be provided. The total clear open area of these ports shall be determined by the equipment manufacturer; but as a minimum, shall be greater than or equal to the area of the sludge returns pipes.
 5. A scum collection chamber shall be formed in the center pier with a false floor mounted just above the return sludge ports. The floor of the scum chamber shall have a 12" deep pocket for mounting a submersible scum pump. There shall be four (4) scum ports to allow the scum to pass into the scum chamber from the rotating scum trough and scum sight well.
- D. Drive Cage Frame: A center rotating drive cage frame and integral sight well assembly shall be furnished to provide an attachment structure for the sludge collector arms, RAS and scum trough, and influent well. The drive cage shall be completely supported and stabilized by the main gear bearing. No below water supports, bearings, or bumpers will be allowed.
1. The 6'- 6" square drive cage shall be fabricated from minimum 3/16" thick stainless steel plate and shapes, be shop welded and for field bolted connections.
 2. A center sight well, fabricated as an integral part of the drive cage from 3/16" stainless steel plate, shall be provided for the collection of sludge and scum from the rotating RAS troughs. The floor of the sight well shall be positioned below the bottom of the sludge collection troughs and shall include a dual continuous lip type neoprene seal acting against the center pier to keep the return sludge from leaking back into the clarifier. The sight well seal shall be replaceable from outside the sight well.
 3. The drive cage shall be designed as a box truss for the load conditions described in Section 2.01-A.
- E. Scum Collection Trough / Box:
1. One (1) 12" wide tapered scum collection trough with approach ramp shall be mounted to the scum collection sight well and influent feed well wall. This trough shall be on the inside of the influent well and trap and remove scum at this location. There shall be a pivoting scum wiper mounted from the bridge to pull the scum up the inclined beach and deposit it into the scum trough.
 2. A 1'-6" deep x 4'- 6" square scum collection sight well surrounding the center pier column shall be provided to collect scum into the scum ports located at the top of the pier. Dual neoprene seal rings shall be provided to close the gap against the outside diameter of the center pier column.
- F. Scum Removal Pump: The clarifier Manufacturer shall furnish a submersible scum removal pump for mounting in the scum collection chamber of the center pier column.
1. The scum removal pump shall be a WEMCO Hidrostal submersible pump for handling the scum and scum water collected to the scum box inside the inlet feed

well. The pump shall remove the types of solids collected in a normal municipal scum removal system at a rate of 80 to 100 gallons per minute (gpm).

2. A 3-inch diameter galvanized carbon steel scum discharge pipe shall be provided extending from the submersible scum pump to the end of the clarifier access truss bridge and stop at the end of the clarifier access bridge.

G. Rake Arm Frames/Suction Pipes/Sludge Return Troughs: The sludge collector mechanism shall have two (2) collector rake arm frames with flights arranged to sweep the floor twice each revolution and a hydraulic differential sludge removal system designed for high rate sludge return and concurrent skimming of the clarifier surface between the influent well and the scum baffle.

The sludge removal system shall consist of vertical withdrawal suction pipes connected to the bottom of the sludge collection manifold troughs. This system shall allow for straight or nearly straight sludge suction pipes that allow the sludge to be easily viewed, sampled, or cleaned from the access truss bridge. The collection manifold shall consist of an open trough that provides for visual inspection of the return sludge flows discharged from the sludge suction pipes and for full surface skimming by means of skimming weirs located at the liquid surface. Bent hydraulic differential pick-up pipes or submerged sludge collection manifolds shall not be allowed.

1. The rake arm frames shall be 3/16" thick x 10" deep formed stainless steel channel shapes connected to the lower portion of the drive cage. Overlapping straight blades shall be positioned to direct sludge to the entrance of the nearest suction pipe. The overlapping straight blades shall be a minimum 8" deep and shall be formed from rolled 11 gauge 316 stainless steel. Adjustable squeegees shall be provided of 26 gauge x 8" wide stainless steel and shall be attached with 1/2 inch diameter stainless steel bolts in slotted holes on a maximum of 24" centers. Stainless steel washers shall be provided for both sides of the connection. Flights above and below overlapping straight blades shall be directed as shown on drawings.
2. The sludge suction pipes shall be minimum schedule 10-S wall stainless steel pipe and be sized as indicated in Section 1.01-D. The sludge suction pipes shall extend from a point near the floor to a flanged connection at the bottom of the sludge collection manifold troughs. The pipes shall be straight and vertical with the exception of the outermost tube which may have a maximum off-set of 20 degrees from the vertical provided that the suction point for the outermost tube on each arm shall be located approximately 5'-0" from the inside wall of the clarifier.
3. The fabricated sludge collection troughs shall extend from the scum baffle to the sight well built into the drive cage. The sludge collection troughs shall be sized to induce and control the sludge flow from the suction pipes and convey the sludge with minimal losses to the sight well. The sludge return troughs shall have stiffened edges and the necessary cross bracing. The return sludge collection trough shall have at least three (3) 12" wide x 4" deep scum collection ports on the forward face to collect surface scum outside the inlet well.

At least one (1) weir shall be located at the outboard end of the trough, and one (1) weir at the leading face just outside of the influent well. Each port shall be fitted with an adjustable 14-gauge stainless steel weir plate. The outboard end of the trough shall be angled back and have a wiper assembly that will continuously

contact the scum baffle, trapping scum for removal through the outboard scum port.

4. Type 316 stainless steel tie rods shall be supplied to connect the elements of the rake arm frame assembly and sludge collection trough and shall be minimum 5/8" in diameter.
5. The rake arm frame, vertical suction piping, return sludge trough, and connecting tie rods shall form a trussed system capable of withstanding the loads described in Section 2.01-A. The tie rods shall be configured in order to maintain the top of trough elevation in all empty or operating conditions.

H. Access Bridge / Service Platform: A fixed access beam bridge and drive service platform shall be furnished to provide access to the center drive assembly. The bridge shall span half the clarifier tank diameter and shall be supported at the tank walls and the main spur gear drive assembly.

1. The bridge shall consist of a fabricated steel beam bridge interlaced with cross angles and diagonal angles for rigidity. Structurally, the bridge shall be designed such that the maximum deflection shall be limited to 1/800 of the span, with all dead loads plus a live load of 50 lbs./ft.² on the walkway. The Manufacturer shall be responsible for sizing the members to meet these requirements; except, that the members specified are the minimum acceptable.
2. Two (2) slide plates shall be provided at each of the clarifier side walls to allow for thermal expansion. The slide plates shall be a minimum of 1/2" thick carbon steel plate.
3. The bridge shall be provided with a minimum 36" wide walkway designed to allow for an uninterrupted passage along its entire length across the clarifier basin. The access walkway shall consist of removable aluminum grating sections; 1 1/4" deep x 3/16" x 1" clear openings. The access bridge handrails are fabricated as part of the truss.
4. A drive service platform shall be provided to allow easy maintenance of the gear drive assembly. The platform shall be nominal 7'-0" square fabricated from minimum 6" deep channel shapes and angles. Platform to be covered with removable 1/4" thick aluminum checkered floor plate.

The drive service platform to include an anodized aluminum handrail/kickplate system provided for all sides assembled from 1 1/2" dia. schedule 40 aluminum pipe. The railing shall be a two (2) rail system with the top rail located at 42" above the deck and include a 4" wide extruded aluminum kickplate. The handrail system shall be pre Golden Rail or equal and comply with all current OSHA standards.

I. Scum Collection System: A fixed neoprene curtain shall be supported by the access bridge to direct any surface scum into the return sludge and scum collection trough. The scum collection system shall include the following:

1. Individual clear vinyl strips form a curtain supported by a 2" x 8" x 1/4" deep carbon steel angle attached to the underside of the access bridge, and a clamp plate on the opposite side to hold the individual vinyl strips against the troughs as they pass. Fabricated components shall be hot dipped galvanized. Individual vinyl strips shall overlap the influent well and scum baffle to insure no floating scum can pass. All fasteners shall be Type 316 stainless steel.

2. One (1) foam suppressant spray assembly to provide spray water around the center column just below the gear drive. Assembly shall be field assembled from 1" dia. Schedule 80 PVC pipe and fittings and include five (5) PVC cone shape nozzles, solenoid valve, and 1" diameter true union plug valve for flow control and throttling. A 1" diameter water supply pipe shall be supported from the walkway handrail with a cast iron Y-strainer with blow-off valve. Y strainer shall be located near one end easy access from the walkway.

Note: The inner PVC spray system shall be supplied for both manual and automated operation. Automated operation shall coincide with the scum pump operating cycle.

- J. **Octagonal Flocculation Baffle:** Clarifier influent shall exit the influent ports in the center pier and be directed toward the water surface while velocities are being reduced and diffused and scum directed to the water surface inside the octagonal flocculation baffle. The flocculation baffle shall be fabricated from 11 gauge stainless steel plate and transition from the square shape of the drive cage to an octagonal shape at the top, terminating 20 inches below the water surface. The flocculation baffle shall have a split floor plate that bolts to the drive cage and comes to within 1" of the outside diameter of the center pier.
- K. **Influent Feed Well:** Clarifier influent shall pass through an influent feed well sized as indicated in Section 1.01-D.
 1. The influent well shall be furnished as 16-gauge thick stainless steel plate, supported by structural channels attached to the drive cage using minimum 3/4" diameter fasteners.
 2. The influent well shall be supported by and rotate with the drive cage frame. Four (4) 10" deep stainless-steel channels shall be provided to support the inlet well.
- L. **Lubrication:** Lubricants of the type recommended by the equipment Manufacturer shall be furnished and applied by the General Contractor. The Contractor shall certify that the collector drive system has received the proper amount of recommended lubricant.

PART 3. EXECUTION

3.01 DELIVERY AND INSTALLATION

- A. The equipment and material shall be shipped complete except where partial disassembly is required by transportation regulations or for protection of components.
- B. Spare parts shall be packed in containers bearing packing lists clearly designating contents and pieces of equipment for which they are intended.
- C. The contractor shall inspect equipment prior to unloading and notify the manufacturer of any damage to equipment to effect proper remedial action.
- D. The contractor shall unload, store and safeguard equipment, materials, and spare parts in accordance with manufacturer's recommendations.
- E. All equipment shall be installed in strict conformance to manufacturer's recommendations.

3.02 START-UP, TRAINING AND MANUFACTURER'S SERVICES

- A. A factory trained representative for the equipment specified herein shall be present at the jobsite and/or classroom designated by the Owner for the period as specified for installation inspection, plant startup, functional testing, and operator instructions; travel time excluded.

