KITSAP COUNTY PUBLIC WORKS SEWER UTILITY

CENTRAL KITSAP TREATMENT PLANT DIGESTER REHABILITATION AND MODIFICATIONS
APRIL 2022

Bid Documents

Volume 1 of 2

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CERTIFICATE PAGE

Kitsap County Public Works Sewer Utility

Central Kitsap Treatment Plant Digester Rehabilitation and Modifications

The engineering material and data contained in the Plans and Specifications were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.

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KITSAP COUNTY PUBLIC WORKS SEWER UTILITY

CENTRAL KITSAP TREATMENT PLANT DIGESTER REHABILITATION AND MODIFICATIONS
VOLUME 1 OF 2

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INVITATION TO BID
FORMAL BID CONTRACT
2022-121

KITSAP COUNTY PUBLIC WORKS WASTEWATER DIVISION

CENTRAL KITSAP WWTP DIGESTER REHABILITATION AND MODIFICATIONS

BID SUBMISSION DATE & TIME	**Wednesday, May 4, 2022 @ 3:00 p.m.** **Purchasing Office** **614 Division Street MS-7** **Port Orchard, Washington 98366**
BID OPENING TIME & LOCATION	**Wednesday, May 4, 2022 @ 3:15 p.m.** **Port Madison Conference Room, 4th Floor Room #416** **Kitsap County Administration Building** **619 Division Street** **Port Orchard, Washington 98366**
MANDATORY PRE-BID MEETING	**Tuesday, April 19, 2022 @ 1:00 p.m.** **Kitsap County** **Central Kitsap Wastewater Treatment Plant** **12351 Brownsville Hwy NE** **Poulsbo, Washington 98370**
ENGINEERS ESTIMATE:	**$3,118,000**

The Kitsap County Board of Commissioners will receive sealed bids for the construction of the **Central Kitsap WWTP Digester Rehabilitation and Modifications** until the time and date indicated above. Bids will be received, publicly opened and read aloud at the locations described above. Instructions for the delivery of bids are contained in the Special Provisions for the Project. Prospective Bidders are hereby notified that they are solely responsible for ensuring timely delivery of their bid to the Kitsap County Purchasing Office on or before the bid submission date and time indicated above.

The principal items or elements of construction include:

Digester Site Dewatering

- Provide a ground dewatering plan, install dewatering and groundwater monitoring wells, and operate all dewatering wells to ensure the groundwater level is below the bottom of the digesters to prevent flotation while the digesters are empty or partially empty. Treat and dispose of extracted groundwater to meet the specified water quality. A Dewatering Analysis report is provided as Appendix A in the Contract Documents.

Digester Cleaning and Repair

- Each digester will be drained to the extent possible one at a time by the County. The Contractor will clean and repair both digesters, one at a time.
- Contractor shall remove and dispose of remaining digester contents including grit and debris that has accumulated in each digester. Contractor shall clean the digester walls, ceiling and

floor.

- Contractor shall provide a safe environment for personnel entry into each digester for inspection, including inert nitrogen gas purge (both out-of-service and into service), adequate venting, air quality monitoring and control, and all scaffolding and lighting required for inspection. Inspection will be performed by the County and Engineer.
- Contractor shall perform necessary coating, structural and metal repairs to each digester as determined by the County and the Engineer during the inspection, and as outlined in the Contract Documents.
- One digester will be cleaned and repaired at a time, while the other is used as a sludge holding tank. Contractor shall provide temporary odor control to the digester being operated as a sludge holding tank.

Annular Seal Repair

- Contractor shall remove and replace annular seal of both digesters while the digesters are empty and with the cover in place, as described in the Contract Documents.

Digester Biogas 3-way Valves, Flame Arrestors and PVRVs Removal and Replacement

- On each digester, Contractor shall remove and replace the following equipment that will be provided by the County: one 3-way Safety Diverter Valve (SDV) assembly, two flame arrestors, and two Pressure Vacuum Relief Valves (PVRVs). The data sheets of the 3-way valve, flame arrestor and PVRV are provided as Appendix B in the Contract Documents.
- Contractor shall procure the County preselected manufacturer's services and coordinate with the manufacturer to inspect assembly after installation, then set the pressure relief settings and perform a gas system balance when digesters are back in operation. The quote and scope of Varec Biogas services by Beaver Equipment are provided as Appendix C for reference in the Contract Documents.

Existing Process Valve Replacement

- Contractor shall replace manual process valves and actuators in the Digester Control Building as indicated in the Contract documents.
- Valves and actuators will be furnished by the County. Contractor shall remove and dispose of existing valves and install the new valves and actuators. Contractor shall furnish new bolt kits, gaskets and couplings.
- Contractor shall inspect and clean piping adjacent to replaced valves in case of solids accumulation.

Digester Bypass Piping

- Contractor shall construct new digester bypass piping within the Digester Control Building.

Thickened Sludge Loadout Piping

- Contactor shall construct new thickened sludge loadout piping and valve outside of the WAS Building.

Digester Mixing System Improvements

- Contractor shall demolish existing components, including pumps, pipes and electrical panels as shown in the Contract Documents.
- Contractor shall install new digester mixing pumps provided by the County. The procurement document for the digester mixing pumps is provided as Appendix D in the Contract Documents.
- Contractor shall modify the existing draft tube, replace existing piping and nozzles within the

digesters as shown in the Contract Documents.

Testing and Startup

- Contractor shall be responsible for testing and startup of the individual components as well as the complete system after installation per requirement in the Contract Documents.

A mandatory pre-bid meeting will be held at the location described above. After the meeting, a tour of the site will be conducted. This will be the only tour of the site and facilities.

Bid documents may be found on the Kitsap County Web site www.kitsapgov.com/purchasing/bids.htm. Questions regarding the bid process, contract terms and conditions, or how to obtain copies of the bid documents shall be directed to Glen McNeill at 360-337-4789, or email purchasing@kitsap.gov. Technical questions about the work covered by the bid documents shall be directed to Floyd Bayless, Construction Manager, at (360) 337-5631 or email fbayless@kitsap.gov.

Kitsap County reserves the right to reject any all bids and to waive informalities or irregularities. Bids received after the time set for submission of bids will not be considered.

Each bid proposal shall be completely sealed in a separate envelope, properly addressed as stated above, with the name and address of the bidder and the name of the project plainly written on the outside of the envelope. All bids shall be accompanied by:

- County Bid Proposal – as published in Invitation to Bid
- Signed acknowledgment of receipt of all addenda
- Surety company Bid Bond on an approved form, certified check, or cashier's check payable to Kitsap county in an amount not less than five percent (5%) of the basic Bid
- Subcontractor's List
- Bidder Information
- Bidder Responsibility Checklist;
- Subcontractor Responsibility Checklist;
- Non Collusion Affidavit
- Certification of Compliance with Wage Payment Statutes

Should the successful bidder fail to enter into such contract in accordance with the Bid and furnish all documents and bonds required within the time frames stated in the specifications, the bid proposal deposit or bond shall be forfeited to Kitsap County.

Bids are likely to be rejected if the lowest, responsible, responsive Bid received exceeds the Engineer's estimate by an unreasonable amount.

Kitsap County hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to the advertisement, Women and Minority Business Enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an award. Minority Business Enterprises will be required to meet all requirements of law as related to Public Works contracts, including the provision of the Equal Employment Opportunity and Affirmative Action Plan on the basis of any other bidder.

Bidders are encouraged to review and understand the conditions, requirements and Contractor responsibilities of the project's "Permits and Licenses" section outlined in Special Provisions Section 1-07.6.

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BID PROCEDURES AND CONDITIONS

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BID PROPOSAL

TO: Kitsap County Board of Commissioners
614 Division Street
Port Orchard, WA 98366

Board of Commissioners:

The undersigned bidder agrees, if this bid is accepted, to enter into a contract with the Contracting Agency, in the form included in the specifications to perform and furnish the work as specified or indicated in the bidding documents for the bid price and within the bid times indicated in this bid and in accordance with the other terms and conditions of the contract documents.

In submitting this bid, bidder represents, as more fully set forth in the contract, that:

1. This bid will remain subject to acceptance for 60 days after the day of bid opening. The Contracting Agency retains the right to request the apparent low bidder extend the award period or adjust their price accordingly. If an adjustment is requested, the Contracting Agency reserves the right to request the same adjustment from other bidders.
2. The Contracting Agency has the right to reject this bid.
3. Bidder will sign and submit the contract with the bonds and other documents required by the bidding requirements within 10 days after the date of Contracting Agency's Notice of Award.
4. Bidder has examined copies of all the bidding documents.
5. Bidder has made sufficient examination and has investigated and is satisfied as to the conditions to be encountered, the character, quantity, quality and scope of work, the quantities and qualities of materials to be supplied and equipment and labor to be used, and the requirements of the contract and proposal submitted, including all addenda for performance of the work.
6. Bidder has visited the jobsite and is completely familiar with the existing conditions, concurrently scheduled construction, access, staging and site limitations, and has made allowances for those conditions in the their bid.
7. Bidder is familiar with all federal, state, and local laws, ordinances and regulations, which in any manner might affect those engaged or employed in the work, the materials, equipment, or procedures used in the work, or which in any other way, might affect the conduct of the work. The Bidder is assumed to be familiar with such laws and regulations, and no plea of misunderstanding or ignorance of the law will be considered.
8. Bidder has correlated the information known to bidder, information and observations obtained from visits to the site, reports and drawings identified in the bidding documents and additional examinations, investigations, explorations, tests, studies, and data with the bidding documents.
9. Bidder agrees that the work will be completed within the time period established in the Contract Document (see Section 1-08.5) from the date of Notice to Proceed.
10. The bidder has determined from careful examination the methods; materials, labor and equipment required to perform the work in full and shall reflect the same in his bid price. If, during the performance of the work, methods, materials, labor or equipment required are beyond those anticipated by the bidder, the Bidder will not be entitled to additional compensation except as may be provided for elsewhere in these specifications

It is anticipated that this project will be funded in part by the Washington State Department of Ecology. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract.

Bidder has received the following addenda, receipt of which is hereby acknowledged:

DATE	NUMBER
_____	_____
_____	_____
_____	_____
_____	_____

SUMMARY OF BID DOCUMENTATION:

It is mandatory that each bidder complete and submit with its bid, documentation required by the contract documents, including, but not limited to the following:

1. Bid Proposal
2. Bid Guarantee Bond
3. Subcontractor's List
4. Bidder Information
    a. Bidder Responsibility Checklist
    b. Subcontractor Responsibility Checklist
5. Non-collusion Affidavit Certificate
6. Certification of Compliance with Wage Payment Statutes

BASIC BID:

Pursuant to and in compliance with the advertisement for bids and other documents relating thereto, the undersigned Bidder hereby certifies having carefully examined contract documents entitled **Central Kitsap WWTP Digester Rehabilitation and Modifications** as well as conditions affecting the work, and is familiar with the sites; and having made the necessary examinations, here proposes to furnish all labor, materials, equipment, and services necessary to complete the work in strict accordance with the above named documents for an amount computed upon the basis of the quantity of work actually performed at the Bid prices set forth herein.

PROPOSAL:

The Bidder certifies that the cost of all labor, equipment, plants, materials, including overhead and profit, necessary for proper completion of the work shall be included in the prices for the various bid items. NOTE: UNIT PRICES FOR ALL ITEMS, ALL EXTENSIONS, AND THE TOTAL AMOUNT OF BID MUST BE SHOWN. All prices shall be in legible and written in ink or typed. The proposal shall include: a unit price for each item (omitting digits more than four places to the right of the decimal point); an extension for each unit price (omitting digits more than two places to the right of the decimal point); and the total contract price (the sum of all extensions). Unit prices for all numbers shall be shown in both words and figures. In case of conflict, words shall govern.

The Bidder shall bid on all alternates and/or schedules as they are fully considered in making award. If a bidder fails to bid an alternate or schedule, or if he or she notes “no bid,” it will be construed as meaning that there will be no change in the contract amount and that the alternate or schedule is included in the contract amount. Descriptions for measurement and payment for the following Bid items are included in Section 1-09 of the Special Provisions.

BID SCHEDULE

Central Kitsap WWTP Digester Rehabilitation and Modifications

Item No.	Ref. Section	Est. Quantity	Unit Price (in words)	Unit Price (in Numbers)	Extended Amount (Qty x Unit Price) (in numbers)
1 Preconstruction Work Phase	1-04	1 LS		$	$
2 Final Cleanup and Restoration	1-04	1 LS		$	$
3 Project Record Drawings	1-05	1 LS		$	$
4 Type B Schedules	1-08	8 MO	Five hundred dollars and no cents	$500.00	$4,000.00
5 Minor Change (Allowance)*	1-09	1 FA	Four hundred thousand dollars and no cents	$400,000.00	$400,000.00
6 Mobilization and Demobilization	1-09	1 LS		$	$
7 Ground Dewatering	1-09, Div 31	1 LS		$	$
8 Groundwater Treatment	Div 31	1 LS			
9 Administration of Owner Furnished Equipment	01 64 16	1 LS		$	$
10 Digester Cleaning and Inspection	Div 1 to Div 46	1 LS		$	$
11 Digester Repairs (Allowance)*	1-09, Div 46	1 FA	Two hundred seventy-five thousand dollars and no cents	$ 275,000.00	$ 275,000.00
12 Digester Annular Seal Repair	Div 46	1 LS		$	$

Central Kitsap WWTP Digester Rehabilitation and Modifications

13 PVRV Assemblies and Waste Gas Burner Inspection and Coordination	1-02, Appendix C	1 LS	_____	$ _____	$ _____
14 Digester Improvements		1 LS	_____	$ _____	$ _____
Subtotal				**$** _____	
Sales Tax @ 9.2%				**$** _____	
Total				**$** _____	

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SALES TAX:

All work identified in the bid schedule is subject to collection of Washington State sales tax on the Contract Price. Bidders should contact the Washington State Department of Revenue for further clarification of sales tax rules. If the project extends through a sales tax increase, the Contractor will be allowed a commensurate increase in the sales tax and adjustment in the contract amount. However, the Contracting Agency will not adjust payment if the Bidder bases a Bid on a misunderstood tax liability.

AWARD OF SCHEDULES:

The Proposal contains multiple schedules to assist the County in tracking the costs associated with separate components of the overall project. The intent of the County is to award a Contract for all schedules to the lowest responsive and responsible bidder provided the Bid has been submitted in accordance with the requirements of these specifications. However, the County reserves the right to award any of the schedules singularly or in combination thereof. Failure to complete all schedules in their entirety will result in the bid being non-responsive. The sum of all schedules will be used to determine the lowest responsible bidder.

OPENING OF BIDS:

Bids received prior to the time of opening will be kept unopened and secured until the time of the bid opening as specified in the Advertisement for Bids. No bid received thereafter will be considered. No responsibility will attach, and bidders waive any and all complaints against the County for premature opening of an improperly addressed or identified bid.

At the time and place fixed for the opening of bids, every bid received within appropriate time will be opened and publicly read aloud.

The Contracting Agency reserves the right to postpone the date and time for receiving and/or opening of bids at any time prior to the date and time established in the Advertisement for Bid. Postponement notices shall be mailed to bidders in the form of addenda.

The Contracting Agency may reject all bids if they exceed budgeted cost or the Contracting Agency may negotiate bid pricing with the apparent low responsive bidder including changes in the contract plans and specifications, to bring the bid within budgeted cost.

CONTRACT AND BOND:

If notified of the acceptance of this bid within sixty (60) days of the time set for opening of bids, the undersigned agrees to execute a contract for the above work, for a compensation computed from the above-stated sums, on the Contract Form bound with the specifications and to furnish a bond as required by the specifications on the form bound therein.

BID GUARANTEE:

It is agreed that if the undersigned fails to execute said Contract and furnish said Bond within ten (10) days after written notice of award of Contract, then the Bid Guarantee shall be retained by the County as liquidated damages. If this bid is not accepted within sixty (60) days after the time set for the opening of bids, or if the undersigned delivers said Contract and Bond in a timely manner, then the check or cash shall be returned, or the Bid Bond shall become void.

SIGNATURE

Signed By:_____ Date: _____

Please Print Name:_____ Title: _____

Name of Firm: _____

Address:_____

Telephone: (_____) _____ Fax: (_____)_____

END OF BID PROPOSAL

BID GUARANTY BOND
2022-121 IFB

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____, hereinafter called the Principal, and _____, hereinafter called the Surety, are jointly and severally held and firmly bound unto the Kitsap County Department of Public Works, hereinafter called the Obligee, each in the penal sum of five percent (5%) of the total amount of the Bid of the Principal for the work, this sum not to exceed _____ dollars ($_____) of lawful money of the United States for the payment thereof unto the Obligee, the Principal, and Surety jointly and severally bind themselves forever firmly by these presents.

WHEREAS, the Principal is herewith submitting its offer for the fulfillment of Obligee's contract for construction of: **Central Kitsap WWTP Digester Rehabilitation and Modifications**.

NOW, THEREFORE, the condition of this obligation is such that if the Principal is awarded the contract, and if the Principal, within the time specified in the bid for such contract, enters into, executes, and delivers to the Obligee an agreement in the form provided herein complete with evidences of insurance, and if the Principal within the time specified in the bid gives the Performance and Payment Bond on the form provided herein to the Obligee, then this obligation shall be void; otherwise, the Principal and Surety will pay unto the Obligee the difference in the money between the total amount of the Bid of the Principal and the amount for which the Obligee legally contracts with another party to fulfill the Contract if the latter amount be in excess of the former, but in no event shall the Surety's liability exceed the penal sum hereof.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal, and that nothing of any kind or nature whatsoever that will not discharge the Principal shall operate as a discharge or a release of liability of the Surety.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety, and the Obligee and their respective heirs, executors, administrators, successors, and assigns.

SIGNED AND SEALED this _____ day of _____, 2022.

Contractor's Corporate Seal

Principal

Signature for Principal

Title of Signatory

Surety's Corporate Seal

Surety

Signature for Surety

Title of Signatory

END OF BID GUARANTEE BOND

SUBCONTRACTORS LIST

Each Bidder is advised of the requirements of Washington Law, RCW 39.30.060. Pursuant to Title 39 of the Revised Code of Washington, each bidder is required to 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 heating, ventilation and air conditioning; plumbing as described in RCW 18.106 and electrical as described in RCW 19.28 or to name itself for the work. Additionally, each bidder is required to submit as part of the bid or within 48-hours 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 structural steel and rebar. The Bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the bidder must indicate which subcontractor will be used for which alternate. Failure of the bidder to submit 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 bidder's bid non-responsive and, therefore, void.

List subcontractors appropriately

HEATING, VENTILATION AND AIR CONDITIONING

Subcontractor Name: _____

PLUMBING

Subcontractor Name: _____

ELECTRICAL

Subcontractor Name: _____

STRUCTURAL STEEL INSTALLATION

Subcontractor Name: _____

REBAR INSTALLATION

Subcontractor Name: _____

DIGESTER CLEANING (Note: This is required by this contract and not RCW 39.30.060)

Subcontractor Name: _____

GROUND DEWATERING (Note: This is required by this contract and not RCW 39.30.060)

Subcontractor Name: _____

OTHER SUBCONTRACTORS (whose work is equal to or greater than 10% of the bid)
(Note: This is required by this contract and not RCW 39.30.060)

_____

_____

_____

_____

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

END OF SUBCONTRACTORS LIST

BIDDER INFORMATION

Contracting Firm Name:
Number of Years Contractor has been in the construction business under its present firm name:
Present gross dollar amount of work under contract:
Present gross dollar amount remaining to be completed of work under contract:
General type of work performed by firm:

List the five major pieces of equipment to be used on this project:	Owned	Leased	Rented
1.			
2.			
3.			
4.			
5.			

List the name of the Project Manager and Superintendent responsible for this project	# of Years with Firm
Name of Project Manager:	
Name of Superintendent:	

Bank Reference:
Have you changed bonding companies within the last three years?
If so, why? (Optional)

Have you ever been sued by the client or have you ever sued the client on any public works contract for a special purpose district, municipality, county, or state government? _____

For what reason? _____

_____

Disposition of case, if settled: _____

_____

Do you have any outstanding payments due to the Department of Revenue? _____

If yes, describe the plan to address those payments _____

_____

_____

Bidder agrees that the County shall retain the right to obtain any and all credit reports?

(_____) _____
Yes Signature

In the last 5 years, has the Bidder had a three-year average Experience Modification Rate (EMR) no greater than 1.1 (Include EMR documentation)?

(_____) _____
Yes/No Signature

Does the Bidder have sufficient bonding capacity?

(_____) _____
Yes/No Signature

The Bidder shall include with their Bid a notarized statement from an admitted and Washington State approved surety insurer, which states that Bidder's current bonding capacity is sufficient for this project.

In the last five (5) years, has the Bidder had their Contractor's license revoked?

(_____) _____
Yes/No Signature

In the last five (5) years, has the Bidder been "defaulted" or "terminated" by an owner (other than for convenience of the owner)?

(_____)_____
Yes/No Signature

In the last five (5) years, has the Bidder been convicted of a crime involving the awarding of a contract of a government (local, state, or federal) construction project or the bidding or performance of a government construction contract?

(_____)_____

Yes/No Signature

In the last five (5) years, has the Bidder been found guilty in a criminal action, for making any false claim or material misrepresentations to any public agency or entity?

(_____)_____

Yes/No Signature

In the last five (5) years, has the Bidder been convicted of a crime involving any federal, state or local law related to construction, including acts of dishonesty?

(_____)_____

Yes/No Signature

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

BIDDER RESPONSIBILITY CHECKLIST

The following checklist will be used to document that the Bidder meets the bidder responsibility criteria. Please print a copy of documentation from the appropriate website to be included with the submittal.

General Information	
Project Name: Central Kitsap WWTP Digester Rehabilitation and Modifications	Formal Bid Contract Number: 2022-121
Bidder's Business Name:	Bid Submittal Deadline:

Contractor Registration	
License Number:	Status: Active: Yes ☐ No ☐
Effective Date (must be effective on or before Bid Submittal Deadline):	Expiration Date:

Contractor Infraction List			
Is Bidder on Infraction List?	Yes ☐	No ☐	

Current UBI Number	
UBI Number:	Account Status: Open ☐ Closed ☐

Industrial Insurance Coverage	
Account Number:	Account Current: Yes ☐ No ☐

Employment Security Department Number
Employment Security Department Number:
Provide a copy of latest correspondence containing bidder's account number with Employment Security Department. Do not provide document containing personal information such as social security numbers.

State Excise Tax Registration Number	
Tax Registration Number:	Account Status: Open ☐ Closed ☐

Not Disqualified from Bidding		
Has the Bidder been listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries in the last two (2) years?	Yes ☐	No ☐

Bankruptcy		
Has the Bidder declared Bankruptcy in the last five (5) years?	Yes ☐	No ☐

Information Supplied by:	
Print Name of Bidder Representative:	Date:

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

SUBCONTRACTOR RESPONSIBILITY CHECKLIST

The following checklist will be used to document that the Bidder meets the mandatory bidder responsibility criteria. Please print a copy of documentation from the appropriate website to be included with the submittal.

General Information	
Project Name: Central Kitsap WWTP Digester Rehabilitation and Modifications	Formal Bid Contact Number: 2022-121
Subcontractor's Business Name:	Bid Submittal Deadline:
Contractor Registration	
License Number:	Status: Active: Yes ☐ No ☐
Effective Date (must be effective on or before Subcontract Bid Submittal Deadline):	Expiration Date:
Contractor Infraction List	
Is Subcontractor on Infraction List? Yes☐ No☐	
Current UBI Number	
UBI Number:	Account Status: Open ☐ Closed ☐
Industrial Insurance Coverage	
Account Number:	Account Current: Yes ☐ No ☐
Employment Security Department Number	
Employment Security Department Number:	
Please provide a copy of latest correspondence containing subcontractor's account number with Employment Security Department. Do not provide document containing personal information such as social security numbers.	
State Excise Tax Registration Number	
Tax Registration Number:	Account Status: Open ☐ Closed ☐
Not Disqualified from Bidding	
Is the Subcontractor listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries? Yes ☐ No ☐	
Contractor Licenses	
Electrical: If required by Chapter 19.28 RCW, does the Subcontractor have an Electrical Contractor's License? Yes☐ No☐	Elevator: If required by Chapter 70.87 RCW, does the Subcontractor have an Elevator Contractor's License? Yes☐ No☐
Checked by:	
Name of Employee:	Date:

[THIS FORM SHALL BE COMPLETED IN FULL FOR EACH SUBCONTRACTOR AND SUBMITTED WITH THE BID PROPOSAL]

PROJECT REFERENCES

Using the following form (use additional forms as needed), the Bidder shall describe projects that meet the similar size and scope criteria of Section 1-02.1.

Project Name: _____

Project Manager: _____ Project Superintendent: _____

Public Agency Name: _____

Contact Person: _____ Phone No: _____

Awarded Contract Amount: _____ Final Contract Amount: _____

Project Start Date: _____ Project Completion Date: _____

Project Location: _____

Project Scope: _____

_____

_____

_____

_____

_____

_____

_____

Claims, if any, filed by the Contractor and the basis for the claims: _____

_____

_____

_____

_____

_____

_____

[This form(s) shall be completed in full and submitted within 48 hours of the bid submittal deadline by the two lowest bidders and other bidders as requested by the Contracting Agency.]

END OF BIDDER INFORMATION

NON-COLLUSION AFFIDAVIT

The undersigned, being duly sworn, deposes and says that the person, firm, association, co-partnership or corporation herein named, has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in the preparation and submission of this proposal to Kitsap County for its consideration in the award of the contract.

_____ Sole Proprietorship _____
Legal Name of Bidder

Partnership _____

_____ Corporation _____
By (Signature)

Other _____

_____
Street Address

_____
City State Zip

_____
Telephone

_____
State of Washington Contractor's Number

STATE OF WASHINGTON)
( ) SS.
COUNTY OF KITSAP)

On this day personally appeared before me _____ to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that _____ signed the same as _____ free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this _____day of _____, 2022

_____Notary Public in and for the State of Washington, residing at

_____

My Commission Expires:_____

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

END OF NON-COLLUSION AFFIDAVIT

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CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUTES

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date of April 11, 2022, the bidder is not a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

_____
Bidder's Business Name

_____
Signature of Authorized Official*

_____
Printed Name

_____
Title

_____ _____ _____
Date City State

Check One:
Sole Proprietorship ☐ Partnership ☐ Joint Venture ☐ Corporation ☐

State of Incorporation, or if not a corporation, State where business entity was formed:

_____

If a co-partnership, give firm name under which business is transacted:

_____

** If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co- partnership, proposal must be executed by a partner.*

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

END OF CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUTES

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BIDDER'S CHECKLIST

NOTE: The purpose of this checklist is to serve as a reminder of major items to be addressed in submitting a bid and by the Successful Bidder after notification of award, and is not intended to be all-inclusive. It does not alleviate the Bidder from the responsibility of becoming familiar with all aspects of the Project Manual and proper completion and submission of the Bid.

1. Contract Documents thoroughly read and understood. _____
2. Attend pre-bid conference. _____
3. All blank spaces in proposal filled in, preferably in black ink. _____
4. Receipt of all addenda acknowledged. _____
5. Review of geotechnical information acknowledged. _____
6. Bid Form and other documents are signed by authorized officer. _____
7. Prices computed and presented correctly. _____
8. Subcontractors are named as indicated in the Contract Documents. _____
9. The following documents, to be submitted with the bid, completed, signed, and dated as applicable.
    a. Bid Proposal _____
    b. Bid Guaranty Bond _____
    c. Subcontractors List _____
    d. Bidder Information
        i. Bidder Responsibility Checklist _____
        ii. Subcontractor Responsibility Checklist _____
    e. Non-Collusion Affidavit Certificate _____
    f. Certification of Compliance with Wage Payment Statutes _____
10. Bid documents submitted in sealed envelope and properly labeled. _____
11. The following documents shall be executed and complied with after the contract is awarded:
    a. Capital Projects Contract Agreement _____
    b. Performance and Payment Bond _____
    c. Insurance Certificates _____

END OF BIDDER'S CHECKLIST

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CONTRACT REQUIREMENTS

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CAPITAL PROJECTS CONTRACT AGREEMENT
KC CONTRACT #_____

This Contract is made and entered into this _____ day of _____, 2022 between KITSAP COUNTY, with its principal offices at 614 Division Street, Port Orchard, Washington 98366, hereinafter called the Contracting Agency, and _____, a general Contractor licensed in the State of Washington, with its principal offices located at _____ _____, hereinafter the Contractor.

WITNESSETH:

WHEREAS, the Contracting Agency desires to construct the **Central Kitsap WWTP Digester Rehabilitation and Modifications** and

WHEREAS, the Contractor has been selected by competitive bid as the responsible bidder with the lowest responsive bid as is required by Chapter 39.04 RCW.

NOW THEREFORE, the Contracting Agency and Contractor mutually agree as follows:

1. CONTRACT DOCUMENTS

The Agreement between the parties is expressed in the Contract Documents, which include the Invitation to Bid; the accepted Bid Proposal; the Bid Guaranty Bond; the Subcontractor's List; the Bidder Information; the Non-Collusion Affidavit; the Performance and Payment Bond; the Special Provisions; the Project Drawings; the WSDOT Standard Specifications; CSI Specifications; and this Agreement.

2. DESCRIPTION OF THE WORK

This contract provides for the construction of 1) Digester site dewatering; 2) Cleaning and inspection of two digesters; 3) Annular seal repair of two digesters; 4) 3-way valve and Pressure Vacuum Relief Valve replacement on two digesters; 5) Replacement of valves in the Digester Control Building; 6) Addition of Digester bypass piping; 7) Addition of thickened sludge loadout piping; 8) Digester mixing system improvements in accordance with the Contract Documents entitled "Central Kitsap WWTP Digester Rehabilitation and Modifications". Contractor agrees to furnish all material, labor, carriage, tools, equipment, apparatus, facilities and anything else necessary to complete the work in a professional and workmanlike manner.

The Contractor shall complete its Work in a timely manner and in general accordance with the agreed schedule submitted by the Contractor and approved by the Contracting Agency.

3. CONTRACT REPRESENTATIVES

Each party to this Contract shall have a representative. Each party may change its representative upon providing written notice to the other party. These representatives will be:

CONTRACTING AGENCY:	
Name of Representative:	Floyd Bayless
Title:	Construction Manager
Mailing Address:	614 Division Street MS #27
City, State, and Zip Code:	Port Orchard, WA 98366
Telephone Number:	360-337-5777
Email Address:	fbayless@kitsap.gov

CONTRACTOR:

Name of Representative: _____

Title: _____

Mailing Address: _____

City, State, and Zip Code: _____

Telephone Number: _____

Fax Number: _____

Email Address: _____

All instructions, modifications, and changes to the Contract shall be conveyed to the Contractor through the Contracting Agency's Representative. Any work executed upon the direction of any person or entity other than the Contracting Agency's Representative may be considered defective and will be performed without reimbursement for said work to the Contractor. The Contracting Agency's Representative shall have the authority to reject any and all nonconforming or defective work under the Project Documents.

4. CONTRACT AMOUNT

The Contracting Agency hereby agrees to pay the Contractor according to the Contractor's Bid in the amount of $_____ (including accepted alternates and Washington State Sales Tax (WSST)), at the time and manner and upon the conditions provided for in this Contract.

5. CONTRACT TIME

Time is of the essence in the performance of this Contract. The Contractor agrees to work promptly and fully complete the work within the limits as described in the Contract Documents. Failure to complete the work within the allowed time limit as described in Section 1-08.5 of the Special Provisions will subject the Contractor to the payment of liquidated damages as described in Section 1-08.9 of the Standard Specifications and the Special Provisions.

6. PREVAILING WAGES

Contractor shall be responsible for complying with the prevailing wage requirements associated with RCW Chapter 39.12 and WAC 296-127 as further described in Section 1-07.9 of the Standard Specifications and the Special Provisions.

7. PERFORMANCE AND PAYMENT BOND

Contractor agrees to provide a Performance and payment Bond as described in Section 1-03.4 of the Standard Specifications as amended by the Special Provisions.

8. HOLD HARMLESS AND INDEMNIFICATION

The Contractor shall hold harmless, indemnify and defend the Contracting Agency, Engineer, its officers, officials, employees and agents, from and against any and all claims, actions, suits, liability, loss, expenses, damages, and judgments of any nature whatsoever, including, but not limited to, reasonable costs and attorneys' fees in defense thereof, for injury, sickness, disability or death to persons or damage to property or business, caused by or arising out of the performance of the services rendered under this contract by the Contractor, its employees, agents, or subcontractors or anyone for whose acts any of them may be liable. Provided however, that the Contractor's obligation hereunder shall not extend to injury, sickness, death or damage caused by or arising out of the sole negligence of the Contracting Agency, its officers, officials, employees or agents. Provided further, that in the event of the concurrent negligence of the parties, the Contractor's obligations hereunder shall apply only to the percentage of fault attributable to the Contractor, its employees, agents, or subcontractors.

In any and all claims against the Contracting Agency, Engineer, its officers, officials, employees and agents by any employee of the Contractor, subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or subcontractor under Worker's Compensation acts, disability benefit acts, or other employee benefit acts, it being clearly agreed and understood by the parties hereto that the Contractor expressly waives any immunity the Contractor might have had under such laws. By executing the Contract, the Contractor acknowledges that the foregoing waiver has been mutually negotiated by the parties and that the provisions of this Section shall be incorporated, as relevant, into any contract the Contractor makes with any subcontractor or agent performing Work hereunder.

The Contractor's obligations hereunder shall include, but are not limited to, investigating, adjusting and defending all claims alleging loss from action, error or omission, or breach of any common law, statutory or other delegated duty by the Contractor, the Contractor's employees, agents or subcontractors.

9. INSURANCE
Contractor agrees to comply with the insurance requirements described in Section 1-07.18 of the Special provisions.

10. TERMINATION
This contract may be terminated by the officials or agents of the County authorized to contract for or supervise the execution of such work in accordance with Section 1-08.10 of the Standard Specifications as amended by the Special Provisions.

11. NON-WAIVER OF RIGHTS
The parties agree that the excuse or forgiveness of performance or waiver of any provisions of this Contract does not constitute a waiver of such provisions for future performance, or prejudice the right of the waiving party to enforce any of the provisions of this Contract at a later time.

12. INDEPENDENT CONTRACTOR
The Contractor shall perform this Contract as an Independent Contractor and not as an agent, employee or servant of the Contracting Agency. The parties agree that the Contractor is not entitled to any benefits or rights enjoyed by employees of the County. Contractor shall comply with all laws regarding workers' compensation.

The Contractor specifically has the right to direct and control Contractor's own activities in providing the agreed services in accordance with the specifications set out in this Contract. Furthermore, the Contractor shall have and maintain complete responsibility and control over all of its subcontractors, employees, agents, and representatives. No subcontractor, employee, agent, or representative of the Contractor shall be or deem to be or act or purport to act as an employee, agent, or representative of the Contracting Agency, unless otherwise directed by the terms of this Contract.

The Contractor agrees to immediately remove any of its employees or agents from assignment to perform services under this Contract upon receipt of a written request to do so from the Contracting Agency's Representative or designee.

13. NONDISCRIMINATION
The Contractor, its assignees, delegates, or subcontractors in the performance of this Contract shall not discriminate against any person on the basis of race, color, creed, religion, national origin, age, sex, marital status, sexual orientation, veteran status, disability, or other circumstance prohibited by federal, state, or local law, and shall comply with Title VI of the Civil Rights Act of 1964, P.L. 88 354 and Americans with Disabilities Act of 1990.

14. CHOICE OF LAW, JURISDICTION AND VENUE

Any action at law, suit in equity, or other judicial proceeding for the enforcement of this contract or any provisions thereof shall be instituted as provided for in RCW 36.01.050. It is mutually understood and agreed that this contract shall be governed by the laws of the State of Washington, both as to interpretation and performance.

15. SUCCESSORS AND ASSIGNS

The Contracting Agency, to the extent permitted by law, and the Contractor each bind themselves, their partners, successors, executors, administrators, and assigns to the other Party to this Contract and to the partners, successors, administrators, and assigns of such other party in respect to all covenants of this Contract.

16. ASSIGNMENT, DELEGATION, AND SUBCONTRACTING

a. The CONTRACTOR shall perform the terms of the contract using only its bona fide employees or agents, and the obligations and duties of the CONTRACTOR under this Contract shall not be assigned, delegated, or subcontracted to any other person or firm without the prior express written consent of the COUNTY.

b. The CONTRACTOR warrants that it has not paid nor has it agreed to pay any company, person, partnership, or firm, other than a bona fide employee working exclusively for CONTRACTOR, any fee, commission, percentage, brokerage fee, gift, or other consideration contingent upon or resulting from the award or making of this Contract.

17. SEVERABILITY

If a court of competent jurisdiction holds any part, term or provision of this Contract to be illegal, or invalid in whole or in part, the validity of the remaining provisions shall not be affected, and the parties' rights and obligations shall be construed and enforced as if the Contract did not contain the particular provision held to be invalid.

If it should appear that any provision of this Contract is in conflict with any statutory provision of the United States or the State of Washington, said provision which may conflict therewith shall be deemed inoperative and null and void insofar as it may be in conflict therewith, and shall be deemed modified to conform to such statutory provision.

18. ENTIRE AGREEMENT

The parties agree that this Contract is the complete expression of its terms and conditions. Any oral or written representations or understandings not incorporated in this Contract are specifically excluded.

19. NOTICES

Any notices shall be effective if personally served upon the other party or if mailed by registered or certified mail, return receipt requested, to the addresses set out in Section 3. Notice may also be given by facsimile with the original to follow by regular mail. Notice shall be deemed to be given three days following the date of mailing or immediately if personally served. For service by facsimile, service shall be effective upon receipt during working hours. If a facsimile is sent after working hours, it shall be effective at the beginning of the next working day.

20. THIRD PARTY BENEFICIARY

All parties agree that the State of Washington shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

21. MODIFICATION

All amendments or modifications shall be in writing, signed by both parties, and attached to this Contract.

22. COMPLIANCE WITH LAWS

The CONTRACTOR shall comply with all applicable federal, state and local laws, rules and regulations in performing this Contract.

23. COMPLIANCE WITH PUBLIC RECORDS ACT

Contractor acknowledges that the County is subject to the Public Records Act, chapter 42.56 RCW ("PRA"). All records owned, used, or retained by the County are public records subject to disclosure unless exempt under the Act, whether or not such records are in the possession or control of the County or Contractor. Contractor shall cooperate with the County so County may comply with all of its obligations under the Act. Contractor shall promptly provide County with all records relating to this Agreement requested by County for purposes of complying with the PRA. In addition to its other indemnification and defense obligations under this Agreement, Contractor shall indemnify and defend the County from and against any and all losses, penalties, fines, claims, demands, expenses (including, but not limited to, attorney's fees and litigation expenses), suits, judgments, or damage arising from or relating to any failure of Contractor to comply with this subsection. This subsection shall survive expiration or termination of the Agreement.

This Contract shall take effect this _____ day of _____, 2022.

CONTRACTOR:

Firm _____

By _____

Signature: _____
(Authorized Representative)

Title
_____

Address: _____

_____

Contractor Registration No. _____

Federal Tax ID No. _____

BOARD OF COUNTY COMMISSIONERS
Kitsap County, Washington

_____
Robert Gelder, Chair

_____
Edward E. Wolfe, Commissioner

_____
Charlotte Garrido, Commissioner

Attest:

_____
Dana Daniels, Clerk of the Board

Approved as to form by the Prosecuting Attorney's Office.

END OF CAPITAL PROJECTS CONTRACT AGREEMENT

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PUBLIC WORKS PAYMENT BOND
TO KITSAP COUNTY, WA

Bond No. _____

Kitsap County, Washington, (County) has awarded to _____ (Principal), a contract for the construction of the project designated as **Central Kitsap WWTP Digester Rehabilitation and Modifications**, Kitsap County Contact #KC-____-___, in Kitsap County, Washington (Contract), and said Principal is required under the terms of that Contract to furnish a payment bond in accord with Title 39.08 Revised Code of Washington (RCW) and (where applicable) 60.28 RCW.

The Principal, and _____ (Surety), a corporation organized under the laws of the State of _____ and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the County, in the sum of _____ _____US Dollars ($_____) Total Contract Amount, subject to the provisions herein.

This statutory payment bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall pay all persons in accordance with RCW Titles 39.08 and 39.12 including all workers, laborers, mechanics, subcontractors, and material suppliers, and all persons who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work; and if such payment obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, except as provided herein, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts, and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the officer executing on behalf of the surety.

PRINCIPAL		SURETY	
_____		_____	
Principal Signature	Date	Surety Signature	Date
_____		_____	
Printed Name		Printed Name	
_____		_____	
Title		Title	

Name, address, and telephone of local office/agent of Surety Company are:

Approved as to form:

_____

Signature Title Date

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PERFORMANCE BOND
TO KITSAP COUNTY, WA

Bond No. _____

The Kitsap County, Washington, (County) has awarded to _____ (Principal), a contract for the construction of the project designated as **Central Kitsap WWTP Digester Rehabilitation and Modifications**, Kitsap County Contact #KC-____-___, in Kitsap County, Washington (Contract), and said Principal is required to furnish a bond for performance of all obligations under the Contract.

The Principal, and _____ (Surety), a corporation organized under the laws of the State of _____ and licensed to do business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Dept., are jointly and severally held and firmly bound to the County, in the sum of _____ _____US Dollars ($_____) Total Contract Amount, subject to the provisions herein.

This statutory performance bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall well and faithfully perform all of the Principal's obligations under the Contract and fulfill all the terms and conditions of all duly authorized modifications, additions, and changes to said Contract that may hereafter be made, at the time and in the manner therein specified; and if such performance obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

This bond may be executed in two (2) original counterparts, and shall be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed and original power of attorney for the officer executing on behalf of the surety.

PRINCIPAL		SURETY	
_____		_____	
Principal Signature	Date	Surety Signature	Date
_____		_____	
Printed Name		Printed Name	
_____		_____	
Title		Title	

Name, address, and telephone of local office/agent of Surety Company are:

Approved as to form:

_____

Signature Title Date

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SPECIAL PROVISIONS

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INTRODUCTION TO THE SPECIAL PROVISIONS

The work on this project shall be accomplished in accordance with the *Standard Specifications for Road, Bridge and Municipal Construction*, 2022 edition, as issued by the Washington State Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter (hereafter "Standard Specifications"). The Standard Specifications, as modified or supplemented by these Special Provisions, all of which are made a part of the Contract Documents, shall govern all of the Work.

These Special Provisions are made up of both General Special Provisions (GSPs) from various sources, which may have project-specific fill-ins; and project-specific Special Provisions. Each Provision either supplements, modifies, or replaces the comparable Standard Specification, or is a new Provision. The deletion, amendment, alteration, or addition to any subsection or portion of the Standard Specifications is meant to pertain only to that particular portion of the section, and in no way should it be interpreted that the balance of the section does not apply.

The GSPs are labeled under the headers of each GSP, with the effective date of the GSP and its source. For example:

(March 8, 2013 APWA GSP)

(April 1, 2013 WSDOT GSP)

Project specific Special Provisions are labeled under the heading of each Special Provision as follows:

(Local Agency SP)

The specifications also include Construction Specification Institute (CSI) formatted specifications Divisions 1 to 40 (6-digit format). The CSI specifications are supplemental to the WSDOT Special Provisions and WSDOT standards.

Also incorporated into the Contract Documents by reference are:

1. *Manual on Uniform Traffic Control Devices for Streets and Highways*, currently adopted edition, with Washington State modifications, if any
2. *Standard Plans for Road, Bridge and Municipal Construction, WSDOT/APWA, current edition*

Contractor shall obtain copies of these publications, at Contractor's own expense.

END OF INTRODUCTION

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1-01 Definitions and Terms

1-01.3 Definitions

(Local Agency SP)
Section 1-01.3 is supplemented as follows:

All references in the Standard Specifications, Amendments, or WSDOT General Special Provisions, to the terms “State”, “Department of Transportation”, “Washington State Transportation Commission”, “Commission”, “Secretary of Transportation”, “Secretary”, “Headquarters”, and “State Treasurer” shall be revised to read “Contracting Agency” unless the reference is to an administrative agency of the State of Washington, a State statute or regulation, or the context reasonably indicates otherwise.

All references to “State Materials Laboratory” shall be revised to read “Contracting Agency designated location”.

All references to “final contract voucher certification” shall be interpreted to mean the final payment form established by the Contracting Agency.

The venue of all causes of action arising from the advertisement, award, execution, and performance of the contract shall be in the Superior Court of the County where the Contracting Agency’s headquarters are located.

Acceptance – Formal action of the Contracting Agency in determining that the Contractor's work has been completed in accordance with the contract and in notifying the Contractor in writing of the acceptability of the work.

Act of God – A cataclysmic phenomenon of nature, such as an earthquake, flood or cyclone. Rain, wind, high water, or other natural phenomenon which might reasonably have been anticipated from historical records of the general locality of the work shall not be construed as acts of God.

Additive – A supplemental unit of work or group of bid items, identified separately in the Bid Proposal, which may, at the discretion of the Contracting Agency, be awarded in addition to the base bid.

Alternate – One of two or more units of work or groups of bid items, identified separately in the Bid Proposal, from which the Contracting Agency may make a choice between different methods or material of construction for performing the same work.

Application for Payment – The form accepted by the Engineer which is to be used by the Contractor in requesting progress and final payments and which is to include such supporting documentation as is required by the Contract Documents.

Bid Proposal Form – Bid Proposal Form shall mean the same as the definition provided for the term “Proposal Form.”

Business Day – A business day is any day from Monday through Friday except holidays as listed in Section 1-08.5.

Construction Manager – The person designated, in writing, by the Contracting Agency to act as its representative and to perform administrative functions relating to this contract. Initial contact by the Contractor with the Contracting Agency shall be through the Construction Manager.

Contract Bond – The definition in the Standard Specifications for “Contract Bond” applies to whatever bond form(s) are required by the Contract Documents, which may be a combination of a Payment Bond and a Performance Bond.

Contract Documents – See definition for “Contract”.

Contract Drawings – Contract Drawings or Drawings shall mean the same as the definition provided for the term “Contract Plans” or “Plans.”

Contracting Agency – The Contracting Agency shall mean Kitsap County, a municipal corporation, acting and existing under the laws of the State of Washington.

Contract Price – The amount payable to the Contractor under the terms and conditions of the contract provisions based on the lump sum prices, unit prices, or combination thereof, on the Bidding Schedule, with adjustments made in accordance with the Contract.

Contract Time – The period of time established by the terms and conditions of the contract within which the work must be physically completed.

Dates – Delete the heading Completion Dates and the three paragraphs that follow it, and replace them with the following:

Bid Opening Date – The date on which the Contracting Agency publicly opens and reads the bids.

Award Date – The date of the formal decision of the Contracting Agency to accept the lowest, responsible, and responsive bidder for the work.

Contract Execution Date – The date the Contracting Agency officially binds the agency to the Contract.

Limited Notice to Proceed with Construction Date – The date stated in the Limited Notice to Proceed on which the Preconstruction Phase contract time begins.

Notice to Proceed with Construction Date – The date stated in the Notice to Proceed with Construction on which the Construction Phase contract time begins.

Substantial Completion Date – The day the Engineer determines the Contracting Agency has full and unrestricted use and benefit of the facilities, both from the operational and safety standpoint, any remaining traffic disruptions will be rare and brief, and only minor incidental work, replacement of temporary substitute facilities, plant establishment periods, or correction or repair remains for the physical completion of the total contract.

Physical Completion Date – The day all of the work is physically completed on the project. All documentation required by the Contract and required by law does not necessarily need to be furnished by the Contractor by this date.

Completion Date – The day all the work specified in the contract is completed and all the obligations of the Contractor under the contract are fulfilled by the Contractor. All documentation required by the contract and required by law must be furnished by the Contractor before establishment of this date.

Final Acceptance Date – The date on which the Contracting Agency accepts the work as complete.

EADOC – The web-based electronic media site that is hosted by EADOC LLC. Information may be obtained at www.EADOCsoftware.com. EADOC is a project management system for facilitating document workflows, communication, and collaboration, which assists in the management of construction projects. It serves as a single source for project information for communication and collaboration among all project participants by automating various tasks in an organization of modules. EADOC provides secure, permissions-based access requiring the identification of all users and their approved access rights.

Electronic Documents – The electronic form or image of Project Communications that can be stored on and retrieved from an electronic storage device through a collaboration system over the Internet. Includes all written and graphic products produced with computer software or converted to electronic form or electronic image by computer software.

Engineer – Engineer shall mean either the Contracting Agency's design engineer or the Contracting Agency's construction administration representative.

Field Directive – A written order issued by Engineer which requires minor changes in the Work, but which does not involve a change in the Contract Price or the Contract Times.

Invitation to Bid – The definition is the same as that provided for the term "Call for Bids."

Limited Notice to Proceed – Written notice from the Contracting Agency informing the successful Bidder to start the Work associated with the Preconstruction Work Phase. See Section 1-04.3 for additional information.

Notice – As defined in the Contract. Notice for documents transmitted through EADOC is the time and date when the document is sent to the other party as recorded in EADOC.

Notice of Award – The written notice from the Contracting Agency to the successful Bidder signifying the Contracting Agency's acceptance of the Bid Proposal.

Notice to Proceed with Construction – The written notice from the Contracting Agency or Engineer to the successful Bidder authorizing and directing the Contractor to proceed with the Construction Work Phase. The Notice to Proceed with Construction establishes the date on which the contract time begins. See Sections 1-04.3 and 1-08.4 for additional information.

Owner – The definition is the same as that provided for the term "Contracting Agency".

Performance and Payment Bond – The definition is the same as that provided for the term "Contract Bond." The Contractor will be required to submit a Performance and Payment Bond on the Contracting Agency provided form within ten (10) calendar days of receipt of Notice of Award.

Project Communications – All written documentation and written communications required by the Contract Documents including, but not limited to: correspondence, reports, notices, submittals, transmittals, RFI's, request for change orders, payment applications, change orders, claims, change proposals, field orders, meeting agendas and minutes, substitutions, test reports, monitoring reports, punchlists, and all other formal Contract communications. Project communications shall also include documents required by the Contract that include written documents, demands, instruments, or directives, unless otherwise indicated in this Section.

Project Data – Samples, certifications, material specifications, installation procedures, catalog data or other materials, equipment, or other information intended to describe items to be furnished by the Contractor for the project and which are identified as required submittals in the Standard Specifications and Special Provisions.

Project Team – The associated members of the Contracting Agency, Contracting Agency Consultants, Construction Manager, Design Engineer, Contractor, Subcontractors, and Vendors.

Quality Assurance – A program establishing policies, procedures, standards, training, guidelines, testing, and systems necessary to provide quality in the work to meet the project requirements and accepted industry standards.

Quality Control – Those activities that provide confidence that materials and workmanship will meet the requirements of the contract to fulfill the project objectives. The Contractor is responsible for the quality control of the project.

Shop Drawings – Drawings prepared by the Contractor or his/her suppliers or subcontractors to describe detailed dimensions and materials of items to be furnished for the work. Shop drawings are not contract Drawings.

Total Bid Price – The sum of all bid prices offered by the bidder as set forth in the Bidding Schedule on the Bid Proposal form.

Traffic - Both vehicular and non-vehicular traffic, such as pedestrians, bicyclists, wheelchairs, and equestrian traffic.

Work Directive – A written directive to the Contractor, recommended by the Engineer, issued on or after the effective date of the Notice to Proceed and signed by the Contracting Agency's Representative, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed, or to emergencies. A Work Directive may or may not change Contract Price or Contract Time, but is evidence that the parties expect that the change directed or documented by the Work Directive will be incorporated in a subsequently issued Change Order following negotiations of the parties as to its effect, if any, on the Contract Price or Contract Time.

Working Day – A working day shall have the same meaning as a business day and is any day from Monday through Friday except holidays as listed in Section 1-08.5.

END OF SECTION 1-01

1-02 Bid Procedures and Conditions

1-02.1 Prequalification of Bidders

(Local Agency SP)
Section 1-02.1 is deleted and replaced with the following:

1-02.1 Bidder Responsibility

It is the intent of the Contracting Agency to award a contract to the lowest responsive, and responsible bidder. Before award, the bidder must meet the following bidder responsibility criteria to be considered a responsible bidder. The bidder will be required by the Contracting Agency to submit documentation demonstrating compliance with the criteria. The bidder must:

1. Have a current certificate of registration as a contractor in compliance with Chapter 18.27 RCW at the time of bid submittal;
2. Have a current Washington Unified Business identifier (UBI) number;
3. If applicable, have:
    a. Industrial insurance coverage for the bidder's employees working in Washington as required in Title 51 RCW;
    b. A Washington Employment Security Department number per Title 50 RCW;
    c. A Washington Department of Revenue state excise tax registration number as required in Title 82 RCW;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
5. Have current bonding capacity adequate for this project.
6. Not have filed for bankruptcy in the last five (5) years.
7. Not have had their Contractor's license revoked in the last five (5) years.

1-02.1(1) Subcontractor Responsibility

The Contractor shall include the language of this section in each of its first-tier subcontracts and shall require each of its subcontracts to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Contracting Agency, the Contractor shall promptly provide documentation to the Contracting Agency demonstrating that the subcontractor meets the subcontractor responsibility criteria below. The requirements of this section apply to all subcontractors regardless of tier. The subcontractor shall:

1. Have a current certificate of registration as a contractor in compliance with Chapter 18.27 RCW at the time of subcontract bid submittal;
2. Have a current Washington Unified Business identifier (UBI) number;
3. If applicable, have:
    a. Industrial insurance coverage for the subcontractor’s employees working in Washington as required in Title 51 RCW;
    b. A Washington Employment Security Department number per Title 50 RCW;
    c. A Washington Department of Revenue state excise tax registration number as required in Title 82 RCW; and/or
    d. An electrical contractor license, if required by Chapter 19.28 RCW.
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).

1-02.1(2) Supplemental Bidder Responsibility Criteria

In addition to the bidder responsibility criteria above, the bidder must meet the following relevant supplemental bidder responsibility criteria applicable to the project:

1. Bidder shall not be "inactive" or "not in good standing with the Washington State Secretary of State's Office, the Department of Revenue, or the Department of Labor and Industries.
2. Bidder shall have been in business as an underground pipeline construction contractor under its present name for a minimum of two (2) years;
3. Bidder shall not have been disqualified from entering a construction contract by another governmental agency in the last two (2) years;
4. Bidder shall not have declared bankruptcy or been in receivership in the last five (5) years;
5. Bidder, Bidder's designated project manager, and Bidder's designated superintendent/foreman for this project shall each have successfully completed at least three (3) projects of a similar size and scope as required by the Contract Documents for this project within the last ten (10) years. In evaluating whether the projects were "successfully completed," the Contracting Agency may check references for the previous projects and may evaluate the bidder's performance including but not limited to, the following areas:
    a. Quality control;
    b. Safety record;
    c. Timeliness of performance;
    d. Use of skilled personnel, including subcontractors;
    e. Management of subcontractors;
    f. Availability of and use of appropriate equipment;
    g. Compliance with contract documents;
    h. Management of submittals process, change orders and closeout.
6. Bidder shall not owe delinquent taxes to the Washington State Department of Revenue without a payment plan approved by the Department of Revenue.

For purposes of meeting this criterion, the Contracting Agency has determined that "similar size and scope" means municipal public works projects that include site dewatering, digester or storage tank cleaning, repair and rehabilitation, and wastewater treatment plant pump, piping and valve installations, . All of the following shall be included in at least one of three projects: dewatering well installation and operation, digester and digester gas piping purge using inert gas, temporary odor control installations, digester or storage tank cleaning, ventilation and scaffolding, existing concrete, metal and coating spot repair, sequencing equipment and piping replacement to allow part of the system to continue operating. Separate projects may be used to demonstrate compliance with these installation requirements. Each project shall also have a construction cost in excess of $2,000,000.

1-02.1(3) Documentation

As evidence the bidder meets the responsibility criteria above, the Bidder shall complete and submit the following documentation as part of the Bidder's Bid Proposal.

1. Bidder Responsibility Checklist.
2. Subcontractor Responsibility Checklist, provide for each subcontractor identified in Bidder's Subcontractors List.

In addition, the two lowest bidders must submit the following documentation for each referenced project to the Contracting Agency within 48 hours of the bid submittal deadline. The Contracting Agency reserves the right to request such documentation from other bidders. In the event a bidder refuses to provide the requested information or fails to provide the requested information within the time periods specified in the Bid Documents, then the Contracting Agency may find the bidder non-responsible.

1. Documented information from the Washington State Secretary of State's Office, the Department of Revenue, or the Department of Labor and Industries providing the date of incorporation or formation, the state of incorporation or formation, that the bidder is active and in good standing in the State of Washington, State of Washington tax reporting number, and the name and address of the registered agent, general partner, or managing member.
2. Bidder shall not be listed on the Washington State Department of Revenue's "Delinquent Taxpayer List" website: http://dor.wa.gov/content/fileandpaytaxes/latefiling/dtlwest.aspx.
3. List of projects of similar size and scope. This list shall include the following for each project:
    a. Project Name.
    b. Project Manager's Name and Project Superintendent's Name.
    c. Project owner's name and contact information for the project owner's representative.
    d. Awarded contract amount.
    e. Final contract amount.
    f. Project start and completion date.
    g. Location of the project.
    h. A description of the scope of the project and how the project is similar to this project. The description should include, but not be limited to the pump size and capacity, the site work that was required, the ground conditions encountered, and other information relevant to the successful completion of the referenced project.
    i. Claims (either resolved or unresolved) filed by the Contractor and basis for the claims.

The basis for evaluation of Bidder compliance with these supplemental criteria shall be any documents or facts obtained by the Contracting Agency (whether from the Bidder or third parties) which any reasonable owner would rely on for determining such compliance, including but not limited to:

1. Financial, historical, or operational data from the Bidder.
2. Information obtained directly by the Contracting Agency from owners for whom the Bidder has worked, or other public agencies or private enterprises.
3. Any additional information obtained by the Contracting Agency which is believed to be relevant to the matter.

1-02.1(4) Appeals

If the Contracting Agency determines the bidder does not meet the bidder responsibility above and is therefore not a responsible bidder, the Contracting Agency shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees with this determination, it may appeal the determination within 24 hours of receipt of the Contracting Agency's determination by presenting additional information to the Contracting Agency. The Contracting Agency will consider the additional information before issuing its final determination. If the final determination affirms that that bidder is not responsible, the Contracting Agency will not execute a contract with any other bidder until two (2) business days after the bidder determined to be not responsible has received the final determination. For purposes of this section, the date of the Contracting Agency's transmission of the Contracting Agency's determination(s) by facsimile or electronic mail to the bidder at the facsimile number or email address provided by the bidder in its bid shall constitute the date of receipt by the bidder of the written notices provided for herein.

1-02.1(5) Other Conditions

Specialty contractor experience and qualification requirements are specified in other sections of the Special Provisions. While the Contractor will be required to conform to those additional qualifications, they are not criteria that will be evaluated as a condition for determining if the bidder is responsible.

If two or more prospective bidders desire to bid jointly as a Joint Venture on a single contract, each must be deemed qualified, as provided above, and they must also include with the bid proposal packet an agreement to Joint Venture. The Joint Venture is then treated as a new firm and qualified as such. The Joint Venture and any of its members are subject to the conditions as stated elsewhere within these specifications. Any agreement to Joint Venture shall be signed by each of the bidders and must specify each individual who is authorized to execute proposals, contracts, bond, and other documents on behalf of the Joint Venture. If any of the bidders is a corporation, the agreement must be accompanied by a resolution of the corporation authorizing such Joint Venture agreement and designating the officer(s) authorized to sign such Joint Venture agreement or contract on behalf of such corporation.

1-02.2 Plans and Specifications

(Local Agency SP)
Section 1-02.2 is deleted and replaced with the following:

Information as to where Bid Documents can be obtained or reviewed will be found in the Invitation to Bid for the work.

After award of the contract, conformed plans and specifications will be issued to the Contractor at no cost as detailed below:

To Prime Contractor	No. of Sets	Basis of Distribution
Reduced plans (11" x 17")	5	Furnished automatically with the limited NTP
Standard plans (22" x 34")	2	Furnished automatically with the limited NTP
Contract Provisions	5	Furnished automatically with the limited NTP

Additional copies of the Contract Plans and Contract Provisions may be purchased by the Contractor by payment of the cost of reproduction and delivery charges.

1-02.4(2) Subsurface Information

(Local Agency SP)
The first paragraph of Section 1-02.4(2) is deleted and replaced with the following:

The Contracting Agency has made limited subsurface investigations and the boring log data and soil sample test data accumulated by the Contracting Agency is available in Appendix A of the Contract Documents. This data is informational only and shall not be considered as part of the Contract. The Contracting Agency makes no representation or warranty expressed or implied that:

1. The Bidder's interpretations from the boring logs are correct.
2. Moisture conditions and indicated water tables will not vary from those found at the time the borings were made.
3. The ground at the location of the borings has not been physically disturbed or altered after the boring was made.

The Contractor may not rely upon or make any claim against the Contracting Agency or Engineer with respect to:

1. The completeness of such data and reports for Contractor's purposes, including, but not limited to any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. Other data, interpretations, opinions, and information contained in such reports; or
3. Any Contractor interpretation of, or conclusion, drawn from such technical data or any such other data, interpretations, opinions, or information.

The Contractor is advised that additional geotechnical investigations and engineering could be required and should be considered and taken into account as part of the requirements of the work. Such investigations and engineering could be required to augment or support the available technical data, particularly to assess or verify the in-situ conditions in areas which were not investigated in order to meet the Contractor's needs and requirements for construction, especially for shoring, dewatering, or other special construction that is dependent on, and affected by, site specific in-situ conditions. Contractor shall evaluate his needs for this additional information and all costs for gathering said information shall be incidental to other bid items.

1-02.5 Proposal Forms

(July 31, 2017 APWA GSP)
Delete this section and replace it with the following:

The Proposal Form will identify the project and its location and describe the work. It will also list estimated quantities, units of measurement, the items of work, and the materials to be furnished at the unit bid prices. The bidder shall complete spaces on the proposal form that call for, but are not limited to, unit prices; extensions; summations; the total bid amount; signatures; date; and, where applicable, retail sales taxes and acknowledgment of addenda; the bidder's name, address, telephone number, and signature; the bidder's UDBE/DBE/M/WBE commitment, if applicable; a State of Washington Contractor's Registration Number; and a Business License Number, if applicable. Bids shall be completed by typing or shall be printed in ink by hand, preferably in black ink. The required certifications are included as part of the Proposal Form.

The Contracting Agency reserves the right to arrange the proposal forms with alternates and additives if such is to the advantage of the Contracting Agency. The bidder shall bid on all alternates and additives set forth in the Proposal Form unless otherwise specified.

(Local Agency SP)
Section 1-02.5 is supplemented with the following:

The Contracting Agency has elected to purchase the manufacturer's services by Varec Biogas via three site visits throughout the construction on a sole source basis and has received a "not to exceed" price. A copy of the proposal by Beaver Equipment is included in Appendix C of the Contract Documents. Contractor shall include the amount of this quote in the Contractor's bid.

The form of the Bid Proposal shall not be altered by interlineations, erasures, or by any other method whatsoever.

1-02.6 Preparation of Proposal

(December 10, 2020 APWA GSP, Option B)
Supplement the second paragraph with the following:

4. If a minimum bid amount has been established for any item, the unit or lump sum price must equal or exceed the minimum amount stated.
5. Any correction to a bid made by interlineation, alteration, or erasure, shall be initialed by the signer of the bid.

Delete the last two paragraphs, and replace them with the following:

The Bidder shall submit with their Bid a completed Certification of Compliance with Wage Payment Statutes form, provided by the Contracting Agency. Failure to return this certification as part of the Bid

Proposal package will make this Bid Nonresponsive and ineligible for Award. A Certification of Compliance with Wage Payment Statutes form is included in the Proposal Forms.

The Bidder shall make no stipulation on the Bid Form, nor qualify the bid in any manner.

A bid by a corporation shall be executed in the corporate name, by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign).

A bid by a partnership shall be executed in the partnership name and signed by a partner. A copy of the partnership agreement shall be submitted with the Bid Form if any UDBE requirements are to be satisfied through such an agreement.

A bid by a joint venture shall be executed in the joint venture name and signed by a member of the joint venture. A copy of the joint venture agreement shall be submitted with the Bid Form if any UDBE requirements are to be satisfied through such an agreement.

1-02.7 Bid Deposit

(Local Agency SP)
Section 1-02.7 is supplemented with the following:

Bid bonds shall contain the following:

1. Contracting Agency-assigned number for the project;
2. Name of the project;
3. The Contracting Agency named as obligee;
4. The amount of the bid bond stated either as a dollar figure or as a percentage which represents five percent of the maximum bid amount that could be awarded;
5. Signature of the bidder's officer empowered to sign official statements. The signature of the person authorized to submit the bid should agree with the signature on the bond, and the title of the person must accompany the said signature;
6. The signature of the surety's officer empowered to sign the bond and the power of attorney.

Bid bonds shall be issued by a surety company licensed to do business in the State of Washington. Bidder shall use the bond form included in the Contract Provisions.

Bid bonds and checks will be returned to all except the three lowest bidders within ten (10) days after the bid award. Bid bonds or checks of each of the three lowest bidders will be returned within three (3) days after execution of the Contract, and after the Contract has been executed and approved by Kitsap County.

1-02.9 Delivery of Proposal

(Local Agency SP)
The first and second paragraphs of Section 1-02.9 are deleted and replaced with the following

Each Bid Proposal shall be submitted in a sealed envelope, with the Project Name and Formal Bid Contract Number as stated in the Invitation to Bid clearly marked on the outside of the envelope, or as otherwise stated in the Bid Documents, to ensure proper handling and delivery.

The Contracting Agency will not open or consider any Bid Proposal that is received after the time specified in the Invitation to Bid for receipt of Bid Proposals or received in a location other than that specified in the Call for Bids.

1-02.10 Withdrawing, Revising, or Supplementing Proposal

(Local Agency SP)
The second paragraph of Section 1-02.10 is deleted and replaced with the following:

The bidder has no right to withdraw or modify the bid for any reason whatsoever after the time set for the opening thereof, unless the award of the contract is delayed for a period exceeding sixty (60) days from the time set for opening of the bids.

Prior to the time set for opening of bids, a bidder may withdraw or revise his bid proposal, provided that an individual authorized to sign proposals files the request for withdrawal or revision with the County Purchasing Office in writing. The original proposal, as modified in writing by an attached revision filed before the time set for opening of bids will be considered as the bid proposal by the bidder. No oral, fax, telephone, or telegraphic Bid Proposals or modifications will be considered or accepted.

1-02.13 Irregular Proposals

(Local Agency SP)
Item 1 in Section 1-02.13 is revised to read as follows:

1. A proposal will be considered irregular and will be rejected if:
    a. The bidder is not prequalified when so required;
    b. The authorized proposal form furnished by the Contracting Agency is not used or is altered;
    c. The completed proposal form contains any unauthorized additions, deletions, alternate bids, or conditions;
    d. The bidder adds provisions reserving the right to reject or accept the award, or enter into the contract;
    e. A price per unit cannot be determined from the bid proposal;
    f. The proposal form is not properly executed;
    g. The bidder fails to submit or properly complete a subcontractor list, if applicable, as required in Section 1-02.6.
    h. The bidder fails to submit or properly complete a Disadvantaged Business Enterprise Certification, if applicable, as required in Section 1-02.6;
    i. The Bidder fails to submit written confirmation from each DBE firm listed on the Bidder's completed DBE Utilization Certification that they are in agreement with the bidders DBE participation commitment, if applicable, as required in Section 1-02.6, or if the written confirmation that is submitted fails to meet the requirements of the Special Provisions;
    j The Bidder fails to submit DBE Good Faith Effort documentation, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to demonstrate that a Good Faith Effort to meet the Condition of Award was made;
    k. The bid proposal does not constitute a definite and unqualified offer to meet the material terms of the bid invitation, or
    l. More than one proposal is submitted for the same project from a Bidder under the same or different names.
    m. The bidder fails to submit or properly complete a Bidder Responsibility Checklist as required in Section 1-02.1(3).
    n. The bidder fails to submit or properly complete a Subcontractor Responsibility Checklist for each subcontractor as required in Section 1-02.1(3).

(Local Agency SP)
Item 2 in Section 1-02.13 is supplemented with the following:

h. If the County, for good cause, deems the bid bond inadequate or improper.

1-02.14 Disqualification of Bidders

(Local Agency SP)
Section 1-02.14 is supplemented with the following:

A Bidder will be deemed not responsible if:

1. The Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1), as amended; or
2. The Bidder fails to meet the Project-specific supplemental bidder responsibility criteria listed in Section 1-02.1.

1-02.15 Pre-Award Information

(August 14, 2013 APWA GSP)
Section 1-02.15 is revised to read as follows:

Before awarding any contract, the Contracting Agency may require one or more of these items or actions of the apparent lowest responsible bidder:

1. A complete statement of the origin, composition, and manufacture of any or all materials to be used,
2. Samples of these materials for quality and fitness tests,
3. A progress schedule (in a form the Contracting Agency requires) showing the order of and time required for the various phases of the work,
4. A breakdown of costs assigned to any bid item,
5. Attendance at a conference with the Engineer or representatives of the Engineer,
6. Obtain, and furnish a copy of, a business license to do business in the city or county where the work is located.
7. Any other information or action taken that is deemed necessary to ensure that the bidder is the lowest responsible bidder.

1-02.16 Addenda

(Local Agency SP)
Section 1-02.16 is added as the following:

Where appropriate, responses to questions, inquiries, or requests for additional information or for substitution of proposed material will be issued in the form of Addenda, and copies of each addendum will be issued to all prospective bidders of record. Additionally, addenda are on file at the Kitsap County Purchasing Office. During the bidding period, prospective bidders will be advised by Addendum of additions to, deletions from or changes in the requirements of the contract documents.

Kitsap County will not be responsible for the authenticity or correctness of oral interpretations of contract documents or for information obtained in any other manner than through the media of Addenda. Bidders shall acknowledge receipt of Addendum in their bid proposals and each Addendum shall be considered a part of the Contract Documents. Failure to acknowledge receipt of any Addenda issued will invalidate a proposal as incomplete.

Should a bidder have a Request for Clarification or find discrepancies, ambiguities or omissions in the drawings or specifications, or should a bidder be in doubt as to their meaning, bidder shall at once notify Floyd Bayless, Construction Manager, at (360) 337-5631 or email fbayless@co.kitsap.wa.us. If appropriate, the Contracting Agency will send a written instruction to all bidders in the form of an Addendum. Neither the Contracting Agency nor the Engineer may be held responsible for any oral

instruction. Questions received by the Contracting Agency less than seventy-two (72) hours before bids close may not be answered. All addenda issued prior to the time of bid closing are incorporated into the contract.

Interpretations, corrections, and changes of the Bidding documents will be made by addendum only through the Kitsap County Purchasing Office. Interpretations, corrections, and changes in the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

Any variances to the contract documents shall not be accepted unless agreed to by the County in writing. Substitutions will not be considered until after award of contract.

END OF SECTION 1-02

1-03 Award and Execution of Contract

1-03.1 Consideration of Bids

(January 23, 2006 APWA GSP)
The first paragraph of Section 1-03.1 is revised to read as follows:

After opening and reading proposals, the Contracting Agency will check them for correctness of extensions of the prices per unit and the total price. If a discrepancy exists between the price per unit and the extended amount of any bid item, the price per unit will control. If a minimum bid amount has been established for any item and the bidder's unit or lump sum price is less than the minimum specified amount, the Contracting Agency will unilaterally revise the unit or lump sum price, to the minimum specified amount and recalculate the extension. The total of extensions, corrected where necessary, including sales taxes where applicable and such additives and/or alternates as selected by the Contracting Agency, will be used by the Contracting Agency for award purposes and to fix the Awarded Contract Price amount and the amount of the contract bond.

(Local Agency SP)
Section 1-03.1 is supplemented with the following:

The Contracting Agency will consider all material submitted by the bidder to determine whether the bidder's offering is in compliance with the Contract Documents. The Contracting Agency will consider all material submitted by the bidder, and evidence it may obtain otherwise, to determine whether the bidder, its key personnel, and proposed subcontractors have the qualifications and experience to successfully complete contracts of this type. Such evaluation will include, but not be limited to, the following factors:

1. Whether the bidder has adequate financial resources to complete the work.
2. Whether the bidder has the necessary experience and organization to perform the work.
3. Whether the bidder has a satisfactory record of performance, integrity, experience, and skills to perform and complete the work.
4. Whether the bidder has a history of completing, failing to complete, defaulting on or otherwise not completing construction contracts.
5. Whether the bidder's proposed major subcontractors appear capable of and have histories of successfully completing construction contracts.

1-03.3 Execution of Contract

(Local Agency SP)
Section 1-03.3 is revised to read as follows:

Copies of the Contract Provisions, including the unsigned Form of Contract, will be available for signature by the successful bidder following award. The number of copies to be executed by the Contractor will be determined by the Contracting Agency.

Within fourteen (14) calendar days after receipt of the Contracting Agency-prepared contract, the successful bidder shall return the signed Contracting Agency-prepared contract, an insurance certification as required by Section 1-07.18, and a satisfactory bond as required by law and Section 1-03.4. Before execution of the contract by the Contracting Agency, the successful bidder shall provide any pre-award information the Contracting Agency may require under Section 1-02.15.

Until the Contracting Agency executes a contract, no proposal shall bind the Contracting Agency nor shall any work begin within the project limits or within Contracting Agency-furnished sites. The Contractor shall bear all risks for any work begun outside such areas and for any materials ordered before the contract is executed by the Contracting Agency.

If the bidder experiences circumstances beyond their control that prevents return of the contract documents within the calendar days after the award date stated above, the Contracting Agency may grant up to a maximum of fourteen (14) additional calendar days for return of the documents, provided the Contracting Agency deems the circumstances warrant it.

1-03.4 Contract Bond

(July 23, 2015 APWA GSP)
Delete the first paragraph and replace it with the following:

The successful bidder shall provide executed payment and performance bond(s) for the full contract amount. The bond may be a combined payment and performance bond; or be separate payment and performance bonds. In the case of separate payment and performance bonds, each shall be for the full contract amount. The bond(s) shall:

1. Be on Contracting Agency-furnished form(s);
2. Be signed by an approved surety (or sureties) that:
    a. Is registered with the Washington State Insurance Commissioner, and
    b. Appears on the current Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner,
3. Guarantee that the Contractor will perform and comply with all obligations, duties, and conditions under the Contract, including but not limited to the duty and obligation to indemnify, defend, and protect the Contracting Agency against all losses and claims related directly or indirectly from any failure:
    a. Of the Contractor (or any of the employees, subcontractors, or lower tier subcontractors of the Contractor) to faithfully perform and comply with all contract obligations, conditions, and duties, or
    b. Of the Contractor (or the subcontractors or lower tier subcontractors of the Contractor) to pay all laborers, mechanics, subcontractors, lower tier subcontractors, material person, or any other person who provides supplies or provisions for carrying out the work.
4. Be conditioned upon the payment of taxes, increases, and penalties incurred on the project under titles 50, 51, and 82 RCW; and
5. Be accompanied by a power of attorney for the Surety's officer empowered to sign the bond; and
6. Be signed by an officer of the Contractor empowered to sign official statements (sole proprietor or partner). If the Contractor is a corporation, the bond(s) must be signed by the president or vice president, unless accompanied by written proof of the authority of the individual signing the bond(s) to bind the corporation (i.e., corporate resolution, power of attorney, or a letter to such effect signed by the president or vice president).

END OF SECTION 1-03

1-04 Scope of the Work

1-04.1(2) Bid Items Not Included in the Proposal

(Local Agency SP)
Section 1-04.1(2) is deleted and replaced with the following:

When the Contract specifies Work that has no Bid Item in the Bid Proposal, that work shall be considered incidental to other items in the Bid Proposal whether specified as incidental or not in the measurement and payment descriptions for the individual Bid Items.

1-04.1(3) Preconstruction Work Phase

(Local Agency SP)
Section 1-04.1(3) is added as follows:

This Section specifies planning and work included within the Preconstruction Work Phase that takes place during the period after the Limited Notice to Proceed and prior to the start of the work authorized by the Notice to Proceed with Construction. The planning effort includes identifying and organizing the Contractor's work team, attending a preconstruction meeting whose purpose is planning the construction activities with the Contracting Agency, the Construction Manager, and the Design Engineer, preparing and delivering priority submittals for equipment, and other activities related to planning activities identified herein.

To accomplish the preconstruction activities, the Contractor shall provide staff to meet on the project site as needed and shall establish and maintain an office in the Puget Sound region to accomplish the work. Satisfactory completion of the Preconstruction Work Phase activities will be a prerequisite to the Notice to Proceed with Construction for the Construction Work Phase.

Submittal information shall be provided in sufficient detail to verify compliance with the specifications during the Preconstruction Work Phase and shall be provided prior to Notice to Proceed with Construction for the Construction Work Phase. The Contractor shall make arrangements with subcontractors and suppliers for the preparation and submittal of required documentation.

1-04.1(3)A Activities

The following is a list of the activities to be included in the Preconstruction Work Phase. Each of the activities and required work products are defined either within this specification or in specification sections in the Special Provisions.

1. Contractor's Management and Work Plan
2. Project Safety and Accident Prevention Program
3. COVID-19 Health and Safety Plan (CHSP)
4. Onsite Investigations
5. Preconstruction Photographs
6. Submittals
    a. Submittal Plan and Schedule
    b. Priority or Long Lead Time Material Submittals
    c. Priority Technical Submittals
        a. Work Sequencing Plan
        b. Dewatering Plan
        c. Spoils and Water Handling, Testing, and Disposal Plan
        d. Spill Prevention, Control, and Countermeasures Plan
7. Apply for and obtain Contractor Furnished Permits

8. Schedules
    a. Contractor's Scheduler Qualifications
    b. Schedule of Values for Lump Sum Bid Items
    c. Contractor's Construction Schedule
9. Attend EADOC Training

1-04.1(3)B Contractor's Management and Work Plan

Contractor shall prepare and submit a plan describing in detail the approach and methods for prosecuting the work in accordance with the contract. The Management Plan shall include the following:

1. An organizational chart describing:
    a. The hierarchy and relationship of the Contractor's project staff;
    b. The hierarchy of subcontractors and suppliers including the trade(s) or portion(s) for which each is responsible; and
    c. A resume for the proposed Project Manager and/or site superintendent.
2. An address and phone directory of the Contractor, Subcontractor, and priority equipment suppliers.
3. A narrative describing how the Contractor intends to staff, equip, and supply the job by trade in order to meet the contract work sequence and schedule constraints. Include the size of the work crew, description of on-site equipment, working hours, and requirements for material and equipment procurement, lay down, and storage.
4. Provide rates for craft labor likely to be used to complete the Work in accordance with Section 1-07.9(1). At a minimum, provide basic wage and benefits cost, worker's insurance costs, federal insurance costs, safety costs, and travel allowance costs, if applicable. Craft labor cost for the Contractor and all his subcontractors shall be provided.
5. Provide rates for equipment likely to be used to complete the Work. At a minimum, provide complete equipment description, hourly cost, operating cost per hour, and operated cost per hour. Equipment cost for the Contractor and all his subcontractors shall be provided.

1-04.1(3)C Project Safety and Accident Prevention Program

Contractor shall prepare and submit a Safety and Accident Prevention Program. This program shall outline the anticipated hazards and safety controls necessary to safeguard Contractor's employees, the public, Kitsap County staff and Kitsap County representatives. It shall be specific to the job and site and meet federal, state, and local jurisdictional requirements. The program will be reviewed for compliance with this Section prior to the start of work.

1-04.1(3)D COVID-19 Health and Safety Plan (CHSP)

COVID-19 Health and Safety Plan (CHSP)

The Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP). The CHSP shall be prepared and submitted as a Type 2 working drawing prior to beginning physical Work.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the look ahead schedule required under Section 1-08.3(2)D. If the conditions change on the project or a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including Contractor's employees, Kitsap County staff, Kitsap County representatives, project staff, subcontractors,

suppliers, and anyone on the project site, staging areas, or yards. The plan shall contain the following minimum elements:

1. The CHSP shall identify all standards, guidance, publications, and sources on which it is based. Those standards may include references to OHSA, WISHA, and CDC publications that are current at the time the CHSP is prepared.
2. The CHSP shall identify a responsible individual from the Contractor who is responsible for implementation of the CHSP. The individual(s) contact information shall be listed in the CHSP.
3. The CHSP shall specifically identify the project for which it is applicable, and if applicable, shall address project work areas outside the project limits such as staging areas or yards.
4. The CHSP shall identify the PPE and administrative and engineered controls necessary to maintain a safe site. This includes but is not limited to sanitation resources, screening stations, safety briefings, controlling access, and personal protective equipment (PPE) needed to protect workers from COVID-19.
5. The CHSP shall identify measures for screening and managing workers or visitors to areas identified in the CHSP. The plan shall include procedures should a person exhibit symptoms of COVID-19.
6. The CHSP shall identify how the plan will be updated as new work activities are added with each Weekly Look-Ahead schedule. The CHSP updates shall identify the number of workers, crews, work tasks, and the degree of congestion or confinement workers will experience for the work activities in the Weekly Look-Ahead schedule.
7. The CHSP shall include how the Contractor will ensure everyone on the site has been trained on the CHSP requirements. This includes subcontractors, suppliers, and anyone on the project site.

COVID-19 Health and Safety Plan (CHSP) Inspection

The Contractor shall grant full and unrestricted access to the Engineer for CHSP Inspections. The Engineer (or designee) will conduct periodic compliance inspections on the project site, staging areas, or yards to verify that any ongoing work activity is following the CHSP plan. If the Engineer becomes aware of a noncompliance incident either through a site inspection or other means, the Contractor will be notified immediately (within 1 hour). The Contractor will be given 24 hours to either remedy the noncompliance incident or halt the associated work activity. If the Contractor fails to comply within 24 hours of receiving the Engineer's notification, the Engineer may suspend Work. The Contractor must satisfy the Engineer that the noncompliance incident has been corrected before the suspension will end.

1-04.1(3)E Onsite Investigations

The Contractor shall perform on-site investigations in support of technical submittal preparation. See Section 1-02.4(2) for additional information. Activities include but may not be limited to the following:

Utility Locations

Perform utility excavations to support collection of the as-built location of existing utilities that may impact or be impacted by the Work under this Contract. Locations of excavations shall be in coordinated and identified jointly by the Contractor and the Construction Manager. Proper equipment, labor, trench support methods, backfill, and asphalt patching materials shall be made available to support the operations. The Contractor shall be prepared to repair any damage caused during exploratory activities. Prior to any utility excavations, provide the Construction Manager advance notice of at least four (4) working days. All information from exploratory excavations shall be submitted to the Construction Manager within two working days after completion of said excavation. See Section 1-07.17 for further information regarding utilities and similar facilities.

1-04.1(3)F Preconstruction Photographs or Video

Contractor shall perform preconstruction photo or video documentation in accordance with Section 1-05.4(6) Construction Photographs or Video.

1-04.1(3)G Submittals

Prepare and submit the Submittal Control Document in accordance with Section 1-06.1.

Contractor shall provide submittals in accordance with Section 1-06.1 for all priority materials or materials that may take more than six (6) weeks to be obtained. Prior to submission of these priority or long lead time material submittals, Contractor shall attend pre-submittal meetings with the Construction Manager and Design Engineer as deemed appropriate for particular submittals.

Priority Technical Submittals:

Priority technical submittals are identified as submittals on items that have an impact on work activities starting immediately following Notice to Proceed for construction. The list includes but may not be limited to the following items. Should the Contractor's schedule identify a critical submittal not listed, preparation and submittal shall be performed during the preconstruction period:

1. Work Sequencing Plan: Provide a Work Sequencing Plan to identify the logical progression of work that will complete the work within the constraints defined and maintain operation of the WWTP per CSI Specification Section 01 12 16.
2. Dewatering Plan: Provide a Dewatering Plan, including drawings and complete design data showing methods and equipment to be utilized in dewatering, including relief of hydrostatic head, and in maintaining the digesters in a dewatered and in a hydrostatically relieved condition per CSI Specification Section 31 23 19.
3. Spoils and Water Handling, Testing, Treatment and Disposal Plan: per CSI Specification Section 31 23 19.
4. Spill Prevention, Control and Countermeasures Plan: Provide a Spill Prevention, Control and Countermeasures Plan per Section 1-07.15(1) as amended by the Special Provisions.

1-04.1(3)H Contractor Furnished Permits

The Contractor shall apply for and obtain the Contractor Furnished Permits per Section 1-07.6(2) during the Preconstruction Work Phase.

1-04.1(3)I Schedules

The Contractor shall submit the Contractor's scheduling qualifications including the resume(s) of the designated person(s) responsible for schedules and reports (the "Contractor's Scheduler"). The Contractor's Scheduler shall have demonstrable capability to plan, coordinate, execute, and monitor a CPM schedule as required for this Project. The Construction Manager will approve or reasonably disapprove the Contractor's proposed scheduler. In the event of disapproval, a new scheduler shall be proposed within one week and be subject to the same consideration criteria as noted above. In addition, the Contractor shall prepare and submit the following schedule information:

1. Schedule of Values for the lump sum Bid items included in the Bid Proposal.
2. Contractor's Construction Schedule (CPM) prepared in accordance with Section 1-08.3.

1-04.1(3)K Attend EADOC Training

Contractor shall attend EADOC training in accordance with Section 1-12.8.

1-04.2 Coordination of Contract Documents, Plans, Special Provisions, Specifications, and Addenda

(Local Agency SP)
The second paragraph of Section 1-04.2 is revised to read as follows:

Any inconsistency in the parts of the contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 2 over 3, 3 over 4, and so forth):

1. Change Orders,
2. Work Directives,
3. Addenda,
4. Proposal Form,
5. CSI Special Provisions,
6. WSDOT Special Provisions,
7. Contract Plans,
8. Amendments to the Standard Specifications,
9. Standard Specifications,
10. Contracting Agency's Standard Plans or Details (if any), and
11. WSDOT Standard Plans for Road, Bridge, and Municipal Construction.

1-04.4 Changes

(Local Agency SP)
The seventh paragraph of Section 1-04.4 is revised to read as follows:

The Contractor shall proceed with the Work upon receiving:

1. A written change order approved by the Engineer, or
2. A work directive from the Engineer before actually receiving the written change order.

1-04.4(2) Work Directives

(Local Agency SP)
Section 1-04.4(2) is deleted and replaced with the following:

Where situations involve changes in the Work that might delay the Project, if not processed expeditiously, the changed work shall be initiated through use of a Work Directive. The Work Directive is not a Change Order, but only a directive issued by the Engineer to proceed with work that may be included in a subsequent Change Order.

The Engineer initiates the form which shall include the project name, number, contract number, and Contractor name. In addition, the reason for the change and a description of the desired Work shall be included in sufficient detail to fully describe the required Work and necessity for the change. A method of payment and estimated cost shall be included along with any modifications to the Contract Time.

Once the Engineer has completed and signed the form, copies of the form and any supporting design criteria, sketches, modified drawings, or specifications attached to the form will be sent to the Contracting Agency's representative for approval. Once authorized by the Contracting Agency's representative, the Work Directive will be forwarded to the Contractor for signature and returned to the Engineer. The Contractor shall then perform the work described in the work directive.

As Work directed by the Work Directive progresses, Contractor shall submit to the Engineer any documentation required by the Work Directive on the day that work is performed for inclusion in a subsequent Change Order. Documentation may include records of force account work, material invoices, as-built data, or quality control documentation.

1-04.4(3) Requests for Information

(Local Agency SP)
Section 1-04.4(3) is added as the following:

Requests for Information (RFIs) will be used by the Contractor where necessary to provide written direction to clarify or provide additional information or direction regarding the Plans and Specifications. Unless otherwise approved, the Contractor shall use a form provided by the Engineer. While the Engineer will attempt to respond to RFIs in an expeditious manner to avoid impacting the Contract Time, the Engineer shall have a minimum of five (5) working days to review and respond to RFIs. RFIs shall be used if the matter could result in a change in the contract price or time.

1-04.5(1)A Dispute Review Board

(Local Agency SP)
Section 1-04.5(1)A and its subsections are deleted and replaced with the following:

The formation and use of a dispute resolution board is not included in this Contract.

1-04.6 Variation in Estimated Quantities

(Local Agency SP)
Section 1-04.6 is supplemented with the following:

For certain items, quantities have been entered into the Bid Proposal only to provide a common Bid Proposal for bidders. Actual quantities will be determined in the field as the work progresses and will be paid at the original unit bid price, regardless of final quantity. These bid items, identified by the term “allowance” in their title, shall not be subject to the price adjustment provisions of 1-04.6 of the Standard Specifications.

1-04.11 Final Cleanup

(Local Agency SP)
Section 1-04.11 is deleted and replaced with the following:

1-04.11 Cleanup

The Contractor shall be responsible for ongoing and final cleaning of the project site. The Contractor shall continually, from the first day of work on the project to the last, include in his operations sufficient personnel, equipment, and materials specifically assigned to cleanup all areas which are affected or disturbed by the work operations.

1-04.11(1) Daily Cleanup

The Contractor shall cause all disturbed areas to be cleaned of all debris and excess construction materials, to be temporarily or permanently graded and finished to smooth lines and grades, to be maintained free of dust, to control surface runoff such that there is no soil erosion or contaminated runoff onto adjacent areas or drainages, and to not have any detrimental impacts. All such cleanup shall be conducted to the satisfaction of the Contracting Agency.

The Contractor shall clean all roadways, streets, sidewalks, and other facilities of all material and debris that are dropped or otherwise deposited thereon as a result of the Contractor’s operations. All such areas shall be cleaned at the conclusion of each day’s operations and at such other times as ordered by the Contracting Agency.

In addition, the Contractor shall use water for dust control on paved, surfaced, or unimproved streets or roadways as may be required to prevent inconvenience to the public. The Contractor shall also use water, if necessary, to remove mud and other debris from streets and roadways.

If the roadways and facilities are not properly or promptly cleaned and the conditions so warrant, as determined by Contracting Agency, the Contractor shall provide facilities to remove soil from truck or other equipment tires or between dual wheels or outside of truck beds before trucks or equipment may be allowed to travel over streets.

1-04.11(2) Final Cleanup

The Contractor shall perform final cleanup of the project site to the satisfaction of the Contracting Agency after completion of all work and prior to Final Acceptance. The Contracting Agency will not establish the Physical Completion Date until this is done. Such cleanup shall include, but not be limited to, removal of all rubbish, surplus materials, construction materials, equipment, and debris. Oversize rock, stumps, brush, and other extraneous materials shall be removed from the project site and disposed of in a lawful manner.

Roadway surfaces shall be thoroughly broom cleaned and washed to remove all material or debris which was deposited on the surfaces.

Any existing fencing removed or damaged by the Contractor shall be replaced in kind and to the satisfaction of the property owner.

The Contractor shall not remove temporary warning, regulatory or guide signs until authorized to do so by the Contracting Agency.

1-04.11(3) Corrective Action

Any violation of the above requirements, as determined by the Contracting Agency, will be sufficient grounds for the Contracting Agency to order the cleanup work to be performed by others. The costs for such corrective action shall be deducted from any monies due or to become due to the Contractor.

1-04.12 Temporary Facilities

(Local Agency SP)
Section 1-04.12 is added as the following:

The Contractor shall furnish, for the duration of the project, a temporary field trailer(s) for his use as well as the Contracting Agency's use within a reasonable distance of the project site. Temporary facility installation shall meet the construction safety requirements of OSHA, State, and other governing agencies and the noise limitations shall meet the requirements in Section 1-07.5(5) in the Special Provisions. Contractor shall be responsible for providing telephones, fax machines, and copier and shall pay for installation and monthly service charges for all utilities, including telephone, copy machines, and fax machines. Provide and pay for equipment service contracts for all furnished equipment.

Upon completion of the work, and subject to approval of the Engineer, the Contractor shall completely remove all temporary facilities. Temporary utilities shall be removed to the temporary service connection point and capped or terminated.

All disturbed surfaces shall be restored to the condition which existed prior to installation of temporary facilities or utilities. All roadway surfaces or other improvements which have been damaged by construction activities shall be repaired or replaced by the Contractor, as directed.

1-04.12(1) Space Allocation

On-site space is limited. Arrangements for additional space required for Contractor's staging and storage of materials and equipment (in addition to that allocated) shall be made for locations off site as described below.

Due to the limited space available outside project limits (and within the existing right of way and temporary construction easements), the Contractor shall make the necessary arrangements with nearby property owner(s) in order to establish an area(s) for the temporary facilities and storing of equipment and materials. All costs associated with third parties arrangements shall be considered incidental to the construction and shall be included in the costs of other items of work involved in the project.

1-04.12(2) Contractor's Work Area

Contractor shall limit operations and storage of equipment and materials to the areas designated on the Plans, unless written agreements have been obtained from third parties that allow the use of areas outside those described on the Plans. Contractor shall provide a copy of all such third-party agreements to the Contracting Agency prior to using areas described by the agreement. All such agreements shall

contain provisions that hold the Contracting Agency harmless from any and all damages and costs associated with the use of said areas. Contractor shall be solely responsible for the use of said areas.

Contractor shall maintain the area(s) during construction and shall proceed with the work in an orderly manner, maintaining the construction site free of debris and unnecessary equipment or materials. Material shall be stored on pallets or racks off the ground and in a manner to allow access for inspection.

1-04.12(3) Temporary Water for Construction and Testing

Contractor shall coordinate with the County staff to obtain treated plant effluent (3W) for cleaning and testing. Non-potable water (2W) is available on a limited basis for construction purposes and potable water (1W) is not available.

1-04.12(4) Temporary Electric Power

Contractor shall verify existing electric service and provide temporary electric power, if required, for use during construction. Electric power should be available at the treatment plant site. The Contractor shall determine the type and amount available and arrange with the County staff to obtain temporary electric power service. The Contractor shall provide temporary lighting at least to meet all applicable safety requirements to allow erection, application or installation of materials and equipment, and observation or inspection of the Work. Contractor shall meet all safety requirements of OSHA, State and other governing agencies for electrical installations. Facilities for providing temporary electric power shall meet all noise restriction requirements of Section 1-07.5(5) in the Special Provisions.

Contractor shall provide all electrical power required for construction, temporary equipment, ie. odor control and dewatering pumps, testing, general and security lighting, and all other purposes whether supplied through temporary or permanent facilities.

1-04.12(5) Sanitary Facilities

The Contractor shall provide suitable chemical toilets or water closets at appropriate locations within the site of the work in compliance with the requirements of Section 1-07.4 of the Standard Specifications. Secondary containment shall be provided for each chemical toilet or water closet. At the end of the job such toilets shall be removed.

1-04.12(6) Temporary Telephone Service

Contractor shall furnish onsite telephone service to the temporary field trailer, including fax, for the duration of construction of the Contract and shall be responsible for verifying existing service and making all arrangements with the local telephone utility for providing service as required. Said services shall be provided to the construction trailer(s).

1.04.12(7) Site Access and Parking

All vehicles shall be parked in such a manner so as to not encroach on public right-of-way or be a traffic hazard. Ready access to and through the site by emergency vehicles shall be maintained at all times. Contractor shall be responsible for control of parking by all of the Contractor's and subcontractor's work force to assure compliance. Contractor shall anticipate that there may not be sufficient parking space for all of the work force in the construction project area. If this is the case, Contractor shall arrange for carpooling and/or off-site parking and shuttle service, as necessary.

1.04.12(8) Removal of Temporary Facilities

Upon completion of the work, and subject to approval of the Engineer, the Contractor shall completely remove all temporary facilities. Temporary utilities shall be removed to the temporary service connection point and capped or terminated.

All disturbed surfaces shall be restored to the condition which existed prior to installation of temporary facilities or utilities. All roadway surfaces or other improvements which have been damaged by construction activities shall be repaired or replaced by the Contractor, as directed.

END OF SECTION 1-04

1-05 Control of Work

1-05.2 Authority of Assistants and Inspectors

(Local Agency SP)
Section 1-05.2 is supplemented with the following:

The Contracting Agency or the Contracting Agency's Representatives shall have the right to inspect and obtain copies of all written licenses, permits, or approvals issued by any governmental entity or agency to the Contractor, its delegates, or subcontractors, which are applicable to the performance of this Contract, and to inspect all Work and Materials for conformity with the Contract terms. The Contractor shall be responsible for ensuring the Work and materials conform to the Contract terms even if the Contracting Agency or the Contracting Agency's Representative conducts any inspection of the same.

1-05.4 Conformity With and Deviations from Plans and Stakes

(Local Agency SP)
Section 1-05.4 is supplemented with the following:

1-05.4(6) Construction Photographs or Video

Prior to and after construction, Contractor shall provide still photographs, or alternatively, audio color video of project area and adjacent site conditions. Filming plan shall be coordinated with the Contracting Agency's Representative. Filming shall be done at all areas where work will be done for the project so sufficient detail and coverage of the area is provided. Filming shall be done from differing directions, spacing, and angles to sufficiently show/depict the project area's conditions.

Photographs shall be done by a qualified commercial professional photographer. Photos shall be taken with a high-quality digital camera, with minimum 8-mega-pixel resolution.

Photographs shall be 3-inch by 5-inch color matte prints mounted on 8-1/2" by 11" cardstock, enclosed within plastic film folders, or other approved mounting. Pictures shall be logically arranged and bound in a 3-ring D binder. Photographs shall also be provided on USB Flash Drive(s) with an index correlated with the mounted prints. Pictures shall have the date, location, description, direction of filming and other pertinent reference information (e.g., facing east, facing south, etc.) on or below each image. Submit sample for review and approval in advance of producing bound document.

Video shall be done by qualified commercial professional photographer. Video equipment shall be a high-quality digital recorder. The video shall contain an audio track which narrates the progression of the video through the project area/site. Recording shall display index counter, date, and time of recording.