3.03 FUNCTIONAL TESTING

- A. Prior to plant startup, all equipment shall be inspected by a factor trained representative for proper alignment, operation, connection, and satisfactory operation by means of a functional test.

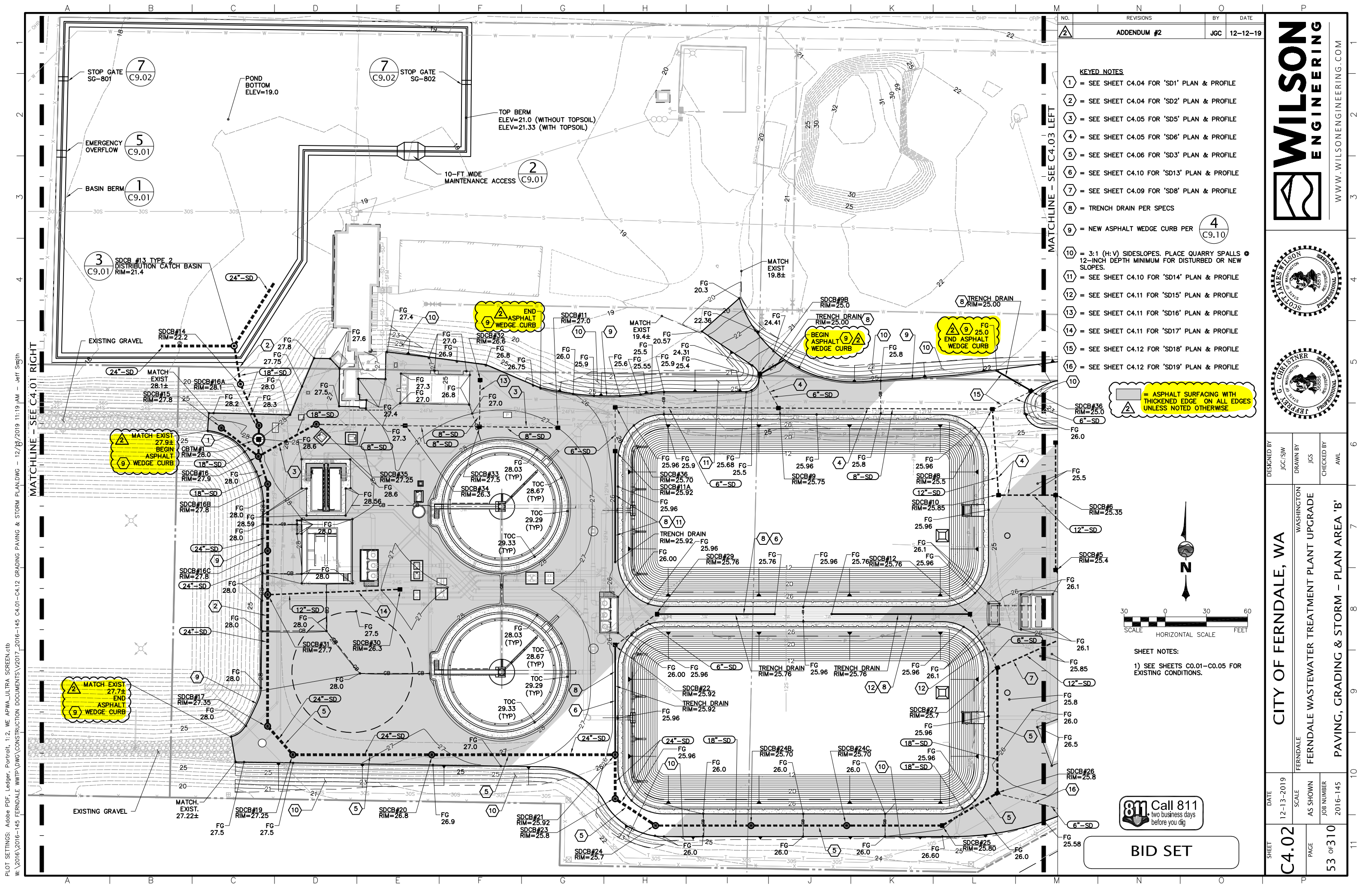
3.04 GROUTING THE TANK FLOOR

- A. After the equipment has been installed, a 2-inch layer of grout shall be applied to the tank floor, using screeds and templates installed on the mechanism rake arms as guides, and the grout shall be floated to form the finished surface. Grouting shall not be done until the manufacturer has inspected and leveled the mechanism. Prior to grouting, the Owner/Engineer shall inspect and accept preparation of the base slab surface.
- B. The collector mechanism shall be detailed to allow clearance for a grout topping to be applied to the rough floor of the clarifiers. The purpose of the topping is to provide a smooth uniform floor and a precision fit to the scraper blades. The grout topping shall be nominally 2 inches thick adjusted as required to fit the mechanism but in not case shall the topping be less than 1 inch thick. The collector arms and rotating mechanism shall be carefully leveled and adjusted in accordance with the manufacturer's written instructions and as directed in the field by the manufacturer's technical service personnel prior to placement of the floor grout. Grout is to be applied before installation of the flight squeegees.
- C. The rough floor shall be thoroughly cleaned and washed down prior to the grouting operation. Sandblasting or muriatic acid etching shall be used as need to remove paint or other hard to remove substances from the rough floor.
- D. An acrylic-latex bonding agent such as "Duraweld-C" shall be liberally applied as directed on the container to dampen the floor sections prior to grouting. This material shall be broomed evenly on to the rough floor just ahead of the grout operation.
- E. The floor grout shall be Five Star Clarifier Grout or approved equal.
- F. After completion of the floor grouting, the adjustable squeegees shall be installed and adjusted to provide a maximum ½ inch clearance from the squeegees to the finished floor.

3.05 MANUFACTURER'S CERTIFICATE

- A. Provide manufacturer's certificate of installation and commissioning following functional testing and startup.

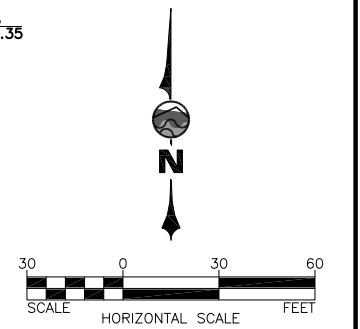
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NO.	REVISIONS	BY	DATE
2	ADDENDUM #2	JGC	12-12-19

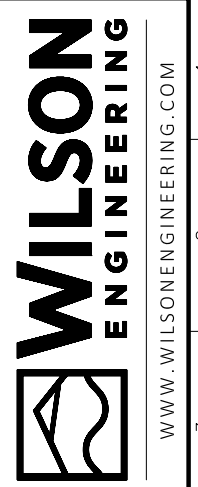
- KEYED NOTES**
- 1 = SEE SHEET C4.04 FOR 'SD1' PLAN & PROFILE
 - 2 = SEE SHEET C4.04 FOR 'SD2' PLAN & PROFILE
 - 3 = SEE SHEET C4.05 FOR 'SD5' PLAN & PROFILE
 - 4 = SEE SHEET C4.05 FOR 'SD6' PLAN & PROFILE
 - 5 = SEE SHEET C4.06 FOR 'SD3' PLAN & PROFILE
 - 6 = SEE SHEET C4.10 FOR 'SD13' PLAN & PROFILE
 - 7 = SEE SHEET C4.09 FOR 'SD8' PLAN & PROFILE
 - 8 = TRENCH DRAIN PER SPECS
 - 9 = NEW ASPHALT WEDGE CURB PER C9.10
 - 10 = 3:1 (H:V) SIDESLOPES. PLACE QUARRY SPALLS @ 12-INCH DEPTH MINIMUM FOR DISTURBED OR NEW SLOPES.
 - 11 = SEE SHEET C4.10 FOR 'SD14' PLAN & PROFILE
 - 12 = SEE SHEET C4.11 FOR 'SD15' PLAN & PROFILE
 - 13 = SEE SHEET C4.11 FOR 'SD16' PLAN & PROFILE
 - 14 = SEE SHEET C4.11 FOR 'SD17' PLAN & PROFILE
 - 15 = SEE SHEET C4.12 FOR 'SD18' PLAN & PROFILE
 - 16 = SEE SHEET C4.12 FOR 'SD19' PLAN & PROFILE

ASPHALT SURFACING WITH THICKENED EDGE ON ALL EDGES UNLESS NOTED OTHERWISE



SHEET NOTES:
1) SEE SHEETS C0.01-C0.05 FOR EXISTING CONDITIONS.

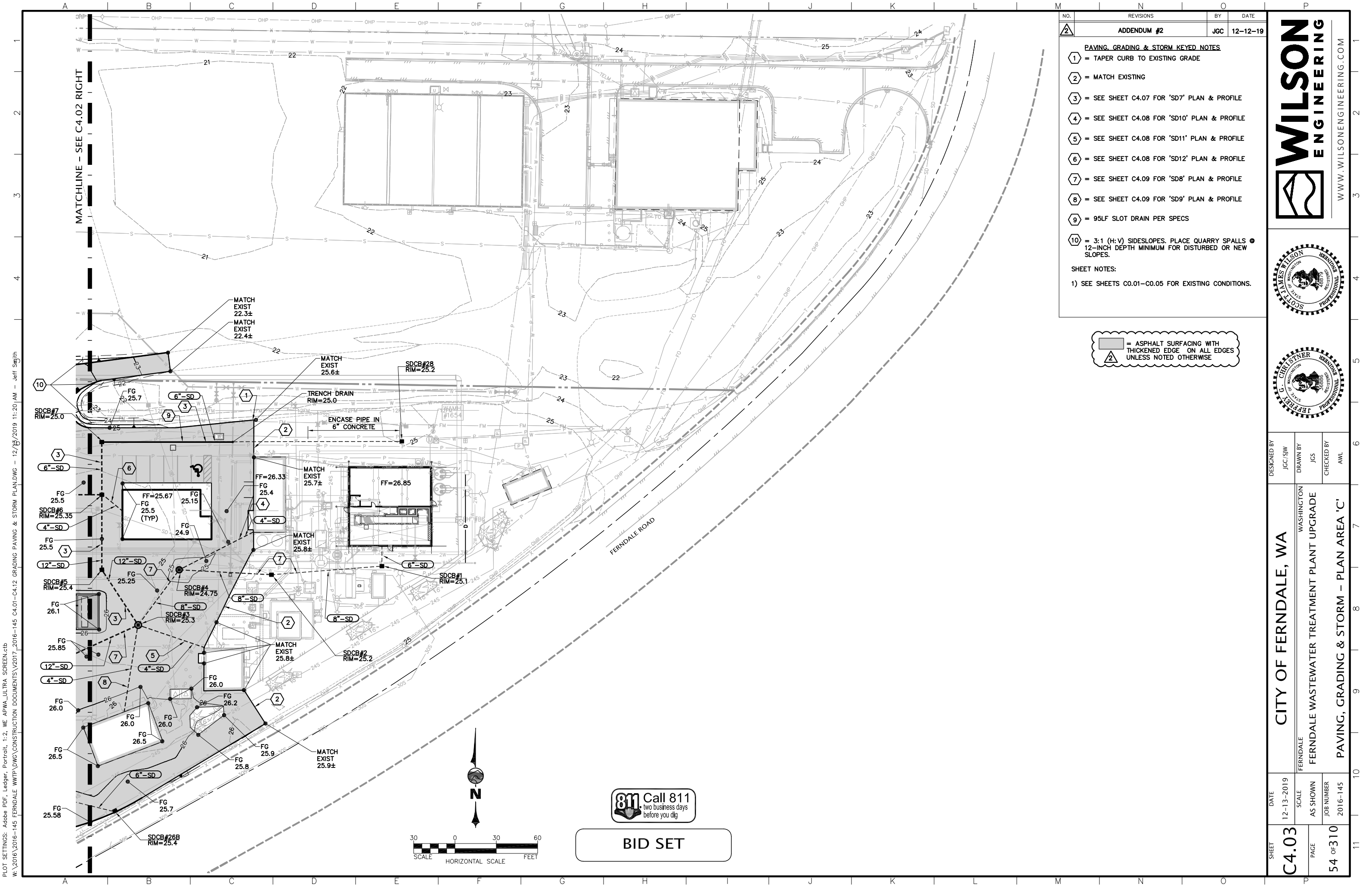
811 Call 811
two business days before you dig