The pre-construction photographs or video shall be performed prior to commencement of the work and after initial staking of the project and construction limits. Post construction photographs shall be taken at final completion of the work. Post construction filming locations shall be similar to preconstruction filming locations. Submit 1 copy of photographs and USB Flash Drive(s) to the Engineer.

1-05.4(7) Existing Markers and Monuments

Contractor shall take necessary precautions to locate and protect existing markers, property corners, monuments, section corners, subdivision corners, plat markers, benchmarks, and all other reference points that may be affected by construction. All markers that may be disturbed by construction shall be identified, referenced, and replaced if disturbed in accordance with recognized surveying practices. Property corners, fences and other indications of property lines shall be referenced by the Contractor prior to construction and reset after completion of the construction operations in accordance with recognized survey practices.

Contractor shall not knowingly remove or disturb any such marker before a licensed land surveyor can reference such marker. Contractor shall be responsible for providing said survey services and shall be responsible for all costs for replacing markers and recording of surveys. Contractor will not be entitled to any delay costs for referencing an existing marker.

In the event that any of these items are not replaced by the Contractor, they shall be replaced by Engineer and the cost of this work shall be billed to the Contractor by the Contracting Agency.

1-05.4(8) Re-establishment of Existing Markers and Monuments

If a marker or monument must be disturbed, Contractor shall follow these steps in accordance with recognized survey practices:

1. Survey work associated with WAC 332-120 shall be performed for the removal and resetting of monuments.
2. Before Contractor disturbs monument(s), Contractor's Surveyor shall establish reference points to perpetuate the position of the monument(s) and an Application For Permit to Remove or Destroy a Survey Monument shall be filed with the Department of Natural Resources (DNR) as set forth in WAC 332-120, for all existing monuments that are subject to being disturbed, prior to construction of improvements.
3. Once a permit has been authorized by DNR, the Contractor may excavate monument(s).
4. The Contractor shall provide replacement monuments as shown on the Plans or as required by the County.
5. The Contractor shall set replacement monument, case, and cover in position.
6. Contractor's Surveyor shall verify the position and punch mark the brass cap.
7. Contractor's Surveyor shall file Completion Report for Monument Removal and Destruction with the Department of Natural Resources upon completion of monument replacement.

The Contractor shall be responsible for removal and resetting of markers and monuments disturbed by construction.

1-05.5 Project Record Drawings

(Local Agency SP)
Section 1-05.5 is added as the following:

The Contractor shall maintain two sets of full-size drawings and specifications for the Contract on site during the construction that shall be accessible for review by the Contracting Agency and the Engineer at all times. The Contractor's superintendent or authorized representative shall update the documents with clear and accurate red-lined field revisions and record information on a daily basis and within two (2) business days after receipt of information that a change in Work has occurred. The quality of the Record Drawings, in terms of accuracy, clarity, and completeness, shall be adequate to allow the Contracting Agency to modify the computer-aided drafting (CAD) Contract Drawings to produce a complete set of Record Drawings for the Contracting Agency without further investigative effort by the Contracting Agency.

The Record Drawing markups shall document all changes in the Work, both concealed and visible and shall be legible and accurately marked to indicate modifications in the completed work that differ from the design information shown on the Contract Plans. The Contractor shall not conceal any Work until the required information is recorded. Items that must be shown on the markups include, but are not limited to:

1. Actual dimensions, arrangement, and materials used when different than shown in the Plans.
2. Changes made by Change Order or Work Directive.
3. Changes made by the Contractor.
4. Accurate locations of storm sewer, sanitary sewer, water mains, and other water appurtenances, underground power and telephone, gas lines, structures, conduits, light standards, vaults, width of roadways, sidewalks, landscaping areas, building footprints,

channelization, and pavement markings, etc. Include pipe invert elevations, top of castings, (manholes, inlets, etc.).

Redline entries on the Record Drawings shall conform to the following standard:

1. Use erasable colored pencil (not ink) for all markings on the Record Drawings, conforming to the following color code:
2. Additions - Red
3. Deletions - Green
4. Comments - Blue
5. Dimensions - Graphite
6. Provide the applicable reference for all entries, such as the change order number, the request for information (RFI) number, or the approved shop drawing number.
7. Date all entries.
8. Clearly identify all items in the entry with notes similar to those in the Contract Drawings (such as pipe symbols, centerline elevations, materials, pipe joint abbreviations, etc.).

The Record Drawings shall be used for this purpose alone, shall be kept separate from other Plan sheets, and shall be clearly marked as Record Drawings. One set shall be submitted to the Engineer monthly along with the Contractor's request for progress payments. Failure to supply the record drawings each month or failure of the record drawings to reflect the above information in a clear and concise manner shall be basis for withholding the Contractor's Progress Payments until such time as they are completed to the satisfaction of the Engineer. Upon completion of review of the drawings, the Engineer shall either return the set of record drawings to the Contractor for continued use or may provide a new, unused set of documents for the Contractor's use.

Upon completion of all the work and prior to final acceptance, one or both of the sets of record drawings and specifications shall be delivered to the Engineer along with a copy of all supporting information. The Contractor shall certify on the Record Drawings that said drawings are an accurate depiction of built conditions, and in conformance with the requirements detailed above.

1-05.5(1) Project Electronic Data and Information

Electronic submittals shall conform to Section 1-12. This may include RFIs, Work Directives, Project Data Submittals/Shop Drawings, and other project correspondence. Protocol and requirements shall be discussed and worked out with the Contracting Agency and Engineer in advance. Electronic data and information shall be in a PDF format that conforms to Section 1-06.1(3). Due to security and other IT system constraints, file sizes may be limited. Contractor shall provide paper copies at the request of the Contracting Agency or Engineer.

Once the Contract is awarded, the Contracting Agency will grant the Contractor access to their EADOC software for the Contractor's use on this project. No user fees will be charged to the Contractor for this software. All costs for the training and use of this software shall be considered incidental to the Contract.

1-05.7 Removal of Defective and Unauthorized Work

(October 1, 2005 APWA GSP)
Section 1-05.7 is supplemented with the following:

If the Contractor fails to remedy defective or unauthorized work within the time specified in a written notice from the Engineer or fails to perform any part of the work required by the Contract Documents, the Engineer may correct and remedy such work as may be identified in the written notice, with Contracting Agency forces or by such other means as the Contracting Agency may deem necessary.

If the Contractor fails to comply with a written order to remedy what the Engineer determines to be an emergency situation, the Engineer may have the defective and unauthorized work corrected immediately, have the rejected work removed and replaced, or have work the Contractor refuses to perform completed

by using Contracting Agency or other forces. An emergency situation is any situation when, in the opinion of the Engineer, a delay in its remedy could be potentially unsafe, or might cause serious risk of loss or damage to the public.

Direct and indirect costs incurred by the Contracting Agency attributable to correcting and remedying defective or unauthorized work, or work the Contractor failed or refused to perform, shall be paid by the Contractor. Payment will be deducted by the Engineer from monies due, or to become due, the Contractor. Such direct and indirect costs shall include in particular, but without limitation, compensation for additional professional services required, and costs for repair and replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's unauthorized work.

No adjustment in contract time or compensation will be allowed because of the delay in the performance of the work attributable to the exercise of the Contracting Agency's rights provided by this Section.

The rights exercised under the provisions of this section shall not diminish the Contracting Agency's right to pursue any other avenue for additional remedy or damages with respect to the Contractor's failure to perform the work as required.

1-05.10 Guarantees

(Local Agency SP)
Section 1-05.10 is deleted and replaced with the following:

In addition to any special warranties provided elsewhere in the Project Documents, the Contractor warrants to the Contracting Agency that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Project Documents, and that the Work will conform to the requirements of the Project Documents as described herein. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and may be rejected. The Contractor's warranty excludes remedy for damage caused by abuse, improper or insufficient maintenance, or improper operation. If required by the Contracting Agency's Representative or Contracting Agency, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment provided.

Neither final acceptance by the Contracting Agency nor partial and final payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for faulty materials or workmanship.

If, prior to the expiration of one year after the date of final acceptance of all work or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any work (including materials and equipment) that is found to be defective or not in compliance with the Contract Documents, the Contractor shall promptly, without cost to Contracting Agency, either correct such work, or, if it has been rejected by Contracting Agency, remove and replace it with acceptable work. If the Contractor does not promptly comply with the notification issued by the Contracting Agency for correction of defective and/or non-complying work, the Contracting Agency may have the Work corrected or removed and replaced and all direct and indirect costs of such removal and replacement, including costs of all professional services, shall be paid by Contractor as provided for herein.

Actual or alleged knowledge by the Contracting Agency, Engineer and/or inspector(s), prior to acceptance of all work by the Contracting Agency, of defects or deficiencies in the Work shall not, in any way, affect or diminish the guarantee by the Contractor. The guarantee shall apply to all elements and parts of the Work, regardless of knowledge by the Contracting Agency, Engineer and inspector(s) of defects or deficiencies and regardless of failure of the Contracting Agency, Engineer and/or inspector(s) to inform the Contractor of known or suspected defects or deficiencies prior to final acceptance of the Work by the Contracting Agency.

All subcontractor's, manufacturers', and suppliers' warranties and guarantees, express or implied, for any part of the Work, materials and equipment shall be deemed obtained and shall be enforced by the Contractor for the benefit of the Contracting Agency without the necessity of formal transfer or assignment thereof. Warranties and guarantees by subcontractors, manufacturers, and suppliers shall begin on and extend for one year after the date of final acceptance by the Contracting Agency of all work.

All work (including materials and equipment) repaired or replaced in accordance with this Section shall be guaranteed for a period of one year after the date of acceptance by the Contracting Agency of the repair/replacement work.

Nothing contained in these provisions shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection, or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the Contracting Agency.

These guarantee provisions shall be inserted in all subcontracts and material contracts, and notice of these provisions shall be given to all persons furnishing materials for the Work when no formal contract is entered into for such materials.

1-05.11 Final Inspection

(Local Agency SP)
Section 1-05.11 is deleted and replaced with the following:

1-05.11 Facility Startup, Testing and Training

Contractor shall provide complete startup and testing/commissioning to ensure that equipment and mechanical, electrical, controls and special controls and instrumentation systems are properly installed and function, operate, and perform as intended and required. Contractor shall submit a startup and testing plan showing how the testing will be accomplished for review and acceptance by the Engineer prior to commencing startup and testing of the facilities. Follow the manufacturers recommended start up procedures and refer to technical specifications and drawings for additional information.

All mechanical and electrical equipment shall be tested by the Contractor before any system is put into operation. Testing procedures shall be designed to duplicate as nearly as possible all conditions of operations and shall be carefully selected to ensure that the equipment is not damaged. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, and connected. Any changes, adjustments or replacements required to make the equipment operate as required shall be carried out by the Contractor or a qualified technician of the seller or equipment representative as part of the work.

Before startup, the Contractor shall properly lubricate all bearings and other items which normally require lubrication and fill each gear case and oil reservoir to the proper operating level, using the equipment manufacturer’s supplied lubricant. If any equipment or system does not operate properly, the Contractor shall immediately replace or repair components until it operates properly. When the equipment start-up is complete, the Contractor shall submit a start-up and testing report to the Engineer.

Copies of field test reports shall be signed by the Contractor and provided to the Engineer along with the testing report.

Initial startup and testing or commissioning services shall include a minimum of one (1) 8-hour day(s).

System Startup and Testing General Requirements shall include the following:

1. Following initial startup and testing, the entire system shall be required to undergo a 10-day startup period in the presence of the Contracting Agency and Engineer. Any equipment failing or malfunctioning during this 10-day period shall be repaired or replaced, and when it is once again operational, shall be required to undergo a full 10-day startup period. Acceptance of the work and equipment will occur only after successful completion of the 10-day startup period.
2. The Contractor will supervise and be responsible for the proper maintenance and care of the equipment during the startup period and a succeeding 10-day period after successful startup.
3. When a motor, pump, valve, meter, instrument, or other item of equipment does not operate properly, adjustments shall be made by an experienced technical representative of the manufacturer.

4. If adjustments fail to correct the operation of a piece of equipment, remove and replace it with a suitable replacement that meets the operating requirements.

All components shall be calibrated by the Contractor after completion of installation. Components that cannot be properly calibrated or are found to exceed the specified range or accuracy shall be removed and replaced.

Contractor is responsible for determining that all equipment and all systems are functioning properly by start-up time. Prior to startup, the Contractor shall furnish documentation that the equipment provided is installed and is functioning in compliance with the manufacturer's recommended specification and instructions.

The Contractor shall anticipate that the Contracting Agency may delay acceptance of all work under the Contract if, in the judgment of the Contracting Agency, malfunctions or failures in operation of the system repeatedly occur after startup. The Contractor shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays, or complications caused by or resulting from delay by the Contracting Agency in accepting the work because of malfunctions or failures in operation of the system.

Immediately prior to final acceptance, Contractor shall make a final check of all lubrication requirements and leave all equipment properly lubricated, ready for Contracting Agency's use.

The Contractor shall demonstrate to the Contracting Agency's personnel, the proper manner of maintaining and adjusting the equipment and the systems. Work performed by the manufacturer's representative required for startup will not be considered as operator training even if the operators are present and witnessing the adjustments. Equipment startup will be completed before the required on-the-job operator training begins. Operator training services shall include a minimum of two (2) 8-hour days.

1-05.11(1) Substantial Completion

When the Contractor considers the work to be substantially complete, the Contractor shall notify the Engineer and request the Engineer establish the Substantial Completion Date. The Contractor's request shall list the specific items of work that remain to be completed in order to reach physical completion. The Engineer will schedule an inspection of the work with the Contractor to determine the status of completion and prepare a punch list of unresolved items. If the number of unresolved items exceeds 20, the Engineer may stop the inspection and notify the Contractor that the project is not ready for the Substantial Completion Inspection. The list of unresolved items shall be provided by the Engineer to the Contractor within 10 working days of the Contractor's request for Substantial Completion. The Engineer may also establish the Substantial Completion Date unilaterally. The Contractor will not be allowed an extension of contract time because of a delay in the performance of the work attributable to the exercise of the Engineer's right hereunder.

If the Engineer concurs with the Contractor that the work is substantially complete and the facilities can be used safely and are ready for the intended use, the Engineer, by written notice to the Contractor, will set the Substantial Completion Date. If, after this inspection the Engineer does not consider the work substantially complete and ready for its intended use, the Engineer will, by written notice, so notify the Contractor giving the reasons therefore.

Upon receipt of written notice concurring in or denying substantial completion, whichever is applicable, the Contractor shall pursue vigorously, diligently and without unauthorized interruption, the work necessary to reach Substantial and Physical Completion. The Contractor shall provide the Engineer with a revised schedule indicating when the Contractor expects to reach substantial and physical completion of the work.

The above process shall be repeated until the Engineer establishes the Substantial Completion Date and the Contractor considers the work physically complete and ready for final inspection.

1-05.11(2) Operational Testing

It is the intent of the Contracting Agency to have a complete and operable system prior to establishing the Substantial Completion Date. Therefore, when the work involves the installation of process, mechanical and electrical systems, the Contractor will be required to operate and test these systems for a period of time prior to the Substantial Completion Date. Process and mechanical equipment, electrical controls,

meters, or other devices and equipment to be tested during this period, shall be tested under the observation of the Contracting Agency or Engineer. Where such operational testing is required, the systems shall be tested under operating conditions for a reasonable period of time, but no less than the number of days stipulated, to assure their proper operation and function prior to establishing the Substantial Completion Date. During and following the test period, the Contractor shall correct any items of workmanship, materials, or equipment which do not meet the requirements of the Contract Documents, prove faulty, or that are not in good operating condition. Equipment that repeatedly breaks down or fails to operate or perform properly during this operational testing period will be cause to extend the testing period. The Substantial Completion Date will not be established until the necessary corrections and tests have been completed to the satisfaction of the Engineer and Contracting Agency.

The costs for equipment, labor, materials, supplies, power, gas, water, and everything else needed to successfully complete operational testing shall be included in the unit contract prices related to the system being tested, unless specifically set forth otherwise in the proposal.

Operational and test periods shall not affect a manufacturer's guaranties or warranties furnished under the terms of the contract.

1-05.11(3) Final Inspection and Physical Completion

When the Contractor considers the work physically complete and ready for final inspection, the Contractor, by written notice, shall request the Engineer to schedule a final inspection. The Engineer will set a date for final inspection. The Engineer and the Contractor will then make a final inspection and the Engineer will notify the Contractor in writing of all particulars in which the final inspection reveals the work incomplete or unacceptable. If the number of unresolved items exceeds 20, the Engineer may stop the inspection and notify the Contractor that the project is not ready for the Physical Completion Inspection.

The Contractor shall immediately take such corrective measures as are necessary to remedy the listed deficiencies. Corrective work shall be pursued vigorously, diligently, and without interruption until physical completion of the listed deficiencies. This process will continue until the Engineer is satisfied the listed deficiencies have been corrected.

If action to correct the listed deficiencies is not initiated within 7 days after receipt of the written notice listing the deficiencies, the Engineer may, upon written notice to the Contractor, take whatever steps are necessary to correct those deficiencies pursuant to Section 1-05.7.

The list of unresolved items shall be provided by the Engineer to the Contractor within 10 working days of the Contractor's request for Physical Completion. The Contractor will not be allowed an extension of contract time because of a delay in the performance of the work attributable to the exercise of the Engineer's right hereunder.

Upon correction of all deficiencies, the Engineer will notify the Contractor and the Contracting Agency, in writing, of the date upon which the work was considered physically complete. That date shall constitute the Physical Completion Date of the contract, but shall not imply acceptance of the work or that all the obligations of the Contractor under the contract have been fulfilled.

1-05.12 Final Acceptance

(Local Agency SP)
The first paragraph of Section 1-05.12 is deleted and replaced with the following:

The Contractor must perform all the obligations under the contract before a completion date and final acceptance can occur. Failure of the Contractor to perform all the obligations under the contract shall not bar the Contracting Agency from unilaterally accepting the contract as provided in Section 1-09.9. The Contracting Agency, or a duly authorized representative, accepts the completed contract and the items of work shown in the Comparison of Quantities by signature of the Notice of Completion and Acceptance. The date of that signature constitutes the acceptance date. Progress estimates or payments shall not be construed as acceptance of any work under the contract.

1-05.12(1) One-Year Guarantee Period

(Local Agency SP)
Section 1-05.12(1) is added as the following:

The Contractor shall return to the project and repair or replace all defects in workmanship and material discovered within one year after Final Acceptance of the Work. The Contractor shall start work to remedy any such defects within 7 calendar days of receiving Contracting Agency's written notice of a defect and shall complete such work within the time stated in the Contracting Agency's notice. In case of an emergency, where damage may result from delay or where loss of services may result, such corrections may be made by the Contracting Agency's own forces or another contractor, in which case the cost of corrections shall be paid by the Contractor. In the event the Contractor does not accomplish corrections within the time specified, the work will be otherwise accomplished and the cost of same shall be paid by the Contractor.

When corrections of defects are made, the Contractor shall then be responsible for correcting all defects in workmanship and materials in the corrected work for one year after acceptance of the corrections by Contracting Agency.

This guarantee is supplemental to and does not limit or affect the requirements that the Contractor's work comply with the requirements of the Contract or any other legal rights or remedies of the Contracting Agency.

1-05.13 Superintendents, Labor and Equipment of Contractor

(August 14, 2013 APWA GSP)
Delete the sixth and seventh paragraphs of Section 1-05.13 is revised to read as follows:

1-05.13(1) Emergency Contact List

(Local Agency SP)
The second sentence in the first paragraph of Section 1-05.13(1) is revised to read as follows:

The list shall include, at a minimum, the Prime Contractor's Project Manager, or equivalent, and the Prime Contractor's Project Superintendent.

1-05.14 Cooperation with Other Contractors

(Local Agency SP)
Section 1-05.14 is supplemented with the following:

The Contractor shall not cause unnecessary hindrance or delay to others working in the project area. If the performance of any contract for the project is likely to be interfered with by the simultaneous performance of other contracts, the Contracting Agency and Engineer will decide which Contractor shall cease work temporarily and which Contractor shall continue, or whether the work under the contracts can be coordinated so that the contractors may proceed simultaneously.

On questions concerning conflicting interest of contractors performing related work, the decision of the Contracting Agency and Engineer shall be binding upon all contractors concerned and the Contracting Agency, the Engineer, the Contracting Agency's Representative, and their consultants shall not be responsible for damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the award, performance, or attempted performance of other contracts in the project area or caused by a decision or omission of the Contracting Agency and Engineer regarding the order of precedence in the performance of the contracts.

If, through acts of neglect on the part of the Contractor, other parties suffer loss or damage in their Work, the Contractor agrees to settle with such others by agreement or arbitration, if such others will so settle. If such others assert any claim against the Contracting Agency, the Engineer, the Contracting Agency's Representative, or their consultants on account of damage alleged to have been so sustained, the Contracting Agency shall notify the Contractor, who shall hold harmless, indemnify, and defend the Contracting Agency, Engineer, the Contracting Agency's Representative, and their consultants, and each of their directors, officers, employees, and agents against any such claim, including all attorney's fees and any other costs incurred by the indemnified parties relative to any such claim.

Contractor shall coordinate his work with other contractors, public agencies, property owners, and utility companies which may have facilities or be working in the project area to minimize mutual interference. Contractor shall cooperate with the utility companies and/or their subcontractors and conduct his operations in a manner that the necessary construction of their facilities can be accomplished to the mutual satisfaction of the Contracting Agency and the utility companies.

Contractor shall also coordinate his activities with the Contracting Agency; and no water or sewer mains, individual water or sewer services, street, or private driveways may be closed off without a minimum five (5) working days' notice to the Contracting Agency and the private property owner. Should the property owner or the Contracting Agency have reasonable reason, as determined by the Engineer, to avoid access or water or sewer service shutoff at the scheduled time, the Contractor shall reschedule his work to meet the new condition.

The Contractor shall maintain overall coordination for the execution of the work. Based on the Construction Schedule prepared in accordance with these Specifications, the Contractor shall obtain from each subcontractor a similar schedule and shall be responsible for all parties maintaining these schedules or for coordinating required modifications.

1-05.15 Method of Serving Notices

(March 25, 2009 APWA GSP)
The second paragraph of Section 1-05.15 is revised to read as follows:

All correspondence from the Contractor shall be directed to the Project Engineer. All correspondence from the Contractor constituting any notification, notice of protest, notice of dispute, or other correspondence constituting notification required to be furnished under the Contract, must be in paper format, hand delivered or sent via mail delivery service to the Project Engineer's office. Electronic copies such as e-mails or electronically delivered copies of correspondence will not constitute such notice and will not comply with the requirements of the Contract.

END OF SECTION 1-05

1-06 Control of Materials

1-06.1 Approval of Materials Prior to Use

(Local Agency SP)
Section 1-06.1 and its associated subsections are deleted and replaced with the following:

All equipment, materials, and articles incorporated into the permanent work:

1. Shall be new, unless the Special Provisions permit otherwise;
2. Shall meet the requirements of the Contract Documents and be reviewed by the Engineer prior to use;
3. May be inspected or tested at any time during their preparation and use; and
4. Shall not be used in the work if they become unfit even after being previously approved.

The County and Engineer will be responsible for reviewing and approving submittals for all the Owner-furnished equipment. The approved submittal and shop drawings will be provided to the Contractor for review. Upon completion of the review, the Contractor shall provide a written notice to the County acknowledging the receipt of the submittal information, documenting the remaining submittals to be required during and post installation, and reporting any discrepancies or concerns that the Contractor may have on the submittals.

For Contract-furnished items, prior to use, the Contractor shall assemble and submit to the Contracting Agency, Project Data and Shop Drawings for all proposed materials. The Contractor shall prepare and update on at least a monthly basis a submittal control document that indicates the status of all submittals. The status report shall be initially developed to identify all shop drawing and submittal data to be assembled and submitted by Contractor for Engineer's review.

The Contractor is cautioned that equipment and materials for which submittals are required, and which are constructed, installed, or incorporated prior to Engineer's review is at Contractor's risk. Such equipment or materials may be rejected by the Contracting Agency, and if rejected, shall be removed and replaced by the Contractor if so ordered by the Engineer at the Contractor's expense.

1-06.1(1) Contractor Responsibility for Submittals

The Contract Drawings were developed to provide a general description of the work. These drawings do not and are not intended to provide all the details of each and every element of the work. The Contractor shall be responsible for, and prepare (or have prepared), all shop and working drawings required to supplement the Contract Drawings to establish the necessary details for construction.

Supplemental shop and working drawings shall be prepared by the Contractor as required by these Special Provisions. Supplemental shop and working drawings shall include, but not be limited to metal fabrication plans and details, erection plans and details, masonry layout plans and details, reinforcing steel plans and details, shoring plans and details, concrete formwork plans and details, equipment installation plans and details, piping layout and support plans and details. The Contractor shall be fully and completely responsible for the accuracy of the dimensions and details of the supplemental shop and working drawings, including those prepared by subcontractors, suppliers, and detailers and for full and complete conformity with the defined and implied intent of the Contract Documents. The Contractor shall check all shop drawings to make sure they conform with the Contract Documents, and in the case of re-submittals, that all review comments have been addressed prior to transmittal.

The Contractor shall coordinate between suppliers to verify that equipment, mechanical, electrical, structural elements, and other parts of the work correctly interface. The Contractor shall check and verify field dimensions of new and existing work as needed to ensure that shop drawings and other submittals are correctly dimensioned. Catalog cut sheets shall be clearly marked or notated as to which items are intended to be supplied. The Contractor's shop drawings and submittals that have been carelessly or improperly prepared and clearly not reviewed by the Contractor will be returned un-reviewed.

The Contractor shall prepare and timely transmit submittals so as not to delay the construction schedule. The Contractor is responsible for the timeliness of submittals prepared by his suppliers and

subcontractors. The Contractor shall anticipate the time required for review and possible re-submittals, and shall include reasonable amounts of time for preparation, distribution, and review of submittals in the construction schedule. The Contracting Agency and Engineer shall process submittals expeditiously and endeavor to complete reviews as quickly as possible but is under no obligation to waive procedures or expedite processing because of untimely submittals by the Contractor.

By approving and submitting shop drawings, product data and samples, the Contractor represents that he/she has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he/she has checked and coordinated the information contained within such submittals with the requirements of the work and Contract Documents, including with associated subcontractors, and is fully satisfied that they conform to the Contract Documents.

The Contract Price shall include the cost of furnishing all shop drawings, product data and samples, and the Contractor will be allowed no extra compensation for such drawings, product data or samples.

1-06.1(2) Limitations of Engineer's Submittal Reviews

Engineer's review and acceptance will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

Engineer's review and acceptance will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and acceptance of a separate item as such will not indicate acceptance of the assembly in which the item functions.

Engineer's review and acceptance of required Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Section 1-06.1(4) of the Special Provisions, and Engineer has given written acceptance of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and acceptance shall not relieve Contractor from responsibility for complying with the requirements of Section 1-06.1(3) of the Special Provisions.

Engineer's check and review of Shop Drawings and Samples, Standard Specifications and descriptive literature submitted by Contractor will be only for general conformance with design concept, except as otherwise provided, and shall not be construed as:

1. Permitting any departure from the Contract Requirements;
2. Relieving the Contractor of the responsibility for any error in details, dimensions or other issues that may exist in such submittals;
3. Constituting a blanket acceptance of dimensions, quantities, or details of the material or equipment shown; or
4. Approving departures from additional details or instructions previously furnished by Engineer. Such check or review shall not relieve Contractor of the full responsibility of meeting all of the requirements of the Contract Documents.

1-06.1(3) Submittal Procedures and Requirements

For any submittals that the Contractor is responsible for administrating, the Contractor shall transmit each submittal to the Engineer as identified in Section 1-12.3 of the Special Provisions. The Contractor shall certify that the contents of the submittal have been checked by the Contractor for conformance with the requirements of the Contract Documents. Submittals will not be reviewed without this certification. If it appears to the Engineer that the submittal has not been checked by the Contractor, no further review will occur and it will be deemed incomplete and returned to the Contractor with a determination of "Revise and Resubmit".

Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

1. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
2. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
3. All information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
4. Shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

A separate form shall be used for a given specification section. That is, only an item or items that pertain to a given section shall be listed. Different items within a given section shall be listed.

All submittals shall be transmitted to the Engineer via the Contractor. Submittals direct from subcontractors or suppliers will not be accepted. Any communications which may occur between the Engineer and subcontractors and suppliers shall not be construed as binding on the Engineer, Contracting Agency or Contractor unless formalized in accordance with procedures set forth in the Contract Documents.

Approved File Formats

Submittals shall be Adobe PDF file format, version 8.0 or greater.

1. Bookmark all chapters, sections, and drawings.
    a. Bookmarks shall include a logical description of the chapter or section or the title and number of the drawing.
2. Format shall be standard letter 8.5" x 11" for text and/or 11" x 17" landscape for drawings.
3. Acceptable fonts include:
    a. Arial
    b. Verdana
    c. Helvetica,
    d. Times New Roman
4. Font sizes for text-based documents must be no less than 10 pt and no greater than 14 pt for general text and no less than 12 pt and no greater than 18 pt for headers.
5. Font color must be black.
6. Text decoration, such as bold and italic, may only be used to emphasize key points.
7. Hyperlinks and graphics within the file is encouraged when appropriate.
8. Hyperlinks must use relative addressing.
9. Hyperlinks to information outside the primary domain of the client's intranet are unacceptable.
10. File names shall be in English, clearly convey the information contained in the file, and shall not exceed 100 characters in length. Only standard abbreviations may be used in file names.
11. Scanned documents are unacceptable.
12. Files shall not be password protected.

Each submittal shall be numbered consecutively, i.e., 1, 2, 3, etc. Assign re-submittals the same number as the original with a suffix of a sequential letter to denote it as a re-submittal. For example, the first re-submittal of submittal 25 would be 25A. Include only those items previously issued under the original submittal in re-submittals. Do not combine new submittals with re-submittals.

Where contents of submitted literature from manufacturers include data not pertinent to the submittal, the Contractor shall clearly indicate which item(s) or portion of the contents is provided and is to be reviewed by the Engineer.

The project data must be submitted in accordance with the instructions or the submittal may be returned without review, and the Contractor will not be entitled to any increase in Contract time. The Engineer will, upon completion of the review, return the transmittal form and a PDF copy of the submittal project data to the Contractor.

Engineer's review will be completed within ten (10) working days after receipt by Engineer of each complete submittal in proper sequence and will be returned to Contractor with one of the following markings:

1. "No Exceptions" indicates submittal has been reviewed and appears to be in conformance with requirements of the Contract Documents.
2. "Make Corrections Noted" indicates submittal appears to be in general conformance with requirements of the Contract Documents but requires some corrections. Contractor shall incorporate the corrections noted. No re-submittal is required.
3. "Revise-Resubmit" indicates submittal does not appear to be in conformance with the Contract Documents. Engineer's comments will be noted on the submittal or in a separate letter. Contractor shall recheck, make necessary revisions, and resubmit.
4. "Reference" or "For Information Only" indicates submittal gives general information incidental to, but not required for, review or acceptance by the Engineer.
5. "Submittal Not Required-No Action Taken" indicates that the submittal is not called for by the Contract Documents and that no action was taken by Engineer on the submittal.

The Contractor shall submit to the Contracting Agency, to demonstrate compliance with applicable safety and environmental regulations, copies of any safety and accident prevention or pollution control and/or environmental monitoring plans applicable to the project and required of the Contractor by law, as well as any on-site safety program measures applicable to the Contracting Agency or its agents or members of the public visiting the work area. When such documents require approval by a government agency, the Contractor shall also furnish evidence of approval. These submittals are informational and any comment or lack of comment by the Contracting Agency or Engineer thereon shall not be construed as either acceptance or rejection of these documents, which shall be a matter for agencies having jurisdiction.

If the Contractor fails to make the proper changes to the submittal and the Engineer is required to review a submittal more than three (3) times, the Contracting Agency may deduct the costs for subsequent reviews from the Contract Price.

1-06.1(4) Submittal Variations

Variations from the Contract Document are not allowed without prior acceptance by the Engineer and shall be made at no additional cost to the Contracting Agency or extension of the contract time unless accepted by a change order. Contractor shall give Engineer specific written notice of any such variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. The variations shall be specifically identified on each Shop Drawing or Sample submitted to Engineer for review and acceptance and shall direct specific attention to each deviation from the Contract Documents and state any trades, dimension, functions or other aspects of the work that will be affected by the proposed change. Otherwise, the Contractor will not be relieved of the responsibility of executing the Work in accordance with the Contract Documents, even though such Shop Drawings or Samples have been otherwise reviewed.

The Contractor is responsible for the design of any construction changes resulting from any such deviation, for dimensions which shall be confirmed and coordinated at the job site, for fabrication processes and techniques of construction, for coordination of the work with that of all trades and for a complete installation which will function as intended and originally specified.

If a Shop Drawing or Sample, as submitted, indicates a variation from the Contract Requirements as set forth in the Contract Documents, Contractor shall identify the cost of the variation on the Shop Drawing or Sample. If the Engineer finds the variation to be in the interest of Contracting Agency and the variation involve no change in the Contract Price or time for performance, Engineer may approve the Shop Drawings or Samples.

1-06.1(5) Re-submittals

Contractor shall make corrections required by Engineer and shall return corrected copies in accordance with procedures described in Special Provision 1-06.1(3). Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

1-06.4 Handling and Storing Materials

(Local Agency SP)
Section 1-06.4 is supplemented with the following:

1-06.4(1) Pipe

Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with soft coatings such as coal tar enamel, paint, or the like shall be stored to protect the coating from physical damage or other deterioration and shall only be handled with padded, wide slings. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

1-06.4(2) Equipment and Devices

All equipment shall be adequately and effectively protected against damage from moisture, dust, handling, or other causes during transport from manufacturer's premises to the site. Each item or package shall be clearly marked with the number unique to the specification reference covering the item.

Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible.

All equipment items and valves with an assigned equipment number in this Project Manual shall have affixed to them in a prominent location, a label or tag displaying the assigned equipment number. Equipment item and valves lacking a number shall have a similar tag providing a unique description of the item. Markers shall be of stainless steel or aluminum, affixed to the item with stainless steel fasteners, or as otherwise approved by the Engineer. Plastic labels will not be acceptable.

During the interval between delivery and installation, all equipment shall be stored in enclosed, weather-tight licensed commercial warehouses. Environmental controls such as heaters or protective encapsulation shall be provided to ensure against condensation and moisture damage. In the event prolonged (more than 90 days) storage is required for any item of rotative equipment, the Contractor shall institute a preventive maintenance program that shall include grease protection of bare metal surfaces, periodic indexing of rotating parts, renewal of grease in bearings, and any procedures recommended by the manufacturer. The Contractor shall maintain adequate records to demonstrate full compliance with these requirements. All equipment shall be available for inspection by the Engineer.

After installation, all equipment shall be protected from damage, including but not limited to moisture, dust, abrasive particles, debris, and dirt generated by the placement, chipping, sandblasting, cutting, finishing, and grinding of new or existing concrete, terrazzo, and metal as well as the fumes, particulate matter, and splatter from welding, brazing, and painting of new and existing piping and equipment. The Contractor is advised that as a minimum, vacuum cleaning, blowers with filters, protective shielding, and other dust-suppression methods will be required at all times to adequately protect all equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent

the entry of paint. Electrical switch gear, unit substation, and motor load centers shall not be installed until all concrete work and sandblasting in those areas have been completed and accepted.

1-06.4(3) Delivery of Material or Equipment

The Owner-furnished products will be delivered to the Central Kitsap Wastewater Treatment Plant with attention to the County's Construction Manager. The Contractor and the Owner will jointly perform the Contractor Delivery Acceptance in accordance with the Specification Sections 01 64 13 and 01 64 16.

The Contracting Agency's or Engineer's personnel or representatives of the Contracting Agency or Engineer will not accept materials or equipment deliveries for the Contractor.

1-06.6 Substitutions

(Local Agency SP)
Section 1-06.6 is added as the following:

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review.

"Or Equal Items"

"Or Equal" Items: If, in Engineer's sole discretion, an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or equal" item, in which case review and acceptance of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if; in the exercise of reasonable judgment Engineer determines:

1. The proposed item is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
2. The proposed item will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
3. Operation and maintenance costs and requirements are reasonably similar; and
4. The proposed item has a proven record of performance and comparable availability of service and parts.

Contractor shall also certify that, if approved and incorporated into the Work:

1. No increase in cost to the Contracting Agency or increase in Contract Times will result, and
2. The proposed item will conform to the detailed requirements of the item named in the Contract Documents.

If requested by the Engineer, Contractor shall furnish additional information for the Engineer's review and consideration. Insufficient or inadequate information to substantiate an "or equal" determination by the Engineer will be grounds for rejection.

Substitute Items

If, in Engineer's sole discretion, an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute. Requests for review of

proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

The requirements for review by Engineer will be as set forth herein and as Engineer may decide is appropriate under the circumstances. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1. Shall certify that the proposed substitute item will:
    a. Perform adequately the functions and achieve the results called for by the general design,
    b. Be similar in substance to that specified, and
    c. Be suited to the same use as that specified.
2. Will state:
    a. The extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;
    b. Whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Contracting Agency for other work on the Project) to adapt the design to the proposed substitute item; and
    c. Whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
3. Will identify:
    a. All variations of the proposed substitute item from that specified;
    b. Available engineering, sales, maintenance, repair, and replacement services; and
    c. Schedule impacts and changes to the construction schedule.
4. Shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

Contractor shall supply three (3) copies of data substantiating compliance of proposed product or supplier with Contract Documents on all requests for acceptance of change of any product or manufacturer. Each copy shall include:

1. Detailed description of the proposed change, including:
    a. Product identification, including manufacturer's name and address;
    b. Manufacturer's identification, including manufacturer's name and address;
    c. Samples of proposed products;
    d. Name, address, and telephone number of contact persons for similar projects on which product was used and date of installation; and
    e. Drawings indicating and vertical details of all architectural, structural, mechanical, and electrical elements of proposed change.
2. Itemized comparison of proposed substitution with product or supplier specified;
3. Relation to separate subcontracts and trades;
4. Cost data on proposed substitution in comparison with product or supplier specified; and
5. Operation and maintenance requirements and costs;

Requests for change of product or design shall include certification by the Contractor that:

1. The Contractor has personally investigated the proposed product or design deviation and has determined that it is equal or superior in all respects to that specified;
2. The Contractor will provide the same guarantee for product or design deviation as for product or design specified; and
3. The Contractor will coordinate installation of accepted product or design deviation into work, making such changes as may be required for work to be complete in all respects.

Requests for change of products will not be considered if:

1. They are indicated or implied on project data submittals without a formal request having been submitted; and/or
2. Acceptance will require substantial revision to the Contract Documents.

Substitute Construction Methods or Procedures

If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those required for substitute items.

Engineer's Evaluation

Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made. Engineer may require Contractor to furnish additional data about the proposed substitute item, method, or procedure. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed, or utilized until Engineer's review is complete, which will be evidenced by either a Change Order or an approved Shop Drawing. Engineer will advise Contractor in writing of any negative determination. The Engineer may elect to reject any or all requests for deviation at his sole discretion without cause or justification. The Contractor shall immediately proceed with the Work in accordance with the Contract Documents upon notification of rejection of any request for deviation.

Special Guarantee

Contracting Agency may require Contractor to furnish, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute, change in construction methods or procedures, or change in design.

Engineer's Cost Reimbursement

Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, the Contracting Agency may subtract said costs from payments due to the Contractor. The Contracting Agency may also subtract any charges of the Engineer associated with making changes in the Contract Documents (or in the provisions of any other direct contract with Contracting Agency) resulting from the acceptance of each proposed substitute.

Contractor's Expense

Contractor shall provide all data in support of any proposed substitute or "or equal" at Contractor's expense. The Contractor shall be responsible for and assume all costs of all elements involving implementing and completing approved deviations including, but not limited to, coordination, confirming dimensions at the job site, design, preparation of plans, procurement of materials and equipment, fabrication, construction, installation, and instigation of service. If, in the opinion of the Engineer, the completed improvements of each deviation do not fulfill, provide, and meet the defined and implied intent of the Contract Documents, the Contractor shall provide the labor, materials, and equipment required to modify the Work to the satisfaction of the Engineer.

The Contractor shall be responsible for modifications to electrical, structural, mechanical, or other aspects of the work or design as required to install or incorporate materials or equipment selected by the Contractor.

Regardless of the method of specification or selection, any product which is installed or incorporated into the work without prior acceptance of the Engineer may not be accepted by the Contracting Agency.

When material or equipment is specified by performance requirement or reference to specifications, standards, or publications of organizations, the Contractor shall select material or equipment which the Contractor considers to comply with the specified reference standard. The Contractor shall submit a request for acceptance of the selected product in accordance with these Special Provisions.

1-06.7 Testing and Quality Control

(Local Agency SP)
Section 1-06.7 is added as the following:

Contracting Agency-Furnished Testing and Inspections

The Contracting Agency will retain a qualified independent agency to perform the laboratory and/or field tests listed below:

1. Special inspections

Contractor shall fully cooperate with Contracting Agency-Furnished Testing and Inspections. Contractor shall provide Contracting Agency's Representative timely notice on the readiness of work for required inspections, tests, or acceptance. Contractor shall provide access to the work for testing personnel. Where testing is to be performed in a potentially unsafe or confined work area, Contractor shall stop work and provide all required safety measures to assure the safety of testing personnel.

Contractor shall anticipate that such testing may hinder, delay, or complicate execution of the work. Contractor shall not be entitled to an extension of Contract Time or to any claim for damages because of hindrances, delays, or complications caused by or resulting from laboratory and/or field testing performed by the Contracting Agency.

Special inspection by certified inspectors and a certified testing lab may be required on the following, but not limited to:

1. Structural steel
2. Structure excavation/fill
3. Anchor bolts

Contractor shall coordinate with the Contracting Agency's Representative and fully cooperate with the testing services company for the above testing and special inspections and other testing and special inspections as may be specified elsewhere in the Special Provisions. Contractor shall provide access to the work for testing personnel. Where testing is to be performed in a potentially unsafe or confined work area, Contractor shall stop work and provide all required safety measures to assure the safety of testing personnel. Contractor shall furnish Engineer copies of all agency inspection reports or approvals.

Correction of Defective Work

If test or operational results indicate that the work performed, or materials or equipment furnished, by the Contractor does not comply with the Contract Documents, Contractor shall immediately take all necessary measures to correct the defective work, and/or replace defective materials or equipment. Depending on the situation, an independent testing firm may be retained to test the corrected work to determine if the corrections are satisfactory. All costs that are incurred by the Contracting Agency and Engineer as a result of the defective work, materials, or equipment, including retesting, shall be borne by the Contractor, and will be deducted from progress payments.

END OF SECTION 1-06

1-07 Legal Relations and Responsibilities to the Public

1-07.1 Laws to be Observed

(October 1, 2005 APWA GSP)
Section 1-07.1 is supplemented with the following:

In cases of conflict between safety regulations, the more stringent regulation shall apply.

The Washington State Department of Labor and Industries shall be the sole and paramount administrative agency responsible for the administration of the provisions of the Washington DOSH.

The Contractor shall maintain at the project site office, or other well-known place at the project site, all articles necessary for providing first aid to the injured. The Contractor shall establish, publish, and make known to all employees, procedures for ensuring immediate removal to a hospital, or doctor's care, persons, including employees, who may have been injured on the project site. Employees shall not be permitted to work on the project site before the Contractor has established and made known procedures for removal of injured persons to a hospital or a doctor's care.

The Contractor shall have sole responsibility for the safety, efficiency, and adequacy of the Contractor's plant, appliances, and methods, and for any damage or injury resulting from their failure, or improper maintenance, use, or operation. The Contractor shall be solely and completely responsible for the conditions of the project site, including safety for all persons and property in the performance of the work. This requirement shall apply continuously, and not be limited to normal working hours. The required or implied duty of the Engineer to conduct construction review of the Contractor's performance does not, and shall not, be intended to include review and adequacy of the Contractor's safety measures in, on, or near the project site.

(Local Agency SP)
Section 1-07.1 is further supplemented with the following:

The Contractor shall be responsible to immediately report to the Engineer any deviation from the contract provisions pertaining to environmental compliance, including but not limited to spills, unauthorized fill in waters of the State, including wetlands, water quality standards, noise, air quality, etc.

1-07.2 State Taxes

(June 27, 2011 APWA GSP)
Section 1-07.2 is deleted, including its sub-sections, and replaced with the following:

1-07.2 State Sales Tax

The Washington State Department of Revenue has issued special rules on the State sales tax. Sections 1-07.2(1) through 1-07.2(3) are meant to clarify those rules. The Contractor should contact the Washington State Department of Revenue for answers to questions in this area. The Contracting Agency will not adjust its payment if the Contractor bases a bid on a misunderstood tax liability.

The Contractor shall include all Contractor-paid taxes in the unit bid prices or other contract amounts. In some cases, however, state retail sales tax will not be included. Section 1-07.2(2) describes this exception.

The Contracting Agency will pay the retained percentage (or release the Contract Bond if a FHWA-funded Project) only if the Contractor has obtained from the Washington State Department of Revenue a certificate showing that all contract-related taxes have been paid (RCW 60.28.051). The Contracting Agency may deduct from its payments to the Contractor any amount the Contractor may owe the Washington State Department of Revenue, whether the amount owed relates to this contract or not. Any amount so deducted will be paid into the proper State fund.

1-07.2(1) State Sales Tax – Rule 171

WAC 458-20-171, and its related rules, apply to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used primarily for foot or vehicular traffic. This includes storm or combined sewer systems

within and included as a part of the street or road drainage system and power lines when such are part of the roadway lighting system. For work performed in such cases, the Contractor shall include Washington State Retail Sales Taxes in the various unit bid item prices, or other contract amounts, including those that the Contractor pays on the purchase of the materials, equipment, or supplies used or consumed in doing the work.

1-07.2(2) State Sales Tax – Rule 170

WAC 458-20-170 and its related rules apply to the constructing and repairing of new or existing buildings, or other structures, upon real property. This includes, but is not limited to, the construction of streets, roads, highways, etc., owned by the state of Washington; water mains and their appurtenances; sanitary sewers and sewage disposal systems unless such sewers and disposal systems are within, and a part of, a street or road drainage system; telephone, telegraph, electrical power distribution lines, or other conduits or lines in or above streets or roads, unless such power lines become a part of a street or road lighting system; and installing or attaching of any article of tangible personal property in or to real property, whether or not such personal property becomes a part of the realty by virtue of installation.

For work performed in such cases, the Contractor shall collect from the Contracting Agency, retail sales tax on the full contract price. The Contracting Agency will automatically add this sales tax to each payment to the Contractor. For this reason, the Contractor shall not include the retail sales tax in the unit bid item prices, or in any other contract amount subject to Rule 170, with the following exception.

Exception: The Contracting Agency will not add in sales tax for a payment the Contractor or a subcontractor makes on the purchase or rental of tools, machinery, equipment, or consumable supplies not integrated into the project. Such sales taxes shall be included in the unit bid item prices or in any other contract amount.

1-07.2(3) Services

The Contractor shall not collect retail sales tax from the Contracting Agency on any contract wholly for professional or other services (as defined in Washington State Department of Revenue Rules 138 and 244).

1-07.5(3) State Department of Ecology

(Local Agency SP)
Section 1-07.5(3) is supplemented with the following:

The Contractor shall provide for safe access to the construction site and to the Contractor's records by the Washington State Department of Ecology personnel.

1-07.5(8) Noise Restrictions

(Local Agency SP)
Section 1-07.5(8) is added as the following:

The Contractor shall comply with all local controls and noise level rules, specified requirements, regulations and ordinances which apply to any work performed pursuant to the Contract. If the requirements of this Section are more restrictive than those of the local regulations or specified in Section 02 22 29, the requirements of this Section shall govern.

Each internal combustion engine, used for any purpose on the job or related to the job, shall be enclosed, and shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler and enclosure.

Noise levels for scrapers, pavers, graders, and trucks shall not exceed 90 dBA and pile drivers shall not exceed 95 dBA at 50 feet as measured under the noisiest operating conditions. For all other equipment, noise levels shall not exceed 85 dBA. Equipment that cannot meet these levels shall be quieted by the use of improved exhaust mufflers, portable acoustical screens, or other means. Equipment not modified to meet these requirements shall be removed from the project.

Where feasible, the Contractor shall use electric rather than diesel or gas-powered equipment.

1-07.6 Permits and Licenses

(Local Agency SP)
Section 1-07.6 is deleted and replaced with the following:

1-07.6(1) Contracting Agency-Furnished Permits

No Contracting Agency furnished permits are anticipated.

1-07.6(2) Contractor-Furnished Permits

The Contractor shall apply for, and pay all costs associated with all other required permits not listed as Contracting Agency-Furnished Permits in Section 1-07.6(1) above. Failure of the Contractor to identify and obtain all required permits shall not relieve the Contractor of the responsibility of compliance with all applicable regulatory requirements.

The Contractor shall comply with all conditions and requirements of the Contractor-Furnished Permits. The Contractor shall provide safe access to the project by regulatory officials for determination of compliance. The Contractor shall anticipate that compliance with the permits and any necessary corrective action may result in delay or hindrance of the Contractor's prosecution of the work. The Contractor shall not be entitled to any additional compensation or extension of Contract Time for delays or additional work resulting from compliance with Contractor-Furnished Permits.

The Contractor shall furnish all bonds and insurance required by the controlling agencies, and shall, if requested, pay for any inspection and testing.

The Contractor shall furnish the Engineer with one copy of each permit issued for borrow, fill, or waste material required for or generated by the contract work. The Contractor shall notify the Engineer in writing of the location of all borrow, fill, and waste sites regardless of whether a permit is required.

All costs incurred by the Contractor in procuring permits and complying with stipulations in the permits and approvals shall be incidental to and included in the various items of work in the project; and no additional compensation will be made.

Anticipated Contractor-Furnished Permits include:

1. State of Washington Department of Ecology Construction Stormwater General Permit
2. Electrical Permit

1-07.6(3) Business and Contracting Licenses

At a minimum, the Contractor and his subcontractors shall have the following licenses and shall submit proof of such licensing to the Contracting Agency upon request:

1. Washington State Contractor License
2. Washington State Business License

1-07.9 Wages

1-07.9(1) General

(Local Agency SP)
Section 1-07.9(1) is supplemented with the following:

Workers shall be paid at least the wages printed in the current prevailing wage rates at the time of the bid opening as prepared by the Department of Labor and Industry. A copy of the journey level rates for Kitsap County rates is included in Appendix E and is made a part of the Contract. The Contractor is referred to the Department of Labor and Industries website stated below for information regarding apprentice level rates. Contractor shall be responsible for checking and obtaining any updates or corrections to these wage rates and complying with any modifications prior to bidding. Contractor shall account for increased labor costs in his bid and no additional payment shall be made for increases in the prevailing wage rates for the project's duration. Prevailing wage rates can be obtained from the Industrial Statistician upon request at the following address:

Department of Labor and Industries
Prevailing Wage Office
P.O. Box 44540
Olympia, WA 98504-4540
Telephone: (360) 902-5335
Fax: (360) 902-5300
http://www.lni.wa.gov/TradesLicensing/PrevWage/WageRates

Contractors may also contact the Kitsap County Purchasing Office at the contact information contained in the Invitation to Bid to view or obtain a hard copy of the applicable wage rates.

Before payment is made by or on behalf of the Contracting Agency of any sums due under this Contract, the Contractor and each subcontractor shall submit a Statement of Intent to Pay Prevailing Wages and an Affidavit of Wages Paid. It shall be the responsibility of the Contractor to require all subcontractors to complete Affidavits of Wages Paid and to make the proper filing of same.

A fee per each Statement of Intent to Pay Prevailing Wages and Affidavit of Wages Paid is required to accompany each form submitted to the Department of Labor and Industries. The Contractor is responsible for payment of these fees and shall make all applications directly to the Department of Labor and Industries with a copy of all said applications being provided to the Contracting Agency. These fees shall be incidental to and included in the Contract Price.

1-07.13 Contractor's Responsibility for Work

1-07.13(1) General

(Local Agency SP)
Section1-07.13(1) is supplemented with the following:

The Contracting Agency reserves the right to use and/or occupy any portion of the project or it's improvements which have been completed sufficiently to permit use and occupancy and such use shall not be construed as an acceptance of the work or any part thereof, and any claims which the Contracting Agency may have against the Contractor shall not be deemed to have been waived by such use and/or occupancy.

1-07.14 Responsibility for Damage

(Local Agency SP)
Section 1-07.14 is supplemented with the following:

The Contractor shall protect, defend, indemnify, and save harmless the Contracting Agency, its officers, officials, employees, agents, and Engineer from any and all claims, demands, suits, penalties, losses, damages, judgments, or costs of any kind whatsoever (hereinafter "claims"), arising out of or in any way resulting from the Contractor's officers, employees, agents, and/or subcontractors of all tiers, acts or omissions, performance or failure to perform this Contract, to the maximum extent permitted by law or as defined by RCW 4.24.115, now enacted or as hereinafter amended.

The Contractor's obligations under this section shall include, but not be limited to:

1. The duty to promptly accept tender of defense and provide defense to the Contracting Agency at the Contractor's own expense.
2. The duty to indemnify and defend the Contracting Agency and Engineer from any claim, demand, and/or cause of action brought by or on behalf of any of its employees, or agents. The foregoing duty is specifically and expressly intended to constitute a waiver of the Contractor's immunity under Washington's Industrial Insurance Act, RCW Title 51, as respects the Contracting Agency with a full and complete indemnity and defense of claims made by the Contractor's employees. The parties acknowledge that these provisions were mutually negotiated and agreed upon by them.
3. To the maximum extent permitted by law, the Contractor shall indemnify and defend the Contracting Agency and Engineer from and be liable for all damages and injury which shall be caused to owners of property on or in the vicinity of the work or which shall occur

to any person or persons or property whatsoever arising out of the performance of this Contract, whether or not such injury or damage is caused by negligence of the Contractor or caused by the inherent nature of the work specified.

The Contracting Agency may, in its sole discretion, withhold amounts sufficient to pay the amount of any claim for injury, and/or pay any claim for injury of which the Contracting Agency may have knowledge, regardless of the formalities of notice of such claim, arising out of the performance of this Contract.

An amount withheld will be held until the Contractor secures a written release from the claimant, obtains a court decision that such claim is without merit, or satisfies any judgment on such claim. In addition, the Contractor shall reimburse and otherwise be liable for claims costs incurred by the Contracting Agency, including, without limitation, costs for claims adjusting services, attorneys, engineering, and administration.

In the event the Contracting Agency incurs any judgment, award, and/or costs arising, including attorneys' fees, from enforcing the provisions of this provision, all such fees, expenses, and costs shall be recoverable from the Contractor.

1-07.15(1) Spill Prevention, Control and Countermeasures Plan

(Local Agency SP)
Section 1-07.15(1) is supplemented and modified as follows:

All costs associated with this work shall be considered incidental to the construction and included in other items of work.

1-07.16(6) Interfering Structures

(Local Agency SP)
Section 1-07.16(6) is added as the following:

The Contractor shall take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground. An attempt has been made to show major structures on the Drawings. The completeness and accuracy of information shown however, cannot be guaranteed. Protect underground and aboveground existing structures from damage, whether or not they lie within the limits of the easements obtained by the Contracting Agency. Where such existing fences, gates, barns, sheds, buildings, or any other structure must be removed in order to properly carry out the construction, or are damaged during construction, restore to their original condition to the satisfaction of the property owner involved at the Contractor's own expense. Notify the Engineer of any damaged underground structure and make repairs or replacements before backfilling.

If existing structures are encountered which prevent the construction, and which are not properly shown on the Drawings, notify the Engineer before continuing with the construction in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing structures. It is expected that minor relocations of the work will be necessary during the progress of construction. If the Contractor fails to notify the Engineer when an existing structure is encountered, and proceeds with construction despite this interference, the Contractor shall do so at the Contractor's own risk and expense.

1-07.17 Utilities and Similar Facilities

(Local Agency SP)
Section 1-07.17 is supplemented with the following:

The information shown or indicated in the Contract Documents with respect to existing underground facilities at or contiguous to the site is based on available information furnished to the Contracting Agency or Engineer by the owners of such Underground Facilities without necessarily uncovering, measuring or other verification of the utilities. The depth of existing utilities, if indicated, may only be an approximation. Additional utilities may be encountered and the actual locations of the utilities indicated on the Plans may vary from the locations indicated. The information is provided for the convenience of the Contractor only, and no responsibility is assumed by either the Contracting Agency or the Engineer for its accuracy or completeness. The Contractor shall have full responsibility for reviewing and checking utility information, locating all underground facilities, and coordinating work with the owners of such underground facilities.

The Contractor shall take the necessary precautionary measures to protect the existing utilities and structures indicated and any other utilities or structures which may be encountered during construction and shall be responsible for the repair of any damage thereto resulting from the work if:

1. The utility owner has field located and marked its facilities and the actual location of any portion of the utility is within two feet horizontally either side of said location mark; or
2. The utility system is visible or has become visible or can be reasonably assumed to exist at the location due to visible evidence prior to the damage; or
3. The Contractor failed to provide the required notification to the utility owner prior to the damage to the utility; or
4. The actual depth is different by more than one (1) foot from than that indicated on the Plans.

Existing underground utilities, whether public or private, which are damaged by the Contractor, will be repaired by the utility owner, or as directed by the utility owner.

All existing utilities shall be maintained in continuous operation and properly protected during the Contractor's operations unless the Contractor receives written approval from the utility owner for interruption of service. In addition, all work by the Contractor adjacent to, or in the vicinity of, existing utilities shall be performed in accordance with the requirements of the utility owners. The Contractor shall pay all permit, inspection, and other fees levied by the utility owners. Where the Contractor's operations could damage or inconvenience other utility systems or services, the operations shall be suspended until all arrangements necessary for the protection or relocation of these utilities and services have been made by the Contractor. Notify all utility offices, which are affected by the construction operation at least 48 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.

Some existing utility poles, lines, piping and/or appurtenances may need to be held in place, removed, or relocated as part of this project. If said work is required, the Contractor shall coordinate and schedule all such work with the respective utilities so that the Contractor's work and schedule are not impacted. Public and private utilities, or their contractors, will furnish all work necessary to hold, adjust, relocate, replace, or construct their facilities unless otherwise provided for in the Plans or these Special Provisions. Such work, if required, will be done during the prosecution of the work for this project. The Contractor's attention is directed to the fact that significant lead times may potentially be required to coordinate and schedule with the utility companies to perform the work.

Removal, relocation, and adjustment of existing utilities where shown on the Plans or where it could reasonably be foreseen to accommodate the work by the Contractor shall be ordered and paid for by the Contractor. If or when utility conflicts occur, the Contractor shall continue construction on other aspects of the project. Any change to the operation necessary to work around the conflicts shall be incidental to the various bid items of the contract and no further compensation will be made.

The Contractor shall anticipate that the owners of existing utilities may choose to modify and/or improve the existing systems at the time that the Contractor is working. The Contractor shall perform any and all work required to accommodate concurrent work by the owners of existing utilities. The Contractor shall coordinate his activities with those of the utility owners to enable both activities to proceed without delay.

The Contractor shall call the Utilities Underground Locate Center (One Call Center) for field location of utilities not less than two or more than ten business days before the scheduled date for commencement of excavation which may affect underground utility facilities. Notice shall be provided individually to those owners who are not members of the one-number locator service and are known to or suspected of having underground facilities within the area of proposed excavation. The Washington State Department of Transportation is not a participant in the One Call Center and shall be contracted directly for any work that may impact utilities in the State right of way.

The Contractor shall anticipate that work may be hindered or delayed by:

1. The removal, relocation and adjustment of any utility;

2. Maintenance operations of existing utility systems; or

3. The requirements of the owners of existing utility systems.

The Contractor shall not be entitled to an extension of time or to any claim for damages because of hindrances or delays caused by these activities.

The following addresses and telephone numbers of utility companies known or suspected of having facilities within the project limits and other pertinent contacts are supplied for the Contractor's convenience:

Kitsap County Public Works
614 Division Street
Port Orchard, WA 98366
(360) 337-5777
Doug Benoit

North Perry Water District
2921 Perry Ave
Bremerton WA 98310 (360) 865-0763Andrew Cook

Puget Sound Energy
10885 NE 4th St.
P.O. Box 97034
Bellevue, WA 98009
(888) 225-5773
Victor Ibarra

1-07.18 Public Liability and Property Damage Insurance

(Local Agency SP)
Section 1-07.18 is deleted and replaced with the following:

1-07.18 Insurance

1-07.18(1) General Requirements

The Contractor shall obtain the insurance described in this section from insurers that are licensed to do business in the state of Washington with a rating of A-: VII or higher in the A.M. Best's Key Rating Guide. The Contracting Agency reserves the right to approve or reject the insurance provided, based on the insurer (including financial condition), terms and coverage, the Certificate of Insurance, and/or endorsements.

The Contractor's insurance shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the limits of the insurer's liability.

The insurance limits mandated for any insurance coverage required by this Contract are not intended to be an indication of exposure nor are they limitations on indemnification.

The Contractor shall keep this insurance in force during the term of the contract and for thirty (30) days after the Physical Completion date, unless otherwise indicated. Certificates, policies, and endorsements expiring before completion of services shall be promptly replaced as well as the verification sent to the Contracting Agency.

If any insurance policy is written on a claims-made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract. The policy shall state that coverage is claims made and state the retroactive date. Claims-made form coverage shall be maintained by the Contractor for a minimum of 36 months following the Final Completion or earlier termination of this contract, and the Contractor shall annually provide the Contracting Agency with proof of renewal. If renewal of the claims made form of coverage becomes unavailable, or economically prohibitive, the Contractor shall purchase an extended reporting period ("tail") or execute another form of guarantee acceptable to the Contracting Agency to assure financial responsibility for liability for services performed.

The insurance policies shall contain a "cross liability" or "separation of insureds" provision.

The Contractor's and all subcontractors' insurance coverage shall be primary and non-contributory insurance as respects the Contracting Agency's insurance, self-insurance, or insurance pool coverage.

The Contractor shall provide written notice to the Contracting Agency and all Additional Insureds of any policy cancellation, expiration, or material reduction in coverage within two (2) business days of the Contractor's receipt of such notice.

Written notice of any cancellations or changes in coverage shall be mailed to the Contracting Agency at the following address:

Attn: Risk Manager
Department of Administrative Services
614 Division Street
Port Orchard, Washington 98366

Upon request, the Contractor shall forward to the Contracting Agency a full and certified copy of the insurance policy(s).

The Contractor shall not begin work under the contract until the required insurance has been obtained and approved by the Contracting Agency.

Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the Contracting Agency may, after giving five business days notice to the Contractor to correct the breach, immediately terminate the contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the Contracting Agency on demand, or at the sole discretion of the Contracting Agency, offset against funds due the Contractor from the Contracting Agency.

All costs for insurance shall be incidental to and included in the unit or lump sum prices of the contract and no additional payment will be made.

1-07.18(2) Additional Insured

All insurance policies, with the exception of Professional Liability and Workers Compensation, shall name the following listed entities as additional insured(s) with respect to performance of services:

1. The Contracting Agency and its officers, elected officials, employees, agents, and volunteers;
2. The Contracting Agency's consultant, Murraysmith, Inc. and its subconsultants:
    a. Peterson Structural Engineers
    b. HDR, Inc.
    c. Landau Associates, Inc.
    d. Northwest Corrosion Engineering
3. The Contracting Agency's Special Inspection and Testing consultant.

The above-listed entities shall be additional insureds for the full available limits of liability maintained by the Contractor, whether primary, excess, contingent or otherwise, irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract, and irrespective of whether the Certificate of Insurance provided by the Contractor pursuant to 1-07.18(3) describes limits lower than those maintained by the Contractor.

A failure to comply with reporting provisions of the policies shall not affect coverage provided to the above listed entities.

1-07.18(3) Subcontractors

Contractor shall ensure that each subcontractor of every tier obtains and maintains at a minimum the insurance coverages listed herein. Upon request of the Contracting Agency, the Contractor shall provide evidence of such insurance.

1-07.18(4) Evidence of Insurance

The Contractor shall deliver to the Contracting Agency a properly executed Certificate(s) of Insurance and/or signed policy endorsements for each policy of insurance meeting the requirements set forth herein when the Contractor delivers the signed Contract for the work. The certificate and endorsements must conform to the following requirements:

1. An ACORD certificate or a form determined by the Contracting Agency to be equivalent.
2. Copies of all endorsements naming Contracting Agency and all other entities listed in Section 1-07.18(2) as Additional Insured(s), showing the policy number. The Contractor may submit a copy of any blanket additional insured clause from its policies instead of a separate endorsement. A statement of additional insured status on an ACORD Certificate of Insurance shall not satisfy this requirement.
3. Any other amendatory endorsements to show the coverage required herein.
4. Certificates of Insurance shall show the Certificate Holder as Kitsap County and include c/o of the Office or Department issuing the Contract. The address of the Certificate Holder shall be shown as the current address of the Office or Department.

1-07.18(5) Coverages and Limits

The insurance shall provide the minimum coverages and limits set forth below. Providing coverage in these stated minimum limits shall not be construed to relieve the Contractor from liability in excess of such limits. All deductibles and self-insured retentions must be disclosed and are subject to approval by the Contracting Agency. The cost of any claim payments falling within the deductible shall be the responsibility of the Contractor.

1-07.18(5)A Commercial General Liability

Contractor shall maintain a policy of Commercial General Liability Insurance, including:

1. Per project aggregate
2. Premises/Operations Liability
3. Products/Completed Operations – for a period of one year following final acceptance of the work.
4. Personal/Bodily/Advertising Injury
5. Property damage
6. Contractual Liability
7. Independent Contractors Liability
8. Stop Gap / Employers' Liability

Such policy must provide the following minimum limits:

$2,000,000	Each Occurrence
$5,000,000	General Aggregate
$4,000,000	Products & Completed Operations Aggregate
$2,000,000	Personal, Bodily, & Advertising Injury, each offence

Stop Gap / Employers' Liability

$1,000,000	Each Accident
$1,000,000	Disease - Policy Limit
$1,000,000	Disease - Each Employee

The Commercial General Liability coverage shall not exclude any activity to be performed in fulfillment of this Contract and shall contain no special limitations on the scope of protection afforded any additional insured(s). Specialized forms specific to the industry of the Contractor will be deemed equivalent provided coverage is no more restrictive than would be provided under a standard Commercial General Liability policy, including contractual liability coverage. Coverage shall include liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; or premises owned, leased, or used by the Contractor.

1-07.18(5)B Automobile Liability

Automobile Liability for owned, non-owned, hired, and leased vehicles, with an MCS 90 endorsement and a CA 9948 endorsement attached if "pollutants" are to be transported. Such policy(ies) must provide the following minimum limit:

$1,000,000 combined single limit per occurrence for Bodily Injury and Property Damage

1-07.18(5)C Workers' Compensation

The Contractor shall comply with Workers' Compensation coverage as required by the Industrial Insurance laws of the state of Washington. Contractor shall also maintain Employees Liability Coverage with a limit of not less than $1 million. Contractor shall provide evidence of all coverage to the Contracting Agency.

Contractor shall request that their Washington State Department of Labor and Industries, Workers Compensation Representative send written verification to Kitsap County, within ten (10) calendar days after the effective date of the Contract, that the Contractor is currently paying Workers Compensation.

If work is to be performed on or near any navigable waterway, the Contractor shall be responsible for determining if United States Longshore and Harbor Workers Insurance is applicable for this project and shall be responsible for procuring such if the insurance is determined to be applicable. At no time shall the Contracting Agency or the Engineer be responsible for making this determination.

1-07.18(5)D Builder's Risk

Contractor shall purchase and maintain Builder's Risk insurance covering interests of the Contracting Agency, the Contractor, and Subcontractors of every tier, as Named Insureds, in the Work. An Installation Floater instead of Builders Risk is acceptable for renovation projects. Builder's Risk insurance shall be on a special form policy and shall insure against the perils of fire and extended coverage and physical loss or damage, theft, vandalism, malicious mischief, and collapse; and flood and earthquake when shown below. The Builder's Risk insurance shall include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site. Such insurance shall cover resulting "soft costs" including but not limited to design costs, licensing fees, architect's and engineer's fees, and costs due to delay in completion.

Builder's Risk insurance shall be written in the amount of the completed value of the project, with no coinsurance provisions. Such policy must provide coverage and deductibles that comply with the following:

Coverage:

Total Cost of Project to be Insured: Contractor Bid Price

Soft Costs: $2,000,000

Flood: $2,000,000

Earthquake: $3,000,000

Deductibles not to exceed:

Earthquake and Flood: 5% of the Value at Time of Loss, subject to a $250,000 Minimum

Earth Movement: 5% of the Value at Time of Loss, subject to a $250,000 Minimum

All Other Perils: $50,000

Soft Costs: $50,000, with no more than 7-day waiting period

The Builders Risk insurance covering the work shall have maximum deductibles as listed above for each occurrence. The deductible(s) shall be the responsibility of the Contractor.

The Contractor shall provide the Contracting Agency with a full and certified copy of the insurance policy when the Contractor delivers the signed Contract for the work. Failure of Contracting Agency to demand such verification of coverage with these insurance requirements or failure of Contracting Agency to identify a deficiency from the insurance documentation provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

The Builders Risk insurance shall be maintained until final acceptance of the Work by the Contracting Agency.

The Contractor and the Contracting Agency waive all rights against each other and any of their Subcontractors of every tier, agents, and employees, officers, and officials, for damages caused by fire or other perils to the extent covered by Builder's Risk insurance or other property insurance applicable to the work. The policies shall provide such waivers by endorsement.

1-07.18(5)E Excess or Umbrella Liability

The Contractor shall provide Excess or Umbrella Liability insurance with limits of not less than 1 million each occurrence and annual aggregate. This excess or umbrella liability coverage shall be excess over and as least as broad in coverage as the Contractor's Commercial General and Auto Liability insurance.

All entities listed under 1-07.18(2) of these Special Provisions shall be named as additional insureds on the Contractor's Excess or Umbrella Liability insurance policy.

This requirement may be satisfied instead through the Contractor's primary Commercial General and Automobile Liability coverages, or any combination thereof that achieves the overall required limits of insurance.

1-07.18(5)F Pollution Liability

The Contractor shall provide a Contractors Pollution Liability policy, providing coverage for claims involving bodily injury, property damage (including loss of use of tangible property that has not been physically injured), cleanup costs, remediation, disposal, or other handling of pollutants, including costs and expenses incurred in the investigation, defense, or settlement of claims arising out of:

1. Contractor's operations related to this project; and/or
2. Remediation, abatement, repair, maintenance or other work with lead-based paint or materials containing asbestos; and/or
3. Transportation of hazardous materials away from any site related to this project.

All entities listed under 1-07.18(2) of these Special Provisions shall be named by endorsement as additional insureds on the Contractors Pollution Liability insurance policy.

Such Pollution Liability policy shall provide the following minimum coverage:

$2,000,000 each loss and annual aggregate

This policy shall be endorsed so that "pollutants" definition includes sewage and/or reclaimed water as well as any sewage and/or reclaimed water byproducts. The policy shall also include property damage coverall for natural resource damages (NRD).

1-07.18(5)G Professional Liability

The Contractor and/or its Subcontractors and/or its design consultant providing construction management, value engineering, or any other design-related non-construction professional services shall provide evidence of Professional Liability insurance covering professional errors and omissions. Such policy must provide the following minimum limits:

$1,000,000 per claim and annual aggregate

If the scope of such design-related professional services includes work related to pollution conditions, the Professional Liability insurance shall include coverage for Environmental Professional Liability.

If this insurance policy is written on a claims-made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract. The policy shall state that coverage is claims made and shall state the retroactive date. Claims-made form coverage shall be maintained by the Contractor for a minimum of 36 months following the Final Completion or earlier termination of this contract, and the Contractor shall annually provide the Contracting Agency with proof of renewal. If renewal of the claims made form of coverage becomes unavailable, or economically prohibitive, the Contractor shall purchase an extended reporting period ("tail") or execute another form of guarantee acceptable to the Contracting Agency to assure financial responsibility for liability for services performed.

1-07.18(5)H LHWCA Insurance

If this Contract involves work on or adjacent to Navigable Waters of the United States, the Contractor shall procure and maintain insurance coverage in compliance with the statutory requirements of the U.S. Longshore and Harbor Workers' Compensation Act (LHWCA).

Such policy must provide the following minimum limits:

$1,000,000 Bodily Injury by Accident – each accident

$1,000,000 Bodily Injury by Disease – each employee

$1,000,000 Bodily Injury by Disease – policy limits

1-07.18(5)I Protection & Indemnity Insurance Including Jones Act

If this Contract involves marine activities, or work from a boat, vessel, or floating platform, the Contractor shall procure and maintain Protection and Indemnity (P&I) coverage including collision liability, injury to crew (Merchant Marine Act of 1920 - Jones Act) and passengers, removal of wreck and liability for seepage, pollution, containment, and cleanup using form SP-23 or SP 38 or a form as least as broad.

All entities listed under 1-07.18(2) of these Special Provisions shall be named as additional insureds on the Contractor's Protection and Indemnity insurance policy.

Such policy must provide the following minimum limits:

$1,000,000 Bodily Injury by Accident – each accident or occurrence

$1,000,000 Bodily Injury by Disease – each employee

$1,000,000 Bodily Injury by Disease – policy limits

1-07.18(5)J Hull and Machinery

If this Contract involves use of a boat, vessel, or floating platform, the Contractor shall procure and maintain coverage at Market Value of vessel on American Institute Hull Clauses, 6/2/77 form.

1-07.18(5)K Marine Pollution

The Contractor shall procure and maintain Pollution Liability (OPA, CERCLA) insurance to satisfy U.S. Coast Guard requirements as respects the Federal Oil Pollution Act of 1990 and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended.

Such policy must provide the following minimum limits, or statutory limits of liability as applicable, whichever is higher:

$1,000,000 per Occurrence

1-07.23 Public Convenience and Safety

(Local Agency SP)
Section 1-07.23 is supplemented with the following:

Contractor shall conduct the work and take preventative measures such that dust, noise and odors in the project area shall not become objectionable to the adjacent property owners. Should the Contracting Agency determine Contractor is not fulfilling this obligation; Contracting Agency reserves the right to take such action as may be necessary and to charge Contractor for any costs that may be incurred in such remedial action.

It shall be Contractor's responsibility to see that all requirements of the Federal William-Stieger Occupational Safety and Health Act as well as the State of Washington Industrial Safety and Health Act, are observed and enforced to protect all the workmen on the project as well as the general public.

Complaints received by Contracting Agency concerning public inconvenience or safety hazards will be referred to Contractor for immediate corrective action. In addition to normal work hours, corrective actions may need to be taken on Saturdays, Sundays, holidays, and at times other than normal work hours.

END OF SECTION 1-07

1-08 Prosecution and Progress

1-08.0 Preliminary Matters

(Local Agency SP)
Section 1-08.0 and its subsections are added as the following:

1-08.0(1) Preconstruction Public Meeting

Prior to the Contractor beginning work, the Contracting Agency will hold a public meeting for property owners that will or may be affected by the project. Contracting Agency representatives, the Engineer, and the Contractor (project manager and superintendent) will attend this preconstruction public meeting. The purpose of this meeting is to introduce the project team; discuss the project; listen to, and address the public's concerns; and obtain input and answer the public's questions,

1-08.0(2) Preconstruction Conference

Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, Contracting Agency, Engineer, and such other interested parties as may be invited. The purpose of the preconstruction conference will be to:

1. Review the initial progress schedule;
2. Establish a working understanding among the various parties associated or affected by the work;
3. Establish and review procedures for progress payment, notifications, approvals, submittals, etc.;
4. Establish normal working hours for the work;
5. Review safety standards and traffic control; and
6. Discuss such other related items as may be pertinent to the work.

The Contractor shall prepare and submit at the preconstruction conference the following:

1. A breakdown/schedule of values for all lump sum items;
2. A preliminary schedule of shop drawings and submittals;
3. A preliminary construction schedule. See Section 1-08.3
4. A preliminary dewatering plan. See Section 7-08.
5. A list of material sources for acceptance if applicable.

1-08.0(3) Hours of Work

Except in the case of emergency or unless otherwise approved by the Contracting Agency or shown on the Drawings, the normal straight time working hours for the contract shall be any consecutive 8-hour period between 7:00 a.m. and 6:00 p.m. of a working day with a maximum 1-hour lunch break and a 5-day work week. The normal straight time 8-hour working period for the contract shall be established at the preconstruction conference or prior to the Contractor commencing the work.

Written permission from the Contracting Agency is required, if Contractor desires to perform work on holidays, Saturdays, or Sundays; before 7:00 a.m. or after 6:00 p.m. on any day; or longer than an 8-hour period on any day. Contractor shall apply in writing to the Contracting Agency for such permission, no later than 72 hours prior to the day for which the Contractor is requesting permission to work.

Permission to work between the hours of 10:00 p.m. and 7:00 a.m. during weekdays and between the hours of 10:00 p.m. and 9:00 a.m. on weekends or holidays may also be subject to additional noise control requirements. Approval to continue work during these hours may be revoked at any time Contractor exceeds the Contracting Agency's noise control regulations or complaints are received from the public or adjoining property owners regarding the noise from Contractor's operations.

The Contractor shall have no claim for damages or delays should such permission be revoked for these reasons.

Permission to work Saturdays, Sundays, holidays or other than the agreed upon normal straight time working hours Monday through Friday may be given subject to certain other conditions set forth by the Contracting Agency or Engineer. These conditions may include but are not limited to:

1. The Contracting Agency may require designated representatives to be present during the work. Representatives who may be deemed necessary by the Contracting Agency include but are not limited to survey crews; personnel from the Contracting Agency's material testing lab; inspectors; and other Contracting Agency employees when in the opinion of the Contracting Agency, such work necessitates their presence.
2. Requiring Contractor to reimburse Contracting Agency for the costs in excess of straight-time costs for Contracting Agency during such times.
3. Considering the work performed on Saturdays, Sundays, and holidays as working days with regards to the contract time.
4. Considering multiple work shifts as multiple working days with respect to contract time even though the multiple shifts occur in a single 24-hour period.

1-08.0(4) Reimbursement for Overtime Work of Contracting Agency Employees

Where Contractor elects to work on a Saturday, Sunday, or holiday, or longer than an 8-hour work shift on a regular working day, as defined in the Standard Specifications, such work shall be considered as overtime work. On all such overtime work, a construction observer may be present, and possibly others may be required at the discretion of the Contracting Agency and Engineer. In such case, the Contracting Agency may deduct the costs in excess of the straight-time costs incurred by the Contracting Agency for the overtime hours. The Contractor authorizes the Engineer to deduct such costs from the amount due or to become due to the Contractor.

1-08.3 Progress Schedule

1-08.3(1) General Requirements

(Local Agency SP)
Section 1-08.3(1) is supplemented with the following:

The Contracting Agency has pre-purchased all the major equipment to avoid delay of construction due to the long lead time. Contractor shall coordinate with the Contracting Agency to understand the status of all the Owner-furnished items.

For items supplied by Contractor, Contractor shall solicit input on manufacturing and delivery times from critical, long-lead and/or significant equipment and material suppliers and subcontractors. Critical and long-lead equipment or materials shall be identified and scheduled, and will include, but not be limited to, the following:

1. Ductile iron pipe and fittings
2. HDPE pipe and fittings
3. Solenoid valves
4. Pressure gauges
5. Electrical panels, cables and associated items

Once the preliminary schedule is accepted by the Engineer, all subcontractors shall be made aware and sign off on the schedule. This will be done and documented early on at a weekly construction meeting.

To accommodate the desired information and the required schedule updates, Contractor shall use the latest revision of Primavera systems (Primavera P6) to perform scheduling functions. Contractor's attention is directed to the format/content of the schedule of values. Given appropriate consolidation and

expansion, this list shall serve as a starting point. The project schedule shall be in sufficient detail that progress of the Work can be evaluated accurately at any time during the performance of the contract.

Contractor shall employ a person or firm with at least ten years of construction and scheduling experience who is qualified to prepare detailed construction schedules. Evidence of construction experience and successful scheduling (i.e., work completed on schedule) on at least three (3) projects in the last five years shall be provided. Provide schedules and contact information for each of the projects. Contractor shall provide Contracting Agency with resume and other pertinent information on the proposed scheduler. If the Contracting Agency determines that the qualifications are not met, the Contracting Agency can direct the Contractor to provide a different scheduler that meets the qualifications at no additional cost to the Contracting Agency.

The schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of the final completion. The total float belongs to the project and shall not be for the exclusive use or benefit of any party.

The project schedule shall be updated monthly and the Contractor shall submit one (1) PDF copy and one (1) backup copy of the schedule using the backup routine provided in the scheduling software. Processing of pay requests will be contingent upon receipt of updated schedules. In addition to the project schedule, Contractor shall submit a written three-week outlook activity schedule to the Engineer at the weekly progress meetings. The activity schedule shall indicate Contractor's proposed activities for the forthcoming three weeks. Submittal of the weekly schedule does not relieve the Contractor of the requirement to submit and update the project schedule as required herein.

Time is of the essence on this project. Therefore, should schedule slippage occur, Contractor is required to take appropriate measures to get the project back onto the approved schedule. Contractor will not be allowed to continually let the schedule slip. Contractor shall adjust his forces, equipment and work schedules as may be necessary to get the project back on schedule to ensure completion of the work within the prescribed contract time. Contractor shall provide a plan of action and execute it accordingly to the satisfaction of the Contracting Agency. Failure to do so will result in delay of progress payment(s) and/or a reduction in progress payment(s).

1-08.3(2)A Type A Progress Schedule

(Local Agency SP)
Section 1-08.3(2)A is revised to read as follows:

A Type A progress schedule will not be accepted by the Contracting Agency.

1-08.3(2)B Type B Progress Schedule

(Local Agency SP)
The first paragraph and the first sentence of the second paragraph of Section 1-08.3(2)B are revised to read as follows:

Contractor shall submit a preliminary Type B Progress Schedule depicting the entire project prior to the preconstruction conference. The preliminary Type B Progress Schedule shall comply with all of these requirements and the requirements of Section 1-08.3(1).

Contractor shall submit four (4) hard copies, one (1) PDF copy and one (1) backup copy using the backup routine provided in the scheduling software of the revised Type B Progress Schedule depicting the entire project no later than 21-calendar days after the preconstruction conference. Contractor shall address all of the Contracting Agency's comments and the Engineer's comments on the preliminary Type B Progress Schedule.

(Local Agency SP)
The last paragraph of Section 1-08.3(2)B is revised to read as follows:

The Contracting Agency will evaluate the Type B Progress Schedule and accept or return the schedule for corrections within 15 calendar days of receiving the submittal. The accepted Type B Progress Schedule shall establish the baseline schedule. The preliminary construction schedule shall remain in effect until the baseline schedule is accepted by the Contracting Agency. Acceptance of the Type B

Progress Schedule is for general compliance of the contract requirements and does not impose upon the Contracting Agency any warranty that all contract requirements have been addressed, met, or modified in the schedule. If it is determined that the schedule did not include modified contract requirements, the Contractor will modify its schedule without affecting the Contract Time at no additional cost to the Contracting Agency.

1-08.3(2)C Construction Sequencing and Constraints

(Local Agency SP)
Section 1-08.3(2)C is added as the following:

Continuous operation of the Contracting Agency's facilities is of critical importance. Contractor shall schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified. Contractor shall not proceed with work affecting a facility's operation without obtaining Contracting Agency's and Engineer's advance written approval of the need for, and duration of, such work.

See the Contract Plans and CSI Specification Section 01 12 16 Work Sequence for additional construction sequencing and constraint requirements.

Where existing facilities are to be modified during the course of work, Contractor shall obtain Contracting Agency's and Engineer's reviews of submittals for temporary shutdown, demolition, modification, connections between new and existing work, and other related work and shall conform to other Contract conditions as applicable.

The Contractor shall be responsible for developing the sequence of the work and for ensuring that current operations are not interrupted or compromised.

At least two weeks prior to starting the work, Contractor shall coordinate with the Contracting Agency and Contracting Agency's representatives to develop a Work Sequencing Plan that permits facilities to function as normally as practical. A portion of the construction work may be required outside normal working hours to avoid undesirable conditions. The Contractor shall do this work at such times and at no additional cost to the Contracting Agency. Connections between existing facilities and new work shall not be made until all necessary inspection and tests have been completed on the new work and the new work is found to conform in all respects to the requirements of the Contract Documents.

Connection to existing services or utilities, or other work that requires temporary shutdown of any existing operations or utilities shall be planned in detail with appropriate scheduling of the work and coordinated with the Contracting Agency or Engineer. The approved schedule for shutdown or restart shall be indicated on the Contractor's Progress Schedule, and at least seven (7) calendar days of advance written notice shall be given to the Contracting Agency and Engineer so that they may witness the shutdown, tie-in, and startup.

The Contracting Agency and Engineer consider the Contractor's schedule and construction sequencing to be paramount to ensure that the work is properly planned, coordinated, and executed. Contractor shall properly coordinate and execute the work to avoid interference with normal operations.

1-08.3(2)E Weekly Progress Meetings

(Local Agency SP)
Section 1-08.3(2)E is added as the following:

To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Contracting Agency will conduct weekly progress meetings with the Contractor throughout the construction period. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling and resolve other problems that may develop.

Agenda Items

The Contractor shall, to the maximum extent practicable, advise the Contracting Agency at least 24 hours in advance of project meetings regarding items to be added to the agenda.

Minutes

The Contracting Agency will compile a summary of the discussion of each project meeting and will furnish copies to the Contracting Agency representatives, the Engineer, and Contractor. Recipients of copies may make and distribute copies as they deem necessary.

Attendance

These meetings shall be conducted by the Contracting Agency and shall be attended by the Contractor's superintendent and representatives of electrical subcontractors, utilities and/or others that are active or critical in the planning or execution of the pending work. The Contractor may invite subcontractors, materials or equipment suppliers, and others to attend project meetings in which their aspect of the work is involved. The Engineer may attend these meetings as necessary.

Meeting Schedule and Location

Progress meetings will be held weekly. Contracting Agency, Engineer and Contractor will establish a mutually acceptable day and time for meetings. Meetings will be held at the Central Kitsap Treatment Plant unless mutually agreed upon otherwise.

Agenda

A minimum agenda for these meetings is as follows:

1. Review, and revise as necessary, minutes of previous meetings and status of previously identified action items.
2. Review progress of the work since last meeting, including status of submittals for review.
3. Discuss any issues or deficiencies with the work and necessary corrective action.
4. Discuss scheduling of any required Special Inspections or tests associated with work to be completed.
5. Review status of equipment and materials fabrication/shipments.
6. Identify issues that impede planned progress, or which impact operations of existing facilities.
7. Compare status of completion to detailed schedule and identify any activities that are behind schedule. Discuss corrective measures and procedures to regain schedule.
8. Review outstanding contract change issues and claims.
9. Review design modifications and documentation for change orders. Discuss any cost or schedule impacts.
10. Verify Contractor's record drawings are current.
11. Review progress payment requests.

Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the discussions and decisions of the meeting.

Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.

Challenges to minutes shall be settled as a priority portion of “old business” at the next regularly scheduled meeting.

1-08.3(3) Schedule Updates

(Local Agency SP)
The first paragraph of Section 1-08.3(3) is revised to read as follows:

Contractor shall submit updated schedules on a monthly basis. In addition, the Contracting Agency or Engineer may request a schedule update when any of the following events occur:

1. The project has experienced a change that affects the critical path.
2. The sequence of work is changed from that in the approved schedule.
3. The project is significantly delayed.
4. Upon receiving an extension of Contract time.

1-08.4 Prosecution of Work

(July 23, 2015 APWA GSP)
Delete this section and replace it with the following:

Notice to Proceed will be given after the contract has been executed and the contract bond and evidence of insurance have been approved and filed by the Contracting Agency. Contractor shall not commence with the work until the Notice to Proceed has been given by the Contracting Agency. Contractor shall commence construction activities on the project site within ten days of the Notice to Proceed Date, unless otherwise approved in writing. Contractor shall diligently pursue the work to the physical completion date within the time specified in the contract. Voluntary shutdown or slowing of operations by Contractor shall not relieve Contractor of the responsibility to complete the work within the time(s) specified in the contract.

When shown in the Plans, the first order of work shall be the installation of high visibility fencing to delineate all areas for protection or restoration, as described in the Contract. Upon construction of the fencing, Contractor shall request the Engineer to inspect the fence. No other work shall be performed on the site until the Contracting Agency has accepted the installation of high visibility fencing, as described in the Contract.

1-08.5 Time for Completion

(Local Agency SP)
The first paragraph of Section 1-08.5 is supplemented with the following:

If Contractor performs work on a day that is classified as a non-working day, then that day shall be reclassified as a working day and counted towards the Contract time.

(Local Agency SP)
The third and fourth paragraphs of Section 1-08.5 are deleted and replaced with the following:

Contract time for the Preconstruction Phase Work shall begin on the working day identified in the Limited Notice to Proceed. Each working day shall be charged to the contract as it occurs, until the Preconstruction Phase work is physically complete. Each week, the Contracting Agency will provide the Contractor a statement that shows the number of working days: (1) charged to the contract the week before; and (2) specified for the completion of the Preconstruction Phase work. The statement will also show the nonworking days and any partial or whole day the Engineer declares as unworkable.

Contract time for the Construction Phase Work shall begin on the working day identified in the Notice to Proceed with Construction. Each working day shall be charged to the contract as it occurs, until the Construction Phase contract work is physically complete. Each week, the Contracting Agency will provide the Contractor a statement that shows the number of working days: (1) charged to the contract the week before; (2) specified for the physical completion of the contract; and (3) remaining for the physical completion of the contract. The statement will also show the nonworking days and any partial or whole day the Contracting Agency declares as unworkable.

The statements shall be deemed accepted and correct unless Contractor files a written protest of any alleged discrepancies in the statement within 10 calendar days after the date of each statement. To be considered by the Contracting Agency, the protest shall be in sufficient detail to enable the Contracting Agency to ascertain the basis and amount of time disputed. If the Contractor elects to work 10 hours a day and 4 days a week (a 4-10 schedule) and the fifth day of the week in which a 4-10 shift is worked would ordinarily be charged as a working day then the fifth day of that week will be charged as a working day whether or not the Contractor works on that day.

(Local Agency SP)
The sixth paragraph and the subparagraphs of Section 1-08.5 are deleted and replaced with the following:

The Contracting Agency will give the Contractor written notice of the completion date of the contract after all the Contractor's obligations under the contract have been performed by the Contractor. The following events must occur prior to establishing the Completion Date:

1. The physical work on the project must be complete; and
2. The Contractor must furnish all documentation required by the contract and required by law, to allow the Contracting Agency to process final acceptance of the contract. The following documents must be received by the Contracting Agency prior to establishing a completion date:
    a. Final Contract Voucher Certification
    b. Copies of the approved "Affidavit of Prevailing Wages Paid" for the Contractor and all Subcontractors.
    c. Property owner releases per Section 1-07.24
    d. A copy of the Notice of Termination sent to the Washington State Department of Ecology (Ecology); the elapse of 30 calendar days from the date of receipt of the Notice of Termination by Ecology; and no rejection of the Notice of Termination by Ecology. This requirement will not apply if the Construction Stormwater General Permit is transferred back to the Contracting Agency in accordance with WSDOT Standard Specification Section 8-01.3(16)

(Local Agency SP)
Section 1-08.5 is supplemented with the following:

The project has the following critical completion date milestones:

1. Completion of Preconstruction Phase Work. All work under the Preconstruction Phase of this Contract shall be completed within 30 calendar days after the Limited Notice to Proceed Date.
2. Substantial Completion. All work under this Contract shall be substantially complete within 160 calendar days after the Notice to Proceed Date.
3. Physical Completion. All work under this Contract shall be physically complete within 205 calendar days after the Notice to Proceed Date.

The Contractor is cautioned that part of the work in this Contract may be performed only during certain periods of the day and favorable weather conditions, and as such, the Contractor shall plan and execute the work accordingly. Liquidated damages will be applied to any working days that exceed the time frames stipulated above.

1-08.8(1) Abnormal Weather Conditions

(Local Agency SP)
Section 1-08.8(1) is added as follows:

Precipitation as rain, hail, or snow; low temperature; windstorms; ice; snow; and other weather conditions that could reasonably have been anticipated from the National Weather Service historical records of the general locality of the work shall not be construed as abnormal. It is hereby agreed that precipitation greater than the following, temperatures less than the following, and wind velocities greater than the following, cannot be reasonably anticipated. For each day determined to be abnormal as determined by the Contracting Agency, one day shall be added to the contract duration at no additional cost to the Contracting Agency by written change order.

1. Daily rainfall equal to or greater than 0.50 inches during a month when the monthly rainfall exceeds the normal monthly average by 15 to 100 percent.

2. Daily rainfall equal to or greater than 0.20 inches during a month when the monthly rainfall exceeds the normal monthly average by more than 100 percent.
3. Daily rainfall equal to or greater than 1.0 inch at any time.
4. Daily maximum temperature equal to or less than 20 degrees F during a week when the maximum daily temperature never exceeds 35 degrees F.
5. Daily maximum temperature equal to or less than 25 degrees F during a week when the maximum daily temperature never exceeds 30 degrees F.
6. Daily maximum temperature equal to or less than 15 degrees F at any time.
7. Daily maximum wind velocity equal to or greater than 50 mph at any time.

Ice, snow, and other weather conditions may be considered as abnormal in the sole discretion of the Contracting Agency upon written request by the Contractor. Such written request shall describe in detail the weather condition, identify the specific impacts resulting from the weather condition, and be submitted to the Contracting Agency within five days of the onset of the weather condition.

To preclude the difficulties of actual measurement, the parties hereto agree that weather data at the site of the work shall be expressly deemed to be the same as that measured at the Seattle-Tacoma International Airport by the Environmental Data and Information Service of the National Oceanic and Atmospheric Administration ("NOAA") of the U.S. Department of Commerce.

For the purposes of this section, a "month" shall mean a calendar month and a "week" shall mean a calendar week of Sunday through Saturday.

1-08.9 Liquidated Damages

(Local Agency SP)
The third paragraph of Section 1-08.9 is deleted and replaced with the following:

When the Contract Work has progressed to the extent that the Contracting Agency has determined the Contract Work is substantially complete, the Contracting Agency will notify the Contractor in writing of the Substantial Completion Date. For overruns in contract time occurring before the substantial completion date, liquidated damages shall be assessed at seven thousand five hundred ($7,500) dollars per day until substantial completion is achieved. When the Contract Work is physically complete, the Contracting Agency will notify the Contractor in writing of the Physical Completion Date. For overruns in contract time occurring after the physical completion date, actual damages will be assessed based on the direct Engineering, Contracting Agency, and other related costs assignable to the project that are incurred by the Contracting Agency until the Contractor has fulfilled all the obligations under the Contract and submitted all documentation required by the Contract and the law and the Contracting Agency establishes the Final Completion Date. The Contracting Agency may offset these costs against any payment due Contractor. Contractor shall complete the remaining work that is subject to liquidated damages as promptly as possible. Upon request by the Contracting Agency, Contractor shall furnish a written schedule for completing the remaining physical work on the Contract.

1-08.10 Termination of Contract

(Local Agency SP)
Section 1-08.10 is supplemented with the following:

In the event that funding for this project is withdrawn, reduced, or limited in any way after the effective date of this Contract, the Contracting Agency may summarily terminate this Contract notwithstanding any other termination provision of this Contract. Termination under this paragraph shall be effective upon the date specified in the written notice of termination sent by the Contracting Agency to the Contractor. After the effective date, no charges incurred under this Contract are allowable.

END OF SECTION 1-08

1-09 Measurement and Payment

1-09.1 Measurement of Quantities

(Local Agency SP)
In Section 1-09.1, delete the seventh paragraph beginning with the words "Linear Foot…" and replace it with the following:

Linear Foot - Linear feet shall be measured along the pipe alignment and shall include the length through the elbows, tees, and fittings for the pay limits as shown on the Drawings. No adjustments will be made in the length for the slope, uneven contours, overlap of materials, repairs or wasted material.

1-09.2(7) Bid Item Descriptions for Measurement and Payment

(Local Agency SP)
Section 1-09.2(7) is added as follows:

The unit or lump sum Contract Prices shall constitute full payment for furnishing all labor, equipment, materials, permits and agreements, overhead and profit, and performing all operations required to complete the Work as defined in the Contract Documents. Notwithstanding the omission or mention of any incidental Work, the Contract Price and payment shall also constitute full compensation for all Work incidental to completion of item, unless such Work is otherwise specifically mentioned for separate payment under another Bid Item. Payment shall only be made for those items included in the Proposal and all Work required by the Contract shall be included in those Bid Items.

All measurements and computations shall be made by the Engineer or the Contracting Agency's Representative. Contractor may perform quantity surveys for comparison at the Contractor's sole expense. If there is a discrepancy where the measured quantity cannot be agreed upon, the Engineer or Contracting Agency's Representative measurements shall be used.

Measurement and Payment shall be made in accordance with Section 1-04.6 for the following bid items:

Bid Items	Bid Item Name	Measurement/Payment Description
1	Preconstruction Work Phase	The lump sum shall include work required during the Preconstruction Work Phase as described in Section 1-04.3(1) of the Special Provisions.
2	Final Cleanup and Restoration	The lump sum shall include final cleanup and restoration of all paved and unpaved surfaces and areas disturbed by construction to conditions equal to, or better than existing.
3	Project Record Drawings	The lump sum shall include work associated with maintaining, updating, modifying the Contract Drawings to reflect modifications in the completed work that differ from the design information shown on the Contract Drawings. Incremental payments, determined by dividing the calendar days in each pay period by the total calendar days under the contract and then multiplying by 60% of the lump sum amount, will be paid for each monthly update. No more than 60% of the total lump sum amount will be paid for monthly updates. The balance of the lump sum will be paid upon delivery and approval of acceptable record drawings by the Engineer near the end of physical construction. The lump sum for this bid item shall be at least 0.5% of the total bid amount.