DESIGNED BY	JGC/SW
DRAWN BY	JCS
CHECKED BY	AWL

CITY OF FERNDAL, WA
FERNDAL WASTEWATER TREATMENT PLANT UPGRADE
PAVING, GRADING & STORM - PLAN AREA 'B'

SHEET	C4.02
DATE	12-13-2019
SCALE	AS SHOWN
JOB NUMBER	2016-145
PAGE	53 of 310



NO.	REVISIONS	BY	DATE
2	ADDENDUM #2	JGC	12-12-19

PAVING, GRADING & STORM KEYED NOTES

- 1 = TAPER CURB TO EXISTING GRADE
- 2 = MATCH EXISTING
- 3 = SEE SHEET C4.07 FOR 'SD7' PLAN & PROFILE
- 4 = SEE SHEET C4.08 FOR 'SD10' PLAN & PROFILE
- 5 = SEE SHEET C4.08 FOR 'SD11' PLAN & PROFILE
- 6 = SEE SHEET C4.08 FOR 'SD12' PLAN & PROFILE
- 7 = SEE SHEET C4.09 FOR 'SD8' PLAN & PROFILE
- 8 = SEE SHEET C4.09 FOR 'SD9' PLAN & PROFILE
- 9 = 95LF SLOT DRAIN PER SPECS
- 10 = 3:1 (H:V) SIDESLOPES. PLACE QUARRY SPALLS @ 12-INCH DEPTH MINIMUM FOR DISTURBED OR NEW SLOPES.

SHEET NOTES:

1) SEE SHEETS C0.01-C0.05 FOR EXISTING CONDITIONS.

ASPHALT SURFACING WITH THICKENED EDGE ON ALL EDGES UNLESS NOTED OTHERWISE

WILSON
ENGINEERING

SCOTT JAMES WILSON
PROFESSIONAL ENGINEER
WASHINGTON
REG. NO. 34873

JEFFREY G. CIRSENGER
PROFESSIONAL ENGINEER
WASHINGTON
REG. NO. 34885

DESIGNED BY
JGC/SJW

DRAWN BY
JCS

CHECKED BY
AWL

CITY OF FERNDAL, WA

FERNDAL
FERNDAL WASTEWATER TREATMENT PLANT UPGRADE
PAVING, GRADING & STORM - PLAN AREA 'C'

SHEET
C4.03

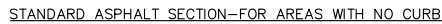
DATE
12-13-2019

SCALE
AS SHOWN

JOB NUMBER
2016-145

PAGE
54 of 310

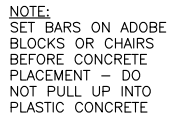
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NOT TO SCALE



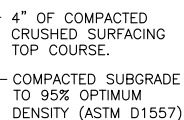
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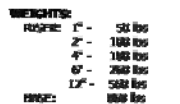
NOT TO SCALE



NOT TO SCALE

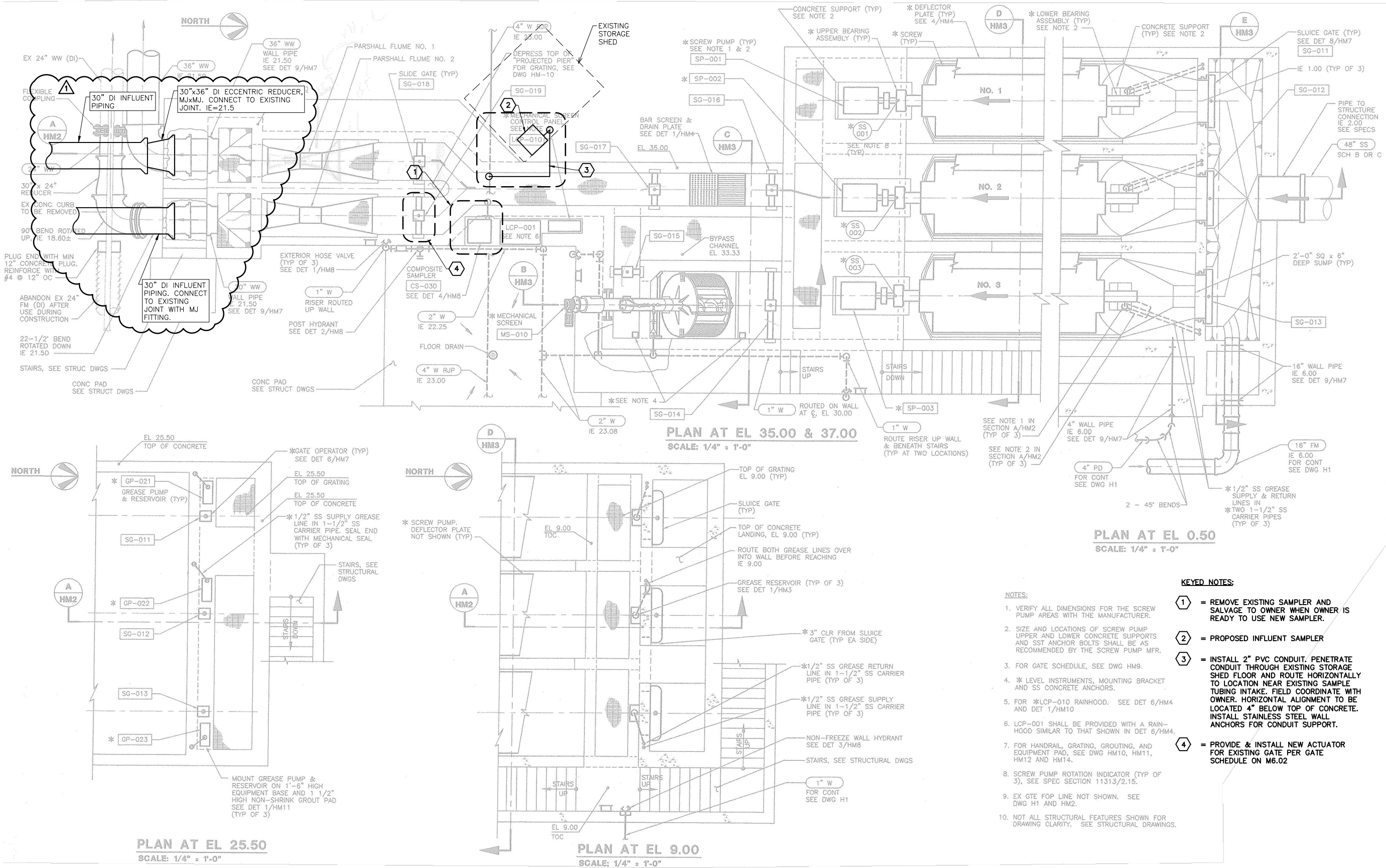


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NOT TO SCALE

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BID SET

CITY OF FERDALE, WA

FERDALE
FERDALE WASTEWATER TREATMENT PLANT UPGRADE

PROPOSED INFLUENT SAMPLER STATION

SHEET
M1.03

DATE
12-13-2019

SCALE
AS SHOWN

PAGE
102 of 310

DESIGNED BY
JG/SW

DRAWN BY
JRF

CHECKED BY
AWL



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NO.	REVISIONS	BY	DATE
2	ADDENDUM #2	JGC	12-13-19

4. TRANSITION WITH RESTRAINED FLANGED COUPLING, ROMAC ALPHA FC OR EQUAL.

① = PIPE SUPPORT (TYP.) PER (3)
M6.01

② = 4" HDPE TO PLANT
(INV = 22.00')

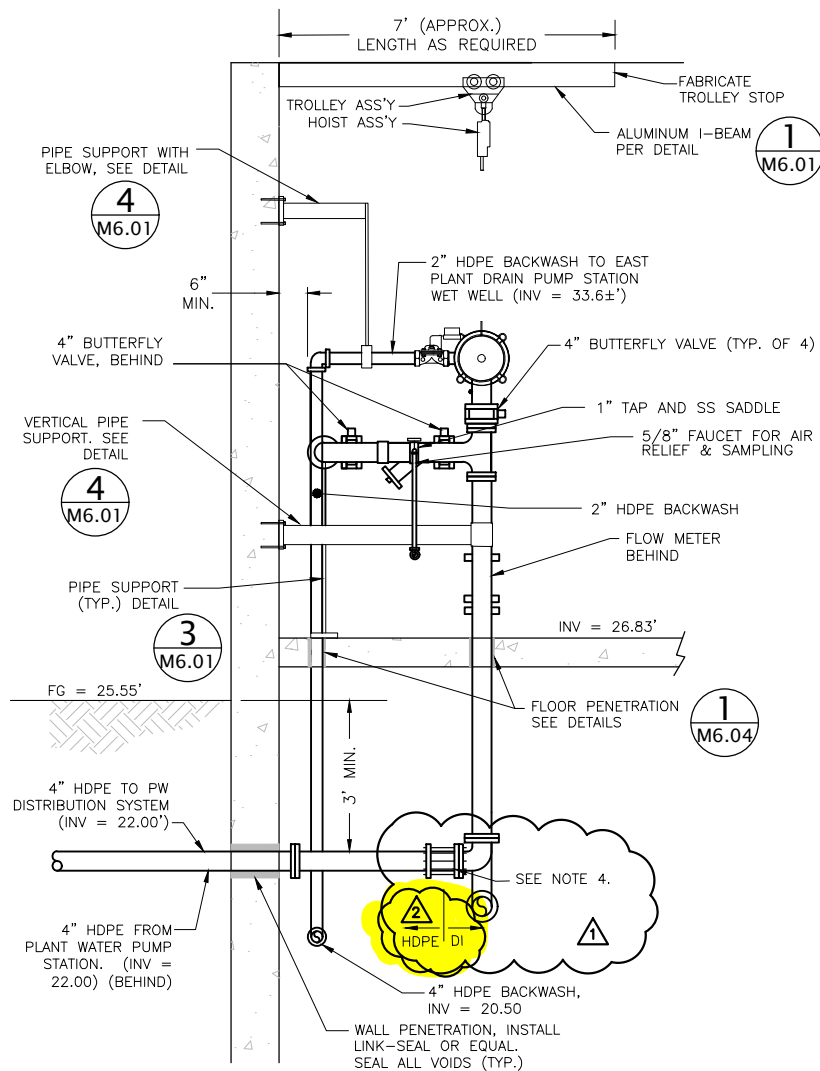
③ = 4" SCHEDULE 80 STEEL PIPE WITH
EPOXY COATING (TYP.)