Bid Items	Bid Item Name	Measurement/Payment Description
4	Type B Schedules	The unit price per month shall include all work associated with furnishing progress schedules, weekly look-ahead schedules, and schedule updates. Payment shall be made on a monthly basis for approved schedules. Progress payments will be contingent upon receipt and approval of the monthly schedule updates. No payment shall be made for the draft or baseline construction schedules as these shall be considered incidental to the contract. Payment for approved monthly schedule updates will be based on the amount shown in the bid schedule.
5	Minor Change (Allowance)*	This item is reserved as a construction contingency for "Minor Changes" which may occur during the course of the work. This budget allowance will facilitate minor additional work without the need for a Contract amendment. The Engineer will still prepare a work change directive and the Contractor will still prepare cost proposals for work that is agreed to be out of scope. The Contracting Agency's approval will be obtained prior to authorization of such work. See Section 1-09.6 for additional information.
6	Mobilization and Demobilization	The lump sum shall include preconstruction expenses and the cost of preparatory work and operations performed by the Contractor, excluding work included in Bid Item 1, Preconstruction Work Phase. This work shall include, but not be limited to, the work identified in Section 1-09.7 of the Special Provisions. Mobilization and demobilization shall not exceed 10% of the total contract amount. Payment for mobilization and demobilization will be limited to 70% and 30%, respectively, of the total bid amount.
7	Ground Dewatering	The lump sum shall include all work required for ground dewatering as specified in Sections 31 23 19, 31 23 20 and 31 23 21 except for the testing for and treatment of potential groundwater contaminants which will be paid under Bid Item 8 Groundwater Treatment.
8	Groundwater Treatment	The lump sum shall include all labor, materials and equipment required to test and treat purged groundwater to below the maximum allowable concentrations for environmental contaminants prior to discharge from the site.
9	Administration of Owner Furnished Equipment	The lump sum shall include all work associated with the Contractor's administration of the Owner-furnished equipment as specified in Section 01 64 16, excluding work already included in Bid Item 1, Preconstruction Work Phase.

Bid Items	Bid Item Name	Measurement/Payment Description
10	Digester Cleaning and Inspection	This lump sum shall include all work required for digester cleaning and inspection of two digesters as specified in Section 46 01 71. Work includes, but not limited to, gas purging, ventilation, digester evacuation, digester cleaning, temporary odor control, scaffolding, lighting and etc. Digester repairs, not including the annular seal, shall be paid under Bid Item 11 Digester Repairs (Allowance)*. Annular seal repairs shall be paid under Bid Item 12 Digester Annular Seal Repair.
11	Digester Repairs (Allowance)*	This item is an allowance for digester repairs as directed by the Owner. Work includes, but not limited to, the digester steel skirt, steel cover, concrete wall and floor, interior coatings, and exterior roof.
12	Digester Annular Seal Repair	This lump sum shall include all work required for removal and replacement of digester annular seals as specified in Section 46 01 70. Work includes, but is not limited to, removal of existing seals, cleaning of annular seal spaces, installation of new seal materials as specified and testing of the seal repairs.
13	PVRV Assemblies and Waste Gas Burner Inspection and Coordination	The lump sum shall include all work required for coordination, management and support for the inspection and adjustment of the waste gas burner, digester flame arrestors and digester pressure vacuum relief valve (PVRV) assemblies by Beaver Equipment/Varec Biogas.. Lump sum shall include all costs for Beaver Equipment/Varec Biogas services as identified Appendix C of the Contract Documents.
14	Digester Improvements	The lump sum shall include all Work required to construct the upgrades and modifications to the digesters that are not specifically included in other Bid Items. This shall include but not be limited to demolition of existing pumps and piping, 3-way valve and PVRV replacements, existing process valve replacements, new digester bypass piping, thickened sludge loadout piping modifications, digester mixing pump replacements, digester mixing pipe system improvements and other miscellaneous work. Lump sum shall include all digester startup and testing activities that are not specifically included in other Bid Items.

* Allowance - For the purpose of establishing a common basis for evaluating bids, an arbitrary quantity and/or bid amount for this item has been shown on the bid form and does not necessarily represent the quantity and/or cost that may be necessary for the work. The Variation in Estimated Quantities provisions of Section 1-04.6 of the Standard Specifications shall not apply to this item. Quantities and/or payments will be determined in the field as work progresses.

1-09.6 Force Account

(Local Agency SP)
Section 1-09.6 is supplemented with the following:

The Contracting Agency has estimated and included in the Proposal, a dollar amount for Bid Items “Minor Changes (Allowance)” (also referenced as Force Account), only to provide a common proposal for

Bidders. This dollar amount shall become a part of Contractor's total bid. However, the Contracting Agency does not warrant expressly or by implication that the actual amount of work will correspond with the estimate. Payment will be made on the basis of the amount of work actually authorized by the Contracting Agency through Work Directives.

A complete list including name, labor classification and weighted wage rate of all personnel to be performing Force Account work shall be given to the Contracting Agency before Force Account work starts. A list including all pertinent information, such as equipment name and model, year, engine size, bucket size, capacity, etc., for all equipment to be used for performance of Force Account work shall also be furnished to the Contracting Agency prior to beginning Force Account work.

1-09.7 Mobilization

(Local Agency SP)
The second and third paragraphs and the associated subparagraphs of Section 1-09.7 are deleted and replaced with the following:

"Mobilization and Demobilization" shall include but not be limited to the following items:

1. Movement of Contractor's personnel, equipment, supplies, and incidentals to the project site;
2. The establishment of onsite trailer, including procurement of all utilities to serve the offices such as power, telephone, fax, high speed internet, etc.;
3. Securing suitable storage area(s), staging area(s), parking area(s) and other facilities necessary for work on the project;
4. Providing sanitary facilities for Contractor and Contracting Agency personnel;
5. Securing private agreements for temporary land use on adjacent properties as needed and providing a copy of all such agreements to the Engineer as required by Section 1-07.24;
6. All other pre-construction expenses and costs for preparatory work and operations performed by the Contractor; and
7. All demobilization costs, including removal of equipment, excess materials, trailer, and general cleanup.

1-09.9 Payments

(March 13, 2012 APWA GSP)
Delete the first four paragraphs of Section 1-09.9 and replace them with the following:

The basis of payment will be the actual quantities of Work performed according to the Contract and as specified for payment.

The Contractor shall submit a breakdown of the cost of lump sum bid items at the Preconstruction Conference, to enable the Project Engineer to determine the Work performed on a monthly basis. A breakdown is not required for lump sum items that include a basis for incremental payments as part of the respective Specification. Absent a lump sum breakdown, the Project Engineer will make a determination based on information available. The Project Engineer's determination of the cost of work shall be final.

Progress payments for completed work and material on hand will be based upon progress estimates prepared by the Engineer. A progress estimate cutoff date will be established at the preconstruction conference.

The initial progress estimate will be made not later than 30 days after the Contractor commences the work, and successive progress estimates will be made every month thereafter until the Completion Date. Progress estimates made during progress of the work are tentative and made only for the purpose of determining progress payments. The progress estimates are subject to change at any time prior to the calculation of the final payment.

The value of the progress estimate will be the sum of the following:

1. Unit Price Items in the Bid Form — the approximate quantity of acceptable units of work completed multiplied by the unit price.
2. Lump Sum Items in the Bid Form — based on the approved Contractor's lump sum breakdown for that item, or absent such a breakdown, based on the Engineer's determination.
3. Materials on Hand — 100 percent of invoiced cost of material delivered to Job site or other storage area approved by the Engineer.
4. Change Orders and/or Minor Change (Allowance) — entitlement for approved extra cost or completed extra work as determined by the Engineer.

Progress payments will be made in accordance with the progress estimate less:

1. Retainage per Section 1-09.9(1);
2. The amount of Progress Payments previously made; and
3. Funds withheld by the Contracting Agency for disbursement in accordance with the Contract Documents.

Progress payments for work performed shall not be evidence of acceptable performance or an admission by the Contracting Agency that any work has been satisfactorily completed. The determination of payments under the contract will be final in accordance with Section 1-05.1.

1-09.9(2) Contracting Agency's Right to Withhold and Disburse Monies Due

(Local Agency SP)
Section 1-09.9(2) is added as the following:

In addition to monies retained pursuant to RCW 60.28 and subject to RCW 39.04.250, RCW 39.12, and RCW 39.76, the Contractor authorizes the Contracting Agency to withhold progress payments due or deduct an amount from any payment or payments due the Contractor which, in the Contracting Agency's opinion, may be necessary to cover the Contracting Agency's costs for or to remedy the following situations:

1. Work not in accordance with the Contract Documents;
2. Defective work or equipment cost or liability that may occur to Contracting Agency as a result of Contractor's, Subcontractors or Suppliers failure to perform;
3. Damage to another contractor when there is evidence thereof and a claim has been filed;
4. Where the Contractor has not paid fees or charges to public authorities or municipalities which the Contractor is obligated to pay;
5. Utilizing material, tested and inspected by the Contracting Agency, for purposes not connected with the Work (See Section 1-05.6);
6. Landscape damage assessments (See Section 1-07.16);
7. For overtime work performed by the Engineer or Contracting Agency personnel (See Section 1-08.0(3).
8. Liquidated damages associated with exceeding the Contract Time (See Section 1-08.9 Liquidated Damage); or
9. Failure of the Contractor to perform any of the Contractor's other obligations under the contract, including but not limited to:
    a. Failure of the Contractor to correct defective or unauthorized equipment or work (Section 1-05.7).
    b. Failure of the Contractor to furnish a Manufacture's Certificate of Compliance in lieu of material testing and inspection as required by Section 1-06.3.

c. Failure to submit Intent to Pay Prevailing Wage forms, or correct underpayment to employees of the Contractor or subcontractor of any tier as required by Section 1-07.9.

d. Failure of the Contractor to pay worker's benefits (Title 50 and Title 51 RCW) as required by Section 1-07.10.

e. Failure of the Contractor to submit and obtain acceptance of a progress schedule per Section 1-08.3.

Lack of construction progress based upon the Contracting Agency's review of the Contractor's approved progress schedule which indicates the Work will not be completed within the Contract Time may also be a basis for withholding progress payments due or to deduct an amount from any payment or payments due the Contractor. The amount withheld under this subparagraph will be based upon the liquidated damages amount per day set forth in Contract Documents multiplied by the number of working days the Contractor's approved progress schedule, in the opinion of the Engineer, indicates the Contract may exceed the Contract Time.

The Contractor authorizes the Contracting Agency to act as agent for the Contractor disbursing such funds as have been withheld pursuant to this section to a party or parties who are entitled to payment. Disbursement of such funds, if the Contracting Agency elects to do so, will be made only after giving the Contractor fifteen (15) calendar days prior written notice of the Contracting Agency's intent to do so, and if prior to the expiration of the 15-calendar day period, no legal action has commenced to resolve the validity of the claims, and the Contractor has not protested such disbursement.

A proper accounting of all funds disbursed on behalf of the Contractor in accordance with this section will be made. A payment made pursuant to this section shall be considered as payment under the terms and conditions of the Contract. The Contracting Agency shall not be liable to the Contractor for such payment made in good faith.

If legal action is instituted to determine the validity of the claims prior to expiration of the 15-day period mentioned above, the Contracting Agency will hold the funds until determination of the action or written settlement agreement of the parties.

1-09.13(3)A Arbitration General

(November 30, 2018 APWA GSP)
Revise the third paragraph to read:

The Contracting Agency and the Contractor mutually agree to be bound by the decision of the arbitrator, and judgment upon the award rendered by the arbitrator may be entered in the Superior Court of the county in which the Contracting Agency's headquarters is located, provided that where claims subject to arbitration are asserted against a county, RCW 36.01.050 shall control venue and jurisdiction of the Superior Court. The decision of the arbitrator and the specific basis for the decision shall be in writing. The arbitrator shall use the Contract as a basis for decisions.

1-09.13(4) Venue for Litigation

(Local Agency SP)
Revise the first sentence of the first paragraph to read:

Litigation shall be brought in the Superior Court of Kitsap County or such other Superior court as mutually agreed to in writing by the parties.

END OF SECTION 1-09

1-11 Operations and Maintenance Data

(Local Agency SP)
Section 1-11 and its subsections are added as the following:

1-11.1 Schedule of O&M Data Required

Contractor shall arrange for, and pay all costs associated with the services of the manufacturer's representative and/or others to provide and prepare operation and maintenance data for the system and/or equipment listed below:

1. Digester Mixing Pumps.
2. Flow meters.
3. Valves.
4. Pump control systems.
5. Other systems or equipment that may need maintenance.

1-11.2 Initial Submittal

Contractor shall submit a draft bookmarked and searchable PDF copy of the Operations and Maintenance Manual to the Contracting Agency for review. The PDF shall comply with Section 1-06.1(3). The initial submittal shall be received by the Engineer at least twenty (20) Working Days prior to placement of the system and/or equipment in operation. The initial submittal may be delivered in multiple parts to the Contracting Agency.

All information shall be specifically for the installed components. Data sheets which cover multiple equipment or list options shall be marked to indicate the installed equipment, including provided options. All other equipment or options shall be crossed out. Each item in the submittal shall include, but not be limited to the following information:

1. Fly sheet indicating: Contracting Agency's name; description of equipment; manufacturer's name, address, and telephone number; and local supplier/ representative's name, address, and telephone number.
2. Detailed index indicating submittal contents, with major headings related to tabbed dividers.
3. Assembly drawings.
4. Parts list and/or bill of materials.
5. Wiring diagrams.
6. Lubrication instructions, including type and frequency.
7. Preventative and periodic maintenance summary.
8. Operating instructions.
9. Overhaul and parts replacement instructions.
10. Source for parts.
11. Testing and troubleshooting procedures.
12. Performance curves.
13. Factory and field test data.
14. List of recommended spare parts.
15. List of expendable parts (i.e., air or oil filters).
16. Warranty.

The Contracting Agency will review the initial submittal and return it to the Contractor for incorporation of review comments.

1-11.3 Final Submittal

After Contractor has addressed the Contracting Agency's comments on the initial submittals, Contractor shall assemble all components into an integrated document. The final submittal shall include two final tab divided hard copies and one bookmarked and searchable PDF copy that reflects the corrections. Each hard copy shall be bound in vinyl covered, three-ring binders. The integrated document shall consist of as many volumes as necessary to contain the data. Individual binders for each component of the submittal are not required. The binder shall be organized in a consistent format with tabbed dividers for each item. Each volume shall include, but not be limited to, the following:

1. The front cover and binding edge shall have typed labels identifying the project, Contracting Agency, and volume number;
2. Detailed index indicating the contents of the volume by major headings; and
3. Oversize (larger than 11"x17") prints shall be inserted in bound-in Kraft or Kevlar envelopes, placed at the end of the applicable area or subarea.

The integrated document shall be submitted to the Contracting Agency within ten (10) Working Days after Substantial Completion of the work. If the integrated document does not meet the requirements of this Section, the Contracting Agency may return the copy to the Contractor for corrections. The submittal process shall be repeated until the integrated document is acceptable. The Contractor shall anticipate that Final Acceptance may be delayed by the Contracting Agency if the integrated document is not acceptable to the Contracting Agency.

END OF SECTION 1-11

1-12 Internet-Based Project Management Requirements

(Local Agency SP)
Section 1-12 and its subsections are added as the following:

1-12.1 Summary

This Section specifies an Internet-based project management system, EADOC, required for use by Contractor and Contracting Agency for collaboration and communications of all Contract related work.

1.12.2 Submittals

Submit the following for each proposed authorized EADOC user within ten days of the effective date of the Notice to Proceed:

1. Name, title, and company affiliation.
2. Address, phone number, email address, and fax number.
3. Specific job-related functions.
4. Level of authority within the Contractor's organization.
5. Level of permissions access requested for each user for accessing each EADOC module.

Submit an updated list of authorized users on a quarterly basis or more frequently as needed, to indicate users to be added or removed.

1.12.3 Project Communications

All official Project Communication and collaboration will take place in EADOC by creating and distributing documents directly within the system, or by scanning and/or uploading project documents into the system for distribution. Unless otherwise indicated, no other form of written Project Communication will be recognized.

Create submittals in EADOC's submittal module. Distribute reports, documents, samples, etc. that cannot be processed through EADOC per Section 1-06. Use EADOC to track and expedite processing submittals. Scan and/or upload support documentation into EADOC and attach to the main submittal document.

The Construction Manager or Engineer will respond to all documents using the appropriate EADOC module. All documents requiring formal signatures will be printed out in EADOC and hard copies signed and distributed. Otherwise, documents distributed electronically via EADOC will be considered official documentation. Documents requiring formal signature include:

1. Change Orders.
2. Construction Change Directives.
3. Pay applications.
4. All correspondence from the Contractor constituting any notification, which shall be submitted in accordance Section 1-05.15.
5. Others as determined by Contracting Agency

All documents will be electronically submitted to the Contracting Agency as an attachment to a transmittal created in EADOC transmittal module.

This Section shall not relieve Contractor of its obligations to provide Contracting Agency with Record Drawings in the physical form specified in Section 1-05.5.

1.12.4 Access Requirements

Contractor shall maintain the list of authorized users to reflect current authorized users of EADOC.

Contractor shall protect the security of the EADOC system by limiting access to authorized users only. Do not allow 'sharing' of usernames. Take appropriate precautions to maintain the security of the system. Ensure that Contracting Agency is notified immediately of any user who is no longer authorized to use the system so that their user account can be de-activated by the EADOC Administrator.

Access will only be permitted to certain modules, in accordance with permission levels configured by the EADOC Administrator. Requests to change permission levels must be submitted to the Construction Manager.

1.12.5 Use Requirements

EADOC shall be used as the Project file storage system with a file folder structure created by the Contracting Agency to organize the Project documents.

The use of EADOC is intended to expedite and improve collaboration and written contract communication and to accurately record the flow of Contract documentation.

Contractor shall encourage its major subcontractors to utilize the Internet-based project management system, as appropriate, to improve communications and coordination within the Contractor's team.

Contractor shall abide by all policies, procedures, and standards established by the Contracting Agency for the use and application of EADOC.

Contractor shall comply with applicable laws and regulations regarding electronic transmission of documents requiring professional engineering stamps or signatures, including provision of hard copies of such documents as appropriate.

Project Communications that require the signature of authorized persons will use either:

1. An approved "image" of the official signature affixed to the document. Also provide Contracting Agency with the original signed hard copy/paper document.
2. An electronic copy or electronic image of a fully executed document containing the required signatures. Also provide Contracting Agency with the original signed hard copy/paper document.

1.12.6 Downtime

In the event that the EADOC system is temporarily unavailable, continue with Project Communications utilizing other electronic means (email) or hard copies to transmit and receive Project Communications.

Maintain records of all Project Communication during the EADOC downtime and upload the records to EADOC when it is operational.

Notify the Contracting Agency's EADOC Administrator by telephone or email when EADOC is not functional.

1.12.7 EADOC Training

Submit a proposed schedule of attendance for the EADOC training sessions including a list of back up personnel. EADOC training is mandatory for listed users of EADOC prior to use, including any training sessions scheduled by the Contracting Agency. Contractor shall provide for up to 12 hours of EADOC training for up to 3 staff. Contractor is not required to pay EADOC for the training sessions but shall pay for the required Contractor staff to attend the training.

1.12.8 Project Management System Requirements

Provide computer hardware and software that meet the requirements of the EADOC project management software at both field office and home office location(s) where Project Communications on this Contract are generated or processed.

1.12.8(1) Modifications

EADOC is continually modified and improved in order to enhance the product and provide additional functionality. EADOC has many methods of alerting clients to changes and providing support to the end users.

1-12.8(2) Software, Hardware, and Internet Access

Minimum software requirements are as follows:

1. An Operating system such as Windows 2000 or later.
2. An Internet browser Explorer Version 6.1 or later.

Minimum hardware requirements are as follows:

1. Pentium-based (or equivalent) workstation or laptop with a minimum of 64 MB of RAM.
2. A scanning device capable of scanning a minimum of 11-inch x 17-inch color document into electronic Portable Document Format (PDF) with a minimum density of 300 dpi.
3. A full-size plan scanner.

Minimum access requirements are as follows:

1. Broadband connection using integrated Services Digital Network (ISDN), Digital Subscriber Line (DSL), or better.

Contractor shall be responsible for his costs associated with the provisions, maintenance, and upgrade of the hardware, software, and Internet access needed for using EADOC for the duration of the Contract.

Contractor shall be responsible for all software necessary to create documents in format compatible with EADOC or to convert non-electronic documents to such formats. Compatible formats include Word, Excel, AutoCAD, and PDF.

1.12.9 Restrictions and Limitations

All Project Communications submitted to the Contracting Agency through EADOC after 3:00 PM, Monday through Friday, will be acknowledged no earlier than the following business day. For Project Communication purposes, business days and hours are defined in Section 1-01.3.

User access rights to the EADOC site will restrict access to this Contract only. Access permission levels will be established by the Contracting Agency and Construction Manager.

1.12.10 Contracting Agency Responsibility

Contracting Agency shall:

1. Provide Contractor with EADOC Use Guidelines within seven days of the effective date of Notice to Proceed.
2. Provide user access to the EADOC system for the duration of the Contract.
3. Manage the permissions level for all users of the system.
4. Provide EADOC training for personnel using the system for each EADOC user identified by the Contractor.
5. Provide technical support (administration) for EADOC, acting solely through and at the request of the Contracting Agency.
6. Provide guidelines regarding the organization and format of the EADOC modules and the access permission requirements for each module or element thereof.
7. Allow users to upload, download, view, and markup files, based on permissions.
8. Track history of revisions and activities with respect to each document submitted or managed within EADOC.

9. Adjust and revise the folder structure as necessary to facilitate management of Project Communications.

With the prior approval of Contracting Agency, exceptions may be made to allow specific items to be transmitted, submitted, responded to, or distributed in hard copy only. In these instances, EADOC shall be used to track and expedite processing of these items. Refer to Section 1-12.5 above.

END OF SECTION 1-12

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TECHNICAL SPECIFICATIONS

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DIVISION 01 – GENERAL REQUIREMENTS

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SECTION 01 12 16 - WORK SEQUENCE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes general sequencing, Project phasing and coordination requirements for the Work.

B. Contract Requirements:

1. The existing Central Kitsap WWTP is currently and continuously receiving and treating raw sewage. The function of the facility shall not be compromised during the course of the Work, except as may be specified herein. Plan and prosecute the Work such that the operation of the WWTP is not interrupted, expect as specified herein.

2. Disruptions could potentially result in the spillage or discharge of raw wastewater and/or sludge. State law allows the Department of Ecology to impose civil penalties for violation of a term, condition, or requirement of Owner's NPDES Permit, including spillage or discharge of raw wastewater.

3. Spillage or discharge of untreated or partially treated sewage or sludge to surface waters or drainage courses is prohibited during construction. Penalties imposed on Owner as a result of any bypass of this type caused by Contractor, its employees or Subcontractors, and legal fees and other expenses to Owner resulting directly or indirectly from the bypass shall be borne in full by Contractor.

4. Control any and all leakage resulting from or integral to making all temporary and permanent piping connections. Provide any and all devices required to control, stop, divert, or dispose of any and all leakage.

1.2 SUBMITTALS

A. Work Sequencing Plan: The Contract shall submit a Work Sequencing Plan for review and approval prior to work being performed on the site. In general, the Work Sequencing Plan will identify the logical progression of work that will complete the work within the constraints defined herein and maintain operation of the WWTP. At a minimum, to include the following:

1. Complete sequence of construction for all activities contained herein.

2. Major work activities to occur.

3. Schedule of temporary shutdowns and estimated duration of shutdowns.

4. Schedule of utility shutdowns and estimated duration of shutdowns.

5. Listing of equipment to be present on site, including temporary pumping equipment to be used to bypass during shutdowns, if required.

6. Assistance to be required of Owner's operating personnel during shutdowns.

7. Contingency plan identifying what action will be taken if activities during a shutdown cannot be completed within the allotted times, or if there is a failure of bypass equipment.

8. Name and contact information of individual in charge of activity during shutdown.

1.3 PROJECT SPECIFIC WORK CONSTRAINTS

A. Digester Rehabilitation Work Constraints:

1. The work involves the demolition and addition of new valves, pipes, pumps, electrical, and ancillary components within the digesters and Digester Control Building.

   a. The anaerobic digestion process in both digesters shall be halted in order to complete the work.

   b. Groundwater shall be drawn down to below the bottom of the digesters before the digesters are emptied and maintained at such level until the digesters are refilled.

   c. The digester work shall be conducted beginning with the East Digester first.

   d. During any work within the digesters and/or Digester Control Building, the Contractor shall continuously monitor for methane and hydrogen sulfide. The Contractor shall provide the necessary instruments for mechanical ventilation, monitoring, and alarms. Ventilation, monitoring, and alarms shall be in place and functioning properly prior to digester shutdown and continue to function until the digesters are returned to service.

   e. The digester that is not undergoing active work is to be used as a sludge holding tank and shall be ventilated with a temporary odor control unit to reduce odors in accordance with Section 46 01 71.

   f. Once all work is complete, both digesters shall be returned to anaerobic digestion service. One possible work sequence is detailed in Sub-section 1.5, below.

B. Sludge Loadout Constraints

1. The work involves addition of a sludge loadout valve on the discharge of the Hauled Sludge Transfer Pump at the Thickened Sludge Loading Area.

    a. The Hauled Sludge Transfer Pump and the Thickened Sludge Loading Area are used intermittently to transfer sludge from other WWTPs to Central Kitsap WWTP for additional treatment and shall be operational Monday through Friday for the duration of construction except as may otherwise be authorized by the Construction Manager for short durations of less than 48-hours to complete the work.

1.4 GENERAL WORK CONSTRAINTS

A. General constraints primarily relate to interfacing with and tying into existing pipelines, power supply, equipment, and other aspects of the operating WWTP.

B. Make every effort to give proper attention to each of these items to minimize interruptions of the existing facilities and avoid delays that may result if the constraints are not observed.

C. Constraints listed below involve limits on activities during construction. These limits relate to the critical nature of the existing WWTP.

1. Coordinate construction schedule and operation with the Owner.

2. Coordinate proposed work with the Owner, Engineer, and facility operations personnel before implementing unit shutdowns. Under no circumstances cease Work at the end of a normal working day if such actions may inadvertently cause a cessation of any facility operating process; in which case, remain on site until necessary Work and/or repairs are complete.

3. The Owner recognizes portions of the facility and facility operations will have to be interrupted or shut down or interfered with in order to accommodate construction activities. The Owner will, through its personnel, attempt to accommodate Work, provided that proper notification is given. The Owner reserves the right to deny permission for interruption or shutdown on any day.

4. Do not operate any of the existing equipment. Do not operate any valves. Contractor is liable for any loss or damage caused to property or equipment or any personal injury resulting from or related to usage or operation of valves or equipment.

5. Truck access to plant facilities shall be maintained at all times.

a. The truck loading facility for dewatered solids is located on the south side of the WAS Thickening Building and shall be available Monday through Friday for the duration of construction except as may otherwise be authorized by the Construction Manager for short durations.

b. Access to the primary Septage Receiving Station located east of the Headworks Building shall be maintained for the duration of construction.

c. Access to the Gravity Thickeners and Thickener Control Structure, Sludge Processing Building No. 109, Power and Blower Building, and Maintenance Building shall be maintained throughout the duration of construction except as otherwise authorized by the Construction Manager for short durations.

D. Extended Working Hours: If it is desired to perform any Work outside the specified working hours, obtain written permission from Owner and all necessary permitting agencies, and make all necessary arrangements prior to commencing.

1.5 WORK SEQUENCE

A. Anaerobic Digester Construction Sequence:

The following presents one possible sequence to construct the piping and equipment in the digesters and Digester Control Building. The Contractor shall select their own means and methods that meet the constraints described above and create a Work Sequencing Plan for approval by the Owner and Engineer.

1. Step 1 – Dewatering:

a. Drill dewatering wells and begin dewatering operations with the sludge levels in the digester at normal operating levels to prevent floating of the digesters.

b. Drill a monitoring well and monitor groundwater levels to determine when water levels are below the bottom of the digesters.

2. Step 2 – Digester Gas Purge and Sludge Drawdown

a. Begin inert gas purge of digester headspace in accordance with Section 46 01 71.

b. The Owner will turn off the heat exchangers for both digesters, shut down the sludge feed to the east digester, and continue operating the gas flare and dewatering centrifuges. The mixing pumps and sludge withdrawal pumps of both digesters will continue operating during purge.

c. Once methane levels in the digesters have dropped below the purge end point, open the hatches on top of the digester covers and begin air ventilation and odor control.

d. Using the withdrawal pumps, the Owner will draw sludge level in the East Digester to a minimum level allowed by the suction of the withdrawal pump (estimated between Elev. 137' and Elev. 140'), then close all the isolation valves on the sludge feed, sludge withdrawal and sludge mixing lines associated with the East Digester. The Owner will also draw sludge level in the West Digester to a pre-set level that is higher than the level of the withdrawal pump suction pipe, then continue sludge feeding, sludge withdrawal and sludge mixing associated with the West Digester.

3. Step 3 –Sludge Bypass Piping

   a. Connect both East and West thickened sludge piping (4" THS) to the digested sludge withdrawal pipe (8" DS) and connect digested sludge withdrawal return pipe to thickened sludge blending tank pipe (6" THS). Coordinate short-duration shutdown with the Owner.

4. Step 4 – East Digester Cleaning, Demolition, Inspection, Repairs, and Improvements

   a. Begin with the East Digester. The West Digester will operate as a sludge holding tank to allow the County to continue operation of the withdrawal pump.

   b. Remove digester pressure/vacuum relief valve assembly and provide the flame arrestors to the County for refurbishment.

   c. Repair digester annular seal in accordance with Section 46 01 70.

   d. Remove remaining sludge, solids, grit, and any foreign materials from the digester.

   e. Install lighting and scaffolding system and clean East Digester interior to allow personnel entry.

   f. The Owner and Engineer will inspect East Digester condition and direct extent of repairs required.

   g. Demolish existing piping within East Digester as show in the plans. Demolish transfer pump. Demolish East Digester mixing pump and transfer pump pads.

   h. Install new digester piping as shown in the plans. Complete repairs to digester interior as shown in the plans and as directed by the Owner and Engineer.

   i. Install new control valves on all pipes associated with the East Digester.

j. Install mixing pump, seal water line, and associated electrical.

k. Install new biogas three-way valve, refurbished flame arrestors, and new pressure/vacuum relief valves.

l. Conduct start-up and testing of the East Digester components and improvements.

5. Step 5 – West Digester Cleaning, Demolition, Inspection, Repairs, and Improvements

   a. Repeat Step 4 work for the West Digester, using the East Digester as a sludge holding tank. The County will drain the West Digester using the withdrawal pump to the minimum level allowed by the suction of the withdrawal pump (estimated between Elev. 137' and Elev. 140'), then close all the isolation valves on the sludge feed, sludge withdrawal and sludge mixing lines associated with the West Digester.

6. Step 6 – Return Digesters to Service

   a. Purge headspace of both digesters with inert gas in accordance with Section 46 01 71.

   b. Once the headspace has been purged, the County will seed the digesters with anaerobic digester sludge and resume sludge loading to both digesters.

7. Step 7 – End Dewatering and Demobilize

   a. Stop dewatering operations and remove temporary dewatering equipment.

   b. Demobilize remaining equipment from the site.

1.6 TEMPORARY SHUTDOWNS

A. Provide notice of required shutdowns in the Work Sequencing Plan. Provide a minimum 10 working day advance written notice of all temporary shutdowns as work progresses.

B. Each Notice of Request for Approval of a Temporary Shutdown submitted to Owner shall include the following:

   1. Dates, times, and duration of proposed shutdown.

   2. Work activities to be performed during the shutdown.

   3. Assistance required of Owner's personnel before, during, and after shutdown.

4. Personnel to be on Site during shutdown.

5. Contingency plan if work during shutdown is not completed during allotted time or critical equipment fails.

C. Upon receipt of such request, Owner will decide what action(s) is required by Owner, additional actions by the Contractor, and if the requested shutdown is acceptable considering current operations and WWTP performance at that time. The request from Contractor will be returned to Contractor with the Owner's written decision noted. If Owner deems that the requested shutdown is unacceptable, Owner will state such reasons, and Contractor shall reschedule the shutdown as required.

D. It is hereby agreed between the Contractor and Owner that disapproval by Owner of the Contractor's shutdown request does not entitle Contractor to any time extension unless Contractor can demonstrate to the satisfaction of Owner, through an updated CPM schedule, that the overall Project completion date will not be met as a result of this disapproval.

E. Owner may postpone a planned and approved shutdown at any time due to current operating conditions, WWTP performance, or safety reasons.

1.7 INTERRUPTION OF UTILITY SERVICE

A. Indicate required shutdowns of existing utilities or interruptions of existing operations in the Work Sequence Plan. Interruptions to utility service will be allowed to the extent that WWTP operations will not be adversely compromised.

B. Submit written notice of interruptions to utility service not less than 10 working days in advance of the date scheduled for the interruption. Notice shall include information required in Paragraph1.6B of this Specification Section.

C. Following receipt of the request, Engineer will notify Contractor if the requested date will be permitted. Evaluation of the request will be based upon the availability of the utility owner's personnel to assist and monitor utilities during the shutdown period and impact to customer service.

D. Minimize the period of interruption by thorough advance planning. Procure and provide all required materials, equipment, and labor on site during the shutdown.

E. Do not begin interruption until written authorization is received from Engineer.

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION - (Not Used)

END OF SECTION

SECTION 01 41 20 - SEISMIC REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS AND SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This section contains seismic design requirements common to several Specification Divisions including but not limited to Architectural, Mechanical, HVAC and Plumbing, Process Integration, and Electrical for non-structural equipment, components, and systems. The components and systems indicated below are required for immediate re-occupancy and minimization of disruption to operations following a seismic event. All elements shall meet the requirements of this section and Chapter 13 of ASCE 7-16.

1.2 ACCEPTED STANDARDS

A. ASCE 7-10 Section 13.1.6 allows for the use of reference documents or standards for industry specific systems or components which represent acceptable procedures for seismic design and construction. The use of these documents or standards does not alleviate the Contractor from submitting calculations, drawings, and product data that show conformance to the requirements of this section.

B. Pre-approved details meeting the requirements of ASCE 7-10 Section 13.3 may be used for this project without submitting calculations indicating compliance with the design criteria specified in Section 1.5 Design Criteria. The Contractor shall provide shop drawings detailing the product and specifying the pre-approved detail(s) to be used and their locations along with supporting documentation.

1.3 SUBMITTALS

A. Product data: Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic restraint component used.

B. Shop drawings: Submit shop drawing plans and details indicating horizontal and vertical location (with respect to floor level and grids) layout, spacing, sizes and types of seismic restraint, and gravity supports for each system or component requiring bracing. The connection details shall be on similar size plan sheets or clearly presented in 8-1/2-inch by 11-inch format. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices. Shop drawings shall be stamped by a registered Professional Engineer in the state of Washington. The shop drawings must be clearly organized and presented such that they can be readily interpreted by the Contractor for installation and the Special Inspector. Include the following:

1. Fabricated Support: representations of field-fabricated supports not detailed on the Shop Drawings.

2. Seismic Restraints: Detail anchorage and bracing not defined by other details or charts on the Shop Drawings. Include the following:

    a. Design: To support selection and arrangement of seismic restraints, include calculations of combined tensile, compressive, and shear loads. NOTE: Anchorage to concrete shall comply with ACI 318-14 Chapter 17 assuming cracked concrete conditions.

    b. Details: Detail fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.

C. Calculations: Calculations shall be submitted together with the Shop Drawings. Calculations shall substantiate the design of the sizes, thicknesses, and types of seismic-restraint connections, gravity support connections, fabrication, and attachment (fastening, anchorage, welding, etc.) to the structure, including all fasteners. Calculations shall clearly indicate the loads imposed on the primary building structure, including magnitude, direction, and location. Calculations shall be based upon the design requirements in Sub-section 1.5 Design Criteria and shall be stamped by a registered Professional Engineer in the State of Washington.

D. Welding certificates of welders performing component or system installation.

E. Field Quality Control Reports

F. Field Observation Reports from the Special Inspector

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in ASCE 7-10 unless requirements in this Section are more stringent.

1.5 DESIGN CRITERIA

A. General. Seismic Demands on Non-Structural Components per ASCE 7-10 Section 13.3 are superseded by Sub-sections 1.5.B and 1.5.C below. Conform to all other Sections of ASCE7-10 Chapter 13.

B. Horizontal seismic forces. Design and detail all members and connections to meet the requirements of ASCE 7-10 based on the actual system or component operating weight. The design and evaluation of components and their support and attachments shall consider their flexibility as well as their strength. The following forces shall be used for all design and calculations.

1. Seismic design category: refer to Structural Notes in the Drawings

2. Occupancy category: Varies with structure. Refer to Structural Notes in the Drawings

3. F_p = horizontal seismic design force applied in any direction

   $F_p = 0.4\ S_{DS}\ [(a_p W_p)(1+2z/h)]/(R_p/I_p)$

   $F_{pMAX} = 1.6\ I_p\ S_{DS}\ W_p$

   $F_{pMIN} = 0.3\ I_p\ S_{DS}\ W_p$

4. a_p = component amplification factor, per ASCE 7-10 Chapter 13, unless specified elsewhere within individual Specification Divisions or individual Specification Sections

5. R_p = component response modification factor, per ASCE 7-10 unless specified elsewhere for individual Division or Specification Sections

6. W_p = component operating weight

7. I_p = component importance factor. Unless otherwise noted, the component importance factor for this project shall be the same as the seismic importance factor for the structure. Refer to Structural Notes in the Drawings

8. z = height (in feet) above ground floor for the attachment of the component (see drawings for floor elevations). z shall be taken as zero below grade. The value of z/h need not exceed 1.0.

9. h = roof height above grade.

10. S_{DS} = Short Period Design Spectral Response Acceleration, refer to Structural Notes in the Drawings

C. Vertical seismic forces. Calculate vertical seismic force by the following equation. The design force shall be applied vertically at the center of gravity of the component or distributed according to the mass distribution of the component or system. The vertical seismic force shall be combined with the horizontal seismic force as well as the Dead Load gravity force to determine the maximum force for component or anchorage design. Combine horizontal and vertical effects as indicated in ASCE 7-10, Section 13.3.1.

   $F_{pV} = +/-0.2\ S_{DS} W_p$

D. Seismic attachments, bracing, and anchorage shall be designed such that the component force is transferred to the lateral force resisting system of the structure through a complete load path. Attachments shall not be made across expansion and contraction joints.

E. Components with vibration isolation systems shall have snubbers in each horizontal direction and vertical restraints as necessary to resist overturning.

F. The seismic anchorage system shall provide restraint in all directions, including vertical, for each component or system for which seismic design is required.

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION - (Not Used)

END OF SECTION

SECTION 01 64 13 – OWNER-FURNISHED MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 DESCRIPTION

This section identifies the Contract materials and equipment that will be furnished by the Owner.

1.2 EQUIPMENT LIST

The following is a list of materials and equipment which will be provided by the Owner for installation under this Contract. In accordance with paragraph 1.3, the following equipment has been acquired by the Owner under separate procurement agreements with the equipment manufacturers (Vendors). For all valves listed herein, the Owner has pre-purchased the valve and operator only. The existing Victaulic adapters may be reused with new valves. The Contractor shall provide all necessary ancillary components, including gaskets and bolt kits.

TYPE	EQUIPMENT NAME	SIZE (IN.)	DESCRIPTION
VALVE	COMMON SCUM AND FOG CONTROL VALVE	4	3-WAY PV
VALVE	SCUM AND FOG TO EAST DIGESTER	4	3-WAY PV
VALVE	SCUM AND FOG TO WEST DIGESTER	4	3-WAY PV
VALVE	WEST SLUDGE TRANSFER HIGH VALVE (OLD)	4	PV
VALVE	EAST GRAVITY THICKENER SLUDGE VALVE	6	PV
VALVE	WEST GRAVITY THICKENER SLUDGE VALVE	6	PV
VALVE	EAST PRIMARY SLUDGE PUMP SUCTION VALVE	6	PV
VALVE	WEST PRIMARY SLUDGE PUMP SUCTION VALVE	6	PV
VALVE	EAST SLUDGE TRANSFER VALVE (OLD)	6	PV
VALVE	WEST SLUDGE TRANSFER LOW VALVE (OLD)	6	PV
VALVE	EAST DIGESTER OVERFLOW TO DRAIN VALVE	6	PV
VALVE	WEST DIGESTER OVERFLOW TO DRAIN LOW VALVE	6	PV
VALVE	WEST DIGESTER OVERFLOW TO DRAIN MID VALVE	6	PV
VALVE	WEST DIGESTER OVERFLOW TO DRAIN HIGH VALVE	6	PV

TYPE	EQUIPMENT NAME	SIZE (IN.)	DESCRIPTION
VALVE	COMMON GRAVITY THICKENER SCUM 3-WAY	6	3-WAY PV
VALVE	EAST DIGESTER RECIRC WITHDRAWL VALVE	6	3-WAY PV
VALVE	WEST DIGESTER RECIRC WITHDRAWL VALVE	6	3-WAY PV
VALVE	COMMON SLUDGE WITHDRAWL LOOP RETURN ISOLATION VALVE	8	PV
VALVE	EAST DIGESTER MIXING SUCTION 3-WAY VALVE	16	3-WAY PV
VALVE	WEST DIGESTER MIXING SUCTION 3-WAY VALVE	16	3-WAY PV
VALVE	EAST MIXING DISCHARGE	16	PV
VALVE	WEST MIXING DISCHARGE	16	PV
VALVE	EAST SCUM BREAKER	16	PV
VALVE	WEST SCUM BREAKER	16	PV
VALVE	SLUDGE WITHDRAWAL LOOP TO TSBT VALVE	6	PV
VALVE	DIGESTER FEED PUMPS BYPASS VALVE - EAST	4	PV
VALVE	DIGESTER FEED PUMPS BYPASS VALVE - WEST	4	PV
VALVE	HAULED SLUDGE TRANSFER PUMP VALVE	4	PV
VALVE	EAST DIGESTER BIOGAS PVRV 1	10	PVRV by Varec
VALVE	EAST DIGESTER BIOGAS PVRV 2	10	PVRV by Varec
VALVE	WEST DIGESTER BIOGAS PVRV 1	10	PVRV by Varec
VALVE	WEST DIGESTER BIOGAS PVRV 2	10	PVRV by Varec
VALVE	EAST DIGESTER BIOGAS 3-WAY VALVE	10	by Groth
VALVE	WEST DIGESTER BIOGAS 3-WAY VALVE	10	by Groth
FLAME ARRESTER	EAST DIGESTER BIOGAS FLAME ARRESTER 1	10	TO BE SALVAGED
FLAME ARRESTER	EAST DIGESTER BIOGAS FLAME ARRESTER 2	10	TO BE SALVAGED
FLAME ARRESTER	WEST DIGESTER BIOGAS FLAME ARRESTER 1	10	TO BE SALVAGED
FLAME ARRESTER	WEST DIGESTER BIOGAS FLAME ARRESTER 2	10	TO BE SALVAGED
PUMP	EAST DIGESTER SLUDGE MIXING PUMP		by Flowserve

TYPE	EQUIPMENT NAME	SIZE (IN.)	DESCRIPTION
PUMP	WEST DIGESTER SLUDGE MIXING PUMP		by Flowserve

Abbreviations: PV = Plug Valve PVRV = Pressure and Vacuum Relief Valve

1.3 CONTRACTOR-VENDOR COORDINATION

For Owner-furnished material and equipment designated in paragraph 1.2, the equipment Vendors has been selected independently of and prior to the Central Kitsap Treatment Plant Digester Rehabilitation and Modifications Contract. A separate agreement between the Owner and the selected Vendor, which defines the scope of the Vendor's work and the costs to the Owner for providing this work, has been developed. This agreement will be assigned to the Contractor for administration and coordination of installation and testing. Section 01 64 16 defines Vendor responsibilities as well as additional Contractor responsibilities. See Appendices to the Contract Documents for:

A. Data sheets of PVRV, flame arresters, and 3-way valve

B. Procurement Document and Submittal of Digester Mixing Pumps (Flowserve Pump) by APSCO

1.4 SCHEDULE

The following items are scheduled to be delivered after the start of construction. Allow 14 days for transit to the site. The remaining items listed in Section 1.2 will be delivered to the site prior to the start of construction. The Owner will notify the Contractor of the estimated delivery dates during the pre-construction phase.

TYPE	EQUIPMENT NAME	EXPECTED SHIPMENT DATE
VALVE	EAST DIGESTER MIXING SUCTION 3-WAY VALVE	7/11/2022
VALVE	WEST DIGESTER MIXING SUCTION 3-WAY VALVE	7/11/2022
VALVE	EAST DIGESTER BIOGAS 3-WAY VALVE	7/30/2022
VALVE	WEST DIGESTER BIOGAS 3-WAY VALVE	7/30/2022
PUMP	EAST DIGESTER SLUDGE MIXING PUMP	TBD
PUMP	WEST DIGESTER SLUDGE MIXING PUMP	TBD

PART 2 PRODUCTS

2.1 MATERIALS

All materials used in the installation of Owner-furnished material and equipment shall conform to the Vendor's recommendations and the requirements of the Contract Documents. The Contractor shall furnish all materials not listed as Owner- furnished to provide the complete and operable equipment systems identified in the Contract Documents.

PART 3 EXECUTION - (Not Used)

END OF SECTION

SECTION 01 64 16 – ADMINISTRATION, INSTALLATION, AND TESTING OF OWNER-FURNISHED EQUIPMENT

PART 1 GENERAL

1.1 GENERAL

This section defines the responsibility of the Contractor for installation and testing, as well as administering the delivery and inspection of equipment listed in Section 01 64 13.

The Owner has selected and pre-purchased equipment listed in Section 01 64 13 for installation and testing by the Contractor. Under the terms of the equipment Procurement Agreements for items listed in Section 01 64 13, the Owner agrees to pay the Vendors a price for furnishing the specified equipment to be installed, inspected, and tested by the Contractor.

All work required by the Contractor which is not included in the Vendor's scope of supply to administer, install, and test the Owner-furnished equipment shall be included in the Contract Price.

1.2 RESPONSIBILITIES OF EQUIPMENT VENDORS

The Vendors will be responsible for coordinating its activities including submittal preparation, equipment, fabrication, shipment, training, operation and maintenance manual preparation and submission. The Vendors will be responsible for working directly with the Owner and Contractor to establish a detailed schedule of activities and deliverables.

A. SUBMITTALS AND PRODUCT DATA:

The Vendors will prepare all required submittals and any re-submittals for review and approval by the Owner and Engineer.

The Vendor will prepare and furnish product data 30 days in advance of the Contractor's scheduled installation.

The Owner and Engineer will review submittals and product data in accordance with Special Provisions Section 1-06.

B. SHIPMENT AND STORAGE:

The Vendors will ship equipment listed in 01 64 13 to the Project Site. The Vendor will be responsible for the adequacy of the shipment. The Vendor will provide written instructions for storing equipment on site prior to installation.

C. SERVICES DURING CONSTRUCTION:

The Vendor will provide factory trained personnel to supervise installation and adjustment of equipment, train the Owner's staff, and provide startup support as specified in the individual purchase agreement between the Owner and the Vendor.

D. OPERATION AND MAINTENANCE MANUALS:

The Vendors will provide O&M manuals for equipment.

E. WARRANTY:

The Vendors will provide warranties for equipment.

1.3 RESPONSIBILITIES OF THE CONTRACTOR

The following paragraphs specify the responsibilities of the Contractor for the installation, inspection and testing of the supplied equipment. All work specified below shall be included in the total contract price.

A. ADMINISTRATION OF PROCUREMENT AGREEMENTS:

Following assignment, the Contractor shall be responsible for performing activities including, but not limited to, the following:

1. Processing certification forms, field test reports and Operation and Maintenance (O&M) manuals, between the Vendor and the Owner. Contractor shall process O&M manuals in accordance with Special Provisions Section 1-06.

2. Processing requests for information and/or change orders between the Vendor and the Owner.

3. Coordination and scheduling of Vendor's activities to ensure timely incorporation of the Vendor's work into the Central Kitsap Wastewater Treatment Plant Digester Rehabilitation and Modifications Contract, to ensure the Contractor satisfies milestone and contract completion schedule requirements.

4. Ensuring that Vendor's personnel while on site conform to all applicable Project requirements.

B. EQUIPMENT OFF-LOADING AND ACCEPTANCE:

1. For Owner-furnished equipment that is scheduled to arrive after the Notice to Proceed date:

   a. The Contractor shall be responsible for receiving and offloading equipment and components from the Vendor at the Project Site.

b. The Contractor and Owner, and where specified the Vendor's representative shall jointly inspect the equipment items are of the specified quantity, quality and workmanship and are in good order and condition upon delivery. Equipment delivered in crates or otherwise packaged will be uncrated by the Contractor to permit inspection. The condition of the equipment will be jointly recorded by the Contractor and the Owner. At the conclusion of this task, the equipment shall become a part of this Contract as if it had been furnished by the Contractor. Contractor shall be responsible for the care and protection of the Owner-furnished equipment until final acceptance.

2. For Owner-furnished equipment that already arrived before the Notice to Proceed date:

   A. The Owner will be responsible for offloading, inspecting, inventorying, and storing the delivered equipment and components at the project site.

   B. The Owner will furnish the equipment and components to the Contractor. Contractor to coordinate with the Owner on the acceptance procedure and date.

C. ON-SITE STORAGE:

1. Once the equipment is received by the Contractor, the Contractor is responsible for all storage requirements to protect the delivered equipment. On-site storage shall be provided in accordance with the Vendor's recommendations.

2. Materials and equipment shall be stored to insure the preservation of their quality and fitness for the work. Stored equipment and materials shall be located to facilitate inspection. The Contractor shall be responsible for damages that occur in connection with the care and protection of materials and equipment until final acceptance of the work.

D. CONTRACTOR-PROVIDED EQUIPMENT AND MATERIALS:

The Contractor shall furnish all materials and equipment not listed as Owner-furnished to provide a complete and operable systems identified in the Contract Documents.

E. INSTALLATION:

The Contractor shall provide all labor, equipment, and materials required to install the equipment. The Contractor shall provide all new facilities and/or all modifications to the existing facilities specified to provide for installation of the equipment. The equipment shall be aligned, connected, and installed at the locations shown on the Contract drawings, and in accordance with the Vendor's recommendations. Installation of the equipment will be deemed complete upon the signature of the Vendor's representative on the Manufacturer's Certificate of Proper Installation. Provide seismic

bracing and anchoring for all equipment per Section 01 41 20.

F. OPERATOR TRAINING:

The Contractor shall schedule and coordinate with the Vendor to provide the operator training required in the Procurement Agreements.

G. FUNCTIONAL AND PERFORMANCE TESTING:

The Contractor shall provide all labor necessary to conduct the functional and performance tests specified in the Vendor's Procurement Documents and Special Provisions Section 1-05.11. Should the installed equipment fail to satisfy the requirements of the tests, due solely or in part to deficiencies in installation, the Contractor shall be responsible for all corrective action required to ensure the equipment meets the performance and operational testing requirements.

H. OPERATIONAL TESTING:

The Contractor shall be responsible for the operational tests of all valving and equipment, in accordance with Special Provisions Section 1-05.11.

I. GUARANTEE:

The Contractor shall not be required to administer the warranty of equipment provided under the Procurement Agreements. The Contractor shall however provide a warranty for all Contractor provided materials, equipment, and installation of equipment and materials provided under the Procurement Agreements in accordance with Special Provisions Section 1-05.10.

PART 2 PRODUCTS – (Not Used)

PART 3 EXECUTION

The Contractor's activities shall not interfere with existing facilities to operate continuously, unless otherwise specified or approved in writing by the Owner.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

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SECTION 02 41 00 - DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of existing equipment, valves, piping, fittings, and associated equipment pads, as shown on the Contract documents. Associated pipe supports and pipe hangers may need to be removed that are not shown on the Contract drawings.

2. Demolition and removal of digester annular seal.

1.2 SUBMITTALS

A. Demolition Plan, submit prior to start of work.

1.3 QUALITY ASSURANCE

A. Existing Conditions: Determine the extent of work required and limitations before proceeding with Work.

B. Conform to applicable local, state, and federal codes for environmental requirements in relation to disposal of debris.

1. Burning at the Site for the disposal of refuse, debris, and waste materials resulting from demolition and site clearing operations shall not be permitted.

C. Permits: The Contractor is responsible for obtaining all necessary permits required for completion of the Work described in this Section.

D. Protection of Persons and Property: Meet all federal, state, and local safety requirements for the protection of workmen, other persons, and property in the vicinity of the Work and requirements of the General Provisions.

E. If the existing material to be demolished and removed contains any hazardous materials which will require special handling upon removal, such as asbestos or lead, it is the responsibility of the Contractor to remove and dispose of the material in accordance with all applicable federal, state, and local regulations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Existing Materials: All materials, equipment, miscellaneous items, and debris involved, occurring, or resulting from demolition, clearing, and grubbing work shall become the property of the Contractor at the place of origin, except as otherwise indicated in the Drawings or Specifications.

PART 3 EXECUTION

3.1 EXAMINATION

A. The Owner assumes no responsibility for the actual condition of the facilities to be demolished. The Contractor shall visit the site, inspect all facilities and be familiar with all existing conditions and utilities.

B. Demolition drawings identify major equipment and structures to be demolished only. Auxiliary utilities such as water, air, chemicals, drainage, lubrication oil, hydraulic power fluid, electrical wiring, controls, and instrumentation are not necessarily shown shall be considered incidental to all demolition work.

C. Identify waste and salvage areas for placing removed materials.

3.2 PREPARATION

A. Carefully coordinate the work of this Section with all other work and construction.

B. Call Local Utility Line Information service at 1-800-424-5555 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2. Disconnect or arrange for disconnection of utilities (if any) affected by required work.

3. Keep all active utilities intact and in continuous operations.

3.3 PROTECTION

A. Utilities: Locate, identify, and protect utilities located by utilities and indicated in the Drawings to remain from damage.

B. Miscellaneous Site Features: Protect all existing miscellaneous site features from damage during construction, including but not limited to existing structures, internal

pipework, electrical wiring, fences, mailboxes, sidewalks, paving, guy wires, utility poles, and curbs.

C. Repair and Replacement:

1. Damaged items, including but not restricted to those noted above, shall be repaired, or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this contract.

2. Any damage to existing facilities or utilities to remain as caused by the Contractor's operations shall be repaired at the Contractor's expense.

3.4 SALVAGE DISPOSITION, STORAGE, AND HANDLING

A. General

1. The Contractor shall notify the Owner prior to beginning any salvage work so that the proper salvage items are identified and the condition of the salvage item and adjacent equipment, piping, and structures can be documented. The Owner may elect to have any items on the salvage list removed and disposed of by the Contractor, rather than being salvaged, at no additional cost to the Owner.

B. Items Designated for Salvage

1. Equipment for salvage is identified on the Contract Drawings, and as a minimum shall be removed and salvaged to the Owner. The following list includes major salvage items, but may not be inclusive:

a. Flame arrestors – to be refurbished by the Owner and reinstalled by the Contractor

C. Removal

1. Salvaged equipment shall be properly disconnected to retain their full salvage value, removed from their foundations, and carefully stored at a location on the plant site as directed by the Owner.

D. Salvaged Equipment

1. The Contractor shall salvage items designated as a unit. The Contractor shall clean, list, and tag the equipment for storage. Protect from damage and deliver to locations designated by the Owner. Salvage each item with auxiliary systems or equipment required for operation, including drives and control panels.

E. Disposal

1. Legally dispose of items or materials not designated for salvage to Owner. Promptly remove from the site. Items and materials not salvaged to the Owner shall not be stored on site nor shall Contractor bury such materials on site.

3.5 DEMOLITION

A. Carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, consult with Engineer prior to the placement of such equipment or material.

B. Demolition of Existing Equipment, Piping, Fittings and Valves:

1. Provide shoring, bracing, and supports, as required, to ensure adjacent structures, equipment, piping, valves, and instrumentation are not damaged and structural elements of existing structure are not overloaded during demolition activities.

a. Increase structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this Contract.

b. Remove all temporary protection when the Work is complete or when so authorized by the Engineer.

c. Removal of equipment pads and refinishing of concrete surface shall be completed in accordance with the Contract Drawings.

2. Remove and dispose of all exposed and/or protruding metalwork, piping, plumbing, and conduits resulting from demolition activities, and all woodwork, roofing, and electrical and mechanical equipment removed from demolished structures.

a. Reinforcing bars shall be cut flush with final wall elevations as shown in the Drawings.

b. No detached metalwork, excluding concrete reinforcing bars, shall be buried with the concrete and masonry rubble.

C. Demolition of Existing Annular Seal

1. Remove and dispose of the existing top mastic seal around the circumference of both digesters, without damage to any radial cover support, piping, handrails, or aluminum flashing on the concrete wall.

2. Remove and dispose of existing asphalt layer to the extent possible, at least 18 inches deep below the top mastic layer around the entire circumference of both digesters. Remove all the asphalt, any sand (if present), bottom mastic layer, and the oakum layer down to the bottom of the skirt, if possible. The West Digester is expected to have a layer of mastic that is directly above the oakum layer (no sand) and the East Digester is expected to have layers of sand below the top mastic layer and over the oakum layer (no lower mastic layer), however, field conditions may vary. Coordinate with the Owner and obtain the Owner's approval to determine the maximum depth of removal.

3.6 ELECTRICAL AND CONTROL SYSTEM DEMOLITION

A. All electrical and control system demolition work shall at all times be conducted in a safe and proper manner to avoid injury from electrical shock to all personnel.

1. Electrical equipment to be shut off for a period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable.

2. At no time shall live electrical wiring or connections or those which can become energized be accessible to any persons without suitable protection or warning signs.

3.7 REMOVAL

A. Remove debris, rock, excavated materials, rubble, abandoned piping, and extracted plant life resulting from abandonment and/or demolition activities from site.

B. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

C. Removal: All material resulting from demolition, clearing, and grubbing, and trimming operations shall be removed from the Project Site and disposed of in a lawful manner. No materials shall be placed on property of private property owners.

3.8 CLEANUP

A. During and upon completion of work, promptly remove all unused tools and equipment, surplus materials, debris, and dust and shall leave all areas affected by the work in a clean, condition, as may be subject to Engineer approval.

B. Adjacent structures shall be cleaned of dust, dirt, and debris resulting from demolition.

C. Adjacent areas shall be returned to their existing condition prior to the start of work.

3.9 LOCATION

A. Items to be demolished and removed (or salvaged) from the Project Site, specific location and extents are shown on the Contract Drawings.

END OF SECTION

DIVISION 03 - CONCRETE

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SECTION 03 01 30 - CONCRETE REPAIRS

PART 1 GENERAL

1.1 SUMMARY

A. This specification describes the repair of concrete cracks, spalls, and other miscellaneous defects using an epoxy resin adhesive sealing system.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete Work

B. Section 03 64 23 – Crack Repair Epoxy Adhesive Injection

1.3 QUALITY ASSURANCE

A. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.

B. Install materials in accordance with all safety and weather conditions required by Manufacturer or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.4 REFERENCES

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

1. American Concrete Institute (ACI):

    a. 503R, Use of Epoxy Compounds with Concrete.

2. ASTM International (ASTM):

    a. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

    b. D4258, Standard Practice for Surface Cleaning Concrete for Coating.

    c. D4259, Standard Practice for Abrading Concrete.

3. International Concrete Repair Institute (ICRI):

a. 310.1R, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (formerly No. 03730).

b. 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays (formerly No. 03732).

1.5 DEFINITIONS

A. Structural Defects: Concrete condition or characteristic that detracts from strength, life expectancy, or durability of concrete, or determined by the Engineer.

1. Structural defects may occur in the following areas:

a. Areas subject to structural loading.

b. Areas subject to heavy wear.

c. Interior of hydraulic structure.

d. Below grade structure.

e. Display defects or parts of defect that extend 1 inch or deeper into concrete and deemed by Engineer as structural defect.

1.6 SUBMITTALS

A. Product data sheets for each material supplied for horizontal, vertical, and overhead concrete repairs.

B. Drawings or photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location in new concrete.

C. Epoxy and/or Mortar Repair System:

1. Manufacturer’s preparation and installation instructions.

D. Written description of equipment proposed for hydrodemolition for surface preparation.

E. Certifications:

1. Manufacturer’s Certificate of Compliance that proposed repair product system meets or exceeds specified performance criteria when tested in accordance with Article Field Quality Control.

F. Statements of Qualification:

1. Epoxy and/or Mortar System Manufacturer’s representative.

1.7 QUALITY ASSURANCE

A. Prior to purchasing repair materials or installing concrete repairs, the Contractor shall submit details for each proposed repair to the Engineer for review. The items to be included in the submittal shall include as a minimum the following items:

1. Repair location.
2. Methods to be used for removal of defective or unsound concrete.
3. Cleaning and surface condition just prior to repair material application.
4. Repair materials, installation, and curing.
5. Qualifications as listed below.

B. Qualifications:

1. Epoxy and/or Mortar System Applicator:

a. Experienced applicator endorsed by Product/System Manufacturer.

C. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.

D. Install materials in accordance with all safety and weather conditions required by Manufacturer or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.8 PRE-REPAIR CONFERENCE

A. Required Meeting Attendees:

1. Contractor, including Contractor’s Quality Control Representative.
2. Repair Subcontractor.
3. Technical representative for Repair Material Manufacturer.
4. Engineer.
5. Special Inspectors.

B. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.

C. Agenda shall include:

1. Review of field conditions. Conduct field observations of Work to be performed.

2. Based on above observations, Repair Material Manufacturer's technical representative shall make material selection and repair method recommendations for horizontal, vertical, and overhead applications.

3. Technical representative for Repair Material Manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.

4. Other specified requirements requiring coordination.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Package products in moisture-resistant containers.

B. Deliver, store, and handle repair materials in accordance with Manufacturer's printed instructions.

PART 2 MATERIALS AND EQUIPMENT

2.1 ONE-COMPONENT, VERTICAL AND OVERHEAD REPAIR MORTAR

A. Polymer-modified, cementitious based, flowable, gray in color, horizontal and vertical surface repair mortar conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance in with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M at 28 days: minimum 4,500 psi.

3. Flexural Strength, ASTM C348 at 28 days: minimum 600 psi.

4. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 400 psi minimum.

5. Shrinkage, ASTM C157 at 28 days: maximum 0.05 percent.

B. Manufacturers and Products:

1. For Surface Repairs not in contact with Potable water: Sika Corp., Lyndhurst, NJ; SikaQuick VOH; Euclid Chemical Co., Cleveland, OH, EucoRepair V100

2.2 POLYMER-MODIFIED REPAIR MORTAR (VERTICAL AND OVERHEAD REPAIRS)

A. Polymer-modified, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface renovation mortar conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M at 28 days: minimum 7,000 psi.

3. Flexural Strength, ASTM C348 at 28 days: minimum 1,200 psi.

4. Chloride Ion Penetrability Based on Charge Passed, ASTM C1202: 800 coulombs maximum.

5. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 500 psi minimum.

6. Drying Shrinkage, ASTM C596 at 28 days: maximum 0.12 percent.

7. Freeze Thaw Resistance, ASTM C666/C666M, at 300 cycles: 90 percent RDF.

B. Manufacturers and Products:

1. For all locations: Sika Corp., Lyndhurst, NJ; SikaTop 123 Plus.

2. For Surface Repairs not in contact with Potable water: Euclid Chemical Co., Cleveland, OH; DuralTop Gel.

2.3 POLYMER-MODIFIED REPAIR MORTAR (HORIZONTAL REPAIRS)

A. One-component, fast-setting conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M, 1 day, 2,500 psi; 7 days, 5,000 psi; 28 days, 7,000 psi minimums.

3. Flexural Strength, ASTM C348 at 28 days: minimum 1,500 psi.

4. Abrasion Resistance Depth of Wear, ASTM C779, Procedure A: 60 minutes, 0.033 inch.

5. Rapid Chloride Ion Penetrability Based on Charge Passed, ASTM C1202: 28 days, 850 coulombs maximum.

6. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 600 psi minimum.

7. Drying Shrinkage, ASTM C157 Modified, at 28 days: maximum 0.09 percent.

B. Manufacturers and Products:

1. For all locations: Sika Corp., Lyndhurst, NJ; SikaTop 122 Plus.

2. For Surface Repairs Not in Contact with Potable Water: Building Systems, Shakopee, MN; Emaco R310 CI.

2.4 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

A. Epoxy resin concrete cement adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.

1. Mixed Bonding Agent Properties:

a. Pot Life: 75 minutes to 105 minutes.
b. Contact Time: 24 hours.
c. Concrete Color: Gray.

2. Cured Epoxy Resin Portland Cement Adhesive Properties:

a. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 600 psi minimum.

b. Flexural Strength, ASTM C348: 1,000 psi minimum.

c. Slant Shear Bond Strength, ASTM C882/C882M:

1) 2-hour Open Time: 2,500 psi minimum.
2) 24-hour Open Time: 2,000 psi minimum.

d. Bonding agent shall not produce a vapor barrier.

e. Compatible with mortar system.

B. Manufacturers and Products:

1. BASF Building Systems, Shakopee, MN; MBT P&R Emaco.
2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
3. Euclid Chemical Co., Cleveland, OH: Dural Prep AC.

2.5 ANTI-CORROSION COATING

A. Three component, solvent free, moisture tolerant, epoxy modified, cementitious material.

B. Products:

1. Sika Corp.; Sika Armatec 110 EpoCem.
2. Or acceptable equivalent product.

2.6 CORROSION INHIBITING COATING

A. Penetrating, corrosion inhibiting, impregnation coating for hardened concrete.

B. Products:

1. Sika Corp.; Sika FerroGard 908.
2. Or acceptable equivalent product.

2.7 EPOXY BONDING AGENT

A. Epoxy bonding/grouting adhesive shall conform to ASTM C881 Type I, II, IV or V; Grade 2, Class C for epoxy resin adhesives, depending on the application. The class of epoxy bonding agent shall be suitable for all ambient and substrate temperatures.

B. Products:

1. Sika Corp.; Sikadur 32, Hi-Mod.
2. Sika Corp.; Sikadur 32, Hi-Mod LPL.
3. Or acceptable equivalent product.

2.8 EPOXY COATING AGENT

A. High-build, protective, solvent-free, colored epoxy coating for providing a protective lining.

B. Products:

1. Sika Corp.; Sikagard 62
2. Or acceptable equivalent product.

2.9 FLEXIBLE CRACK REPAIR

A. Flexible crack repair shall be hydrophobic polyurethane suitable for crack grouting by injection.

B. Each location where flexible crack repair products are used must be approved in writing by the Engineer, prior to installation. Unless explicitly approved in writing by the Engineer, concrete crack repairs shall be per Specification 03 64 23, Crack Repair Epoxy-Poly Injection Grouting.

2.10 PROTECTIVE SLURRY MORTAR

A. Two-component, polymer-modified, cementitious waterproofing, and protective slurry mortar for concrete.

B. Products:

1. Sika Corp.; SikaTop Seal 107.
2. Or acceptable equivalent product.

2.11 CONCRETE SEALER

A. Concrete sealer shall be a solvent-free, colorless, non-vapor-barrier sealer for absorbent cementitious surfaces that will not degrade under UV exposure.

B. Products:

1. Sika Corp.; Sikagard 701W.
2. Or acceptable equivalent product.

PART 3 EXECUTION

3.1 CONCRETE REPAIRATION

A. Identify unsound and deteriorated concrete by sounding techniques and review proposed extent of repair with Engineer.

B. For patch areas 1/4 inch or deeper, follow ICRI 310.1R of ICRI 310.2.

C. Remove unsound, honeycombed, deteriorated, or otherwise defective concrete from work areas by saw cutting or 16,000 psi to 20,000 psi high-pressure water blasting machine capable of removing concrete surfaces to a minimum amplitude roughness of 3/16-inch roughness when measured with a straightedge, CSP 6-9 in accordance with ICRI 310.2, in accordance with ASTM D4259.

1. Remove all loose material up to 1 inch past any corroded reinforcing or corroded metal surfaces. Do not penetrate into concrete further than required to remove loose material.

2. Remove all dirt, oil, or other foreign material from the area of repair.

D. For concrete surface “rust bloom” abrasive based or abrasive blast surface back to “white metal” condition.

E. Do not use power-driven jackhammers and chipping hammers, unless water blasting is not practical or may cause other damage.

1. In such cases where chipping hammers are required, limit size of chipping hammer to reduce formation of microfracture of substrate concrete surface.

2. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.

3. Remove unsound concrete to satisfaction of Engineer.

F. To avoid tapered shoulders or featheredges, square edges of patch areas by sawing or chipping. Avoid cutting embedded reinforcing steel. Roughen polished saw-cut edge by high pressure water blasting or abrasive blasting.

G. Collect and dispose water from removal operations in manner and location acceptable to Owner. Do not dispose via drainage or stormwater systems.

H. Inform Engineer if the following surface conditions exist:

1. 50 percent or more of reinforcing bar surface is exposed during removal of concrete.

2. 25 percent or more of reinforcing steel surface is exposed during removal of concrete and extent of reinforcing bar corrosion is such that more than 25 percent of material is lost.

3. Bond between existing concrete and reinforcement has deteriorated, as determined by Engineer.

I. Clean exposed reinforcing steel of rust to “white metal” and concrete per recommendations of Repair Material Manufacturer and in accordance with ASTM D4258 and recommendations of ICRI 310.1R. Coat exposed reinforcing steel with appropriate repair product:

J. Replace deteriorated reinforcing with new reinforcing equivalent in cross-sectional area to original reinforcing. Weld new bars to existing reinforcement when and as directed by Engineer.

K. Keep areas from which concrete has been removed free of dirt, dust, and water blasting slurry. Remove laitance and other bond inhibiting contaminates from prepared areas.

3.2 FORMWORK AND SHORING

A. Execution of formwork and shoring must meet the requirements specified in Section 03 30 00 Cast-in-Place Concrete Work

B. Formwork

1. Construct forms to sizes, shapes, lines, and dimensions to match existing adjacent surfaces and textures. Provide forms that match openings, offsets, chamfers, anchorages, inserts and other features as described on Contract Documents. Construct forms to accommodate installation of products by other trades. Provide forms for easy removal to minimize damage to concrete surfaces and adjacent surfaces. Apply form release coating over formwork surfaces prior to each concrete placement. Form release agents must not be applied to or come in contact with the repair area concrete substrate or reinforcement.

2. Do not damage repair material during removal of formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete or repair material. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing. Remove all formwork anchors embedded in existing concrete. Fill anchor holes and repair all damage to existing concrete at anchor holes.

C. Shoring

1. Provide shoring in accordance with the shoring drawings prior to performing work to brace the substrate structure temporarily while repair work is proceeding. Shoring must be designed, documented, and stamped by a Licensed Design Professional. Shoring designs must be submitted to and approved by the Engineer prior to work commencing.

2. Leave formwork and shoring in place to support existing loads, construction loads and weight of repair material in beams, slabs, and other structural members until in-place strength of repair material determined in accordance with the Contract Documents. For post-tensioned construction, leave formwork and shoring in place until stressing is complete. When shores and other supports are arranged to allow removal of form-facing material without allowing structural slab or member to deflect, form-facing material and its horizontal supporting members may be removed at an earlier age.

3.3 CONCRETE REPAIRS

A. CRACK REPAIR

1. Preparation

a. General Requirements

1) Clean all cracks in accordance with the paragraph titled Concrete Preparation.

2) Do not repair cracks when the temperature of the concrete is below freezing, and moisture conditions indicate the possibility of ice on the internal surfaces of the crack.

3) Do not apply adhesive if the temperature of the concrete is not within the range of application temperatures recommended by the manufacturer of the adhesive.

b. Crack routing

1) Inspect surfaces adjacent to crack to receive repair material. If deteriorated, route a V-groove section at the crack face until sound concrete is reached.

c. Sealing

1) For epoxy injection, apply a surface seal over all exterior faces of the crack that can be reached to contain the injection adhesive in the crack.

2) For gravity fill repairs, apply a surface seal along the bottom surface of the element that can be reached to contain the repair material in the crack.

2. Application

a. Epoxy Injection

1) Install the injection entry and venting ports using flush mounted or drilled fittings per proprietary manufacturer's instructions.

2) Space the ports at minimum of a distance equal to the thickness of the member or 8 in.

3) Inject the epoxy using Material Manufacturer's recommended equipment.

4) Apply recommended Manufacturer's injection pressure.

5) For vertical or inclined cracks, apply injection by pumping epoxy into entry ports at the lowest elevation, cap, and move upward.

6) For horizontal cracks, apply injection by proceeding from one end of the crack to the other until the crack is fully sealed.

7) After 10 min., repeat injection procedure until all ports refuse injection.

8) Remove ports and remove the surface seal by heat, chipping, or grinding or other acceptable means after the injected epoxy has cured.

b. Gravity fill

1) Mix resin or monomer per Material Manufacturer's instructions.

2) Pre-fill cracks at least 0.125 in. wide with aggregate.

3) Pour resin or monomer onto the surface, over the cracks and spread with brooms, rollers, or squeegees.

4) Work material back and forth over the cracks to maximize fill in crack.

5) Allow at least 20 minutes for material to penetrate cracks (confirm time based on Manufacturer's product).

6) Remove excess material once cracks have been filled to refusal.

7) Allow material to cure per Material Manufacturer's recommendations.

8) Remove sealant and grind smooth.

3. Quality Control

a. Conduct quality and control tests for metering accuracy and mixing effectiveness of the continuous mixing pump in accordance with ACI 503.7.

b. Qualify the test injection procedures in accordance with ACI 503.7.

4. Acceptance Criteria

a. Core Sampling

1) Core sampling

a) Not required for crack lengths under 5ft in length.

b) Confirm with Engineer is core sampling required for crack lengths between 6ft and 30ft.

c) For 30ft or greater obtain 1 core and up to three cores from first 100 ft. and one core for each 100 ft. thereafter.

2) Obtain core samples in accordance with ASTM C42/C42M.

3) Allow 24 hours after injection before coring.

4) Obtain cores in a manner that includes as much of the bond line of the repaired concrete as possible. Replace cores that do not intersect the crack for at least 75 percent of the length of the core.

5) If cores would sever reinforcing steel or other embedded items, do not core, and notify the Engineer so that an alternative location can be chosen.

6) Obtain cores at least 2 in. in diameter for visual inspections and at least 4 in. in diameter for the splitting tensile test. Perform a splitting tensile test on one core from the first 100 ft. and one core for each 250 ft. thereafter.

7) Fill core holes with non-shrink grout Pre-treat hole with bonding agent before grouting.

b. Core Testing

1) Test a portion of the core samples for the splitting tensile strength in accordance with ASTM C496/C496M.

2) Allow 72 hours after injection before beginning splitting tensile tests

3) Prepare core sample per ASTM C42/C42M.

4) Align the core so that the crack is in a plane as close to vertical as possible.

c. Acceptance

1) Work is acceptable if at least 90 percent of the depth of the crack in each core is filled with adhesive.

B. CORROSION AND SURFACE REPAIR

1. Preparation

a. Identification of Extent of Concrete Removal

1) Configure geometry of removal area to maximize the use of right-angle geometry, avoiding reentrant corners, and to obtain uniformity of depth. Determine the depth, location, and size of reinforcing bars prior to removal of concrete.

2) Perform visual inspection and hammer tapping, chain drag sounding, or other methods acceptable by the Engineer to identify cracked, delaminated, spalled, disintegrated, and otherwise unsound concrete for removal. Mark boundaries of repair area before concrete removal.

3) Inspect the marked boundaries with the Engineer prior to commencing with the concrete removal. Revise the repair area boundaries as instructed by the Engineer.

b. Shoring and Formwork

1) Provide shoring and formwork per the paragraph titled Formwork and Shoring.

2) For post-tensioned concrete, detention strands and wires as required by Contract Documents prior to repair.

c. Concrete Removal

1) Remove concrete from repair areas to indicated depth and profile. Notify Engineer if additional delaminated, fractured, or unsound concrete is present.

2) Do not damage embedded reinforcing and adjacent concrete. The removal methods must produce minimal microcracking (bruising) of the prepared substrate surfaces. Avoid directly striking reinforcing steel with impact tools used for concrete removal.

3) Provide perpendicular edges at perimeter of repair area. The perimeter of the repair areas must be saw cut to a depth of 0.50 to 0.75 in. For vertical or overhead surfaces, provide 45-degree slope at repair boundaries to facilitate air and rebound escape. Do not cut or damage embedded reinforcement or other embedded items. If embedded reinforcing steel or other embedded items are too close to the surface to provide the perpendicular edge cut, notify the Engineer for direction before proceeding.

4) Extend concrete removal along the corroded reinforcing steel to a point where there is no further delamination, concrete cracking, or reinforcing steel corrosion, and where the reinforcement is bonded to the surrounding concrete.

5) Remove concrete around the exposed layer of reinforcement to a uniform depth beyond within the repair areas to provide a minimum clearance between exposed reinforcing steel and surrounding concrete of 0.75 in., or at least 0.25 in. larger than the maximum nominal size of the coarse aggregate in the repair material.

d. Preparation of Concrete Substrate Surface

1) Confirm perpendicular edges at repair area perimeter and reinstate if damaged by concrete removal process. Remove loosely bonded concrete, bruised or fractured concrete, and bond-inhibiting materials such as dirt, concrete slurry, or any other detrimental materials from the concrete substrate using approved methods. Where concrete has been removed by impact methods, abrasive blasting must be used to prepare the surface and remove bruised concrete.

2) Provide substrate surface profiles as specified in the Contract Documents.

3) Visually inspect and sound substrate surface to confirm that no further delaminations or otherwise unsound concrete remains. If encountered, notify the Engineer.

4) Clean the substrate per the paragraph titled Concrete preparation.

2. Application

a. Existing Reinforcement Preparation

1) Clean existing reinforcement that will remain. Remove corrosion and/or other laitance and notify the Engineer if section loss is greater than 20%.

2) If applicable, replace coating on reinforcement per ASTM A780 (galvanized bar), ASTM A775 (epoxy coated bar), or ASTM A934 (epoxy coated bar). Exposed areas must not exceed 2 percent of surface area in each linear foot of each bar.]

3) Permit evaluation of existing reinforcement and placement of new reinforcement by the Engineer.

b. Placement of New Reinforcement

1) Placement of new reinforcement to replace or strengthen existing reinforcement is like new construction. Placement, splicing, and handling of new reinforcement must meet the requirements specified in Section 03 30 00 Cast-in-Place Concrete Work.

2) Reinforcement must be free of materials deleterious to bond. New reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

c. Placement of Concrete

1) If portland cement concrete is used as the repair material, follow the requirements indicated in 03 30 00 Cast-in-Place Concrete Work as well the Contract Document for proportioning, mixing, and placing concrete. For all other materials, follow Material Manufacturer's recommendations.

2) A bonding agent must be used.

3) Apply corrosion inhibitors to rebar in repair area.

4) Consolidate the repair material after placement with a vibrating screed or internal vibrator.

5) Finish the surface to match surface finish and texture requirements indicated in the Contract Document. Screed, float and trowel the repair material or broom the surface for non-slip texture. Follow the requirements of 03 30 00 Cast-in-Place Concrete Work.

d. Placement of Other Repair Materials

1) Equilibrate repair material(s) and substrate to the temperature, cleanliness of substrate and reinforcement, and moisture requirements of the Repair Material Manufacturer's requirements.

2) Comply with the Repair Material Manufacturer's requirements for batching, mixing, placing, and curing repair materials.

3) Review consistency of the mixed repair material(s) relative to the parameters documented in the Repair Material Manufacturer product data sheet. If non-conforming, adjust consistency in compliance with the Repair Material Manufacturer's requirements.

4) Apply or install repair material(s) within the application time frame (pot life) requirements of the Repair Material Manufacturer's requirements, and place and consolidate to provide well-compacted repair.

5) Finish and tool repair materials, finished in accordance with the Repair Material Manufacturer's written instructions and as indicated in Contract Documents.

6) Protect installed repair material(s) from damage, exposure to environmental conditions that are detrimental to the uncured or cured properties of the material. Cure in accordance with the requirements of the Repair Material Manufacturer's requirements.

3. Quality Control

a. Protect concrete surfaces, beyond limits of surfaces receiving bonding agent adhesive, against spillage. Immediately remove any bonding agent adhesive that has spilled beyond desired area. Perform cleanup with material designated by Bonding Agent Adhesive Manufacturer. Avoid contamination of work area.

b. The bond strength between the existing concrete and the repair material must be a minimum of 250 psi per ASTM C1583. Test a minimum of 3 specimens at locations no greater than 500 square yards of prepared surface.

3.4 PROTECTION

A. Protect adjacent surfaces from over application of bonding agent. Promptly remove bonding agent applied beyond repair area.

B. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, as applicable for repair mortar system used, from shotcrete mortar or low- pressure spray mortar.

3.5 TESTS AND INSPECTION

A. Special Inspection, Testing, and Professional Observation shall be provided by the Owner.

B. See Concrete Repairs Section for Testing Requirements.

3.6 FIELD QUALITY CONTROL

A. Sounding for Hollow Areas:

1. See Concrete Repairs Section for Inspection and Testing.

2. Where lab testing is not required, light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.

3. Mark hollow areas for removal and replacement.

4. Saw cut hollow sounding areas to a new square edge, and reapply mortar as specified.

B. Remove and replace unacceptable Work.

3.7 CLEANING

A. Remove overshot mortar and rebound materials as Work proceeds. Remove from Work waste materials, unsound material from concrete surfaces, material chipped from walls, and water used in preparation of application and finishing.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE WORK

PART 1 GENERAL

1.1 SUMMARY

A. The extent of concrete work is shown on the Drawings.

B. Work includes providing formwork and shoring for cast-in-place concrete used in repairs and for forming equipment pads. Work further includes the installation of reinforcing steel bar (rebar), anchor bolts, bearing plates, inserts, and other items to be embedded in concrete.

1.2 RELATED SECTIONS:

A. Section 03 01 30 – Concrete Repairs

B. Section 03 60 00 – Grouting

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Manufacturer Technical Data and Strength Test Results: For sack-mix concrete used on minor-structures and repairs provide datasheet information verifying the compressive strength and performance requirements specified herein for concrete used.

C. Manufacturer's Literature: Containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of concrete used in the work.

D. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with the ACE 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures” showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangements of concrete reinforcement. Include special reinforcement required at openings through concrete structures and indicate spacer or burner bars.

1.4 REFERENCES

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

A. American Concrete Institute (ACI)

1. ACI 301 “Specifications for Structural Concrete for Buildings”
2. ACI 318 “Building Code Requirements for Reinforced Concrete”

3. ACI 347 “Recommended Practice for Concrete Formwork”

B. American Society for Testing and Materials (ASTM)

1. C33, Specification for Concrete Aggregate.
2. C150, Standard Specification for Portland Cement.

C. Comply with building code requirements which are more stringent than the above and all OSHA requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products.

B. Installer Qualifications: Minimum 2-year experience installing similar products.

C. Workmanship

The Contractor is responsible for correction of concrete work that does not conform to the specified requirements, including strength, tolerances, and finishes. Correct deficient concrete as directed by the Owner or Engineer. The Contractor shall also be responsible for the cost of corrections to any other work affected by or resulting from corrections to the concrete work.

D. Allowable Tolerances:

1. Before concrete placement check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.

2. During concrete placement check formwork and related supports to ensure that forms are not displaced, and that completed work will be within specified tolerances.

1.6 CONCRETE MIX DESIGNS

A. High-Strength Concrete Sack Mix (5000 psi compressive strength)

B. All concrete materials shall be proportioned so as to produce a workable mixture in which the water content will not exceed the maximum specified.

C. Mixing of concrete shall follow Manufacturer requirements to achieving the required design compressive strength.

D. There shall be no variation in the type of sack mix once a mix has been approved.

1.7 DELIVERY, HANDLING, AND STORAGE

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Handle products in accordance with Manufacturer's printed recommendations. Do not place grout when temperature or humidity will affect the performance or appearance of the grout.

C. Store products in a dry area. Protect from direct sunlight.

D. Do not place grout on dirty, wet, or frozen substrates.

PART 2 PRODUCTS

2.1 FORMS FOR EXPOSED FINISH CONCRETE

Unless otherwise shown or specified, construct all formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Finish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection. Use overlaid plywood complying with U.S. Product Standard PS-1 "B-B High Density Overlaid Concrete Form", Class I. Use flexible spring steel forms or laminated boards free of distortion and defects to form radius bends as required.

2.2 FORMS FOR UNEXPOSED FINISH CONCRETE

A. Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two (2) edges and one (1) side for tight fit.

2.3 FORM MATERIALS

A. Form Coatings

Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compound. Petroleum based coatings shall not be used for structures in creeks and waterways. Biodegradable coatings shall be used which will not contaminate the creeks/waterways or an alternate method for stripping the form shall be proposed.

B. Chamfers

Provide preformed PVC or shaped wood or metal of size and profile as shown on drawings.

C. Pan Forms

Provide forms for concrete pan-type construction complete with covers and end enclosures to form a true, clean, smooth concrete surface. Design units for easy removal without damaging placed concrete. Block adjoining pan units if required to avoid lateral deflection of formwork during concrete placement and compaction. Provide standard or tapered end forms, as shown.

If required, factory-fabricate pan form units to required sizes and shapes of the following:

1. Steel - 16 gauge minimum, free of dents, irregularities, sag, and rust, or

2. Glass-Fiber Reinforced Plastic - Molded under pressure with matched dies, 0.11 inches minimum wall thickness.

2.4 REINFORCING MATERIALS

A. Reinforcing Bar (rebar): ASTM A615 or ASTM 706 and as follows below

Stirrups and Ties	Grade 60
All other Uses	Grade 60

B. Steel Wire: ASTM A82, plain, cold-drawn, steel.

C. Welded Wire Fabric (WWF): ASTM A185, welded steel wire fabric.

D. Supports for Reinforcement

Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise specified. Wood, brick, concrete blocks, and other devices will not be acceptable. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are hot-dip galvanized, after fabrication, or plastic protected or stainless steel protected.

E. Fiber Reinforcement – Collated polypropylene fiber, ¾”-inch, manufactured from 100% virgin homopolymer polypropylene, hydrophobic, in compliance with ASTM C116.

2.5 PREPACKAGE CONCRETE

A. High Strength Concrete: This type of concrete is to be used wherever concrete is required in the Contract Documents unless another type is specifically referenced.

1. High Strength Concrete shall be a prepackaged, non-metallic, cement-base concrete requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation of each type of non-shrink grout specified herein shall be that recommended by the Manufacturer for the particular application.

Compressive Strength, ASTM C39	
1 Day (min.)	1,500 psi
7 Days (min.)	3,500 psi
28 Days (min.)	5,000 psi
Modulus of Elasticity in Compression, ASTM C469*	3.40×10^6 psi at 28 days
Flexural Strength, ASTM C293*	650 psi at 28 days
Splitting Tensile Strength, ASTM C496*	700 psi at 28 days
Slant Shear Strength, ASTM C882*	1,400 psi at 28 days
Shrinkage, ASTM C157*	< 0.08% at 28 days
Rapid Chloride Permeability, ASTM C1202*	< 1,400 Coloumbs

* Values provided are minimums. For non-load carrying or non-structural repairs, listed information is not required unless submitted product is being submitted as an “or equal” substitution.

B. Concrete Mix 1 (New or Repair Depth 2” or greater)

Bag mix with a minimum compressive strength of 5,000 psi as based on testing per ASTM C39. Water: Clean, fresh, potable.

1. Sika – Sikacrete-211; Sakrete – High-Strength 5000 Plus Concrete Mix; Quikrete – Commercial Grade Quikrete 5000; or approved equal.

C. Concrete Mix 2 (Repair Depth 1-2”)

1. Sika – Sikacrete-211 or approved equal.

D. For repairs that are less than 1” in depth, see 03 60 00 Grouting and 03 01 30 Concrete Repair for repair mortars and epoxies.

2.6 RELATED MATERIALS

A. Bituminous and Fiber Joint Filler

Provide resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D1751, FS HH-F-341, Type 1 and AASHTO M 213. Provide one of the following products:

1. Elastite; Philip Carey/Celotex
2. Flexcell; Celotex Corp.
3. Crane Fiber 1390; W.R. Grace & Co.
4. Fibre; W.R. Meadows, Inc.
5. Tex-Lite; J & P Petroleum Prod. Inc.
6. Sonoflex; Sonneborn/Contech, Inc.

B. Joint Sealing Compound: See Section 07 92 00, Joint Sealants.

C. Concrete Curing Materials

Concrete curing materials shall be in accordance with ACI 301 Section 5 and ACI 308.1 Section 2.

1. Water-based resin curing compound. W.R. Meadows, Inc. 1100, Euclid Kurez DR VOX, or approved equal.

D. Epoxy Adhesive

For application to wire-brushed and prepared existing concrete to be mated to new concrete.

1. W.R. Meadows, Inc. INTRALOK, Sika Sikadur-32 Hi-Mod, Sika Armatec-100 EpoCem, or approved equal.

2. Apply per Manufacturer’s recommendations.

E. Chemical-Hardener Finish: Provide Hornolith from Tamms Industries or approved equal.

F. Non-shrink Grout: See Section 03 60 00, Grouting.

2.7 PROPORTIONING NORMAL CONCRETE

A. Proportion mixes per Sack Mix Manufacturer instructions to obtain constancy indicated in product data sheet.

B. Compressive Strength, Water and Cement Content

Notwithstanding what has been stated here-before, and unless shown otherwise on the Drawings, the concrete shall meet the following requirements. All concrete except as noted otherwise on the drawings shall have 5,000 psi 28-day compressive strength and a maximum water/cement ratio as per Manufacturer guidelines.

2.8 CONCRETE MIXING

1. Per Manufacturer recommendations.

PART 3 EXECUTION

3.1 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct formworks so concrete members and structures are of correct size, shape, alignment, elevation, and position.

1. For repairs, see Section 03 01 30 Concrete Repairs for additional formwork and shoring information.

B. Design formworks to be readily removable without impact shock, or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347, to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for chamfers, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.

E. Erect falsework and support; brace and maintain it to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in-place concrete structures.

Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.

F. Forms for Exposed Concrete

Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes. Do not use metal cover plates for patching holes or defects in forms. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material, which will produce bow. Assemble forms so they may be readily removed without damage to exposed concrete surfaces. Form molding shapes, recesses, and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

Corner Treatment - Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines, except as otherwise indicated.

G. Chamfer exposed corners and edges, reveals and drips as shown using wood, metal, PVC, or rubber strips fabricated to produce uniform smooth lines and tight edge joints. A ½ inch chamfer at exposed edges is typical unless noted otherwise.

H. Provisions for Other Trades - Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such ties. Accurately place and securely support items built into forms.

I. Cleaning and Tightening - Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms after concrete placement if required to eliminate mortar leaks.

3.2 PLACING REINFORCEMENT

Detail and place according to ACI Manual SP-66. Unless otherwise noted, minimum cover shall be 1-1/2 inches for No. 5 and smaller bars, 2.0-inches for No. 6 and larger bars or for any bars exposed to exterior or wet environments, and 3.0-inches when poured against earth. Unless otherwise noted, bend all horizontals reinforcing a minimum of two (2) feet at corners and wall intersections.

A. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

B. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

C. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Do not place reinforcing bars more than two inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

D. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus two (2) inches, and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. General - Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs - Set edge forms or bulkheads and intermediate screed strips for slabs to obtain the required elevations and contours in the finished slab surface. Provide and secure units sufficiently strong to support the types of screed strips by the use of strike-off templates or accepted compacting type screeds.

3.4 PREPARATION OF FORM SURFACES

Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed. Thin formcoating compounds only with thinning agent of type, and in amount, and under conditions of the Form-Coating Compound Manufacturer’s directions. Use dissipating-type form oil at surfaces to receive cement plaster finish. Do not allow excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with Manufacturer’s instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.5 CONCRETE PLACEMENT

A. Pre-Placement Inspection

1. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts involved in ample time to permit the installation of their work; cooperate with other trades

in setting such work as required. Notify Engineer in time for inspection prior to pouring.

2. Remove all garbage and debris from the base of formwork. Items such as aluminum cans, food containers, plywood, and their like are to be cleaned-up and disposed.

3. Thoroughly wet wood forms immediately before placing concrete, as required where form coatings are not used.

4. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

B. Place concrete in compliance with the practices and recommendations of ACI 304 and as herein specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Perform concrete placing at such a rate that concrete, which is being integrated, with fresh concrete is still plastic. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure, which will cause segregation.

2. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.

3. Do not use concrete which becomes non-plastic and unworkable or does not meet the required quality control limits or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the Project Site and dispose of in an acceptable location. Do not use concrete whose allowable mixing time has been exceeded.

C. Concrete Conveying

1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practicable by methods, which will prevent segregation and loss of concrete mix materials.

2. The Contractor shall not wash concrete equipment off at the Project Site unless plastic tarps and hay bales are employed to contain the concrete. The Contractor will be required to haul off-site all concrete contaminated soil.

D. Placing Concrete into Forms

1. Deposit new concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

2. Do not interrupt successive placement; do not permit cold joints to occur.

3. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and Project conditions. Vibration of forms and reinforcing will not be permitted.

4. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete at least six (6) inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

E. Bonding

1. Roughen surfaces of set concrete at all joints except where bonding is obtained by use of concrete bonding agent, and clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly and not to leave laitance, loose particles of aggregate or damaged concrete at the surface.

2. Prepare for bonding of fresh concrete to new concrete that has set but is not fully cured, as follows:

   a. At joints between equipment pads and existing concrete, dampen, but do not saturate, the roughened and cleaned surface of set concrete immediately before placing fresh concrete.

3. Prepare for bonding of fresh concrete to fully cured hardened concrete or existing concrete by using an epoxy-resin-bonding agent as follows:

   a. Handle and store epoxy-resin adhesive binder in compliance with the Manufacturer’s printed instructions, including safety precautions.

b. Mix the epoxy-resin adhesive binder in the proportions recommended by the Manufacturer, carefully following directions for safety of personnel.

c. Before depositing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with epoxy-resin grout not less than 1/16-inch thick. Place fresh concrete while the epoxy-resin material is still tacky, without removing the in-place grout coat, and as directed by the Epoxy-Resin Manufacturer.

d. For repairs, see Section 03 01 30 Concrete Repairs for additional formwork and shoring information

F. Cold Weather Placing

1. Protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.

2. When the air temperature has fallen to or is expected to fall below 40°F, provide adequate means to maintain the temperature in the area where concrete is being placed at either 70°F for three (3) days or 50°F for five (5) days after placing. Provide temporary housing or coverings including tarpaulins or plastic film. Keep protections in place and intact at least 24 hours after artificial heat is discontinued. Keep concrete moist. Avoid rapid dry-out of concrete due to over-heating and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50°F, and not more than 80°F, at point of placement.

4. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel and adjacent concrete surfaces are entirely free of frost, snow, and ice before placing concrete.

5. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

G. Hot Weather Placing

1. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

a. Monitor the inside of facilities like the Digester as internal temperature can significantly differ from exterior temperatures.

2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F. Mixing water may be chilled or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.

3. Cover reinforcing steel with water-soaked burlap if it becomes too hot so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

4. Wet forms thoroughly before placing concrete.

5. Do not use retarding admixtures unless otherwise accepted in mix designs.

3.6 FINISH OF FORMED SURFACES

A. Smooth Form Finish

Provide as-cast smooth form finish for formed concrete surfaces that are to be exposed to view. Or that are to be covered with a coating material applied directly to the concrete, or a covering material bonded to the concrete such as waterproofing, damp proofing, painting, or other similar system.

Produce smooth form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with a minimum of seams. Repair and patch defective areas with all fins or other projections completely removed and smoothed.

B. Broom Finish (Non-Slip)

1. Apply non-slip, broom finish to equipment pad tops.

2. Immediately after trowel finish, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route or in the direction of water flow. Use fiber-bristle broom unless otherwise directed. Coordinate the required final finish with the Engineer before application.

3.7 SCHEDULE OF CONCRETE SURFACE FINISHES

Also see Section 09 90 00, Painting and Coating for protective coating requirements.

	Surface Description	Type	Finish Requirement
A.	Equipment Pads Top	Pad	Broom Finish
D.	Equipment Pad Vertical Surfaces	Formed	Smooth Form
E.	Digester Repairs	Formed	Smooth Form

3.8 CONCRETE CURING AND PROTECTION

A. General

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.

2. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

3. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for the time period covered in Section 3.10.E and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

B. Curing Methods

Perform curing of concrete by moisture curing (continuous wetting), by moisture-retaining cover curing (damp sand, burlap, canvas, or straw), by liquid membrane curing (liquid membrane-forming compound) or covering concrete with protective sheet materials (polyethylene plastic sheeting “visqueen” or similar) or by combinations thereof, as herein specified. Provide the curing methods indicated as follows:

1. For other concrete work, provide moisture curing, moisture-retaining cover curing, membrane curing, or protective sheet covering. Do not use liquid membrane or chemical curing-hardening curing on any concrete work to receive any applied finishes.

2. Inspect concrete, regardless of current method selected, do not permit the concrete to become surface-dry at any time. For formwork left in place, ensure the wood formwork is wetted throughout the curing process.

3. For curing, use only water that is free of impurities, which could etch or discolor exposed, natural concrete surfaces.

4. Provide moisture curing by any of the following methods:

    a. Keeping the surface of the concrete continuously wet by covering with water.
    b. Continuous water-fog spray.

5. Provide moisture-retaining cover curing by any of the following methods:

    a. Covering the concrete surface with the specified absorptive cover thoroughly saturated with water and keeping the absorptive cover continuously wet. Place absorptive cover so as to provide coverage of the concrete surfaces and edges with a 4-inch lap over adjacent absorptive covers.

    b. Support sheet material to prevent marking of the concrete surface.

6. Provide liquid membrane curing as follows:

    a. Apply the specified membrane-forming curing compound to damp concrete surfaces as soon as the water film has disappeared. Apply uniformly in a coat continuous operation by power spray equipment in accordance with the Manufacturer's directions. Recoat areas, which are subjected to heavy rainfall within three (3) hours after initial application. Maintain the continuity of the coating and repair damage to the coat during the entire curing period.

    b. Do not use membrane-curing compounds on surfaces, which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete. Such as other concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to the Engineer.

7. Curing formed Surfaces - Cure formed concrete surfaces, including the undersides of girders, beams, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

8. Curing Unformed Surfaces

    a. Initially cure unformed surfaces, such as slabs, floor topping and other flat surfaces by moist curing, whenever possible.

b. Final cure unformed surfaces, unless otherwise specified, by any of the methods specified above, as applicable.

c. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise acceptable to the Engineer.

9. Provide liquid curing-hardening compound as follows:

a. Apply to horizontal surfaces when concrete is dry to touch by means of power spray, hand spray or hair broom in accordance with Manufacturer's directions.

C. Temperature of Concrete during Curing

1. When the atmospheric temperature is 40°F and below, maintain the concrete temperature between 50°F and 70°F continuously throughout the curing period. When necessary, make arrangements before concrete placing for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously for the concrete curing period. Provide cold weather protections complying with the requirements of ACI 306.

2. When the atmospheric temperature is 80°F, and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation wind breaks or shading, and for fog spraying, wet sprinkling or moisture-retaining covering. Protect the concrete continuously for the concrete curing period. Provide hot weather protections complying with the requirements of ACI 305.

3. Maintain concrete temperature as uniformly as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete, which exceed 5°F in any one-hour and 50°F in any 24-hour period.

D. Curing Time

1. Per Manufacturer recommendations

2. When permitted by the Engineer, curing operations can be ended once the results of two (2) cylinder tests show that the concrete has reached a strength of 85% f'c. However, no less than 3 days of curing shall occur.

E. Protection from Mechanical Injury - During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations - Provide machine and equipment bases and foundations as shown on the drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of the manufacturer furnishing the machines and equipment.

3.10 REMOVAL OF SHORES AND FORMS

A. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support the work without excessive stress or deflection.

B. Re-Use of Forms

Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use “patched” forms for exposed concrete surfaces, except as acceptable to the Architect.

No forming material will be allowed to be built permanently into exposed visible surfaces.

3.11 CONCRETE SURFACE REPAIRS

A. For repairs of existing concrete in the Digester, see Section 03 01 30 Concrete Repairs for additional formwork and shoring information

B. Patching Defective Areas for new concrete.

1. Repair and patch defective areas with cement mortar immediately after removal of forms but only when directed by the Engineer.

2. Cut out honeycomb, rock pockets, voids over 1/2-inch diameter and holes left by tie rods and bolts down to solid concrete but, in no case, to a depth of less than 1-inch. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to the Engineer.

3. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, the patching mortar will match the color of the surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.

4. Fill holes extending through concrete by means of a plunger type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure complete filling.

C. Repair of Formed Surfaces

1. Repair exposed-to-view formed concrete surfaces that contain defects, which adversely affect the appearance of the finish. Remove and replace the concrete having defective surfaces if the defects cannot be repaired to the satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the rods and bolt; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.

2. Repair concealed formed concrete surfaces that contain defects that adversely affect the durability of the concrete. If defects cannot be repaired, remove and replace the concrete having defective surfaces. Surface defects, as such, include cracks in excess of 0.01-inch wide, cracks or any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts, and spalls except minor breakage at corners.

D. Repair of Unformed Surfaces

1. Test unformed surfaces for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

3. Repair finished unformed surfaces that contain defects, which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-inch wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets and other objectionable conditions.

4. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so those repairs can be made without damage to adjacent areas.

5. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

6. Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with a neat cement grout coating or use concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same material to provide concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

7. Repair isolated random cracks and single holes not over 1 inch in diameter by the dry-pack method. Groove the top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and brush with a neat cement grout coating. Place dry pack before the cement grout takes its initial set. Mix dry pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

8. For repair of existing unformed surfaces, mechanically remove all lose concrete as required to expose sound aggregate. Clean concrete surfaces to achieve a contaminate free, open textured surface. Square cut or undercut perimeter to minimum depth as specified by the Repair Mortar Manufacturer. Remove all lose concrete around the exposed steel and hand tool or blast clean all portions of rebar with visible rust to near white metal finish. If half of the diameter of the reinforcing steel is exposed, chip out behind the reinforcing to a 1/2-inch minimum depth. Splice new reinforcing steel to existing where corrosion has depleted the cross-section area by 25%. Apply a corrosion inhibitor/primer/bonding agent to all exposed rebar and other steel components and to concrete surfaces to be repaired per Manufacturer's requirements, such as Sika Armatec 110. Apply a polymer-modified, cement-based, repair mortar, trowel applied as specified by the Manufacturer, such as Sika MonoTop 615.

9. Repair methods not specified above may be used subject to the acceptance of the Engineer.

END OF SECTION

SECTION 03 60 00 - GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes all work necessary to form, mix, place, cure, repair, finish, and perform all other work as required to produce finished grout, in accordance with the requirements of the Contract Documents.

B. Work covered in this Section includes:

1. Patching, grouting, and sealing.
2. Grouting for support of plumbing, fire sprinklers, and HVAC equipment
3. Grout for support of mechanical, electrical, and communications equipment
4. Removal of loose and spalling grout and concrete.

1.2 RELATED SECTIONS

A. Section 03 01 30 – Concrete Repair

B. Section 03 30 00 – Cast-in-Place Concrete Work

1.3 SUBMITTALS

A. Manufacturer Technical Data and Strength Test Results: For sack-mix grouts used on minor-structure/systems provide datasheet information verifying the compressive strength, shrinkage, and expansion requirements specified herein for grout used.

B. Manufacturer's Literature: Containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of non-shrink and epoxy grout used in the work.

1.4 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Specifications, codes, and standards shall be as specified in Section 03 30 00, Cast-in-Place Concrete Work and as referred to herein.

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

B. Codes and Standards

1. American Society for Testing and Materials (ASTM)

a. C191, “Standard Test Method for Setting Time of Hydraulic Cement”

b. C131, “Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine”

c. C136, “Standard Test Method for Sieve Analysis to Fine and Coarse Aggregate”

d. C150, “Standard Specification for Portland Cement”

e. C488, “Standard Test Method for Pull-Out Strength”

f. C531, “Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes”

g. C1107, “Standard Test Method for Packaged Dry, Hydraulic Cement Grout (Non-Shrink)”

2. American Concrete Institute (ACI)

a. “Guide to Hot Weather Concreting,” ACI 305R.

b. “Guide to Cold Weather Concreting,” ACI 306R.

c. “Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces,” ACI 320.2R, as supplemented and modified herein.

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

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products.

B. Installer Qualifications: Minimum 2-year experience installing similar products.

1.6 DELIVERY, HANDLING, AND STORAGE

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Handle products in accordance with Manufacturer’s printed recommendations. Do not place grout when temperature or humidity will affect the performance or appearance of the grout.

C. Store products in a dry area. Protect from direct sunlight.

D. Do not place grout on dirty, wet, or frozen substrates.

PART 2 PRODUCTS

2.1 PREPACKAGED GROUTS

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

1. High Strength Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation of each type of non-shrink grout specified herein shall be that recommended by the Manufacturer for the particular application.

Early Height Change, ASTM C827	0.0 to +0.3%		
Hardened Height Change, ASTM C1090	+0.2 to +0.4%		
Effective Bearing Area	95%		
Compressive Strength, ASTM C942	Plastic	Flowable	Fluid
1 Day (min.)	1,000 psi	1,000 psi	1,000 psi
28 Days (min.)	5,000psi	5,000psi	5,000psi
Bond Strength, ASTM C882			
28 Days	2000psi		
Application Temperature	40°F to 90°F		
Material Temperature	40°F to 90°F		

B. Application

1. High Strength Non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under equipment base plates, and at all locations where grout is specified in the contract documents.

2.2 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is

plastic and moldable but will not flow. Where “dry pack” is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

B. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed four (4) inches.

2.3 MEASUREMENT OF INGREDIENTS

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

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

PART 3 EXECUTION

3.1 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as specified by the Manufacturer. The finish of the grout surface shall match that of the adjacent concrete.

B. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the Engineer.

3.2 GROUTING PROCEDURES

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

3.3 INSTALLATION

A. Examination

1. Examine substrates and conditions under which materials will be installed. Do not proceed with Installation until unsatisfactory conditions are corrected.

2. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas landscaping from contact due to mixing and handling of materials.

B. Surface Preparation

Comply with Manufacturer’s printed instructions and the following:

1. Mechanically remove all unsound concrete to the limits indicated on the drawings. Remove cement paste and laitance to expose sound aggregate.

2. Clean surface to receive grout of all materials including dust, oil, dirt, and grease or Efflorescence.

3. Dampen with clean water before patching and remove standing water.

C. Specialized Installation Requirements

1. Grout Below Bearing Plates:

a. Support bearing plates above cleaned bearing surfaces with double-nutted anchor bolts or wedges.

b. Fill space below bearing plates supporting structural members and stationary equipment with non-metallic non shrink grout.

c. Fill space below bearing plates supporting vibrating equipment with metallic non shrink grout.

D. Formwork:

1. Comply with Manufacturer's printed instructions and the following:

a. Forms must be watertight, strong, properly braced, and properly coated.

b. Allow a minimum clearance of 2 inches between forms and baseplate for grout entry.

c. Allow a minimum grout head of 6 inches.

d. Slope form on placing side to assist in grout movement and to prevent trapping air.

e. Allow 1-inch horizontal clearance and 1-inch vertical clearance for height above bottom of baseplate.

f. Provide venting of forms to avoid entrapment of air.

E. Mixing Requirements:

1. Comply with Manufacturer's printed instructions and the following:

a. Do not re-temper with additional water.

F. Placement of Grout Materials:

1. Comply with Manufacturer's printed instructions and the following:

a. The area to be grouted should be thoroughly flushed and soaked with clean water prior to grouting. Leave no standing water.

b. Place the grout quickly and continuously use light rodding or strapping to eliminate air bubbles.

c. Place grout mixture into prepared areas from one side or the other, rapidly and continuously, to reduce air entrapment. Avoid placing grout from opposite sides.

d. Grout temperature should be maintained from 50°F to 90°F to achieve specified results. Use cold water in hot weather or hot water in cold weather to achieve desired grout temperature. Do not use if temperature is expected to go below 32°F within a 12-hour period.

G. Curing Requirements:

1. Utilize a damp cure of at least 3 days is necessary to control the Non-Shrink characteristics and maintain strength levels.

2. Cover fresh grout and anchoring cement with plywood where exposed to construction traffic for 24 hours minimum.

H. Cleaning After Grout Placement

1. Remove excess material before material cures. If material has cured, remove using mechanical methods that will not damage substrate.

3.4 COMPLETION

A. Adjusting Defective Work: Replace or patch grout and anchoring cement as directed by Owner/Engineer/Architect.

END OF SECTION

SECTION 03 64 23 - CRACK REPAIR EPOXY/POLYURETHANE INJECTION GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes all work necessary to furnish all materials, tools, equipment, appliances, transportation, labor, and supervision required to repair cracks through the injection of an epoxy resin adhesive.

B. Section includes:

1. Epoxy resin adhesive for injection.
2. Surfacing sealing.
3. Equipment for epoxy injecting.

1.2 SUBMITTALS

A. Action Submittals:

1. Physical and chemical properties for epoxy adhesives.

2. Technical data for metering, mixing, and injection equipment.

3. Drawings and photos of proposed injection locations. Do not proceed with injection until review by Engineer is complete.

B. Informational Submittals:

1. Manufacturer’s recommended surface preparation procedures and application instructions for epoxy adhesives.

2. Installation instructions for repairing core holes with epoxy grout.

3. Manufacturer’s Certificate of Compliance: certified test results for each batch of epoxy adhesive.

4. Statements of Qualification for Epoxy Adhesive:

   a. Manufacturer’s site representative.
   b. Injection applicator.
   c. Injection pump operating technician.

5. Epoxy adhesive two component ratio and injection pressure test records for concrete crack repair work.

1.3 REFERENCES

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

1. American Association of State Highway and Transportation Officials (AASHTO): T237, Standard Method of Test for Testing Epoxy Resin Adhesive.

2. American National Standards Institute (ANSI).

3. ASTM International (ASTM):

a. C882, Standard Specification for Test Method for Bond Strength of Epoxy-Resin System Used with Concrete by Slant Shear.

b. D570, Standard Test Method for Water Absorption of Plastics.

c. D638, Standard Test Method for Tensile Properties of Plastics.

d. D648, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.

e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.

f. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.4 DEFINITIONS

A. Crack: complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.

B. Crack Injection: method of sealing or repairing cracks by injecting a polymer.

C. Large Cracks: 0.008 inch and wider, inject all.

D. Moderate Cracks: width greater than or equal to 0.005 inch and less than 0.008 inch, inject leaking cracks.

E. Small Cracks: width equal to 0.005 inch or less. Repair leaking cracks per method approved by Engineer if unable to inject.

1.5 QUALITY ASSURANCE

A. Qualifications for Epoxy Injection Staff:

1. Manufacturer’s site representative:

a. Capable of instructing successful methods for restoring concrete structures utilizing epoxy injection process.

b. Understands and is capable of explaining technical aspects of correct material selection and use.

c. Experienced in the operation, maintenance, and troubleshooting of application equipment.

2. Injection crew and job foreman shall provide written and verifiable evidence showing compliance with the following requirements:

a. Licensed and certified by Epoxy Manufacturer.

b. Minimum 3 years' experience in successful epoxy injection for at least 10,000 linear feet of successful crack injection including 2,000 linear feet of wet crack injection to stop water leakage.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: package adhesive material in new sealed containers and label with following information:

1. Manufacturer's name.
2. Product name and lot number.
3. ANSI Hazard Classification.
4. ANSI recommended precautions for handling.
5. Mix ratio by volume.

B. Storage and Protection: store adhesive containers at ambient temperatures below 110 degrees Fahrenheit (F) and above 45 degrees F.

PART 2 MATERIALS AND EQUIPMENT

2.1 MANUFACTURERS

A. Materials, equipment, and accessories specified in this Section shall be products of:

1. BASF Building Systems, Shakopee, MN; SCB Concresive Series.

2. Sika Corp., Lyndhurst, NJ; Sikadur Series.

a. Sikadur-31 Hi-Mod Gel
b. Sikadur-35 Hi-Mod LV
c. SikaFix HH LV

3. Euclid Chemical Co., Cleveland, OH; Euco Series.

2.2 EPOXY ADHESIVE

A. Two-component A and B structural epoxy adhesive for injection into cracks or other voids in concrete structures for bonding or grouting.

B. Adhesive Properties:

	Test Method	
7-day, Tensile Strength, psi	ASTM D638	8,000 min.
Tensile Elongation @ Break, percent	ASTM D638	5.0% min.
Compressive Yield Strength, 7 days @ 73°F, psi	ASTM D695a	8,000 min.
Compressive Modulus, psi	ASTM D695a	$2.5x10^5$ min.
Heat Deflection Temperature, °F	ASTM D648a	120 min.
Water absorption @ 24 hours, maximum %	ASTM D570	1.0
Bond Strength @ 2 days psi	ASTM C882	1,000 min.
Bond Strength @ 14 days psi	ASTM C882	2,000 min.

2.3 EPOXY GROUT ADHESIVE

A. Two-component A and B structural epoxy grouting adhesive for use in cracks with active leaking/water transmission.

B. Adhesive Properties:

	Test Method	
7-day, Tensile Strength, psi	ASTM D638	8,000 min.
Tensile Elongation @ Break, percent	ASTM D638	5.0% min.
Compressive Yield Strength, 7 days @ 73°F, psi	ASTM D695a	8,000 min.
Compressive Modulus, psi	ASTM D695a	$2.5x10^5$ min.
Heat Deflection Temperature, °F	ASTM D648a	120 min.

Water absorption @ 24 hours, maximum %	ASTM D570	1.0
Adhesion Strength @ 2 days psi (moist cure)	ASTM C882	3,000 min.
Adhesion Strength @ 14 days psi (moist cure)	ASTM C882	2,000 min.

2.4 SURFACE SEAL

A. Sufficient strength and adhesion for holding injection fittings firmly in place, and to resist pressures preventing leakage during injection.

B. Capable of removal after injection adhesive has cured.

2.5 SOURCE QUALITY CONTROL

A. Test Requirements: per Manufacturer guidelines.

PART 3 EXECUTION

3.1 GENERAL

A. Structurally repair cracks in structures as specified in Specification 03 01 30, Concrete Repairs.

B. Cracks: repair by injection of epoxy adhesive.

3.2 PREPARATION

A. Free cracks from loose matter, dirt, laitance, oil, grease, salt, and other contaminants.

B. Clean cracks in accordance with Epoxy Adhesive Manufacturer's instructions.

C. Clean surfaces adjacent to cracks from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system.

1. For cracks that are dry use an epoxy crack repair system such as Sikadur-31/35.

2. For cracks where visible water is present used an expanding polyurethane chemical grout such as SikaFix HH LV

D. Do not use acids and corrosives for cleaning, unless neutralized prior to injecting epoxy.

3.3 APPLICATION

A. Sealing: apply surface seal in accordance with Manufacturer's instructions to designated crack face prior to injection; seal surface of crack to prevent escape of injection epoxy.

B. Entry Ports:

1. Establish openings for epoxy entry in surface seal along crack.

2. Determine space between entry ports equal to thickness of concrete member to allow epoxy to penetrate to the full thickness of the wall.

3. Provide a means to prevent concrete dusts and fines from contaminating the crack or ports when drilling.

4. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:

a. Cracks extend entirely through wall.
b. Backfill of walls on one side.
c. Difficult to excavate behind wall to seal both crack surfaces.

C. Core drill to verify epoxy depth where only one side of wall is exposed.

1. Epoxy/Epoxy Grouting Injection:

2. Store epoxy at minimum of 70 degrees F.

3. Start injection into each crack at lowest elevation entry port.

4. Continue injection at first port until adhesive begins to flow out of port at next highest elevation.

5. Plug first port and start injection at second port until adhesive flows from next port.

6. Inject entire crack with same sequence.

D. Finishing:

1. Cure epoxy adhesive after cracks have been completely filled to allow surface seal removal without draining or runback of epoxy material from cracks.

2. Remove surface seal from cured injection adhesive.

3. Finish crack face flush with adjacent concrete.

4. Indentations or protrusions caused by placement of entry ports are not acceptable.

5. Remove surface seal material and injection adhesive runs and spills from concrete surfaces.

3.4 EQUIPMENT

A. Portable, positive displacement-type pumps with in-line metering to meter and mix two adhesive components and inject mixture into crack.

B. Pumps:

1. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.

2. Primary injection pumps for each material of different mix ratio, including a standby backup pump of similar ratio.

3. Capable of immediate compensation for changes in resins.

4. Do not use batch mix pumps.

C. Discharge Pressure: automatic pressure controls capable of discharging mixed adhesive at pressures up to 200 psi, plus or minus 5 percent, and able to maintain pressure.

D. Automatic Shutoff Control: provide sensors on both Component A and B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.

E. Proportioning Ratio Tolerance: maintain Epoxy Adhesive Manufacturer's prescribed mix ratio within a tolerance of plus or minus 5 percent by volume at discharge pressure up to 160 psi.

F. Ratio/Pressure Check Device:

1. Two independent, valved nozzles, capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.

2. Pressure gauge, capable of sensing pressure behind each valve.

3.5 FIELD QUALITY CONTROL

A. Epoxy Adhesive Two Component Ratio Tests:

1. Disconnect mixing head and pump two adhesive components simultaneously through ratio check device.

2. Adjust discharge pressure to 160 psi for both adhesive components.

3. Simultaneously discharge both adhesive components into separate calibrated containers.

4. Compare amounts simultaneously discharged into calibrated containers during same time period to determine mix ratio.

5. Complete test at 160 psi discharge pressure and repeat procedure for 0 psi discharge pressure.

6. Run ratio test for each injection unit at beginning and end of each injection workday, and when injection work has stopped for more than 1 hour.

7. Document and maintain complete accurate records of ratios and pressure checks.

B. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect two adhesive component delivery lines to pressure check device.

2. Pressure Check Device:

a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.

b. Pressure gauge capable of sensing pressure buildup behind each valve.

3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 psi.

4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 psi within 3 minutes.

5. Run pressure test for each injection equipment unit:

a. Beginning and end of each injection workday.
b. When injection work as stop for more than 45 minutes.

6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

3.6 TESTS AND INSPECTIONS

A. Special inspection, testing, and professional observation shall be provided by the Owner.

B. Special Inspector shall verify that Manufacturer and installer's procedures and instructions for surface preparation and installation are followed.

3.7 ALTERNATIVE CRACK REPAIRS

A. Where specifically approved in writing by the Engineer, alternative crack repair products and procedures may be used.

B. Each individual location where alternative crack repair products or procedures are used, shall be approved in writing by the Engineer, prior to beginning work or installing the alternative products.

END OF SECTION

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SECTION 03 81 00 - CONCRETE SAW-CUTTING AND CORE DRILLING

PART 1 GENERAL

1.1 SUMMARY

This section specifies the process for flat and track sawing, and core drilling of concrete.

1.2 RELATED SECTIONS

A. Section 46 01 71 – Digester Cleaning and Repair

1.3 DEFINITIONS

A. Slurry – The liquid material comprised of water and cuttings generated when the Owner's structure is cut using a water coolant.

B. Embedments – Objects within or immediately adjacent to the cutting area that could be damaged during cutting. Examples of embedments are reinforcing rod and cable and utilities such as electrical power and telephone lines.

C. Holes / openings – the voids resulting from the core drilling/cutting operations.

1.4 REFERENCES

A. American National Standard Institute (ANSI):

1. ANSI B7.1 Standard – Safety Requirements for the Use, Care & Protection of Abrasive Wheels

B. Concrete Sawing and Drilling Association (CSDA):

1. CSDA BP-017 – Depiction/Marking of Existing Subsurface Embedment's
2. CSDA BP-026 – Operating in GPR Scanned Slabs

C. Occupational Safety and Health Administration (OSHA):

1. OSHA - Safety and Health Standards Digest Construction Industry (OSHA) - 3149/1996).

PART 2 PRODUCTS

2.1 FLAT SAWING

A. Normal and customary equipment used on a flat saw job include:

1. Flat saw powered by electric or air power of the appropriate horsepower and design to accomplish the job requirements

2. Diamond blades and blade guards of sufficient sizes to complete the job

3. Layout, marking, and measuring equipment adequate for the job

4. Hand tools pertinent to the saw being used

5. Vacuuming equipment for slurry control

6. Equipment adequate to cut corners if over cuts are not allowed (i.e., core drill, chain saw, hand saw, etc.)

7. Shoring for managing the piece to be removed

8. Ventilation equipment appropriate for the saws used by the Contractor.

9. Supplies to shore or hold openings securely in place after cutting

B. The Owner (or representative) and Contractor shall locate areas to be cut to be reviewed, approved and all cut lines clearly marked prior to the start of any cutting operations. Clearly mark the location and type of all Embedments both on the cut lines and near the cutting area.

C. The Owner will provide water and power for the Contractor.

D. Any scaffolding required by the Contractor shall be designed, provided by, and erected by competent personnel and according to code requirements.

2.2 TRACK MOUNTED WALL SAWING

A. Normal and customary equipment used on a wall saw job include:

1. Power unit

2. Wall saw drive and carriage assemblies

3. Wall saw rails or track

4. Diamond blades and guards

5. Wall saw mounting supplies, hand tools and miscellaneous equipment pertinent to a particular wall saw.

6. Equipment necessary to cut back-side corners if required if no over cuts are specified. i.e., core drill, chain saw, hand saw, etc.

7. Supplies to shore or hold openings securely in place after cutting.

8. Scaffolding for personnel access

9. Storage containers for water or slurry

10. Shoring, scaffolding, rigging, and rigging equipment for managing the piece to be removed

B. The Owner (or representative) and Contractor shall locate areas to be cut to be reviewed, approved and all cut lines clearly marked prior to the start of any cutting operation. A determination should be made by the Owner as to whether over cuts are allowed. In addition, it is the responsibility of the Owner or contracting agency to clearly mark the location and type of all embedments both on the cut lines and near the cutting area.

C. The Owner will provide water and power for the Contractor.

D. Any scaffolding required by the Contractor shall be designed, provided by, and erected by competent personnel and according to code requirements.

2.3 CORE DRILLING

A. Normal and customary equipment used on a core drill job include:

1. Power unit, if applicable (such as a generator or hydraulic power unit)

2. Core drill base, column, carriage, and motor assembly

3. Properly sized drill motor and rig for the hole sizes requested

4. Core drill bits to complete the assigned work.

5. Proper equipment and tools (anchors, rotary hammer, vacuum pad with vacuum pump and vacuum cleaner).

B. Any scaffolding required by the Contractor shall be designed, provided by, and erected by competent personnel and according to code requirements.

C. Shoring, rigging, and rigging equipment for handling or managing the piece to be removed.

D. Scanning (or equivalent) and marking the embedment locations per CSDA- BP-017 and CSDA-BP-026.

E. Provide labor to catch core(s) and water when the core is cut free on a suspended slab.

F. The Owner (or representative) and Contractor shall locate areas to be core drilled to be reviewed, approved and all core locations clearly marked prior to the start of any coring operations. Clearly mark the location and type of all Embedments both on the cut lines and near the cutting area.

G. The Owner will provide water and power for the Contractor.

PART 3 EXECUTION

3.1 PRE-CONSTRUCTION MEETING

A. A pre-job/construction meeting shall be held with the Owner, Engineer, and Contractor to determine the following information relating to steel reinforcing bar or other embedments:

1. Are there steel reinforcing bars or other embedments within the structure to be cut?

2. What is the size and location of the steel reinforcing bars or other embedments?

3. Is it permissible to cut the steel reinforcing bars or other embedments in the course of the sawing operation?

4. Is it possible to lay out the cut line in such a way that minimizes or avoids the cutting of the steel reinforcing bars or other embedments?

5. After cutting begins is it permissible to move the cut line to stop splitting a steel reinforcing bar or embedment?

3.2 GENERAL SAFETY

A. When needed, place partitions, barricades, or caution tape around the work area to prevent unauthorized personnel from having access to the work area.

B. Follow safety and health requirements as outlined in Section 46 01 71 Digester Clearing and Repair.

3.3 FLAT SAWING PROCEDURES

A. Flat Sawing Set-up

1. Except when the Contractor determines that any of the following steps do not apply to a particular work or that other steps are appropriate:

2. A concrete flat saw (slab saw, pavement saw, floor saw) of the correct type and horsepower and diamond blades and blade guards of the correct size shall be supplied by the Contractor.

3. The Contractor equipment must comply with all applicable OSHA/WISHA standards.

4. Clean and inspect the blade flanges and arbor for damage before mounting any blade.

5. Inspect diamond blade for the condition of the segments and core. Do not use the blade if any of the following conditions exist: core cracks or missing or broken segments or loss of tension.

6. Check to confirm blades are of proper specification for the material being cut.

7. When sawing interior slabs with internal combustion powered saws, precautions must be taken by the Owner or contracting agency to provide adequate ventilation, air circulation, and/or oxygen replacement that meet OSHA/WISHA standards. Other options for interior sawing include electric, hydraulic, or air powered saws.

8. Inspect any air, hydraulic, electric or water lines or cords attached to the flat saw for proper condition and fit. Repair or replace as required.

9. Should bracing of the concrete section to be removed be required, it must be installed prior to the completion of the sawing operation. If opening to be removed is to stay in place for an extended period, adequate support is required. The Owner or contracting agency shall provide all bracing and Engineering required for safe removal unless otherwise agreed to in writing by the Contractor.

10. The Owner or contracting agency shall provide fall protection for all holes/openings created by the Contractor.

B. Flat Sawing Cutting Operation

1. Except when the Contractor determines that any of the following steps do not apply to a particular work or that other steps are appropriate:

2. Blades and blade guards should be properly fastened to the saw as per Saw Manufacturer's specifications.

3. The saw should be operated according to the Saw Manufacturer's specifications.

4. When needed, place partitions, barricades, or caution tape around work areas to prevent un- authorized personnel from having access to the work area.

5. Allow no personnel to be in-line with the blade while it is rotating.

6. Never allow the saw to run un-attended.

3.4 TRACK MOUNTED WALL SAWING PROCEDURES

A. Track Mounted Wall Sawing Set-up

1. Except when the Contractor determines that any of the following steps do not apply to a particular work or that other steps are appropriate:

2. Install the appropriate number of anchors according to the Anchor Manufacturer's installation instructions as well as the Wall Saw Manufacturer's installation instructions.

3. Make sure the tracks are securely attached to the wall by the anchors through hold-down plates or brackets and/or according to the Wall Saw Manufacturer's instructions.

4. The Contractor equipment must comply with all applicable OSHA/WISHA standards.

5. Inspect the complete saw including the roller assembly and blade guard for damage or improper functioning before applying the saw to the track. Repair or replace as required.

6. Clean and inspect the blade flanges and arbor for damage before mounting any blade. Repair or replace as required.

7. Inspect any air, hydraulic, electric or water lines or cords attaching to the wall saw for proper condition and fit. Repair or replace as required.

8. Should bracing of the concrete section to be removed be required, it must be installed prior to the completion of the sawing operation. If cut piece to be removed is to stay in place for an extended period, adequate support is required. The Owner or contracting agency shall provide all bracing and Engineering required for safe removal unless otherwise agreed to in writing by the Contractor. Wedging is not acceptable as a bracing technique.

9. Inspect diamond blade for the condition of the segments and core. Do not use the blade if any of the following conditions exist: core cracks, missing or broken segments, loss of tension or any other condition as mentioned in the Blade Manufacturer's instructions.

10. Check to confirm that the blades are of a proper specification for the material being cut.

B. Track Mounted Wall Sawing Cutting Operation

1. Except when the Contractor determines that any of the following steps do not apply to a particular work or that other steps are appropriate:

2. When needed, place partitions or screens between wall saw operations and the personnel area to prevent any flying objects from contacting any worksite personnel.

3. Allow no personnel to be in-line with the blade while it is rotating.

4. On applications requiring a bottom horizontal cut, sequence the cut or shore the work piece so that the weight of the work piece is prevented from jamming, pinching and/or crushing the diamond blade.

5. Blades and blade guards should be properly fastened to the saw as per the Saw Manufacturer's specifications.

6. The saw should be operated according to the Saw Manufacturer's specifications.

7. Before commencing sawing operations, determine whether the piece being removed needs to be cut into smaller, more manageable pieces.

3.5 CORE DRILLING PROCEDURES

A. Core Drilling Set-up

1. Except when the Contractor determines that any of the following steps do not apply to a particular work or that other steps are appropriate:

2. Equipment used in the drilling operations must meet all OSHA/WISHA standards and specifications as to plugs, noise, wiring, and fume pollution.

3. For a large core bit or core bit with core weighing, over 75Lb the Contractor shall provide mechanical means to move bit(s) and cores.

4. Inspect diamond core drill bits for damage including the hub area.

5. Check to confirm drill bits are of proper specification for the material being cut.

6. The Contractor shall protect areas directly under the area to be core drilled so that falling cores do not injure any persons or damage any property.

B. Drilling Operation Considerations

1. If any of the core drilling operations are performed without water as a coolant, then additional safety precautions may apply. Consult the Diamond Tool Manufacturer or the Core Drill Manufacturer for specification usage information.

2. If any of the core drilling operations are performed with handheld core drilling equipment, then additional safety precautions may apply. Consult the Core Drill Manufacturer for specification usage information.

3. Never operate a core drill assembly unattended unless the equipment has been designed specifically for this purpose.

4. The core drilling equipment should be operated in accordance with the Manufacturer's specifications.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTIONS

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SECTION 07 57 13 – SPRAYED POLYURETHANE FOAM ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparation of Substrate.
2. Sprayed in-place Polyurethane Foam Insulation.
3. Acrylic Elastomeric Roof Coating.

B. Provide all labor, materials, equipment, and supervision necessary to prepare an existing sprayed-in-place polyurethane roofing system for patching and recoat as outlined in this specification and extent shown on the drawings. The manufacturer's application instruction for each product used is to be considered part of these specifications and should be followed at all times.

1.2 QUALITY ASSURANCE

A. REFERENCE STANDARDS:

1. ASTM C 518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

2. ASTMD93 Standard Test Methods for Flash Point by Pensky- Martens Closed Cup Tester

3. ASTMD412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

4. ASTMD 562 Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer

5. ASTMD 570 Standard Test Method for Water Absorption of Plastics

6. ASTMD471 Standard Test Method for Rubber Property, Effect of Liquids

7. ASTMD 624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

8. ASTMD903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds, adhesive bonding, peel strength, stripping strength

9. ASTMD 1353 Standard Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products.

10. ASTMD 1549 Test Method for Determination of Solar Reflectance

11. ASTMD 1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics

12. ASTM D 1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics

13. ASTMD 1644 Standard Test Methods for Nonvolatile Content of Varnishes

14. ASTM D 1653A Standard Test Methods for Water Vapor Transmission of Organic Coating Films

15. ASTM D 2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging

16. ASTM D 2240 Standard Test Method for Rubber Property, Durometer Hardness.

17. ASTM D 2370 Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100 degrees C

18. ASTM D 2697 Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings

19. ASTMD2794 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

20. ASTMD2856 Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer

21. ASTMD 6083 Standard Specification for Liquid Applied Acrylic Coating Used in Roofing

22. ASTMD 6694 Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing

23. ASTME 84 Standard Test Method for Surface Burning Characteristics of Building Materials, flame spread, flame spread index, smoke developed, smoke developed

24. AWPB American Wood Preserve Bureau Standard LP-2

25. UL790 Standard Test Methods for Fire Tests of Roof Coverings

26. SPFA Spray Foam Alliance AY Documents

B. MANUFACTURER QUALIFICATIONS:

Company specializing in manufacturing urethane foam products and systems of this section with minimum ten years documented experience.

C. INSTALLER QUALIFICATIONS:

SPF Manufacturer approved Applicator specializing in performing Work of this sectionwith minimum three years documented experience.

1.3 DESIGN/PERFORMANCE REQUIREMENTS

Underwriters Laboratories, Inc. UL 790: Class A Fire Hazard Classification as applied to the deck types and inclines indicated.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in Manufacturer's unopened packaging, clearly marked with the manufacturer's name, brand name, product identification, type of material, safety information, manufacture date, and lot numbers until ready for installation.

B. Store acrylic coating materials between 50 degrees F (18 degrees C) and 90 degrees F (29 degrees C) with careful handling to prevent damage to products. If conditions exceed these ranges, special consideration in storage must be taken. Do not store at high temperatures in direct sunlight.

C. Protect all materials from exposure to moisture, freezing and other damage during transit, handling, storage, and installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PRE-INSTALLATION MEETINGS

A. Convene pre-installation meeting a minimum of two weeks prior to commencing work of this section.

B. Attendance: Owner's Construction Manager, Contractor, and roof system applicator.

C. Agenda: Review installation sequence and scheduling.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by Manufacturer for optimum results. Do not install products under environmental conditions outside Manufacturer's absolute limits.

B. Do not apply polyurethane foam or roof coating during periods of rain, snow, fog, and mist.

C. Do not apply the polyurethane foam when substrate or ambient air temperatures are below 50 degrees F (10 degrees C) or above 120 degrees F (49 degrees C), or when wind velocities exceed 12 mph. Do not apply polyurethane foam when the substrate surface temperature is less than 5 degrees F (minus 15 degrees C) above the ambient temperature.

D. Do not apply acrylic roof coatings at temperatures below 50 degrees F (10 degrees C) or when there is a possibility of temperatures falling below 32 degrees F (0 degrees C) within a 24-hour period.

E. Use windscreens during the application of the polyurethane foam and roof coating to prevent overspray onto surfaces not intended to receive foam and coating. Under no circumstances shall the polyurethane foam be applied when wind speeds exceed 15 miles per hour.

1.8 WARRANTY

A. One (1) year from substantial completion for workmanship and materials for specific new work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Bayer MaterialScience LLC, www.spf.BayerMaterialScience.com
2. Or approved equal.

B. Bases of design: Bayer MaterialScience LLC, Bayseal CC.

2.2 POLYURETHANE FOAM

A. General: Two-component monolithic polyurethane foam designed for use as a self-adhering, seamless, high insulating, spray applied rigid polyurethane foam roof system.

B. Designed for spray application and shall have the following minimum physical properties when cured:

1. Minimum in-place Density: 3.0 lb/cf when tested in accordance with ASTMD 1622.

2. Compressive strength: Minimum 50 psi when tested in accordance with

3. ASTM D 1621.

4. Closed cell content: Minimum 90 percent when tested in accordance with ASTMD2856.

5. R-Value aged: 6.4 hr/sf/degrees F/Btu minimum at 1 inch thick when tested in accordance with ASTM C 518.

6. Dimensional Stability, 7 days, 158 degrees F, 100 percent R.H: Percent volume change, less than 1 percent when tested in accordance with ASTM D 2126.

7. Flame spread: Class II, less than 75 when tested in accordance with ASTME 84.

2.3 ACRYLIC ELASTOMERIC COATING

A. Acrylic elastomeric coatings shall be Bayblock II, high-solids, fire retardant, thixotropic, acrylic latex coatings for the protection of sprayed-in place polyurethane foam insulation, concrete masonry unit, metal.

B. Acrylic latex coating shall have the following minimum properties:

1. Tensile Strength: 279 psi when tested in accordance with ASTM D 412.

2. Elongation: 243 percent when tested in accordance with ASTM D 412.

3. Reflectivity: 0.87

4. Emissivity: 0.89 percent.

5. Fire Rating: UL 790 Class A.

6. Solids by Weight: 70 percent plus or minus 2 when tested in accordance with ASTM D 6083.

7. Solids by Volume: 55 percent plus or minus 2 when tested in accordance with ASTM D 6083.

8. Coverage DFT: average 9.5 dry mils on 100 sq ft.

9. Temperature Limits: minus 30 degrees F to plus 200 degrees F.

10. Color:

    a. Topcoat: White.
    b. Basecoat: Gray.

2.4 PRIMER COATING

A. Bayblock Prime RI: Two component, water-based rust inhibitive primer for ferrous and non-ferrous metal surfaces for the application of elastomeric coatings and spray polyurethane foam.

B. Bayblock Prime 100: Single component, water-based, general-purpose primer for non-metallic surfaces for the application of elastomeric coatings and spray polyurethane foam.

2.5 ACCESSORIES

A. Fasteners: Fastener for nailing sheet metal flanges to wood substrate: Hot dipped galvanized steel roofing nails, No. 11 or 12-gauge, barbed shank, minimum 3/8-inch (9.5 mm) diameter head and 1-1/2 inches (38 mm) long.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that all surfaces to receive additional polyurethane foam insulation are clean, dry, and free of dust, dirt, debris, oil, solvents, and all materials that may adversely affect the adhesion of the polyurethane foam.

C. Verify that all roof penetrations and flashings are properly installed and secured.

D. Inspect roof for area of exposed foam or areas where thin coating has allowed foam to be burned beneath the coating.

E. Notify the Owner of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

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

C. Provide masking protection as may be needed to prevent overspray of material on adjacent buildings and appurtenances, vehicles, and portions of building not to be coated. Remove all overspray as required. Mask building surfaces to terminate the foam and coating in a neat, straight line.

D. Apply primer to all surfaces to receive foam of type and rate as recommended by the Foam Manufacturer.

E. Surface Preparation - SPF Roof:

1. Power wash the existing SPF roof receiving the new SPF roofing system or by other means acceptable by the SPF Manufacturer.

2. Remove all coating that is loose or poorly adhered.

3. Cut out all areas that are wet, punctures and soft spots in an industry acceptable manner.

4. All blisters and coatings in the areas indicated on the drawings shall be removed and repaired to insure adhesion of the new material.

5. The area to be coated will be clean, dry, and free of any contaminants, which would cause poor adhesion.

6. All cracks, holes, and other imperfections shall be cut and filled using a suitable caulk/sealant.

7. All areas that appear wet must be allowed to dry or removed and re-foamed.

8. All new foam must receive an additional 2 coats of coating.

9. Repair any pinholes.

3.3 SAFETY REQUIREMENTS

A. Exercise care not to allow fumes from the polyurethane foam and coating materials to enter the building, using the following minimum precautions:

1. Turn off all HVAC equipment and cover all intake vents and other potential sources of air entry into the building.

2. Provide CO2 or other dry chemical fire extinguishers to be available at the jobsite.

3. Provide adequate ventilation for all areas being worked.

B. Proper safety precautions shall be followed throughout the entire roofing operation.

1. Conform to safety precautions of Spray Polyurethane Foam Alliance of the American Plastics Council's Recommendations for the Safe Handling and Use of Sprayed Urethane Foam and Coating Materials.

C. Provide fire extinguishers available on the roof and at all work sites at all times during roofing operations.

3.4 SPRAY POLYURETHANE FOAM APPLICATION

A. Apply polyurethane foam in strict accordance with the Manufacturer's specifications and application instructions.

B. Apply in a minimum of 1/2 inch (12.5 mm) thick passes and 1-1/2 inch (38 mm) maximum thick passes. Total thickness of the polyurethane foam shall be a minimum of 1-1/2 inches (38 mm), except where tapering is required to facilitate drainage and matching adjacent existing SPF surface.

C. Apply the full thickness of polyurethane foam in any area on the same day.

D. Terminate polyurethane foam neatly a minimum of 4 inches (102 mm) above the finished roof surface at roof penetrations. Foamed-in-place cants shall be applied to allow a smooth transition from the horizontal to vertical surface and shall be applied prior to the application of additional foam lifts to achieve specified thickness. Mask building surfaces to terminate the foam and coating in a neat, straight line.

E. Finished polyurethane foam surface texture shall be "smooth to orange-peel", free of voids, pinholes, and depressions. "Verge of popcorn" texture is acceptable if it can be thoroughly and completely coated. Popcorn and treebark textures are not acceptable. Unacceptable foam textures must be removed and re-foamed prior to coating application.

3.5 APPLICATION OF ACRYLIC ELASTOMER ROOF COATING

A. Polyurethane foam surface shall be free of moisture, dust, dirt, debris, and other contaminants that would impair the adhesion of the silicone coating.

B. If foam is exposed in excess of three days and additional foam thickness is necessary, or surface oxidation has occurred, then the surface shall be primed before coats. Prime with Bayblock Prime NS primer applied at a rate of 200 square feet per gallon.

C. Spray and apply coating in accordance with the Manufacturer's application instructions and precautions in the technical datasheet.

D. Apply acrylic elastomeric roof coating on the same day as the polyurethane foam application, and after the polyurethane foam has been allowed to cure a minimum of one hour. If the basecoat is not applied within 24 hours of polyurethane foam, remove, and repair all signs of oxidation, or other damages as required by Manufacturer.

E. Acrylic elastomeric coatings coating shall be applied in a minimum of two separate coats by spray or roller at the rate of approximately 1-1/4 gallons per coat per 100 square feet.

F. Allow each coat to cure a minimum of 12 hours before proceeding with successive coats. Second and successive coats must be applied within 48 hours to ensure proper adhesion. Allow topcoat to cure a minimum of 72 hours without foot traffic.

G. Nominal thickness of the additional final dry film protective elastomeric acrylic coating system shall be an average 22 dry mils with a minimum total millage including existing coating of 28 dry mils.

H. Edges of the roof shall be precoated in a "picture framing" fashion so as to have at least one additional coat on the edges than the field of the roof.

I. Mask off metal and other surfaces not to receive coating.

J. All foam is to be coated. Coating shall be extended up and over all foam or vent pipes and terminate a minimum of 2 inches (51 mm) above the foam creating a self-terminating flashing.

K. Coat foam the same day of application, unless delayed by inclement climatic conditions.

3.6 FIELD QUALITY CONTROL

A. Any areas that do not meet the minimum standards for application as specified herein shall be corrected by the applicator.

3.7 PROTECTION

A. Protect installed roofing system until completion of Project.

B. Touch-up, repair or replace any damaged products.

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DIVISION 09 - FINISHES

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SECTION 09 90 00 – PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. This specification defines the requirements for spot coating repairs for the metallic components of the Central Kitsap Wastewater Treatment Plant Digester, including piping, valving, and other metallic surfaces.

2. The work will include removal and replacement of the existing protective coating system applied to the metallic surfaces within the digester.

3. The existing coating condition will be evaluated, and the extent of required repairs will be determined during digester inspection by the Owner and the Engineer. The Contractor shall perform coating repair as determined and directed by the Engineer.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D4285, “Standard Test Method for Indicating Oil or Water in Compressed Air”

2. E337, “Standard Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

B. National Association of Corrosion Engineers (NACE International)

1. SP0287-2016, “Field Application of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape”

2. SP0188-2006, “Discontinuity Testing of New Protective Coatings on Conductive Substrates”

C. National Institute of Standards and Technology (NIST)

1. “Certified Coating Thickness Standards for Nonmagnetic Coating on Steel”

D. The Society for Protective Coatings (SSPC)

1. PA 1, “Shop, Field and Maintenance Painting”

2. PA 2, “Measurement of Dry Paint Thickness with Magnetic Gages”

3. PA Guide 11, “Protecting Edges, Crevices, and Irregular Steel Surfaces by Stripe Coating”

4. SP 1, “Solvent Cleaning”

5. SP 2, “Hand tool Cleaning”

6. SP 3, “Power Tool Cleaning”

7. SP 10, “Joint Surface Preparation Standard Near-White Metal Blast Cleaning”

8. SP 11, “Power Tool Cleaning to Bare Metal”

9. VIS 1, “Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning”

10. Vis 3, “Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning”

1.3 SUBMITTALS

A. Contractor shall submit, prior to Contractor applying any coatings, a list of the coatings and manufacturer that the Contractor will be using. List shall address the application for which each coating is intended, surface preparation requirements, number of coats, methods of application, and coating thickness.

B. Contractor shall submit, prior to issuance of Notice to Proceed, Product data Sheets with Manufacturer’s instructions for cleaning solvents, coatings, and thinners. Include Safety Data Sheets (SDS’s) for solvents, coatings, thinners, and other chemical and physical agents.

C. Provide information on the blasting media including grit size for coating systems specified.

1.4 QUALITY ASSURANCE

A. Acceptable Manufacturer’s: A company with a minimum of 5 years documented experience in manufacturing of and providing technical service for chemical resistant systems equivalent to those specified herein.

B. Contractor must specialize in performing the work of this specification with a minimum of five years documented experience.

1. Provide three (3) references with name, address, and telephone number.

C. Installer Qualifications: Engage only factory trained and qualified applicators that have successfully completed applications using the specified martials on projects of similar size and scope.

D. Owner will have a coating inspector on site to verify that the requirements of this specification are being met. However, it is the Contractor's responsibility to ensure that the correct materials and equipment are being provided and that the workmanship (including surface cleanings, testing, and repairs) are being completed as required by these specifications. The Owner's Coating Inspector will be responsible for recording and documenting the progress of the work and will not be responsible for the quality of work being performed.

E. Substitutions

1. Contractor seeking approval of products other than the specified system must submit cured samples, full product information, project histories and references, technical data with specifications, SDS and certifications regarding conformity of performance properties from an independent testing laboratory.

2. Omission or non-conformance of any item specified herein will result in rejection by the Engineer.

F. Pre-Installation Conference

1. The Contractor and the Manufacturer's technical representative shall meet on site with the Owner and the Owners representative to the review the requirements herein, safety, weather conditions, surface preparation, material application, and inspection.

1.5 DELIVERY, HANDLING, AND STORAGE

A. All materials shall be brought to the job site in the original unopened and labeled containers of the Paint Manufacturer and shall be subject to inspection by the Engineer. Contractor shall provide, in addition, one unbroken gallon container of each type and color of paint and each type of solvent and thinner used.

B. Store paints in a protected area that is heated or cooled as required to maintain temperatures within the range recommended by the Paint Manufacturer.

1.6 WARRANTY

A. At the Owners discretion, a one-year warranty inspection will be conducted during the 12th month after the coating work has been completed. Contractor will be responsible for all repair work necessary as a result of substandard material performance and/or inappropriate surface preparation/coating application.

PART 2 PRODUCTS

2.1 COMPATIBILITY

A. Contractor shall be responsible for the compatibility of all paint products used and preparations employed.

B. All products shall be from a single manufacturer.

C. Submit certificates that paint system to be applied is compatible with the substrate and that proper paint adhesion will result.

D. Do not paint non-ferrous, corrosion resistant ferrous alloys, and non-metallic materials.

2.2 COATING SYSTEM

A. Pre-Coating Repairs

1. Metal Repair - All holes shall be patched or covered as shown in the Drawings.

2. Pre-coating repairs shall be performed by Contractor after surface preparation and before prime coat is applied.

B. Contractor shall install a three-coating coating system including:

1. Prime Coat (first coat): Tnemec Series 1 Omni-Thane coating (applied at 2.5 to 3.5 mils dry film thickness) or approved equal.

2. Stripe Coat: Tnemec Series N69F Epoxoline or approved equal.

3. Intermediate Coat (second coat): Tnemec Series N69F Epoxoline (applied at 7 to 9 mils dry film thickness) or approved equal.

4. Finish Coat (third coat): Tnemec Series N69F Epoxoline (applied at 7 to 9 miles dry film thickness) or approved equal.

5. Total dry film thickness shall be 16.5 to 21.5 mils dry film thickness, excluding stripe coat.

C. Colors: Colors will be selected by Owner.

D. Comply with Manufacturer’s written installation procedures and individual product data sheet application bulletins.

2.3 MIXING

A. Prepare multiple component coatings using all the contents of the container for each component as packaged by the Manufacturer. No partial batches will be permitted.

B. Do not use multi-component coatings that have been mixed beyond their pot life.

C. Have on-site small quantity kits for touch-up painting.

D. Mix only components specified and furnished by the Coating Manufacturer.

2.4 CLEANING MATERIALS

A. Cleaning materials must be compatible with the coating materials to be applied to the metallic surfaces.

2.5 ABRASIVE BLAST MEDIA

A. Use dry, neutral pH abrasives of angular configuration that are free of dirt, dust, oil, clay, and other foreign material. The selected abrasive must be able to achieve the required surface profile.

B. Select abrasives that conform to federal and state regulations for metals and toxicity.

PART 3 EXECUTION

3.1 GENERAL

A. All surfaces shall be prepared in accordance with the recommendations of the Manufacturer of the coating and to the surface preparation requirements of this specification, whichever is stricter.

B. Removal of all spent blast media and coating materials must be in conformance with SSPC Guide 7 – Disposal of Lead Contaminated Debris and State of Washington Requirements.

C. The cleaning and painting schedule shall be approved by the Engineer and no painting shall be completed before the prepared surfaces are approved by the Engineer.

D. Coat surfaces within eight (8) hours of blast cleaning and within the time recommended by the Coating Manufacturers literature. Do not coat over visible rust bloom or contaminated surfaces. If, for any reason, rust bloom appears on the exterior surface to be coated, restore that surface to a near white metal blast (SSPC-SP 10). Ensure that the surfaces are clean, dry, and free of contamination prior to all coating applications. Protect all coated surfaces from damage during the curing process. If the Contractor elects to use dehumidification equipment as a means of meeting

environmental conditions, the requirement for coating of the blasted surfaces within 8 hours can be waved.

E. Mix coatings in accordance with Manufacturer's recommendations. Do not exceed specified pot life.

F. Appy all coatings in accordance with SSPC-PA 1, these specifications, and the Manufacturer's recommendations. If a conflict exists, apply these specifications.

G. Do not use materials that have been contaminated. Do not apply coatings to wet surfaces.

H. Apply coatings in uniform layers of 50% overlapping strokes. Remove all ridges, sags, runs, drips, and laps using a hand brush. Verify proper wet film thickness (WFT) often during coating application.

I. Protect uncured coatings from rain. Do not apply coatings if they will be exposed to rain prior to curing. If the coating is exposed to rain prior to curing, Contractor will remove or repair the coating to Owner's satisfaction at no additional cost to Owner.

3.2 PRE-WORK MEETING

A. Prior to commencing work, the Owner will conduct a Pre-Work Meeting. The purpose of Pre-Work Meeting is to establish a working understanding between all parties and to discuss construction schedule, submittals, permits, authorizations, applications for payment and payment processing, and other matters as may pertain directly to the Project.

B. Contractor shall supply, at a minimum, a detailed outline of the following:

1. All materials to be used including, but not limited to cleaners, thinners, and specified coating materials.

2. Application work plan. The work plan shall include anticipated work sequence, method of application for all phases of the Project including, containment, cleaning, coating application, and touch-up repair work.

3. Methods and techniques for controlling environmental conditions such that the environmental conditions meet the requirements of this specification.

4. Copies of Contractor's data sheets for recording environmental conditions.

3.3 EXAMINATION

A. Prior to starting work, Owner will complete a joint site-visit with Contractor to discuss any remaining questions regarding the Project.

3.4 CONTAINMENT

A. General

1. The Contractor shall notify the Owner prior to beginning any salvage work so that the proper salvage items are identified and the condition of the salvage item and adjacent equipment, piping, and structures can be documented. The Owner may elect to have any items on the salvage list removed and disposed of by the Contractor, rather than being salvaged, at no additional cost to the Owner.

3.5 SURFACE PREPARATION

A. The NACE/SSPC Joint Surface Preparation Standards for abrasive blasting are incorporated in and made a part of this specification. All references to SSPC-SP10/NACE No. 2 designate the definitions and other requirements in these documents. SSPC VIS 1-89 Visual Standard for Abrasive Blast Cleaned steel shall be used to visually evaluate the blast cleanliness.

B. Remove all oil and grease from surface by solvent cleaning per SSPC-SP1. Minimum surface preparation is SSPC-SP10/NACE No. 2, Near White Metal Blast Cleaning. Abrasively blast clean all surfaces using a sharp, angular abrasive for minimum surface profile of 2 mils. Prime any bare steel the same day as it is cleaned and before flash rusting occurs

1. Inspect the surfaces to be coated. All holes in the steel surfaces or pits greater than 1/8 inch shall be filled flush with the substrate with epoxy patching and surfacing compound Tnemec Series 215, or approved

2. Remove or grind down all sharp burrs, edges, and weld spatter from all steel that is to be coated. Corners and edges shall be chamfered 1/16” at a 45-degree angle minimum or rounded to a 1/16” radius (1/8” diameter) minimum. Abrasive blasting prior to the application of the coating materials shall restore the anchor profile.

3. All substrates are to be vacuumed, swept, and blown down with clean, dry air to remove spent abrasive, dust, and other foreign material that might interfere with the adhesion of the coating material.

3.6 COATING APPLICATION

A. Each coat of paint shall be applied at the rate, manner, and environmental conditions as specified by the Manufacturer and approved by the Engineer, to achieve the minimum dry film thickness (DFT) required. Deficiencies in the DFT shall be corrected by the application of an additional coat(s) of paint. Additional coats of paint shall not be applied until paints are thoroughly dry.

B. Contractor shall not apply coatings under the following conditions:

1. Temperature exceeding the Manufacturer's recommended minimum and maximum temperatures.

2. Dust or smoke laden atmosphere.

3. Damp or humid weather.

4. When the sire temperature is expected to drop below 40 degrees F of less than 5 degrees F above the dewpoint.

5. Relative humidity greater than 80%.

C. Dewpoint shall be determined by use of sling psychrometer in conjunction with the U.S. Department of Commerce, Weather Bureau Psychrometric Tables. Other methods of dewpoint determination must be pre-approved by the Engineer.

3.7 PRIME COAT

A. Apply prime coat in accordance with Manufacturer's recommendations and these specifications.

B. If prime coat fails to meet required minimum DFT, apply the necessary wet film thickness needed to obtain the specified DFT. Monitor coating thickness in accordance with SSPC-PA 2.

C. Follow Manufacturer's recommendations for time to overcoat prior to applying intermediate coat.

3.8 STRIPING OF IRREGULAR SURFACES

A. Stripe coat the following critical locations: bolts, joints, corners, edges, welds, and any other places where paint has a tendency to break down.

B. Brush or spray apply coating to critical points. If striping is spray applied, brush the coating into irregular surfaces using back and forth strokes so as to ensure that the coating is applied to all irregular surfaces.

C. Allow the stripe coat to dry prior to applying intermediate coating material.

D. Stripe coat material is to be the same as the intermediate epoxy coating.

3.9 INTERMEDIATE COAT

A. Apply of appropriate primer coat must be obtained by the Engineer prior to application of the intermediate coat.

B. Ensure that all surfaces to be coated are clean and free of dust, oil, grease, or other contaminants prior to intermediate coat application. Use clear, fresh water (less than 100 ppm chlorides) to clean contaminated areas.

C. Monitor wet film thickness (WFT) of intermediate coat during application. If intermediate coat fails to meet required DFT, then apply correct WFT needed to obtain correct DFT. Monitor coating thickness in accordance with SSPC-PA 2.

D. Follow Manufacturer's recommendations for time to overcoat prior to applying topcoat.

3.10 TOPCOAT

A. Approval of intermediate coat must be obtained by the Engineer prior to application of the topcoat.

B. Ensure that all surfaces to be coated are clean and free of dust, oil, grease, or other contaminants prior to topcoat application. Use clear, fresh water (less than 100 ppm chlorides) to clean contaminated areas.

C. Monitor wet film thickness (WFT) of topcoat during application. If topcoat fails to meet required DFT, then apply correct WFT needed to obtain correct DFT. Monitor coating thickness in accordance with SSPC-PA 2.

3.11 FIELD QUALITY CONTROL

A. The completed coating system shall produce a minimum dry film thickness in accordance with these specifications. Verification of proper DFT will be as per SSPC-PA2. In areas where required thickness is not obtained, sufficient coats shall be applied to produce the required coating thickness. In areas where excess thickness is noted, remove excess thickness to the required surface preparation and reapply.

B. The completed coating on the metal surfaces shall be inspected by the Contractor in the presence of the Engineer for pinholes and holidays with a Tinker and Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal. The unit shall operate at less than 75 volts. A non-sudsing type wetting agent such as Kodak Photo-Flo or equal shall be added to the water prior to wetting the detector sponge. Areas found to contain pinholes or holidays shall be repaired and recoated in accordance with Manufacturer's recommendations and these specifications.

3.12 COATING REPAIR

A. Repair pinholes and holidays by daubing the blemishes with the topcoat material

B. Allow the repair area coating to properly cure before re-inspection.

3.13 SITE CLEAN-UP

A. Prior to final acceptance by the Owner, the Contractor must remove all spent abrasive blast material from the job site.

B. Maintain the site in a neat and orderly fashion. Do not allow rags, paint cans, pallets, or other materials to accumulate.

C. Restore ruts or other track marks left by lifting equipment or other vehicles.

D. Upon completion of the Project, restore the site to the original or better condition to the satisfaction of the Owner.

3.14 ACCEPTANCE

A. Acceptance of the completed coating system shall be based upon the proper application and proper preparation of the coated surfaces and a finished product that does not contain runs, drips, surface irregularities, overspray, cracks, pinholes, holidays, and other surface signs that detract from the overall appearance of the finished product.

3.15 COATING WARRANTY

A. A warranty inspection may be conducted during the 12th month following completion of all coating work and final acceptance. All defective work shall be repaired in accordance with these specifications and to the satisfaction of the Owner. Owner may, by written notice to the Contractor, reschedule the warranty inspection to another date within the one-year warranty period.

END OF SECTION

DIVISION 10 - SPECIALTIES

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SECTION 10 14 00 – IDENTIFICATION DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tag, tape and stenciling systems for equipment, piping, valves, pumps, ductwork, and similar items.

2. Hazard and safety signs.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):

a. A13.1, Scheme for the Identification of Piping Systems.

2. The International Society of Automation (ISA).

3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):

a. Z535.1, Safety Color Code.
b. Z535.2, Environmental and Facility Safety Signs.
c. Z535.3, Criteria for Safety Symbols.
d. Z535.4, Product Safety Signs and Labels.

4. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC).

b. 704, Standard System for the Identification of Hazards of Materials for Emergency Response.

5. Occupational Safety and Health Administration (OSHA):

a. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:

a. Catalog information for all identification systems.

b. Acknowledgement that products submitted meet requirements of standards referenced.

2. Identification register, listing all items in PART 3 of this Specification Section to be identified, type of identification system to be used, lettering, location, and color.

3. Schedule of Hazard and Safety Signage indicating text and graphics.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. W.H. Brady Co.
2. Panduit.
3. Seton.
4. National Band and Tag Co.
5. Carlton Industries, Inc.

2.2 MANUFACTURED UNITS

A. Type A1 - Round Metal Tags:

1. Materials:

a. Aluminum or stainless steel.
b. Stainless steel shall be used in corrosive environments.

2. Size:

a. Diameter: 1-1/2 IN minimum.
b. Thickness: 0.035 IN (20 GA) minimum.

3. Fabrication:

a. 3/16 IN minimum mounting hole.
b. Legend: Stamped and filled with black coloring.

4. Color: Natural.

B. Type A2 - Rectangle Metal Tags:

1. Materials: Stainless steel.

2. Size:

   a. 3-1/2 IN x 1-1/2 IN minimum.
   b. Thickness: 0.036 IN (20 GA) minimum.

3. Fabrication:

   a. 3/16 IN minimum mounting hole.
   b. Legend: Stamped and filled with black coloring.

4. Color: Natural.

C. Type A3 - Metal Tape Tags:

1. Materials: Aluminum or stainless steel.

2. Size:

   a. Width 1/2 IN minimum.
   b. Length as required by text.

3. Fabrication:

   a. 3/16 IN minimum mounting hole.
   b. Legend: Embossed.

4. Color: Natural.

D. Type B1- Square Nonmetallic Tags:

1. Materials: Fiberglass reinforced plastic.

2. Size:

   a. Surface: 2 x 2 IN minimum.
   b. Thickness: 100 MILS.

3. Fabrication:

   a. 3/16 IN mounting hole with metal eyelet.
   b. Legend: Preprinted and permanently embedded and fade resistant.

4. Color:

a. Background: Manufacturer standard or as specified.
b. Lettering: Black.

E. Type B2 - Nonmetallic Signs:

1. Materials: Fiberglass reinforced or durable plastic.

2. Size:

a. Surface: As required by text.
b. Thickness: 60 MILS minimum.

3. Fabrication:

a. Rounded corners.

b. Drilled holes in corners with grommets.

c. Legend: Preprinted, permanently embedded and fade resistant for a 10-year minimum outdoor durability.

4. Color:

a. Background: Manufacturer standard or as specified.
b. Lettering: Black.

5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.

F. Type C - Laminated Name Plates:

1. Materials: Phenolic or DR (high impact) acrylic.

2. Size:

a. Surface: As required by text.
b. Thickness: 1/16 IN.

3. Fabrication:

a. Outdoor rated and UV resistant when installed outdoors.
b. Two layers laminated.
c. Legend: Engraved through top lamination into bottom lamination.
d. Two drilled side holes, for screw mounting.

4. Color: Black top surface, white core, unless otherwise indicated.

G. Type D - Self-Adhesive Tape Tags and Signs:

1. Materials: Vinyl tape or vinyl cloth.

2. Size:

   a. Surface: As required by text.
   b. Thickness: 5 MILS minimum.

3. Fabrication:

   a. Indoor/Outdoor grade.
   b. Weather and UV resistant inks.
   c. Permanent adhesive.
   d. Legend: Preprinted.
   e. Wire markers to be self-laminating.

4. Color: White with black lettering or as specified.

5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.

H. Type E - Heat Shrinkable Tape Tags:

1. Materials: Polyolefin.

2. Size: As required by text.

3. Fabrication:

   a. Legend: Preprinted.

4. Color: White background, black printing.

I. Type F - Underground Warning Tape:

1. Materials: Polyethylene.

2. Size:

   a. 6 IN wide (minimum).
   b. Thickness: 3.5 MILS.

3. Fabrication:

   a. Legend: Preprinted and permanently imbedded.
   b. Message continuous printed.

c. Tensile strength: 1750 PSI.

4. Color: As specified.

J. Type G - Stenciling System:

1. Materials:

a. Exterior type stenciling enamel.
b. Either brushing grade or pressurized spray can form and grade.

2. Size: As required.

3. Fabrication:

a. Legend: As required.

4. Color: Black or white for best contrast.

2.3 ACCESSORIES

A. Fasteners:

1. Bead chain: #6 brass, aluminum, or stainless steel.
2. Plastic strap: Nylon, urethane, or polypropylene.
3. Screws: Self-tapping, stainless steel.
4. Adhesive, solvent activated.

2.4 MAINTENANCE MATERIALS

A. Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

A. Install identification devices at specified locations.

B. All identification devices to be printed by mechanical process, hand printing is not acceptable.

C. Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.

D. Attach tags with 1/8 IN round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.

1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.

E. Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.

1. Several items of equipment mounted in housing to be individually tagged inside the compartment.

3.2 SCHEDULES

A. Hazard and Safety Signage:

1. Miscellaneous OSHA hazard signage:

a. Tag Type: Type B2 - Nonmetallic Signs.

b. Fastener: Screw or adhesive.

c. Size: 10 IN x 14 IN.

d. Location: As indicated on Drawings.

e. Location: Field located as directed by Owner.

1) Allowance: Provide OSHA Danger, Caution, Safety Instruction or Biohazard signs as directed by Owner.

f. Legend:

1) Description of hazard shall be determined by Engineer.
2) Provide international graphic symbology where indicated.

B. Process Systems:

1. General:

a. Provide arrows and markers on piping.

1) At 20 FT maximum centers along continuous lines.

2) At changes in direction (route) or obstructions.

3) At valves, risers, "T" joints, machinery, or equipment.

4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.

b. Position markers on both sides of pipe with arrow markers pointing in flow direction.

1) If flow is in both directions use double headed arrow markers.

c. Apply tapes and stenciling in uniform manner parallel to piping.

2. Trenches with piping:

a. Tag type: Type F - Underground Warning Tape

b. Location: Halfway between top of piping and finished grade.

c. Letter height: 1-1/4 IN minimum.

d. Natural gas or digester gas:

1) Color: Yellow with black letters.

2) Legend:

a) First line: “CAUTION CAUTION CAUTION”
b) Second line: “BURIED GAS LINE BELOW”

e. Storm and sanitary sewer lines:

1) Color: Green with black letters.

2) Legend:

a) First line: “CAUTION CAUTION CAUTION”
b) Second line: “BURIED SEWER LINE BELOW”

3. Yard valves, buried, with valve box and concrete pad:

a. Tag type: Type A2 - Rectangle Metal Tags.

b. Fastener: 3/16 IN x 7/8 IN plastic screw anchor with 1 IN #6 stainless steel pan head screw.

c. Legend:

1) Letter height: 1/4 IN minimum.
2) Valve designation as indicated on the Drawings (e.g., “V-xxx”).

4. Valves and slide gates:

    a. Tag type:

        1) Outdoor locations: Type B1 - Square Nonmetallic Tags.

        2) Indoor noncorrosive:

            a) Type A1 - Round Metal Tags.
            b) Type B1 - Square Nonmetallic Tags.

        3) Indoor corrosive:

            a) Stainless steel Type A1 - Round Metal Tags.
            b) Type B1 - Square Nonmetallic Tags.

    b. Fastener:

        1) Type A1: Chain of the same material.
        2) Type B1: Stainless steel chain.

    c. Color: Per ASME A13.1 corresponding to the piping system.

    d. Legend:

        1) Letter height: 1/4 IN minimum.
        2) Valve designation as indicated on the Drawings (e.g., “V-xxx”).

5. Process equipment (e.g., pumps, pump motors, blowers, air compressors, bar screens, clarifier drive mechanism, etc.):

    a. Tag type:

        1) Type B2 - Nonmetallic Signs.
        2) Type D - Self-Adhesive Tape Tags and Signs.
        3) Type G - Stenciling System.

    b. Fastener:

        1) Self.
        2) Screws.
        3) Adhesive.

    c. Legend:

        1) Letter height: 1/2 IN minimum.

2) Equipment designation as indicated on the Drawings (e.g., “Primary Sludge Pump P-xxx”).

6. Piping systems:

a. Tag type:

1) Outdoor locations: Type G - Stenciling System.

2) Indoor locations:

a) Type D - Self-Adhesive Tape Tags and Signs.
b) Type G - Stenciling System.

b. Fastener: Self.

c. Color: Per ASME A13.1.

d. Legend:

1) Letter height: Manufacturers standard for the pipe diameter.
2) Mark piping in accordance with ASME A13.1.
3) Use piping designation as indicated on the Drawings.
4) Arrow: Single arrow.

C. Instrumentation Systems

1. Instrumentation Equipment (e.g., flow control valves, primary elements, etc.):

a. Tag type:

1) Outdoor locations: Type B1 - Square Nonmetallic Tags.

2) Indoor noncorrosive:

a) Type A1 - Round Metal Tags.
b) Type B1 - Square Nonmetallic Tags.

3) Indoor corrosive:

a) Stainless steel Type A1 - Round Metal Tags.
b) Type B1 - Square Nonmetallic Tags.

b. Fastener:

1) Type A1: Chain of the same material.
2) Type B1: Stainless steel chain.

c. Legend:

1) Letter height: 1/4 IN minimum.
2) Equipment ISA designation as indicated on the Drawings (e.g., “FIT-xxx”).

2. Enclosure for instrumentation and control equipment, (e.g., PLC control panels, etc.):

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height: 1/2 IN minimum.
2) Equipment name (e.g., "PLC CONTROL PANEL PCP-xxx").

3. Components inside equipment enclosure, (e.g., PLC’s, control relays, contactors, and timers):

a. Tag type: Type D - Self-Adhesive Tape Tags.

b. Fastener: Self.

c. Legend:

1) Letter height: 3/16 IN minimum.
2) Description or function of component (e.g., "PLC-xxx” or “CR-xxx").

4. Through enclosure door mounted components (e.g., selector switches, controller digital displays, etc.):

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height: 1/4 IN minimum.
2) Component ISA tag number as indicated on the Drawings (e.g., “HS-xxx”).

D. Electrical Systems:

1. Trenches with ductbanks, direct-buried conduit, or direct-buried wire and cable.

a. Tag type: Type F - Underground Warning Tape.

b. Letter height: 1-1/4 IN minimum.

c. Location:

1) Where trench is 12 IN or more below finished grade: In trench 6 IN below finished grade.

2) Where trench is less than 12 IN below finished grade: In trench 3 IN below finished grade.

d. Electrical power (e.g., low, and medium voltage):

1) Color: Red with black letters.

2) Legend:

a) First line: “CAUTION CAUTION CAUTION.”
b) Second line: “BURIED ELECTRIC LINE BELOW.”

e. Communications (e.g., telephone, instrumentation, LAN, SCADA):

1) Color: Orange with black letters.

2) Legend:

a) First line: “CAUTION CAUTION CAUTION.”
b) Second line: “BURIED COMMUNICATION LINE BELOW.”

2. Exterior pad mounted equipment (e.g., transformers, switchgear):

a. Tag type: Type D - Self-Adhesive Tape Tags.

b. Fastener: Self.

c. General legend:

1) Letter height:

a) First line: 1-1/2 IN minimum.
b) Subsequent lines: 1/2 IN minimum.

2) First line: Equipment name (e.g., "TRANSFORMER Txxx").

3) Second line: System voltage (e.g., "13,800 V: 480/277 V").

4) Third line: Date installed (e.g., “INSTALLED JULY 20xx”).

d. Each section/cubical legend:

1) Letter height: 1-1/2 IN minimum.

2) Description of source or load (e.g., "MAIN DISCONNECT" or "TO SWITCHGEAR SGxxx" or "TO TRANSFORMER Txxx").

3. Switchgear, switchboards, and motor control centers:

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Main equipment legend:

1) Letter height:

a) First line: 1 IN minimum.
b) Subsequent lines: 3/8 IN minimum.

2) First line: Equipment name (e.g., "MAIN SWITCHBOARD MSBxxx").

3) Second line:

a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
b) Include the building name or number if the source is in another building.

4) Third line: System voltage and phase (e.g., “480/277 V, 3PH”).

5) Fourth line: Date installed (e.g., “INSTALLED JULY 20xx”).

d. Main and feeder device legend:

1) Letter height: 3/8 IN minimum.

2) Description of load (e.g., “MAIN DISCONNECT,” "PUMP Pxxx" or "PANELBOARD HPxxx").

4. Panelboards and transformers:

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height:

a) First line: 3/8 IN minimum.
b) Subsequent lines: 3/16 IN minimum.

2) First line: Equipment name (e.g., "PANELBOARD LPxxx" or "TRANSFORMER Txxx").

3) Second line (panelboards only): System voltage and phase (e.g., “208/120V, 3PH”).

4) Third line:

a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
b) Include the building name or number if the source is in another building.

5) Fourth line: Date installed (e.g., “INSTALLED JULY 20xx”).

5. Transfer switches:

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height:

a) First line: 3/8 IN minimum.
b) Subsequent lines: 3/16 IN minimum.

2) First line: Equipment name (e.g., "AUTOMATIC TRANSFER SWITCH ATSxxx").

3) Second line: Normal source of power (e.g., "NORMAL SOURCE FED FROM MCCxxx").

4) Third line: Emergency source of power (e.g., "EMERGENCY SOURCE FED FROM SGENxxx").

5) Fourth line: Date installed (e.g., “INSTALLED JULY 20xx”).

6. Safety switches, separately mounted circuit breakers and motor starters, VFD’s, etc.:

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height: 1/4 IN minimum.

2) First line: Description of load equipment is connected to (e.g., "PUMP Pxxx").

3) Second line:

a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").

b) The source of power room number is only required when there are multiple electrical rooms, if the source is in another building, the building name or number shall be used.

7. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height: 1/2 IN minimum.
2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCPxxx").

8. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):

a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.

b. Fastener: Self.

c. Legend:

1) Letter height: 3/16 IN minimum.
2) Description or function of component (e.g., "M-xxx," "CR-xxx" or "TR-xxx").

9. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):

a. Tag type: Type C - Phenolic Name Plates.

b. Fastener: Screws.

c. Legend:

1) Letter height: 1/4 IN minimum.

2) Component tag number as indicated on the Drawings or as defined by Contractor (e.g., “HS-xxx”).

10. Conductors in control panels and in pull or junction boxes where multiple circuits exist.

    a. Tag type: Type D - Self-Adhesive Tape Tags.

    b. Fastener: Self.

    c. Tag conductor at both ends.

    d. Legend:

        1) Letter height: 1/8 IN minimum.

        2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.

11. Conductors in cable trays.

    a. Tag type: Type D - Self-Adhesive Tape Tags.

    b. Fastener: Self.

    c. Tag all conductors at the same location in the tray at 50 FT maximum intervals.

    d. Legend:

        1) Letter height: 1/8 IN minimum.
        2) Circuit number or wire number as scheduled on the Drawings.

12. Conductors in handholes and manholes.

    a. Tag type: Type A3 - Metal Tape Tags.

    b. Fastener: Nylon strap.

    c. Tag conductor at both ends.

    d. Legend:

        1) Letter height: 1/8 IN minimum.
        2) Circuit number or wire number as scheduled on the Drawings.

13. Grounding conductors associated with grounding electrode system in accordance with the following:

a. Tag type: Type D - Self-Adhesive Tape Tags.

b. Fastener: Self.

c. Legend:

1) Letter height: 1/8 IN minimum.

2) Function of conductor (e.g., "MAIN BONDING JUMPER", "TO GROUND RING", "TO MAIN WATER PIPE").

14. Flash protection for switchboards, panelboards, industrial control panels and motor control centers:

a. Tag type: Type D - Self-Adhesive Tape Signs.
b. Fastener: Self.
c. Legend: Per NFPA 70.

15. Poles:

a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.

b. Fastener:

1) Metal pole: Self.

2) Wood pole:

a) Self-mount tag on aluminum utility panel.
b) Panel thickness: 20 MILS.
c) Two mounting holes.
d) Screw or nail panel to pole.

c. Color: Yellow with black letters.

d. Legend:

1) Letter height: 1 IN minimum.
2) Pole number as scheduled on the Drawings.

16. Power cable trays:

a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.

b. Fastener: Self.

c. Size: 1-3/4 IN x 2-1/2 IN.

d. Location:

1) Every 50 FT maximum.
2) Label each barriered section of tray.

e. Legend:

1) OSHA Danger Sign.
2) Description of Danger, (e.g., “UP TO 480 VOLTS”).

17. Control cable trays:

a. Tag type: Type D – Self-Adhesive Tape Tags and Signs.

b. Fastener: Self.

c. Size: 1-3/4 IN x 2-1/2 IN.

d. Location: Every 50 FT maximum.

e. Legend:

1) OSHA Danger Sign.

2) Description of Danger, (e.g., “LESS THAN 50 VOLTS, CLASS 2 OR 3 IN or “ANALOG INSTRUMENTATION” or “DIGITAL COMMUNICATION”).

18. Telecommunication cable trays:

a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.

b. Fastener: Self.

c. Location: Every 20 FT maximum.

d. Legend:

1) Letter height: 1/4 IN minimum.
2) Description of tray, (e.g., “TELECOMMUNICATIONS”).

19. Entrances to electrical rooms:

a. Tag type: Type B2 - Nonmetallic Signs.

b. Fastener: Screw or adhesive.

c. Size: 5 IN x 7 IN.

d. Location: Each door to room.

e. Legend:

1) OSHA Danger Sign.
2) Description of Danger: “HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY.”

20. Entrances to Telecommunications Rooms:

a. Tag type: Type B2 - Nonmetallic Signs.

b. Fastener: Screw or adhesive.

c. Size: 5 IN x 7 IN.

d. Location: Each door to room.

e. Legend:

1) OSHA Warning Sign.

2) Description of Warning: “TELECOMM ROOM, AUTHORIZED PERSONNEL ONLY.”

21. Equipment where more than one voltage source is present:

a. Tag type:

1) Type B2 - Nonmetallic Signs.
2) Type D - Self-Adhesive Tape Signs.

b. Fastener:

1) Screw or adhesive.
2) Self.

c. Size: 1-3/4 IN x 2-1/2 IN.

d. Location: Exterior face of enclosure or cubical.

e. Legend:

1) OSHA Danger Sign.
2) Description of Danger: “MULTIPLE VOLTAGE SOURCES.”

22. Raceway and Cable Identifier:

a. Use a scheme indicated in Control Panel, Loop Drawings, or Reference Drawings

b. Where no raceway, cable or conduit identification scheme is indicated in the Drawings or Specifications, use the following scheme:

1) Modifier-Tag-Suffix (for example: P-VFD3113)

a) Modifier:

(1) P = Power.
(2) C = Control.
(3) S = Signal (Instrumentation).
(4) PC = Power and Control.
(5) F = Fiber Optic.

b) Tag:

(1) Equipment, device, component, or instrument tag as given in the Drawings.

(2) Where no tag equipment, device, component, or instrument tag is given, use panelboard tag and circuit number.

c) Suffix:

(1) Letter to create unique ID

END OF SECTION

DIVISION 26 - ELECTRICAL

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SECTION 26 05 00 – ELECTRICAL – BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic requirements for electrical systems.

B. Related Sections:

1. Division 03 - Concrete.
2. Section 10 14 00 - Identification Devices.
3. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
4. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Aluminum Association (AA):

   a. ADM, Aluminum Design Manual.

2. American Institute of Steel Construction (AISC):

   a. Steel Construction Manual.

3. American National Standards Institute (ANSI).

4. ASTM International (ASTM):

   a. A36/A36M, Standard Specification for Carbon Structural Steel.

   b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

   c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

   a. C2, National Electrical Safety Code (NESC).

6. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC).

7. National Electrical Manufacturers Association (NEMA):

a. Underwriters Laboratories, Inc. (UL).

B. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.

1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.

2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

1.3 DEFINITIONS

A. For the purposes of providing materials and installing electrical work the following definitions shall be used.

1. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms, and other similar process type rooms.

2. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater, or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes, or chemical mixtures.

3. Hazardous areas: Class I, II or III areas as defined in NFPA 70.

4. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

B. Execution of this Contract will involve replacement of existing equipment.

1. There is an existing Motor Control Center on the ground level of the Digester Building.

2. The Contractor is responsible for coordinating with the Owner the equipment which shall remain in service, or which shall have a limited downtime, and to schedule his work accordingly.

3. Temporary equipment and wiring, installed in accordance with the NFPA 70, may be used if necessary to maintain operation or to limit downtime.

4. Under no circumstances shall equipment be taken out of service without the Owner's permission.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Special Provision 1-12.2.and individual specification sections for submittal requirements for products defined as equipment.

2. General requirements:

a. Provide Manufacturer's technical information on products to be used, including product descriptive bulletin.

b. Include data sheets that include Manufacturer's name and product model number.

1) Clearly identify all optional accessories.

c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.

d. Manufacturer's delivery, storage, handling and installation instructions.

e. Product installation details.

f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.

g. See individual specification sections for any additional requirements.

3. Fabrication and/or layout drawings:

a. Concrete and reinforcing steel, per Division 03 requirements.

b. Provide a conductor identification schedule for all power, control, communication, and protective circuits.

1) Schedule to include the following information:

a) Conductor identification number.
b) Conductor size.
c) Number of conductors.
d) Type of conductor.
e) Size of conductor.
f) Size of conductor usage descriptions.

g) Conductor run (to and from).
h) Conduit size and type.

c. Provide circuit schedules for all power, control, communication, and protective circuits.

1) Include a detailed description, list of individual loads per circuit and a total estimated load per circuit.

B. Operation and Maintenance Manuals:

1. See Special Provision 1-12.2.for requirements for:

a. The mechanics and administration of the submittal process.
b. The content process of Operation and Maintenance Manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect nameplates on electrical equipment to prevent defacing.

1.6 AREA DESIGNATIONS

A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.

1. Indoor areas:

a. Dry.

b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.

B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

A. Electrical Equipment Support Pedestals and/or Racks:

1. Manufacturers:

a. Modular strut:

1) Unistrut Building Systems.
2) B-Line by Eaton.
3) Globe Strut.
4) Superstrut by Thomas & Betts.

2. Material requirements:

a. Modular strut:

1) Galvanized steel: ASTM A123/123M or ASTM A153/A153M.

2) Stainless steel: AISI Type 316.

3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.

4) Aluminum: AA Type 6063-T6.

b. Structural members (e.g., I beams, L and C channels):

1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.

c. Mounting plates:

1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.

d. Mounting hardware:

1) Stainless steel.

e. Concrete and reinforcing steel: See Division 03 specifications.

B. Equipment pads (interior and exterior):

1. Concrete and reinforcing steel: See Division 03 specifications.

C. Field touch-up of galvanized surfaces.

1. Zinc-rich primer.

a. One coat, 3.0 MILS, ZRC by ZRC Products.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.

B. Install equipment in accordance with the requirements of:

1. NFPA 70.
2. IEEE C2.
3. The Manufacturer's instructions.

C. In general, conduit routing is not shown on the Drawings.

1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.

2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.

D. When complete branch circuiting is not shown on the Drawings:

1. Panelboard name and circuit number will be shown, and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.

2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.

3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.

E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.

F. Install equipment plumb, square and true with construction features and securely fastened.

G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.

H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.

I. Device Mounting Schedule:

1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:

a. Safety switch (to center of operating handle): 54 IN.
b. Separately mounted motor starter (to center of operating handle): 54 IN.
c. Pushbutton or selector switch control station (to center): 46 IN.

J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.

1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 IN in equipment location with the Engineer's approval.

K. Provide electrical equipment support system per the following area designations:

1. Dry areas:

a. Galvanized system consisting of galvanized steel channels and fittings, nuts, and hardware.

b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation before rust appears.

2. Wet areas:

a. Galvanized system consisting of galvanized steel channels and fittings, nuts, and hardware.

b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation before rust appears.

3. Corrosive areas:

a. Stainless steel system consisting of stainless steel channels and fittings, nuts, and hardware.

4. Highly corrosive areas:

a. PVC coated steel system consisting of PVC coated steel channels and fittings with stainless steel nuts and hardware.

L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the Manufacturer.

1. Do not cut, or weld to, building structural members.

2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

M. Provide non-metallic corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.

N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.

O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.

P. Do not use materials that may cause the walls or roof of a building to discolor or rust.

Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00.

R. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.

S. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.

1. Determine the SCCR rating by one of the following methods:

a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.

b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.

c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.

2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.

3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

3.2 FIELD QUALITY CONTROL

A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.

1. Secure Shop Drawings for equipment furnished by Owner and installed by Contractor.

B. Replace equipment and systems found inoperative or defective and re-test.

C. The protective coating integrity of support structures and equipment enclosures shall be maintained.

1. Repair galvanized components utilizing a zinc rich paint.

2. Repair painted components utilizing touch up paint provided by or approved by the Manufacturer.

3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.

4. Repair surfaces which will be inaccessible after installation prior to installation.

5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.

D. Replace nameplates damaged during installation.

END OF SECTION

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SECTION 26 05 19 – WIRE AND CABLE – 600 VOLT AND BELOW

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:

a. Building wire.
b. Power cable.
c. Control cable.
d. Instrumentation cable.
e. Wire connectors.
f. Insulating tape.
g. Pulling lubricant.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 26 05 00 - Electrical - Basic Requirements.
2. Section 26 08 13 - Acceptance Testing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Insulated Cable Engineers Association (ICEA):

a. S-58-679, Standard for Control Cable Conductor Identification.

2. National Electrical Manufacturers Association (NEMA):

a. ICS 4, Industrial Control and Systems: Terminal Blocks.

3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):

a. WC 57/S-73-532, Standard for Control Cables.

b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

4. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC).

b. 70E, Standard for Electrical Safety in the Workplace.

c. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

5. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):

a. 568, Commercial Building Telecommunications Cabling Standard.

6. Underwriters Laboratories, Inc. (UL):

a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.

b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.

c. 467, Standard for Safety Grounding and Bonding Equipment.

d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.

e. 486C, Standard for Safety Splicing Wire Connections.

f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.

g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

i. 2225, Cables and Cable Fittings for Use in Hazardous (Classified) Locations.

j. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

B. Instrumentation Cable:

1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.

2. The following are specific types of instrumentation cables:

a. Analog signal cable:

1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.

2) Commonly used types are defined in the following:

a) TSP: Twisted shielded pair.
b) TST: Twisted shielded triad.

b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.

C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.

D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12, or No. 10 AWG.

E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data:

a. Provide submittal data for all products specified in PART 2 of this Specification Section except:

1) Wire connectors.
2) Insulating tape.
3) Cable lubricant.

b. See Specification Section 26 05 00 for additional requirements.

B. Contract Closeout Information:

1. Operation and Maintenance Data:

a. See Special Provision 1-12.2 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. See Specification Section 26 05 00.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Building wire, power, and control cable:

a. Aetna Insulated Wire.
b. Alphawire.
c. Cerrowire.
d. Encore Wire Corporation.
e. General Cable.
f. Okonite Company.
g. Southwire Company.

2. Instrumentation cable:

a. Analog cable:

1) Alphawire.
2) Belden Inc.
3) General Cable.

3. Wire connectors:

a. Burndy Corporation.
b. Buchanan.
c. Ideal.
d. Ilsco.
e. 3M Co.
f. Teledyne Penn Union.
g. Thomas and Betts.
h. Phoenix Contact.

4. Insulating and color-coding tape:

a. 3M Co.
b. Plymouth Bishop Tapes.
c. Red Seal Electric Co.

2.2 MANUFACTURED UNITS

A. Building Wire:

1. Conductor shall be copper with 600 V rated insulation.

2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.

3. Surface mark with Manufacturer's name or trademark, conductor size, insulation type and UL label.

4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Power Cable:

1. Conductor shall be copper with 600 V rated insulation.

2. Surface mark with Manufacturer's name or trademark, conductor size, insulation type and UL label.

3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.

4. Number of conductors as required, including a bare ground conductor.

5. Individual conductor color coding:

   a. ICEA S-58-679, Method 4.
   b. See PART 3 of this Specification Section for additional requirements.

6. Conform to NFPA 70 Type TC.

C. Control Cable:

1. Conductor shall be copper with 600 V rated insulation.

2. Surface mark with Manufacturer's name or trademark, conductor size, insulation type and UL label.

3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.

4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.

a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).

5. Individual conductor color coding:

a. ICEA S-58-679, Method 1, Table E-2.
b. See PART 3 of this Specification Section for additional requirements.

6. Conform to NFPA 70 Type TC.

D. Electrical Equipment Control Wire:

1. Conductor shall be copper with 600 V rated insulation.

2. Conductors shall be stranded.

3. Surface mark with Manufacturer's name or trademark, conductor size, insulation type and UL label.

4. Conform to UL 44 for Type SIS insulation.

5. Conform to UL 83 for Type MTW insulation.

E. Instrumentation Cable:

1. Surface mark with Manufacturer's name or trademark, conductor size, insulation type and UL label.

2. Analog cable:

a. Tinned copper conductors.
b. 300 V or 600 V PVC insulation with PVC jacket.
c. Twisted with 100% foil shield coverage with drain wire.
d. Six (6) twists per foot minimum.
e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
f. Conform to UL 2250, UL 1581 and NFPA 70 Type ITC.

3. Digital cable:

a. As recommended by Equipment (e.g., PLC, RTU) Manufacturer.

b. Horizontal voice and data cable:

1) Category 6 per TIA/EIA/ANSI 568.

2) Cable shall be label-verified.

3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.

4) Conductors: No. 24 AWG solid untinned copper.

5) Rated CMP per NFPA 70.

c. Conform to NFPA 262 and NFPA 70 Type ITC.

F. Wire Connectors:

1. Twist/screw on type:

a. Insulated pressure or spring type solderless connector.

b. 600 V rated.

c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.

d. Phase and neutral conductors: Conform to UL 486C.

2. Compression and mechanical screw type:

a. 600 V rated.
b. Ground conductors: Conform to UL 467.
c. Phase and neutral conductors: Conform to UL 486A.

3. Terminal block type:

a. High density, screw-post barrier-type with white center marker strip.
b. 600 V and ampere rating as required, for power circuits.
c. 600 V, 20-ampere rated for control circuits.
d. 300 V, 15-ampere rated for instrumentation circuits.
e. Conform to NEMA ICS 4 and UL 486A.

G. Insulating and Color-Coding Tape:

1. Pressure sensitive vinyl.

2. Premium grade.

3. Heat, cold, moisture, and sunlight resistant.

4. Thickness, depending on use conditions: 7, 8.5, or 10 MIL.

5. For cold weather or outdoor location, tape must also be all-weather.

6. Color:

    a. Insulating tape: Black.
    b. Color coding tape: Fade-resistant color as specified herein.

7. Comply with UL 510.

H. Pulling Lubricant: Cable Manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 EXECUTION

3.1 INSTALLATION

A. Permitted Usage of Insulation Types:

1. Type XHHW-2:

    a. Building wire and power and control cable in architectural and non-architectural finished areas.

    b. Building wire and power and control cable in conduit in outdoor areas and below grade.

    c. Building wire and power and control cable in cable tray in outdoor areas.

2. Type SIS and MTW:

    a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.

B. Conductor Size Limitations:

1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.

2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.

3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.

C. Color Code All Wiring as Follows:

1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.

b. Conductors larger than No. 6 AWG:

1) Insulated phase and neutral conductors shall be identified by one of the following methods:

a) Continuous colored outer finish along its entire length.
b) 3 IN of colored tape applied at the termination.

2) Insulated grounding conductor shall be identified by one of the following methods:

a) Continuous green outer finish along its entire length.
b) Stripping the insulation from the entire exposed length.
c) Using green tape to cover the entire exposed length.

3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.

2. Power cables ICEA S-58-679, Method 4 with:

a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.

b. Ground conductor: Bare.

3. Control cables ICEA S-58-679, Method 1, Table E-2:

a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.

b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.

D. Install all wiring in raceway unless otherwise indicated on the Drawings.

E. Feeder, branch, control, and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:

1. Where specifically indicated on the Drawings.

2. Where field conditions dictate, and written permission is obtained from the Engineer.

3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.

a. The combinations shall comply with the following:

1) 12 VDC, 24 VDC and 48 VDC may be combined.
2) 125 VDC shall be isolated from all other AC and DC circuits.
3) AC control circuits shall be isolated from all DC circuits.

4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.

a. The combinations shall comply with the following:

1) Analog signal circuits may be combined.

2) Digital signal circuits may be combined but isolated from analog signal circuits

5. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.

a. Do not combine control device circuits with lighting or receptacle circuits.

b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:

1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.

2) The neutral conductors may not be shared.

3) Up sizing raceway size for the size and quantity of conductors.

F. Ground the drain wire of shielded instrumentation cables at one end only.

1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).

G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.

1. Feeder and branch power circuits:

a. Device outlet boxes:

1) Twist/screw on type connectors.

b. Junction and pull boxes and wireways:

1) Twist/screw on type connectors for use on No. 8 and smaller wire.

2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.

c. Motor terminal boxes:

1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.

2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.

d. Manholes or handholes:

1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.

2) Watertight compression or mechanical screw type connectors for use on No. 6 AWG and larger wire.

2. Control circuits:

a. Junction and pull boxes: Terminal block type connector.

b. Manholes or handholes: Twist/screw on type connectors pre-filled with epoxy.

c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.

3. Instrumentation circuits can be spliced where field conditions dictate, and written permission is obtained from the Engineer.

a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.

b. Junction and pull boxes: Terminal block type connector.

c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.

4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.

H. Insulating Tape Usage:

1. For insulating connections of No. 8 AWG wire and smaller: 7 MIL vinyl tape.

2. For insulating splices and taps of No. 6 AWG wire or larger: 10 MIL vinyl tape.

3. For insulating connections made in cold weather or in outdoor locations: 8.5 MIL, all weather vinyl tape.

I. Color Coding Tape Usage: For color coding of conductors.

3.2 FIELD QUALITY CONTROL

A. Acceptance Testing:

1. See Specification Section 26 08 13.

END OF SECTION

SECTION 26 05 26 – GROUNDING AND BONDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for grounding and bonding system(s).

B. Related Specification Sections include but are not necessarily limited to:

1. Section 10 14 00 - Identification Devices.
2. Section 26 05 00 - Electrical - Basic Requirements.
3. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
4. Section 26 05 33 - Raceways and Boxes.
5. Section 26 08 13 - Acceptance Testing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):

a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.

3. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC).

4. Underwriters Laboratories, Inc. (UL):

a. 467, Grounding and Bonding Equipment.

B. Assure ground continuity is continuous throughout the entire Project.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data.

a. Provide submittal data for all products specified in PART 2 of this Specification Section except:

1) Grounding clamps, terminals, and connectors.

b. See Specification Section 26 05 00 for additional requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Ground rods and bars and grounding clamps, connectors, and terminals:

a. ERICO by Pentair.
b. Harger Lightning & Grounding.
c. Heary Bros. Lightning Protection Co. Inc.
d. Burndy by Hubbell.
e. Robbins Lightning, Inc.
f. Blackburn by Thomas & Betts.
g. Thompson Lightning Protection, Inc.

2.2 COMPONENTS

A. Wire and Cable:

1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
2. Insulated conductors: Color coded green, per Specification Section 26 05 19.

B. Conduit: As specified in Specification Section 26 05 33.

C. Grounding Clamps, Connectors and Terminals:

1. Mechanical type:

a. Standards: UL 467.
b. High copper alloy content.

2. Compression type for interior locations:

a. Standards: UL 467.
b. High copper alloy content.
c. Non-reversible.
d. Terminals for connection to bus bars shall have two bolt holes.

3. Compression type suitable for direct burial in earth or concrete:

    a. Standards: UL 467, IEEE 837.
    b. High copper alloy content.
    c. Non-reversible.
    d. Factory filled with oxide inhibiting compound.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Install products in accordance with Manufacturer's instructions.

2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.

3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply Manufacturer’s approved touch-up paint to protect metallic surface from corrosion.

4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves.

    a. Seal the sleeve interior to stop water penetration.

5. Do not splice grounding electrode conductors except at ground rods.

6. Install ground rods and grounding electrode conductors in undisturbed, firm soil.

    a. Provide excavation required for installation of ground rods and conductors.

    b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.

    c. Unless otherwise specified, connect conductors to ground rods with compression type connectors or exothermic weld.

    d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.

    e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.

7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Supplemental Grounding Electrode:

1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.

   a. See Grounding Electrode System paragraph for conductor termination requirements.

2. Equipment support rack and pedestals mounted outdoors:

   a. Connect metallic structure to a ground rod.
   b. Grounding conductor: #6 AWG minimum.

C. Other Bonding Requirements:

1. Other metal piping:

   a. Connect in a daisy chain or radial fashion: Interior hot and cold water piping system to the main ground busas indicated on the Drawings.

   b. See Grounding Electrode System paragraph for conductor termination requirements.

D. Raceway Bonding/Grounding:

1. Install all metallic raceway so that it is electrically continuous.

2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.

3. NFPA 70 required grounding bushings shall be of the insulating type.

4. Provide double locknuts at all panels.

5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.

6. Provide bonding jumpers if conduits are installed in concentric knockouts.

7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

E. Equipment Grounding:

1. Ground all utilization equipment with an equipment grounding conductor.

F. Acceptance testing:

1. See Specification Section 26 08 13.

END OF SECTION

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SECTION 26 05 33 – RACEWAYS AND BOXES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:

a. Conduits.
b. Conduit fittings.
c. Conduit supports.
d. Wireways.
e. Outlet boxes.
f. Pull and junction boxes.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 26 05 00 - Electrical - Basic Requirements.
2. Section 26 05 19 - Wire and Cable - 600 Volt and Below.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Aluminum Association (AA).