④ = 4" BUTTERFLY VALVE (NORMALLY
CLOSED) W/ HANDLE OPERATOR

⑤ = SS SADDLE AND 1" TAP

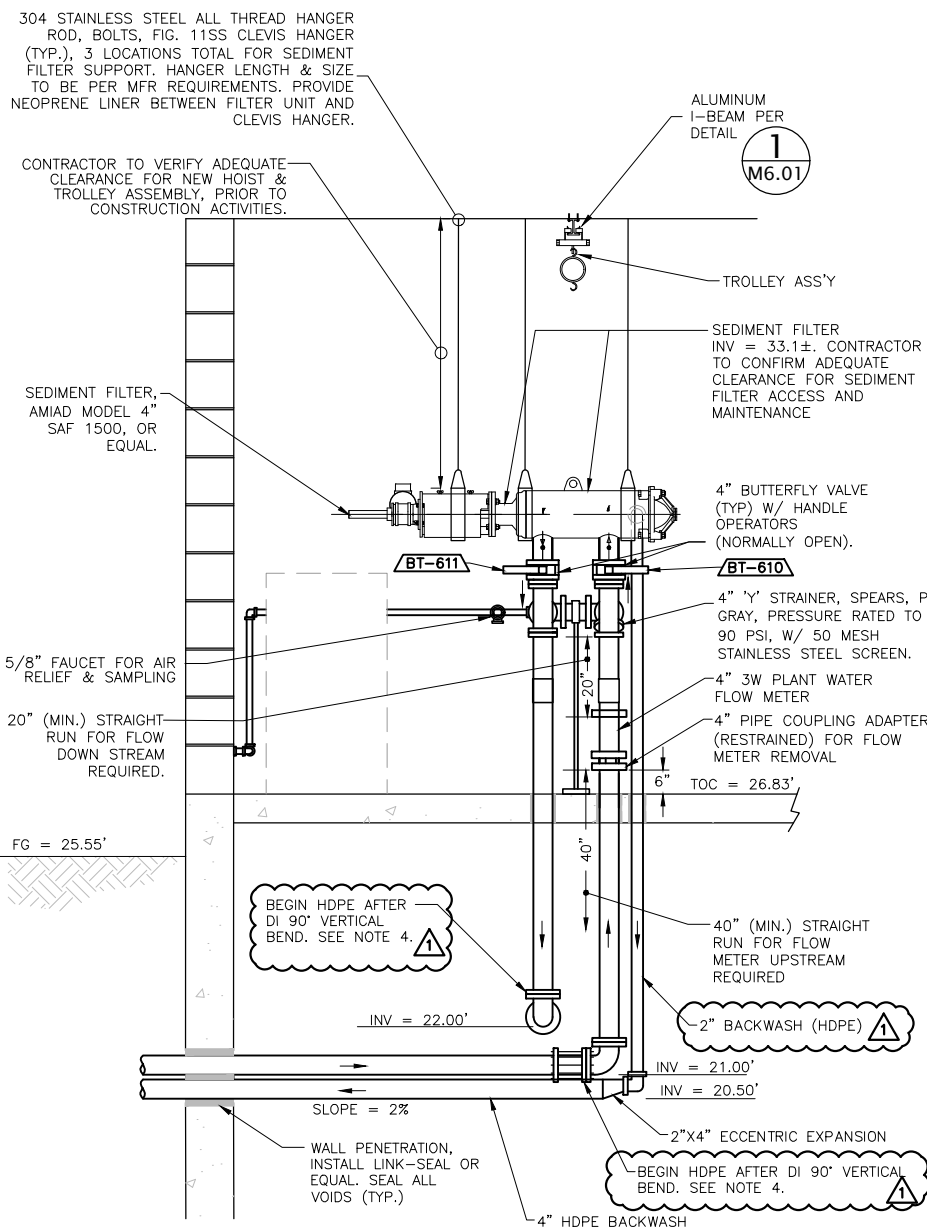
⑥ = 4" HDPE FROM 3W WATER PUMP
STATION (INV = 22.00')

- ⑦ = 2" HDPE BACKWASH TO EAST PLANT DRAIN PUMP STATION WET WELL
- ⑧ = 4" Y" STRAINER, SPEARS, PVC GRAY, PRESSURE RATED TO 90 PSI, W/50 MESH STAINLESS STEEL SCREEN.
- ⑨ = SEDIMENT FILTER SOLENOID VALVE (EQ# SV-951)
- ⑩ = 4" HDPE BACKWASH
- ⑪ = 2 - AIR DIAPHRAGM TANKS (3W)
- ⑫ = 2 - AIR DIAPHRAGM TANKS (2W)



A 3W PLANT WATER FILTER – SECTION 'A'

VALVE HANDLES AND HOIST CHAINS NOT SHOWN FOR CLARITY.

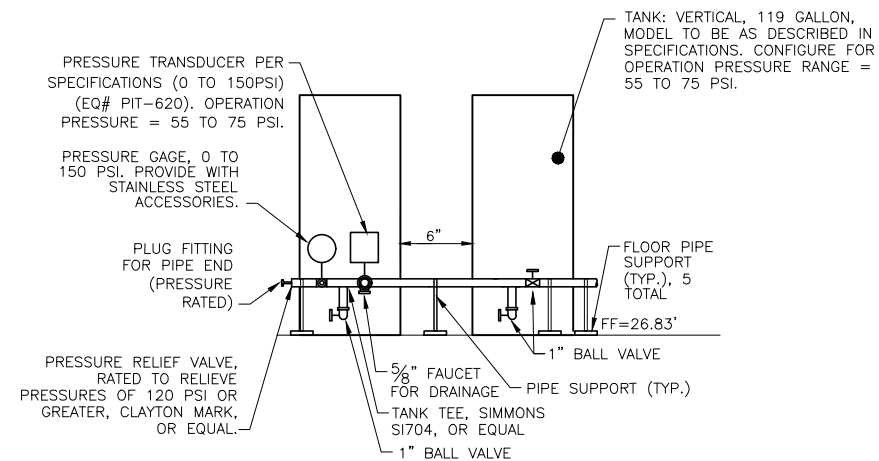


B 3W PLANT WATER FILTER – SECTION 'B'

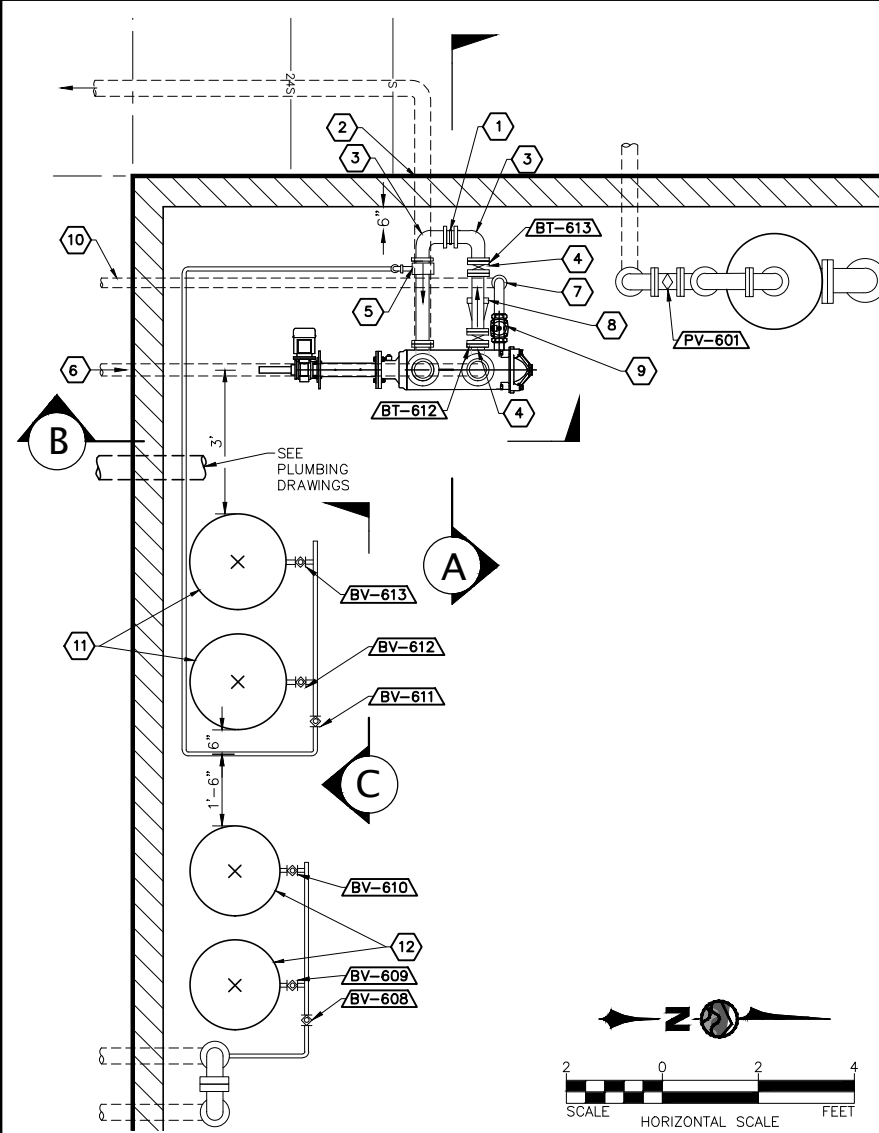
VALVE HANDLES AND HOIST CHAINS NOT SHOWN FOR CLARITY.