2. American Iron and Steel Institute (AISI).

3. ASTM International (ASTM):

a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

c. D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

4. National Electrical Manufacturers Association (NEMA):

a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.

e. TC 14.AG, Aboveground Reinforced Thermosetting Resin Conduit and Fittings.

f. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit and Fittings.

5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):

   a. C80.1, Electric Rigid Steel Conduit (ERSC).
   b. C80.3, Steel Electrical Metallic Tubing (EMT).
   c. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
   d. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

6. National Fire Protection Association (NFPA):

   a. 70, National Electrical Code (NEC).

7. Underwriters Laboratories, Inc. (UL):

   a. 1, Standard for Flexible Metal Conduit.

   b. 6, Electrical Rigid Metal Conduit - Steel.

   c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.

   d. 360, Standard for Liquid-Tight Flexible Metal Conduit.

   e. 467, Grounding and Bonding Equipment.

   f. 514A, Metallic Outlet Boxes.

   g. 514B, Conduit, Tubing, and Cable Fittings.

   h. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.

   i. 797, Electrical Metallic Tubing - Steel.

   j. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.

k. 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

l. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

m. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data.

a. Provide submittal data for all products specified in PART 2 of this Specification Section except:

1) Conduit fittings.
2) Support systems.

b. See Specification Section 26 05 00 for additional requirements.

2. Fabrication and/or layout drawings:

a. Proposed routing of raceways buried under concrete floors and embedded in concrete walls.

1) Identify conduit by tag number of equipment served or by circuit schedule number.

b. Proposed routing and details of construction, including raceway and rebar, for raceways embedded in floor slabs, walls, and columns.

1) Identify conduit by tag number of equipment served or by circuit schedule number.

c. Proposed location and details of construction for openings in slabs and walls for raceway runs.

d. Identify dimensional size of pull and junction boxes to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

A. See Specification Section 26 05 00.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Rigid metal conduits and electrical metallic tubing:

a. Allied Tube and Conduit.
b. Western Tube and Conduit Corporation.
c. Wheatland Tube.
d. Patriot Aluminum Products, LLC.

2. Flexible conduit:

a. AFC Cable Systems.
b. Anamet, Inc.
c. Electri-Flex Company.
d. International Metal Hose Company.
e. Southwire Company, LLC.

3. Conduit fittings and accessories:

a. Appleton by Emerson Electric Co.
b. Carlon by Thomas & Betts.
c. Cantex, Inc.
d. Crouse-Hinds by Eaton.
e. Killark by Hubbell.
f. Osburn Associates, Inc.
g. O-Z/Gedney by Emerson Electric Co.
h. Raco by Hubbell.
i. Steel City by Thomas & Betts.
j. Thomas & Betts.

4. Support systems:

a. Unistrut by Atkore International, Inc.
b. B-Line by Eaton.
c. Kindorf by Thomas & Betts.
d. Minerallac Company.
e. CADDY by Pentair.
f. Superstrut by Thomas & Betts.

5. Outlet, pull and junction boxes:

a. Appleton by Emerson Electric Co.
b. Crouse-Hinds by Eaton
c. Killark by Hubbell.
d. O-Z/Gedney by Emerson Electric Co.
e. Steel City by Thomas & Betts.
f. Raco by Hubbell
g. Bell by Hubbell.
h. Hoffman Engineering.
i. Wiegmann by Hubbell.
j. B-Line by Eaton.
k. Adalet.
l. RITTAL North America LLC.
m. Stahlin by Robroy Enclosures.

2.2 RIGID METAL CONDUITS

A. Rigid Galvanized Steel Conduit (RGS):

1. Mild steel with continuous welded seam.
2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
3. Threads galvanized after cutting.
4. Internal coating: Baked lacquer, varnish, or enamel for a smooth surface.
5. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6.

B. Rigid Aluminum Conduit (RAC):

1. AA Type 6063 aluminum alloy, T-1 temper.
2. Maximum copper content of 0.10%
3. Extruded, seamless.
4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

2.3 FLEXIBLE CONDUIT

A. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):

1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.

2. Extruded PVC outer jacket positively locked to the steel core.

3. Liquid and vaportight.

4. Standard: NFPA 70 Type LFMC, UL 360.

2.4 CONDUIT FITTINGS AND ACCESSORIES

A. Fittings for Use with RGS and RAC:

1. General:

a. In hazardous locations listed for use in Class I, Groups C and D locations.

2. Locknuts:

a. Threaded steel or malleable iron.
b. Gasketed or non-gasketed.
c. Grounding or non-grounding type.

3. Bushings:

a. Threaded, insulated metallic.
b. Grounding or non-grounding type.

4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.

5. Couplings:

a. Threaded straight type: Same material and finish as the conduit with which they are used on.

b. Threadless type: Gland compression or self-threading type, concrete tight.

6. Unions: Threaded galvanized steel or zinc plated malleable iron.

7. Conduit bodies (ells and tees):

a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.

b. Standard and mogul size.

c. Cover:

1) Clip-on type with stainless steel screws.

2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.

8. Conduit bodies (round):

a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.

b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.

9. Sealing fittings:

a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
b. Standard and mogul size.
c. With or without drain and breather.
d. Fiber and sealing compound: UL listed for use with the sealing fitting.

10. Hazardous location flexible coupling (HAZ-FLEX):

a. Liquid tight and arc resistant.

b. Electrically conductive so no bonding jumper is required.

c. Dry and wet areas:

1) Bronze braided covering over flexible brass core.
2) Bronze end fittings.
3) Zinc-plated steel or malleable iron unions and nipples.

d. Corrosive areas:

1) Stainless steel braided covering over flexible stainless steel core.
2) Stainless steel end fittings.
3) Aluminum unions and nipples.

11. Service entrance head:

a. Malleable iron, galvanized steel, or copper free aluminum.

b. Insulated knockout cover for use with a variety of sizes and number of conductors.

12. Expansion couplings:

a. 2 IN nominal straight-line conduit movement in either direction.
b. Galvanized steel with insulated bushing.
c. Gasketed for wet locations.
d. Internally or externally grounded.

13. Expansion/deflection couplings:

a. 3/4 IN nominal straight-line conduit movement in either direction.
b. 30 DEG nominal deflection from the normal in all directions.
c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.

d. Internally or externally grounded.
e. Watertight, raintight and concrete tight.

14. Standards: UL 467, UL 514B, UL 1203.

B. Fittings for Use with FLEX-LT:

1. Connector:

a. Straight or angle type.
b. Metal construction, insulated and gasketed.
c. Composed of locknut, grounding ferrule and gland compression nut.
d. Liquid tight.

2. Standards: UL 467, UL 514B.

C. Weather and Corrosion Protection Tape:

1. PVC based tape, 10 mils thick.

2. Protection against moisture, acids, alkalis, salts, and sewage and suitable for direct bury.

3. Used with appropriate pipe primer.

2.5 ALL RACEWAY AND FITTINGS

A. Mark Products:

1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the Manufacturer.

2.6 OUTLET BOXES

A. Cast Outlet Boxes:

1. Zinc plated cast iron or die-cast copper free aluminum with Manufacturer's standard finish.

2. Threaded hubs and grounding screw.

3. Styles:

a. "FS" or "FD".
b. "Bell".
c. Single or multiple gang and tandem.
d. "EDS" or "EFS" for hazardous locations.

4. Accessories: 40 MIL PVC exterior coating and 2 MIL urethane interior coating.

5. Standards: UL 514A, UL 1203.

2.7 PULL AND JUNCTION BOXES

A. NEMA 4X Rated (metallic):

1. Body and cover: 14 GA Type 304 or 316 stainless steel.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged door and stainless steel screws and clamps.
6. Door with oil-resistant gasket.

B. NEMA 4X Rated (Nonmetallic):

1. Body and cover: Ultraviolet light protected fiberglass-reinforced polyester boxes.
2. No knockouts.
3. External mounting flanges.
4. Hinged door with quick release latches and padlocking hasp.
5. Door with oil resistant gasket.

C. NEMA 7 and NEMA 9 Rated:

1. Cast gray iron alloy or copper-free aluminum with Manufacturer's standard finish.

2. Drilled and tapped openings or tapered threaded hub.

3. Cover bolted down with stainless steel bolts or threaded cover with neoprene gasket.

4. External mounting flanges.

5. Grounding lug.

6. Accessories: 40 MIL PVC exterior coating and 2 MIL urethane interior coating.

D. Miscellaneous Accessories:

1. Rigid handles for covers larger than 9 SQFT or heavier than 25 LBS.
2. Split covers when heavier than 25 LBS.
3. Weldnuts for mounting optional panels and terminal kits.
4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20-ampere minimum.

E. Standards: NEMA 250, UL 50.

2.8 SUPPORT SYSTEMS

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:

1. Material requirements.

a. Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.

b. Stainless steel: AISI Type 316.

c. PVC coat galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.

d. Aluminum: AA Type 6063 T6.

B. Single Conduit and Outlet Box Support Fasteners:

1. Material requirements:

a. Zinc plated steel.
b. Stainless steel.
c. Malleable iron.
d. PVC coat malleable iron or steel: 20 MIL PVC coating.
e. Steel protected with zinc phosphate and oil finish.

PART 3 EXECUTION

3.1 INSTALLATION

A. Shall be in accordance with the requirements of:

1. NFPA 70.
2. Manufacturer instructions.

B. Size of Raceways:

1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.

2. Unless specifically indicated otherwise, the minimum raceway size shall be:

a. Conduit: 3/4 IN.
b. Wireway: 2-1/2 IN x 2-1/2 IN.

C. Field Bending and Cutting of Conduits:

1. Utilize tools and equipment recommended by the Manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.

2. Do not reduce the internal diameter of the conduit when making conduit bends.

3. Prepare tools and equipment to prevent damage to the PVC coating.

4. Degrease threads after threading and apply a zinc rich paint.

5. Debur interior and exterior after cutting.

D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.

E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.

1. Repair galvanized components utilizing a zinc rich paint.

2. Repair painted components utilizing touch up paint provided by or approved by the Manufacturer.

3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the Manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.

4. Total nominal thickness: 40 MIL.

5. Repair surfaces which will be inaccessible after installation prior to installation.

F. Remove moisture and debris from conduit before wire is pulled into place.

1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.

2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.

3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.

G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.

H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where

passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.

I. Fill openings in walls, floors, and ceilings and finish flush with surface.

3.2 RACEWAY ROUTING

A. Raceways shall be routed in the field unless otherwise indicated.

1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.

2. Run in straight lines parallel to or at right angles to building lines.

3. Do not route conduits:

a. Through areas of high ambient temperature or radiant heat.

b. In suspended concrete slabs.

c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings.

4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.

5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance, and repair.

6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 DEG of bends in the conduit run or in long straight runs to limit pulling tensions.

B. All conduits within a structure shall be installed exposed except as follows:

1. As indicated on the Drawings.
2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
3. Conduits in architecturally finished areas shall be concealed.

C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:

1. Between instrumentation and telecommunication: 1 IN.
2. Between instrumentation and 125 V, 48 V and 24 VDC, 2 IN.
3. Between instrumentation and 600 V and less AC power or control: 6 IN.
4. Between instrumentation and greater than 600 VAC power: 12 IN.
5. Between telecommunication and 125 V, 48 V and 24 VDC, 2 IN.

6. Between telecommunication and 600 V and less AC power or control: 6 IN.
7. Between telecommunication and greater than 600 VAC power: 12 IN.
8. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 IN.
9. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 IN.
10. Between 600 V and less AC and greater than 600 VAC: 2 IN.
11. Between process, gas, air, and water pipes: 6 IN.

D. Conduits shall be installed to eliminate moisture pockets.

1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.

F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.

G. Provide all required openings in walls, floors, and ceilings for conduit penetration.

3.3 RACEWAY APPLICATIONS

A. Permitted Raceway Types Per Wire or Cable Types:

1. Power wire or cables: All raceway types.

2. Control wire or cables: All raceway types.

3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.

4. Motor leads from a VFD: RGS, RAC or shielded VFD cables in all other raceways.

5. Telecommunication cables: All raceway types.

B. Permitted Raceway Types Per Area Designations:

1. Dry areas:

a. RGS and RAC.

2. Wet areas:

a. RGS and RAC.

3. Corrosive areas:

a. RGS and RAC.

4. Highly corrosive areas:

a. RAC.

5. NFPA 70 hazardous areas:

a. RGS
b. RAC when required by other area designations.

C. Permitted Raceway Types Per Routing Locations:

1. In concrete block or brick walls:

a. PVC-40.

2. Through floor penetrations:

a. Fiberglass (above grade rated) in areas designated as wet, corrosive or highly corrosive.

b. RGS wrapped with factory applied weather and corrosion protection tape when emerging from concrete into areas designated as wet, corrosive or highly corrosive.

3. Direct buried conduits and ductbanks:

a. PVC-80.

b. Fiberglass (above or below grade rated).

c. 90 DEG elbows for transitions to above grade:

1) RGS wrapped with factory applied weather and corrosion protection tape.
2) Fiberglass (above grade rated).

d. Long sweeping bends greater than 15 DEG:

1) RGS.
2) Fiberglass (above or below grade rated).

4. Concrete encased ductbanks:

a. PVC-40.

b. PVC-EB.

c. Fiberglass (above or below grade rated).

d. 90-degree elbows for transitions to above grade:

1) RGS wrapped with factory applied weather and corrosion protection tape.
2) Fiberglass (above grade rated).

e. Long sweeping bends greater than 15 DEG:

1) RGS for sizes 2 IN and larger.
2) Fiberglass (above or below grade rated).

D. FLEX-LT conduits shall be installed as the final conduit connection to light fixtures, dry type transformers, motors, electrically operated valves, instrumentation primary elements, and other electrical equipment that is liable to vibrate.

1. The maximum length shall not exceed:

a. 6 FT to light fixtures.
b. 3 FT to motors.
c. 2 FT to all other equipment.

E. HAZ-FLEX coupling shall be installed as the final conduit to motors, electrically operated valves, instrumentation primary elements and electrical equipment that is liable to vibrate.

1. The maximum length shall not exceed:

a. 3 FT to motors.
b. 2 FT to all other equipment.

F. NEMA 4X Rated Wireway:

1. Surface mounted in areas designated as wet and or corrosive.

3.4 CONDUIT FITTINGS AND ACCESSORIES

A. Conduit Seals:

1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.

2. Fill plug and drain shall be accessible.

3. Pour the conduit seals in a two-step process.

a. Pour the seal and leave cover off.

b. After seal is dry, inspect for proper sealing, install cover and mark (for example, paint or permanent marker) as complete.

B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.

1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.

C. Install Expansion Fittings:

1. Where conduits are exposed to the sun and conduit run is greater than 200 FT.
2. Elsewhere as identified on the Drawings.

D. Install Expansion/Deflection Fittings:

1. Where conduits enter a structure.

a. Except electrical manholes and handholes.
b. Except where the ductbank is tied to the structure with rebar.

2. Where conduits span structural expansions joints.

3. Elsewhere as identified on the Drawings.

E. Threaded connections shall be made wrench tight.

F. Conduit joints shall be watertight:

1. Where subjected to possible submersion.
2. In areas classified as wet.
3. Underground.

G. Terminate Conduits:

1. In NEMA 12 rated enclosures:

a. Watertight, insulated and gasketed hub and locknut.
b. Use grounding type locknut or bushing when required by NFPA 70.

2. In NEMA 4 and NEMA 4X rated enclosures:

a. Watertight, insulated and gasketed hub and locknut.

3. In NEMA 7 and NEMA 9 rated enclosures:

a. Into an integral threaded hub.

4. When stubbed up through the floor into floor mount equipment:

    a. With an insulated grounding bushing on metallic conduits.
    b. With end bells on nonmetallic conduits.

H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded, and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:

1. Dry or wet and/or hazardous areas:

    a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.

    b. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.

2. Corrosive areas:

    a. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.

    b. Stainless steel system consisting of: Stainless steel channels and fittings, nuts and hardware and conduit clamps.

3. Highly corrosive areas:

    a. PVC coated steel system consisting of: PVC coated galvanized steel channels and fittings and conduit clamps with stainless steel nuts and hardware.

    b. Fiberglass system consisting of: Fiberglass channels and fittings, nuts and hardware and conduit clamps.

4. Conduit type shall be compatible with the support system material.

    a. Galvanized steel system may be used with RGS.
    b. Stainless steel system may be used with RGS and RAC.
    c. Aluminum system may be used with RAC.
    d. Fiberglass system may be used with PVC-40 and PVC-80.

B. Permitted single conduit support fasteners per area designations and conduit types:

1. Architecturally finished areas:

   a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.

   b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.

   c. Provide anti-rattle conduit supports when conduits are routed through metal studs.

2. Dry or wet and/or hazardous areas:

   a. Material: Zinc plated steel, stainless steel, and malleable iron.

   b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.

3. Corrosive areas:

   a. Material: Stainless steel and PVC coat malleable iron or steel.

   b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.

4. Highly corrosive areas:

   a. Material: PVC coat malleable iron or steel.

   b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.

5. Conduit type shall be compatible with the support fastener material.

   a. Zinc plated steel, steel protected with zinc phosphate and oil finish and malleable iron fasteners may be used with RGS.

   b. Stainless steel system may be used with RGS and RAC.

   c. Nonmetallic fasteners may be used with PVC-40, PVC-80, and fiberglass.

C. Conduit Support General Requirements:

1. Maximum spacing between conduit supports per NFPA 70.

2. Support conduit from the building structure.

3. Do not support conduit from process, gas, air, or water piping, or from other conduits.

4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the Manufacturer if the support is rated less than 25 LBS.

    a. Do not exceed maximum concentrated load recommended by the Manufacturer on any support.

    b. Conduit hangers:

        1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.

    c. Do not use suspended ceiling support systems to support raceways.

    d. Hangers in metal roof decks:

        1) Utilize fender washers.
        2) Not extend above top of ribs.
        3) Not interfere with vapor barrier, insulation, or roofing.

5. Conduit support system fasteners:

    a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
    b. 316 SS, no exceptions.

3.6 OUTLET, PULL, AND JUNCTION BOX INSTALLATION

A. General:

1. Install products in accordance with Manufacturer's instructions.

2. See Specification Section 26 05 00 and the Drawings for area classifications.

3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.

4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes:

1. Permitted uses of metallic outlet boxes:

    a. Housing of wiring devices:

1) Recessed in all stud framed walls and ceilings.

2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.

b. Pull or junction box:

1) Above gypsum wall board or acoustical tile ceilings.
2) Above 10 FT in an architecturally finished area where there is no ceiling.

2. Permitted uses of cast outlet boxes:

a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.

b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.

3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 26 05 00.

4. Set device outlet boxes plumb and vertical to the floor.

5. Outlet boxes recessed in walls:

a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.

b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.

6. Place barriers between switches in boxes with 277 V switches on opposite phases.

7. Back-to-back are not permitted.

8. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.

a. Make covers of boxes accessible.

2. Permitted uses of NEMA 1 enclosure:

a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.

3. Permitted uses of NEMA 4 enclosure:

   a. Pull or junction box surface mounted in areas designated as wet.

4. Permitted uses of NEMA 4X metallic enclosure:

   a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.

5. Permitted uses of NEMA 7 enclosure:

   a. Pull or junction box surface mounted in areas designated as Class I hazardous.

      1) Provide PVC coating in corrosive and highly corrosive areas when PVC coated conduit is used.

END OF SECTION

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SECTION 26 08 13 – ACCEPTANCE TESTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic requirements for acceptance testing.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 01 64 13 Owner Furnished Material and Equipment

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. InterNational Electrical Testing Association (NETA):

a. ATS, Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.

2. Nationally Recognized Testing Laboratory (NRTL).

3. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):

a. 455-78-B, Optical Fibres - PART 1-40: Measurement Methods and Test Procedures - Attenuation.

B. Phasing Diagram:

1. Coordinate with Utility Company for phase rotations and Phase A, B and C markings.

a. Create a phasing diagram showing the coordinated phase rotations with generators and motors through the transformers.

1.3 SUBMITTALS

A. Submittals:

1. Prior to energizing equipment:

a. Coordinated phasing diagram.

2. Within two weeks after successful completion of functional testing:

    a. Single report containing information including:

        1) Summary of Project.
        2) Information from pre-energization testing.

PART 2 PRODUCTS

2.1 FACTORY QUALITY CONTROL

A. Provide Electrical equipment with all factory tests required by the applicable industry standards or NRTL.

B. Factory testing will not be accepted in lieu of field acceptance testing requirements specified in this Specification Section and Special Provision Section 1-05.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. General

1. Perform testing in accordance with this Specification Section and NETA ATS.

2. Provide field setting and programming of all adjustable protective devices and meters.

B. Electrical Equipment and Connections Testing Program:

1. See individual Division 26 Specification Sections for equipment specific testing requirements.

2. Test all electrical equipment.

    a. Perform all required NETA testing.

    b. Perform all required NETA testing plus the optional testing identified with each specific type of equipment in Article 3.2 of this Specification Section.

C. Cable - Low Voltage:

1. Perform inspections and tests per NETA ATS 7.3.2.

D. Low Voltage Molded Case Circuit Breakers:

1. Perform inspections and tests per NETA ATS 7.6.1.1.

2. Components:

a. Test all components per applicable paragraphs of this Specification Section and NETA ATS.

b. Thermal magnetic breakers: Visual and mechanical inspection per NETA ATS only.

c. Solid state trip type: Visual and mechanical inspection and electrical tests per NETA ATS.

3. Record as-left settings.

E. Instrument Transformers:

1. Perform inspections and tests per NETA ATS 7.10.

2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.

3. Perform the following optional tests per NETA ATS:

a. Dielectric withstand test on potential transformers.

F. Grounding:

1. Perform inspections and tests per NETA ATS 7.13.

2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.

G. Motors:

1. Perform inspections and tests per NETA ATS 7.15.

H. Motor Controllers:

1. Perform inspections and tests per NETA ATS 7.16.

2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.

3. Perform the following optional tests per NETA ATS:

a. Motor running overcurrent protection.
b. Control wiring insulation resistance.

END OF SECTION

DIVISION 31 - EARTHWORK

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SECTION 31 23 19 – DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. The plant digesters are partially buried beneath the ground surface and shallow groundwater conditions exist at the site. During the period when the digesters are drained for maintenance, there is a risk of uplift of and/or damage to the digester structure due to groundwater-induced hydrostatic pressures. Pressure relief valves are installed in the walls and floor of the digesters to relieve hydrostatic pressure in the event of excessive hydrostatic pressure differentials toward the tank, but the County cannot guarantee the functionality of the pressure relief valves. To reduce the risk of uplift and/or damage to the digester structure and to reduce the hydrostatic pressure differential toward the digesters, the surrounding groundwater shall be lowered (dewatered) to approximately elevation 130 ft NGVD29 throughout the footprint of the digester structure. A dewatering assessment report is provided to assist the Contractor with the feasibility and anticipated level of effort for achieving adequate dewatered conditions prior to draining the digesters. This Section includes information pertinent to the design and construction of the groundwater dewatering and groundwater monitoring systems for the digesters and requirements for handling of investigation derived waste (IDW) and groundwater generated during dewatering activities.

B. The work to be completed by the Contractor includes, but is not necessarily limited to the following:

1. Construct and develop four permanent dewatering wells in accordance with Specification Sections 31 23 20 and additional wells as necessary to achieve dewatered groundwater conditions; construct and develop one permanent monitoring well in accordance with Specifications Section 31 23 21 at the location shown in the Plans or determined by the Engineer in the field; and provide and operate temporary pumps to perform dewatering activities in accordance with this section.

2. Provide a dewatering system with redundancies for dewatering pumps so that continuous dewatering is maintained throughout the entire Project duration, estimated to be approximately four (4) months. Contractor to coordinate with the Owner on the potential temporary power source for the pumps available at the plant.

3. Provide groundwater treatment to meet discharge requirements for turbidity, sand content and petroleum hydrocarbons and associated contaminants to the levels below the Construction General Permit and any other discharge requirements.

Groundwater treatment system(s) may be located in the staging area indicated on the Contract Drawings.

4. Provide all personnel, materials, equipment, and tools to continuously operate and maintain the dewatering and groundwater treatment system throughout the Project duration.

5. Dewater the groundwater surrounding the digesters – including subsurface water originating as groundwater, seepage, and precipitation recharge – in the direct vicinity of the digester structure.

6. Convey and record the flow of the treated groundwater to an approved discharge location at the plant as shown on the Contract Drawings Sheet C-1. Contractor is responsible for installing the temporary on-the-ground piping to convey discharge groundwater via the route approved by the Owner. Contractor shall also provide flow meter(s) to record and report the daily flow discharged. Discharge groundwater piping and any storage and treatment system cannot interfere with the normal plant operation and access.

C. The Contractor may use the existing dewatering wells and underdrain system as a component of the Project dewatering system, if desired, but the Owner makes no representations as to the condition, operability, or effectiveness of the existing system, and the use of the existing dewatering wells is at the Contractor's sole risk. The remaining portion of the existing dewater system, described in the dewatering assessment report, consists of two dewatering wells with submersible pumps installed on pitless adapters within the wells and an underdrain system beneath the digesters. The existing dewatering well pumps are currently inoperable, and the wells appear to be significantly impacted by biofouling. If the Contractor causes damage to the existing dewatering wells, the Contractor shall be responsible for decommissioning the damaged well(s) in accordance with Chapter 173-160 WAC.

D. The Contractor shall be responsible for providing dewatering design and all materials, equipment, labor, and services necessary for operation of the dewatering system, disposal of IDW, disposal of water generated by dewatering operation, and erosion control. Contractor shall also be responsible for obtaining applicable discharge permits, pre-treatment permits, or other applicable discharge authorization and compliance with such permits or authorizations.

E. Section includes:

1. Dewatering systems.
2. System operation and maintenance.
3. IDW disposal.

F. Related Sections:

1. Section 31 23 20 Permanent Dewatering Wells
2. Section 31 23 21 Monitoring Well

1.2 SUBMITTALS

A. Dewatering Plan, including:

1. PE-approved and stamped drawings and design data showing the method to be employed in dewatering the vicinity surrounding the digesters 30 days before commencement of dewatering activities.

2. Descriptions and drawings and design data of proposed groundwater control and lowering facilities including, but not limited to: location, depth, and size of wells and header equipment; size and location of discharge lines; capacities of pumps and standby units; flow meters; and detailed description of dewatering methods to be employed to convey pumped groundwater from the Project Site to an acceptable disposal location(s); standby equipment and power supply; pollution control and treatment facilities; discharge locations to be utilized; and provisions for immediate temporary water supply as required by this Section.

3. A monitoring plan for monitoring pumping rates and groundwater levels to assess of the efficacy of the installed dewatering system during dewatering activities.

4. Documentation of electrical power needs (e.g., phase, voltage, etc.) for the dewatering system and details of electrical power cables and other electrical equipment to be provided by Contractor.

5. A written schedule and sequence of construction and monitoring activities associated with the dewatering system.

6. A written contingency plan detailing control procedures to be adopted if dewatering problems arise.

7. Capacity of all pumps, prime movers, and standby equipment.

8. Design calculations proving adequacy of system and its associated equipment. The dewatering system shall be designed using accepted and professional methods of design and engineering consistent with the best modern practice. The dewatering system shall include wells, wellpoints, pumping systems, discharge piping, discharge water treatment, and other equipment, appurtenances, and related earthwork necessary to perform the complete dewatering function.

9. Plan to be reviewed by the Engineer prior to the beginning of construction activities requiring dewatering. Review by the Engineer of the design shall not be construed as a detailed analysis of the adequacy of the dewatering system, nor shall any

provisions of the above requirements be construed as relieving the Contractor of its overall responsibility and liability for the work.

B. Descriptions and references for 3 groundwater dewatering projects with similar scope, size, and soil conditions to the Project completed within the past 5 years.

C. Copies of all applicable permits required to complete the work described in this section including water discharge.

D. A Spoils and Water Handling, Testing, Treatment and Disposal Plan, which shall address the requirement of Section 3.2 herein and the following. Spoils Handling, Testing, Treatment and Disposal Plan shall be submitted to the Engineer for review and approval.

1. Means and methods to handle and dispose of IDW generated during installation and development of the dewatering and monitoring wells and extracted groundwater generated during testing and operation of the dewatering system.

2. Descriptions of the composition of soils expected to be excavated on site, including a summary of potential contamination that may be encountered.

3. Mapped locations of any proposed temporary spoil pile locations.

4. Methods for preventing IDW spoil materials from eroding or leaching from temporary stockpiles.

5. Description of the expected quantity of groundwater generated during well development and dewatering activities. Pre-treatment of groundwater is required prior to discharge.

6. Description of the water quality testing and treatment to appropriate disposal criteria or achieve discharge permit requirements for turbidity, sand content, total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylenes and other applicable constituents required in applicable discharge permits or authorizations. Treatment will be performed with a Contractor supplied pre-treatment system designed for contaminants of concern.

7. A testing and sampling plan and schedule for determination of turbidity, sand content and petroleum hydrocarbons and associated contaminants, and other applicable constituents required in applicable discharge permits or authorizations to comply with applicable discharge permit and discharge limit requirements.

1.3 DEFINITIONS

A. Dewatering includes the following:

1. Lowering of groundwater table and intercepting horizontal water seepage to approximate elevation 130 ft NGVD29 or lower throughout the footprint of the digester structure – as measured in the existing monitoring well, new monitoring well, and existing dewatering wells – in order to reduce hydrostatic pressures to reduce the risk of uplift of and/or damage to the digester structure and to minimize inflow of groundwater to the digesters via the existing pressure relief valves. In order for dewatered conditions to be achieved, and accounting for the groundwater "cone of depression" surrounding each pumped dewatering well, the water level in each pumped dewatering well may need to be lowered to an approximate elevation of 124 ft NGVD29, or near the bottom of the gravel blanket fill surrounding the digester structure.

2. Disposing of dewatered groundwater in accordance with the Spoils Handling and Disposal plan and plant's discharge permit.

B. IDW includes drilling solids, cuttings, and/or slurry, as well as groundwater purged during well development, testing, and dewatering.

1.4 QUALITY CONTROL

A. The Contractor work requirements shall include:

1. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

2. Retaining an independent Professional Engineer (PE) licensed in the State of Washington with dewatering experience to approve and stamp the Contractor's dewatering plan.

3. Secure and comply with all necessary permits to complete the requirements of this Section.

4. Control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

5. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop.

a. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the Contractor.

b. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

1.5 QUALIFICATIONS

A. The Contractor(s) performing the work of this section shall have a minimum of 5 years of documented experience and responsibility for the design, installation, operation, and maintenance of dewatering systems and with lowering groundwater levels greater than 25 ft below ground surface in soil conditions and geologic setting similar to those encountered at the Project.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Dewatering, where required, may include the use of equipment provided by the Contractor, potentially including but not limited to wells, well points, temporary submersible and/or sump pumps, temporary pipelines for water disposal, groundwater exclusion installations, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the jobsite.

B. Discharge of groundwater generated during dewatering well and monitoring well installation and development, during testing of the dewatering system and during dewatering operations will require treatment for sand content, turbidity and potential contamination. The Contractor shall furnish all equipment necessary to treat generated groundwater in accordance with the Spoils and Water Handling, Testing, Treatment and Disposal Plan and meet Construction General Permit and any other discharge requirements.

PART 3 EXECUTION

3.1 DEWATERING

A. Provide all equipment necessary for dewatering.

1. Have on hand, at all times, sufficient pumping equipment and machinery, including electrical power generation for operating pumps, in good working condition.

2. Provide all labor, materials, and equipment necessary to dewater the formation surrounding the digester structure, in accordance with the requirements of the Contract Documents. Have available, at all times, competent workers for the operation of the pumping equipment.

3. Provide all labor, materials, and equipment necessary to treat groundwater for turbidity and potential groundwater contaminants such that treated water is in compliance with the plant's discharge permit.

4. Adequate standby equipment shall be kept available at all times, installed and available for immediate operation, as may be required to ensure efficient dewatering and maintenance of dewatering operation in the event that all or any part of the dewatering system may become inadequate or fail or during power failure.

B. Dewatering of groundwater in the formation surrounding the digester structure shall be established at least ten (10) days prior to the commencement of digester drainage and maintenance activities and dewatered conditions shall be continuous and maintained throughout the duration of the digester maintenance period until digesters are fully repaired and filled with sludge for normal operations. The digester maintenance period is expected to be approximately four (4) months.

C. Site Grading:

1. At all times and if applicable, site grading shall promote drainage away from the digester structure.

D. Lower and maintain the groundwater level to elevation 130 feet NGVD29 or lower – as measured in the existing and new monitoring wells and existing dewatering wells (if unpumped) – until digester maintenance is complete and both digesters are refilled and returned to service.

E. Dewatering shall at all times be conducted in such a matter as to preserve the undisturbed bearing capacity of the foundation soils below the digesters. If foundation soils are disturbed or loosened by uncontrolled flow of water, the affected areas shall be remediated at no cost to the Owner.

F. Uplift of the digester structure shall be prevented and inflow of groundwater to the digesters via the existing pressure relief valves shall be minimized by maintaining a positive and continuous removal of groundwater to achieve and maintain dewatered conditions. The Contractor shall be fully responsible and liable for all damages which may result from failure to adequately keep the formation surrounding the digesters dewatered.

G. If well points or wells, in addition to the 4 permanent wells described in Specifications section 31 23 20, are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or adequately developed to prevent extended pumping of fine sands or silts from the subsurface. A continual check of sand concentrations in the dewatering discharge water shall be maintained and reported to

the Engineer to ensure that the subsurface soil is not being removed by the dewatering operation.

H. Dispose of groundwater from the work in a suitable manner without damage to environment, adjacent property, or the plant operations and/or construction work. Water disposal shall comply with the plant's NPDES permit, Construction General Permit and any other discharge permit. Dewatering water meeting the stipulations of the permit may be disposed of at the discharge location identified on the Contract Drawings Sheet C-1.

I. The return of groundwater to its static (i.e., pre dewatering) level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

J. Dewatering of trenches and other excavations employed by the Contractor shall be considered as incidental to the construction of the work and all costs thereof shall be included in the various contract prices in the bid forms.

3.2 INVESTIGATION DERIVED WASTE AND PURGED GROUNDWATER DISPOSAL

A. Investigation derived waste (IDW; drilling solids, cuttings, and/or slurry, as well as groundwater purged during well development, and testing) and purged groundwater generated during dewatering startup and operation shall be managed by the Contractor as follows:

1. Solids:

a. Drilling solids, cuttings, and/or slurry generated during the drilling process shall be field screened for evidence of petroleum hydrocarbon contamination, drummed (or otherwise securely stored) temporarily onsite, and disposed of in accordance with the Model Toxics Control Act (MTCA) regulations and other application regulations (e.g., Washington Dangerous Waste regulations).

b. The Contractor shall perform field screening and coordinate environmental laboratory testing and disposal of IDW in accordance with WA State Department of Ecology's Guidelines for Remediation of Petroleum Contaminated Sites (Table 12.1 Guidelines for Reuse of Petroleum-Contaminated Soil and Table 12.2 Description and Best Management Practices for Soil Categories in Table 12.1), MTCA and other applicable environmental regulations. Securely contained IDW may be stockpiled on-site during dewatering well construction.

c. Field screening procedures shall consist of the visual screening and sheen test methods of Ecology's Guidelines for Remediation of Petroleum Contaminated

Sites (Section 5.3). A photo-ionization detector (or other recommended equipment within the cited Guidelines) may also be used.

d. Analytical testing of soil, prior to disposal at a permitted soil disposal facility, shall be completed at a Washington State-certified laboratory and shall meet the requirements of the Contractor-selected disposal facility and shall at a minimum consist of the following analytes and methods:

1) Gasoline-range petroleum hydrocarbons (TPH-G) by Ecology-approved method Northwest gasoline-range total petroleum hydrocarbons extended (NWTPH-Gx)

2) Diesel- and oil-range petroleum hydrocarbons (TPH-D and TPH-O) by Ecology-approved method Northwest diesel-range total petroleum hydrocarbons extended (NWTPH-Dx)

3) Benzene, toluene, ethylbenzene, and xylene (BTEX) by US Environmental Protection Agency (EPA) Method 8260

4) Resource Conservation and Recovery Act (RCRA) 8 metals by EPA Method 6020/7470.

2. Groundwater:

a. Groundwater may be disposed of at the discharge location designated on the plans, in accordance with the plant's NPDES permit, the Construction General Permit and any other discharge permit(s) and/or authorization limits for the following parameters:

1) Turbidity, as measured by a calibrated electronic turbidity meter provided by the Contractor

2) Sand content, as measured by Imhoff cone provided by the Contractor

b. Groundwater may be disposed of at the discharge location designated on the plans, in accordance with the Construction General Permit, the plant's NPDES permit and any other discharge permit(s) and/or authorization limits for the following environmental contaminants, as determined by a Washington-accredited analytical laboratory by the specified methods:

1) Total petroleum hydrocarbons (TPH) – Gasoline Range using method NWTPH-Gx

2) TPH – Diesel Range and Heavy Oil Range, using method NWTPH-Dx

3) BTEX using EPA Method 8260

4) Other constituents and associated analytical methods as required in discharge permits or authorizations.

c. The Contractor shall sample and test the purged groundwater in accordance with the Spoils and Water Handling, Testing, Treatment and Disposal Plan, as described in Paragraph 1.2(D) above.

d. Purged groundwater above the maximum allowable concentrations for turbidity and/or sand content shall be treated to below the maximum allowable concentrations by the Contractor using above ground temporary settlement tanks provided by the Contractor, or equivalent. The Contractor shall provide and utilize as necessary above ground settling (e.g., Baker or equivalent) tanks to manage the discharge water to reduce turbidity and sand concentration in the discharge water to below the allowed levels. Settling tanks shall be properly equipped, baffled, and have adequate capacity to meet the well development needs.

e. Purged groundwater above the maximum allowable concentration for environmental contaminants shall be treated to below the maximum allowable concentrations by the Contractor using an appropriate pre-treatment system provided by the Contractor (e.g., granular activated carbon unit or equivalent).

3.3 CORRECTIVE ACTION

A. If dewatering requirements are not satisfied due to inadequate or improper installation and/or development of the new permanent dewatering wells, the Contractor shall remediate the dewatering system at no additional cost to the Owner.

B. If inadequacy or failure of the dewatering system result in loosening of the foundation strata or damage to foundations or structures, the Contractor shall perform work necessary for reinstatement of foundation soil and repair to damaged foundations and structures at no additional cost to the Owner.

3.4 DAMAGES

A. Immediately repair damages to adjacent facilities caused by dewatering system installation and/or operations.

3.5 REMOVAL

A. Contractor shall obtain written approval from the Engineer before discontinuing operation of any portion of the installed dewatering system.

END OF SECTION

SECTION 31 23 20 –DEWATERING WELLS

PART 1 GENERAL

1.1 SUMMARY

A. The objective of the work described in this Specifications Section is to construct and test four (4) permanent dewatering wells and any additional wells or dewatering devices the Contractor deems necessary to complete the work. It is anticipated that the permanent dewatering wells will each be constructed to a bottom of well elevation of 114 feet NGVD29 (approximately 40 feet (ft) below ground surface (bgs)).

B. The construction of each permanent dewatering well is intended to place the bottom of the well screen at the base of the gravel blanket fill material surrounding the digesters (approximately elevation 124 ft NGVD29) and include a 10-ft blank casing sump below the well screen. Final dewatering well construction details shall be determined in the field based on the soil and groundwater conditions encountered during drilling activities. The work for each permanent dewatering well includes:

1. Drilling of a borehole of a diameter suitable for proper installation of a 10-inch diameter casing and 10-inch pipe size stainless steel continuous wire-wrap screen and development as a natural filter pack well. The maximum diameter of the borehole shall be 16 inches. The boreholes shall be drilled with a drilling method that minimizes borehole clogging or “borehole skin” effects and that will allow for optimal hydraulic connection between the well and the formation material following well development. The use of drilling slurry may adversely affect well performance and is at the risk of the Contractor.

2. Setting well casing and screen at the proper elevation

3. Constructing the surface seal in accordance with Chapter 173-160 WAC

4. Constructing wellhead completion features in accordance with the Plans

5. Developing dewatering well following well completion.

6. Dewatering well test pumping.

C. The work also includes:

1. Site restoration
2. Filing of state and local drilling reports
3. Conveying construction water to the drill sites, if necessary
4. Disposing of water, cuttings, and development fluids
5. Providing continuous safety and protective measures

6. Performing other work incidental to the Project.

D. Work location and sequence: the first four dewatering wells are to be completed at the locations shown in the Plans.

E. Personnel and equipment:

1. The Contractor(s) performing the work of this section shall have a minimum of 5 years of documented experience and responsibility for the design and installation, operation, and maintenance of dewatering systems and with lowering groundwater levels greater than 25 ft below ground surface in soil conditions and geologic setting similar to those encountered at the Project.

2. The Contractor shall employ only competent workmen for the execution of the work and all such work shall be performed under the direct supervision of experienced and licensed drillers.

3. The Contractor shall furnish drilling equipment complete with all necessary tools and appurtenances of capacity in excess of that required to complete the work described in this section, including equipment with capacity to drill to a minimum of 50 ft depth for installation of a 10-inch well. All equipment to be used for the performance of the work shall comply with all Federal, State, and local safety regulations.

4. Down-hole drilling equipment shall be steam cleaned prior to use on the Project.

F. Licenses, permits and reports: The Contractor, or subcontracted drilling contractor, shall have filed a Notice of Intent to drill form and shall possess a valid State of Washington “Water Well” contractor's license. The Contractor shall pay all costs to procure all fees, permits and licenses related to the dewatering wells construction including, but not limited to, drill cuttings, development water and test pumped water disposal. Contractor shall have in possession, at the job site, all required permits. Contractor shall comply with all State and local laws, ordinances, and rules and regulations relating to the performance of the work and shall file all reports as required by the State and local agencies in connection with the dewatering wells construction. Copies of all reports and the original permits and licenses shall be submitted to the Engineer.

1.2 RELATED SECTIONS:

1. Section 31 23 19 Dewatering
2. Section 31 23 21 Monitoring Well

1.3 REFERENCES

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed references, the requirements of this section shall prevail.

1. State of Washington Administrative Code (WAC) Chapter 173-160 – Minimum Standards for Construction and Maintenance of Wells

1.4 SUBMITTALS

A. Make, model, and capacity of drill rig

B. Copies of all required reports, permits, and licenses

C. Equipment disinfection documentation

D. Borehole lithologic drilling log

E. Product data for the blank well casing and stainless steel well screen to show compliance with both the physical and chemical properties of the casing and well screen

F. Surface seal material design

G. A flowmeter calibration certificate prior to the commencement of development and pumping test pumping

H. Copies of all turbidity readings, well development, well depth measurements, water level measurements, and pumping test records.

1.5 DEFINITIONS

A. Natural filter pack: well installation procedure by which the well casing and screen is installed in direct contact with the formation material and the gravel pack surrounding the well screen is developed by removing the fines content from the formation through well development.

B. Stainless steel: Type 304 or higher quality stainless steel material

C. Well development: the removal of drilling material and fine material from the formation immediately surrounding the well screen to create a highly porous gravel pack hydraulically connecting the well screen to the surrounding formation.

PART 2 PRODUCTS

2.1 GENERAL

A. As specified in this Specifications Section and the related sections listed in paragraph 1.2

B. Provide a drilling rig(s) suitable for drilling, installation, development, and testing of the dewatering wells in accordance with this section. Provide tools, accessories, power, lighting, water, other equipment, materials, and experienced personnel necessary to conduct efficient drilling operations at the site.

2.2 DRILL RIG AND PIPE

A. The drilling unit and associated equipment for the borehole shall have a minimum drilling capacity of 50 ft

B. Maintain a record showing any addition and amount of water or other additives required during drilling. Show the depths at which such products are required in the daily drilling reports.

2.3 BLANK WELL CASING

A. Provide 10-inch nominal diameter low carbon steel casing. Well casing shall be standard American National Standards Institute (ANSI) Schedule 40.

B. Furnish equipment and personnel for welding casing joints and casing-to-screen connections.

C. All casing material shall be new.

2.4 WELL SCREEN

A. Provide 10-inch pipe size stainless steel (Type 304) continuous wire wrap well screen.

B. Well screen slot openings shall be designed by the Contractor to limit turbidity of the pumped water and to minimize well losses during pumping. The proposed well screen slot opening are to be confirmed by the Engineer based on the results of grain size analyses performed on formation samples from within the screen depth interval of each well.

C. All well screen material shall be new.

2.5 BOTTOM CAP

A. The bottom of the casing shall be closed with a 10-inch welded cap made from the same material as the blank casing.

2.6 SURFACE WELLHEAD COMPLETION

A. The surface wellhead completion of the dewatering well shall be completed as shown in the Plans.

B. As-built survey of the wellhead surface completion shall be provided following construction of the well.

1. Vertical datum is NGVD29.

2. Horizontal datum is Washington Coordinate System Grid, North Zone, North American Datum of 1983, 1991 Adjustment (NAD 83/91).

2.7 NATURAL FILTER PACK

A. The filter pack surrounding the well screens shall be naturally developed from the existing material (gravel fill) within which the screen is placed.

2.8 BENTONITE PELLETS

A. Bentonite pellets shall be size-graded clay pellets which exhibit a high swelling capability. The pellets shall be Baroid's 3/8-inch Holeplug or equivalent.

2.9 CEMENT-BENTONITE GROUT SURFACE SEAL

A. The material used for the surface seal shall comply with well sealing material requirements of WAC 173-160-221.

B. Cement used shall conform to ASTM C 150, Type I.

2.10 WELLHEAD MONUMENT SURFACE PAD CONCRETE

A. Concrete shall consist of Portland cement and aggregate mixed at a ratio of at least six ninety-four (94) pound sacks of Portland cement per cubic yard of aggregate. In no case shall the size of the aggregate be greater than one-fifth the radial thickness of the annular seal. Water shall be added to concrete mixes to attain proper consistency for placement, setting, and curing.

B. Cement shall conform to ASTM C 150, Type I.

2.11 DISCHARGE WATER SETTLING TANKS

A. Provide adequate temporary storage capacity for settlement of sand and turbidity from well discharge water at each dewatering well during well development and chemical analytical testing of generated water for potential petroleum hydrocarbon contamination. Anticipated pumping rates from each well during development and testing are up to 600 gallons per minute.

2.12 DISCHARGE LINE AND METER

A. Provide temporary discharge piping required to convey pumped well development and well testing water to the designated disposal area identified in Specifications Section 31 23 19. Each discharge line shall include a throttling valve and an in-line flow meter with totalizer and instantaneous read capability. The Contractor shall be responsible for the accuracy of the flow measurements and shall provide a calibration certificate for the flowmeter utilized. The flow meter shall have an accuracy of +/-2 percent and shall have been calibrated within three (3) months prior to Project use.

2.13 TEMPORARY DEWATERING PUMPS

A. Provide a submersible turbine (or equivalent) pump for temporary installation in each new permanent dewatering well for well step-rate testing and well development. The temporary pump furnished shall be capable of pumping up to 600 gallons per minute under total dynamic head conditions based on anticipated drawdown levels as well as the Contractor-designed discharge line length, size, and material. The temporary pump shall be set near the bottom of each well, with the pump intake below the well screen and within the blank well casing sump. The Contractor is responsible for installing any appurtenances (e.g., pump shroud) on the pump to protect the pump motor from overheating and to allow optimal performance of the pump. The Contractor shall provide a flow control device on the discharge of the temporary pump so that the discharge can be reduced to as low as 50 gallons per minute. Additional temporary pumps will be supplied by the Contractor if more than four wells or dewatering devices are necessary to complete the work at no additional cost to the Owner.

2.14 WATER LEVEL METERS

A. Provide a functioning and accurate electronic water level depth meter capable of indicating changes in water levels to the nearest 0.01 ft. Provide assistance to the Engineer for supplemental water level measurements when required.

2.15 PERSONNEL

A. Provide qualified personnel on a 24-hour basis during long-term (e.g., 24-hour or similar) pumping tests to operate the pumping test equipment.

PART 3 EXECUTION

3.1 GENERAL

A. All work shall be performed as specified and in accordance with applicable parts of Chapter 173-160 WAC, “Minimum Standards for Construction and Maintenance of Wells”. Should the Contractor discover any discrepancies between the Specifications

and State requirements, the Contractor shall bring them to the attention of the Engineer immediately.

3.2 WATER FOR DRILLING

A. The Contractor shall pay for and shall construct all facilities necessary to furnish water for use during well drilling, construction, and completion. Water may be made available from the plant fire hydrant system. Contractor needs to coordinate with North Perry Water District to obtain temporary meter for fire hydrant water. 3W process water (disinfected plant effluent) is available at the plant in unlimited quantity at no cost. Contractor needs to coordinate with the Owner if 3W is needed.

3.3 INVESTIGATION DERIVED WASTE DISPOSAL

A. Investigation derived waste (IDW; including drilling solids, cuttings, and/or slurry, as well as groundwater purged during well development, testing, and dewatering) shall be managed in accordance with, and as detailed in, Specifications Section 31 23 19.

3.4 BOREHOLE DRILLING

A. Drill a borehole for each permanent dewatering well suitable for installation of 10-inch nominal well casing and 10-inch pipe size well screen, plus a suitable surface seal in accordance with Chapter 173-160 WAC. The surface seal must extend to at least 10 ft from ground surface and to within 3 ft of the well screen and be at least 2 inches thick around the well casing (or at least 4 inches in diameter larger than the well casing). Care shall be taken to prevent sealing material from entering the well screen. The total depth of the well is anticipated to be 40 ft below ground surface (or 10 ft below the base of the gravel blanket fill material) but may be increased or decreased at the direction of the Engineer. Drill additional borings for additional temporary dewatering wells as necessary to complete the work.

3.5 FORMATION SAMPLING

A. Take two representative formation samples at each interval of 5 feet and at each change in formation. Label and preserve each sample in water-tight sealable sample containers. Clearly mark each container with bore hole designation, date, time, and depth interval represented. Store the samples in a manner that prevents breakage or loss.

B. Prepare a complete lithologic drilling log and submit to the Engineer within 24 hours of the end of borehole drilling.

3.6 CASING AND WELL SCREEN INSTALLATION

A. When the drilling has been completed, install the blank casing and well screen, with appropriate welded connections. Do not drive the casing and screen into place in the borehole.

3.7 ASSEMBLY INSTALLATION

A. Suspend the well casing and screen within the drill casing and in tension from the surface. The bottom of the casing shall be at a sufficient distance above the bottom of the bore hole as to ensure that none of the casing string will be supported from the bottom of the hole. Add water to the well screen to reduce pressure differentials between the formation and screen. Pull back drill casing to expose well screen and casing to the formation. If drill casing is more than two (2) inches larger in diameter than the well screen and casing diameter, fill the annular space with washed (fines removed) pea gravel as a formation stabilizer before and during pullback of drill casing.

B. If for any reason the casing and screen cannot be placed in the correct position, construct another dewatering well at an adjacent location selected by the Engineer and complete this dewatering well in accordance with the specifications and Plans at no additional cost to the Owner. Seal the abandoned borehole according to the Chapter 173-160 WAC.

3.8 CEMENT-BENTONITE GROUT SURFACE SEAL

A. When installation of the well casing and screen is complete, fill the annular space between the casing and the outer surface seal borehole with the specified surface seal material using a temporary tremie pipe. The tremie pipe shall be initially located 5 feet from the bottom of the annular space to be cemented. Once the bottom of the tremie pipe is covered with surface seal material, the tremie pipe shall be removed in a manner that allows the bottom of the tremie pipe to remain covered throughout seal placement. Do not allow surface seal material to free fall into the well annulus. Leave the top of the surface seal at the depth below ground surface as shown in the Plans.

B. The surface seal shall extend to a depth that is 3 ft above the top of installed well screen. If necessary, the annular space between the top of the well screen and the bottom of the surface seal shall be filled with at least 2 ft of washed pea gravel and 1 ft of bentonite pellets.

C. Record the volume of cement used. The volume shall not be less than the calculated volume of the annular space between the wall of the surface seal borehole and the casing. Significant differences between estimated and actual volume of cement installed may be grounds for dewatering well rejection.

3.9 DISCHARGE WATER MANAGEMENT

A. The Contractor shall manage discharge water as IDW in accordance with, and as detailed in, Specifications Section 31 23 19.

3.10 WELL DEVELOPMENT

A. No earlier than 24 hours after surface seal placement, the dewatering wells shall be developed by the surge and bail method followed by overpumping. The objective of well development is to remove any fine particulates smeared along the inside face of the borehole wall during drilling and to create a high permeability gravel filter pack surrounding the well screen. As such, production and removal of appreciable amounts of fine particulates from the well during development should be anticipated.

B. The surge and bail method shall be performed using a surge block (or swab) constructed with firm rubber (or similar material) disc(s) of a diameter that fits snugly, but allows vertical movement, within the inside diameter of the well screen. Surging shall be conducted by oscillatory movement of the surge block (or swab) up and down within the well casing/screen within a 2 to 3 ft interval of the screen at a time. Surging shall begin first within the interval of the casing just above the well screen, then continue throughout the length of the screen, from top to bottom, one interval at a time. Each interval shall be surged (or swabbed) for 10 minutes at a time. The amount of material produced from surging each interval (or series of intervals) shall be measured by sounding tape (or other similar depth sounding methods). Multiple passes through the entire length of the screen are expected. Between each pass (or more frequently, if necessary), the material produced into the well shall be removed by bailing or pumping (or similar sediment removal method). Surging shall be continued until the material produced from the full length of the screen is less than 0.25 inches, or as determined by the Engineer.

C. Following the surge and bail development, each permanent dewatering well shall be further developed by overpumping. For overpumping, a temporary pump shall be lowered into the well, placed below the well screen, and operated at a rate that draws the water level in the well down to 2 ft above the top of the screen, starting at 50 gallons per minute and gradually increasing up to a maximum rate of 600 gallons per minute as the discharge water clears. Every 15 to 30 minutes, stop the pump and allow the water in the pump column to flow back through the pump bowls and into the well. This procedure, with increasing pumping rates, shall be repeated as development of the dewatering well continues and shall be done in a manner satisfactory to the Engineer. Continue development of each dewatering well until the well produces groundwater that is clear and clean, with turbidity readings of 50 NTU or less, at a rate determined by the Engineer.

3.11 WELL INSTALLATION AND TESTING

A. After well development is complete, perform an initial step-rate test in each permanent dewatering well, as described below, using a Contractor-supplied temporary pump.

B. Following the installation, development, and step-rate testing of all four permanent dewatering wells, as well as the installation of the monitoring well (in accordance with Specifications Section 31 23 21), install a contractor-supplied temporary pump in each of the four permanent dewatering wells and perform an initial 24-hour dewatering pumping test to assess the effectiveness of the permanent dewatering wells at achieving dewatered conditions and the appropriateness of the dewatering well design. If the initial dewatering pumping test indicates that the permanent dewatering wells may sufficiently lower groundwater in the vicinity of the digesters to achieve dewatered conditions, as defined in Specifications Section 31 23 19 and as determined by the Engineer, the Contractor shall perform groundwater dewatering in accordance with Specifications Section 31 23 19. If the initial dewatering pumping test indicates that the 4 permanent wells cannot achieve dewatered conditions, the Contractor can install additional dewatering wells at their discretion to complete the work at no additional cost to the Owner.

C. Schedule all pumping tests sufficiently in advance to allow for the Engineer to be onsite throughout each testing period.

3.12 STEP-RATE PUMPING TEST

A. Each step-rate pumping test shall be completed on one dewatering well at a time.

B. Operate the temporary pump initially at a rate of approximately 100 gallons per minute (or as low as 50 gallons per minute). The pumping rate will then be increased by 100 (or 50) gallon per minute increments at uniform 30-minute intervals until the well has been tested at up to approximately 500 gallons per minute or lower, as determined by the Engineer.

C. During the step-rate test, the Contractor shall record the time, water levels (prior to and during pumping), and discharge rates. See paragraph 3.14 of this section for water level recording instructions.

3.13 DEWATERING PUMPING TEST

A. A 24-hour continuous constant-rate dewatering pumping test using the four constructed permanent dewatering wells, each with a Contractor-supplied temporary pump, shall commence after the completion of the step-rate testing in all four wells. All permanent dewatering wells shall be pumped at a constant rate throughout the 24-hour testing period. The rate of pumping from each well will be determined from the

results of the step-rate test in each well and determined in consultation with the Engineer. The pumping rate from each well is anticipated to be between 50 and 500 gallons per minute. The Contractor shall ensure that the pumping rate selected remains constant throughout the test. The test duration shall be 24 hours.

B. Prior to and throughout the duration of the dewatering pumping test, the Contractor shall measure and record water levels in each of the pumped wells, the new monitoring well, the existing monitoring well, and the two existing (old) dewatering wells. When the test is completed and the pump stopped, the Contractor shall measure recovery of the water level in all measured wells for a period of approximately 8 hours. See Part 3.14 of this section for recording instructions. The Contractor shall coordinate with the Engineer for adequate water level measurements.

C. During the 24-hour dewatering test, if the rate of water pumped falls below or above the designated flow by 5 percent or more for a period of greater than 15 minutes, discontinue the test until the water level in the wells recovers and stabilizes. Repeat the test. No payment will be made for the incomplete test.

3.14 PUMPING AND RECOVERY TEST RECORDS

A. For the step-rate pumping test performed on each new permanent dewatering well, the Contractor shall measure and record the depth to water in the pumped well at a minimum. For the constant rate dewatering pumping test and recovery period, the Contractor shall measure and record the depth to water in each of the pumped wells, the monitoring wells (new and existing), and old dewatering wells (DW-SW and DW-SE). Depth to water measurements for all tests shall be recorded on forms to be provided by the Engineer and according to the following schedule:

1. Measure and record depth to static water level.

2. Turn pump on as requested by the Engineer, at time (t) = 0.

3. Accurately measure and record depth to water in the pumping well and at each change in flow rate as follows:

    a. Each minute, from t = 1 to t = 12
    b. Each 2 minutes, from t = 14 to t = 20
    c. Each 5 minutes, from t = 25 to t = 50
    d. Each 10 minutes, from t = 60 to t = 120
    e. Each 15 minutes, from t = 135 to t = 1440.

B. In case of failure of the pump operation for a period greater than one percent of the elapsed pumping time from t = 0, the test shall be suspended until the static water level again has been attained. Should the test be aborted as a result of a deficiency, malfunction, or other reason on the part of the Contractor's equipment or personnel,

all time consumed in waiting for complete water level recovery and in resuming the pump test to the point where it was aborted or suspended shall be at no cost to the Owner.

3.15 DEVELOPMENT AND PUMPING TEST RECORDS

A. Provide certified copies of all development and test pumping records to the Engineer.

3.16 FINAL CLEANING

A. Following the digester maintenance period and cessation of groundwater dewatering, the Contractor shall be responsible for cleaning up the site, including removal of all temporary piping and temporary pumps and fittings, so that the site has been restored to as near the original grade and condition as possible. Install the dewatering well bolted capping plates on each dewatering wellhead. The Owner reserves the right to accept or reject any restoration.

END OF SECTION

SECTION 31 23 21 – MONITORING WELL

PART 1 GENERAL

1.1 SUMMARY

A. Scope: The objective of the work described in this specification section is to construct a new monitoring well to be used to measure groundwater levels within the gravel fill surrounding the digester structure. It is anticipated that the monitoring well will be constructed to a depth of approximately 30 feet (to the base of the gravel fill) with 2-inch-diameter blank and slotted PVC casing. Final monitoring well construction details will be determined in the field and be based on the geologic and groundwater conditions encountered during drilling activities. The work includes:

1. The drilling of a borehole to a depth corresponding to the base of the gravel fill surrounding the digester structure, anticipated to be approximately 30 feet bgs, and collecting formation samples. The borehole shall be drilled with hollow stem auger (HSA) or equivalent drilling equipment (except that the drilling unit must not require drilling mud for normal operation) and shall be 6-inches-diameter, minimum, in order to accept a 2-inch-diameter PVC casing string and to provide an annular space of appropriate thickness to receive filter and sealing material.

2. Setting blank and slotted casing, gravel packing, installing the cement grout seal, and monitoring well development.

3. Construction of wellhead completion features.

4. The work also includes:

    a. Site restoration
    b. Providing continuous safety and protective measures
    c. Filing of state and local drilling reports
    d. Conveying construction water to the drill site, if necessary
    e. Disposing of water, cuttings, and development fluids
    f. Performing other work incidental to the Project.

B. Project location: The new monitoring well is to be completed at the location shown in the Plans, immediately west of the digester structure, to be located within the gravel fill surrounding the digester structure.

C. Personnel and equipment:

1. The Contractor(s) performing the work of this section shall have a minimum of 5 years of documented experience and responsibility for the design and installation groundwater monitoring wells in the state of Washington.

2. The Contractor shall employ only competent workmen for the execution of the work and all such work shall be performed under the direct supervision of experienced drillers.

3. The Contractor shall furnish drilling equipment complete with all necessary tools and appurtenances of adequate capacity to complete the work. All equipment to be used for the performance of the work shall comply with all Federal, State, and local safety regulations.

4. Down-hole drilling equipment shall be steam cleaned prior to use on the Project.

D. Licenses, Permits and Reports: The drilling contractor shall have filed a Notice of Intent to drill form and shall possess a valid State of Washington "Resource Protection" contractor's license. The Contractor shall pay all costs to procure all fees, permits and licenses related to the monitoring well construction including, but not limited to, drilling permits and fees associated with drill cuttings and development water disposal. Contractor shall have in possession, at the job site, all required permits. Contractor shall comply with all State and local laws, ordinances, and rules and regulations relating to the performance of the work and shall file all reports as required by the State and local agencies in connection with the monitoring well construction. Copies of all reports and the original permits and licenses shall be submitted to the Engineer.

1.2 RELATED SECTIONS:

1. Section 31 23 19 Dewatering
2. Section 31 23 20 Dewatering Wells

1.3 REFERENCES

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed references, the requirements of this section shall prevail.

1. State of Washington Administrative Code (WAC) Chapter 173-160 – Minimum Standards for Construction and Maintenance of Wells

2. Ecology Guidance for Remediation of Petroleum Contaminated Sites. Publication No. 10-09-057. Washington State Department of Ecology. Revised June. Available at <https://fortress.wa.gov/ecy/publications/documents/1009057.pdf>.

3. Revised Code of Washington Chapter 79A.305 – Model Toxics Control Act.

1.4 SUBMITTALS

A. Make, model and capacity of drilling rig.

B. Copies of all reports, permits and licenses.

C. Equipment disinfection documentation.

D. Fluids and cuttings disposal plans.

E. Borehole lithologic drilling log.

F. Product data for the blank and slotted casing to show compliance with both the physical and chemical properties of the PVC.

G. A gradation description, sample, and certified sieve analysis of filter sand pack materials.

H. Surface seal mix design.

I. At-grade wellhead concrete-encased monument and security cap details.

J. Locking well cap details.

PART 2 PRODUCTS

2.1 GENERAL

A. As specified in this specification section and the related sections listed in paragraph 1.2.

B. Provide a complete conventional HSA or equivalent drilling unit, except that the drilling unit must not require drilling mud for normal operation. Provide tools, accessories, power, lighting, water, other equipment, materials, and experienced personnel necessary to conduct efficient drilling operations at the site.

2.2 DRILL RIG

A. The drilling unit and associated equipment for the bore hole shall have a minimum drilling capacity of 50 feet and be able to accommodate the expected soil conditions.

B. Maintain a record showing any addition and amount of water or other additives required during drilling. Show the depths at which such products are required in the daily drilling reports.

2.3 BLANK CASING, WELL SCREEN, AND CENTRALIZERS

A. Provide 2-inch, Schedule 40 PVC, ASTM F480, blank casing and well screen.

1. Casing and screen connections shall be flush-threaded conforming to the requirements of ASTM F480.

2. Casing and screen flush-threaded connections shall be provided with “O” rings.

3. Casing and screen shall make up in manufacturer-stated lengths, shoulder to shoulder, when assembled.

4. Casing shall be packaged in boxes to maintain product cleanliness and must be clearly labeled with the manufacturer name and contents.

5. The screen shall be 10 ft in length and the screen perforations shall be machine-cut horizontal slots with openings of 0.010 inches.

6. All blank casing and well screen material shall be new.

B. Furnish adjustable stainless steel casing centralizers that will eliminate off center casing and screen placement during installation. Centralizers shall be equipped with worm gear or equivalent clamps for quick and secure attachment to the casing and screen.

2.4 BOTTOM PLUG

A. The bottom of the casing string shall be closed with a flush-threaded PVC plug.

2.5 FILTER SAND PACK

A. Sand for the filter sand pack shall be washed clean of silt, dirt, and foreign matter. Sand shall be well-rounded and shall have a uniformity coefficient less than 2.5. All filter pack sand is subject to review by the Engineer prior to use in the packing process. The gradation of the sand pack material shall be 12-20 or equivalent.

2.6 BENTONITE PELLETS

A. Bentonite pellets shall be size-graded clay pellets which exhibit a high swelling capability. The pellets shall be Baroid’s 3/8-inch Holeplug or equivalent.

2.7 CEMENT-BENTONITE GROUT SURFACE SEAL

A. The material used for the surface seal shall comply with resource protection well sealing material requirements of WAC 173-160-450.

B. Cement used shall conform to ASTM C 150, Type I.

2.8 WELLHEAD MONUMENT SURFACE PAD CONCRETE

A. Concrete shall consist of Portland cement and aggregate mixed at a ratio of at least six ninety-four (94) pound sacks of Portland cement per cubic yard of aggregate. In no case shall the size of the aggregate be greater than one-fifth the radial thickness of the annular seal. Water shall be added to concrete mixes to attain proper consistency for placement, setting, and curing.

B. Cement shall conform to ASTM C 150, Type I.

2.9 AT-GRADE WELLHEAD SURFACE COMPLETION

A. Provide at-grade surface completion equipment and material for the monitoring well as shown in the Plans.

B. As-built survey of the wellhead surface completion shall be provided following construction of the well.

1. Vertical datum is NGVD29.

2. Horizontal datum is Washington Coordinate System Grid, North Zone, North American Datum of 1983, 1991 Adjustment (NAD 83/91).

PART 3 EXECUTION

3.1 GENERAL

A. All work shall be performed as specified and in accordance with applicable parts of Washington Administrative Code (WAC), Chapter 173-160, “Minimum Standards for Construction and Maintenance of Wells”. Should the Contractor discover any discrepancies between the Specifications and State requirements, the Contractor shall bring them to the attention of the Engineer immediately.

3.2 WATER FOR DRILLING

A. The Contractor shall pay for and shall construct all facilities necessary to furnish water for use during well drilling, construction, and completion. Water may be made available from the plant fire hydrant system. Contractor needs to coordinate with North Perry Water District to obtain temporary meter for fire hydrant water. 3W process water (disinfected plant effluent) is available at the plant in unlimited quantity at no cost. Contractor needs to coordinate with the Owner if 3W is needed.

3.3 INVESTIGATION DERIVED WASTE DISPOSAL

A. Investigation derived waste (IDW; including drilling solids, cuttings, and/or slurry, as well as groundwater purged during well development, testing, and dewatering) shall be managed in accordance with, and as detailed in, Specifications Section 31 23 19.

3.4 BOREHOLE DRILLING

A. Drill a 6-inch, minimum diameter borehole by HSA or equivalent drilling method. Depth of the borehole is anticipated to be approximately 30 ft to the base of the gravel fill material surrounding the digester structure but may be increased (to a maximum of 50 ft) or decreased at the direction of the Engineer.

3.5 FORMATION SAMPLING

A. Take two representative formation samples with standard penetration testing (SPT), or equivalent, sampling equipment at each interval of 5 feet and at each change in formation. Label and preserve each sample in water-tight and sealable sample containers. Clearly mark each container with bore hole designation, date, time, and depth interval represented. Store the samples in a manner that prevents breakage or loss.

B. Prepare a complete lithologic drilling log and submit to the Engineer within 24 hours of the end of borehole drilling.

3.6 BLANK AND SLOTTED CASING INSTALLATION

A. When the drilling has been completed, install the blank and slotted casing with centralizers attached. Do not drive the casing and screen into place in the borehole.

3.7 CENTRALIZERS

A. Attach centralizers to the casing string to hold the casing in the proper position until the sand filter pack and grout cement seal are in place. Place the first set of centralizers immediately below the well screen and place a second set immediately above the well screen.

3.8 ASSEMBLY INSTALLATION

A. Suspend the blank and slotted casing in tension from the surface by means of a clamp so that the casing is centered in the borehole. The bottom of the casing shall be at a sufficient distance above the bottom of the bore hole as to ensure that none of the casing string will be supported from the bottom of the hole.

B. If for any reason the casing and screen cannot be placed in the correct position, construct another monitoring well at an adjacent location selected by the Engineer and

complete this monitoring well in accordance with the specifications and Plans at no additional cost to the Owner. Seal the abandoned borehole according to the Chapter 173-160 WAC.

C. If any of the casings or screen should collapse prior to well completion, withdraw them, and replace at no additional cost to the Owner.

3.9 STORAGE AND HANDLING OF SAND

A. The filter pack sand shall be delivered to the site in 100-pound (or similar) bags and stored in a protected location to prevent breakage and contamination.

3.10 SAND FILTER PACK

A. Install filter sand pack specified in the annular space between the borehole and the casing and screen. During the sand pack installation, "sound" or "tag" the top of the sand's depth at regular intervals.

B. Record the volume of filter sand used. The volume shall not be less than the calculated volume of the annular space between the wall of the bore hole and the casing and screen diameters.

C. A quantity less than the computed volume will be considered as an indication of potential voids and measures shall be taken by the Contractor to eliminate the voids. Significant differences between estimated and actual volume of sand installed may be grounds for monitoring well rejection.

D. During filter pack placement, agitate the well with a bailer or equivalent to settle the sand around the well screen and continue until settling stops.

E. Extend the filter sand pack three (3) ft above the top of the monitoring well screen interval.

F. Place a 3-foot-thick bentonite pellet layer between the filter sand pack and the surface grout seal to prevent migration of grout into the filter sand pack material.

3.11 CEMENT-BENTONITE GROUT SURFACE SEAL

A. When installation and settlement of the filter sand pack and the bentonite pellet layer is complete, fill the annular space between the casing and the borehole with the specified cement-bentonite grout mix using a temporary tremie pipe. The tremie pipe shall be initially located 5 feet from the bottom of the annular space to be grouted. Once the bottom of the tremie pipe is covered with grout, the tremie pipe shall be removed in a manner that allows the bottom of the tremie pipe to remain covered throughout seal placement. Do not allow grout to free fall into the well annulus.

B. Record the volume of grout used. The volume shall not be less than the calculated volume of the annular space between the wall of the borehole and the casing. Significant differences between estimated and actual volume of grout installed may be grounds for monitoring well rejection.

3.12 WELL DEVELOPMENT

A. No earlier than 24 hours after surface seal placement, the monitoring well shall be developed. Development methods may include bailing, surging, air-lifting, or over-pumping.

B. Develop the well until a minimum of 10 casing volumes of water have been removed.

C. Bail all remaining sediment from the bottom of the monitoring well following development.

D. Sediment and groundwater produced during well development shall be captured and contained in drums (or equivalent) and be managed in accordance with Section 3.3 and Specifications Section 31 23 19.

3.13 AT-GRADE WELLHEAD SURFACE COMPLETION

A. Install at-grade surface completion equipment at the monitoring well as shown in the Plans.

3.14 FINAL CLEANING

A. Immediately after the well is constructed, the Contractor shall be responsible for cleaning up the site, including removal of all temporary piping, so that the site has been restored to as near the original grade and condition as possible. The Engineer reserves the right to accept or reject any restoration.

END OF SECTION

DIVISION 40 – PROCESS INTEGRATION

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SECTION 40 05 07 – HANGERS AND SUPPORTS FOR PROCESS PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. System of pipe supports and anchors with necessary inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, and other accessories.

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME): B31.1, Power Piping

B. ASTM International (ASTM):

1. ASTM A36 Standard Specification for Carbon Structural Steel

2. A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

C. Manufacturers' Standardization Society (MSS):

1. SP 58, Pipe Hangers and Supports—Materials, Design and Manufacture.

2. SP 127, Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, and Application.

1.3 DEFINITIONS

A. Wetted or Submerged: Submerged, less than 1-foot above peak (maximum) water surface elevations in water holding structure, under cover or slab of channel or tank.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design, detail, and installation of pipe support system shall be responsibility of Contractor.

2. Pipe support system components shall withstand dead loads imposed by weight of pipes filled with water plus insulation, plus live loads due to thermal expansion, vibration, internal test pressures, and have minimum safety factor of 5.

3. Contractor is responsible for providing them throughout plant, where a specific hanger detail does not apply. This specification applies to pipe hangers, supports, and anchors shown and not shown on the drawings. Hangers, supports, and anchors shown on drawings are minimum required for operation and maintenance only, final number and type to be determined by Contractor as specified.

4. Supply design loading criteria to Precast Concrete Manufacturer for piping supported from precast members.

1.5 SUBMITTALS

A. Shop Drawings:

1. Catalog information and piping support drawing of the pipe supporting system, including Manufacturer's product data, dimensions, sizes, types, catalog number, location, maximum loadings, thrust anchorage, and installation instructions.

2. Calculations for each type of pipe support, attachment, and anchor.

3. Submit seismic design calculations as described in Specification 01 41 20 – Seismic Requirements for Non-Structural Components and Systems.

PART 2 PRODUCTS

2.1 GENERAL

A. Manufacturer’s products shall be in accordance with MSS standards. MSS types indicated are typical of types and quality of standard pipe supports and hangers to be employed.

B. Provide factory fabricated piping hangers and supports, clamps, hanger rod attachments, building attachments, saddles, and other miscellaneous products to comply with MSS SP-58, ASME B31.1 and Manufacturer's published product information.

C. Special support and hanger details may be required for cases where standard catalog supports are not available.

2.2 MATERIALS

A. Hangers, rods, clamps, metal framing, support components, and hanger accessories shall be galvanized unless otherwise noted.

B. Hangers, rods, clamps, protective shields, metal framing, support components, and hanger accessories for the wetted and submerged piping in digesters shall be Type 304 stainless steel.

2.3 HORIZONTAL PIPE HANGERS AND SUPPORTS

A. Adjustable Swivel Split Ring Hanger: MSS Type 6.

B. Adjustable Clevis Hanger: MSS Type 1, fabricated from steel.

C. Adjustable Band Hanger: MSS Type 7, fabricated from steel.

D. Adjustable Swivel-Band Hanger: MSS Type 10.

E. Clamp: MSS Type 4.

F. Steel Brackets: Welded structural steel shapes complying with following:

1. Light Duty: MSS Type 31.
2. Medium Duty: MSS Type 32.
3. Heavy Duty: MSS Type 33.

G. Adjustable Saddle Support:

1. MSS Type 38, including saddle, pipe, and reducer.

2. Fabricate base support from steel pipe and include cast iron flange or welded steel plate.

H. Stanchion Saddle Support:

1. MSS Type 37, including saddle and U-bolt.

2. Fabricate base support from steel pipe and include cast iron flange or welded steel plate.

I. Strap or wire hangers not acceptable.

2.4 VERTICAL PIPING CLAMPS

A. Two-Bolt Riser Clamp: MSS Type 8, galvanized or plastic coated.

2.5 HANGERS RODS AND ATTACHMENTS

A. Hanger Rods:

1. ASTM A36, threaded both ends or continuous thread.

2. Rods shall conform to following sizes.

Pipe Size	Minimum Rod Diameter (in.)
2 1/2 in. and 3 *1/2* in.	*1/2*
4 in.	*5/8*
6 in. *to 8 in.*	*3/4*
10 in. to 12 in.	*7/8*
Trapeze Hangers	As Required

B. Turnbuckles: MSS Type 13.

C. Weldless Eye Nut: MSS Type 17.

D. Eye Socket: MSS Type 16.

E. Clevis: MSS Type 14.

2.6 BUILDING ATTACHMENTS

A. Individual Concrete Inserts:

1. MSS Type 18, malleable iron.
2. MSS Type 19, steel.
3. Minimum Safe Load: 1,100 pounds

B. Continuous Concrete Inserts:

1. Unistrut, P-3200 Series.
2. Grinnel.
3. Superstrut.
4. Or approved equal.

C. Top Beam C-Clamp: MSS Type 19.

D. C-Clamps: MSS Type 23, steel.

E. Single-Side Clamp: MSS Type 25.

F. Top I-Beam Clamp: MSS Type 25.

G. Side Beam Clamp: MSS Type 20.

H. Concrete Anchors and Inserts:

1. All anchors shall be epoxy anchors or expansion anchors as shown in the Drawings.

2. Materials:

a. Type 316 stainless steel

3. Types:

a. Threaded-type Concrete Inserts:

1) Internally threaded to receive machine bolts
2) Malleable iron, ASTM A47
3) Cast steel, ASTM A27
4) Stainless steel, type 304, ASTM A320

b. Wedge-type Concrete Inserts:

1) Box-type ferrous castings designed to accept bolts having special wedge-shaped heads.

c. Slotted-type Concrete Inserts:

1) Box-type welded construction with slot designed to receive square head bolt and with knockout cover.

4. Manufacturers:

a. Hilti, Inc.
b. Simpson Strong-Tie Co., Inc.
c. Proprietary products as named in the Drawings.

2.7 MISCELLANEOUS MATERIALS

A. Metal Framing Systems:

1. Unistrut, galvanized.
2. B-Line, galvanized.
3. Grinnell, galvanized.
4. Or approved equal.

B. Shop-Fabricated Anchors and Supports:

1. Steel Plates, Shapes, and Bars: ASTM A36.
2. Restraining Rods: ASTM A307.

PART 3 EXECUTION

3.1 GENERAL

A. Proceed with installation of hangers, supports, and anchors after required building structural work is complete and concrete support structure has reached 28-day compressive strength as specified.

B. Install hangers, supports, clamps, and attachments from building structure. Comply with MSS SP 58. Group parallel runs of horizontal piping to be supported together on trapeze type hangers where possible.

C. Install supports to provide indicated pipe slopes and to ensure maximum pipe deflections allowed by ANSI B31.1 are not exceeded.

D. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

E. Do not support piping from other piping.

F. Prevent contact between dissimilar metals. Where concrete or metal pipe support is used, place 1/8-inch-thick Teflon, neoprene rubber, or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and support.

G. Prevent electrolysis in support of copper tubing by use of hangers and supports where are copper plated, plastic coated or by other recognized industry methods. Electrician's tape not acceptable isolation method.

H. Apply anti-seize compound to stainless steel nuts and bolts.

3.2 INSTALLATION OF BUILDING ATTACHMENTS

A. Support piping from structural framing, unless otherwise noted.

B. Concrete Inserts:

1. Locate inserts so total load on insert does not exceed Manufacturer's recommended maximum load.

2. Where necessary to anchor supports to hardened concrete or completed masonry, use concrete anchors.

C. Attach to structural steel with beam clamps.

3.3 PIPE SUPPORT

A. Spacing: Shall be as follows unless specified on design drawings.

Type of Pipe	Maximum Pipe Support Spacing (ft)
Plastic	
1/2 in.	4-1/2
3/4 in.	4-1/2
1 in.	5
1 1/2 in.	5-1/2
2 in. and 4 in.	6
6 in. and 8 in.	8
10 in. and over	10
Cast Iron and Ductile Iron	
3 in. and 4 in.	10
6 in.	12
8 in.	12
10 in. and over	15

B. Where piping of various sizes is to be supported together, space supports for smallest pipe size or install intermediate supports for smaller diameter pipe.

C. Where piping connects to equipment, support by pipe support and not by equipment.

D. Provide pipe supports so that there is no interference with maintenance or removal of equipment.

E. Unless otherwise shown, place piping running parallel to walls approximately 1-1/2-inch out from face of wall and at least 3 inches below ceiling.

F. Pedestal pipe supports shall be adjustable with stanchion, saddle, and anchoring flange. Provide grout between baseplate and floor.

G. Piping supports for vertical piping passing through floor sleeves shall be galvanized steel riser clamps. Modular mechanical seals shall be provided between the pump and head works at all locations.

H. Piping passing through sleeves or openings in interior wall sleeves shall be carried by supports or hangers. Do not rest on wall.

I. Support piping in manner preventing undue strain on valve, fitting, or equipment. Provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, adjacent to non-rigid joints, and where otherwise shown. Do not install pipe supports and hangers in equipment access areas.

J. Install supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Stacked horizontal runs of piping along walls may be supported by metal framing system attached to concrete insert channels.

3.4 INSULATING PIPING

A. Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed allowable pipe stress.

B. Where low compressive strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields.

END OF SECTION

SECTION 40 05 10 – PROCESS PIPING AND FITTING GENERAL REQUIREMENT

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, heat tracing, insulation, lining and coating, testing, disinfection, excavation, backfill and encasement, to provide a functional installation.

B. The piping shown is intended to define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

1.2 REFERENCE STANDARDS

A. Commercial Standards:

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (inch)
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys
ANSI/AWWA C207	Steel Pipe Flanges for Water Works Service, Sizes 4 in through 144 in.
ANSI/AWWA C606	Grooved and Shouldered Joints
ANSI/AWS D1.1	Structural Welding Code
ASTM A 307	Specification for Carbon Steel Bolts and Studs, 6,000 psi Tensile
ASTM A 325	Specification for High-Strength Bolts for Structural Steel Joints
ASTM A53	Standard Specification for Ductile Iron Castings.
ASTM D 792	Test Methods for Specific Gravity and Density of Plastics by Displacement

ASTM D 2000	Classification System for Rubber Products in Automotive Applications
ANSI/NSF 61	Drinking Water System Components

1.3 SUBMITTALS

A. The Contractor shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, as specified in the General Conditions and in the individual piping sections.

The shop drawings shall include all necessary dimensions and details on pipe joints, fittings, fitting specials, valves, appurtenances, design calculations, and material lists. The submittals shall include detailed layout, spool, or fabrication drawings which show all pipe spools, spacers, adapters, connectors, fittings, and pipe supports necessary to accommodate the equipment and valves provided in a complete and functional system.

B. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

C. The Contractor shall submit as part of the shop drawings a statement from the pipe fabricator certifying that all pipes will be fabricated subject to a recognized Quality Control Program. An outline of the program shall be submitted to the Engineer for review prior to the fabrication of any pipe.

D. ANSI/NSF61 certification is required for all potable water piping.

1.4 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, the Engineer shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

B. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards. Welds shall be tested as specified. The Contractor shall perform all tests at no additional cost to the Owner.

C. Welding Requirements: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot, and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

D. Welder Qualifications: All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the pipeline. Machines and electrodes similar to those used in the work shall be used in qualification tests. The Contractor shall furnish all material and bear the expense of qualifying welders.

PART 2 PRODUCTS

2.1 GENERAL

A. Pipe Supports: All pipes shall be adequately supported in accordance with the requirements of Section 40 05 07 – Hangers and Supports for Process Piping.

B. Lining: All requirements pertaining to thickness, application, and curing of pipe lining, are in accordance with the requirements of the applicable industrial standards.

C. Coating: All requirements pertaining to thickness, application, and curing of pipe coating, are in accordance with the requirements of the applicable industrial standards, unless otherwise specified. Pipes above ground or in structures shall be field painted in accordance with Section 09 90 00.

D. Pressure Rating: All piping systems shall be designed for the maximum expected pressure as shown on the piping schedule.

E. Bolts, Nuts, and Washers for Equipment and Piping:

1. Select fasteners for the type, grade, and class required for the installation of miscellaneous metal items.

2. Carbon Steel:

    a. General: Zinc-coated, ASTM A153
    b. Structural Connections: ASTM A307, Grade 2 (60 ksi), hot-dip galvanized
    c. Anchor Bolts: ASTM A307, Grade 2 (60 ksi), hot-dip galvanized
    d. Pipe and Equipment Flange Bolts: ASTM A193, Grade B-7
    e. High Strength Bolts: ASTM F3125, Heavy Hex Head

3. Stainless Steel: Type 316 stainless steel, Class 2; ASTM A193 for bolts; ASTM A194 for nuts

    a. Where stainless steel bolts are in contact with dissimilar metals, glass epoxy insulating sleeves and washers shall be used to electrically isolate the bolts.

2.2 PIPE FLANGES

A. Flanges: Where the design pressure is 150 pounds per square inch (psi) or less, flanges shall conform to either ANSI/AWWA C207 Class D or ANSI B16.5 150-pound class. Where the design pressure is greater than 150 psi, up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E, Class F, or ANSI B16.5 150-pound class. Where the design pressure is greater than 275 psi up to a maximum of 700 psi, flanges shall conform to ANSI B16.5 300-pound class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207. Flanges for miscellaneous small pipes shall be in accordance with the standards specified for these pipes.

B. Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or with the standards for miscellaneous small pipes. All blind flanges for pipe sizes 12 inches and over shall be provided with lifting eyes in form of welded or screwed eye bolts.

C. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

D. Flange Bolts: and bolts shall extend through the hexagonal nuts a minimum of 1/4-inch. All- thread studs shall be used on all valve flange connections, where space restrictions preclude the use of regular bolts.

E. Insulating Flanges: Insulated flanges shall have bolt holes 1/4-inch diameter greater than the bolt diameter.

F. Insulating Flange Sets: Insulating flange sets shall be provided where shown. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2-inch or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2-inch, insulating sleeves and washers shall be two-piece and shall be made of polyethylene or phenolic. Steel washers shall be in accordance with ASTM A 325. insulating gaskets shall be full-face.

G. Insulating Flange Manufacturers, or Equal:

1. JM Red Devil, Type E
2. Maloney Pipeline Products Co., Houston
3. PSI Products, Inc., Burbank, California

H. Flange Gaskets: Gaskets for flanged joints for water, sewer and air service shall be full faced, 1/4 inch thick, neoprene rubber, 55-65 durometer hardness. Dimensions shall be per ANSI B16.21. Ring gaskets shall not be permitted.

I. Flange Gasket Manufacturers, or Equal:

1. Garlock, style *7986*
2. or approved equal

2.3 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.4 MECHANICAL-TYPE COUPLINGS (GROOVED OR BANDED PIPE)

A. General: Cast mechanical-type couplings shall be provided where shown. The couplings shall conform to the requirements of ANSI/AWWA C606. All gaskets for mechanical-type couplings shall be compatible with the piping service and fluid utilized, in accordance with the Coupling Manufacturer's recommendations. The wall thickness of all grooved piping shall conform with the Coupling Manufacturer's recommendations to suit the highest expected pressure. To avoid stress on equipment, all equipment connections shall have rigid-grooved couplings, or harness sets in sizes where rigid couplings are not available, unless thrust restraint is provided by other means. The Contractor shall have the Coupling Manufacturer's service representative verify the correct choice and application of all couplings and gaskets, and the workmanship, to assure a correct installation.

B. Couplings for Steel Pipe, Manufacturers, or Equal:

1. Gustin-Bacon (banded or grooved)
2. Victaulic Style 41 or 44 (banded, flexible)
3. Victaulic Style 77 (grooved, flexible)
4. Victaulic Style 07 or HP-70 (grooved, rigid)

C. Ductile Iron Pipe Couplings, Manufacturers, or Equal:

1. Gustin-Bacon
2. Victaulic Style 31 (flexible or rigid grooving)

Note: Ductile iron pipe couplings shall be furnished with flush seal gaskets.

D. Couplings for polyvinyl chloride (PVC) Pipe, Manufacturers, or Equal:

1. Gustin-Bacon

2. Victaulic Style 775

Note: Couplings for PVC pipe shall be furnished with radius cut or standard roll grooved pipe ends.

E. Flanged Mechanical Joint Coupling with Cam-Lock Joint Restraint:

1. Smith-Blair Product No. 911. Shall have a pressure rating of 150 psi and a safety factor of 1.5:1 with a fusion bonded epoxy coating per AWWA C213

2.5 SLEEVE-TYPE COUPLINGS

A. Construction: Sleeve-type couplings shall be provided where shown, in accordance with ANSI/AWWA C219 unless otherwise specified, and shall be of steel with steel bolts, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressure without excessive "oiling." The shape of the follower shall be of such design as to provide positive confinement of the gasket. Buried sleeve-type couplings shall be epoxy-coated at the factory as specified.

B. Pipe Preparation: The ends of the pipe, where specified or shown, shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round fora distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.

C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N," grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:

1. Color - Jet Black
2. Surface - Non-blooming
3. Durometer Hardness - 74 ± 5
4. Tensile Strength - 1000 psi Minimum
5. Elongation - 175 percent Minimum

The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.

D. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.

E. Restrained Joints: All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be in accordance with the requirements of the appropriate reference standard, or as shown.

F. Manufacturers, or Equal:

1. Romac, Style 400
2. Ford Meter Box Co., Inc., Style FC1 or FC3
3. Smith-Blair, Style 411

2.6 FLEXIBLE CONNECTORS

A. Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment, and where shown. Flexible connectors for service temperatures up to 180 degrees F shall be flanged, reinforced Neoprene or Butyl spools, rated for a working pressure of 40 to 150 psi, or reinforced, flanged duck and rubber, as best suited for the application. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for minimum 150 psi working pressure, unless otherwise shown. The connectors shall be 9 inches long, face-to-face flanges, unless otherwise shown. The final material selection shall be approved by the Manufacturer. The Contractor shall submit Manufacturer's shop drawings and calculations.

2.7 EXPANSION JOINTS

A. All piping subject to expansion and contraction shall be provided with sufficient means to compensate for such movement, without exertion of undue forces to equipment or structures. This may be accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints. Expansion joints shall be of stainless steel, monel, rubber, or other materials, best suited for each individual service. The Contractor shall submit detailed calculations and Manufacturer's shop drawings, guaranteeing satisfactory performance of all proposed expansion joints, piping layouts showing all anchors and guides, and information on materials, temperature, and pressure ratings. -

2.8 PIPE THREADS

A. All pipe threads shall be in accordance with ANSI/ASME B1.20.

2.9 DISMANTLING JOINT

A. General: Adjustable telescoping restraint with double flanged fittings and tie-rods to lock at the required length.

B. Pressure Rating: Joint shall be rated at the maximum working pressure of the Pipe Flanges Paragraph 2.2.

C. Adjustment: Flange shall accommodate a minimum of 3-inch longitudinal adjustment to allow access to the appurtenance.

D. Material:

1. Flange spools shall be AWWA Class D Steel Ring Flange compatible with Pipe Flanges Paragraph 2.2.

2. Pipe:

a. 3–12-inch pipe is STD Weight Class per ASTM A53
b. 14–72-inch pipe is ASTM plate 1% cold expanded to size.

3. End Ring and Body:

a. 3–12-inch end ring and body from ASTM A536 65-45-12 Ductile Iron.
b. 14-72-inch end ring and body from ASTM A36 Steel.

4. Gaskets: Per Pipe Flanges Paragraph 2.2.

5. Bolts and Nuts: Per Pipe Flanges Paragraph 2.2.

6. Tie-Rods: Stainless Steel type 304.

7. Coating: Fusion bonded epoxy.

E. Manufacturers, or Equal:

1. Romac Industries.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation. All defective or damaged materials shall be replaced with new materials. All pipe and fittings with mortar lining shall be protected from drying out either in shipping or storage. The Contractor shall periodically check all stored mortar lined pipe and fittings for adequate moisture and add water as necessary

B. Flanges: Securely attach metal, hardboard, or wood protectors over entire gasket surface.

C. Threaded or Socket Welding Ends: Fit with metal, wood, or plastic plugs or caps.

D. Linings and Coatings: Prevent excessive drying.

E. Cold Weather Storage: Locate products to prevent coating from freezing to ground.

F. Handling: Use heavy canvas or nylon slings to lift pipe and fittings.

3.2 CLEANUP

A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.

3.3 INSTALLATION

A. Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction to avoid damage to embedded raceways and rebars.

B. Join pipe and fittings in accordance with Manufacturer's instructions, unless otherwise shown or specified.

C. Remove foreign objects prior to assembly and installation.

D. Flanged Joints:

1. Install perpendicular to pipe centerline.

2. Bolt Holes: Straddle vertical centerlines, aligned with connecting equipment flanges or as shown.

3. Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.

4. Plastic Flanges: Install annular ring filler gasket at joints of raised-face flange.

5. Grooved Joint Flange Adapters: Include stainless steel washer plates as required for mating to serrated faces and lined valves and equipment.

6. Raised-Face Flanges: Use flat-face flange when joining with flat-faced ductile or cast-iron flange.

7. Verify compatibility of mating flange to adapter flange gasket prior to selecting grooved adapter flanging.

8. Flange fillers are to be avoided, but, if necessary, may be used to make up for small angles up to 6 degrees and for filling gaps up to 2 inches between flanges. Stacked flange fillers shall not be used.

9. Threaded flanged joints shall be shop fabricated and delivered to Site with flanges in-place and properly faced.

E. Ductile Iron Piping:

1. Cutting Pipe: Cut pipe with milling type cutter, rolling pipe cutter, or abrasive blade cutter. Do not flame cut.

2. Dressing Cut Ends:

   a. General: As required for the type of joint to be made.

   b. Rubber Gasketed Joints: Remove sharp edges or projections.

   c. Push-On Joints: Bevel, as recommended by Pipe Manufacturer.

   d. Flexible Couplings, Flanged Coupling Adapters, and Grooved End Pipe Couplings: As recommended by the Coupling or Adapter Manufacturer.

F. High-Density Polyethylene Piping:

1. Join pipes, fittings, and flange connections by means of thermal butt-fusion.

2. Perform butt-fusion in accordance with Pipe Manufacturer's recommendations as to equipment and technique.

3. Special Precautions at Flanges: Polyethylene pipe connected to heavy fittings, manholes, and rigid structures shall be supported in such a manner that no subsequent relative movement between polyethylene pipe at flanged joint and rigid structures is possible.

3.4 PIPELINE TESTING

A. All pipes shall be tested in accordance with Section 40 80 01 – Process Piping Testing.

3.5 MANUFACTURER'S SERVICES

A. Where the assistance of a Manufacturer's service representative is advisable, in order to obtain perfect pipe joints, supports, or special connections, the Contractor shall furnish such assistance at no additional cost to the Owner.

END OF SECTION

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SECTION 40 05 10.01 – DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall furnish and install ductile iron pipe and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents.

B. Related Sections:

1. Section 40 80 01 –Process Piping Testing

1.2 REFERENCE STANDARDS

A. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

B. ANSI/AWWA C105/A21.5 Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

C. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 in Through 48 in for Water and Other Liquids

D. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

E. ANSI/AWWA C115/A21.15 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges

F. ANSI/AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe

G. ANSI/AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

H. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 in. Through 12 in. for Water and Other Liquids

I. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances

J. ASTM C 150 Specification for Portland Cement

K. ASTM B 1000 Standard Practices for Casting Preparation and Test Procedure of Porcelain Enamel-lined Pipe, Fittings, and Valves for Use in the Municipal Wastewater, Sewage, and Water Treatment Industry

1.3 SUBMITTALS

A. Shop Drawings: The Contractor shall submit shop drawings of pipe and fittings in accordance with the requirements of the referenced standards.

B. Certifications: The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specification, as specified in the referenced standards and the following supplemental requirements:

1. Physical and chemical properties.

2. Hydrostatic test reports.

3. AWWA- ANSI/NSF61 certification.

C. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

1.4 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.

B. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the Section 40 80 01 – Process Piping Testing, and the referenced standards as applicable.

C. The Contractor shall perform said material tests at no additional cost to the Owner. The Engineer shall have the right to witness all testing conducted by the Contractor; provided, that the Contractor's schedule is not delayed for the convenience of the Engineer.

D. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. The pipe shall be of the diameter shown, shall be furnished complete with rubber gaskets as indicated in the Contract Documents, and all specials and fittings shall be provided as required under the Contract Documents.

B. Pipe Manufacturer shall submit certification that source manufacturing facility has been producing ductile iron pipe of specified diameters, dimensions, and standards for a period of not less than 10 years. Testing of pipe required by AWWA C151/A21.51 shall be conducted in testing and laboratory facilities located in the USA and operating under USA laws and regulations. Pipe shall be handled during manufacture and shipped without nesting (without insertion of one pipe inside another).

2.2 MATERIALS

A. Ductile Iron Pipe: Pipe materials shall conform to the requirements of ANSI/AWWA C151.

B. Lining: Ductile iron pipe shall be ceramic epoxy lined with Protecto 401 Ceramic Epoxy or approved equal lining.

C. Polyethylene Sleeve: Material for the polyethylene sleeve shall conform to the requirements of ANSI/AWWA C105.

2.3 DESIGN OF PIPE

A. General: The pipe furnished shall be ductile iron pipe, mortar-lined and polyethylene-wrapped, with rubber-gasketed joints as shown.

B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C151.

C. Pipe Dimensions: The pipe shall be of the diameter shown. The minimum wall thickness for each pipe size shall be as specified or shown.

D. Fitting Dimensions: The fittings shall be of the diameter shown.

E. Joint Design: Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, and restrained joints as required.

1. Mechanical and push-on joints shall conform to ANSI/AWWA C111/A21.11. 250 pounds per square inch (psi) minimum working pressure

2. Flanged joints: dimensions per AWWA C110/A21.10 flat face, ductile iron, threaded conforming to ANSI/AWWA C115/A21.15.

3. Grooved End: Rigid type radius cut conforming to AWWA C606, 250 psi minimum working pressure; Victaulic.

4. Restrained joints shall be "Flex-Ring" or "Lok-Ring" Restrained Joint by American Ductile Iron Pipe, "TR FLEX" Restrained Joint by U.S. Pipe, or equal.

F. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself, will provide watertight joints under all operating conditions when properly installed. The Contractor shall require the Pipe Manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

G. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe as shown or as otherwise acceptable to the Engineer.

2.4 SPECIALS AND FITTINGS

A. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3-inch through 48-inch and shall have a minimum pressure rating of 250 psi.

2.5 LINING

A. Lining for Shop Application: Except as otherwise provided herein, interior surfaces of all ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with Protecto 401 lining applied at 40 mil nominal dry thickness. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

2.6 EXTERIOR COATING OF PIPE

A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer. Apply prime coat and topcoat, 4.0-6.0 mils each coat of Tnemec Series 66-2 Hi-Build Epoxoline, or equal. Color as selected by Owner.

B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1-mil thick. In addition, a polyethylene sleeve shall be installed.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE

A. Handling and Storage: All pipe, fittings, etc., shall be carefully handled and protected against damage, impact shocks, and free fall. All pipe handling equipment shall be acceptable to the Engineer. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed where the lining or coating show defects that may be harmful as determined by the Engineer. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.

B. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

C. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe.

D. Before placement of pipe, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the work.

E. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600.

F. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the Pipe Manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

G. Cold Weather Protection: No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

H. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

I. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand,

dirt, mortar splatter, and any other debris following completion of pipe laying, pointing of joints and any necessary interior repairs prior to testing the completed pipeline.

J. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, and roughness.

3.2 INSTALLATION OF PIPE APPURTENANCES

A. Protection of Appurtenances: Where pipe is encased in polyethylene sleeves, buried appurtenances shall also be encased in polyethylene.

B. Installation of Valves: All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation. The Contractor shall adjust all stem packing and operate each valve prior to installation to insure proper operation.

C. All valves shall be installed so that the valve stems are plumb and, in the location, shown.

3.3 PIPELINE TESTING

A. All pipes shall be tested in accordance with Section 40 80 01 –Process Piping Testing.

END OF SECTION

SECTION 40 05 10.07 – HIGH DENSITY POLYETHYLENE PIPE

PART 1 GENERAL

1.1 PIPE TYPES

A. PE-3608 High Density Polyethylene (HDPE) SDR-17

1.2 SCOPE

A. The Contractor shall furnish and install high density polyethylene pipe and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents, for the construction of the piping inside the digester for the digestor sludge mixing system.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C906	AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch
ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM D2837	Standard Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
ASTM D2774	Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D3035	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
ASTM D3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
PPI TR-33	Plastic Pipe Institute Butt Fusion Process
ASTM F714	Standard Specification for Polyethylene Plastic Pipe (SDR-PR). Based on outside diameter
ASTM D1248	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM F2206	Sheet Stock, Plate Stock, or Block Stock

ISO 11414	Preparation of Polyethylene (PE) Plastic Pipe/Pipe or Pipe Fitting Test Piece Assemblies by Butt Fusion

1.4 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall submit shop drawings of pipe and fittings in accordance with the requirements in Special Provision Section 1-12.2 and the requirements of the referenced standards.

B. Certifications: The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards and the following supplemental requirements:

1. Physical and chemical properties.
2. Hydrostatic test reports.
3. AWWA certification.

C. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

1.5 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.

B. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.

C. The Contractor shall perform said material tests at no additional cost to the Owner. The Engineer shall have the right to witness all testing conducted by the Contractor.

D. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. The nominal diameters of the pipes are shown on the Drawings.

B. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures and excessive interior surface roughness.

2.2 PIPE DESIGN

A. General: HDPE pipe shall be designed in accordance with the requirements of ASTM 3350 and PPI-TR4 3408 with hydrostatic design basis (HDB) of 800 pounds per square inch (psi) at 73 degrees Fahrenheit (F) as applicable and as modified in this Section.

B. Pipe Wall Thickness for Internal Pressure: The pipe shall be designed with a net thickness to withstand the design pressure in accordance with the ASTM D2837 Obtaining Hydrostatic Design Basis for thermoplastic pipe materials.

C. Pipe Wall Thickness for External Load: The pipe shall also be designed with a net thickness to withstand external loads using Pipe Manufacturer Safe External Pressure by 50-year load duration, standard dimension ratio (SDR) rating, and anticipated water service temperature of 60-80 degrees F. Short term Safe External Pressures shall also be monitored and shall not be exceeded during construction.

D. Ultraviolet (UV) stabilizer and color shall be black with minimum 2 percent carbon black.

2.3 MATERIALS

A. Pipe: ANSI/AWWA C906, Standard PE Code Designation - PE 3608, minimum cell classification - PE 345464C (ASTM D3350), ductile iron pipe size (DIPS) outside diameter (OD). All HDPE pipe and fittings shall be of the dimension ratio (DR) 17, minimum 100 psi rating, unless otherwise shown on the plans.

B. Joints: Pipe shall be joined using thermal butt fusion method only per ASTM D3261.

C. Fittings: HDPE fittings shall be of the same class as or higher-pressure rating than the HDPE piping.

D. Connections with other pipe types: Connections with other pipe types shall be with PE flange adapter.

2.4 SPECIALS AND FITTINGS

A. Fittings for HDPE pipe shall conform to the requirements of ASTM D-3350 and shall have a minimum pressure rating of 80 psi.

2.5 DESIGN OF PIPE

A. General: The pipe furnished shall be HDPE pipe, with butt fusion jointing.

B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated.

C. Pipe Dimensions: The pipe shall be of the diameter shown. The minimum wall thickness for each pipe size shall be as specified or shown.

D. Fitting Dimensions: The fittings shall be of the diameter shown.

E. Joint Design: HDPE pipe and fittings shall be furnished with butt fusion joints as required. Butt fusion joints shall conform to ASTM D3261.

2.6 MANUFACTURERS

A. JM Eagle, Los Angeles, CA

B. Or approved equal

PART 3 EXECUTION

3.1 INSPECTION

Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation. All defective pipe and fittings shall be removed from the site of the work.

3.2 INSTALLATION OF PIPE

A. Handling and Storage: All pipe, fittings, etc., shall be carefully handled and protected against damage, impact shocks, and free fall. All pipe handling equipment shall be acceptable to the Engineer. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed where defects are present that may be harmful as determined by the Engineer. Such damaged pipe shall be repaired, or a new undamaged pipe shall be furnished and installed.

B. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

C. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe.

D. Before placement of pipe, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings shall be closed during any interruption to the Work.

E. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600.

F. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall

be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection of the pipe exceed the maximum deflection recommended by the Pipe Manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

G. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

H. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, pointing of joints and any necessary interior repairs prior to testing the completed pipeline.

3.3 JOINING

A. Sections of PE pipe shall be joined into continuous lengths on the job site above ground per ASTM D3261. The joining method shall be the thermal butt fusion method and shall be performed in strict accordance with the Pipe Manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the Pipe Manufacturer, including, but not limited to, temperature requirements for 400 degrees F, alignment, and 75 psi interfacial fusion pressure.

B. Butt fusion joining shall be 100 percent efficient providing joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion will not be allowed. Extrusion welding or hot gas welding of HDPE shall not be used for pressure pipe applications or in fabrications where shear or structural strength is important.

C. Remove and extract internal fusion bead from pipe.

1. Verify complete internal fusion bead removal was performed by examination of extracted internal fusion bead.

2. Appearance of the extracted internal fusion bead shall have same double roll back semblance as external fusion bead.

3. Possess smooth root cut or pipe smoothness and shall be verified by means of closed-circuit television (CCTV) examination.

4. Removal of internal bead may include pipe wall mass. However, wall mass that is removed shall not exceed 1/10th of pipe wall thickness

3.4 INSTALLATION OF PIPE APPURTENANCES

A. Installation of Valves: All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation. The Contractor shall adjust all stem packing and operate each valve prior to installation to insure proper operation.

B. Connections with other pipe type or equipment shall be with flanged connections:

1. PE flange adapter, thermally butt-fused to end of the pipe. Flange “stub ends” are not allowed.

2. Bolt and nut of sufficient length to show a minimum of three complete threads when joint is made and tightened to Manufacturer’s standard.

3. Follow requirements of PPI Technical Note 38 including mandatory 4-hour bolt re-torqueing.

3.5 PIPELINE TESTING

A. All pipes shall be tested in accordance with Section 40 80 01 –Process Piping Testing.

END OF SECTION

SECTION 40 05 52 – PROCESS VALVES

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall provide all valves, actuators, and appurtenances that are not furnished by the Owner, as specified in Section 01 64 13.

B. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated.

C. Single Manufacturer: Where two or more valves of the same type or size are required, the valves shall be furnished by the same Manufacturer.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI): Z21.15, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.

B. American Society of Mechanical Engineers (ASME):

1. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

2. B16.44, Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 psi.

C. American Society of Sanitary Engineers (ASSE): 1011, Performance Requirements for Hose Connection Vacuum Breakers.

D. American Water Works Association (AWWA):

1. C500, Metal-Seated Gate Valves for Water Supply Service.

2. C504, Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm).

3. C508, Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS.

4. C509, Resilient-Seated Gate Valves for Water Supply Service.

5. C510, Double Check Valve Backflow Prevention Assembly.

6. C511, Reduced-Pressure Principle Backflow Prevention Assembly.

7. C512, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.

8. C515, Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.

9. C550, Protective Interior Coatings for Valves and Hydrants.

10. C800, Underground Service Line Valves and Fittings.

1.3 SUBMITTAL

A. Shop Drawings: Shop drawings shall contain the following information:

1. Valve name, size, flow coefficient of the valve (Cv) factor, pressure rating, identification number (if any), and specification section number.

2. Complete information on valve actuator, including size, Manufacturer, model number, limit switches, and mounting.

3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, handwheels, position indicators, limit switches, integral control systems, needle valves, and control systems.

4. Complete wiring diagrams and control system schematics.

5. Valve Labeling: A schedule of valves to be labeled, indicating in each case the valve location and the proposed wording for the label.

B. Owner's Manual: The Owner's Manual shall contain the required information for each valve.

C. Factory Test Data: Where indicated, signed, dated, and certified factory test data for each valve requiring certification shall be submitted before shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.

PART 2 PRODUCTS

2.1 PRODUCTS - GENERAL

A. General: All valves and gates shall be new and of current manufacture. All shut-off valves 6 inches and larger shall have actuators with position indicators. Buried valves shall be provided with valve boxes and covers containing position indicators and valve extensions. Manual shut-off valves mounted higher than 6 feet above working level shall be provided with chain actuators.

B. Valve Labeling**:** Except when such requirement is waived by the Engineer in writing, a label shall be provided on all shut-off valves and control valves except for hose bibbs and chlorine cylinder valves. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, and shall by permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.

C. Valve Testing: As a minimum, unless otherwise indicated, each valve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated 100 degrees Fahrenheit (F) design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, each valve 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated 100 degrees F water-working pressure for a period of 5 minutes to demonstrate tight shut-off. Stem seal leakage shall not be a cause for rejection. All valves 3 inches and smaller shall undergo the Manufacturer's standard test.

D. Certification: Prior to shipment, the Contractor shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, and ASTM International (ASTM).

E. Valve Marking: All valve bodies shall be permanently marked in accordance with Manufacturers Standardization Society (MSS) SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

F. Nuts and Bolts: All nuts and bolts on valve flanges and supports shall be in accordance with Manufacturer’s standards.

2.2 VALVE ACCESSORIES

A. All valves shall be furnished complete with the accessories required to provide a functional system.

B. Buried and Submerged Valves:

1. Provide seals on shafts and gaskets on valve and actuator covers to prevent water entry.

2. Provide totally enclosed actuator mounting brackets with gasket seals.

2.3 SPARE PARTS

A. Where indicated, the Contractor shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The Contractor shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. All spare parts are intended for use by the Owner, only, after expiration of the guarantee period.

2.4 VALVES

A. Ball Valves (BV)

1. Metal Ball Valves, General Water and Air Service

a. Size: 4 inches and smaller

b. Body: Ball valves up to 1-1/2-inch (included) in size shall have bronze or carbon steel 2- or 3-piece bodies with screwed ends for a pressure rating of not less than 600 psi water, oil, gas (WOG). Valves 2-inch to 4-inch in size shall have bronze or carbon steel 2- or 3-piece bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi unless otherwise indicated.

c. Balls: The balls shall be solid chrome plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.

d. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced Teflon seal.

e. Seats: The valve seats shall be of Teflon or Buna-N, for bi-directional service and easy replacement.

f. Manufacturers:

1) Conbraco Industries, Inc. (Apollo)
2) ITT Engineered Valves
3) Neles-Jamesbury, Inc.
4) Nibco
5) Watts Regulator
6) Worcester Controls
7) Flow-Tek

2. Plastic Ball Valves, Chemical Service

a. Size: 4 inches and smaller

b. Plastic ball valves for corrosive fluids shall be made of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polypropylene (PP), or polyvinylidene fluoride (PVDF), as recommended by the Manufacturer for the specific application.

c. Plastic ball valves with a vented ball shall be installed so that the vent is directed back upstream

d. Construction

1) Plastic ball valves shall have union ends or flanged ends to mate with ANSI B 16.5, class 150 flanges, for easy removal. The balls shall have full size ports and Teflon seats. Body seals, union O-ring seals, and stem seals shall be in accordance with the corrosion resistance requirements of respective Valve Manufacturer. External (without entering into the wetted area) seat packing adjustment is preferred. Metal reinforced stems to prevent accidental breakage are preferred. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F for PVC and CPVC, with decreasing ratings for higher temperatures and other plastics.

2) Ball valves for chemical solutions that produce off-gas, such as sodium hypochlorite, shall be provided with vented balls with pressure relief hole drilled on low pressure side by the Ball Valve Manufacturer.

e. Manufacturers:

1) ASAHI-America
2) Nibco
3) George Fischer, Inc.
4) Plast-O-Matic Valves, Inc.
5) Spears Mfg Co.

B. Plug Valves (PV)

1. Type V-300 Plug Valves, General Water and Sludge Service

a. Size: All

b. Flanged, non-lubricated, resilient seated eccentric type.

c. Drip-tight shutoff up to full pressure rating of valve, with pressure in either direction.

d. Pressure rating:

1) Valves 12-inch and smaller: 175 psi gauge (psig)
2) Valves 14-inch and larger: 150 psig

e. Cast iron body, ASTM A 126, Grade B.

f. Buna-V packing or O-ring seals.

g. Nickel seats.

h. Balanced plug coated with Hycar.

i. End Style:

1) Non-buried service: Flanged ends, 150-pound ANSI standard.
2) Buried service: Mechanical joint.

j. Bearings:

1) Valves 20-inch and smaller: Stainless steel.
2) Valves 24-inch and larger: Bronze or stainless steel.

k. Manufacturers:

1) DeZurik Series 100, Figure 118
2) Milliken, Millcentric Series 600
3) Pratt, Ballcentric
4) Val-Matic, Series 5000

2. 3-way Plug Valves, General Water and Sludge Service

a. Concentric, non-lubricated with resilient faced plug capable of 360-degree rotation to shut off any of the three ports.

b. Port areas are 100 percent of pipe area.

c. Drip-tight shutoff up to full pressure rating of valve, with pressure in any direction.

d. Pressure Rating 175 psi.

e. Body of ASTM A536 Ductile Iron

f. Fusion bonded epoxy coating interior/exterior

g. Flanges per ANSI B16.1, Class 125

h. Radial bearings shall be self-lubricating type 316 SST

i. Externally adjustable 2 way thrust bearing shall be bronze

j. Shaft seals shall be “V” type packing in a fixed gland with an adjustable follower

k. Manufacturers

1) DeZurik
2) Milliken
3) Val-Matic

C. Regulating and Release Valves (PRV)

1. Pressure-Reducing Valve, Water Service

a. Size: 2-1/2 inches and smaller

b. Direct diaphragm operated, spring controlled, bronze body, NPT threaded ends, 200-psig rated minimum.

c. Size/Rating: As shown on Contract Drawings.

d. Manufacturers and Products:

1) Fisher
2) Watts

D. Miscellaneous Valves

1. Solenoid Valve

a. Size: 1/4-inch to 2 inches

b. Two-way internal pilot operated diaphragm type, brass body, resilient seat suitable for air or water, solenoid coil molded epoxy, National Electrical Manufacturers Association (NEMA) insulation Class F, 120 volts alternating current (AC), 60-Hertz, unless otherwise indicated. Solenoid enclosure NEMA 250, Type 4 unless otherwise indicated.

c. Minimum operating pressure differential no greater than 5 psig, maximum operating pressure differential not less than 125 psig.

d. Manufacturers and Products:

1) ASCO
2) Skinner

PART 3 EXECUTION

3.1 VALVE INSTALLATION

A. General: All valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the Manufacturer's written instructions and as indicated. All gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe.

B. Access: All valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment.

C. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the Contractor shall properly assemble and install such items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.2 FIELD QUALITY CONTROL

A. Tests:

1. Pressure test valves at same time connected piping is tested.
2. Repair leaking joints.
3. Protect parts of valves and actuators that could be damaged by test.

3.3 INSPECTION, STARTUP, AND FIELD ADJUSTMENT

A. The Contractor shall demonstrate that all equipment meets the specified performance requirements. As necessary, an experienced, competent, and authorized service representative of the manufacturer of each valve type shall visit the site to perform the following tasks:

1. Assist the Contractor in the installation of the equipment, as necessary.

2. To inspect, check, adjust if necessary, and approve the installation.

3. To start-up and field-test the valves for proper operation.

4. To perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the Engineer.

END OF SECTION

SECTION 40 73 00 - PRESSURE INSTRUMENTATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pressure Indicators.

a. Pressure Gauges – Mechanical.

2. Isolation Devices.

a. Diaphragm Seals.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):

a. B16.5, Pipe Flanges and Flanged Fittings

2. ASTM International (ASTM):

a. A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 26 05 00.

B. Operation and Maintenance Manuals:

1. See Special Provision Section 1-12.2 for requirements for:

a. The mechanics and administration of the submittal process.
b. The content of Operation and Maintenance Manuals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.

2.2 PRESSURE INDICATORS

A. Pressure Gauge - Mechanical:

1. Manufacturers:

a. Ametek / USGauge (Solfrunt Model 1980).
b. Ashcroft (Type 1279 or 1379).

2. Materials:

a. Bourdon tube, socket, connecting tube: 316 stainless steel.

b. Case: Phenolic.

c. Pressure snubber:

1) Filter disc: 316 stainless steel.
2) Housing: 316 stainless steel.

3. Accessories:

a. Provide valve at point of connection to equipment and at panel if panel mounted.

b. Utilize pressure snubber with porous metal discs to provide pulsation dampening on gauge applications as shown on schedule.

c. Provide 1/2 IN stainless steel anti-siphon pigtail inlet connection for hot water and steam applications.

4. Design and fabrication:

a. All components suitable for service at:

1) 250 DEGF.
2) The maximum process temperature to which the gauge is to be exposed.

b. Provide viewer protection from element rupture.

c. Calibrate gauges at jobsite for pressure and temperature in accordance with Manufacturer's instructions.

Unless otherwise required by codes, provide stem mounted or flush mounted, as required.

d. Equip with white faces, black numerals, and black pointers.

e. Gauge tapping position to be clear of equipment functions and movements and protected from maintenance and operation of equipment.

1) Gauge to be readable from an accessible standing position.

f. Gauge accuracy: 1% of full range.

g. Select gauge range so that:

1) The normal operating value is in the middle third of the dial.
2) Maximum operating pressure does not exceed 75% of the full-scale range.

h. Schedule:

TAG NUMBER	SERVICE	PRESSURE RANGE (PSI)	CASE SIZE (IN)	PROTECTOR REQUIREMENTS	SNUBBER REQ'D
PI-6110A	Digester Sludge	0 – 10	4.5	Diaphragm seal	No
PI-6110B	Digester Sludge	0 – 10	4.5	Diaphragm seal	No
PI-6220A	Digester Sludge	0 – 10	4.5	Diaphragm seal	No
PI-6220B	Digester Sludge	0 – 10	4.5	Diaphragm seal	No
PI-6111	Seal water	0 – 100	4.5	None	Yes
PI-6221	Seal water	0 – 100	4.5	None	Yes

2.3 ISOLATION DEVICES

A. Diaphragm Seal:

1. Manufacturers:

a. Ametek.
b. Ashcroft.
c. Emerson Rosemount.

2. Materials:

a. Lower housing: 316 stainless steel.
b. Diaphragm material: 316 stainless steel.

3. Design and fabrication:

    a. Isolates instrument from process fluids which are corrosive or contain solids.

    b. Upper housing with bleed screw.

    c. Lower housing with flushing connection.

    d. Fill fluid:

        1) Utilize halocarbon fill for process applications involving strong oxidizing agents.

            a) Agents include but are not limited to: Cl2, KMNO4, FeCl, NaOH, and NaOCl.

        2) Utilize Manufacturer's standard fill for other applications.

            a) Ensure fill is suitable for application temperatures.

    e. Process connections:

        1) Instrument: 0.25 IN female NPT.
        2) Process: 0.5 IN female NPT.
        3) PVC pipe applications: Use a socket weld connection.

4. Installed where specified or shown on Drawings.

5. Schedule:

TAG NUMBER	SERVICE
PE-6110A	Digester Sludge
PE-6110B	Digester Sludge
PE-6220A	Digester Sludge
PE-6220B	Digester Sludge

2.4 ACCESSORIES

A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.

1. Materials, unless otherwise specified, shall be as follows:

    a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.

b. Mounting brackets:

1) Standard: 316 stainless steel.
2) Highly corrosive areas: Aluminum.

c. Mounting plates, angles:

1) Standard: Carbon steel.
2) Corrosive areas: 316 stainless steel.

d. Instrument pipe stands:

1) Standard: Hot-dip galvanized 2 IN schedule 40, ASTM A106, Grade B carbon steel.

2) Corrosive areas: 316 stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with Manufacturer's instructions.

B. Provide pressure gages on suction and discharge of each pump and blower and at locations indicated on Drawings or otherwise specified.

C. Provide compound type on pump suction gages which show at least 10 PSI vacuum.

D. Install instrument mounting pipe stands level and plumb.

E. Instrument Valves:

1. Orient stems for proper operation.

2. Install arrays orderly and neat in appearance with true horizontal and vertical lines.

3. Provide a minimum of 2 IN clearance between valve handle turning radii where there are multiple valve handles appearing in a straight line.

4. Valves shall have bonnets and any soft seals removed during welding or soldering into the line.

a. When cool, reassemble the valves.

5. Support each valve individually.

a. The tubing system does not qualify as support for the valve.

F. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.

G. Keep foreign matter out of the system.

H. Remove all oil on piping and tubing with solvent before piping and tubing installation.

I. Plug all open ends and connections to keep out contaminants.

J. Threaded Connection Seals:

1. Use Tite-Seal or acceptable alternate.
2. Use of lead base pipe dope or Teflon tape is not acceptable.
3. Do not apply Tite-Seal to tubing threads of compression fittings.

K. Instrument Mounting:

1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.

2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.

3. Mount instruments level, plumb, and support rigidly.

4. Mount to provide:

   a. Protection from heat, shock, and vibrations.
   b. Accessibility for maintenance.
   c. Freedom from interference with piping, conduit, and equipment.

END OF SECTION

SECTION 40 80 01 – PROCESS PIPING TESTING

PART 1 GENERAL

1.1 SUMMARY

A. Hydrostatic test and pneumatic test for pressure piping.

B. Systems to be tested, type of test to be performed, and test pressure shall be as specified in other sections of Specifications.

1.2 SUBMITTALS

A. Testing Plan:

1. To be submitted for review and approval of the Engineer a minimum one week prior to testing.

2. At a minimum, the plan shall include the following:

a. Testing date and schedule.
b. Piping systems and section(s) to be tested.
c. Test type.
d. Method of isolation.
e. Calculation of maximum allowable leakage for piping section(s) to be tested.
f. Proposed testing equipment to be used.

B. Certifications of Calibration: Testing equipment.

1.3 CLOSEOUT SUBMITTALS

A. Certified Testing Report.

1. Type of test performed.
2. Date and time test performed.
3. Pipeline testing location.
4. Name of person(s) performing test.
5. Testing results, including testing pressure and measured leakage.

PART 2 PRODUCTS – (Not Used)

PART 3 EXECUTION

3.1 PREPARATION

A. Notify Engineer in writing 5 days in advance of testing. Perform testing in presence of Engineer.

B. Pressure Piping:

1. Install temporary thrust blocking or other restraint as necessary to protect adjacent piping or equipment and make taps in piping prior to testing.

2. Wait 5 days minimum after concrete thrust blocking is installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.

3. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.

C. Test section may be filled with water and allowed to stand under low pressure prior to testing.

3.2 HYDROSTATIC TEST FOR PRESSURE PIPING

A. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.

B. Exposed Piping:

1. Perform testing on installed piping prior to application of insulation.

2. Maximum Filling Velocity: 0.25 foot per second, applied over full area of pipe.

3. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.

4. Maintain hydrostatic test pressure continuously for 30 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.

5. Examine joints and connections for leakage.

6. Correct visible leakage and retest as specified.

3.3 PNEUMATIC TEST FOR PRESSURE PIPING

A. Do not perform on:

1. Polyvinyl chloride (PVC) or chlorinated polyvinyl chloride (CPVC) pipe.
2. Piping larger than 18 inches.
3. Buried and other non-exposed piping.

B. Fluid: Oil-free, dry air.

C. Procedure:

1. Apply preliminary pneumatic test pressure of 25 PSI gauge (psig) maximum to piping system prior to final leak testing, to locate visible leaks. Apply soap bubble mixture to joints and connections; examine for leakage.

2. Correct visible leaks and repeat preliminary test until visible leaks are corrected.

3. Gradually increase pressure in system to half of specified test pressure. Thereafter, increase pressure in steps of approximately one-tenth of specified test pressure until required test pressure is reached.

4. Maintain pneumatic test pressure continuously for minimum of 10 minutes and for such additional time as necessary to conduct soap bubble examination for leakage.

5. Correct visible leakage and retest as specified.

D. Allowable Leakage: Piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of leakage.

E. After testing and final cleaning, purge with nitrogen those lines that will carry flammable gases to assure no explosive mixtures will be present in system during filling process.

3.4 FIELD QUALITY CONTROL

A. Test Report Documentation:

1. Test date

2. Description and identification of piping tested

3. Test fluid

4. Test pressure

5. Remarks, including:

a. Leaks (type, location)
b. Repair/replacement performed to remedy excessive leakage

6. Signed by Contractor and Engineer to represent that test has been satisfactorily completed.

END OF SECTION

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT

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SECTION 46 01 70 – DIGESTER ANNULAR SEAL REPAIR

PART 1 GENERAL

1.1 REQUIREMENTS

A. The Contractor shall furnish all tools, equipment, materials and supplies and shall perform all labor required to complete the repair of the digester annular seals on the two digesters at the Kitsap County's Central Kitsap Wastewater Treatment Plant (WWTP).

1.2 REFERENCES, CODES, AND STANDARDS

A. American Society of Testing Materials (ASTM).

1. D4258 Standard Practice for Surface Cleaning Concrete for Coating

B. Code of Federal Regulations (CFR)

1. 29 CFR 1929 Occupational Safety and Health Regulations for Construction.
2. 29 CFR 1926.62, Lead in Construction

C. SSPC – Steel Structures Painting Council, the Society for Protective Coatings

1. Guide 6 Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations

2. SP2 Hand Tool Cleaning

3. SP3 Power Tool Cleaning

4. SP13 Surface Preparation of Concrete

5. VIS 1 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

6. VIS 3 Guide Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning

1.3 SUBMITTALS

A. Complete data on each product and material and proposed location/use for each product.

B. Material Safety Data Sheets for all products used at the jobsite.

C. Work Plan that includes the means and methods for annular seal cleaning including noise and dust control, and for annular seal repair.

PART 2 PRODUCTS

2.1 GENERAL

A. Products shall be delivered to the site in new, unopened containers that are clearly legible at the time of use with the product identification, date of manufacture, and name of manufacturer.

B. The Contractor shall use materials suitable for the intended use and recommended by their manufacturer for the intended service of outdoor, immersed, or non-immersed municipal wastewater treatment plant sewage service.

C. The cost of testing and analysis of proposed substitute material that may be required by the Owner shall be paid for by the Contractor. If the proposed substitution requires changes in the Contract work, the Contractor shall be responsible for all costs affected by the substitution.

2.2 MATERIALS

A. Oakum

B. SikaFix HH LV grout and SikaFix Accelerator

C. 0.45-0.70 mm sand

D. SikaFlex 2C NS Mastic extruded grade

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered and stored in an environment in accordance with the Manufacturer’s recommendations.

B. Upon arrival at the destination, the Owner shall inspect and accept materials prior to use by the Contractor.

3.2 ANNULAR SEAL REPAIR

A. Cleaning of Annular Seal space

1. See Section 02 41 00 for Demolition of existing annular seal.

2. Clean the annular space to remove debris.

B. Repair of Annular Seal

1. Three inches of oakum shall be placed as the bottom layer of new annular seal material. Push the oakum into the void, at maximum to the bottom of the existing skirt, or as far as possible to the top of the existing asphalt layer. Oakum must be placed a minimum of 18 inches from the top of the digester wall.

2. Pour a minimum of 12 inches of 0.45-0.70 mm of clean, dry sand into annular seal void above the oakum layer.

3. Apply a minimum of 6 inches of Sikafix HH LV mixed with Sikafix Accelerator per Manufacturer's recommendation into the annular seal void above the sand layer.

4. Apply top layer mastic seal, thickness per Manufacturer's recommendations. Mastic layer shall be extended over flashing and sloped to avoid ponding per the annular seal repair detail in the Contract Drawings.

3.3 TESTING OF ANNULAR SEAL

A. After the annular seal repair has been completed and allowed appropriate time to set/dry, the system shall be tested as follows:

1. Contractor shall test the seal for gas tightness by filling the digester with plant water to 6 to 12 inches below the bottom of the skirt and pressurizing the air space to 12 inches of water column. Contractor shall coordinate the location for plant water connection with the Owner.

2. Contractor shall test for leaks using two methods: (1) the entire skirt exterior top area shall be checked for leaks by means of a soap suds solution, and (2) the pressure loss shall not exceed ¼-inch of water column after two (2) hours. The two tests may occur simultaneously. If the pressure is not met or leaks are found using the soap suds test, the Contractor shall complete the necessary repairs and re-test.

END OF SECTION

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SECTION 46 02 71 – DIGESTER CLEANING AND REPAIR

PART 1 GENERAL

1.1 SUMMARY

A. This section specifies the removal and disposal of digester content, cleaning, inspection, and repair requirements for the two (2) anaerobic digesters. Access to the digesters shall be through three 48-inch diameter roof access ports (or manways). Access may be available through the upper and lower floor access ports if existing piping is temporarily removed. Contractor shall coordinate inspection of the entire digester, including walls, roof, and skirt, with the Owner and Engineer.

B. Digester repairs and improvements are covered both in this Section and other Sections in this Contract Documents. The Contractor shall coordinate the work and testing requirements of other elements of the Project with the work and testing requirements of this Section.

C. Each digester has a diameter of 65 feet and wall height of 31 feet. The bottom floor is sloped towards the center at a 1:4 slope. Each digester has a fixed, domed, steel cover that was installed in 1991. The Digester Control Building is an integral structure that is between the digesters with a shared wall separating the control rooms from the inside of the digesters. The digesters were last cleaned in 2016 and accumulation of grit, rags, and other debris is to be expected in the bottom cone of the digesters. Record drawings of the digesters and digester cover submittal are included in Appendix F for reference.

1.2 REFERENCES

A. General:

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

1. References to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization, or if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version

associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

B. American Gas Association (AGA)

1. Purging Principles and Practice 2001

C. Code of Federal Regulations (CFR)

1. 29 CFR 1929 Occupational Safety and Health Regulations for Construction.
2. 29 CFR 1926.62, Lead in Construction

D. International Building Code (IBC), the latest Version

E. National Fire Protection Association (NFPA)

1. 54 – National Fuel Gas Code

2. 69 – Standard on Explosion Prevention Systems

3. 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities

1.3 SUBMITTALS

In addition to meeting all the requirements in Special Provisions Section 1-06 of an approved Work Sequencing Plan, the Contractor shall provide the following information:

A. Safety Data Sheets (SDS): Submit SDS's for all products proposed for use, including paint systems, solvents, thinners, and mineral spirits to be used for degreasing, surface preparation and thinning of paint systems for review by the Engineer and approval by the Paint Manufacturer's representative. Applicable SDS's shall be kept on the Site for the entire time such products are present on the Site. See also Section 09 90 00.

B. Start-up and testing plan as specified in Special Provisions Section 1-05.11.

C. Copy of Contractor's or sub-contractors' confined space permit and procedures.

D. Power and water requirement for operation of rehab equipment. This includes items such as lights, ventilation units, pressure washers, concrete saws, concrete core drilling equipment, etc.

E. Submit certification of Department of Ecology (DOE)-approved facility to where the digester content (and thickened solids if applicable) will be hauled.

1.4 SAFETY AND HEALTH REQUIREMENTS

A. Comply with all applicable Washington WISHA, Labor and Industries, DOE, and Department of Health regulations.

B. Conform to all applicable safety requirements set forth by Manufacturer's printed instructions and applicable technical bulletins and manuals.

C. Provide and require the use of personal protective life-saving equipment for persons working within or about the Site.

D. Ladders, Scaffolding and Rigging:

1. All ladders, scaffolding and rigging shall be designed for their intended uses.

2. Ladders and scaffolding shall be erected to facilitate inspection of the entire digestor and where requested by Owner and/or the Engineer and be moved by the Contractor to locations requested by the Owner and/or Engineer.

E. Digester Gas Purging:

1. Purge the digesters with Nitrogen gas in accordance with NFPA 54, NFPA 69, and AGA Purging Principles and Practice.

F. Ventilation:

1. Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof.

2. Ventilation accomplished by educting air, vapors, and other hazardous material from the confined space shall be conducted to reduce the concentration of air contaminants to the degree a hazard does not exist.

3. Forced air eduction during blast cleaning and coating application operations is mandatory.

4. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

G. Protective Equipment:

1. Provide the appropriate protective and safety equipment to all personnel working on the site.

2. Provide for the duration of the coating/painting operations suitable personal breathing apparatus, protective clothing, and safety gear for the use of the Owner and Engineer's on-site representatives.

3. All such equipment shall be provided and maintained in excellent working order and shall be available at all times during painting and coating operations.

H. Grounding: Blasting, spray and air hoses shall be grounded to prevent accumulation of charges of static electricity.

I. Illumination:

1. Spark-proof artificial lighting shall be provided for all work in confined spaces. Light bulbs shall be guarded to prevent breakage.

2. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70: National Electric Code for the atmosphere in which they will be used.

3. Whenever required by the Owner and/or Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Owner and/or Engineer.

J. Noise: Whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices. Dust Prevention and Control: Applicable environmental regulations for dust prevention shall be strictly enforced. Emissions from digester construction activities shall be controlled to be within applicable environmental regulations.

1. Any complaints received by the Owner or Engineer shall be delivered to the Contractor for resolution. The Contractor shall immediately halt the work and shall take whatever corrective action is required to mitigate any such problems.

2. All costs associated with protection of off-site properties and/or correction of damage to property as a result of painting operations shall be borne directly by the Contractor at no additional expense to the Owner.

PART 2 PRODUCTS

2.1 ACCEPTABLE COMPANIES FOR DIGESTER CLEANING

The Owner and Engineer believe the following candidate companies are capable of providing the digester cleaning services that will satisfy the requirements of this Section. This statement, however, shall not be construed as an endorsement of a particular company's services, nor shall it be construed that a named company's standard procedures will comply with the requirements of this Section. Candidate companies include Northwest Cascade Inc., Northwest Industrial Scrub, or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Tank evacuation shall be as specified in Paragraph 3.2. The Contractor shall remove and dispose of the remaining digester contents and clean the digester as specified herein.

B. Cleaning and repair shall be coordinated with the Owner and subject to the constraints specified in Section 01 12 16.

C. The digester interior is considered a hazardous confined space. Contractor shall comply with all local, County, State and Federal rules regarding Entry to Hazardous Confined Spaces. Contractor shall provide the required air changes per hour.

D. The Contractor shall remove for treatment and disposal all liquid, sludge, and debris, including grit, gravel, and rags in the digesters to allow them to be inspected, repaired, and tested as specified. After testing is completed, Contractor shall notify the Owner. The Owner will notify the Contractor of completeness of work.

E. Damage to any parts of the digester during the work specified herein shall be repaired at no cost to the Owner. Damaged items shall be restored to equal or better condition and to the satisfaction of the Owner.

F. Digester repairs shall be on a time-and-material basis and be as directed by the Owner and will be charged against the allowance in the Bid Schedule. This work includes skirt, cover, roof, wall, floor, and interior coating repairs.

3.2 TANK EVACUATION

The Contractor shall be responsible for purging the digester headspace with nitrogen gas. The estimated headspace volume to be purged before digester drawdown is 42,000 cubic feet per digester. The headspace purging will take place prior to the County draining the sludge of the digester.

County personnel will reduce the sludge volume for disposal through draining of the digester contents to the greatest extent feasible. Prior to Contractor's work of cleaning the digester, advance notice shall be provided by the Contractor as detailed in Section 01 12 16. The estimated volume of material to be removed is between 150,000 and 220,000 gallons per digester. Contractor shall haul the material to an appropriate facility for disposal. Provide submittal of DOE approved facility per Paragraph 1.3.E.

The Contractor shall remove all fluid contents and solids, including sludge, scum, grit, sand, and other foreign materials deposited in the digesters. The Contractor shall provide all labor, equipment, supplies and permits for removing, transporting, and disposing biosolids and debris from the digesters and ensure that treatment of biological waste products will be in

accordance with all local, County, State and Federal rules and regulations. The Contractor shall dispose of the biosolids and debris at an appropriate publicly owned treatment works (POTW), or a DOE-approved processing facility for disposal of the biosolids and debris. Contractor is responsible for all costs associated with processing facility disposal requirements, including but not limited to testing, permitting, fees, surcharges, taxes, etc.

If the Contractor chooses to dewater the fluid and solid contents on site, the equipment used for such dewatering shall consistently achieve a solid capture rate of 95 percent. The County will accept, treat, and dispose of the filtrate or centrate from the Contractor's solids dewatering operation provided that the filtrate or centrate is delivered to the plant treatment system (at a location designated by the Owner) at a rate not greater than 200 gallons per minute. The County's existing dewatering equipment will not be available to the Contractor for dewatering material removed from the digesters during cleaning.

3.3 TEMPORARY ODOR CONTROL

A. The Contractor shall provide and operate a temporary mobile activated carbon odor control package system for the digester that is used as a sludge storage tank. The system shall be located outdoor near the digester, at a location approved by the Owner.

B. The minimum capacity of the odor control system shall be 1,000 scfm.

C. The Contractor shall coordinate with the Owner to identify the existing power source for the odor control system.

D. Potential equipment and vendor: VAPORPAC temporary system by ECS

3.4 DIGESTER CLEANING

A. After evacuation of the existing digesters, all interior surfaces shall be washed clean, and the digester walls shall be washed down. The wash water source shall be plant effluent and Contractor shall field coordinate the connection to the effluent water system. This water may be used for cleaning and dilution. Contractor shall remove and dispose of this wash water in accordance with section 3.2, above.

B. Washing of the side walls (concrete or lining) and steel skirt shall be by pressure cleaning to expose existing materials for inspection. Contractor shall select the maximum pressure possible without removing or stripping of coatings, lining, or concrete. Begin pressure washing with a small test area at 250 psi, evaluate the impact, consult with the County to determine an appropriate pressure, and continuously monitor during the course of cleaning to avoid damage.

C. After washing, Contractor shall coordinate with the Owner for inspection by the Owner and Engineer as specified below.

3.5 DIGESTER INSPECTION

A. After the digester has been washed and pressure cleaned, Owner and Engineer will inspect the interior condition of the digester, including, but not limited to, steel skirt, skirt, and wall seal (between skirt and tank wall), underside of the digester dome, interior coatings, and lining. Contractor shall coordinate the inspection of the digesters with the Owner and Engineer and provide required PPE, equipment, and gear needed for safe access and work within the digester.

B. Contractor shall erect a scaffold within the digester to allow the Owner and Engineer inspection of the entire digester interior, generally no more than 3-feet from the surface to be inspected.

C. Contractor shall provide sufficient lighting to fully light the interior of the digesters during inspection.

3.6 DIGESTER REPAIR

A. Contractor shall make repairs as directed by the Owner. The Owner and Engineer will determine the extent of repairs needed during the digester inspection. Anticipated repairs include, but are not limited to, the digester steel skirt, digester steel cover, wall, annular seal, interior coatings, and exterior roof.

B. Reference Contract Drawings S-3 and M-10 and Section 46 01 70 for the requirement of digester metal repair and seal repair.

C. Reference Contract Drawing S-3 for any concrete repair.

D. Reference Section 09 90 00 for coating and lining repairs.

E. Reference Section 07 57 13 for digester roofing repair.

F. All other repairs shall be as directed by the Owner.

3.7 TESTING

After completion of cleaning and repair work, the digesters shall be tested as specified and in accordance with the testing procedures in Section 46 01 70. Testing shall be included in the start-up and testing plan specified in Special Provisions Section 1-05.11.

3.8 COORDINATION WITH OTHER WORK

Contractor shall coordinate other work that will need to be executed while the digesters are off-line and empty for cleaning, inspection, and repair. This work shall include valve replacements, piping improvements, annual seal repair and other work that can only be accomplished when the digesters are empty.

END OF SECTION

APPENDICES

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Dewatering Analysis Report
Central Kitsap Wastewater Treatment Plant
12351 Brownsville Highway Northeast
Poulsbo, Washington

March 10, 2022

Prepared for

Kitsap County
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Dewatering Analysis Report
Central Kitsap Wastewater Treatment Plant
12351 Brownsville Highway Northeast
Poulsbo, Washington

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LIST OF ABBREVIATIONS AND ACRONYMS

µg/L ..... micrograms per liter
bgs ..... below ground surface
County ..... Kitsap County
DRO ..... diesel range organics
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
ft ..... foot/feet
GIS ..... geographic information system
gpm ..... gallons per minute
GRO ..... gasoline range organics
H&H ..... hydrologic and hydraulic
Landau ..... Landau Associates, Inc.
MTCA ..... Model Toxics Control Act
NWTPH-Dx ..... Northwest diesel-range total petroleum hydrocarbon extended
NWTPH-Gx ..... Northwest gasoline-range total petroleum hydrocarbon extended
PID ..... photoionization detector
plant ..... Central Kitsap Wastewater Treatment Plant
POTW ..... publicly owned treatment works
PRV ..... pressure release valve
PVC ..... polyvinyl chloride
USG ..... unstructured grid
UST ..... underground storage tank
WAC ..... Washington Administrative Code

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1.0 INTRODUCTION

This dewatering analysis report summarizes the results of the hydrologic and hydraulic (H&H) engineering design services provided by Landau Associates, Inc. (Landau) in support of the Kitsap County (County) Central Kitsap Wastewater Treatment Plant (plant) project located at 12351 Brownsville Highway Northeast in Poulsbo, Washington (site; Figure 1).

This report has been prepared by Landau based on discussions with and information provided by representatives of Murraysmith and the County, review of available historical geotechnical and hydrogeologic information for the site, data collected during its field investigation and laboratory testing programs, its familiarity with geologic conditions in the vicinity of the site, and its experience with similar projects.

1.1 Project Understanding

Landau understands the County's need to fully dewater and perform maintenance activities on the plant's two digesters. To accomplish this, groundwater levels in the immediate vicinity of the digesters must be lowered to reduce hydrostatic pressures and prevent uplift of the digester structures. The existing dewatering system is no longer functional and must be replaced.

The digesters are located on the eastern portion of the site and are tied together with the plant's control room as one continuous structure, with the digesters flanking the control room to the east and west (see Figure 2, Site Plan). Each digester has an inner diameter of 65 feet (ft), with a constructed depth of approximately 22 ft below ground surface (bgs) at the perimeter, increasing to approximately 30 ft bgs at the center of the structure.

The existing dewatering system servicing the digesters originally included four dewatering wells, an underdrain system, and two monitoring wells, as depicted in Exhibit 1 below. The underslab drains consist of 6-inch-diameter perforated corrugated polyvinyl chloride (PVC) pipe wrapped with a permeable fabric membrane. The underslab drains form two concentric circles below each digester, which tie into the gravel blanket, and a third continuous drain around the combined control building/digester structure. Currently only two of the original dewatering wells and one of the original monitoring wells remain.[1] The dewatering wells are connected to the under-slab drainage system below the digesters and control room. Dewatering wells were installed in an open cut excavation and placed within a minimum 5-foot-wide gravel fill drainage zone (referred to herein as the 'gravel blanket') surrounding the digesters.

[1] The two original dewatering wells immediately north of the digesters and the one monitoring well immediately west of the digesters have presumably been abandoned or decommissioned and are no longer present. As described in Section 5.1, the two southernmost dewatering wells for the thickeners were found and are accessible. It is assumed that these two wells were constructed for the purpose of dewatering around the thickeners only.

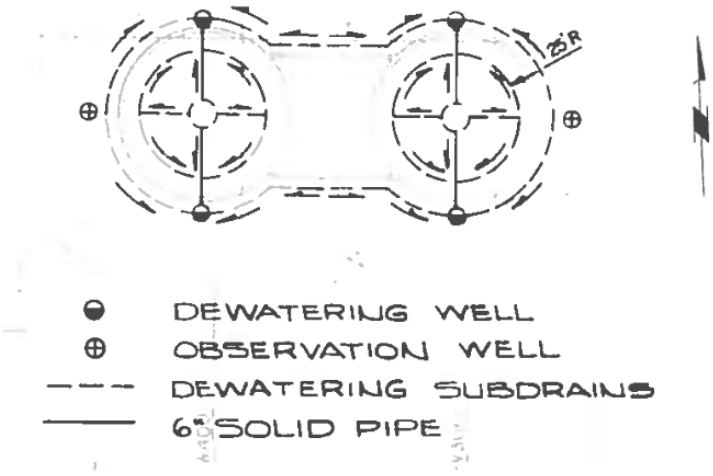

Exhibit 1. Digesters and existing dewatering system layout

In addition to the dewatering system, each digester basin has five pressure release valves (PRVs) comprised of three wall-type PRVs located approximately 4 ft from the top of the basin footings (at approximate elevation 134 ft NGVD29)[2] and two floor-type PRVs installed flush to the basin floor. The basin wall-type PRVs appear to be hydraulically connected to the gravel blanket surrounding the digesters.

1.2 Site History

The site is currently occupied by the Central Kitsap Wastewater Treatment plant, which comprises two primary and secondary clarifiers, four aeration basins, two thickeners, a waste-activated sludge thickening building, two digesters, a digester control building, and other appurtenant structures to support facility operation. The site was first developed in 1977 and has been subsequently upgraded through the Phase I, II, III and IV of the Central Kitsap Wastewater Treatment Facilities Improvement Project.

[2] National Geodetic Vertical Datum of 1929.

There are two former underground storage tanks (USTs) in the immediate vicinity of the digesters, and the site is listed as a leaking UST site by the Washington State Department of Ecology (Ecology). The former USTs are shown in relation to the digesters on Figure 2. Records indicate that two USTs (one 6,000-gallon gasoline UST and one 6,000-gallon diesel UST) at the Kitsap County Wastewater Treatment plant were decommissioned in February 2016 (HydroCon 2016). Contaminated soil is indicated to have been removed during decommissioning activities; however, groundwater contamination was observed in the excavation area. Groundwater analytical results from the 2016 UST decommissioning project indicated that gasoline range organics (GRO), diesel range organics (DRO), and benzene were detected above Ecology's Model Toxics Control Act (MTCA) Method A levels. The 2016 groundwater results exceeding Method A cleanup levels were as follows: GRO at 1,570 micrograms per liter (µg/L), DRP at 3,550 µg/L, and Benzene at 12.9 µg/L. A petroleum release was reported to Ecology and the Ecology site information details (Ecology, Accessed February 4, 2022) are provided in Table 1.

Table 1. Petroleum Release Site Details

Site Identification Information	
Site Name	Central Kitsap Treatment Plant
Site Address	12330 Highway 303 NE, Poulsbo, Washington 98370
Cleanup Site ID	9572
Facility/Site ID	55114724
UST ID	11068
Site Rank	3 – Moderate Risk

Notes:
ID = Identification UST = underground storage tank

1.3 Scope of Services

Murraysmith retained Landau to provide services to support design of a new dewatering system for the County's wastewater treatment plant's digesters. H&H services have been provided by Landau in accordance with the scope outlined in Attachment A of Murraysmith's Agreement for Services, Amendment No. 1, Project Number 20-2840, dated December 13, 2021.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

The following sections summarize the field exploration and laboratory testing program completed for the project. Both geotechnical and environmental analytical laboratory testing were completed to support dewatering analysis and better understand spoils management during construction.

2.1 Field Explorations

Subsurface conditions were explored on December 13 and 14, 2021 by advancing and sampling two hollow stem auger borings (LAI-1 and LAI-2) to depths of approximately 50 ft and one hand auger (HA-1) to a depth of 10 ft. The approximate locations of the explorations are shown on Figure 2, Site Plan. To monitor site groundwater conditions, 2-inch diameter standpipe piezometer monitoring wells were installed in LAI-1 and LAI-2. More detailed discussion of the field exploration program and summary exploration logs are provided in Appendix A. A photolog of samples collected during the field exploration program is provided in Appendix B.

2.2 Laboratory Testing

Soil samples collected during the field investigation program were field-screened for evidence of petroleum hydrocarbon contamination using visual and olfactory observations (sheen and odor) as well as a photoionization detector (PID). Soil samples with no indications of contamination based on the environmental field-screening were collected and transported to Landau's geotechnical soils laboratory for further examination and testing. Several soil samples were submitted to Test America Laboratories, Inc. in Fife, Washington for select environmental analyses to assess potential petroleum hydrocarbon contamination in the immediate vicinity of the digesters. A detailed discussion of the geotechnical and environmental testing is provided in Appendix C.

Geotechnical testing results are summarized on the summary exploration logs provided in Appendix A. Summary test results for the environmental testing program are provided in the following section.

2.2.1 Environmental

Environmental analytical testing was completed on soil and groundwater samples collected from LAI-1 and LAI-2. More detailed discussion of the analytical testing is provided in Appendix C.

Field-screening indicated evidence of possible soil contamination at 7.5 ft bgs at LAI-2. Analytical soil quality results confirmed low-level concentrations (slightly above the MTCA Method A screening level) of GRO at that location and depth. However, the results for the deeper soil sample from LAI-2 and the sample from LAI-1 did not indicate any detections above laboratory reporting limits for any of the petroleum hydrocarbon constituents analyzed. There were also no detections above reporting limits of any of the constituents analyzed in groundwater samples from both LAI-1 and LAI-2.

Based on the GRO result in the soil sample retrieved from 7.5 ft bgs at LAI-2, there does appear to be residual soil contamination. However, detected concentrations are low (slightly above the MTCA Method A screening level) and only identified at one of the locations sampled. In addition, there is no indication of groundwater contamination based on the groundwater samples analyzed. Based on the site history, including a release from one or both USTs to groundwater near the proposed dewatering project described in Section 1.2, Landau recommends monitoring of soil and groundwater during construction and dewatering activities to ensure proper soil and water handling as described in Section 6.1.

2.3 Slug Testing

Slug tests were performed in both LAI-1 and LAI-2 with the objective of estimating the hydraulic conductivity of subsurface soils in the vicinity of the digesters. Slug tests are performed by artificially perturbating the water level in a well and observing the water's recovery to static conditions over time. Perturbation can be accomplished by adding or removing a discrete volume (water or a solid of known volume) to or from the well or by pneumatic (pressurized air) methods. Adding volume to the well results in an initial and sharp increase in water level followed by a gradual fall of the water level back to static conditions (referred to as a 'falling head' test). Removing volume from the well results in the opposite response, or an initial and sharp decrease in water level followed by a gradual rise in the water level back to static conditions (referred to as a 'rising head' test).

Following perturbation, the water-level response curve can be analyzed to estimate the hydraulic conductivity of the soil immediately surrounding the well screen. Slug tests are considered an acceptable method for estimating hydraulic conductivity of relatively low permeability soils (e.g., silt to fine sand) but are not typically used for estimating hydraulic conductivity of highly permeable soils (e.g., coarse sand to gravel) because of the small magnitude of water level perturbation caused and potential confounding factors related to the monitoring well construction parameters.[3]

Slug tests were performed in LAI-1 and LAI-2 using a 43-inch-long, 1.5-inch diameter solid slug. Static water level (i.e., depth to water) was measured manually with a Solinst Model 101 electronic water-level indicator. Water-level response and recovery during the slug tests were measured using a Solinst Model 3001 pressure transducer set to record at a uniform ⅛-second interval. Both falling and rising head tests were conducted and analyzed in LAI-1. However, because LAI-2 is screened across the water table, only rising head tests were completed and analyzed. Water-level data recorded during slug testing was reviewed and three representative tests from each well were selected for analysis. Criteria used to select test data included observed initial displacement (relative to theoretical initial displacement) and overall smoothness of the recovery curve.

[3] The sand pack surrounding a monitoring well screen may be less permeable than the surrounding material in a high permeability setting. In that case, the sand pack may be the limiting factor in the slug test response and the results may be misinterpreted to be representative of the native soil.

Water-level response to the slug tests was analyzed using the Aqtesolv (Duffield 2007) aquifer test analysis software program with the following semi- or fully analytical models:

- Hvorslev 1951
- Bouwer-Rice 1976
- Kansas Geological Survey Model by Hyder et al. 1994.

All three models were adapted by Aqtesolv for use in hydraulic parameter estimation of unconfined aquifer conditions.

The results of slug testing in LAI-1 were considered representative of the native material within which that well is screened and are summarized in Section 4.4.3. The slug tests from LAI-2 were reviewed and determined to be unsuitable for use in this analysis. LAI-2 is screened within coarse material and the results of the slug tests indicated likely interference from the well screen sand pack.[4]

[4] Initial analysis of the LAI-2 slug test data indicated significantly lower than expected hydraulic conductivity values. Based on prior experience, slug testing performed on wells screened in coarse high permeability material results in an underestimate of hydraulic conductivity. For the purposes of this study, the hydraulic conductivity of the coarse gravel blanket fill was estimated based on grain size and textural descriptions of the soil conditions and Landau's understanding of the site hydrogeologic setting.

3.0 PREVIOUS SITE EVALUATIONS

Landau has previously provided geotechnical engineering services for the site under the Phase III and Phase IV plant upgrades. Reports reviewed for this study are listed below. Boring logs from previous studies that were reviewed as part of this report are included in Appendix D.

- Landau Associates. 2011. Report Geotechnical Engineering Services Central Kitsap Wastewater Treatment Plant Phase IV Upgrades, Kitsap County, Washington. July 22.
- Landau Associates. 2008. Report Geotechnical Engineering Services Central Kitsap Wastewater Treatment Plant Phase III Upgrades, Kitsap County, Washington. January 17.

4.0 SITE CONDITIONS

This section describes the geologic and hydrogeologic setting as well as the basic surface and subsurface conditions of the site.

4.1 Geologic Setting

The Puget Lowland has been repeatedly occupied by a lobe of the Cordilleran Ice Sheet—one of two continental glaciers that developed during the recent ice ages of the Quaternary period. The Cordilleran Ice Sheet was centered over the coast ranges of British Columbia. A portion of the ice sheet, termed the Puget Lobe, advanced south from British Columbia to occupy the lowlands of western Washington. The southern termini of the glacial advances were generally in the area of the Black Hills, south of Olympia, Washington.

Between and following these glacial advances, the Puget Lowland was partially filled with alluvial (stream channel) and lacustrine (lake) sediments deposited by runoff from the western slopes of the Cascades and eastern slopes of the Olympics. The Puget Sound area is consequently underlain by a thick, complex sequence of glacial and interglacial sediments.

The most recent glacial advance, which immediately affects the surficial soils of the Puget Lowland, is referred to as the Fraser Glaciation. The Fraser Glaciation is divided into two periods—the Evans Creek Stade, marked by the advance and retreat of the Cascade glaciers, and the later Vashon Stade, when the Puget Lobe advanced and retreated. Radiocarbon dates, summarized by Thorson (1981) indicate that the Puget Lobe occupied the Seattle area about 15,000 years ago, and retreated north of the Seattle area approximately 13,000 years ago.

Geologic information for the project site was obtained from Huntting, et al. (1961), Polenz et al (2013), and Welch et al (2014). Based on the explorations advanced for this study and the available geotechnical information reviewed for the project area, near-surface deposits in the vicinity of the project site consist of undocumented fill and glacial drift. The undocumented fill generally consists of silty sand with variable density. Glacial drift deposits include recessional outwash, glacial till, and advance outwash. Advance outwash and glacial till are glacially overridden deposits and are generally dense to very dense; recessional outwash is deposited by meltwater as the glacier retreats and is generally loose to dense. Surficial geologic maps showing the near-surface soils in the vicinity of the site are provided in Appendix E.

4.2 Hydrogeologic Setting

Groundwater in the general vicinity of the site exists in the fill and glacial drift material. The site is located at a relatively broad groundwater divide, where shallow groundwater north of the site likely flows northward toward Keyport (and discharges to Puget Sound) and shallow groundwater south of the site likely flows southward toward a tributary to Couch Creek (and discharges to Puget Sound at

Burke Bay near Brownsville; Appendix E). The hydraulic gradient beneath the site is likely relative flat. Generally, glacial till exhibits low permeability and glacial outwash (advance and recessional outwash) exhibits moderate to high permeability. The permeability of fill can vary over a large range depending on its makeup. Estimates of site-specific permeability of soils underlying the site are summarized in Section 4.4.3.

4.3 Surface Conditions

The project site is located on the west side of State Highway 303, approximately 1½ miles south of Keyport, Washington. The project site is situated along the western flank of a north-south trending ridge and is surrounded by relatively undeveloped property that is forested by small- to large-diameter deciduous and coniferous trees.

The digesters are located in the northeast quadrant of the site, south of thickeners 1 and 2 and north of the sludge processing and maintenance buildings. The ground surface in this location generally slopes down from southeast to northwest.

4.4 Subsurface Conditions

Landau's understanding of subsurface conditions at the site is based on review of existing geotechnical information and the results of the field investigation program. The approximate locations of the previous and recent explorations are presented on Figure 2.

4.4.1 Soil Conditions

The soil conditions at the site can be categorized into two general units:

- **Fill**: Fill was observed in borings LAI-1, LAI-2, and HA-1 and consisted of sand with variable silt and gravel content or of poorly graded gravel with sand. The fill was generally in a loose to medium dense, moist to wet condition. Fill was observed to depths of 7.5 to 10.0 ft bgs. HA-1 was advanced within the gravel blanket immediately surrounding the digesters and terminated within the engineered fill soils at approximately 10.0 ft bgs.
- **Glacial Drift**: Glacial drift was observed beneath the fill in both boring LAI-1 and LAI-2 and consists of silt with variable sand content or of sand with variable silt and gravel content. The glacial drift was in a hard/very dense, moist to wet condition. LAI-1 and LAI-2 were each terminated in the glacial drift at 50.3 ft bgs.

4.4.2 Groundwater Conditions

During Landau's December 2021 field investigation, groundwater was observed at 12.0 ft bgs at the time of drilling and appeared to stabilize at 8.1 ft bgs in boring LAI-1, 6.7 ft bgs in boring LAI-2, and 8.1 ft bgs in HA-1.

Table 2. Summary of Groundwater Measurements

Monitoring Well ID	Approximate Surface Elevation (ft)	Measured Depth to Groundwater (ft)	
		12/22/21	1/14/22
LAI-1	154.0	8.2	7.1
LAI-2	152.4	6.3	5.9

Notes:
Vertical datum is National Geodetic Vertical Datum of 1929.
ft = feet

Groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors. Furthermore, site groundwater levels are expected to fluctuate seasonally, with maximum groundwater levels occurring during late winter and early spring. Saturated groundwater conditions can be expected to be present within both the fill and the glacial drift material.

4.4.3 Aquifer Hydraulic Characteristics

Site-specific aquifer characteristics for both the fill and the glacial drift material were estimated based on literature values with respect to soil texture descriptions, grain size analysis data, and *in-situ* slug testing.

The fill material can be characterized as either surface fill (i.e., for ground surface grading) or gravel blanket fill (i.e., for drainage around the digester structure). Hydraulic characteristic estimates for each are described below:

- Surface fill: Surface fill material was encountered in both LAI-1 and LAI-2 from ground surface to approximately 9.5 ft bgs. The saturated portion of the surface fill (i.e., the material below the water table and therefore relevant for groundwater flow) is described as gravel with sand (LAI-1) to gravelly poorly graded sand (LAI-2). Literature values of hydraulic conductivity for similar material range from 100 ft per day to 8,500 ft per day (Fetter 2001; Freeze and Cherry 1979; Schwartz and Zhang 2003). Based on grain size data from the LAI-2 soil sample from 7.5 ft bgs and an application of the Hazen (1911) and Shepherd (1989) equations, the hydraulic conductivity of the saturated coarse-grained portion of the surface fill may be as high as 3,600 to 8,000 ft per day, or highly permeable.[5] Specific yield of the surface fill material may be expected to be approximately 0.25 (Fetter 2001).
- Gravel blanket fill: The record design drawings of the digesters indicate a minimum 5-foot-wide gravel blanket fill around the perimeter of the digesters that extends from ground surface down to approximate elevation 124 ft NGVD29, or the level of the bottom of the digester cone footings (i.e., the footings beneath the lowest portion of the digester structure in the middle of each digester basin). The gravel blanket does not appear to extend laterally

[5] Preliminary slug testing was completed in LAI-2, which is screened within the saturated portion of the surface fill but was not used for estimating hydraulic conductivity of the surface fill because slug testing is not appropriate in such high permeability material (the testing is often interfered with by the typically lower permeability sand filter pack installed around the screen so does not provide representative results for the native formation material).

below the floor of the basins. The digesters themselves are likely founded directly on the native glacial drift material, with the underdrain system being trenched in. The gravel blanket fill was encountered throughout the entire 10-ft depth of hand auger HA-1 and was described as gravel with sand and trace silt. Literature values of hydraulic conductivity for such material are high, 100 to 8,500 ft per day, similar to the surface fill described above (Freeze and Cherry 1979; Fetter 2001; Schwartz and Zhang 2003). Grain size data from a sample collected from HA-1 from 6.3 ft bgs and application of the Hazen (1911) and Shepherd (1989) equations indicate that the hydraulic conductivity of the gravel blanket fill may be approximately 3,500 to 5,000 ft per day. Specific yield of the gravel blanket fill material may be expected to be approximately 0.25 (Fetter 2001).

Glacial drift material was encountered below the surface fill in both LAI-1 and LAI-2 from approximately 9.5 ft bgs to the bottom of each boring at approximately 50 ft bgs. The textural descriptions of the glacial drift material varied and included sandy silt (ML), silty fine to coarse sand with varying amounts of gravel (SM), and poorly graded sand (SP). Literature values of hydraulic conductivity for such material ranges from less than 0.1 to 3 ft per day for the ML material, 1 to 60 ft per day for the SM material, and up to approximately 100 ft per day for the SP material (Freeze and Cherry 1979; Fetter 2001; Schwartz and Zhang 2003). Based on grain size data from the LAI-1 and LAI-2 soil samples collected from various depths within the glacial drift material and an application of the Hazen (1911) and Shepherd (1989) equations, the hydraulic conductivity of the glacial drift material is estimated as follows:

- ML material: approximately 4 to 6 ft per day
- SM material: approximately 8 to 40 ft per day
- SP material: approximately 55 ft per day.

The average horizontal hydraulic conductivity of a layered hydrogeologic setting can be estimated with the following formula (which provides an average value that is based on the hydraulic conductivity of individual layers and the proportional thicknesses of those layers; Fetter 2001):

$$K_{average} = \sum_{m=1}^{n} \frac{K_m b_m}{B}$$

$K_{average}$ is horizontal hydraulic conductivity

K_m is the hydraulic conductivity of the m^{th} layer

b_m is the thickness of the m^{th} layer

B is the overall thickness of the aquifer material.

Based on grain-size data estimates of hydraulic conductivity from the samples from LAI-1 and LAI-2 taken from the glacial drift and the thickness of representative layers of ML, SM, and SP material

encountered in the borings, the average horizontal hydraulic conductivity of the glacial drift material between approximately 9.5 to 50 ft bgs is estimated to be approximately 10 to 30 ft per day.

However, due to the density of the glacial drift material encountered in LAI-1 and LAI-2, the actual *in-situ* hydraulic conductivity of the glacial drift may be lower than estimated by grain size data. *In-situ* slug testing at LAI-1, which is screened within portions of ML, SM, and SP material (i.e., all major soil texture categories described in the glacial drift), indicated a hydraulic conductivity estimate of approximately 1 ft per day relatively consistently over several tests. Therefore, the hydraulic conductivity of the native glacial drift material may be within the range of 1 to 30 ft per day.

Specific yield of the observed glacial drift material could be expected to be approximately 0.2.

5.0 DEWATERING ASSESSMENT

Groundwater levels in the vicinity of the digesters will have to be lowered during digester maintenance (i.e., emptying) in order to prevent physical uplift of the digester structure due to hydrostatic pressure and buoyancy effects. This section summarizes Landau's evaluation of the existing dewatering system and provides an assessment of anticipated groundwater dewatering requirements, an estimate of the overall level of effort (i.e., number of wells and pumping rates) to achieve adequate dewatered conditions, and describes a potential dewatering system design to achieve adequate dewatered conditions.

5.1 Existing Dewatering System Evaluation

Landau evaluated the existing dewatering system to assess the feasibility of using the existing system to achieve adequate dewatered conditions in the vicinity of the digesters. This section describes the basic design of the existing system and its current conditions, as observed by Landau.

5.1.1 Existing Dewatering System Design

Landau completed review of select sheets from the 1977 Record Drawings prepared for the plant by URS Company (Appendix F, Sheets G2, G11, G12, S30-S33, M30, M49; hereinafter referred to as the record drawings). According to the plant record drawings, the existing dewatering system for the digesters originally consisted of four vertical dewatering wells connected to an underdrain system. During site inspection, two dewatering wells were identified on the south side of the digesters (see Figure 2, Site Plan).[6] It is unclear whether the additional two dewatering wells for the digesters shown on the record drawings were installed and decommissioned or deemed unnecessary during dewatering system construction.

The design of the existing dewatering system was intended to provide drainage of groundwater from the sides and underneath the digester structure when in operation. Each existing dewatering well consists of a 6-inch diameter PVC well installed within a 24-inch diameter corrugated aluminum casing. The inner PVC wells are perforated with ¼-inch holes or slots; the outer corrugated aluminum casing is also perforated with slots. The annular space between the inner PVC well and the outer corrugated aluminum casing is reportedly filled with pea gravel. Both existing wells are fitted with submersible pumps that were wired to operate automatically based on water level sensors within the wells. The discharge of each pump exits the well casing via a pitless adapter and reportedly is routed to the nearest respective stormwater catch basin.

[6] An additional two wells are located north of the digesters and immediately adjacent to (on the south side of) the thickeners. These two additional wells, referred to herein as the "Thickener DW-1" and "Thickener DW-2" wells, are not equipped with pumps and were presumably installed for groundwater dewatering in the immediate vicinity of the plant thickeners. Groundwater was measured in the Thickener DW-1 well during a December 8, 2021 site visit to be approximately 6.5 ft bgs, similar to the existing dewatering wells for the digester structure.

The existing dewatering wells are presumably installed within the gravel blanket fill around the perimeter of the digester structure. Notes from the record drawings indicate backfill material was comprised of structural base top course, referred to herein as "gravel blanket fill." Material composition of the gravel blanket fill was verified during the field exploration program (in HA-1). The material test data from HA-1 samples indicate a clean gravel with sand, which is consistent with the record drawings.

The digester underdrain system was reportedly designed to be hydraulically connected to the gravel blanket fill surrounding the digesters. Underslab drainpipes consist of 6-inch-diameter corrugated PVC pipe wrapped with a permeable geotextile fabric. Drainpipes extend horizontally below each of the digester structures and connect to the corrugated aluminum casing of the two vertical wells. A third drainpipe extends around the perimeter of the combined digester/control room structure, tying into the gravel blanket fill at approximate elevation 138 ft NGVD29. A schematic of the existing dewatering system is provided in Appendix F, Sheet G11. While the horizontal drainpipes were likely installed within gravel bedding material, it is unknown whether the entire digester structure is underlain with a gravel drainage bed or if the digester structure rests mostly (or to a significant extent) on native glacial drift material.

5.1.2 Existing Dewatering System Conditions

Landau evaluated the existing dewatering wells during a site visit on December 8, 2021 by interviewing plant maintenance staff regarding the past performance and operation of the wells, video scoping one of the wells, performing a short pumping test, and performing a water quality analysis. At the time of the site visit, the depth to water was measured to be approximately 6.3 ft bgs in the western of the two existing wells (referred to herein as "DW-SW") and approximately 6.0 ft bgs in the eastern of the two existing wells (referred to herein as "DW-SE"). The DW-SE well was sounded to a total depth of approximately 23.5 ft bgs and had a soft bottom, likely due to silt or other material settling to the bottom of the well. An obstruction in the DW-SW well was encountered at approximately 17.1 ft bgs and prevented a sounding of the total well depth.

According to plant staff, the existing dewatering wells have not been operated for many years. At some time in the past, potentially in the early 1990s, the submersible pumps were pulled from the wells for inspection and maintenance. At that time, the pump impellers required replacement due to excessive wear, presumably due to damage from sand pumping (i.e., infiltration of sand from the formation and/or filter pack into the well during pump operation; plant staff recalled gritty or silty material within the pump assembly). The well pumps are wired to the plant's electrical system; the electrical breakers for the pump circuit are located within the digester control building and were in the 'on' position at the time of the Landau site visit. Two Warrick® Controls electrical boxes (presumably with relays connected to conductance meters in the wells for start/stop signals, or a similar control system) are mounted to the south wall of the lower level of the digester control building. Despite being wired electrically, the pumps are currently inoperable for unknown reasons.

A submersible camera was lowered into the DW-SW well to inspect the conditions within the well casing and screen. The inside surface of the inner PVC well casing beneath the water surface appeared to be heavily covered in a soft material (likely biofilm) that sloughed off in thick pieces when contacted by the camera. The holes or perforations in the well casing (indicated in the plant record drawings) were not visible. At approximately 17.1 ft bgs (or 18.1 ft below top of casing), the camera was obstructed with what appeared to be a small diameter (e.g., 1-inch) pipe, possibly associated with the submersible pump or an unknown obstruction in the well.

Following the video scan, a short—approximately 50-minute—pumping test was performed on the DW-SW well using a separate temporary submersible pump (Water Spout II). The average flow rate during the test was measured, using the bucket test method, as approximately 3.5 gallons per minute (gpm). Approximately 3.0 ft of drawdown was observed at the end of the test, for a short-term specific capacity of approximately 1.2 gpm per ft. Assuming approximately 11 ft of available head in the well (17.1 ft depth to pump minus 6.3 ft bgs depth to water) and a specific capacity of 1.2 gpm per ft, the potential pumping rate that may be expected from existing dewatering well DW-SW is approximately 13 gpm.[7]

Immediately after beginning the pumping test and toward the end of the 50-minute pumping period, water quality samples were collected for a well condition assessment by Water Systems Engineering, Inc. The first sample (collected at the beginning of the pumping test) provided an indicator of well casing conditions (i.e., the water first being pumped had been sitting in the well casing for some time); the second sample (collected at the end of the pumping test) provided a better indicator of aquifer conditions (i.e., the water having traveled from the aquifer into the well). The well condition water quality samples provided the following findings and indications:

- elevated iron (particularly high for the casing sample) and manganese, indicating a potential for chemical scale accumulation on down-hole metal components (e.g., pump materials);
- elevated sulfate and phosphate, particularly in the aquifer sample, indicating a high potential for bacterial growth;
- elevated silica levels in both the casing and aquifer samples, indicating movement of formation material into the well during pumping;
- very high levels of adenosine triphosphate in both samples, indicating biofouling is occurring within the well and likely outside of the well (i.e., within the gravel-filled annular space between the inner PVC well and the outer aluminum casing and/or in the formation itself); and
- positive results for sulfate-reducing bacteria (with higher levels in the aquifer sample), as well as iron-oxidizing bacteria and other species that tend to cause biofouling.

[7] In reality, the specific capacity of the well may be reduced at pumping rates higher than the tested rate of 3.5 gpm, leading to a lower potential pumping rate. However, the available head may be greater than 11 ft if the existing pump is removed and a separate pump is lowered deeper than 17 ft bgs, possibly leading to a higher potential pumping rate.

Overall, the results of the well condition water quality analyses indicate a high likelihood of chemical encrustation, physical plugging, and biofouling of the well and surrounding gravel pack and/or formation. Well rehabilitation in such conditions—coupled with the well design including a large annular space and two perforated casings between the inside of the well and the formation—is unlikely to provide lasting improvements (i.e., rehabilitation success would likely be limited and short-lived). The results of the well condition water quality analyses are provided in Appendix G.

5.2 Dewatering Requirements

Groundwater dewatering (or lowering) in the material surrounding the digesters is recommended during digester drainage for maintenance activities in order to reduce the risk of hydrostatic pressure-induced buoyancy (i.e., lift) of the digester structure and to reduce inflow of groundwater into the digesters via the pressure relief valves installed in the walls and bottom of the digesters. According to the findings of Landau's geotechnical explorations, the digesters appear to have been built into an excavation within relatively low permeability glacial drift material. According to the plant record drawings and Landau's hand auger HA-1, the digester structure appears to be surrounded by relatively high permeability fill material (i.e., the gravel blanket fill described in Section 4.4.3) and the plant ground surface around the digesters was graded with additional fill material (i.e., the surface fill described in Section 4.4.3).

The glacial drift, gravel blanket fill, and surface fill material is saturated with groundwater up to approximately 146 ft NGVD29[8] (or roughly 7 to 8 ft bgs at the outer wall of the digester). As such, the lower approximately 3 ft of the surface fill (and the more permeable/coarse portion of the surface fill), the gravel blanket fill, and a portion of the glacial drift material will need to be dewatered prior to digester maintenance. Because the surface fill and glacial drift appear to be in hydraulic connection (via groundwater flow) with the gravel blanket fill material surrounding the digesters, dewatering the gravel blanket fill is likely the most efficient way of achieving necessary lowered groundwater conditions.

For the purposes of this dewatering analysis, Landau is assuming a target drawdown groundwater elevation of 130 ft NGVD29 in the immediate vicinity of the digesters. To achieve such dewatered conditions and considering the 'cone of depression' that develops in the groundwater levels surrounding a pumped well, groundwater will likely need to be lowered in the immediate vicinity of the pumped dewatering wells to the base of the gravel blanket fill, or approximate elevation 124 ft NGVD29.

5.3 Dewatering Simulations

To estimate the level of effort (i.e., pumping rates and number of wells) that may be required to achieve anticipated dewatered groundwater conditions and to provide information for a dewatering

[8] National Geodetic Vertical Datum of 1929.

system design, Landau simulated groundwater pumping in the vicinity of the digesters using a MODFLOW three-dimensional numerical flow model (model). The model setup, simulations, and results are described within this section.

5.3.1 Model Setup

To estimate pumping rates and evaluate strategies to achieve adequate dewatered conditions for digester maintenance, the model was built to represent simplified hydrogeologic conditions in the vicinity of the digester structure. The model was run using Aquaveo's™ GMS graphical user interface, which is a geographic information system- (GIS-) based software program that provides convenient visualization and manipulation of MODFLOW input variables and output solutions. The model was run using the MODFLOW-USG (unstructured grid) version of the MODFLOW code in transient mode (which allows for simulation of changing drawdown over time as pumping progresses). The model was used to obtain estimates of discharge rates and dewatering efficiency on a timeframe assumed to be relevant to construction activities (i.e., days to weeks). As such, the model was set up to run for 31 simulated days. The first day represented steady-state non-pumping (i.e., static) conditions; days 2 through 31 represented a 30-day pumping period to allow for stabilized drawdown conditions to be achieved.[9]

The model domain was built to extend 10,000 ft in both east-west and north-south directions with the plant at approximately the center of the model. The model boundaries are therefore approximately 5,000 ft from the plant in any direction in order to minimize numerical effects from the model boundaries on the simulated dewatering. The lateral discretization of the model grid was set up using the quadtree/octree function within MODFLOW-USG such that model cells in the vicinity of the digester outer structure walls and the simulated gravel blanket fill area around the digesters were 1 ft by 1 ft square to allow for numerically stable simulation of steep hydraulic gradients at the transition between dissimilar materials (e.g., glacial drift and gravel blanket fill or gravel blanket fill and the digester structure) and the model cells away from the plant area and toward the model boundaries, expanded to 500 ft by 500 ft square (to reduce computational requirements during model runs). The model grid construction is depicted on Figure 4.

The top and bottom of the model was assigned a uniform elevation of 155 ft NGVD29 (i.e., just above ground surface at the digesters) and 105 ft NGVD29, respectively, for a total model thickness of 50 ft. The model was built using three layers, with layer 1 generally representing the surface fill material and layers 2 and 3 generally representing the glacial drift material. However, hydraulic parameters values were assigned to layers 1 and 2 around the digester location to represent both the digester structure as well as the gravel blanket fill material surrounding the digesters. Specifically, the model

[9] Actual dewatering may be sustained for greater than 30 days, depending on digester maintenance activities. In the simulations, the groundwater levels and pumping rates stabilized after approximately 10 days; therefore, the simulated stabilized pumping rates can be considered reasonable for dewatering durations that extend beyond 30 days. The simulated stabilized dewatered conditions were intended to provide an estimate of the level of effort required to sustain dewatered conditions, once achieved.

layers and hydraulic parameters values were set up to replicate the simplified subsurface conditions beneath the site, as shown on Figure 4 and described below:

- Layer 1: from 155 ft NGVD29 (top of model) down to 145 ft NGVD29, or approximately 10 ft thick, representing the following material:
  - Surface fill for the majority of the lateral extent of the model domain (except for in the immediate vicinity of the digesters, as described immediately below)
  - Gravel blanket fill for an approximately 5- to 10-ft-wide strip surrounding the outer wall of the digester structure
  - Digester structure itself, which is hydraulically isolated from the aquifer by the relatively impermeable concrete walls of the structure
- Layer 2: from 145 ft NGVD29 down to 124 ft NGVD29, or approximately 21 ft thick, representing the following material:
  - Glacial drift for the majority of the lateral extent of the model domain (except for in the immediate vicinity of the digesters, as described immediately below)
  - Gravel blanket fill for an approximately 5- to 10-ft-wide strip surrounding the outer wall of the digester structure
  - Digester structure itself, which is hydraulically isolated from the aquifer
- Layer 3: from 124 ft NGVD29 down to 105 ft NGVD29 (bottom of model), or approximately 19 ft thick, representing glacial drift material throughout the entire lateral extent of the model domain.[10]

The hydraulic parameter (i.e., hydraulic conductivity and specific yield) values assigned to each simulated subsurface material in the model were based on the estimated aquifer hydraulic characteristics of the materials (Section 4.4.3) and are summarized below:

- Surface fill (the majority of layer 1): hydraulic conductivity of 5,000 ft per day, chosen as a conservatively high value within the range of 3,600 to 8,000 ft per day, estimated based on grain size analyses of the saturated coarse-grained fill material; and a specific yield of 0.25, based on literature values for similar material
- Gravel blanket fill (a small portion of layers 1 and 2 in a 5- to 10-ft-wide ring around the digesters): hydraulic conductivity of 5,000 ft per day, chosen conservatively as the upper end of the range of 3,500 to 5,000 ft per day, estimated based on grain size analyses of the blanket fill material observed from hand auger HA-1; and a specific yield of 0.25, based on literature values for similar material
- Glacial drift (the majority of layer 2 and all of layer 3): two scenarios with varying hydraulic conductivity were simulated, as described below, with specific yield assigned as 0.2 for both scenarios (based on literature values):

[10] In this model setup, the digester structure is simulated as resting directly on the native glacial drift material and does not include a gravel underdrain/bedding material that is in direct hydraulic connection with the gravel blanket fill surrounding the digesters.

  - Low permeability drift scenario: hydraulic conductivity of 1 ft per day, based on the results of slug testing in LAI-1, or the low end of the range of site-specific estimates; this scenario was modeled to provide a conservative simulation of whether the groundwater levels within the glacial drift directly beneath the digester structure (simulated to *not* be in direct hydraulic connection to the gravel blanket fill via a continuous gravel underdrain system) would be expected to be lowered adequately by pumping from within the gravel blanket fill
  - High permeability drift scenario: hydraulic conductivity of 30 ft per day, based on the upper end of the range of averages, estimated with grain size data from the glacial drift material samples; this scenario was modeled to provide a conservative simulation with respect to anticipated lateral flow of groundwater from the glacial drift material into the gravel blanket fill during pumping conditions (higher permeability would lead to higher volumetric lateral groundwater flow, which in turn would lead to higher required pumping rates to achieve dewatered conditions)
- Digester structure (a small portion of layers 1 and 2, including the two digesters and the control building): an arbitrarily very low hydraulic conductivity (1e-7 ft per day) and storage coefficient (1e-5) to simulate the hydraulic disconnection between the digester structure and the surrounding groundwater system.

Vertical anisotropy was assigned a conservative value of 1.0 for all model layers.[11] A specified-head (CHD) boundary condition was applied to all model outer perimeter cells (for all three layers) of 148 ft NGVD29, resulting in the bottom 3 ft of the surface fill material (in layer 1) being saturated under pre-pumping conditions. Aerial recharge was assigned to layer 1 throughout the model domain (except for on the digester structure) at a relatively low rate of 0.001 ft per day to represent light precipitation.

Dewatering pumping was simulated with the "Drain" package in MODFLOW using points that represent dewatering wells within the gravel blanket fill of layers 1 and 2. In MODFLOW, once water is simulated to flow from groundwater to a drain, it is completely removed from the model (i.e., it represents a situation where discharge water is managed with existing stormwater/sewer infrastructure and is not re-infiltrated to ground). The bottom elevation of the drains in layer 1 was set to just above 145 ft NGVD29 (just above the base of layer 1) and in layer 2 was set to 124.1 ft NGVD29, just above the base of the gravel blanket fill.[12] The drains were assigned an arbitrarily high 'conductance' value to allow for the simulated aquifer geometry and hydraulic characteristics—not the drain/well pumping rate—to be the limiting factor for discharge rates per drain.

[11] This vertical anisotropy value is considered conservative because it likely results in a slight overestimate of vertical groundwater flow (and therefore overall groundwater flow in general) through what is in reality a depositionally layered set of subsurface materials with lower vertical permeability than horizontal permeability.

[12] Because of numerical instabilities introduced when an active layer is simulated to run dry in MODFLOW, the dewatering simulations were each run with two similar models, both with the basic setup described herein but one representing dewatering of the upper 3 ft (to the bottom of layer 1) and the other representing dewatering the remaining portion of the gravel blanket fill.

5.3.2 Model Simulations

Model runs were performed using both low- and high-end estimates of hydraulic conductivity values for the glacial drift material (as summarized in 5.3.1) to obtain baseline estimates of required volumetric pumping rates from the gravel blanket material to achieve and maintain lowered groundwater levels in the vicinity of the digesters. Simulated overall pumping rates from the gravel blanket material were assessed in both early time (within the first day of pumping) and later time (after approximately 10 or 15 days of pumping). Simulated pumping rates in the first day of pumping (while dewatered conditions are first being established) are generally higher than longer-term pumping rates needed to maintain already-established dewatered conditions, though pumping rates tended to level out relatively quickly (i.e., within approximately 5 days).

Total simulated pumping rates from the drains (i.e., simulated dewatering wells) throughout the transient simulations were obtained using the UGrid flow budget versus time tool in GMS. The total estimated pumping rates (from layers 1 and 2) for each scenario (low and high permeability glacial drift) were compiled and assessed, as summarized below.

5.3.3 Estimated Drawdown and Pumping Rates

The model was successfully used to simulate dewatering of the shallow surface fill (in the vicinity of the digesters) and also the gravel blanket fill surrounding the digesters. In both the low- and high-permeability glacial drift scenarios, the gravel blanket fill was dewatered down to approximately 125 ft NGVD29 throughout the perimeter of the digester structure and the simulated head in the glacial drift directly beneath the digesters was lowered to approximately 130 ft NGVD29.

The initial (day 1) and stabilized (day 10) pumping rates simulated to achieve dewatered conditions for each scenario are summarized below:

- Low permeability glacial drift scenario: initial total pumping rate of approximately 1,200 gpm with stabilized total pumping rate of approximately 300 gpm
- High permeability glacial drift scenario: initial total pumping rate of approximately 2,000 gpm with stabilized total pumping rate of approximately 500 gpm.

5.4 Dewatering System Design

This section describes potential design considerations for recommended new dewatering wells, a new monitoring well immediately west of the digesters, and testing of the dewatering wells.

5.4.1 New Dewatering Wells

Due to the condition of the existing dewatering system and uncertainty regarding its current effectiveness, as described in Section 5.1, the existing dewatering wells are unlikely to be capable of providing adequate pumping rates, even if rehabilitated, to achieve necessary dewatered groundwater conditions. Therefore, Landau recommends a new dewatering system to be installed,

tested, and operated prior to draining the digesters for maintenance. New dewatering wells must be constructed in accordance with Washington Administrative Code (WAC) Chapter 173-160.

Based on the information analyzed in this report, Landau estimates that four wells are required to achieve dewatered groundwater conditions throughout the footprint of the digester structure to approximately 130 ft NGVD29 or lower. The four new wells should be placed within the gravel blanket fill (i.e., within 5 ft of the digester structure) and generally located north and south of each digester, within the constraints of existing buried utilities and digester wall footings.

Based on the simulated high permeability glacial drift scenario described above, each of the four wells would need to be capable of producing 125 to 500 gpm. The new wells should be located and screened within the gravel blanket fill material. The depth of the well screens will therefore be dependent on the depth of the gravel blanket fill, which is assumed—based on the plant record drawings—to extend to the depth of the digester structure footings at approximately 124 ft NGVD29 (or approximately 30 ft bgs), and a blank casing sump is recommended below the well screens to allow for pump placement beneath the screens for additional drawdown in the wells. Based on those basic design constraints (i.e., target pumping rate and overall depth), potential well design and construction parameters are provided below for consideration for the design of the new dewatering wells. The actual dewatering system design should be prepared by the selected contractor for the project.

- Dewatering Well Material:
  - Casing:
    - Diameter: 10-inch nominal, to accommodate an anticipated 6.5-inch diameter pump capable of discharging up to 500 gpm at an assumed 40 ft of total dynamic head
    - Material: low-carbon steel
    - Cased intervals (for planning purposes; actual intervals to be determined based on soil encountered): 2 ft above ground to 20 ft bgs (above the screen) and 30 ft bgs to 40 ft bgs (below the screen)
    - Wellhead completion: 2 ft above ground stick-up with welded flange and temporary bolted cover plus two protective bollards (placed on the opposite side of the wells from the digesters to protect against inadvertent vehicular contact)
  - Screen:
    - Diameter: 10-inch pipe size, to accommodate an anticipated 6.5-inch diameter pump capable of discharging up to 500 gpm at an assumed 40 ft of total dynamic head
    - Material: Type 304 stainless steel
    - Slot size: 150-slot size (or 0.150-inch) openings, a conservatively small size to retain approximately 50 percent of the gravel blanket fill (per grain size

analysis of the sample collected at 6.3 ft bgs in HA-1), to be verified or modified with additional grain size analysis from the screen interval depth during drilling

    - Screened interval: 10-ft screen from 20 to 30 ft bgs, or with the bottom of the screen placed at the base of the gravel blanket fill

- Installation
  - Natural filter pack
  - Surface seal of bentonite or cement at least 2 inches thick extending to at least 10 ft bgs and within 3 ft of top of screen
- Development
  - Surge with surge disc (or swab) with rubber disk(s) cut to fit closely within screen inside diameter, surge with repeated up-and-down oscillatory movement in 2- to 3-ft sections of screen for 30 minutes each section. Measure material produced from formation after swabbing each section. Bail material as necessary. Surging/swabbing is complete when material produced from all sections of screen over 15 minutes is less than 0.25 inch, or at the direction of the engineer
  - Bail all material from bottom of well when surging/swabbing is complete
  - Install temporary submersible pump capable of pumping up to 600 gpm and pump at a rate that draws water level down to a target level within 5 ft of the top of the screen (but does not draw water level down into screen) and sustain that pumping rate until the discharge water is clear (<25 nephelometric turbidity units and 10 milligrams per liter sand content).

5.4.2 Monitoring Well

In addition to the new dewatering wells, one new monitoring well should be installed on the west side of the digesters and within the gravel blanket fill material. The monitoring well should be 2-inch PVC, with a 10-ft-long 0.030-inch slot screen with an artificial filter pack. The bottom of the monitoring well should be placed at the base of the gravel blanket fill or 30 ft bgs, whichever is deeper. The monitoring well should be installed in accordance with Chapter 173-160 WAC. The monitoring well should include a flush-mount wellhead set in a concrete monument. Following completion of the monitoring well, it should be developed to provide hydraulic connection between the well and the surrounding formation material.

5.4.3 Well Testing

The wells should be tested following well development. Testing should consist of a step-rate test at each well and a combined pumping test with multiple new dewatering wells in operation. The step-rate test on each well should be used to determine a sustainable yield from each well and should consist of pumping at three successively higher rates for one hour at each step. The pumping rates for the step-rate test may be between 50 and 500 gpm. Following the step-rate test in each new dewatering well, a longer 24-hour constant-rate test should be performed by pumping the new dewatering wells at a constant and sustained rate, to be determined in consultation with Landau, for

24 hours. Prior to and throughout the pumping tests, water levels should be monitored in the pumped wells, the new monitoring well, the existing monitoring well located on the east side of the digesters, and in the old dewatering wells. Water level measurements should be converted to drawdown and elevation to assist in assessing the effectiveness of the dewatering system design. Discharge water should be managed in cooperation with plant staff and facilities.

6.0 CONSTRUCTION CONSIDERATIONS

This section provides recommendations relevant to construction considerations based on the information summarized above.

6.1 Spoils Handling

Spoils handling during construction includes handling of soil generated through well installation activities and groundwater generated through dewatering activities.

6.1.1 Soil

Landau anticipates that approximately 5 cubic yards of soil will be generated as part of well installation activities. Soils from well borings should be field-screened using visual, olfactory, and photo-ionization methods for evidence of petroleum hydrocarbon contamination and analyzed, as described below, to determine a proper disposal facility. The contractor should manage and dispose of soil in accordance with MTCA and other applicable regulations (e.g., Washington Dangerous Waste regulations).

Waste characterization sampling should include:

- Logging information for each soil sample, including the approximate sample location, the Unified Soil Classification System description, physical evidence (visual observations and olfactory indications of potential contamination), and field screening.
- Transferring soil samples into laboratory-supplied containers in accordance with proper sample-handling procedures. Each sample container should be labeled with the media type, collection date and time, sample identification and number, project name and number, and sampler's initials.
- Completing and maintaining the required chain-of-custody laboratory forms and placing samples in a chilled cooler for transport to an analytical laboratory accredited by Ecology.

Based on the results of previous environmental investigations and field screening, samples should be analyzed for the following parameters at a minimum (analysis may include additional constituents, depending on the requirements of the soil disposal facility):

- GRO by Northwest gasoline-range total petroleum hydrocarbon extended (NWTPH-Gx),
- DRO and oil range organics by Northwest diesel-range total petroleum hydrocarbon extended (NWTPH-Dx),
- Volatile organic compounds by US Environmental Protection Agency (EPA) Method 8260, and
- Resource Conservation and Recovery Act 8 Metals by EPA Method 6000/7000.

Soil samples will be analyzed with an appropriate turnaround time to expedite proper disposal and minimize disruption to the project schedule.

The information in Ecology's *Guidelines for Remediation of Petroleum Contaminated Sites* (Table 12.1 *Guidelines for Reuse of Petroleum-Contaminated Soil* and Table 12.2 *Description and Best Management Practices for Soil Categories in Table 12.1* (Ecology 2016), should be used in conjunction with the laboratory analytical results to determine appropriate methods of offsite disposal or reuse. Soils confirmed to be contaminated at or above Category 3 must be removed from the site within 90 days of confirmation.

To characterize and profile incoming waste, disposal and recycling/reuse facilities require representative analytical data as well as information regarding the waste generator. Individual facility permits have site-specific restrictions on accepted waste types; however, general profiling/analytical requirements are similar across facilities. Hazardous and non-hazardous waste transport must be documented via a hazardous waste manifest or bill of lading, respectively.

6.1.2 Groundwater

Dewatering activities are anticipated to require groundwater pumping of up to 2,000 gpm initially and up to 500 gpm after groundwater level stabilization occurs. Based on the monitoring well sampling from the proposed dewatering area, no groundwater contamination appears to be present in the immediate vicinity of the digester structure. However, contaminated groundwater may be present in the area of the historical leaking UST and associated petroleum release (See Section 1.2). As dewatering activities occur outside of the digesters, it is possible that contaminated groundwater from the nearby UST release, may be transported toward the digesters and captured by the dewatering system. It is recommended to install an additional new monitoring well in the immediate vicinity of the decommissioned UST location (see Figure 2) to further evaluate potential groundwater contamination and migration at the site.[13] The UST area monitoring well should be 2-inch PVC, with a 15-ft-long 0.010-inch slot screen with an artificial filter pack. The screened interval of the well should be placed such that it is crossing the water table prior to dewatering activities and extends below the anticipated groundwater drawdown. The groundwater level at the former UST site during drawdown is anticipated to be between elevation 137 and 143 feet NGVD29. Landau expects that the well will require a 15-foot screen section between 5 and 20 feet bgs.

The well should be installed in accordance with Chapter 173-160 WAC. The UST area monitoring well should include a flush-mount wellhead set in a concrete monument. Following completion, the well should be developed to provide hydraulic connection between the well and the surrounding formation material.

[13] This additional new monitoring well, referred to herein as the UST area monitoring well, is separate from and in addition to the new monitoring well discussed in Section 5.4.2 to be used for measuring groundwater levels and the effectiveness of dewatering activities. The UST area monitoring well is intended to assess current potential groundwater contamination from the historical UST release at the site.

Groundwater samples should be collected from the UST area monitoring well prior to dewatering activities. Groundwater samples should be analyzed for:

- Gasoline-range total petroleum hydrocarbons by Ecology-approved method NWTPH-Gx
- Diesel- and oil-range total petroleum hydrocarbons by Ecology-approved method NWTPH-Dx
- Benzene, toluene, ethylbenzene, and xylenes, 1,2-dichloroethane, and methyl tert-butyl ether by EPA Method 8260
- Ethylene dibromide by EPA Method 8011.

Groundwater concentrations should be compared to the plant's National Pollutant Discharge Monitoring Elimination System permit limits or other published or permitted discharge limits for the plant. If petroleum contaminated groundwater is identified at the UST area monitoring well and/or generated through dewatering, the extracted groundwater will require pre-treatment prior to discharge.

If potentially contaminated groundwater will be generated, treated, and/or discharged to a sanitary sewer, an industrial waste discharge authorization or pre-treatment permit may be required. The contractor shall comply with all applicable Kitsap County code and other plant pre-treatment and discharge requirements.