NO.	REVISIONS	BY	DATE
1	ADDENDUM #1	JGC	12-6-19
2	ADDENDUM #2	JGC	12-13-19



C 3W DIAPHRAM TANKS – SECTION 'C'
NOT TO SCALE



PLANT WATER FILTER & DIAPHRAGM TANKS – PLAN

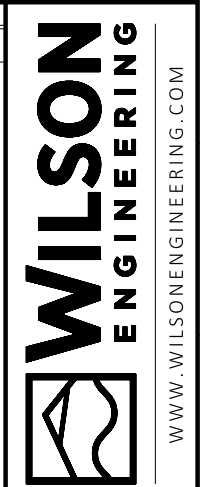
PIPE SUPPORTS NOT SHOWN FOR CLARITY



BID SET

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NO.	REVISIONS	BY	DATE
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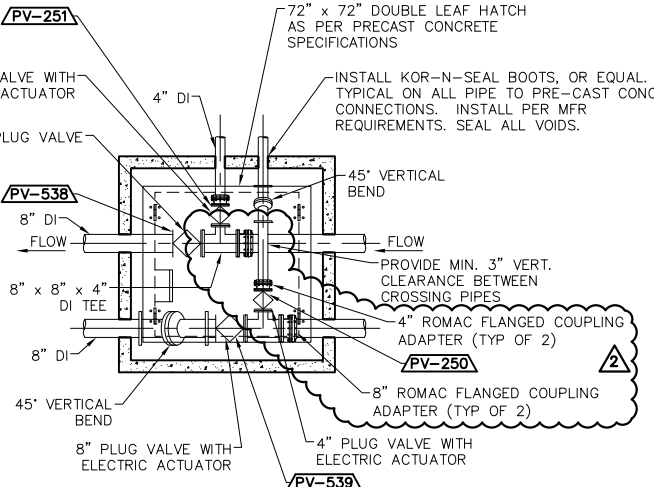
DESIGNED BY	JGC/JW
DRAWN BY	JRF
CHECKED BY	AWL

CITY OF FERNDAL, WA
FERNDAL WASTEWATER TREATMENT PLANT UPGRADE
FLOW METER & VALVE VAULT DETAILS

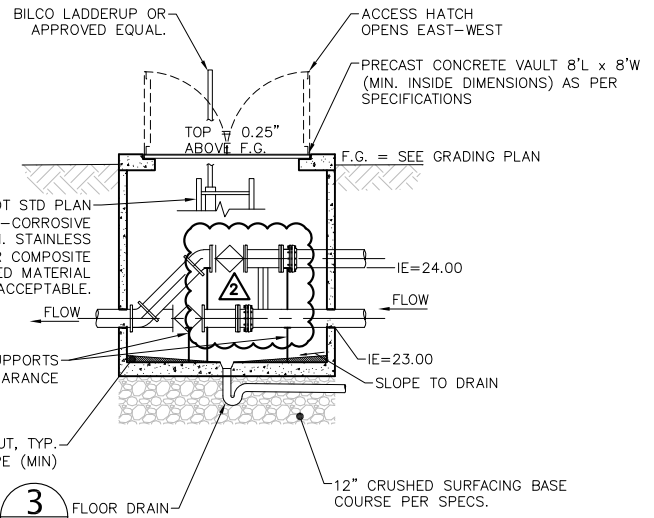
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DATE	12-13-2019
SCALE	AS SHOWN
JOB NUMBER	2016-145
PAGE	140 of 310



BID SET



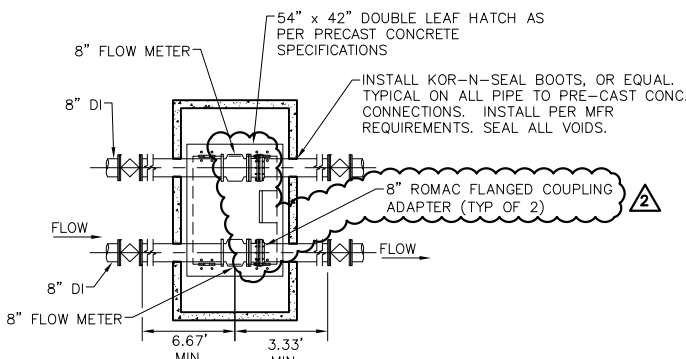
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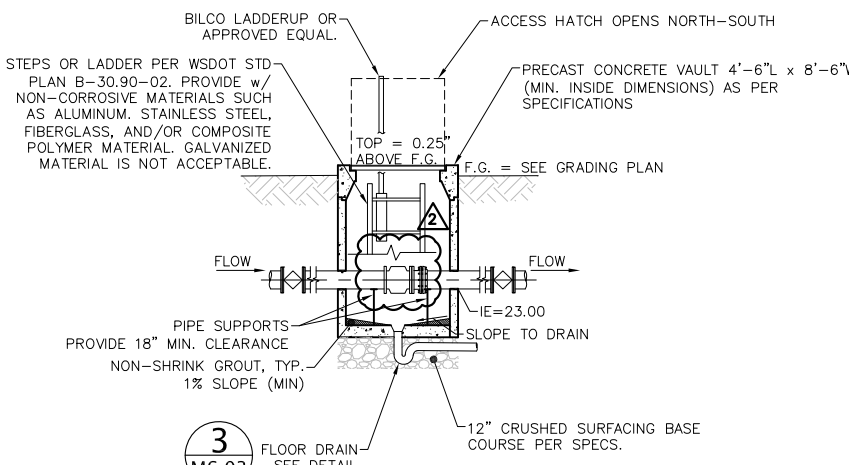
ELEVATION

ACTIVATED SLUDGE DOSING/
WAS VALVE VAULT

NOT TO SCALE



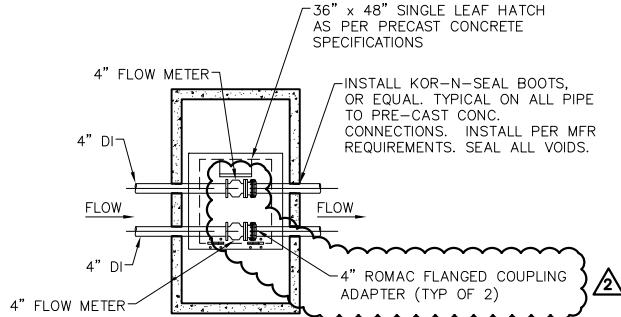
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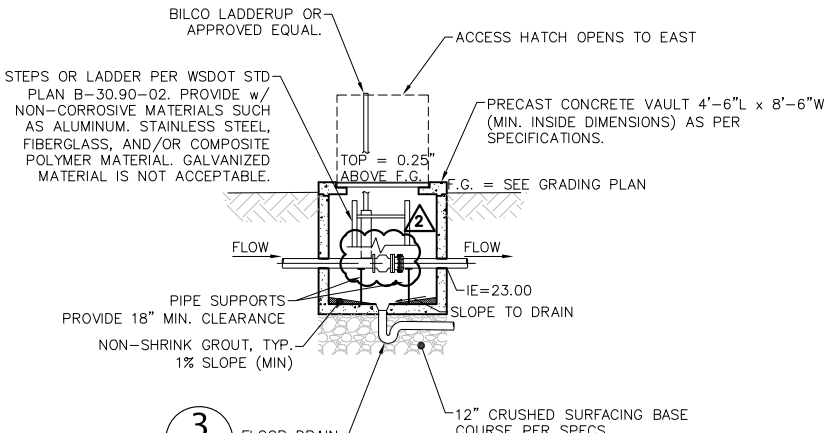
ELEVATION

WAS FLOW METER VAULT

NOT TO SCALE



PLAN

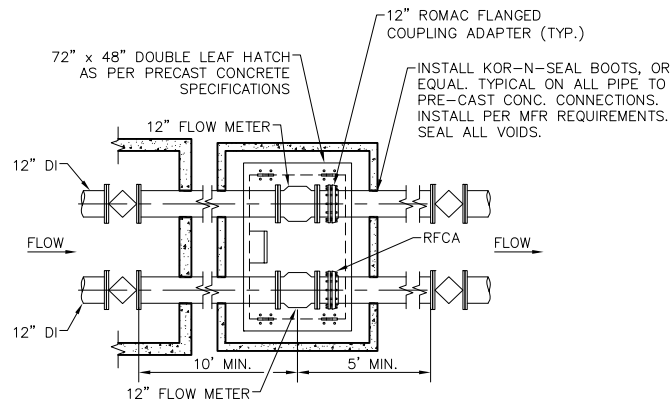


ELEVATION

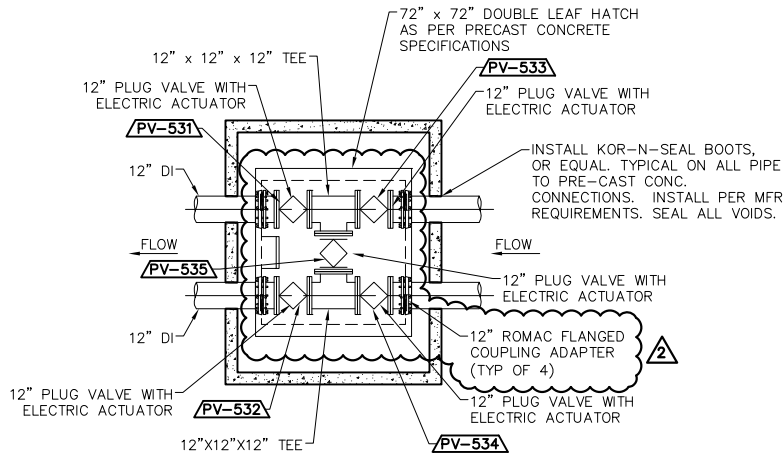
ACTIVATED SLUDGE DOSING
FLOW METER VAULT

NOT TO SCALE

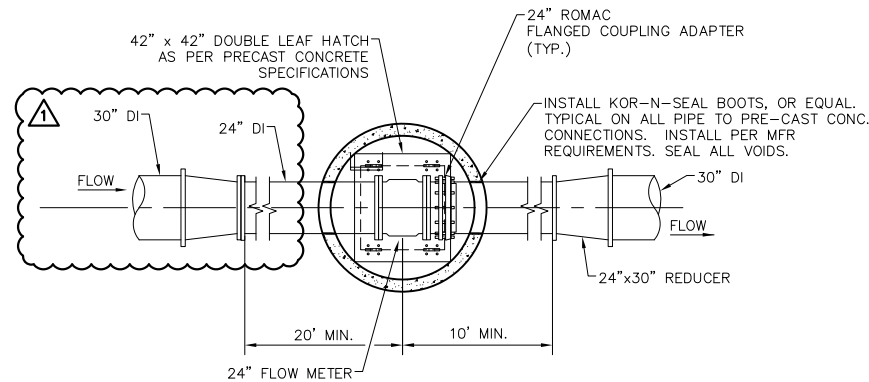
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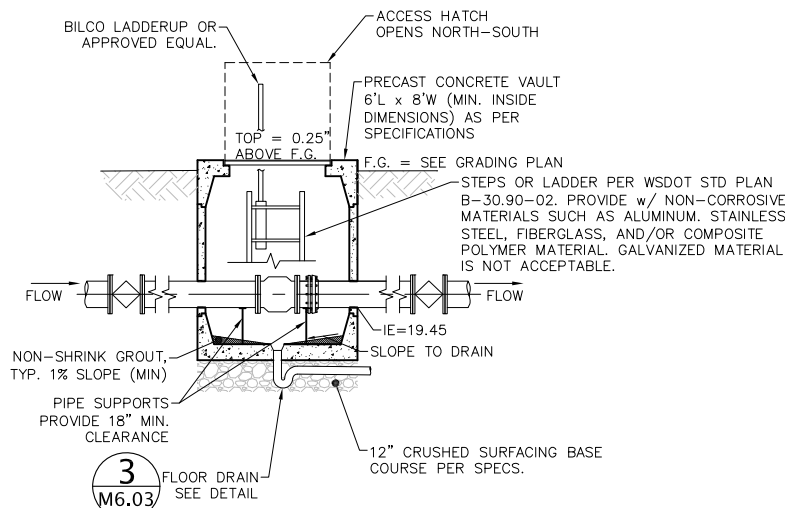
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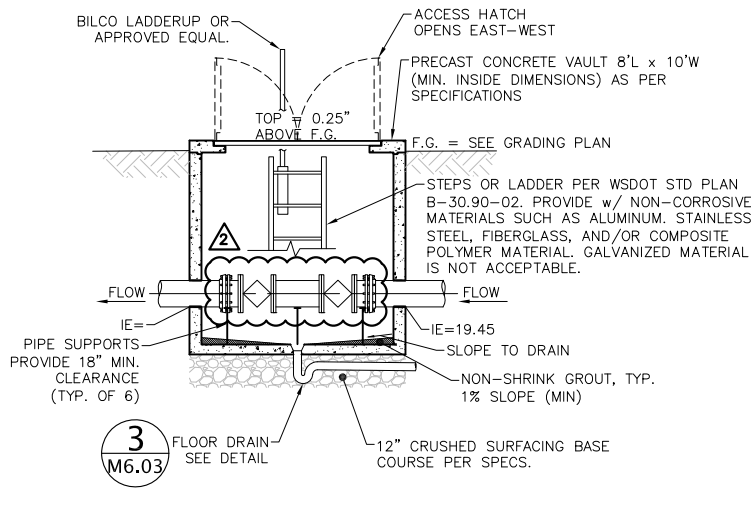
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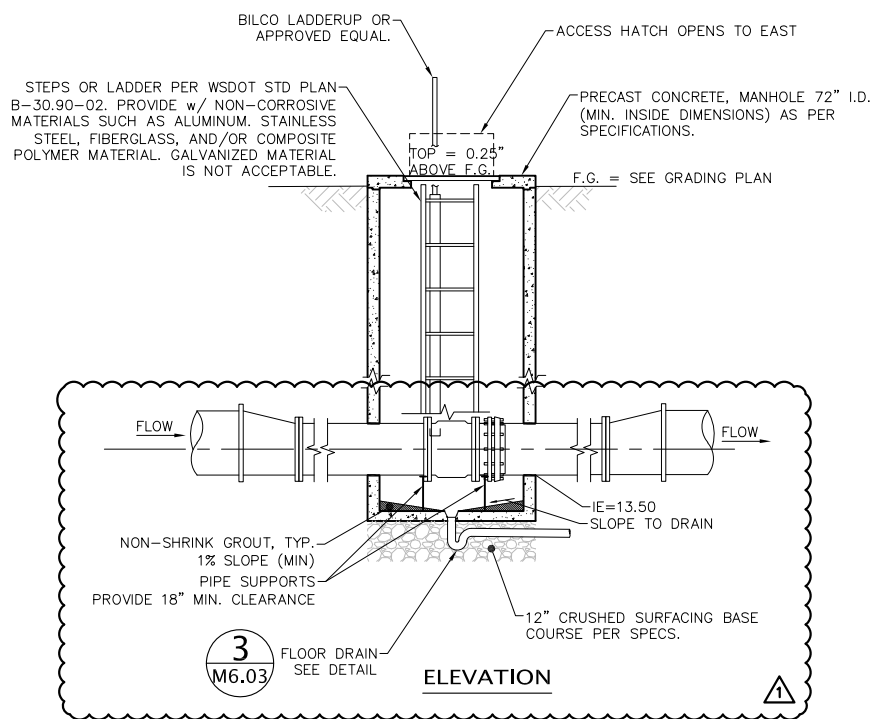
PLAN



ELEVATION



ELEVATION



ELEVATION

1 RAS FLOW METER VAULT
C2.05 NOT TO SCALE

2 RAS VALVE VAULT
C2.05 NOT TO SCALE

3 UV EFFLUENT FLOW METER VAULT
C2.07 NOT TO SCALE

NO.	REVISIONS	BY	DATE
1	ADDENDUM #1	JGC	12-6-19
2	ADDENDUM #2	JGC	12-12-19



DESIGNED BY JGC/JW
DRAWN BY JRF
CHECKED BY AVL

CITY OF FERNDAL, WA
FERNDAL
FERNDAL WASTEWATER TREATMENT PLANT UPGRADE
FLOW METER & VALVE VAULT DETAILS

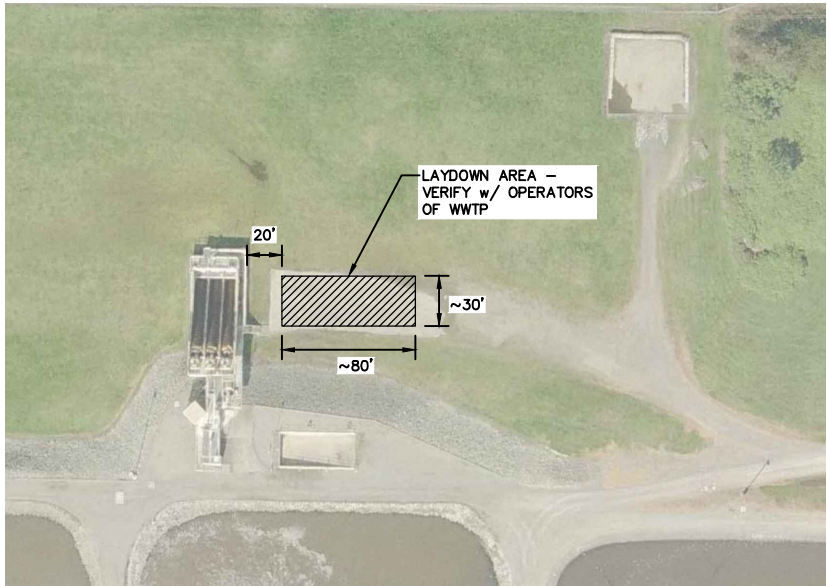
SHEET M8.03
DATE 12-13-2019
SCALE AS SHOWN
PAGE 141 of 310
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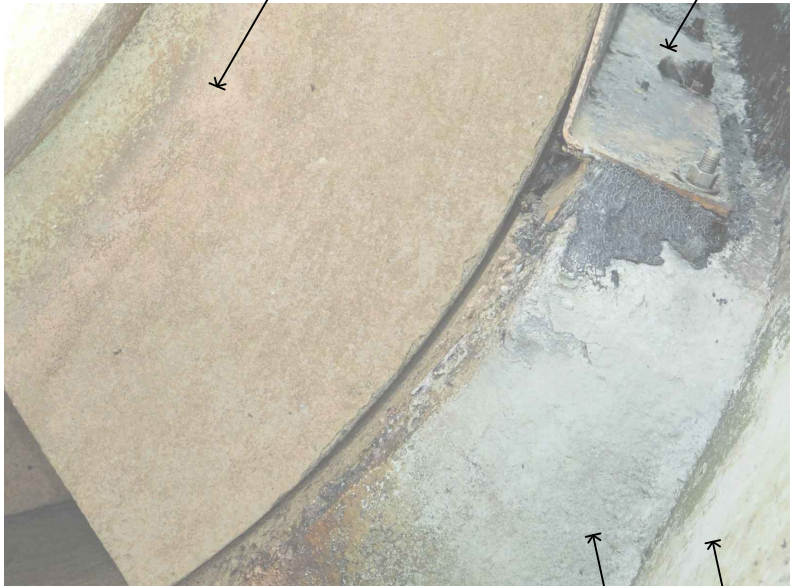
BID SET