7.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of Kitsap County for specific application to the Central Kitsap Wastewater Treatment Plant project. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

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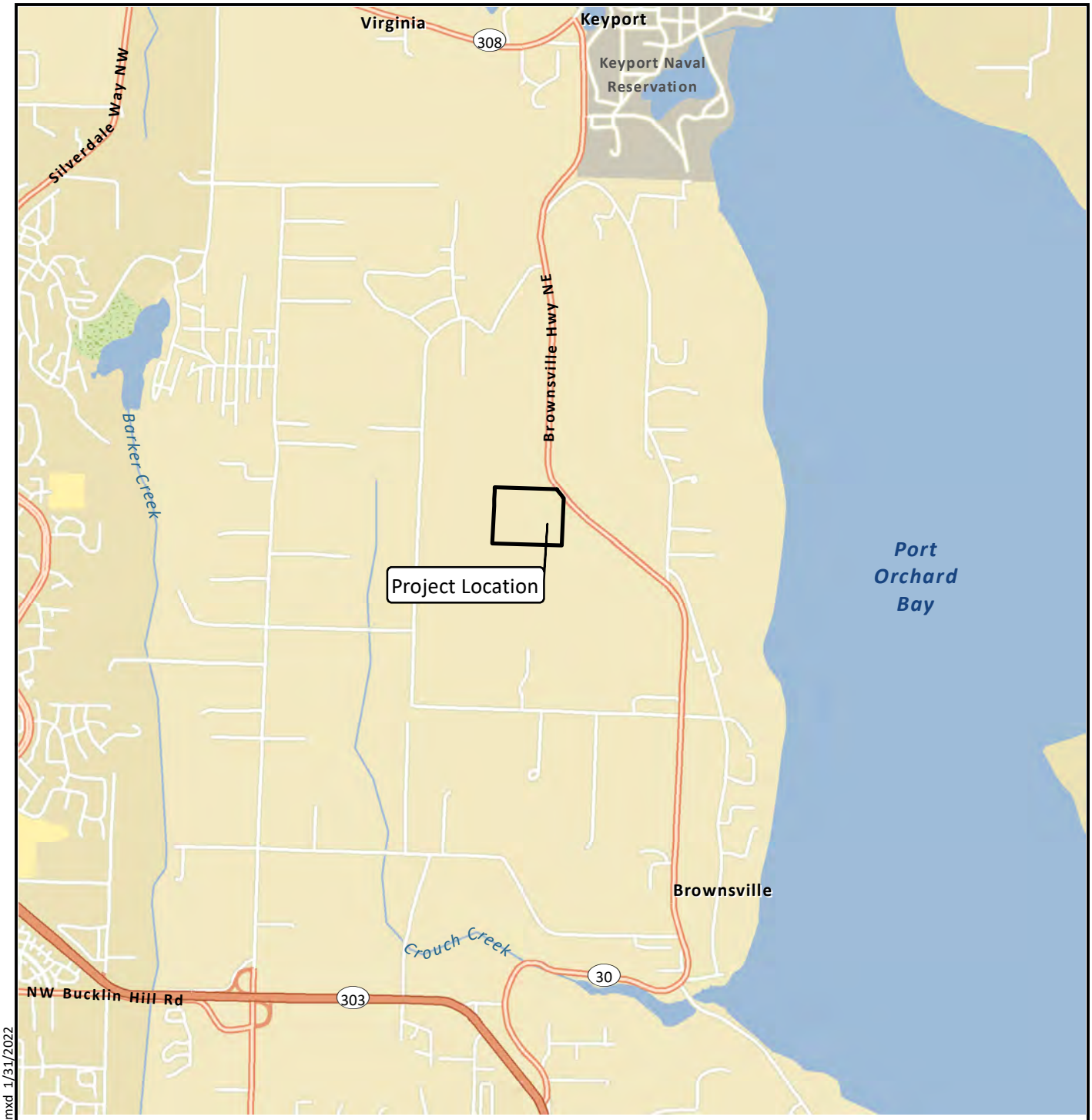

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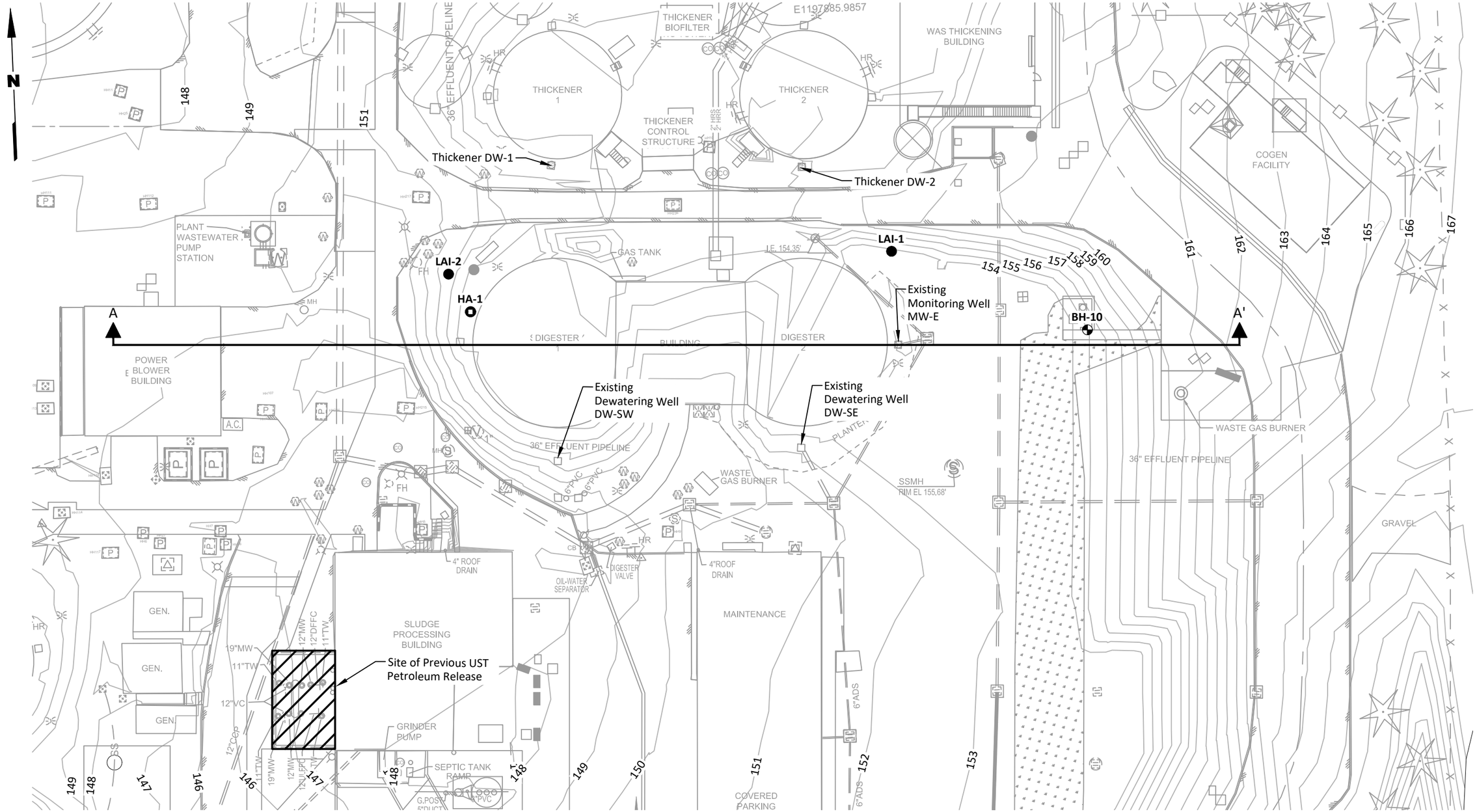
Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Vicinity Map**	Figure 1



Legend

LAI-1 ●	Monitoring Well by Landau Associates, Inc.
HA-1 ◘	Hand Auger by Landau Associates, Inc.
BH-10 ⊕	Boring by HWA (1994)
A A'	Cross Section Location

0 40 80

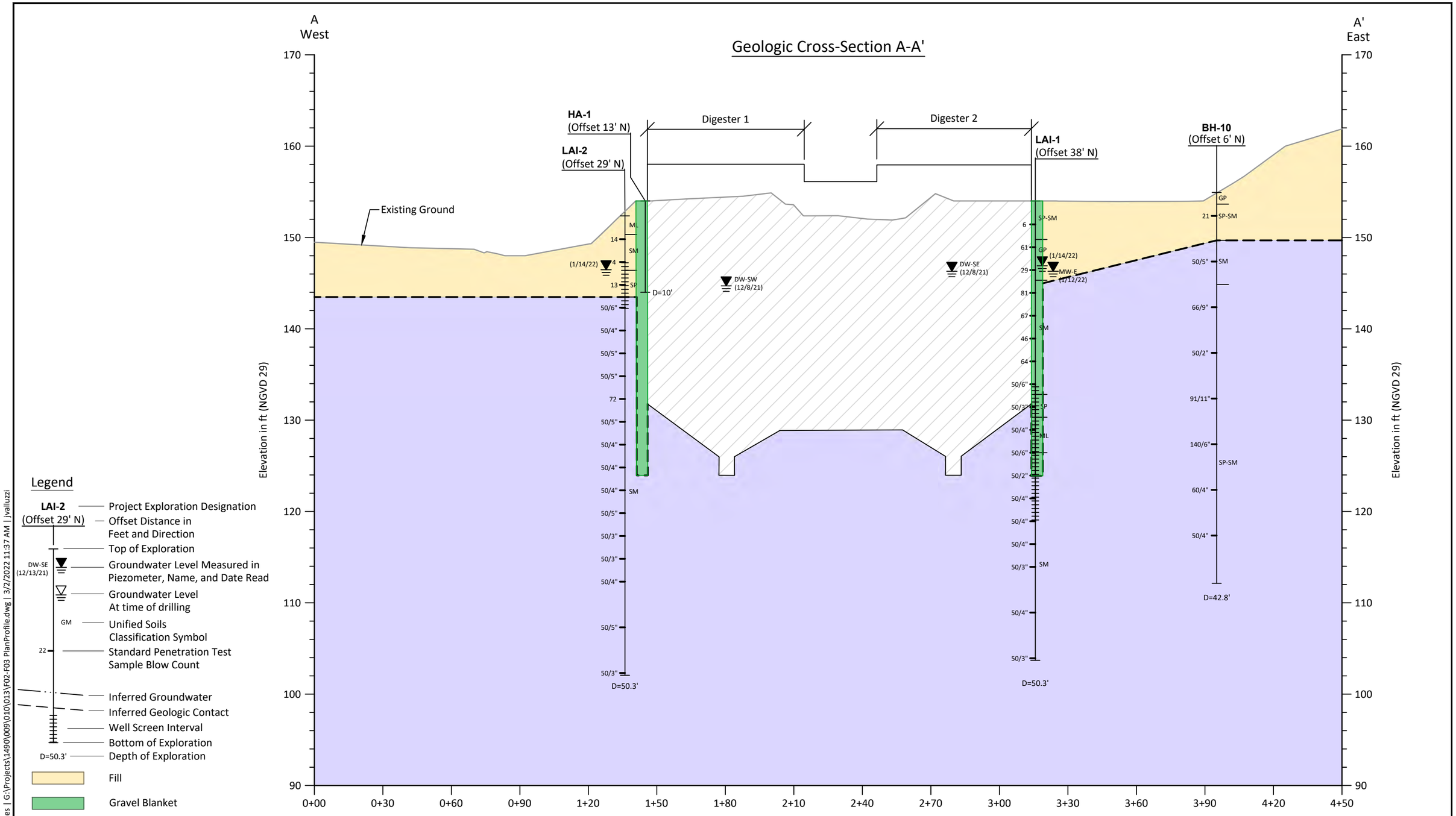
Scale in Feet

Survey Source: Brown and Caldwell, 2022

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Site Plan**	Figure 2

LANDAU ASSOCIATES

Geologic Cross-Section A-A'



Legend

- **LAI-2** (Offset 29' N) — Project Exploration Designation; Offset Distance in Feet and Direction
- Top of Exploration
- DW-SE (12/13/21) — Groundwater Level Measured in Piezometer, Name, and Date Read
- Groundwater Level At time of drilling
- GM — Unified Soils Classification Symbol
- 22 — Standard Penetration Test Sample Blow Count
- Inferred Groundwater
- Inferred Geologic Contact
- Well Screen Interval
- Bottom of Exploration
- D=50.3' — Depth of Exploration
- Fill
- Gravel Blanket
- Glacial Drift
- Structure

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

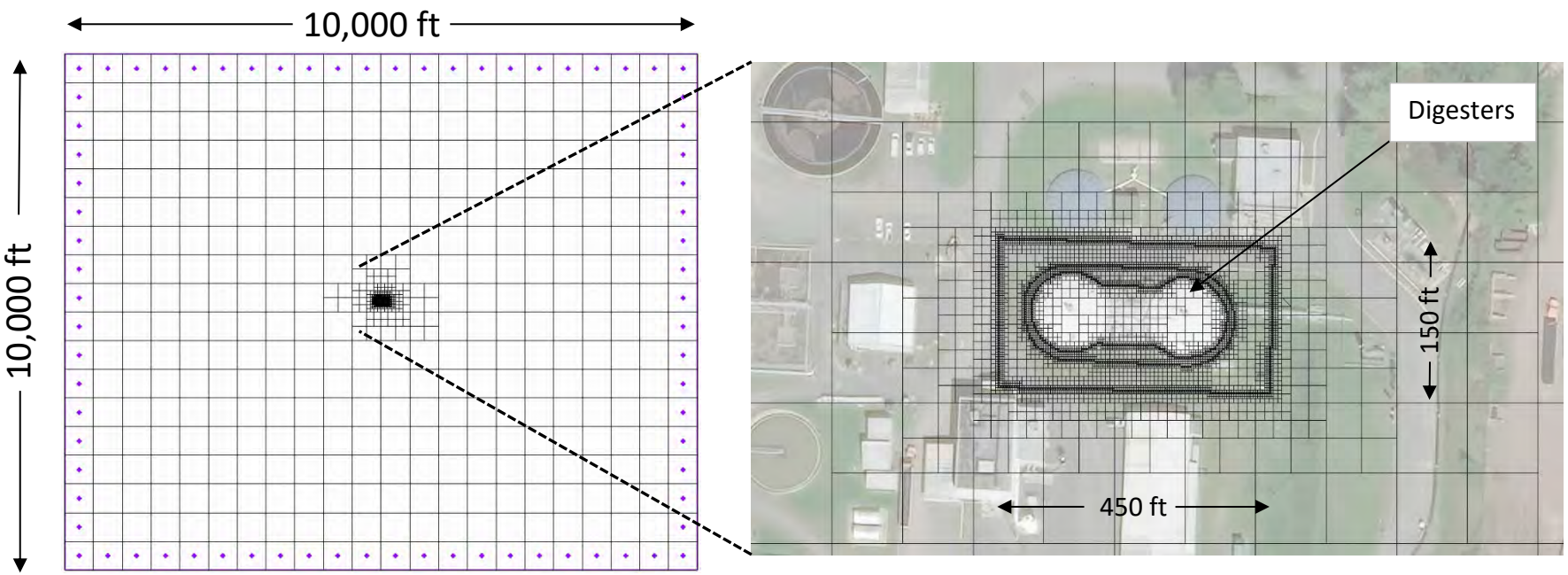
Horizontal Scale in Feet: 1"=40'
Vertical Scale in Feet: 1"=10'

0 40 80
Scale in Feet

Survey Source: Brown and Caldwell, 2022

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Geologic Cross Section**	Figure 3

LANDAU ASSOCIATES



Grid Cell Dimensions:

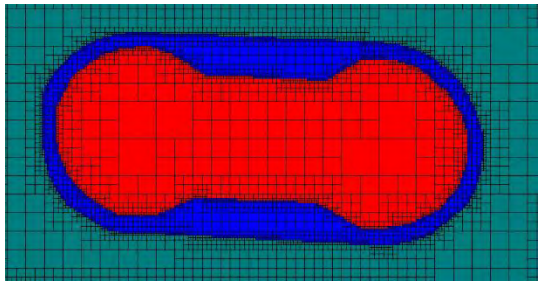
-1 ft x 1 ft in direct vicinity of digesters

-up to 500 ft x 500 ft away from digesters

Constant Head Boundary Condition

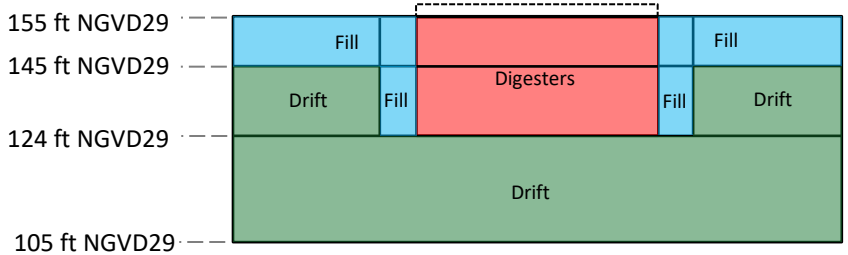
-Model perimeter: 148 ft NGVD29

Hydraulic Conductivity (Layer 2 shown for reference)



Cross Section through Model (Plant Vicinity)

(NOT TO SCALE AND NOT SHOWING ALL GRID CELLS)



Digester Structure (~0 ft/day)

Surface & Gravel Blanket Fill (5,000 ft/day)

Glacial Drift (1 or 30 ft/day)

Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plan Poulsbo, Washington	**Model Grid Construction**	Figure 4

APPENDIX A

Field Exploration Program

APPENDIX A
FIELD EXPLORATIONS

Borings

Site subsurface conditions were explored in December 2021 by advancing two hollow-stem auger borings to 50.3 feet (ft) below ground surface (bgs) and one hand-auger boring to 10.0 ft bgs. Holocene Drilling, Inc., subcontracted by Landau Associates, Inc. (Landau), advanced the hollow-stem auger borings. A Landau representative advanced the hand-auger boring.

The field exploration program was coordinated and monitored by Landau personnel, who also obtained representative soil samples, maintained a detailed record of the subsurface soil and groundwater conditions observed, and described the soil encountered by visual and textural examination. Each representative soil type was described using the soil classification system shown on Figure A-1, in general accordance with ASTM International standard test method D2488*, Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).*

Summary boring logs are presented on Figures A-2 through A-3. The stratigraphic contacts shown on the logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The soil and groundwater conditions depicted are for the specific dates and locations indicated and may not be representative of other locations and/or times.

Observations of groundwater conditions were made during drilling. The groundwater conditions encountered during drilling are presented on the boring logs and represent a short-term condition, which may or may not be representative of the long-term groundwater conditions at the site. Disturbed soil samples were obtained from the hollow-stem auger borings at 2.5- or 5-ft intervals. Disturbed samples were collected using a 1.5-inch inside-diameter, standard penetration test, split-spoon sampler. A 140-pound automatic hammer, falling a distance of approximately 30 inches, was used to drive the sampler 18 inches (or a portion thereof) into the undisturbed soil. The number of blows required to drive the sampler the final 12 inches (or a portion thereof) of soil penetration is noted on the boring logs. Upon completion of drilling and sampling, the hollow-stem auger boreholes were decommissioned in general accordance with the requirements in Washington Administrative Code 173-160. The hand-auger boring was backfilled with excavated soil.

Samples were transported to Landau's soils laboratory for further examination and testing. Test results and a discussion of the testing procedures are presented in Appendix C.

Monitoring Wells

Two standpipe piezometer monitoring wells were installed in borings LAI-1 and LAI-2 to depths of 35 and 10 feet, respectively. The monitoring wells were constructed using 2-inch-diameter polyvinyl chloride (PVC) casing. The depth to which the casing was installed was selected based on Landau's observations of subsurface soil and groundwater conditions encountered in the boring. The lower

portion of the casing was slotted to allow entry of water into the casing. Medium sand was placed in the borehole annulus surrounding the slotted portion of the casing. A bentonite seal was placed above and below the slotted portion of the casing. Monitoring wells were protected by installing flush-mount steel monument set in concrete. Completion details for the monitoring well are shown on the summary boring logs, Figures A-2 and A-3.

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

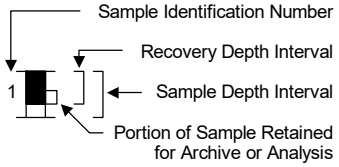
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time after drilling/excavation/well

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington

Soil Classification System and Key

Figure A-1

LAI-1

LAI Project No: 1490009.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL** (DOE#: BNP-032)

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): 154.0 (NGVD 29)
Drilled By: Holocene Drilling Inc.
Logged By: AOF Date: 12/13/21

Moisture Content (%) — Plastic Limit — Liquid Limit (20 40 60 80)
▲ SPT N-Value ▲ △ Non-Standard N-Value △ (20 40 60 80)
× Fines Content (%) × (20 40 60 80)

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0							SP-SM	Brown, poorly graded SAND with silt and gravel (loose, moist) **(FILL)**
		S-1	b2	6				(no odor, no sheen, 0 ppm)
	150							
5		S-2	b2	61				- Grades to gray, gravelly and very dense (no odor, no sheen, 0 ppm)
							GP	- Observed broken gravel in the sample tube
		S-3	b2	29	W = 9 -200 = 10			Gray, poorly graded GRAVEL with sand (no odor, no sheen, 0 ppm) (medium dense, wet)
	145						SM	- Observed moderate drill chatter
10		S-4	b2	81	W = 8			Gray, silty, fine to coarse SAND with gravel (no odor, no sheen, 0 ppm) (very dense, moist to wet)
		S-5	b2	67	W = 12 GS			**(GLACIAL DRIFT)**
	140							- Grades to without gravel (no odor, no sheen, 0 ppm)
15		S-6a	b2	46	W = 18			
		S-6b			W = 19 -200 = 71		SP	Gray, fine to coarse SAND
							ML	(no odor, no sheen, 0 ppm) (dense, wet)
		S-7	b2	64	W = 13 GS		SM	Light gray-brown, SILT with sand (no odor, no sheen, 0 ppm) (hard, moist to wet)
	135							
20		S-8	b2	50/ 6"	W = 14			Gray, silty, fine to coarse SAND (no odor, no sheen, 0 ppm) (very dense, wet)
							SP	
		S-9	b2	50/ 3"	W = 21 GS			Gray, poorly graded SAND (no odor, no sheen, 0 ppm) (very dense, wet)
	130						ML	
25		S-10	b2	50/ 4"	W = 9			Gray, sandy SILT (no odor, no sheen, 0 ppm) (very stiff, moist to wet)
		S-11	b2	50/ 6"	W = 15 GS			(no odor, no sheen, 0 ppm)
	125						SM	Gray silty SAND (very dense, wet)
30		S-12	b2	50/ 2"				(no odor, no sheen, 0 ppm)
		S-13	b2	50/ 4"	W = 15 -200 = 48			- Observed moderate drill chatter - Observed 4 inch cobbles in the drilling spoils (no odor, no sheen, 0 ppm)
	120							
35								

Perched
ATD

50/6" 50/3" 50/4" 50/6" 50/2" 50/4"

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington

Log of Boring LAI-1

Figure A-2 (1 of 2)

LAI-1

LAI Project No: 1490009.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL** (DOE#: BNP-032)

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): 154.0 (NGVD 29)
Drilled By: Holocene Drilling Inc.
Logged By: AOF Date: 12/13/21

Moisture Content (%) — Plastic Limit — Liquid Limit — 20 40 60 80
▲ SPT N-Value ▲ △ Non-Standard N-Value △ — 20 40 60 80
× Fines Content (%) × — 20 40 60 80

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description	Moisture / SPT / Fines
35		S-14	b2	50/ 4"	W = 12		SM	Gray silty, fine to coarse SAND with gravel (no odor, no sheen, 0 ppm) (very stiff, wet)	50/ 4"
		S-15	b2	50/ 4"	W = 10 GS			- Grades to moist to wet (no odor, no sheen, 0 ppm)	50/ 4"
	115							- Observed moderate drill chatter	
40		S-16	b2	50/ 3"	W = 12			- Grades to wet (no odor, no sheen, 0 ppm)	50/ 3"
								- Observed heavy drill chatter and slow drilling to 50 ft bgs	
	110								
45		S-17	b2	50/ 4"	W = 12 -200 = 32			(no odor, no sheen, 0 ppm)	50/ 4"
	105								
50		S-18	b2	50/ 3"				- Grades to moist to wet (no odor, no sheen, 0 ppm)	50/ 3"
55									
60									
65									
70									

Boring Completed 12/13/21
Total Depth of Boring = 50.3 ft.

Monitoring Well Completed 12/13/21

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plant
Poulsbo, Washington

Log of Boring LAI-1

Figure A-2 (2 of 2)

LAI-2

LAI Project No: 1490009.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL** (DOE#: BNP-033)

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): 152.4 (NGVD 29)
Drilled By: Holocene Drilling Inc.
Logged By: AOF Date: 12/14/21

Moisture Content (%) — Plastic Limit — Liquid Limit (20 40 60 80)
▲ SPT N-Value ▲ △ Non-Standard N-Value △ (20 40 60 80)
× Fines Content (%) × (20 40 60 80)

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Soil Description
0	150	S-1	b2	14		ML	Brown, gravelly SILT with sand (medium stiff, moist to wet) **(FILL)**
						SM	Gray silty, fine to coarse SAND with gravel (no odor, no sheen, 0 ppm) (medium dense, moist)
5		S-2	b2	4	W = 10 GS		- Observed minor iron staining - Grades to gray-brown, loose and wet (no odor, no sheen, 0 ppm)
	145	S-3	b2	13	W = 15 GS	SP	Gray-brown, gravelly, poorly graded SAND (slight petroleum odor, no sheen, 0 ppm) (medium dense, wet)
10		S-4	b2	50/ 6"	W = 7 GS	SM	- Observed granular, yellow/orange material and broken plastic debris
	140	S-5	b2	50/ 4"			Gray, silty, fine to coarse SAND with gravel (no odor, no sheen, 0 ppm) (very dense, moist to wet) **(GLACIAL DRIFT)** (no odor, no sheen, 0 ppm)
15		S-6	b2	50/ 5"	W = 7 GS		- Grades to moist (no odor, no sheen, 0 ppm) - Observed moderate drill chatter
	135	S-7	b2	50/ 5"	W = 8		(no odor, no sheen, 0 ppm)
20		S-8	b2	72	W = 11 -200 = 38		- Grades to moist to wet (no odor, no sheen, 0 ppm) - Observed heavy drill chatter
	130	S-9	b2	50/ 5"			(no odor, no sheen, 0 ppm)
25		S-10	b2	50/ 4"	W = 11 -200 = 31		(no odor, no sheen, 0 ppm)
	125	S-11	b2	50/ 4"	W = 9		(no odor, no sheen, 0 ppm)
30		S-12	b2	50/ 4"	W = 10 GS		(no odor, no sheen, 0 ppm)
	120	S-13	b2	50/ 5"			- Grades to moist (no odor, no sheen, 0 ppm)
35							

Perched

50/ 6" | 50/ 4" | 50/ 5" | 50/ 5" | 50/ 5" | 50/ 4" | 50/ 4" | 50/ 4" | 50/ 5"

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington

Log of Boring LAI-2

Figure A-3 (1 of 2)

LAI-2

LAI Project No: 1490009.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL** (DOE#: BNP-033)

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): 152.4 (NGVD 29)
Drilled By: Holocene Drilling Inc.
Logged By: AOF Date: 12/14/21

Moisture Content (%) — Plastic Limit — Liquid Limit
20 40 60 80
▲ SPT N-Value ▲
△ Non-Standard N-Value △
20 40 60 80
× Fines Content (%) ×
20 40 60 80

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description	Fines Content (%)
35		S-14	b2	50/ 3"			SM	Gray, silty, fine to coarse SAND (no odor, no sheen, 0 ppm) (very dense, moist to wet)	50/ 3"
	115	S-15	b2	50/ 3"				- Observed heavy drill chatter (no odor, no sheen, 0 ppm)	50/ 3"
40		S-16	b2	50/ 4"				(no odor, no sheen, 0 ppm) - Observed moderate drill chatter and slow drilling to 50 ft bgs	50/ 4"
	110								
45		S-17	b2	50/ 5"					50/ 5"
	105								
50		S-18	b2	50/ 3"				- Grades to with gravel (no odor, no sheen, 0 ppm)	50/ 3"
55									
60									
65									
70									

Boring Completed 12/14/21
Total Depth of Boring = 50.3 ft.

Monitoring Well Completed 12/14/21

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Central Kitsap Wastewater Treatment Plant Poulsbo, Washington

Log of Boring LAI-2

Figure A-3 (2 of 2)

HA-1

LAI Project No: 1490009.010

SAMPLE DATA | **SOIL PROFILE**

Drilling Method: Hand Auger
Ground Elevation (ft): 165 (NGVD 29)
Drilled By: Landau Associates, Inc.
Logged By: AOF Date: 12/13/21

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Groundwater
0	165						GP	
		S-1	d					
5	160	S-2	d		W = 7 GS			Perched
10	155							

Brown to gray-brown GRAVEL with sand and trace silt (loose, moist to wet)
(FILL)

Moisture Content (%)
Plastic Limit — Liquid Limit
20 40 60 80

▲ SPT N-Value ▲
△ Non-Standard N-Value △
20 40 60 80

× Fines Content (%) ×
20 40 60 80

Boring Completed 12/13/21
Total Depth of Boring = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Central Kitsap
Wastewater Treatment Plant
Poulsbo, Washington

Log of Boring HA-1

Figure
A-4

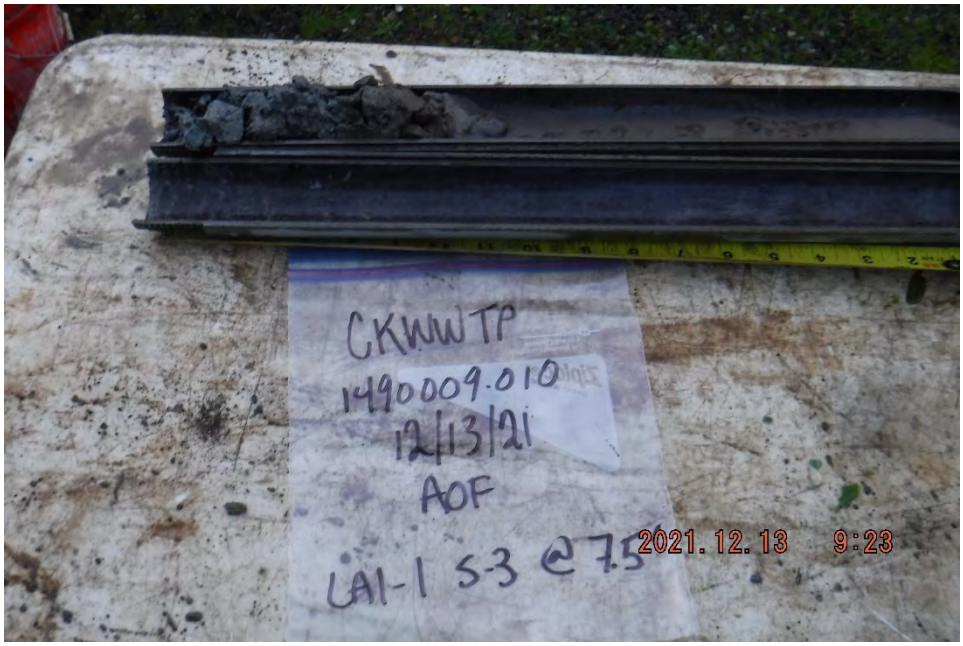
APPENDIX B

Samples Photograph Log

1. Boring LAI-1, S-1, Depth 2.5 feet

2. Boring LAI-1, S-2, Depth 5 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-1



3. Boring LAI-1, S-3, Depth 7.5 feet

4. Boring LAI-1, S-4, Depth 10 feet

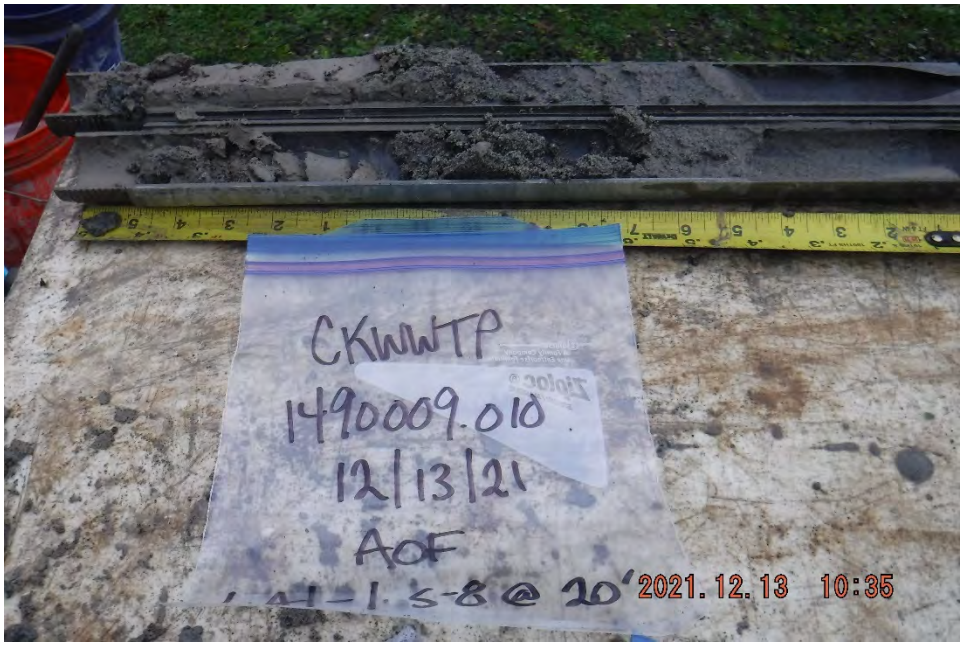
LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-2

5. Boring LAI-1, S-5, Depth 12.5 feet

6. Boring LAI-1, S-6, Depth 15 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-3

7. Boring LAI-1, S-7, Depth 17.5 feet



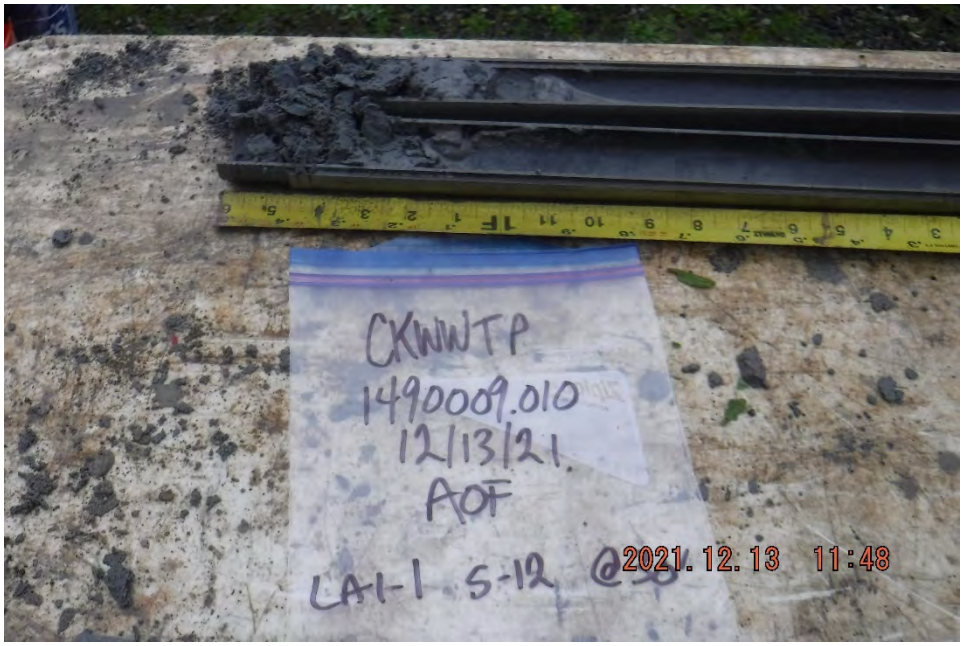
8. Boring LAI-1, S-8, Depth 20 feet

9. Boring LAI-1, S-9, Depth 22.5 feet

10. Boring LAI-1, S-10, Depth 25 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-5

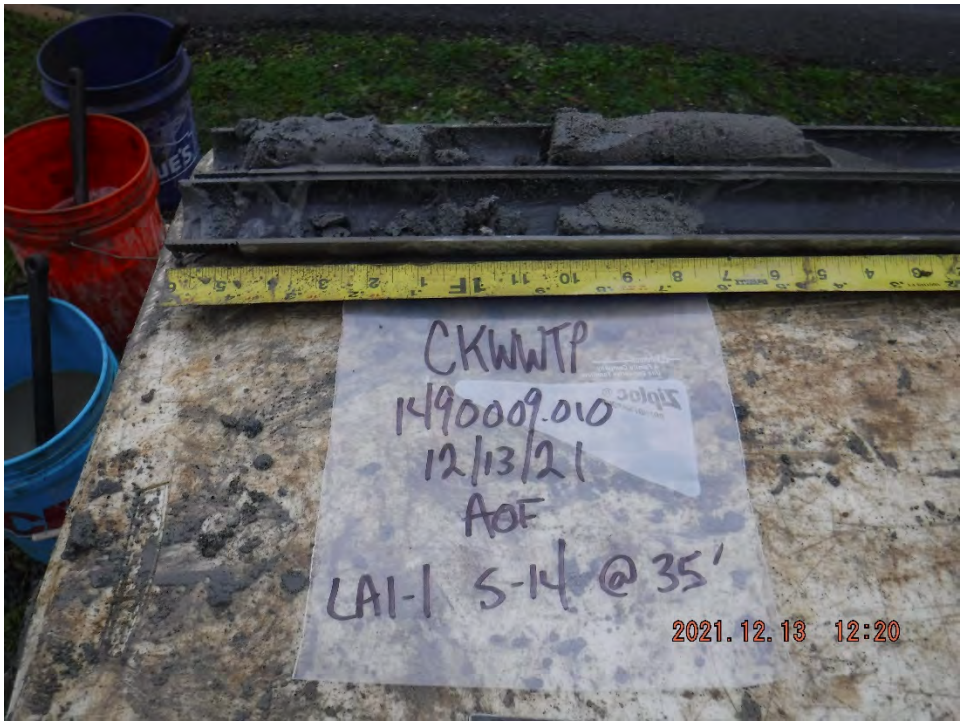
11. Boring LAI-1, S-11, Depth 27.5 feet



12. Boring LAI-1, S-12, Depth 30 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-6

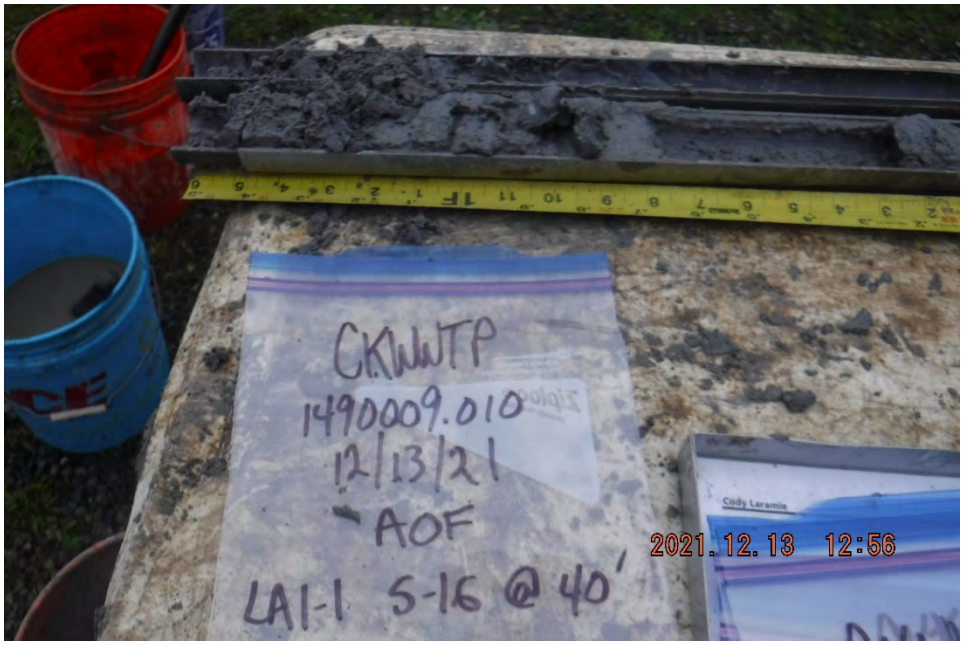
13. Boring LAI-1, S-13, Depth 32.5 feet



14. Boring LAI-1, S-14, Depth 35 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-7

15. Boring LAI-1, S-15, Depth 37.5 feet



16. Boring LAI-1, S-16, Depth 40 feet

17. Boring LAI-1, S-17, Depth 45 feet

18. Boring LAI-1, S-18, Depth 50 feet

19. Boring LAI-2, S-1, Depth 2.5 feet

20. Boring, LAI-2, S-2, Depth 5 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-10

21. Boring, LAI-2, S-3, Depth 7.5 feet

22. Boring, LAI-2, S-4, Depth 10 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-11

23. Boring, LAI-2, S-4B, Depth 11 feet

24. Boring, LAI-2, S-5, Depth 12.5 feet

25. Boring, LAI-2, S-6, Depth 15 feet

26. Boring, LAI-2, S-7, Depth 17.5 feet

27. Boring, LAI-2, S-8, Depth 20 feet

28. Boring, LAI-2, S-9, Depth 22.5 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-14

29. Boring, LAI-2, S-10, Depth 25 feet

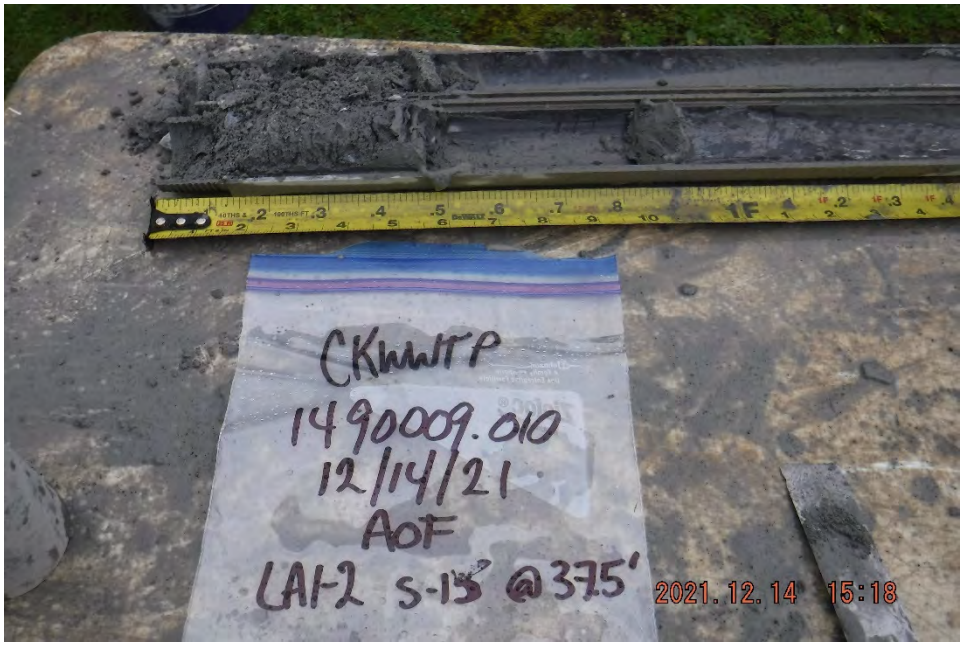
30. Boring, LAI-2, S-11, Depth 27.5 feet

31. Boring, LAI-2, S-12, Depth 30 feet

32. Boring, LAI-2, S-13, Depth 32.5 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-16

33. Boring, LAI-2, S-14, Depth 35 feet



34. Boring, LAI-2, S-15, Depth 37.5 feet

35. Boring, LAI-2, S-16, Depth 40 feet

36. Boring, LAI-2, S-17, Depth 45 feet

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-18

37. Boring, LAI-2, S-18, Depth 50 feet

38. Hand Auger, HA-1

LANDAU ASSOCIATES	Central Kitsap Wastewater Treatment Plant Poulsbo, Washington	**Boring Photograph Log**	Figure B-20

APPENDIX C

Laboratory Testing

APPENDIX C
LABORATORY TESTING

Geotechnical

Samples obtained from the explorations were transported to Landau Associates, Inc.'s (Landau's) soils laboratory for further examination and testing. Geotechnical soil testing was performed in general accordance with the ASTM International (ASTM) standard test methods described below. Field log descriptions were checked against the samples and updated, where appropriate, in general accordance with ASTM standard D2487, *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).*

Natural Moisture Content

Natural moisture content determinations were performed on select soil samples in general accordance with ASTM standard test method D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.* The natural moisture content is shown as "W = xx" (i.e., percent of dry weight) in the "Test Data" column on the summary boring logs in Appendix A.

Grain Size Analyses

Grain size analyses were performed on select soil samples in general accordance with ASTM standard test method D422, *Standard Test Method for Particle-Size Analysis of Soils.* Hydrometer analyses were performed on select soil samples in general accordance with ASTM standard test method D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.* Samples selected for grain size analyses are designated with a "GS" in the "Test Data" column on the summary boring logs in Appendix A. The results of the grain size analyses are presented on Figures C-1 through C-4 in this appendix.

Environmental

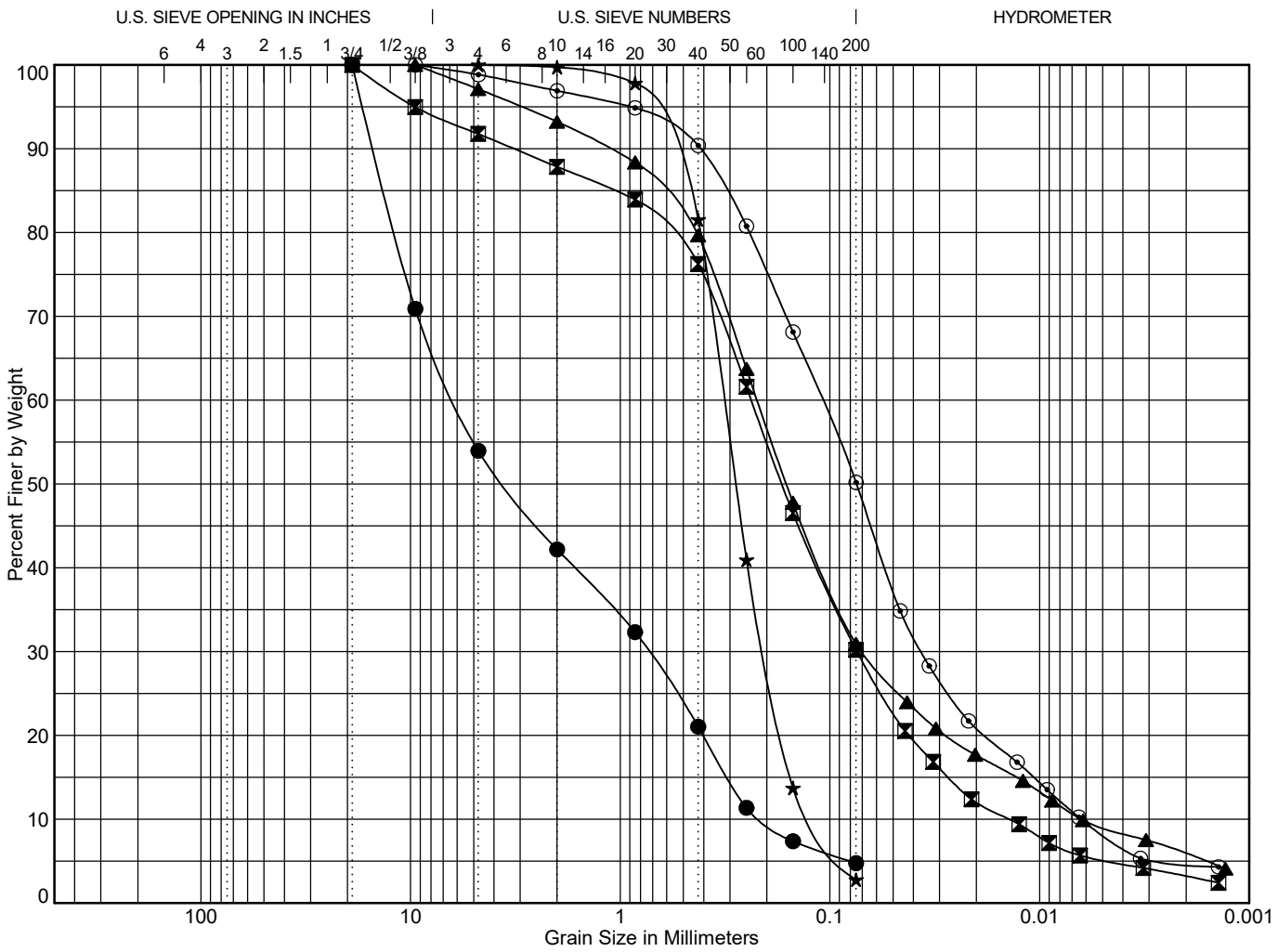
One soil sample from each of soil borings LAI-1 and LAI-2 was collected from above the water table (i.e., from 12.5 feet below ground surface [bgs] at LAI-1 and from 11 feet bgs at LAI-2). An additional soil sample was also collected from LAI-2 at 7.5 feet where indications of possible contamination were identified during field screening. Soil samples were appropriately preserved and submitted for laboratory analysis to TestAmerica Laboratories, Inc. (TestAmerica) located in Fife, Washington. Soil samples were analyzed for gasoline-range organics (GRO), and diesel- and oil-range organics (DRO/ORO) Methods Northwest gasoline-range extended and diesel-range total petroleum hydrocarbon extended (NWTPH-Gx and NWTPH-Dx), respectively; benzene, toluene, ethylbenzene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8260D; and Resource Conservation and Recovery Act (RCRA) 8[1] metals by SW-846 6020B/7471A.

[1] RCRA 8 Metals include arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury.

Groundwater samples were collected from LAI-1 and LAI-2 after monitoring well installation and development. Groundwater samples were collected from the middle of the well screen using low-flow sampling methods and were appropriately preserved and submitted for laboratory analysis to TestAmerica. Groundwater samples were analyzed for GRO and DRO/ORO by Methods NWTPH-Gx and NWTPH-Dx, respectively; BTEX, methyl tert-butly ether (MTBE), and ethylene dibromide (EDB) by EPA Method 8260D; and ethylene dichloride (EDC) by Method 8011.

Soil and groundwater petroleum hydrocarbon analytical results are presented in Tables C-1 and C-2, respectively. The laboratory analytical report is provided in Attachment 1. These data are considered final and have undergone quality assurance review.

Metals detected in soil included arsenic, barium, chromium, and lead; all at concentrations below the respective Model Toxic Control Act (MTCA) Method A screening levels. There were no detections in soil above laboratory reporting limits of any of the petroleum hydrocarbon constituents analyzed for in samples from LAI-1 and the deeper sample (11 ft bgs) from LAI-2. DRO, ORO, benzene, ethylbenzene, and xylenes were not detected above reporting limits in the shallower sample from LAI-2 (7.5 ft bgs). However, toluene was detected at an approximate concentration of 6.4 milligrams per kilogram (mg/kg), below the MTCA Method A screening level (7 mg/kg) and GRO was detected at an approximate concentration of 35 mg/kg, slightly above the MTCA Method A screening level (30 mg/kg). Based on this GRO result, there does appear to be residual soil contamination. However, detected concentrations are low and only appear at one of the locations sampled. There were no detections above reporting limits of any of the constituents analyzed for in groundwater samples.



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

Point		Depth	Classification	LL	PL	PI	C_c	C_u
●	HA-1	6.3	Poorly graded GRAVEL with sand (GP)				0.43	28.94
⊠	LAI-1	12.5	Silty SAND with gravel (SM)				1.67	17.02
▲	LAI-1	17.5	Silty SAND (SM)				3.46	35.14
★	LAI-1	22.5	Poorly graded SAND with trace silt (SP)				1.09	2.71
⊙	LAI-1	27.5	Sandy SILT (ML)				1.93	17.43

Point		Depth	D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	%Coarse Gravel	% Fine Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Fines
●	HA-1	6.3	19	6.082	3.552	0.737	0.21	0.0	46.0	11.8	21.1	16.3	4.8
⊠	LAI-1	12.5	19	0.237	0.169	0.074	0.014	0.0	8.2	3.9	11.6	46.0	30.2
▲	LAI-1	17.5	9.5	0.222	0.161	0.07	0.006	0.0	2.9	3.9	13.5	48.7	30.9
★	LAI-1	22.5	4.75	0.321	0.281	0.204	0.118	0.0	0.0	0.3	18.2	78.8	2.8
⊙	LAI-1	27.5	9.5	0.11	0.075	0.037	0.006	0.0	1.2	1.9	6.5	40.2	50.2

$C_c = D_{30}^2/(D_{60} * D_{10})$
$C_u = D_{60}/D_{10}$

To be well graded: $1 < C_c < 3$ and $C_u > 4$ for GW or $C_u > 6$ for SW

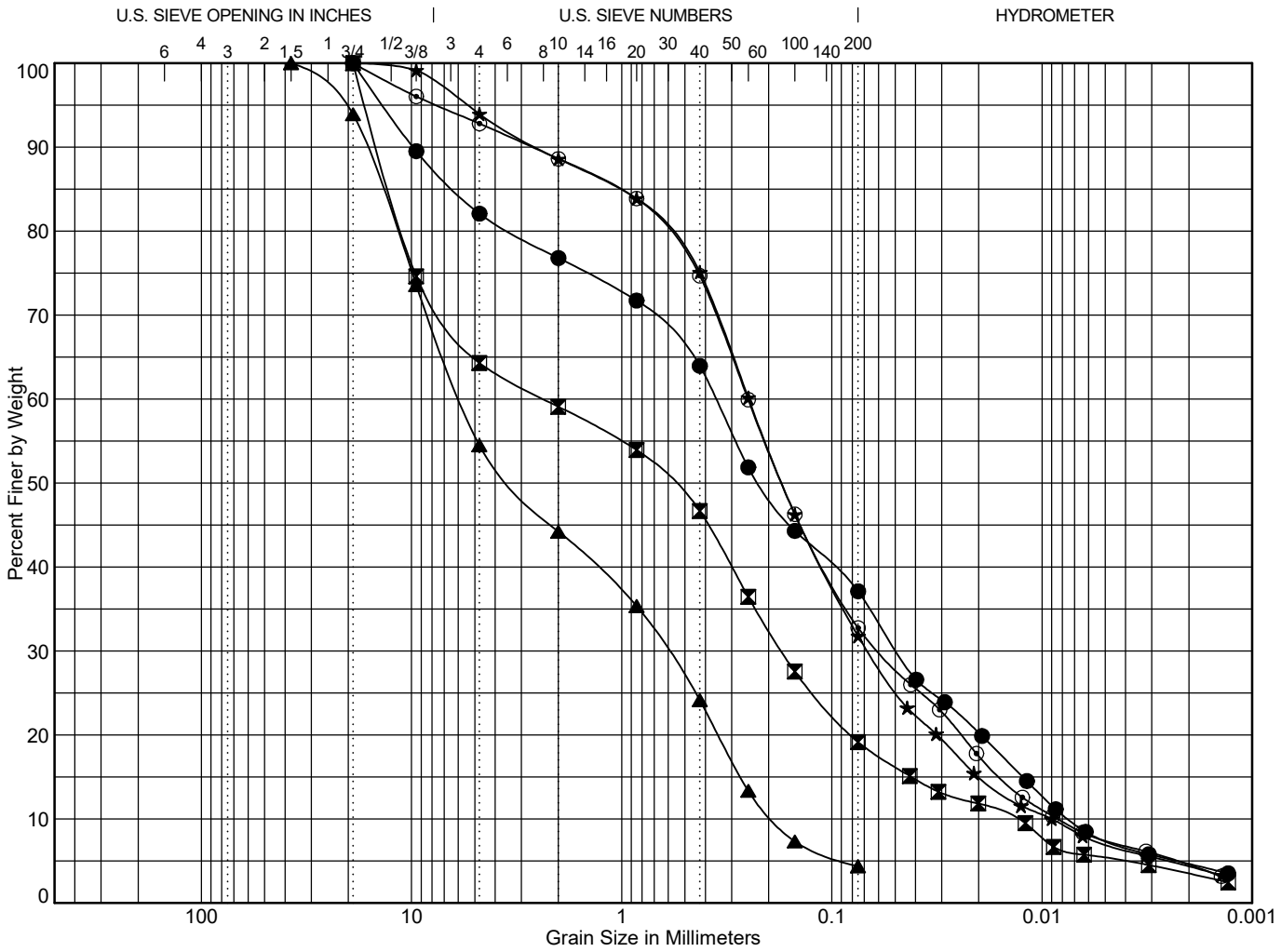
1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ GRAIN SIZE W/STATS

LANDAU ASSOCIATES

Central Kitsap
Wastewater Treatment Plant
Poulsbo, Washington

Grain Size Test Data

Figure
C-1



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

Point		Depth	Classification	LL	PL	PI	C_c	C_u
●	LAI-1	37.5	Silty SAND with gravel (SM)				0.89	47.82
⊠	LAI-2	5.0	Silty SAND with gravel (SM)				0.95	173.32
▲	LAI-2	7.5	Poorly graded SAND with gravel (SP)				0.34	30.82
★	LAI-2	10.0	Silty SAND with gravel (SM)				2.01	27.65
⊙	LAI-2	15.0	Silty SAND with gravel (SM)				1.67	29.80

Point		Depth	D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	%Coarse Gravel	% Fine Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Fines
●	LAI-1	37.5	19	0.357	0.22	0.049	0.007	0.0	17.9	5.3	12.8	26.8	37.1
⊠	LAI-2	5.0	19	2.329	0.584	0.173	0.013	0.0	35.7	5.2	12.4	27.5	19.2
▲	LAI-2	7.5	37.5	5.799	3.254	0.61	0.188	6.1	39.4	10.3	20.1	19.8	4.4
★	LAI-2	10.0	19	0.249	0.172	0.067	0.009	0.0	6.1	5.4	13.5	43.3	31.8
⊙	LAI-2	15.0	19	0.251	0.172	0.059	0.008	0.0	7.2	4.2	13.9	41.9	32.7

$C_c = D_{30}^2/(D_{60} * D_{10})$
$C_u = D_{60}/D_{10}$

To be well graded: $1 < C_c < 3$ and $C_u > 4$ for GW or $C_u > 6$ for SW

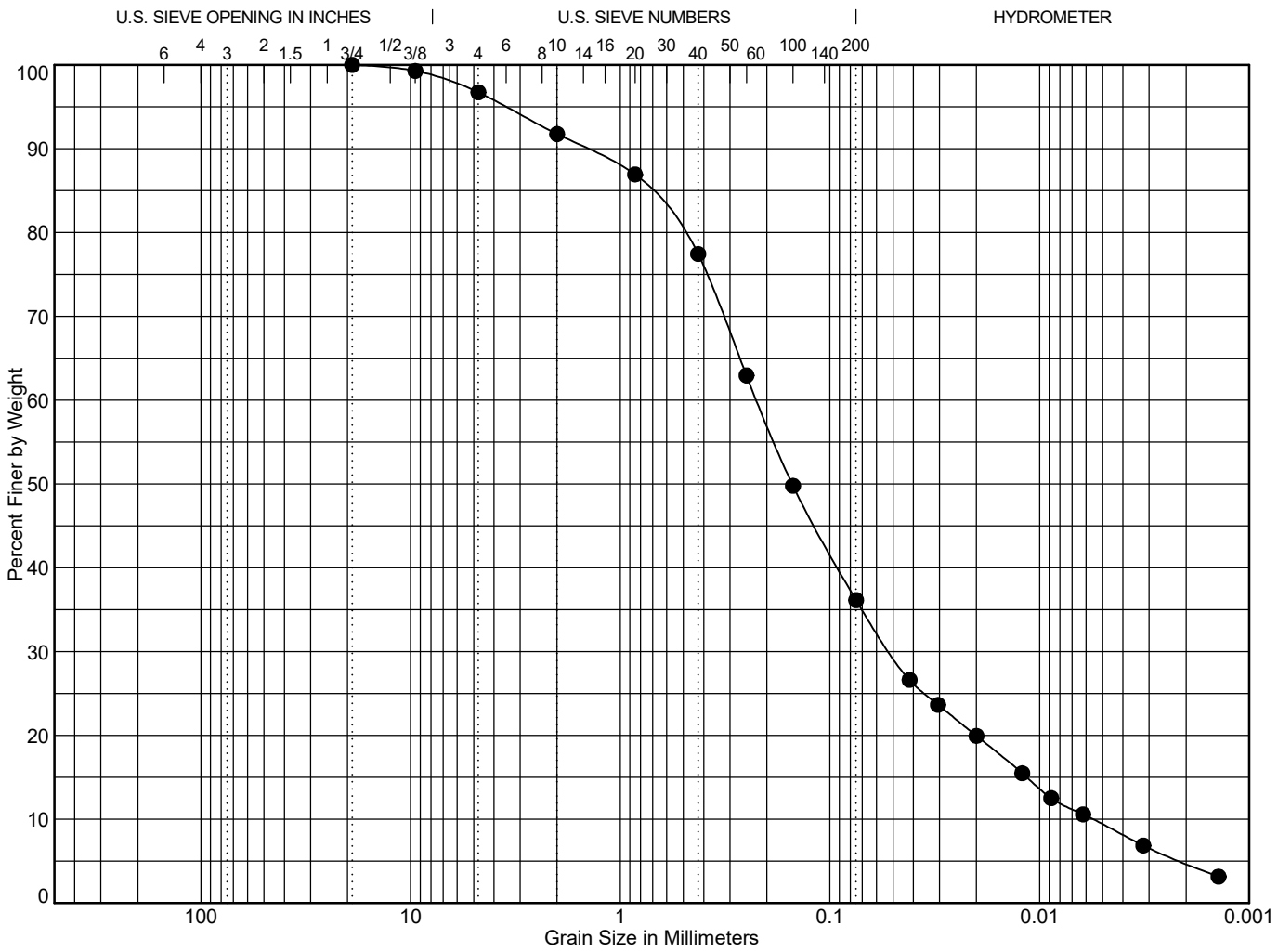
1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ GRAIN SIZE W/STATS

LANDAU ASSOCIATES

Central Kitsap
Wastewater Treatment Plant
Poulsbo, Washington

Grain Size Test Data

Figure
C-2



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

Point	Depth	Classification	LL	PL	PI	C_c	C_u
● LAI-2	30.0	Silty SAND with trace gravel (SM)				2.11	39.81

Point	Depth	D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	%Coarse Gravel	% Fine Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Fines
● LAI-2	30.0	19	0.223	0.151	0.051	0.006	0.0	3.3	5.0	14.3	41.3	36.1

$C_c = D_{30}^2/(D_{60} * D_{10})$

$C_u = D_{60}/D_{10}$

To be well graded: $1 < C_c < 3$ and $C_u > 4$ for GW or $C_u > 6$ for SW

1490009.01 2/7/22 T:\1490\009.010\T\1490009.010.GPJ GRAIN SIZE W/STATS

LANDAU ASSOCIATES

Central Kitsap
Wastewater Treatment Plant
Poulsbo, Washington

Grain Size Test Data

Figure
C-3

Table C-1
Petroleum Hydrocarbon Analytical Results in Soil
Dewatering Analysis
Central Kitsap Wastewater Treatment Plant

Analyte	MTCA Method A Screening Level[a]	Sample ID, Lab SDG, Sample Date		
		20211213.LAI-1.12.5 580-108394-1 12/13/2021	20211214.LAI-2.7.5 580-108394-1 12/14/2021	20211214.LAI-2.11 580-108394-1 12/14/2021
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/Gx)				
Gasoline Range Organics	30/100[b]	4.6 UJ	**35 J**	4.4 UJ
Diesel Range Organics	2000	50 U	53 U	49 U
Oil Range Organics	2000	50 U	53 U	49 U
Total Metals (mg/kg; SW-846 6020B/7471A)				
Arsenic	20	**1.4**	**1.9**	**1.7**
Barium	NA	**24**	**34**	**30**
Cadmium	2	0.78 U	0.83 U	0.54 U
Chromium, Total	2000[c]	**17**	**21**	**20**
Lead	250	**2.2**	**3.3**	**1.5**
Selenium	NA	1.5 U	1.6 U	**1.2**
Silver	NA	0.20 U	0.21 U	0.13 U
Mercury	2	0.032 U	0.029 U	0.031 U
Volatiles (mg/kg; SW-846 8260D)				
Benzene	0.03	0.019 UJ	0.019 UJ	0.018 UJ
Ethylbenzene	6	0.037 UJ	0.038 UJ	0.036 UJ
m-&p-Xylenes	9[d]	0.037 UJ	0.038 UJ	0.036 UJ
o-Xylene	9[d]	0.037 UJ	0.038 UJ	0.036 UJ
Toluene	7	0.056 UJ	**6.4 J**	0.053 UJ

Notes:

Bold text indicates detected analyte**.** **Green Box** = detected concentration is greater than screening level.

[a] Screening Level is MTCA Method A for unrestricted land uses.

[b] MTCA Method A screening level is 100 mg/kg if benzene is not present and the total of ethylbenzene, toluene, and xylenes is less than 1% of the gasoline mixture; otherwise the screening level is 30 mg/kg.

[d] MTCA Method A screening level for Chromium III.

[e] MTCA Method A screening level for total xylenes.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Abbreviations and Acronyms:

ID = Identification

mg/kg = milligram per kilogram

MTCA = Model Toxics Control Act

NA = not applicable

NWTPH = Northwest Total Petroleum Hydrocarbon

SDG = sample delivery group

Table C-2
Petroleum Hydrocarbon Analytical Results in Water
Dewatering Analysis
Central Kitsap Wastewater Treatment Plant

Analyte	MTCA Method A Screening Level	Sample ID, Lab SDG, Sample Date	
		LAI-1-20220114 580-109311-1 1/14/2022	LAI-2-20220114 580-109311-1 1/14/2022
Total Petroleum Hydrocarbons (µg/L; NWTPH-Dx/-Gx)			
Gasoline Range Organics	800/1,000[a]	50 U	50 U
Diesel Range Organics	500	110 U	110 U
Oil Range Organics	500	340 U	350 U
Volatiles (µg/L; SW-846 8260D)			
1,2-Dichloroethane	5	1.0 U	1.0 U
Benzene	5	1.0 U	1.0 U
Ethylbenzene	700	1.0 U	1.0 U
m-&p-Xylenes	1,000[b]	2.0 U	2.0 U
Methyl-tert-butyl ether	20	1.0 U	1.0 U
o-Xylene	1,000[b]	1.0 U	1.0 U
Toluene	1,000	1.0 U	1.0 U
Volatiles (µg/L; SW-846 8011)			
1,2-Dibromoethane (EDB)	0.01	0.010 U	0.010 U

Notes:

[a] MTCA Method A screening level is 1,000 µg/L if benzene is not present; otherwise the screening level is 800 µg/L.

[b] MTCA Method A screening level for total xylenes.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

Abbreviations and Acronyms:

ID = identification
µg/L = microgram per liter
MTCA = Model Toxics Control Act
NWTPH = Northwest Total Petroleum Hydrocarbon
SDG = sample delivery group

ATTACHMENT 1

Laboratory Analytical Reports

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins FGS, Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

Laboratory Job ID: 580-108394-1
Client Project/Site: CKTP Dewatering analysis

For:
Landau & Associates, Inc.
2107 South C Street
Tacoma, Washington 98402

Attn: Sarah Fees

Authorized for release by:
12/28/2021 3:10:30 PM

Sheri Cruz, Project Manager I
(253)922-2310
Sheri.Cruz@Eurofinset.com

Table of Contents

Job ID: 580-108394-1

Laboratory: Eurofins FGS, Seattle

Narrative

Job Narrative
580-108394-1

Comments
No additional comments.

Receipt
The samples were received on 12/15/2021 9:32 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.5º C.

GC/MS VOA
Method 8260D: Surrogate recovery for the following sample was outside the upper control limit: 20211213.LAI-1.12.5 (580-108394-1). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Method 8260D: The following sample was diluted to bring the concentration of target analytes within the calibration range: 20211214.LAI-2.7.5 (580-108394-2). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
Method 5035: The following samples were provided to the laboratory with a significantly different initial weight than that required by the reference method: 20211213.LAI-1.12.5 (580-108394-1), 20211214.LAI-2.7.5 (580-108394-2) and 20211214.LAI-2.11 (580-108394-3). Deviations in the weight by more than 20% may affect reporting limits and potentially method performance. The method specifies 10g. The amount provided was above this range.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
S1+	Surrogate recovery exceeds control limits, high biased.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Sample Summary

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-108394-1	20211213.LAI-1.12.5	Solid	12/13/21 09:50	12/15/21 09:32
580-108394-2	20211214.LAI-2.7.5	Solid	12/14/21 08:30	12/15/21 09:32
580-108394-3	20211214.LAI-2.11	Solid	12/14/21 09:00	12/15/21 09:32
580-108394-4	Trip Blank	Solid	12/14/21 00:00	12/15/21 09:32

580-108394 Chain of Custody

Custody

☐ Seattle/Edmonds (425) 778-0907 ☐ Spokane (509) 327-9737
☒ Tacoma (253) 926-2493 ☐ Portland (503) 542-1080
☒ OLYMPIA

Date 12/13/21
Page 1 of 1

Turnaround Time:
Standard X
Accelerated

Project Name CKWIP DEWATERING Project No. 1490009.010
Project Location/Event CENTRAL KITSAP WASTEWATER TREATMENT PLANT
Sampler's Name AVRIL FOSBRE
Project Contact S. FEES, K. GAUGLITZ
Send Results To S. FEES, K. GAUGLITZ, D. JORGENSEN

Special Handling Requirements:
Shipment Method:
Stored on ice: (Yes) / No

Sample I.D.	Date	Time	Matrix	No. of Containers	NWTPH-Dx	RCRA8 (6020B)	NWTPH-Gx	BTEX (8260D)
20211213_LA1-1.12.5	12/13	950	SOIL	2	X	X	X	X
20211214_LA1-2.7.5	12/14	830	↓	↓	X	X	X	X
20211214_LA1-2.11	12/14	900	↓	↓	X	X	X	X
TRIP BLANK			AQ	1			X	X

Testing Parameters

Observations/Comments

Allow water samples to settle, collect aliquot from clear portion ☐

NWTPH-Dx - Acid wash cleanup ☐
- Silica gel cleanup ☐

Dissolved metal samples were field filtered

Other

Therm. ID: A2 Cor: 5.5° Unc: 5.8°
Cooler Dsc: LR
Packing: Bub
Cust. Seal: Yes No
Blue Ice: Wet, Dry, None
FedEx:
UPS:
Lab Cour:
Other: CD

Relinquished by	Received by	Relinquished by	Received by
Signature: Avril Fosbre	Signature:	Signature:	Signature:
Printed Name: AVRIL FOSBRE	Printed Name: DIANA VALLELUNGA	Printed Name:	Printed Name:
Company: LAI	Company: EFGS	Company:	Company:
Date: 12/15/21 Time: 932	Date: 12/15/21 Time: 0932	Date: Time:	Date: Time:

WHITE COPY - Laboratory YELLOW COPY - Project File PINK COPY - Client Representative

Login Sample Receipt Checklist

Client: Landau & Associates, Inc.

Job Number: 580-108394-1

Login Number: 108394
List Number: 1
Creator: Greene, Ashton R

List Source: Eurofins FGS, Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Method: 8260D - Volatile Organic Compounds by GC/MS

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		19		ug/Kg	☼	12/16/21 16:20	12/21/21 16:00	1
Toluene	ND		56		ug/Kg	☼	12/16/21 16:20	12/21/21 16:00	1
Ethylbenzene	ND		37		ug/Kg	☼	12/16/21 16:20	12/21/21 16:00	1
m-Xylene & p-Xylene	ND		37		ug/Kg	☼	12/16/21 16:20	12/21/21 16:00	1
o-Xylene	ND		37		ug/Kg	☼	12/16/21 16:20	12/21/21 16:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*131*	*S1+*	*80 - 120*	*12/16/21 16:20*	*12/21/21 16:00*	*1*
4-Bromofluorobenzene (Surr)	*113*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:00*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:00*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*80 - 121*	*12/16/21 16:20*	*12/21/21 16:00*	*1*

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		19		ug/Kg	☼	12/16/21 16:20	12/21/21 16:23	1
Ethylbenzene	ND		38		ug/Kg	☼	12/16/21 16:20	12/21/21 16:23	1
m-Xylene & p-Xylene	ND		38		ug/Kg	☼	12/16/21 16:20	12/21/21 16:23	1
o-Xylene	ND		38		ug/Kg	☼	12/16/21 16:20	12/21/21 16:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*97*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:23*	*1*
4-Bromofluorobenzene (Surr)	*95*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:23*	*1*
Dibromofluoromethane (Surr)	*95*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:23*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*80 - 121*	*12/16/21 16:20*	*12/21/21 16:23*	*1*

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		18		ug/Kg	☼	12/16/21 16:20	12/21/21 16:46	1
Toluene	ND		53		ug/Kg	☼	12/16/21 16:20	12/21/21 16:46	1
Ethylbenzene	ND		36		ug/Kg	☼	12/16/21 16:20	12/21/21 16:46	1
m-Xylene & p-Xylene	ND		36		ug/Kg	☼	12/16/21 16:20	12/21/21 16:46	1
o-Xylene	ND		36		ug/Kg	☼	12/16/21 16:20	12/21/21 16:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*95*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:46*	*1*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:46*	*1*
Dibromofluoromethane (Surr)	*86*		*80 - 120*	*12/16/21 16:20*	*12/21/21 16:46*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*80 - 121*	*12/16/21 16:20*	*12/21/21 16:46*	*1*

Client Sample ID: Trip Blank
Date Collected: 12/14/21 00:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-4
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		20		ug/Kg		12/16/21 16:20	12/21/21 15:37	1
Toluene	ND		60		ug/Kg		12/16/21 16:20	12/21/21 15:37	1
Ethylbenzene	ND		40		ug/Kg		12/16/21 16:20	12/21/21 15:37	1
m-Xylene & p-Xylene	ND		40		ug/Kg		12/16/21 16:20	12/21/21 15:37	1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Client Sample ID: Trip Blank
Date Collected: 12/14/21 00:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-4
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		40		ug/Kg		12/16/21 16:20	12/21/21 15:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*92*		*80 - 120*	*12/16/21 16:20*	*12/21/21 15:37*	*1*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*	*12/16/21 16:20*	*12/21/21 15:37*	*1*
Dibromofluoromethane (Surr)	*91*		*80 - 120*	*12/16/21 16:20*	*12/21/21 15:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*80 - 121*	*12/16/21 16:20*	*12/21/21 15:37*	*1*

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Method: 8260D - Volatile Organic Compounds by GC/MS - DL

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	6400		120		ug/Kg	☼	12/22/21 10:00	12/22/21 15:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*93*		*80 - 120*	*12/22/21 10:00*	*12/22/21 15:57*	*1*
4-Bromofluorobenzene (Surr)	*103*		*80 - 120*	*12/22/21 10:00*	*12/22/21 15:57*	*1*
Dibromofluoromethane (Surr)	*96*		*80 - 120*	*12/22/21 10:00*	*12/22/21 15:57*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*80 - 121*	*12/22/21 10:00*	*12/22/21 15:57*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		4.6		mg/Kg	☼	12/18/21 14:01	12/18/21 17:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*50 - 150*	*12/18/21 14:01*	*12/18/21 17:18*	*1*

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**35**		4.7		mg/Kg	☼	12/18/21 14:01	12/18/21 17:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*	*12/18/21 14:01*	*12/18/21 17:42*	*1*

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		4.4		mg/Kg	☼	12/18/21 14:01	12/18/21 18:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*50 - 150*	*12/18/21 14:01*	*12/18/21 18:06*	*1*

Client Sample ID: Trip Blank
Date Collected: 12/14/21 00:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-4
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		5.0		mg/Kg		12/18/21 14:01	12/18/21 16:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*50 - 150*	*12/18/21 14:01*	*12/18/21 16:54*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50		mg/Kg	☼	12/17/21 12:32	12/27/21 20:49	1
Motor Oil (>C24-C36)	ND		50		mg/Kg	☼	12/17/21 12:32	12/27/21 20:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*91*		*50 - 150*	*12/17/21 12:32*	*12/27/21 20:49*	*1*

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		53		mg/Kg	☼	12/17/21 12:32	12/27/21 21:08	1
Motor Oil (>C24-C36)	ND		53		mg/Kg	☼	12/17/21 12:32	12/27/21 21:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*92*		*50 - 150*	*12/17/21 12:32*	*12/27/21 21:08*	*1*

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		49		mg/Kg	☼	12/17/21 12:32	12/27/21 21:46	1
Motor Oil (>C24-C36)	ND		49		mg/Kg	☼	12/17/21 12:32	12/27/21 21:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*85*		*50 - 150*	*12/17/21 12:32*	*12/27/21 21:46*	*1*

Method: 6020B - Metals (ICP/MS)

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.4**		0.49		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Barium	**24**		0.98		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Cadmium	ND		0.78		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Chromium	**17**		0.98		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Lead	**2.2**		0.49		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Selenium	ND		1.5		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10
Silver	ND		0.20		mg/Kg	☼	12/22/21 17:27	12/28/21 01:16	10

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.9**		0.52		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Barium	**34**		1.0		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Cadmium	ND		0.83		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Chromium	**21**		1.0		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Lead	**3.3**		0.52		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Selenium	ND		1.6		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10
Silver	ND		0.21		mg/Kg	☼	12/22/21 17:27	12/28/21 01:20	10

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.7**		0.34		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Barium	**30**		0.67		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Cadmium	ND		0.54		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Chromium	**20**		0.67		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Lead	**1.5**		0.34		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Selenium	**1.2**		1.0		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10
Silver	ND		0.13		mg/Kg	☼	12/22/21 17:27	12/28/21 01:23	10

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Method: 7471A - Mercury (CVAA)

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.032		mg/Kg	☼	12/22/21 17:26	12/27/21 13:29	1

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.029		mg/Kg	☼	12/22/21 17:26	12/27/21 13:32	1

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.031		mg/Kg	☼	12/22/21 17:26	12/27/21 13:34	1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-376115/3-A
Matrix: Solid
Analysis Batch: 376534

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376115

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		20		ug/Kg		12/21/21 10:00	12/21/21 15:14	1
Toluene	ND		60		ug/Kg		12/21/21 10:00	12/21/21 15:14	1
Ethylbenzene	ND		40		ug/Kg		12/21/21 10:00	12/21/21 15:14	1
m-Xylene & p-Xylene	ND		40		ug/Kg		12/21/21 10:00	12/21/21 15:14	1
o-Xylene	ND		40		ug/Kg		12/21/21 10:00	12/21/21 15:14	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*91*		*80 - 120*	*12/21/21 10:00*	*12/21/21 15:14*	*1*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*	*12/21/21 10:00*	*12/21/21 15:14*	*1*
Dibromofluoromethane (Surr)	*94*		*80 - 120*	*12/21/21 10:00*	*12/21/21 15:14*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*80 - 121*	*12/21/21 10:00*	*12/21/21 15:14*	*1*

Lab Sample ID: LCS 580-376115/4-A
Matrix: Solid
Analysis Batch: 376534

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376115

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			800	842		ug/Kg		105	79 - 135		
Toluene			800	805		ug/Kg		101	75 - 125		
Ethylbenzene			800	805		ug/Kg		101	80 - 135		
m-Xylene & p-Xylene			800	780		ug/Kg		97	80 - 132		
o-Xylene			800	781		ug/Kg		98	80 - 132		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*94*		*80 - 120*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*
Dibromofluoromethane (Surr)	*93*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*85*		*80 - 121*

Lab Sample ID: LCSD 580-376115/5-A
Matrix: Solid
Analysis Batch: 376534

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376115

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			800	916		ug/Kg		114	79 - 135	8	20
Toluene			800	852		ug/Kg		107	75 - 125	6	20
Ethylbenzene			800	814		ug/Kg		102	80 - 135	1	20
m-Xylene & p-Xylene			800	857		ug/Kg		107	80 - 132	9	20
o-Xylene			800	870		ug/Kg		109	80 - 132	11	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*97*		*80 - 120*
4-Bromofluorobenzene (Surr)	*113*		*80 - 120*
Dibromofluoromethane (Surr)	*91*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*89*		*80 - 121*

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-376626/1-A
Matrix: Solid
Analysis Batch: 376657

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376626

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		20		ug/Kg		12/22/21 10:00	12/22/21 13:16	1
Toluene	ND		60		ug/Kg		12/22/21 10:00	12/22/21 13:16	1
Ethylbenzene	ND		40		ug/Kg		12/22/21 10:00	12/22/21 13:16	1
m-Xylene & p-Xylene	ND		40		ug/Kg		12/22/21 10:00	12/22/21 13:16	1
o-Xylene	ND		40		ug/Kg		12/22/21 10:00	12/22/21 13:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*88*		*80 - 120*	*12/22/21 10:00*	*12/22/21 13:16*	*1*
4-Bromofluorobenzene (Surr)	*101*		*80 - 120*	*12/22/21 10:00*	*12/22/21 13:16*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*	*12/22/21 10:00*	*12/22/21 13:16*	*1*
1,2-Dichloroethane-d4 (Surr)	*88*		*80 - 121*	*12/22/21 10:00*	*12/22/21 13:16*	*1*

Lab Sample ID: LCS 580-376626/2-A
Matrix: Solid
Analysis Batch: 376657

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376626

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	800	853		ug/Kg		107	79 - 135
Toluene	800	800		ug/Kg		100	75 - 125
Ethylbenzene	800	788		ug/Kg		98	80 - 135
m-Xylene & p-Xylene	800	793		ug/Kg		99	80 - 132
o-Xylene	800	774		ug/Kg		97	80 - 132

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*96*		*80 - 120*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*
Dibromofluoromethane (Surr)	*88*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*83*		*80 - 121*

Lab Sample ID: LCSD 580-376626/3-A
Matrix: Solid
Analysis Batch: 376657

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376626

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	800	873		ug/Kg		109	79 - 135	2	20
Toluene	800	814		ug/Kg		102	75 - 125	2	20
Ethylbenzene	800	816		ug/Kg		102	80 - 135	4	20
m-Xylene & p-Xylene	800	811		ug/Kg		101	80 - 132	2	20
o-Xylene	800	793		ug/Kg		99	80 - 132	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*95*		*80 - 120*
4-Bromofluorobenzene (Surr)	*103*		*80 - 120*
Dibromofluoromethane (Surr)	*95*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*84*		*80 - 121*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-376300/1-A
Matrix: Solid
Analysis Batch: 376301

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376300

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		5.0		mg/Kg		12/18/21 14:01	12/18/21 15:40	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*86*		*50 - 150*	*12/18/21 14:01*	*12/18/21 15:40*	*1*

Lab Sample ID: LCS 580-376300/2-A
Matrix: Solid
Analysis Batch: 376301

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376300

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	40.0	37.9		mg/Kg		95	80 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*50 - 150*

Lab Sample ID: LCSD 580-376300/3-A
Matrix: Solid
Analysis Batch: 376301

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376300

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	40.0	41.4		mg/Kg		104	80 - 120	9	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*104*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-376209/1-A
Matrix: Solid
Analysis Batch: 376804

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376209

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		50		mg/Kg		12/17/21 12:32	12/27/21 18:17	1
Motor Oil (>C24-C36)	ND		50		mg/Kg		12/17/21 12:32	12/27/21 18:17	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*88*		*50 - 150*	*12/17/21 12:32*	*12/27/21 18:17*	*1*

Lab Sample ID: LCS 580-376209/2-A
Matrix: Solid
Analysis Batch: 376804

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376209

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	500	498		mg/Kg		100	70 - 125
Motor Oil (>C24-C36)	500	508		mg/Kg		102	70 - 129

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-376209/2-A
Matrix: Solid
Analysis Batch: 376804

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376209

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*110*		*50 - 150*

Lab Sample ID: LCSD 580-376209/3-A
Matrix: Solid
Analysis Batch: 376804

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376209

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			500	477		mg/Kg		95	70 - 125	4	16
Motor Oil (>C24-C36)			500	493		mg/Kg		99	70 - 129	3	16

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*107*		*50 - 150*

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 580-376690/24-A
Matrix: Solid
Analysis Batch: 376850

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376690

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Barium	ND		1.0		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Cadmium	ND		0.80		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Chromium	ND		1.0		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Lead	ND		0.50		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Selenium	ND		1.5		mg/Kg		12/22/21 17:27	12/27/21 23:23	10
Silver	ND		0.20		mg/Kg		12/22/21 17:27	12/27/21 23:23	10

Lab Sample ID: LCS 580-376690/25-A
Matrix: Solid
Analysis Batch: 376850

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376690

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic			50.0	53.4		mg/Kg		107	80 - 120
Barium			50.0	52.6		mg/Kg		105	80 - 120
Cadmium			50.0	51.8		mg/Kg		104	80 - 120
Chromium			50.0	50.9		mg/Kg		102	80 - 120
Lead			50.0	55.1		mg/Kg		110	80 - 120
Selenium			50.0	48.5		mg/Kg		97	80 - 120
Silver			50.0	52.4		mg/Kg		105	80 - 120

Lab Sample ID: LCSD 580-376690/26-A
Matrix: Solid
Analysis Batch: 376850

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376690

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			50.0	51.8		mg/Kg		104	80 - 120	3	20
Barium			50.0	51.6		mg/Kg		103	80 - 120	2	20
Cadmium			50.0	51.2		mg/Kg		102	80 - 120	1	20

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 580-376690/26-A
Matrix: Solid
Analysis Batch: 376850

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376690

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium			50.0	50.1		mg/Kg		100	80 - 120	1	20
Lead			50.0	55.9		mg/Kg		112	80 - 120	1	20
Selenium			50.0	46.8		mg/Kg		94	80 - 120	3	20
Silver			50.0	51.9		mg/Kg		104	80 - 120	1	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 580-376689/21-A
Matrix: Solid
Analysis Batch: 376856

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 376689

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.030		mg/Kg		12/22/21 17:26	12/27/21 12:34	1

Lab Sample ID: LCS 580-376689/22-A
Matrix: Solid
Analysis Batch: 376856

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 376689

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.167	0.163		mg/Kg		98	80 - 120		

Lab Sample ID: LCSD 580-376689/23-A
Matrix: Solid
Analysis Batch: 376856

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 376689

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury			0.167	0.162		mg/Kg		97	80 - 120	0	20

Lab Chronicle

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1	376028	12/16/21 09:04	HDG	FGS SEA

Client Sample ID: 20211213.LAI-1.12.5
Date Collected: 12/13/21 09:50
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-1
Matrix: Solid
Percent Solids: 89.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			376115	12/16/21 16:20	ASJ	FGS SEA
Total/NA	Analysis	8260D		1	376534	12/21/21 16:00	CJ	FGS SEA
Total/NA	Prep	5035			376300	12/18/21 14:01	JBT	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	376301	12/18/21 17:18	W1T	FGS SEA
Total/NA	Prep	3546			376209	12/17/21 12:32	RJL	FGS SEA
Total/NA	Analysis	NWTPH-Dx		1	376804	12/27/21 20:49	JAE	FGS SEA
Total/NA	Prep	3050B			376690	12/22/21 17:27	ABP	FGS SEA
Total/NA	Analysis	6020B		10	376850	12/28/21 01:16	FCW	FGS SEA
Total/NA	Prep	7471A			376689	12/22/21 17:26	ABP	FGS SEA
Total/NA	Analysis	7471A		1	376856	12/27/21 13:29	JLS	FGS SEA

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1	376028	12/16/21 09:04	HDG	FGS SEA

Client Sample ID: 20211214.LAI-2.7.5
Date Collected: 12/14/21 08:30
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-2
Matrix: Solid
Percent Solids: 90.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			376115	12/16/21 16:20	ASJ	FGS SEA
Total/NA	Analysis	8260D		1	376534	12/21/21 16:23	CJ	FGS SEA
Total/NA	Prep	5035	DL		376626	12/22/21 10:00	ASJ	FGS SEA
Total/NA	Analysis	8260D	DL	1	376657	12/22/21 15:57	CJ	FGS SEA
Total/NA	Prep	5035			376300	12/18/21 14:01	JBT	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	376301	12/18/21 17:42	W1T	FGS SEA
Total/NA	Prep	3546			376209	12/17/21 12:32	RJL	FGS SEA
Total/NA	Analysis	NWTPH-Dx		1	376804	12/27/21 21:08	JAE	FGS SEA
Total/NA	Prep	3050B			376690	12/22/21 17:27	ABP	FGS SEA
Total/NA	Analysis	6020B		10	376850	12/28/21 01:20	FCW	FGS SEA
Total/NA	Prep	7471A			376689	12/22/21 17:26	ABP	FGS SEA
Total/NA	Analysis	7471A		1	376856	12/27/21 13:32	JLS	FGS SEA

Lab Chronicle

Client: Landau & Associates, Inc.
Project/Site: CKTP Dewatering analysis

Job ID: 580-108394-1

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1	376028	12/16/21 09:04	HDG	FGS SEA

Client Sample ID: 20211214.LAI-2.11
Date Collected: 12/14/21 09:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-3
Matrix: Solid
Percent Solids: 89.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			376115	12/16/21 16:20	ASJ	FGS SEA
Total/NA	Analysis	8260D		1	376534	12/21/21 16:46	CJ	FGS SEA
Total/NA	Prep	5035			376300	12/18/21 14:01	JBT	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	376301	12/18/21 18:06	W1T	FGS SEA
Total/NA	Prep	3546			376209	12/17/21 12:32	RJL	FGS SEA
Total/NA	Analysis	NWTPH-Dx		1	376804	12/27/21 21:46	JAE	FGS SEA
Total/NA	Prep	3050B			376690	12/22/21 17:27	ABP	FGS SEA
Total/NA	Analysis	6020B		10	376850	12/28/21 01:23	FCW	FGS SEA
Total/NA	Prep	7471A			376689	12/22/21 17:26	ABP	FGS SEA
Total/NA	Analysis	7471A		1	376856	12/27/21 13:34	JLS	FGS SEA

Client Sample ID: Trip Blank
Date Collected: 12/14/21 00:00
Date Received: 12/15/21 09:32

Lab Sample ID: 580-108394-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			376115	12/16/21 16:20	ASJ	FGS SEA
Total/NA	Analysis	8260D		1	376534	12/21/21 15:37	CJ	FGS SEA
Total/NA	Prep	5035			376300	12/18/21 14:01	JBT	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	376301	12/18/21 16:54	W1T	FGS SEA

Laboratory References:
FGS SEA = Eurofins FGS, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Landau & Associates, Inc.
Job ID: 580-108394-1
Project/Site: CKTP Dewatering analysis

Laboratory: Eurofins FGS, Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Washington	State	C788	07-13-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
2540G		Solid	Percent Moisture
2540G		Solid	Percent Solids

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

Laboratory Job ID: 580-109311-1
Client Project/Site: Central Kitsap Wastewater Treatment Plan
Revision: 1

For:
Landau & Associates, Inc.
2107 South C Street
Tacoma, Washington 98402

Attn: Sarah Fees

Authorized for release by:
1/31/2022 2:52:41 PM

Sheri Cruz, Project Manager I
(253)922-2310
Sheri.Cruz@Eurofinset.com

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Job ID: 580-109311-1

Laboratory: Eurofins Seattle

Narrative

Job Narrative
580-109311-1

Comments
Revised 1/31/2022 to add the revised COC to report and re-associate 8260B/CA_LUFTMS to NWTPH-GRO by MS.

Receipt
The samples were received on 1/14/2022 5:56 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 3.6º C.

Receipt Exceptions
The following sample (Trip Blank) has 8011 requested on the COC however the laboratory did not provide trip blanks for this method. Tripblank - 20220114 (580-109311-3). Client confirmed that 8011 did not need a trip blank. Revised COC provided.

GC/MS VOA
Method 8260D: The laboratory control sample duplicate (LCSD) for analytical batch 580-379322 recovered outside control limits for the following analytes: Toluene and Ethylbenzene. These analytes were biased high in the LCSD and were not detected in the associated samples; therefore, the data have been reported.

Method 8260D: The continuing calibration verification (CCV) associated with batch 580-379322 recovered above the upper control limit for Toluene. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated samples are impacted: LAI-1-20220114 (580-109311-2), Tripblank - 20220114 (580-109311-3) and (CCVIS 580-379322/3).

Method 8260D: The continuing calibration verification (CCV) associated with batch 580-379389 recovered above the upper control limit for Toluene. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated samples are impacted: LAI-2-20220114 (580-109311-1) and (CCVIS 580-379389/39).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method 8011: The following continuing calibration verification (CCV) standard associated with batch 580-379562 recovered high and outside acceptance criteria for %D for surrogate 1,2-Dibromopropane. Since the %Rec is within the acceptance criteria for the surrogate in the CCV and associated samples, the data have been reported. The following sample is impacted: (CCV 580-379518/5-A)

Method 8011: The low level laboratory control sample (LLCS) for preparation batch 580-379518 and analytical batch 580-379562 recovered outside control limits for the following analytes: Ethylene Dibromide. This analyte was biased high in the LLCS and was not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method 3510C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP) associated with preparation batch 580-379294. Laboratory control sample/laboratory control sample duplicate were created and substituted for MS/MSD/DUP.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Landau & Associates, Inc. Job ID: 580-109311-1
Project/Site: Central Kitsap Wastewater Treatment Plan

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.

GC Semi VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Sample Summary

Client: Landau & Associates, Inc.
Job ID: 580-109311-1
Project/Site: Central Kitsap Wastewater Treatment Plan

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-109311-1	LAI-2-20220114	Water	01/14/22 10:45	01/14/22 17:56
580-109311-2	LAI-1-20220114	Water	01/14/22 12:00	01/14/22 17:56
580-109311-3	Tripblank - 20220114	Water	01/14/22 00:01	01/14/22 17:56

Chain-of-Custody Record

LANDAU ASSOCIATES

- [ ] North Seattle (206) 631-8660
- [x] Tacoma (253) 926-2493
- [ ] Olympia (360) 791-3178
- [ ] Spokane (509) 327-9737
- [ ] Portland (503) 542-1080
- [ ] _____

Date 1/14/21

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Turnaround Time: Standard / Accelerated

Project Name CKWWTP

Project No. 1490009.010.012

Project Location/Event CKWWTP / January GWM

Sampler's Name SMR

Project Contact Sarah Fees, Whitney Cian,

Send Results To Sarah Fees, Whitney Cian, Dani Jorgensen

Special Handling Requirements:

Shipment Method:

Stored on ice: Yes / No

Sample I.D.	Date	Time	Matrix	No. of Containers	DRO/RRO (NWTPH-Dx)	BTEX + MTBE (8260D)	GRO (NWTPH-Gx)	Ethylene dibromide (EDB)	Observations/Comments
LAI-2-20220114	1/14/21	1045	Aq	10	X	X	X	X	
LAI-1-20220114	1/14/21	1200	Aq	10	X	X	X	X	
Tripblank-20220114	—	—	Aq	4		X	X	X	

Testing Parameters

Allow water samples to settle, collect aliquot from clear portion ☐

NWTPH-Dx - Acid wash cleanup ☐

- Silica gel cleanup ☐

Dissolved metal samples were field filtered

Other

Relinquished by	Received by	Relinquished by	
Signature	Signature	Signature	
Printed Name Simone Rodriguez	Printed Name Kim Brady	Printed Name	
Company Landau Associates	Company EFGS	Company	
Date 1/14/22 Time 1435	Date 1/14/22 Time 1435	Date Time	Date Time

580-109311 Chain of Custody

WHITE COPY - Laboratory YELLOW COPY - Project File PINK COPY - Client Representative

w/ccs A3 3.6 / B.6 49

Chain-of-Custody Record

LANDAU ASSOCIATES

- [ ] North Seattle (206) 631-8660
- [x] Tacoma (253) 926-2493
- [ ] Olympia (360) 791-3178
- [ ] Spokane (509) 327-9737
- [ ] Portland (503) 542-1080
- [ ] _____

Date 1/14/21

Page 1 of 1

Turnaround Time: Standard / Accelerated

Project Name CK WWTP

Project No. 1490009.010.012

Project Location/Event CKWWTP / January GWM

Sampler's Name SMR

Project Contact Saran Fees, Whitney Ciani,

Send Results To Saran Fees, Whitney Ciani, Dani Jorgensen

Special Handling Requirements: _____

Shipment Method: _____

Stored on ice: Yes / No

Sample I.D.	Date	Time	Matrix	No. of Containers	DRO/RRO (NWTPH-Dx)	BTEX + MTBE (8260D)	GRO (NWTPH-Gx)	Ethylene dibromide (EDB)
LAI-2-20220114	1/14/21	1045	Aq	10	X	X	X	X
LAI-1-20220114	1/14/21	1100	Aq	10	X	X	X	X
Tripblank-20220114	—	—	Aq	4		X	X	X

Testing Parameters

Observations/Comments

- Allow water samples to settle, collect aliquot from clear portion ☐
- NWTPH-Dx - Acid wash cleanup ☐
- Silica gel cleanup ☐
- Dissolved metal samples were field filtered

Other _____

cancel EDB by 8011 for trip blank
(DRJ 1/17/2022)

Relinquished by	Received by	Relinquished by	
Signature	Signature	Signature	
Printed Name Simone Rodriguez	Printed Name Kimbrough	Printed Name	
Company Landau Associates	Company EFGS	Company	
Date 1/14/22 Time 1435	Date 1/14/22 Time 1435	Date Time	Date Time

580-109311 Chain of Custody

WHITE COPY - Laboratory YELLOW COPY - Project File PINK COPY - Client Representative

10/2018

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1/31/2022 (Rev. 1)

Login Sample Receipt Checklist

Client: Landau & Associates, Inc.