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PLOT SETTINGS: DWG To PDF.pc3, ANSI full bleed B (17.00 x 11.00 Inches), Portrail, 1:2, WE APWA_UNSCREENED.ctb
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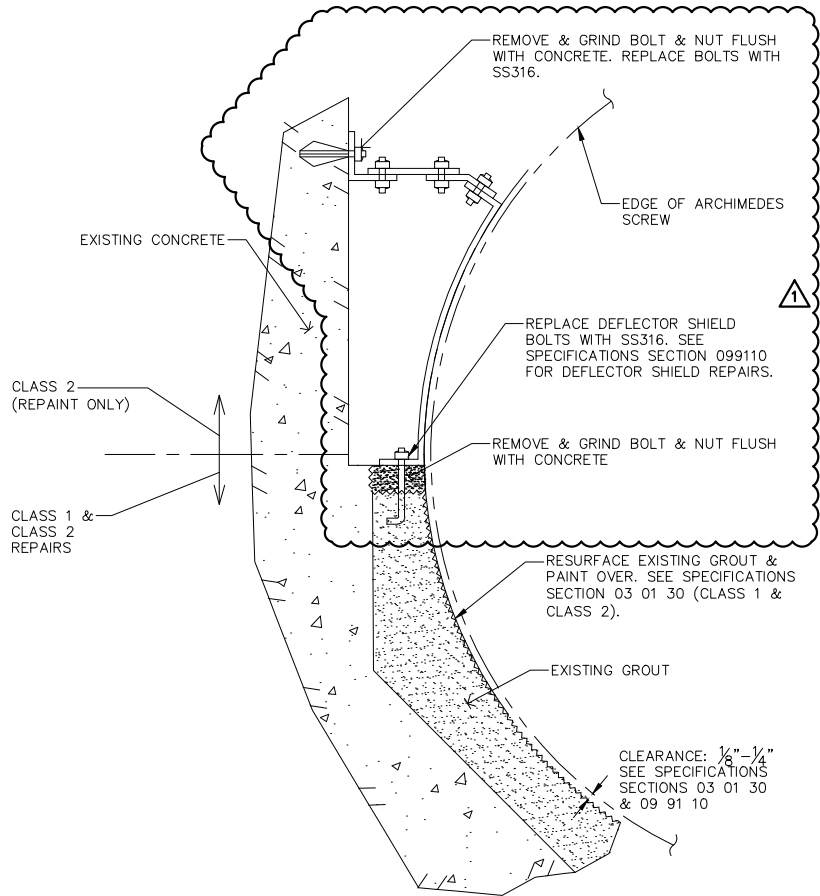
1
-
LAYDOWN AREA FOR SCREW REPAINTING
NOT TO SCALE



2
S2.15
TYPICAL VIEW AT TOP OF SCREWS
NOT TO SCALE



3
S2.15
TYPICAL ARCHIMEDES SCREWS
NOT TO SCALE



4
S2.15
TYPICAL ARCHIMEDES SCREW CHANNEL REPAIRS



NO.	REVISIONS	BY	DATE
ADDENDUM #1		JGC	12-6-19



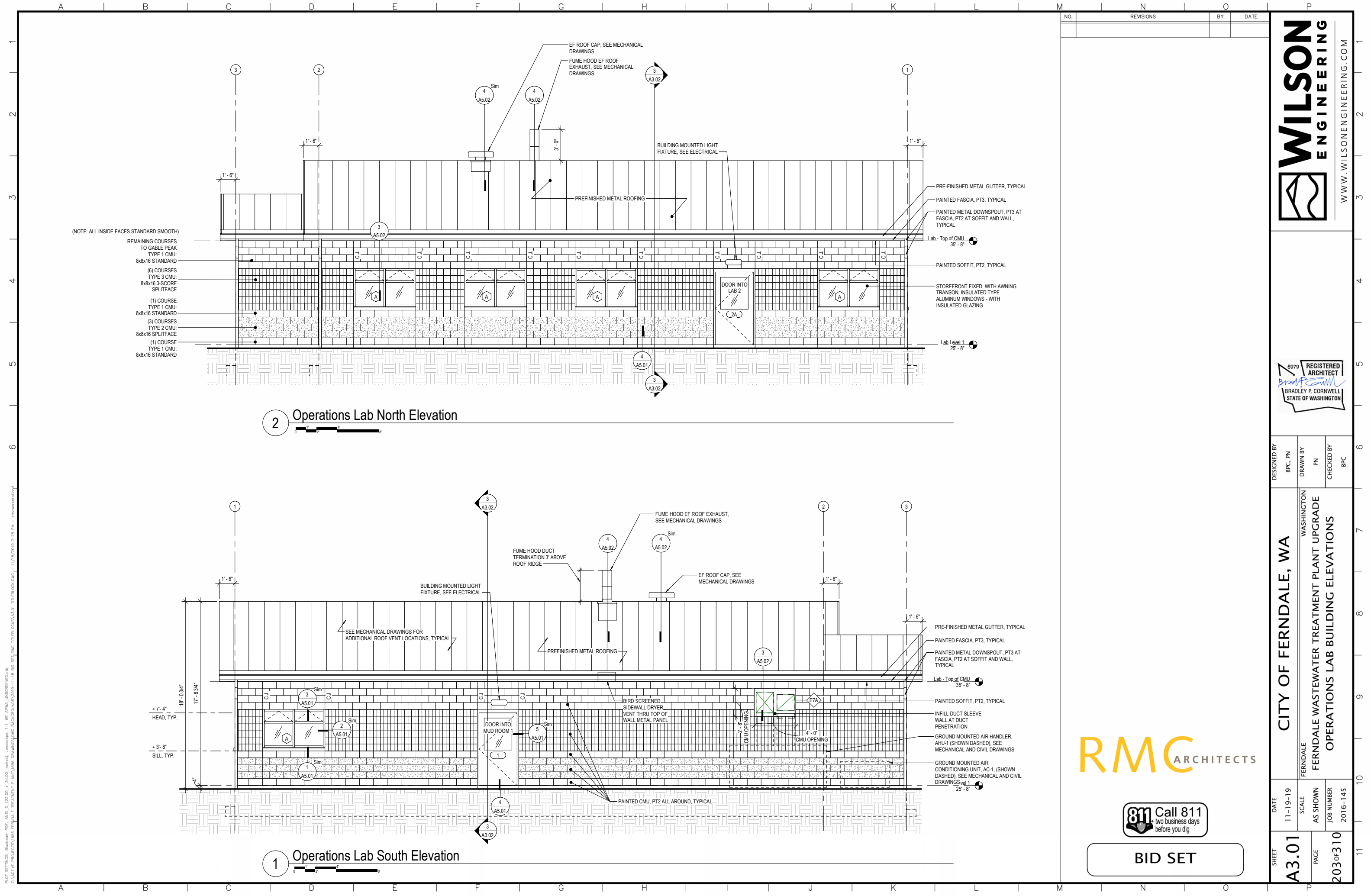
DESIGNED BY	JGW
DRAWN BY	RDN
CHECKED BY	AWL

CITY OF FERNDAL, WA	WASHINGTON
FERNDAL	FERNDAL WASTEWATER TREATMENT PLANT UPGRADE
EXISTING HEADWORKS REPAIR DETAILS	

SHEET	DATE	SCALE	JOB NUMBER
S2.16	12-03-2019	AS SHOWN	2016-145
PAGE			167 of 310



BID SET




PLOT SETTINGS: Bluebeam PDF, ANSI_D (22.00...x34.00 Inches), Landscape, 1:1, WE, APWA_UNSCREENED.ctb
Z:\ACTIVE PROJECTS\1656 FERNDAL WASTEWATER TREATMENT PLANT\1656 DRAWINGS\DWG BACKGROUNDS\2016-11-18 BID SET\1656 TITLEDRAWINGS\A3.01 TITLEDRAWING.dwg - 11/18/2019 2:28 PM - mworkstation4



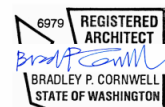


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6979 REGISTERED ARCHITECT
BRADLEY P. CORNWELL
STATE OF WASHINGTON

DESIGNED BY	BPC, PN	DRAWN BY	PN	CHECKED BY	BPC
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CITY OF FERNDAL, WA

WASHINGTON

FERNDAL

FERNDAL WASTEWATER TREATMENT PLANT UPGRADE

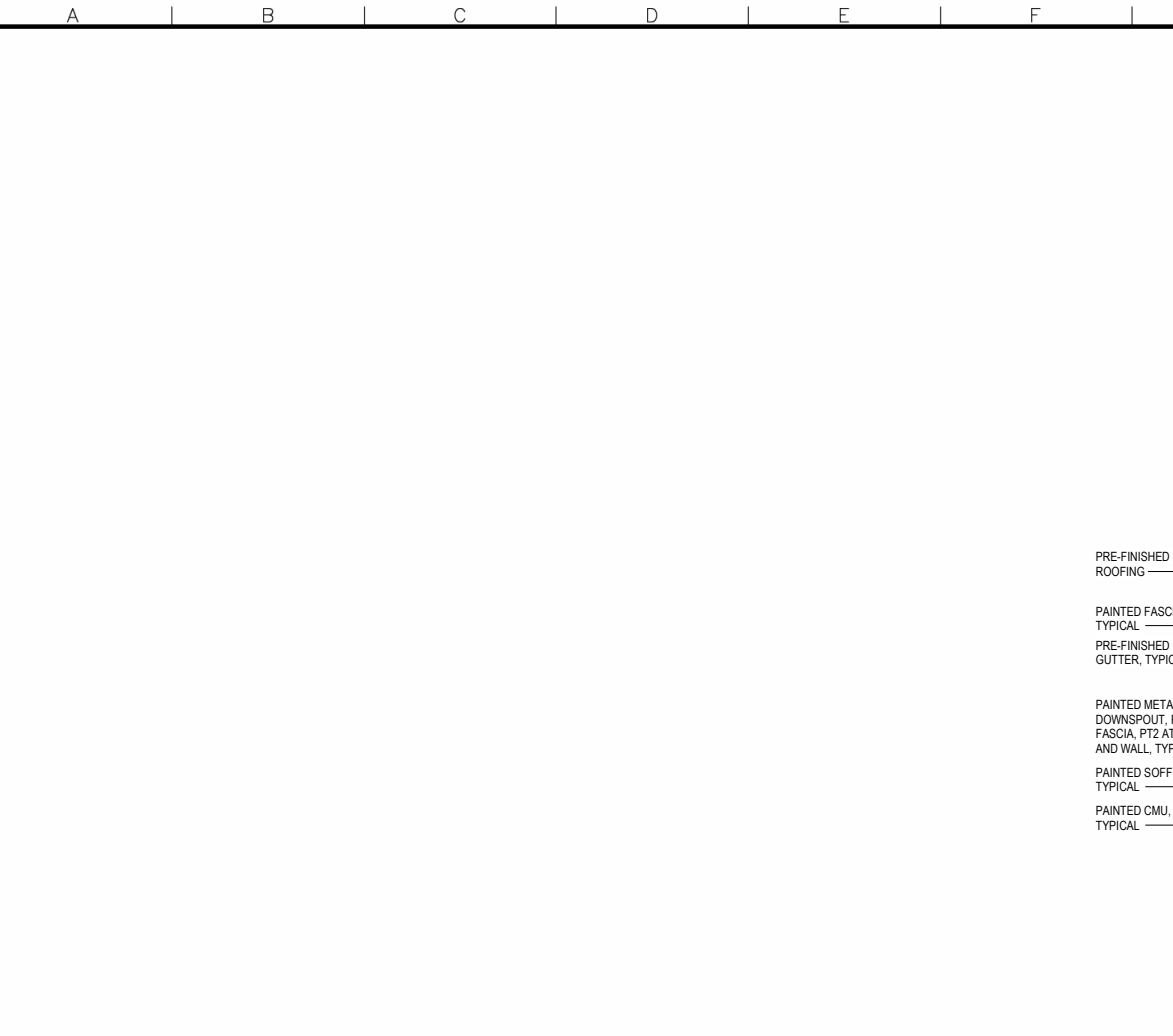
OPERATIONS LAB BUILDING ELEVATIONS

DATE	11-19-19	SCALE	AS SHOWN	JOB NUMBER	2016-145
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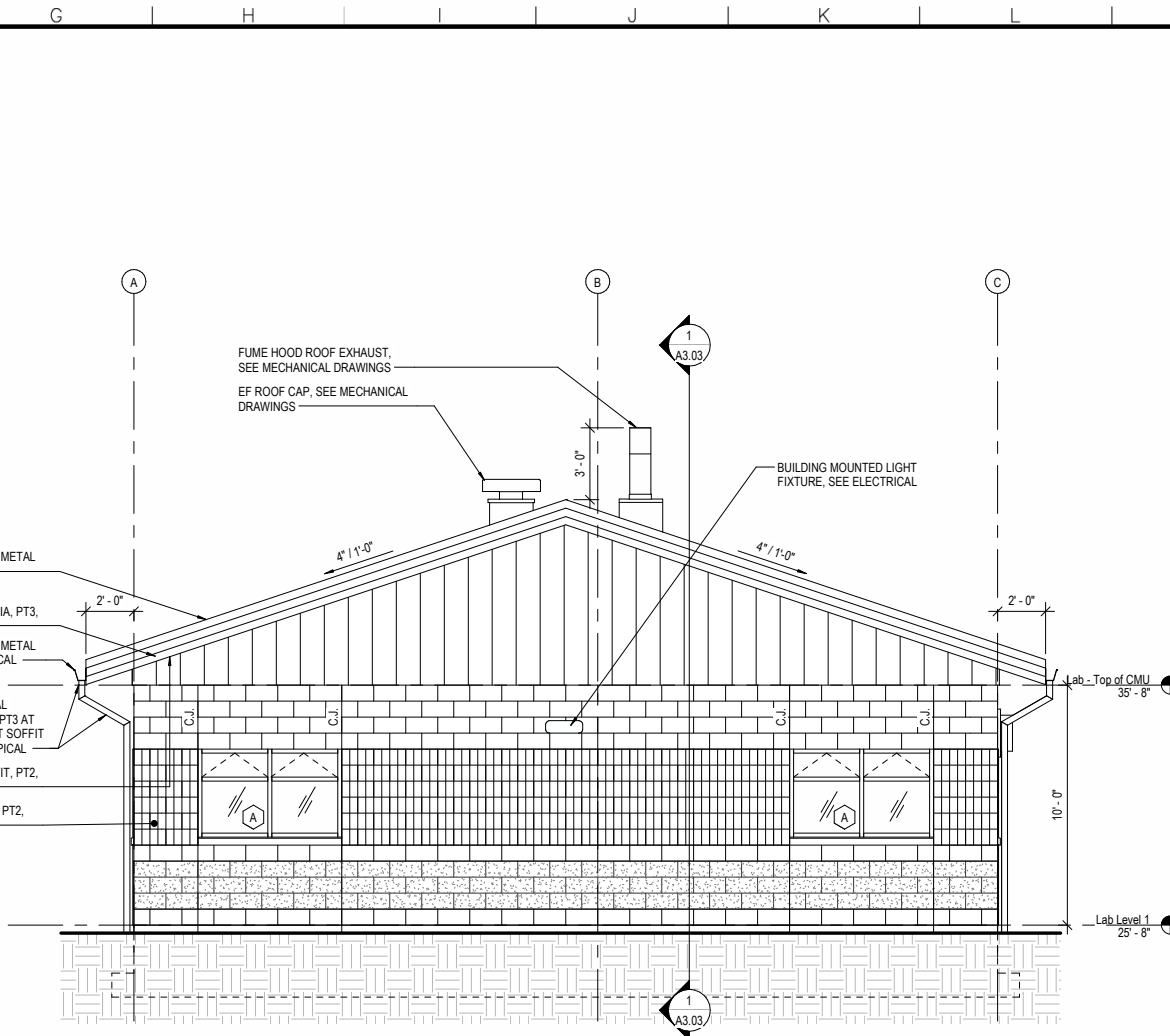
A3.01

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Architectural section drawing of a roof assembly. The drawing shows a cross-section of a roof with a 2'-0" slope. A vertical dashed line is labeled 'A' at the top. The roof assembly includes a structural layer, insulation, and a waterproofing layer. A window or door is shown in the wall below the roof. The drawing is labeled with 'G' and 'H' at the top, and 'A' in a circle at the top left. Text on the right side reads: 'FUME HOOD SEE MECHANICAL DRAWINGS', 'EF ROOF', and 'DRAWINGS'.



Architectural section drawing of a roof assembly. The drawing shows a cross-section of a roof with a 2'-0" slope. A vertical dashed line is labeled 'A' at the top. The roof assembly includes a structural layer, insulation, and a waterproofing layer. A window or door is shown in the wall below the roof. The drawing is labeled with 'G' and 'H' at the top, and 'A' in a circle at the top left. Text on the right side reads: 'FUME HOOD SEE MECHANICAL DRAWINGS', 'EF ROOF', and 'DRAWINGS'.

M	N	O
NO.	REVISIONS	BY DATE



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6979 REGISTERED ARCHITECT
Bradley P. Cornwell
BRADLEY P. CORNWELL
STATE OF WASHINGTON

DESIGNED BY BPC, PN	
DRAWN BY PN	
CHECKED BY BPC	

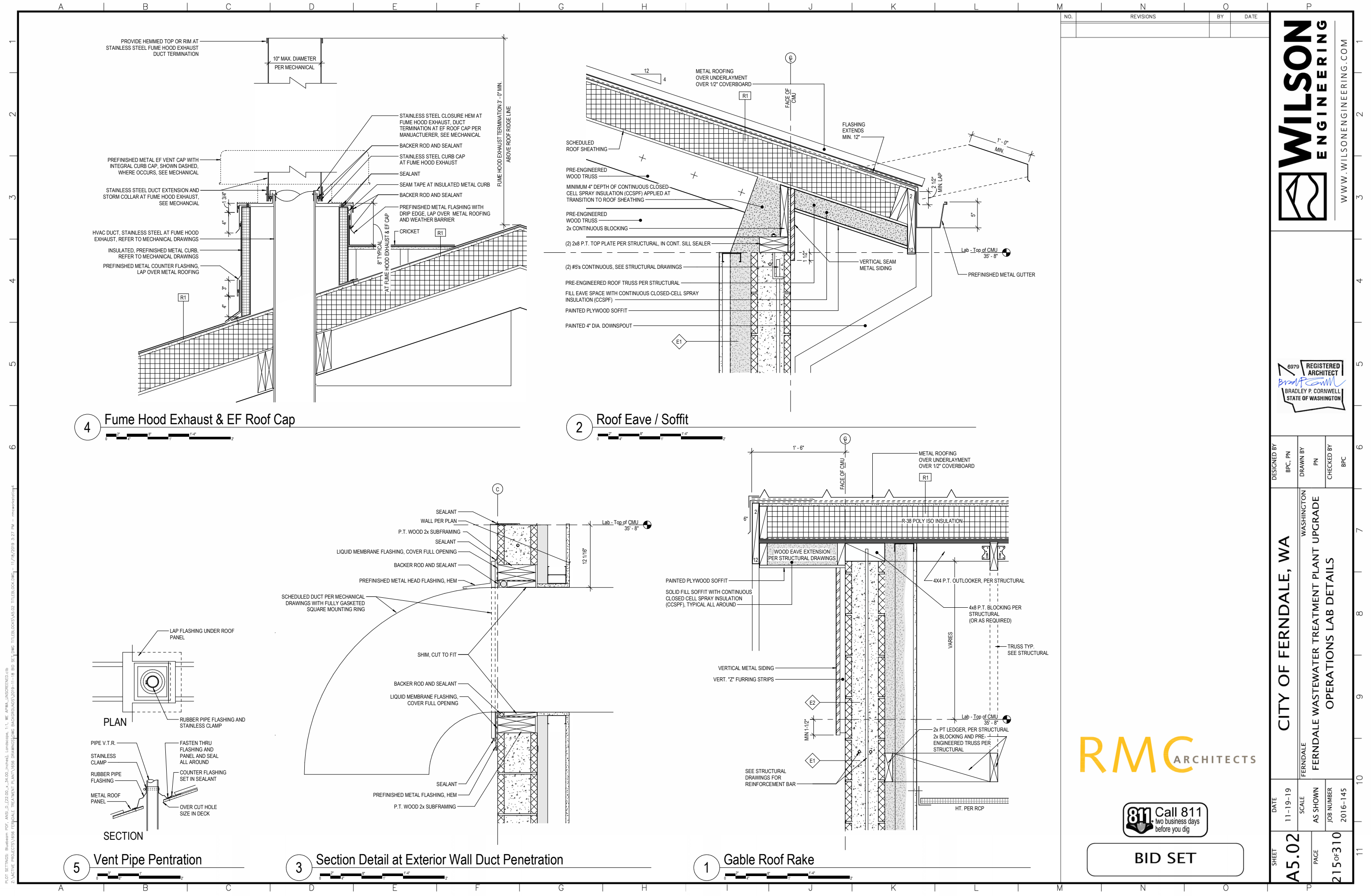
SHEET	DATE	CITY OF FERNDALE, WA
PAGE	SCALE	FERNDALE
	AS SHOWN	FERNDALE WASTEWATER TREATMENT PLANT UPGRADE OPERATIONS LAB BUILDING ELEVATIONS & SECTIONS
204 of 310	JOB NUMBER	2016-145

RMC ARCHITECTS



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PLOT SETTINGS: Bluebeam PDF, ANSI_D (22.00...x34.00 Inches), Landscape, 1:1, W: APWA_UNSCREENED.ctb
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<div>6979 REGISTERED ARCHITECT BRADLEY P. CORNWELL STATE OF WASHINGTON</div>					
DESIGNED BY	BPC, PN	DRAWN BY	PN	CHECKED BY	BPC
CITY OF FERNDALE, WA		WASHINGTON			
FERNDALE		FERNDALE WASTEWATER TREATMENT PLANT UPGRADE OPERATIONS LAB DETAILS			
DATE	11-19-19	SCALE	AS SHOWN	JOB NUMBER	2016-145
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