Job Number: 580-109311-1

Login Number: 109311
List Number: 1
Creator: Presley, Kim A

List Source: Eurofins Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Method: 8260D - Volatile Organic Compounds by GC/MS

Client Sample ID: LAI-2-20220114 **Lab Sample ID: 580-109311-1**
Date Collected: 01/14/22 10:45 **Matrix: Water**
Date Received: 01/14/22 17:56

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0		ug/L			01/26/22 15:17	1
Toluene	ND		1.0		ug/L			01/26/22 15:17	1
Ethylbenzene	ND		1.0		ug/L			01/26/22 15:17	1
m-Xylene & p-Xylene	ND		2.0		ug/L			01/26/22 15:17	1
o-Xylene	ND		1.0		ug/L			01/26/22 15:17	1
Methyl tert-butyl ether	ND		1.0		ug/L			01/26/22 15:17	1
1,2-Dichloroethane	ND		1.0		ug/L			01/26/22 15:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*104*		*80 - 120*		*01/26/22 15:17*	*1*
4-Bromofluorobenzene (Surr)	*84*		*80 - 120*		*01/26/22 15:17*	*1*
Dibromofluoromethane (Surr)	*83*		*80 - 120*		*01/26/22 15:17*	*1*
1,2-Dichloroethane-d4 (Surr)	*82*		*80 - 120*		*01/26/22 15:17*	*1*

Client Sample ID: LAI-1-20220114 **Lab Sample ID: 580-109311-2**
Date Collected: 01/14/22 12:00 **Matrix: Water**
Date Received: 01/14/22 17:56

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0		ug/L			01/25/22 17:08	1
Toluene	ND	*+	1.0		ug/L			01/25/22 17:08	1
Ethylbenzene	ND	*+	1.0		ug/L			01/25/22 17:08	1
m-Xylene & p-Xylene	ND		2.0		ug/L			01/25/22 17:08	1
o-Xylene	ND		1.0		ug/L			01/25/22 17:08	1
Methyl tert-butyl ether	ND		1.0		ug/L			01/25/22 17:08	1
1,2-Dichloroethane	ND		1.0		ug/L			01/25/22 17:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*103*		*80 - 120*		*01/25/22 17:08*	*1*
4-Bromofluorobenzene (Surr)	*83*		*80 - 120*		*01/25/22 17:08*	*1*
Dibromofluoromethane (Surr)	*87*		*80 - 120*		*01/25/22 17:08*	*1*
1,2-Dichloroethane-d4 (Surr)	*86*		*80 - 120*		*01/25/22 17:08*	*1*

Client Sample ID: Tripblank - 20220114 **Lab Sample ID: 580-109311-3**
Date Collected: 01/14/22 00:01 **Matrix: Water**
Date Received: 01/14/22 17:56

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0		ug/L			01/25/22 16:45	1
Toluene	ND	*+	1.0		ug/L			01/25/22 16:45	1
Ethylbenzene	ND	*+	1.0		ug/L			01/25/22 16:45	1
m-Xylene & p-Xylene	ND		2.0		ug/L			01/25/22 16:45	1
o-Xylene	ND		1.0		ug/L			01/25/22 16:45	1
Methyl tert-butyl ether	ND		1.0		ug/L			01/25/22 16:45	1
1,2-Dichloroethane	ND		1.0		ug/L			01/25/22 16:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*105*		*80 - 120*		*01/25/22 16:45*	*1*
4-Bromofluorobenzene (Surr)	*84*		*80 - 120*		*01/25/22 16:45*	*1*
Dibromofluoromethane (Surr)	*86*		*80 - 120*		*01/25/22 16:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*80 - 120*		*01/25/22 16:45*	*1*

Client: Landau & Associates, Inc.
Project/Site: Central Kitsap Wastewater Treatment Plan

Job ID: 580-109311-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Client Sample ID: LAI-2-20220114
Date Collected: 01/14/22 10:45
Date Received: 01/14/22 17:56

Lab Sample ID: 580-109311-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics - NWTPH-G	ND		0.050		mg/L			01/26/22 15:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*84*		*77 - 123*		*01/26/22 15:17*	*1*

Client Sample ID: LAI-1-20220114
Date Collected: 01/14/22 12:00
Date Received: 01/14/22 17:56

Lab Sample ID: 580-109311-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics - NWTPH-G	ND		0.050		mg/L			01/25/22 17:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*83*		*77 - 123*		*01/25/22 17:08*	*1*

Client Sample ID: Tripblank - 20220114
Date Collected: 01/14/22 00:01
Date Received: 01/14/22 17:56

Lab Sample ID: 580-109311-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics - NWTPH-G	ND		0.050		mg/L			01/25/22 16:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*84*		*77 - 123*		*01/25/22 16:45*	*1*

Client: Landau & Associates, Inc.
Job ID: 580-109311-1
Project/Site: Central Kitsap Wastewater Treatment Plan

Method: 8011 - EDB and DBCP in Water by Microextraction

Client Sample ID: LAI-2-20220114
Date Collected: 01/14/22 10:45
Date Received: 01/14/22 17:56
Lab Sample ID: 580-109311-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylene Dibromide	ND	*+	0.010		ug/L		01/27/22 11:59	01/27/22 17:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dibromopropane	*91*		*60 - 140*	*01/27/22 11:59*	*01/27/22 17:50*	*1*

Client Sample ID: LAI-1-20220114
Date Collected: 01/14/22 12:00
Date Received: 01/14/22 17:56
Lab Sample ID: 580-109311-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylene Dibromide	ND	*+	0.010		ug/L		01/27/22 11:59	01/27/22 18:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dibromopropane	*76*		*60 - 140*	*01/27/22 11:59*	*01/27/22 18:06*	*1*

Client: Landau & Associates, Inc.
Project/Site: Central Kitsap Wastewater Treatment Plan

Job ID: 580-109311-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Client Sample ID: LAI-2-20220114
Date Collected: 01/14/22 10:45
Date Received: 01/14/22 17:56

Lab Sample ID: 580-109311-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11		mg/L		01/25/22 16:40	01/26/22 08:48	1
Motor Oil (>C24-C36)	ND		0.35		mg/L		01/25/22 16:40	01/26/22 08:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*81*		*50 - 150*	*01/25/22 16:40*	*01/26/22 08:48*	*1*

Client Sample ID: LAI-1-20220114
Date Collected: 01/14/22 12:00
Date Received: 01/14/22 17:56

Lab Sample ID: 580-109311-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11		mg/L		01/25/22 16:40	01/26/22 09:08	1
Motor Oil (>C24-C36)	ND		0.34		mg/L		01/25/22 16:40	01/26/22 09:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*76*		*50 - 150*	*01/25/22 16:40*	*01/26/22 09:08*	*1*

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-379322/5
Matrix: Water
Analysis Batch: 379322

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0		ug/L			01/25/22 11:11	1
Toluene	ND		1.0		ug/L			01/25/22 11:11	1
Ethylbenzene	ND		1.0		ug/L			01/25/22 11:11	1
m-Xylene & p-Xylene	ND		2.0		ug/L			01/25/22 11:11	1
o-Xylene	ND		1.0		ug/L			01/25/22 11:11	1
Methyl tert-butyl ether	ND		1.0		ug/L			01/25/22 11:11	1
1,2-Dichloroethane	ND		1.0		ug/L			01/25/22 11:11	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*106*		*80 - 120*		*01/25/22 11:11*	*1*
4-Bromofluorobenzene (Surr)	*83*		*80 - 120*		*01/25/22 11:11*	*1*
Dibromofluoromethane (Surr)	*89*		*80 - 120*		*01/25/22 11:11*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*80 - 120*		*01/25/22 11:11*	*1*

Lab Sample ID: LCS 580-379322/6
Matrix: Water
Analysis Batch: 379322

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			10.0	10.9		ug/L		109	80 - 122		
Toluene			10.0	11.6		ug/L		116	80 - 120		
Ethylbenzene			10.0	11.4		ug/L		114	80 - 120		
m-Xylene & p-Xylene			10.0	11.0		ug/L		110	80 - 120		
o-Xylene			10.0	10.9		ug/L		109	80 - 120		
Methyl tert-butyl ether			10.0	9.60		ug/L		96	72 - 120		
1,2-Dichloroethane			10.0	8.95		ug/L		90	69 - 126		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*107*		*80 - 120*
4-Bromofluorobenzene (Surr)	*89*		*80 - 120*
Dibromofluoromethane (Surr)	*84*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*82*		*80 - 120*

Lab Sample ID: LCSD 580-379322/7
Matrix: Water
Analysis Batch: 379322

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			10.0	11.8		ug/L		118	80 - 122	8	14
Toluene			10.0	12.6	*+	ug/L		126	80 - 120	8	13
Ethylbenzene			10.0	12.3	*+	ug/L		123	80 - 120	8	14
m-Xylene & p-Xylene			10.0	11.8		ug/L		118	80 - 120	7	14
o-Xylene			10.0	11.7		ug/L		117	80 - 120	7	16
Methyl tert-butyl ether			10.0	10.6		ug/L		106	72 - 120	10	18
1,2-Dichloroethane			10.0	9.90		ug/L		99	69 - 126	10	11

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-379322/7
Matrix: Water
Analysis Batch: 379322

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Toluene-d8 (Surr)	*106*		*80 - 120*
4-Bromofluorobenzene (Surr)	*87*		*80 - 120*
Dibromofluoromethane (Surr)	*85*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*87*		*80 - 120*

Lab Sample ID: MB 580-379389/5
Matrix: Water
Analysis Batch: 379389

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0		ug/L			01/26/22 12:51	1
Toluene	ND		1.0		ug/L			01/26/22 12:51	1
Ethylbenzene	ND		1.0		ug/L			01/26/22 12:51	1
m-Xylene & p-Xylene	ND		2.0		ug/L			01/26/22 12:51	1
o-Xylene	ND		1.0		ug/L			01/26/22 12:51	1
Methyl tert-butyl ether	ND		1.0		ug/L			01/26/22 12:51	1
1,2-Dichloroethane	ND		1.0		ug/L			01/26/22 12:51	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	*105*		*80 - 120*		*01/26/22 12:51*	*1*
4-Bromofluorobenzene (Surr)	*82*		*80 - 120*		*01/26/22 12:51*	*1*
Dibromofluoromethane (Surr)	*83*		*80 - 120*		*01/26/22 12:51*	*1*
1,2-Dichloroethane-d4 (Surr)	*80*		*80 - 120*		*01/26/22 12:51*	*1*

Lab Sample ID: LCS 580-379389/6
Matrix: Water
Analysis Batch: 379389

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.9		ug/L		109	80 - 122
Toluene	10.0	11.2		ug/L		112	80 - 120
Ethylbenzene	10.0	11.0		ug/L		110	80 - 120
m-Xylene & p-Xylene	10.0	10.5		ug/L		105	80 - 120
o-Xylene	10.0	10.5		ug/L		105	80 - 120
Methyl tert-butyl ether	10.0	9.68		ug/L		97	72 - 120
1,2-Dichloroethane	10.0	8.35		ug/L		84	69 - 126

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Toluene-d8 (Surr)	*107*		*80 - 120*
4-Bromofluorobenzene (Surr)	*89*		*80 - 120*
Dibromofluoromethane (Surr)	*82*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*81*		*80 - 120*

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-379389/7
Matrix: Water
Analysis Batch: 379389

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			10.0	10.8		ug/L		108	80 - 122	1	14
Toluene			10.0	11.1		ug/L		111	80 - 120	1	13
Ethylbenzene			10.0	11.0		ug/L		110	80 - 120	0	14
m-Xylene & p-Xylene			10.0	10.6		ug/L		106	80 - 120	1	14
o-Xylene			10.0	10.6		ug/L		106	80 - 120	1	16
Methyl tert-butyl ether			10.0	9.52		ug/L		95	72 - 120	2	18
1,2-Dichloroethane			10.0	7.95		ug/L		79	69 - 126	5	11

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*106*		*80 - 120*
4-Bromofluorobenzene (Surr)	*91*		*80 - 120*
Dibromofluoromethane (Surr)	*83*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*80*		*80 - 120*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Lab Sample ID: MB 580-379321/5
Matrix: Water
Analysis Batch: 379321

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics - NWTPH-G	ND		0.050		mg/L			01/25/22 11:11	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*83*		*77 - 123*		*01/25/22 11:11*	*1*

Lab Sample ID: LCS 580-379321/8
Matrix: Water
Analysis Batch: 379321

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics - NWTPH-G			1.00	0.926		mg/L		93	55 - 148

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*86*		*77 - 123*

Lab Sample ID: LCSD 580-379321/9
Matrix: Water
Analysis Batch: 379321

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics - NWTPH-G			1.00	0.888		mg/L		89	55 - 148	4	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*86*		*77 - 123*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS) (Continued)

Lab Sample ID: MB 580-379391/5
Matrix: Water
Analysis Batch: 379391

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics - NWTPH-G	ND		0.050		mg/L			01/26/22 12:51	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*82*		*77 - 123*		*01/26/22 12:51*	*1*

Lab Sample ID: LCS 580-379391/8
Matrix: Water
Analysis Batch: 379391

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline Range Organics - NWTPH-G			1.00	0.914		mg/L		91	55 - 148		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*88*		*77 - 123*

Lab Sample ID: LCSD 580-379391/9
Matrix: Water
Analysis Batch: 379391

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics - NWTPH-G			1.00	0.917		mg/L		92	55 - 148	0	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*88*		*77 - 123*

Method: 8011 - EDB and DBCP in Water by Microextraction

Lab Sample ID: MB 580-379518/1-A
Matrix: Water
Analysis Batch: 379562

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 379518

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylene Dibromide	ND		0.010		ug/L		01/27/22 11:59	01/27/22 16:46	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dibromopropane	*68*		*60 - 140*	*01/27/22 11:59*	*01/27/22 16:46*	*1*

Lab Sample ID: LCS 580-379518/2-A
Matrix: Water
Analysis Batch: 379562

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 379518

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ethylene Dibromide			0.0576	0.0649		ug/L		113	60 - 140		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dibromopropane	*89*		*60 - 140*

Method: 8011 - EDB and DBCP in Water by Microextraction

Lab Sample ID: LCSD 580-379518/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 379562 — **Prep Batch: 379518**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ethylene Dibromide			0.0576	0.0678		ug/L		118	60 - 140	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dibromopropane	*78*		*60 - 140*

Lab Sample ID: LLCS 580-379518/4-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 379562 — **Prep Batch: 379518**

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ethylene Dibromide			0.0115	0.0191	*+	ug/L		166	60 - 145

Surrogate	*LLCS %Recovery*	*LLCS Qualifier*	*Limits*
1,2-Dibromopropane	*77*		*60 - 140*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-379294/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 379316 — **Prep Batch: 379294**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11		mg/L		01/25/22 16:40	01/26/22 03:15	1
Motor Oil (>C24-C36)	ND		0.35		mg/L		01/25/22 16:40	01/26/22 03:15	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*90*		*50 - 150*	*01/25/22 16:40*	*01/26/22 03:15*	*1*

Lab Sample ID: LCS 580-379294/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 379316 — **Prep Batch: 379294**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)			2.00	2.07		mg/L		104	50 - 120
Motor Oil (>C24-C36)			2.00	2.19		mg/L		109	64 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*100*		*50 - 150*

Lab Sample ID: LCSD 580-379294/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 379316 — **Prep Batch: 379294**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2.00	1.80		mg/L		90	50 - 120	14	26
Motor Oil (>C24-C36)			2.00	1.97		mg/L		99	64 - 120	10	24

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-379294/3-A
Matrix: Water
Analysis Batch: 379316

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 379294

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	86		50 - 150

Lab Chronicle

Client: Landau & Associates, Inc.
Job ID: 580-109311-1
Project/Site: Central Kitsap Wastewater Treatment Plan

Client Sample ID: LAI-2-20220114
Lab Sample ID: 580-109311-1
Date Collected: 01/14/22 10:45
Matrix: Water
Date Received: 01/14/22 17:56

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260D		1	379389	01/26/22 15:17	B1M	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	379391	01/26/22 15:17	B1M	FGS SEA
Total/NA	Prep	8011			379518	01/27/22 11:59	RJL	FGS SEA
Total/NA	Analysis	8011		1	379562	01/27/22 17:50	TL1	FGS SEA
Total/NA	Prep	3510C			379294	01/25/22 16:40	JHR	FGS SEA
Total/NA	Analysis	NWTPH-Dx		1	379316	01/26/22 08:48	JAE	FGS SEA

Client Sample ID: LAI-1-20220114
Lab Sample ID: 580-109311-2
Date Collected: 01/14/22 12:00
Matrix: Water
Date Received: 01/14/22 17:56

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260D		1	379322	01/25/22 17:08	JSM	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	379321	01/25/22 17:08	JSM	FGS SEA
Total/NA	Prep	8011			379518	01/27/22 11:59	RJL	FGS SEA
Total/NA	Analysis	8011		1	379562	01/27/22 18:06	TL1	FGS SEA
Total/NA	Prep	3510C			379294	01/25/22 16:40	JHR	FGS SEA
Total/NA	Analysis	NWTPH-Dx		1	379316	01/26/22 09:08	JAE	FGS SEA

Client Sample ID: Tripblank - 20220114
Lab Sample ID: 580-109311-3
Date Collected: 01/14/22 00:01
Matrix: Water
Date Received: 01/14/22 17:56

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260D		1	379322	01/25/22 16:45	JSM	FGS SEA
Total/NA	Analysis	NWTPH-Gx		1	379321	01/25/22 16:45	JSM	FGS SEA

Laboratory References:
FGS SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Landau & Associates, Inc. Job ID: 580-109311-1
Project/Site: Central Kitsap Wastewater Treatment Plan

Laboratory: Eurofins Seattle

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Washington	State	C788	07-13-22

APPENDIX D

Boring Logs from Previous Studies

APPENDIX D
BORING LOGS FROM PREVIOUS STUDIES

Included in this section is a boring log from previous studies completed in the immediate vicinity of the digesters.

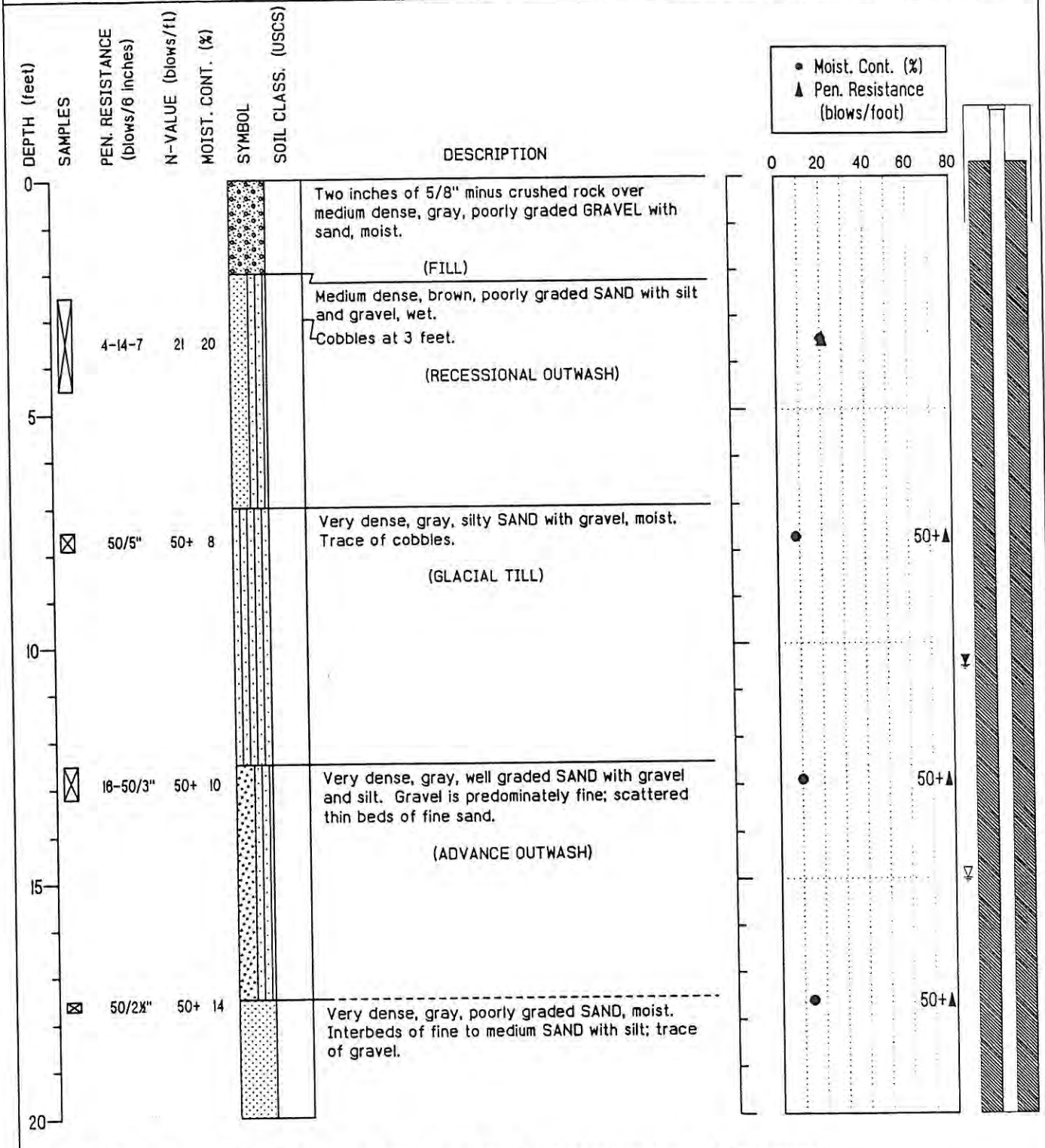
- Log of one boring (BH-10) completed by Hong West & Associates, Inc. in 1994.

HONG WEST & ASSOCIATES, INC.

BORING LOG

DRILLING COMPANY: Soil Sampling Service
DRILLING METHOD: Mobile Drill B-61 CFHS Auger
SAMPLING METHOD: SPT, D&M

TOTAL DEPTH: 42.8 Feet
SURFACE ELEVATION: 159± Feet
MEASURING POINT EL.: Feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated.

PROJECT: CENTRAL KITSAP WWTP

BORING: BH-10

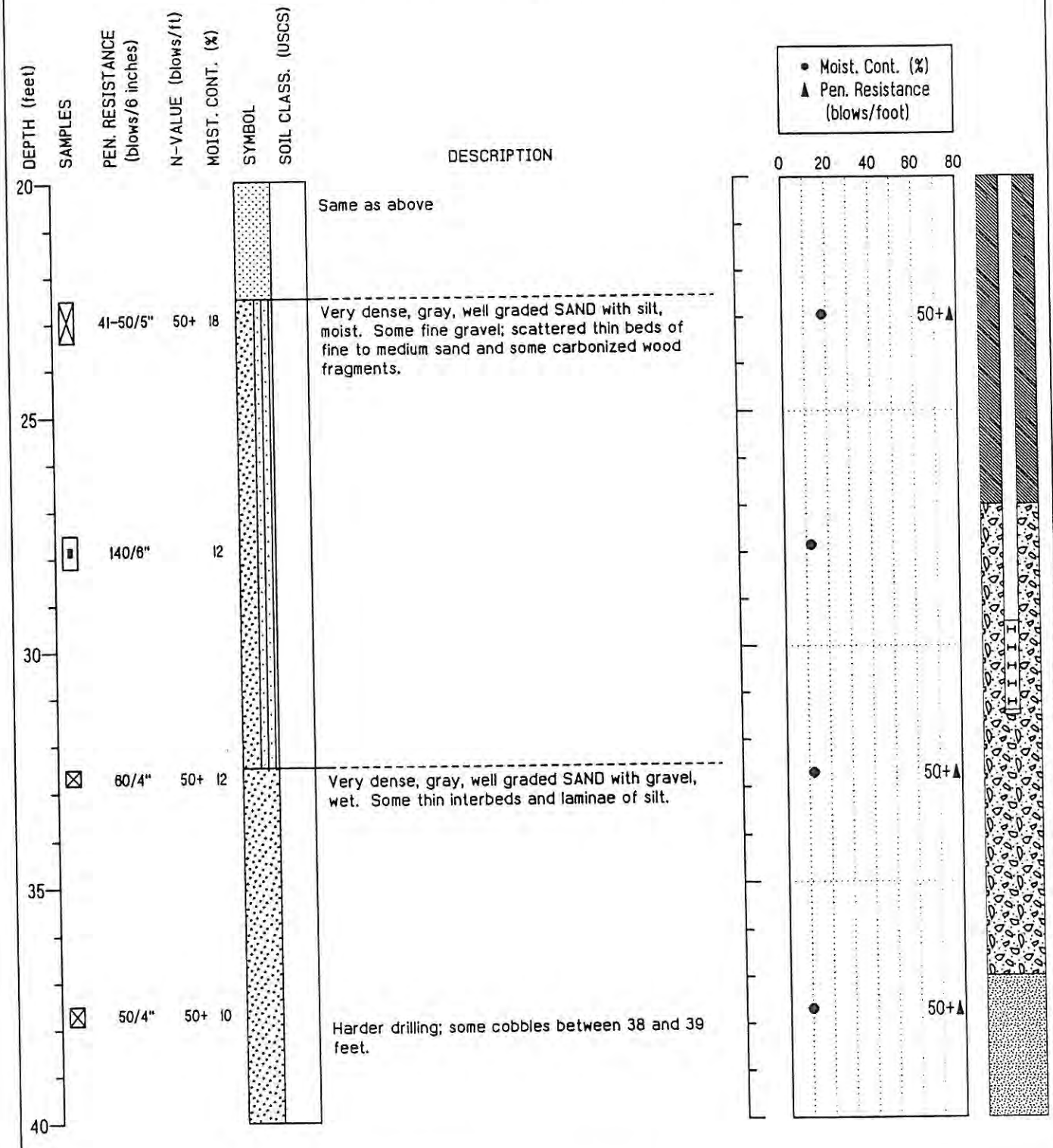
LOCATION: Kitsap County, Washington
DATE COMPLETED: 12/17/94
LOGGED BY: Rod Faubion

PROJECT NUMBER: 94127

PAGE: 1 OF 3

Figure A-15

HONG WEST & ASSOCIATES, INC.
BORING LOG



PROJECT: CENTRAL KITSAP WWTP

BORING: BH-10

LOCATION: Kitsap County, Washington
DATE COMPLETED: 12/17/94
LOGGED BY: Rod Faubion

PROJECT NUMBER: 94127

PAGE: 2 OF 3

Figure A-16

APPENDIX E

Hydrologic Setting

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands
Division of Geology and Earth Resources
David K. Norman - State Geologist

WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES
MAP SERIES 2013-02
Geologic Map of the Seabeck and Poulsbo 7.5-minute Quadrangles
October 2013

Pamphlet accompanies map

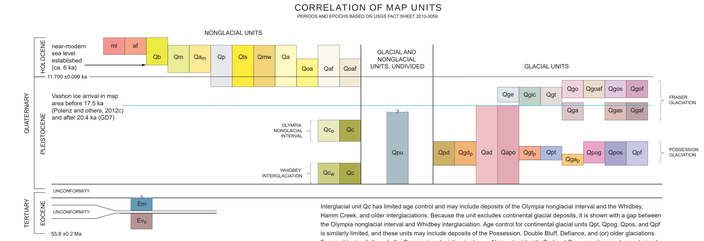
SEABECK

POULSBO

Approximate Site Location

CORRELATION OF MAP UNITS

PERIODS AND EPOCHS BASED ON USGS FACT SHEET 2010-3059



Interglacial unit Qc has limited age control and may include deposits of the Olympia nonglacial interval and the Whidbey, Hamm Creek, and older interglaciations. Because the unit excludes continental glacial deposits, it is shown with a gap between the Olympia nonglacial interval and Whidbey interglaciation. Age control for continental glacial units Qpt, Qpog, Qpos, and Qpf is similarly limited, and these units may include deposits of the Possession, Double Bluff, Defiance, and (or) older glaciations. For graphic simplicity, only the Possession glaciation is shown. Alpine glacial units Qad and Qapo are also poorly constrained and may include deposits of older glaciations as well as nonglacial episodes, because at least some alpine ice advances occurred when nonglacial conditions prevailed in the Puget Lowland.

MAJOR FINDINGS

- The northwest-trending, dextral Dabob Bay fault zone has ruptured Pleistocene sediment at Dyes Inlet and the Toandos Peninsula.
- Deposits from at least three and probably four pre-Vashon glaciations are exposed in the map area.
- New age-control data and stratigraphic field relations indicate that much of the pre-Vashon sediment in the map area is older than previously thought. Many deposits previously mapped as Vashon advance are associated with previous glaciations.
- The modern landscape is a construct of the last glaciation, with only relatively minor changes since then.
- The AD 900–930 Seattle fault earthquake did not result in significant subsidence or uplift in northern Dyes Inlet.

DESCRIPTION OF MAP UNITS

(See pamphlet for detailed map unit descriptions)

Quaternary Unconsolidated Deposits

HOLOCENE NONGLACIAL DEPOSITS

af — **Artificial fill**—Sand, cobbles, pebbles, boulders, silt, clay, organic matter, rip-rap, and concrete placed to elevate the land; engineered or non-engineered.

ml — **Modified land**—Locally derived sand, pebbles, cobbles, pebbles, boulders, silt, clay, and diamicton; excavated and redistributed to modify topography.

Qb — **Beach deposits**—Sand, pebbles, pebbly sand, cobbles, silt, clay, shells, peat, and isolated boulders; loose; clasts moderately to well rounded and oblate; locally well sorted.

Qbm — **Marine deltaic alluvium**—Sand, mud, pebbles, cobbles, and organic salt marsh deposits; loose; well rounded and moderately to well sorted; stratified to massively bedded.

Qm — **Marsh deposits**—Organic sediment and (or) loose clay, silt, and sand in tidal flats and coastal wetlands; saltwater to brackish equivalent of unit Qp.

LATEST PLEISTOCENE TO HOLOCENE NONGLACIAL DEPOSITS

Qp — **Peat**—Organic and organic-rich sediment; includes peat, gyttja, muck, silt, and clay; typically in closed depressions.

Qls — **Landslide deposits**—Cobbles, pebbles, sand, silt, clay, boulders, and diamicton in slide bodies and toes; clasts and grains angular to rounded; unsorted; generally loose, jumbled, and unstratified.

Qmw — **Mass wasting deposits**—Cobbles, pebbles, sand, silt, clay, boulders, and diamicton; loose; generally unsorted, but locally stratified; shown along potentially or demonstrably unstable slopes.

Qoa / Qa — **Alluvium**—Pebbles and sand, some silt, clay, locally cobbles and peat; moderately to well sorted; stratified to massive; deposited in flood plains and on terraces. Unit Qoa where relict.

Qoaf / Qaf — **Alluvial fan deposits**—Pebbles, sand, cobbles, boulders, and silt; loose; moderately to poorly sorted; stratified; forms concentric lobes where streams emerge from valleys; unit Qoaf where relict.

PLEISTOCENE GLACIAL AND NONGLACIAL DEPOSITS

Vashon Drift

Qgo — **Vashon recessional outwash**—Sand, pebble, and cobble gravel, some silt and clay; moderately fresh; clasts subrounded; moderately sorted and stratified. Subdivided into:

Qgoaf — **Vashon recessional alluvial and delta fan deposits**—Pebble gravel, sand, silt, and boulders; loose; moderately to poorly sorted and stratified; forms concentric lobes where streams once emerged from valleys.

Qgos — **Vashon recessional outwash, sand facies**—Sand, some beds and lenses of pebbles, silt, and clay; gray to tan; loose; clasts moderately to well rounded; moderately to well sorted.

Qgof — **Vashon recessional glacial lake deposits**—Silt, sand, clay, and rare dropstones; gray; loose, locally moderately stiff; moderately to well sorted, laminated or massive.

Qgic — **Vashon ice-contact deposits**—Cobble and pebble gravel, sand, ablation till, flow till, lodgment till, lacustrine mud, and rare boulders; tan to gray; loose to compact; variously sorted; massive to well stratified; includes sub-ice flow and collapse features. Subdivided into:

Qge — **Vashon esker**—Pebble to cobble gravel and sand; tan to brown; loose; clasts moderately to well rounded; mostly well sorted; mostly basaltic; forms sinuous hills.

Qgt — **Vashon lodgment till**—Diamicton of clay, silt, sand, pebbles, cobbles, and isolated boulders; brown to gray; lightly weathered or unweathered; compact, commonly resembling concrete; unsorted; unstratified.

Qga — **Vashon advance outwash**—Pebble and cobble gravel, sand, silt, and clay; clean; gray to tan; compact; clasts well rounded and well sorted; thinly to thickly bedded. Subdivided into:

Qgas — **Vashon advance outwash sand**—Sand, clay, pebbles, cobbles, or diamicton; gray to brown; compact; subrounded to well rounded and well sorted; thinly to thickly bedded.

Qgaf — **Vashon advance lacustrine mud**—Silt and clay, interbeds of sand, pebbles, and diamicton, with rare dropstones; gray; compact; well sorted; laminated to massive.

Pre-Vashon Glacial Deposits

Pre-Vashon Olympic-Sourced Glacial Deposits

Qad — **Pre-Vashon alpine drift**—Diamicton and outwash; gray to red-brown; loose to very compact; clasts subangular to subrounded; sorted to unsorted and unstratified; outwash generally horizontally bedded or crossbedded.

Qapo — **Pre-Vashon alpine outwash**—Sandy to muddy pebble gravel, locally cobbly, some intervening sand and lacustrine mud and seams of peat and gyttja; brown; compact; moderately sorted; bedded.

Pre-Vashon Northern-Sourced Glacial Deposits

Qdfp — **Possession till (columnar section and line unit only)**—Diamicton of clay, silt, sand, pebbles, cobbles, and boulders; gray to brown; typically lightly weathered; compact and unstratified, commonly resembling concrete.

Qdfa — **Possession advance outwash**—Sand, some silt, clay, pebbles, and rare cobbles and boulders; brown or gray; compact; unstratified to well stratified.

Qdfs — **Possession Drift, undivided**—Till (diamicton), sand, pebble gravel, and minor silt; light brown to gray; dense to very dense; coarsens upward; clasts subrounded to rounded; moderately to well sorted or unsorted; moderately stratified.

Qpt — **Pre-Vashon till**—Diamicton of clay, silt, sand, pebbles, cobbles, and boulders; gray to brown; typically lightly weathered; compact and unstratified, commonly resembling concrete.

Qpog — **Pre-Vashon outwash pebble gravel**—Pebbles, sand, silt, and clay, with some cobbles and boulders; gray to brown; compact; unstratified to well stratified.

Qpos — **Pre-Vashon outwash sand**—Sand, some silt, clay, pebbles, and rare cobbles and boulders; brown or gray; compact; unstratified to well stratified.

Qpf — **Pre-Vashon silt**—Silt and clay, with some sand and rare dropstones; gray or brown; compact; unstratified to well stratified; generally thought to be glaciolacustrine but may include nonglacial deposits.

Qpd — **Pre-Vashon drift**—Till (diamicton) and outwash consisting of cobble to pebble gravel with occasional boulders and a sandy to clayey matrix.

Pre-Vashon Nonglacial Deposits

Qc$_{pi}$ — **Pre-Vashon alluvium of the Olympia nonglacial interval**—Sand, silt, pebble gravel, clay, and organic sediment; gray to tan or brown, silt and clay range to bluish-gray; compact; moderately sorted; bedded.

Qc$_{pw}$ — **Whidbey Formation**—Silt, clay, and sand; light gray to light brown; dense; clasts subangular to subrounded; well stratified; well sorted; laminated to very thickly bedded.

Qc — **Pre-Vashon alluvium**—Sand, silt, pebble gravel, clay, and organic sediment; gray to tan, locally brown, with silt and clay facies ranging to bluish-gray; compact; moderately sorted; bedded.

Glacial and Nonglacial Deposits, Undivided

Qpu — **Undivided Quaternary sediment older than Vashon till**—Sand, pebble gravel, silt, clay, diamicton, organic sediment, and boulders; color and weathering varied; compact.

Tertiary Sedimentary and Volcanic Bedrock

Em — **Marine sedimentary rocks (middle Eocene)**—Marine silty sandstone, siltstone, boulder conglomerate; green-gray to light brown; fine to coarse grained; grains moderately well rounded; moderately well sorted; thinly bedded to massive; dominantly basaltic.

Ec$_{Ny}$ — **Crescent Formation (early to middle Eocene)**—Basalt; black to greenish black, weathers to gray and medium yellow-brown; commonly fine grained in sills and flows.

GEOLOGIC SYMBOLS

- Contact—Solid where location accurate, long-dashed where location approximate, dotted where concealed, queried where identity or existence questionable
- Fault, unknown offset—Dotted where concealed, queried where identity or existence questionable
- Thrust fault—Dotted where concealed; sawteeth on upper (tectonically higher) block; queried where identity or existence questionable
- High-angle dip-slip fault—Dotted where concealed, queried where identity or existence questionable; relative motion shown by U and D
- Right-lateral strike-slip fault—Short-dashed where inferred, dotted where concealed, queried where identity or existence questionable; arrows show relative motion
- Oblique-slip fault, reverse right-lateral offset—Long-dashed where location approximate, short-dashed where inferred, dotted where concealed, queried where identity or existence questionable; arrows show relative motion; rectangles on upthrown block
- Oblique-slip fault, high-angle right-lateral offset—Dotted where concealed, queried where identity or existence questionable; arrows and U and D show relative motion
- Anticline—Solid where location accurate, long-dashed where location approximate, dotted where concealed, queried where identity or existence questionable
- Syncline—Solid where location accurate, short-dashed where inferred, dotted where concealed, queried where identity or existence questionable
- Qpf — Geologic unit too thin to show at map scale—Solid where location accurate, dashed where inferred, queried where identity or existence questionable
- Naval base boundary—Base not accessed; geology compiled from prior mapping, analysis of remote sensing data, and subsurface boring records
- seismic line 77 — Geophysical data collection line—Accurately located
- A — A′ — Cross section line
- Fluvial terrace scarp—Identity and existence certain, location accurate, hachures point downscarp
- Landslide scarp—Identity and existence certain, location accurate; hachures point downslope
- Strand line (former shoreline)—Identity and existence certain, location accurate
- Incipient landslide scarp—Identity and existence certain, location accurate; hachures point downslope
- 72 — Bedding—Showing strike and dip
- 13 — Bedding—Showing strike and dip; top direction of beds known
- Vertical bedding—Showing strike
- Horizontal bedding
- 26 — Bedding in unconsolidated sedimentary deposits—Showing strike and dip
- 26 — Foreset bedding in unconsolidated sedimentary deposits—Showing strike and dip
- Current flow-direction indicators (flutes, pebble imbrication, etc.)—Showing bearing and plunge
- Glacial striae—Showing bearing
- 45 — Joint—Showing strike and dip
- Minor syncline—Showing bearing and plunge
- 63 — Minor fault—Showing strike and dip
- Minor vertical or near-vertical fault—Showing strike
- GD7 — Age sample, radiocarbon (ºC)
- GD5 — Age sample, optically stimulated luminescence
- GD10 — Age sample, fossil
- GD11 — Age sample, argon-argon (Ar-Ar)
- G1 — Geochemistry sample location
- W35† — Water well or boring
- S10 — Significant site
- HVSR1 — Passive seismic data collection point on map; depth estimate on cross section
- N2 — Paleomagnetic measurement location, normal polarity

Lambert conformal conic projection
North American Datum of 1927; to place on North American Datum of 1983, move the projection lines approximately 19 meters north and 94 meters east as shown by crosshair corner ticks
Base map from scanned and rectified U.S. Geological Survey Seabeck and Poulsbo 7.5-minute quadrangles, 1997
Shaded relief generated from a 2-meter lidar bare-earth digital elevation model (available from Puget Sound Lidar Consortium, http://pugetsoundlidar.ess.washington.edu/); sun azimuth 340°; sun angle 45°; vertical exaggeration 1x
GIS by Michael Polenz, Kimberly A. Stone, Gary T. Petro, and Trevor A. Contreras
Digital cartography and GIS by J. Eric Schuster, Anne C. Olson, and Ian J. Hubert
Editing and production by Jaretta M. Roloff and Jessica L. Czajkowski

SCALE 1:24,000
1 0.5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
0.5 0 1 KILOMETER
contour interval 20 feet

APPROXIMATE MEAN DECLINATION, 2013

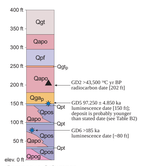
This geologic map was funded in part by the U.S. Geological Survey National Cooperative Geologic Mapping Program.

Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G12AC20234. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Geologic Map of the Seabeck and Poulsbo 7.5-minute Quadrangles, Kitsap and Jefferson Counties, Washington

by Michael Polenz, Gary T. Petro, Trevor A. Contreras, Kimberly A. Stone, Gabriel Legorreta Paulin, and Recep Cakir

October 2013



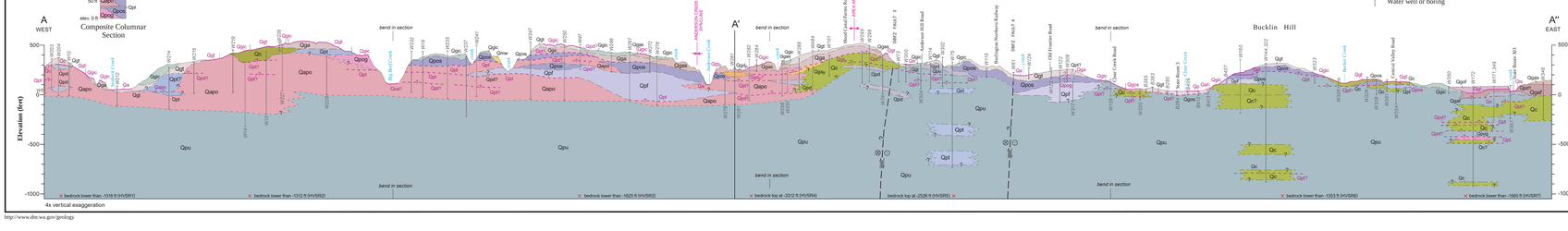
Composite Columnar Section

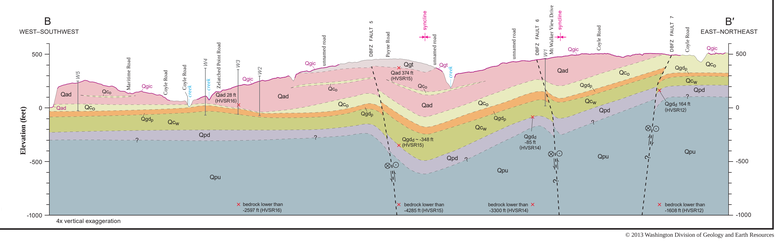
GEOLOGIC SYMBOLS IN CROSS SECTIONS

Fault—Solid where location accurate; dashed where inferred; queried where identity or existence questionable. Arrows indicate relative vertical motion. Arrow point (▽) indicates motion toward the viewer, and arrow feathers (▽) indicate motion away from the viewer.

Qpf — Surficial geologic units too thin to show as polygons at the scale of the cross sections (between ticks)

W95 — Water well or boring

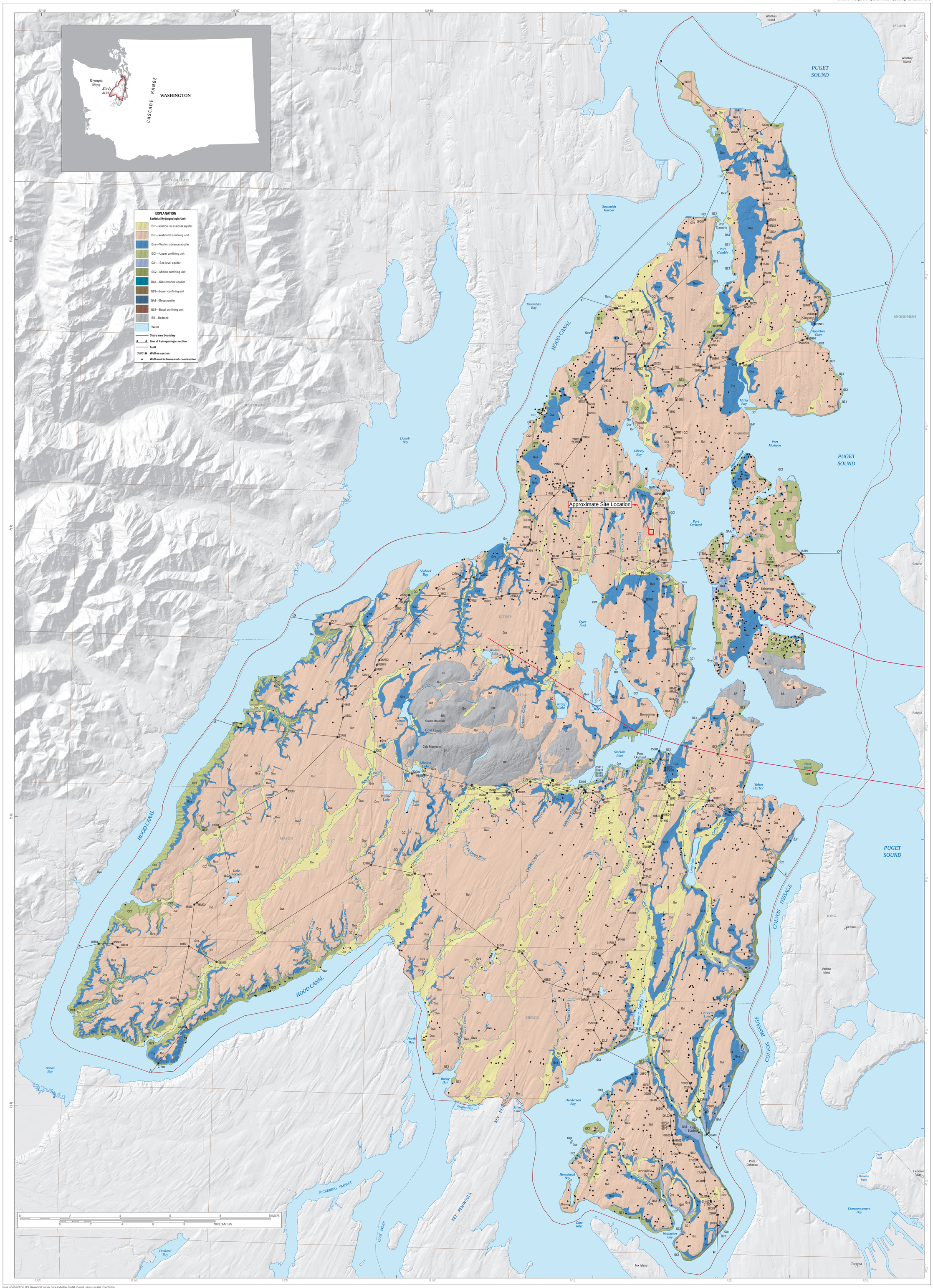




U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
KITSAP PUBLIC UTILITY DISTRICT

Scientific Investigations Report 2014–5106
Surficial hydrogeology, cross section traces, and well locations—PLATE 1
Welch, W.B., Frans, L.M., and Olsen, T.D., 2014, Hydrogeologic framework, groundwater movement, and water budget of the Kitsap Peninsula, west-central Washington: U.S. Geological Survey Scientific Investigations Report 2014-5106, 44 p., doi.org/10.3133/sir20145106.



Base modified from U.S. Geological Survey data and other digital sources, various scales. Coordinate Reference System: State Plane Washington North FIPS 4601 Feet, North American Datum of 1983.

SURFICIAL HYDROGEOLOGY, CROSS SECTION TRACES AND WELL LOCATIONS, KITSAP PENINSULA, WEST-CENTRAL WASHINGTON

By
Wendy B. Welch, Lonna M. Frans, and Theresa D. Olsen

2014

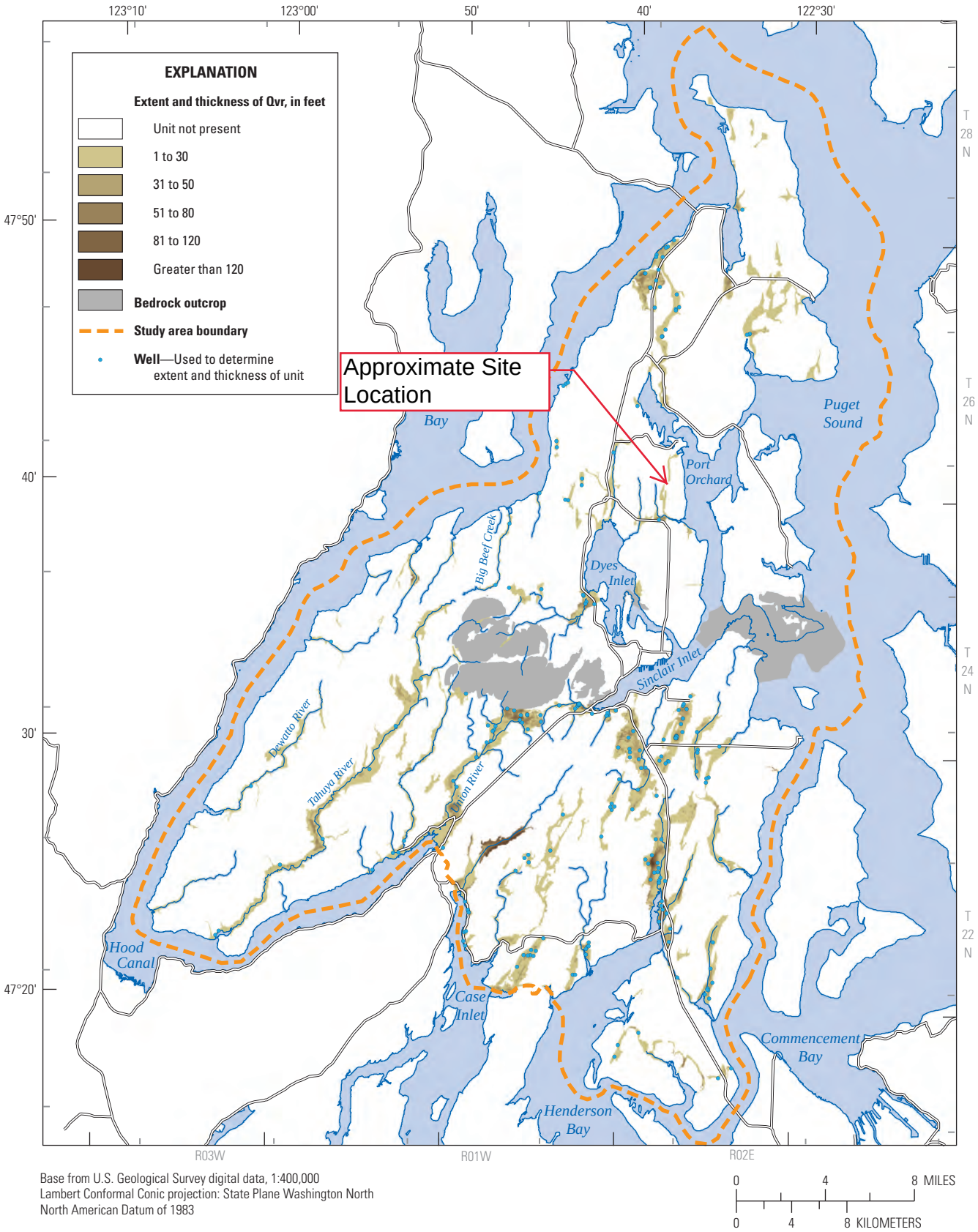


Figure 5. Extent and thickness of Vashon recessional aquifer (Qvr), Kitsap Peninsula, west-central Washington.

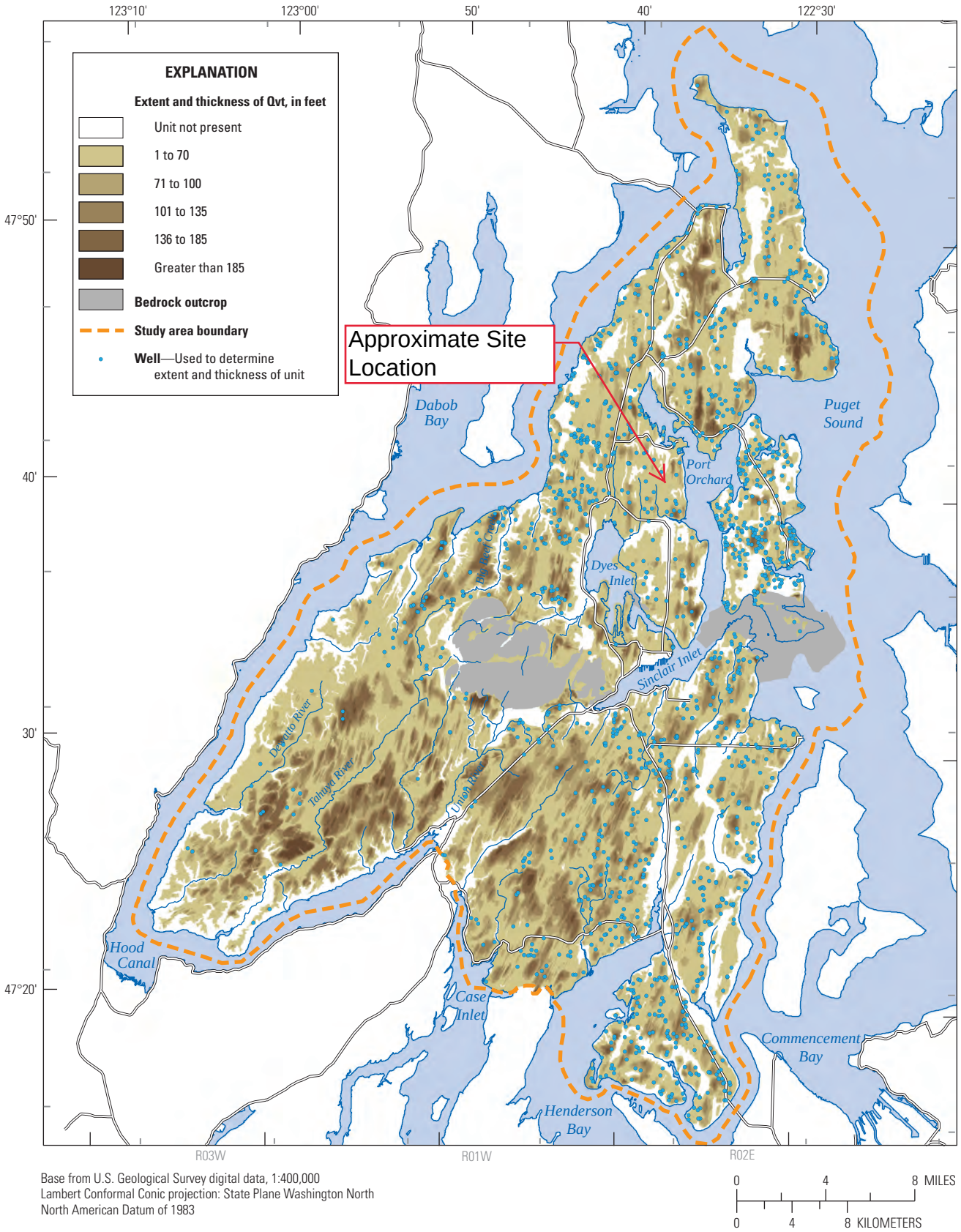


Figure 6. Extent and thickness of Vashon till confining unit (Qvt), Kitsap Peninsula, west-central Washington.

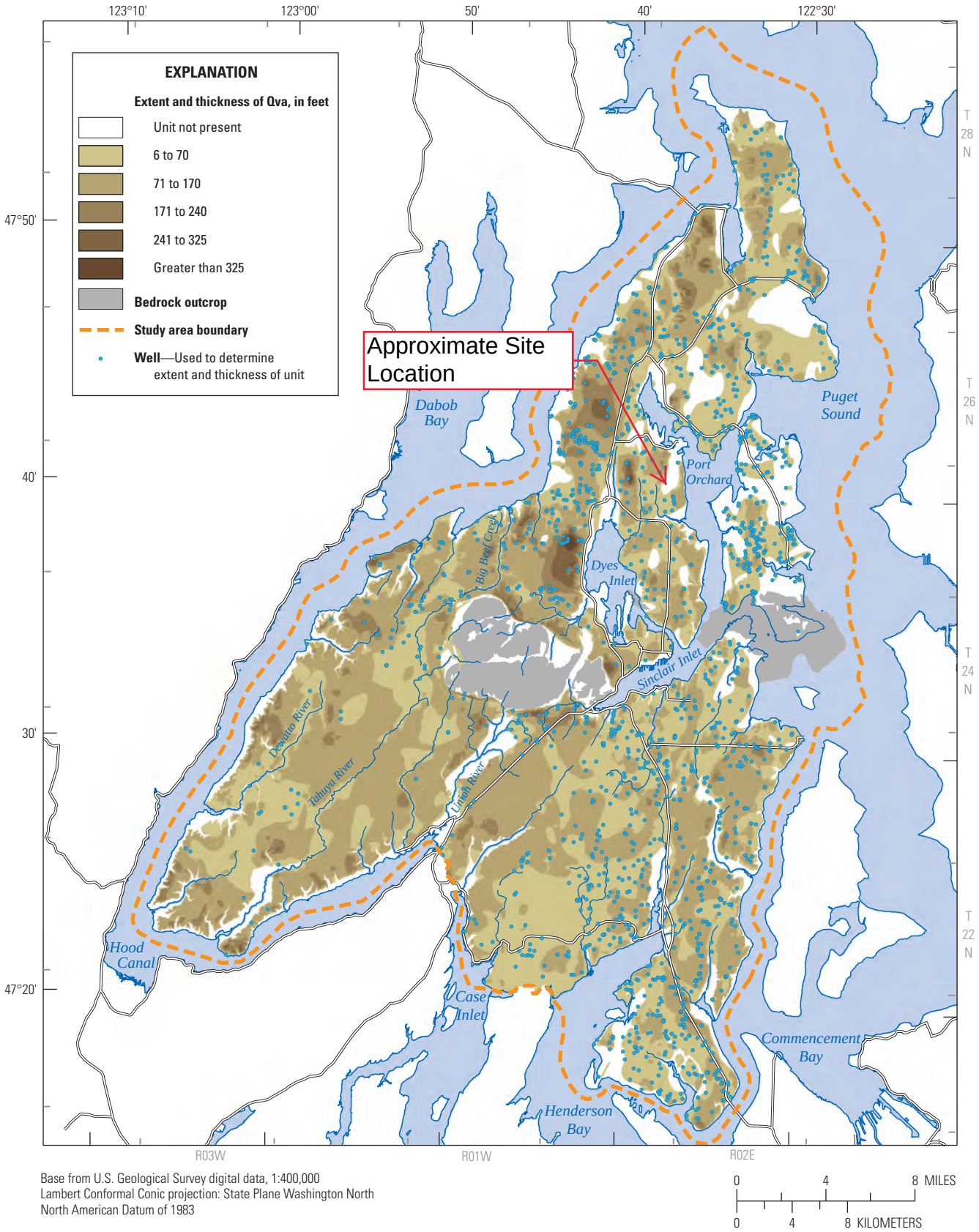


Figure 7. Extent and thickness of Vashon advance aquifer (Qva), Kitsap Peninsula, west-central Washington.

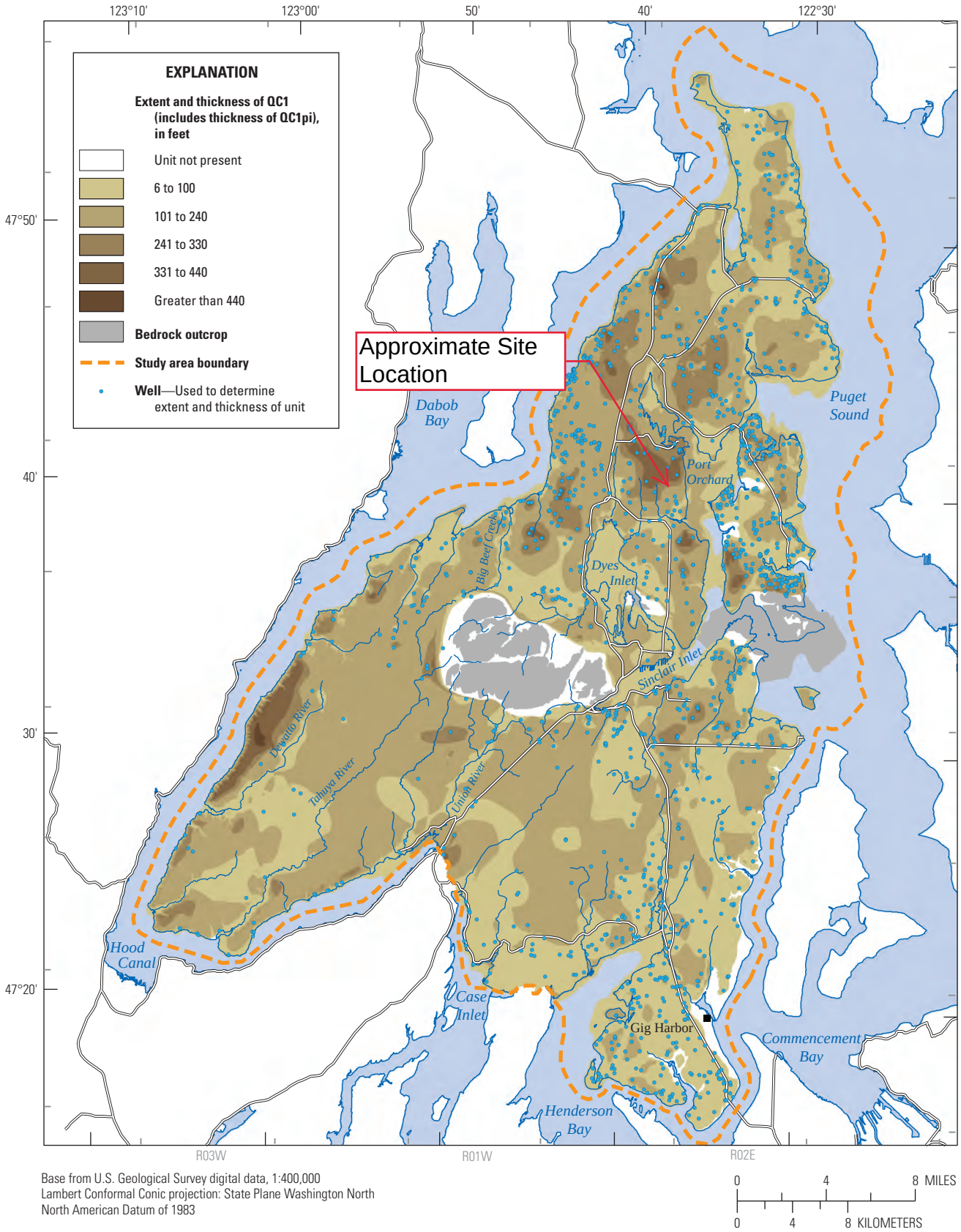


Figure 8. Extent and thickness of the upper confining unit (QC1), Kitsap Peninsula, west-central Washington.

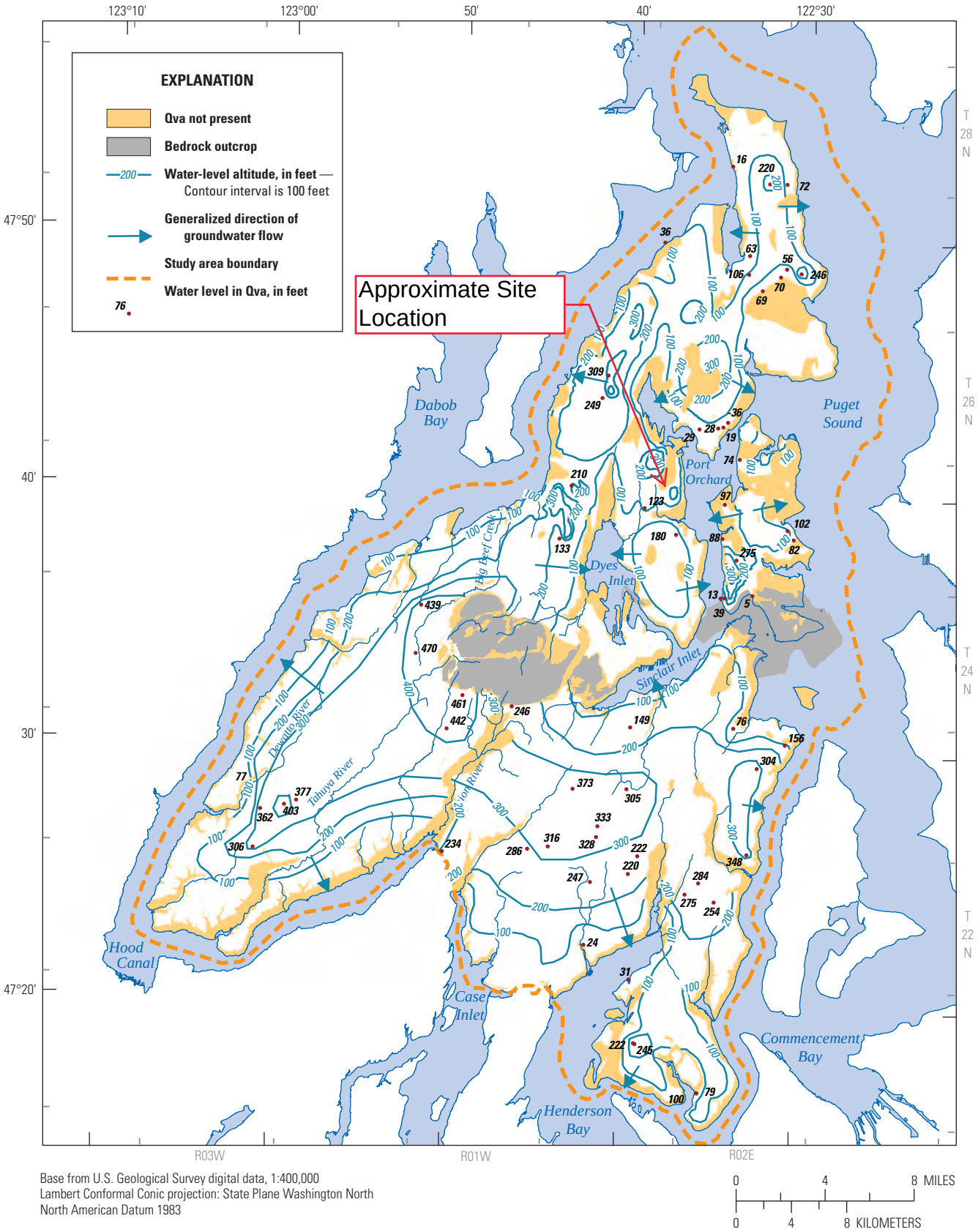
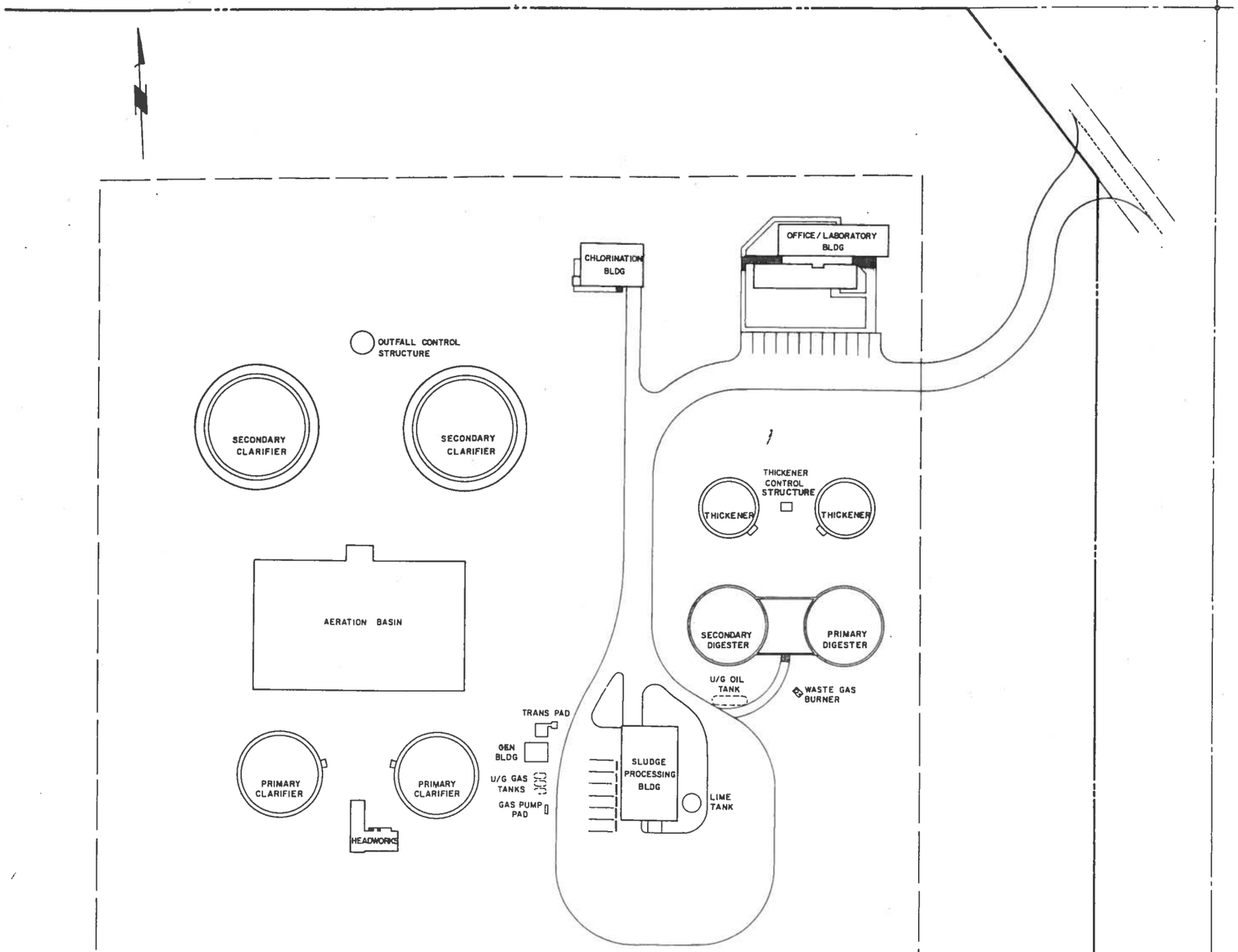


Figure 20. Water-level altitudes and generalized direction of groundwater flow in the Vashon advance aquifer (Qva), Kitsap Peninsula, west-central Washington, autumn 2010.

APPENDIX F

Select Sheets from Central Kitsap Wastewater Treatment Plant 1977 Record Drawings (URS Company)



THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

WALTER L BERSCHAUER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4404-07-99
SCALE 1" = 50'
Designed M.C.
Drawn by M.C.
Checked by J.L.B.
Proj. Engr J.L.B.
Approved by W.L.B.
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

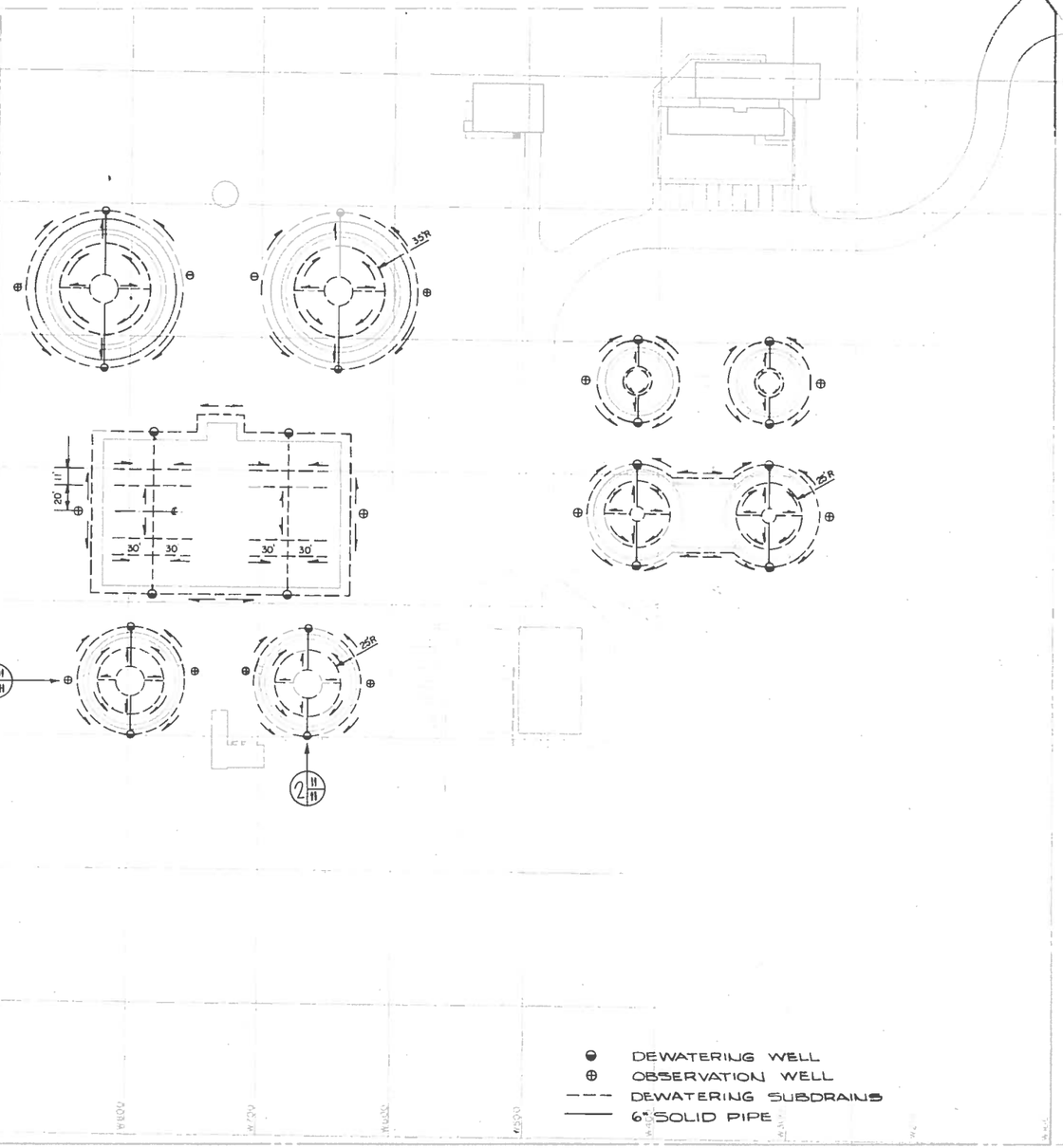
KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

SITE PLAN

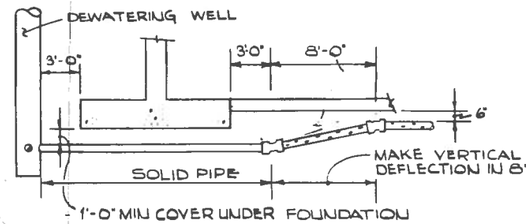
SHEET G2
17

GENERAL NOTES

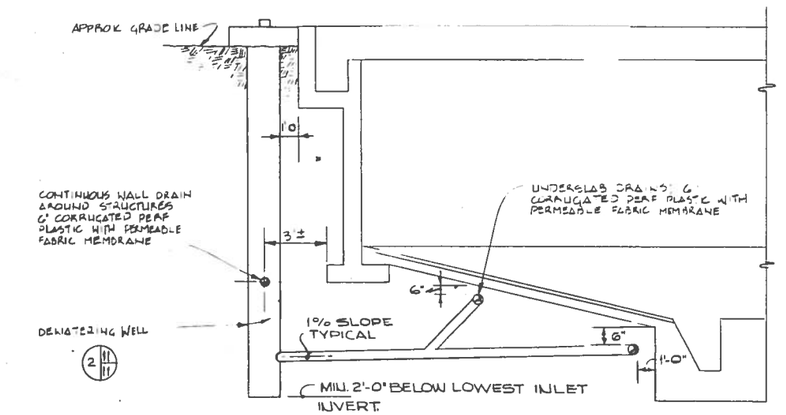
1. ALL PERFORATED DRAINS TO BE 6" DIAMETER.
2. SEPARATELY CONNECT WALL AND UNDERSLAB SYSTEMS TO DEWATERING WELL.
3. LOCATE DEWATERING WELLS IN GENERAL AREA SHOWN IN PLANS AND ADJACENT TO WALK AREAS.
4. SURFACE DRAINS, BUILDING FOUNDATION DRAINS AND STORM DRAIN SYSTEM ILLUSTRATED ON SHEET .



DEWATERING SYSTEM KEY



AERATION UNDERSLAB DRAINS
N.T.S.



CIRCULAR BASINS UNDERSLAB DRAINS
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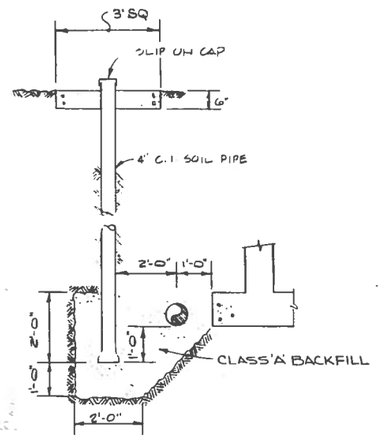
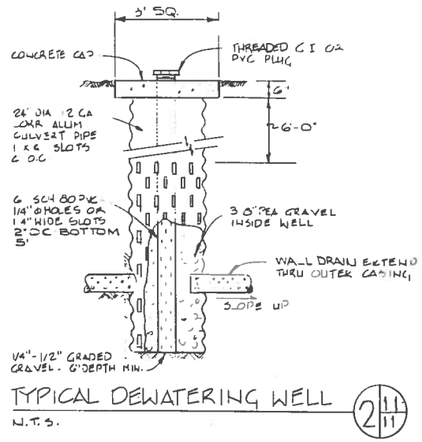


TYPICAL OBSERVATION WELL 1 11/11
NTS



TYPICAL DEWATERING WELL 2 11/11
N.T.S.

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

Job No 165-07-00
SCALE 1"=50'
Designed F.K.
Drawn by D.B. & D.M
Checked by J.B.
Proj. Engr L.L.B.
Approved W.L.B.
Date JUNE '77

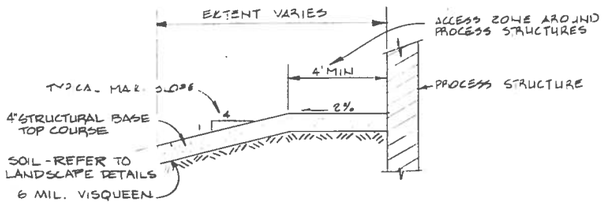
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

SUBSURFACE DRAINAGE PLAN & DETAILS

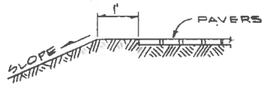
SHEET G11 / 17

ELECTRICAL | MECHANICAL | ARCHITECTURAL | STRUCTURAL | GENERAL



TYPICAL CRUSHED YARD SURFACING DETAIL 1 G/12
N.T.S.

SIDEWALK & CURB 2 G/12
N.T.S.



EMBANKMENT & WALK 3 G/12
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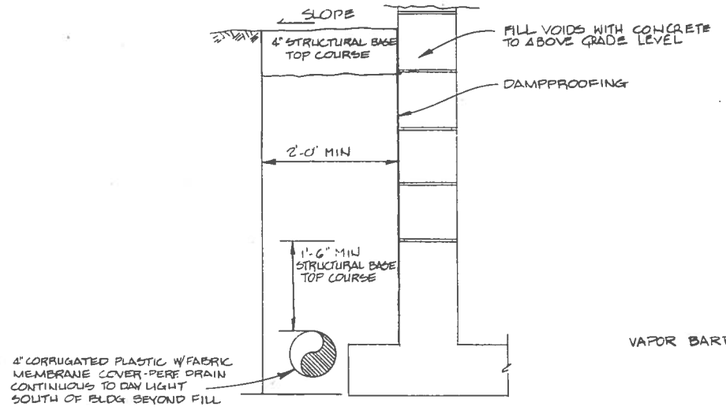
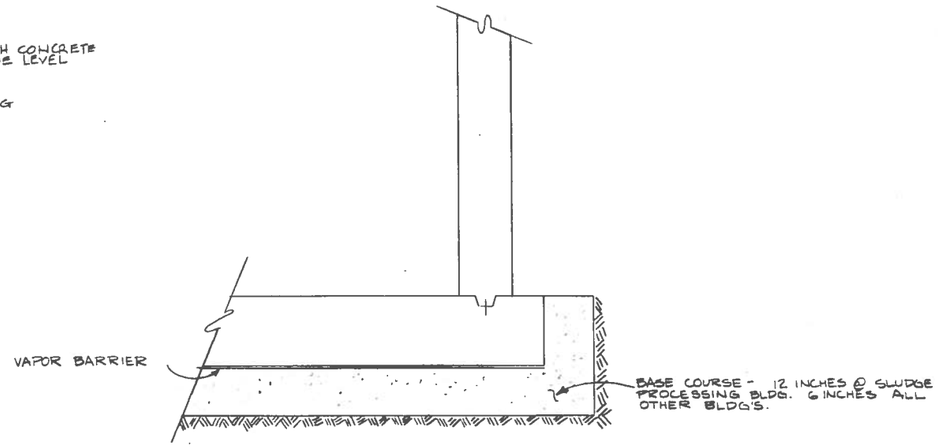
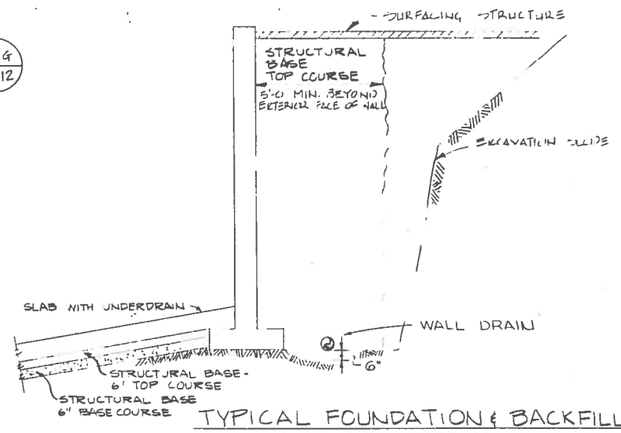


OFF/LAB BLDG. FOUNDATION DETAIL 4 G/12
N.T.S.



TYPICAL FOUNDATION DETAIL 6 G/12
SLAB WITHOUT UNDERDRAIN
N.T.S



TYPICAL FOUNDATION & BACKFILL DETAIL 5 G/12
SLAB WITH UNDERDRAIN
N.T.S.

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

4464-07-99 Job No
SCALE NONE

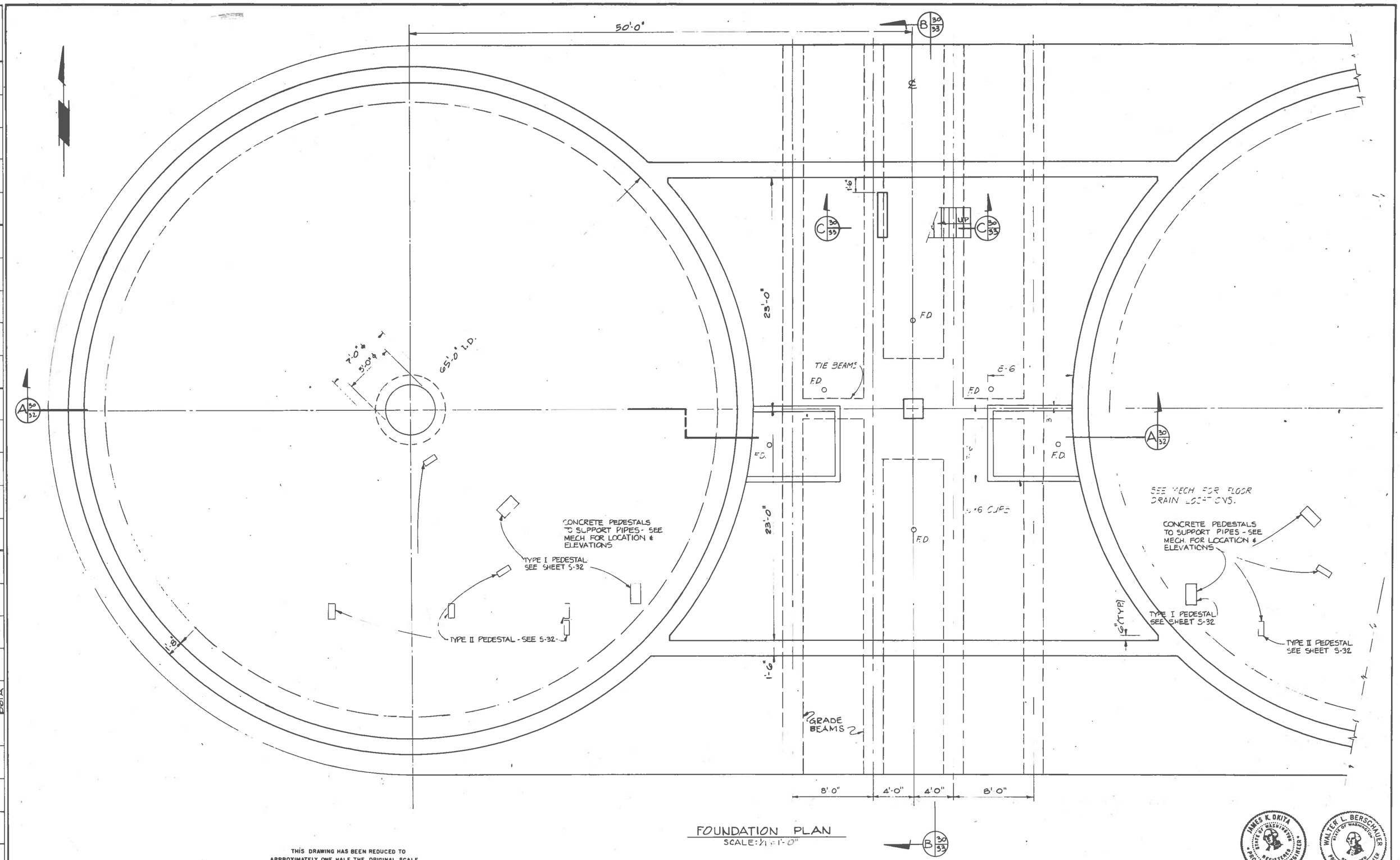
Designed F.K. | Proj. Engr. J.D.
Drawn by D.M. | Approved by W.D.
Checked by J.B. | Date JUNE '77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

STRUCTURAL BACKFILL & DRAINAGE

SHEET G12 / 17



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

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. OKITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4469-07-02
SCALE 1/4" = 1'-0"
Designed JO
Drawn by BW
Checked by AL
Proj. Engr JB
Approved by WB
Date JUNE 77

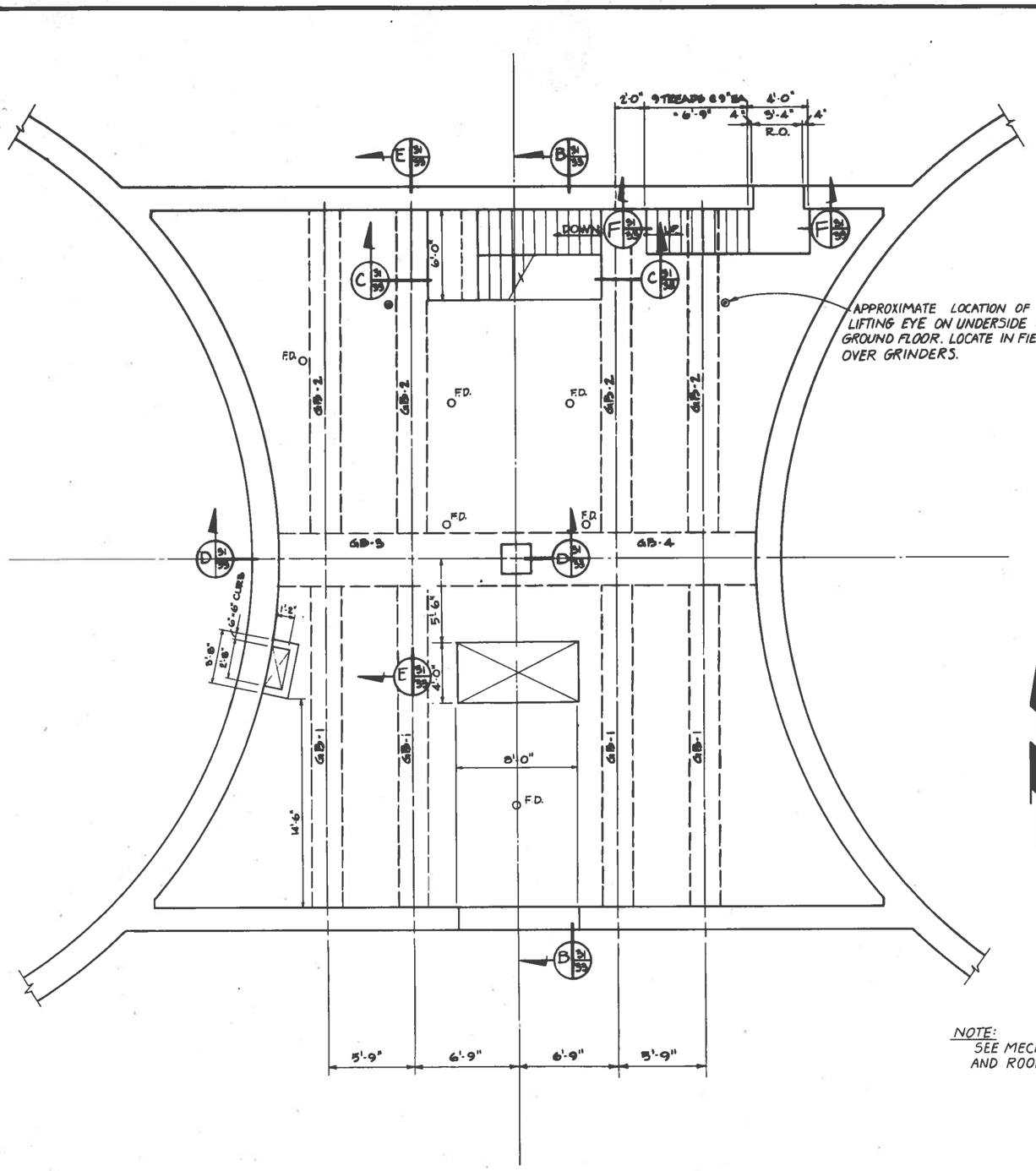
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

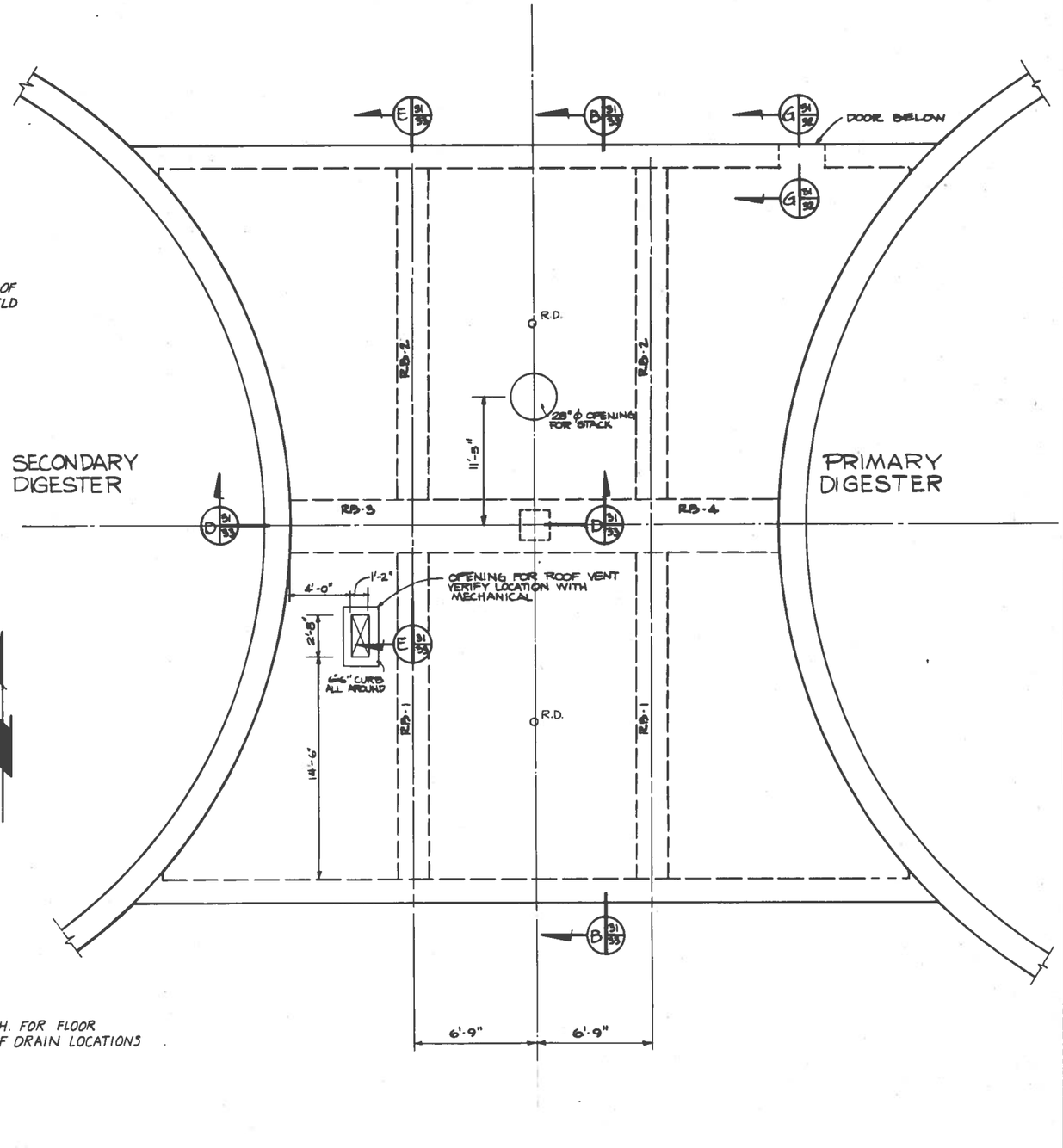
DIGESTERS & CONTROL ROOM
FOUNDATION PLAN

SHEET S30 / 47

B61A



GROUND FLOOR PLAN



ROOF PLAN

NOTE:
SEE MECH. FOR FLOOR AND ROOF DRAIN LOCATIONS

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

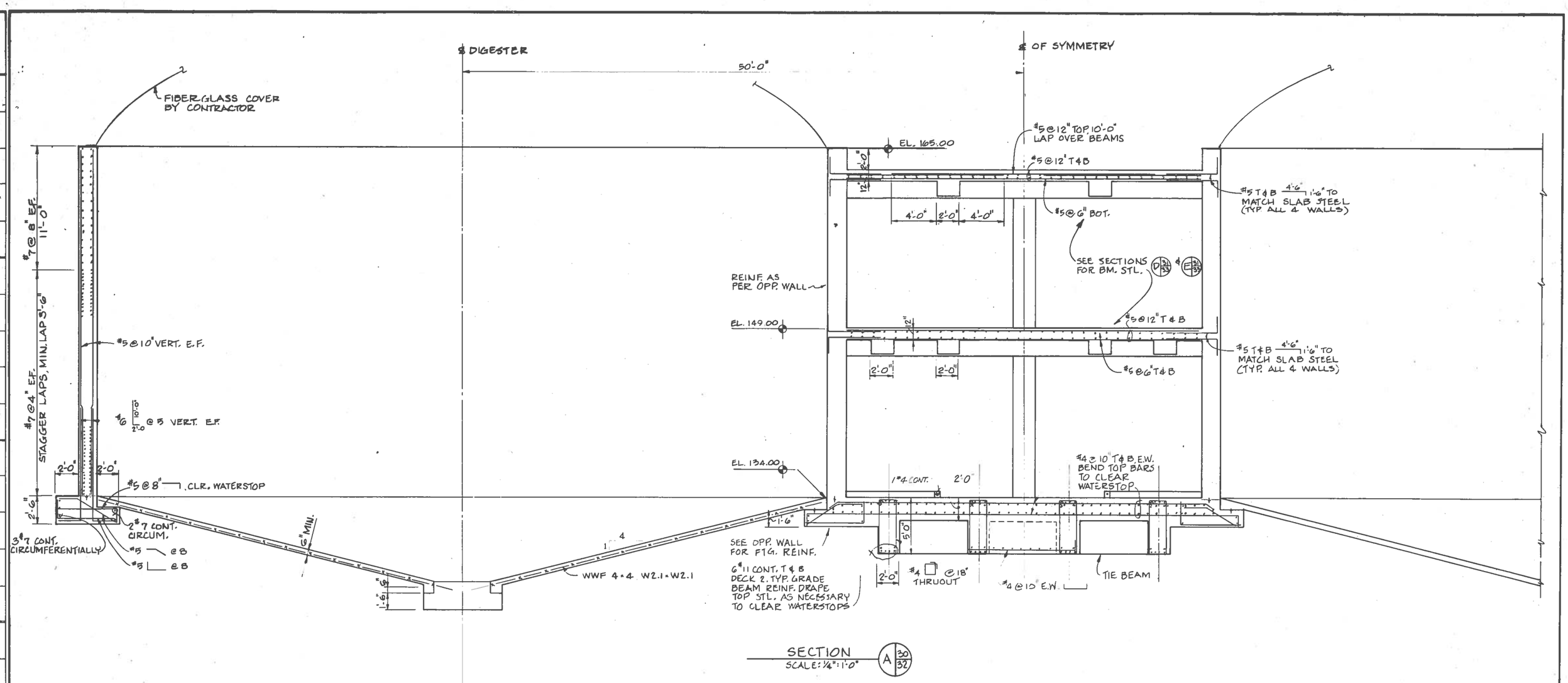
Job No 1461-07-99
SCALE 1/4" = 1'-0"
Designed JO
Drawn by BW
Checked by AL
Proj. Engr. JB
Approved by WB
Date JUNE '99

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
GROUND FLOOR & ROOF PLAN

SHEET S31
47



SECTION
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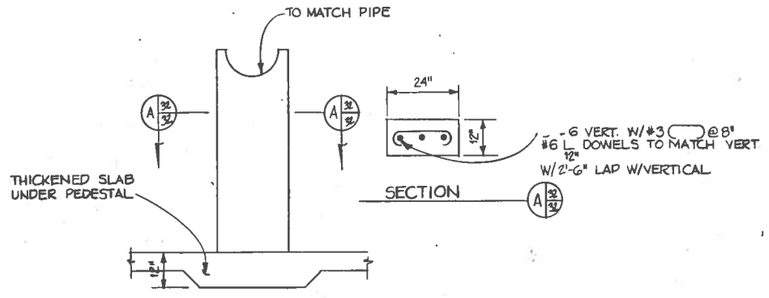
A 30/32



TYPE I PEDESTAL ELEV.
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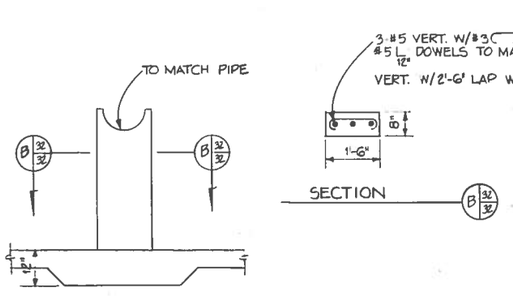

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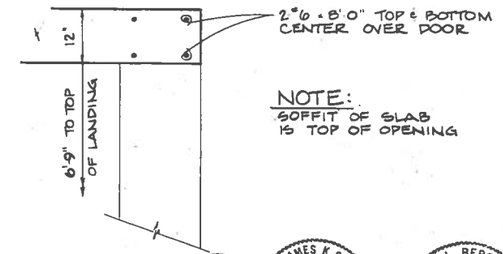


THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. OKITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4464-07-02
SCALE AS NOTED
Designed JO
Drawn by BW
Checked by AL
Proj. Engr
Approved by
Date JUNE '77

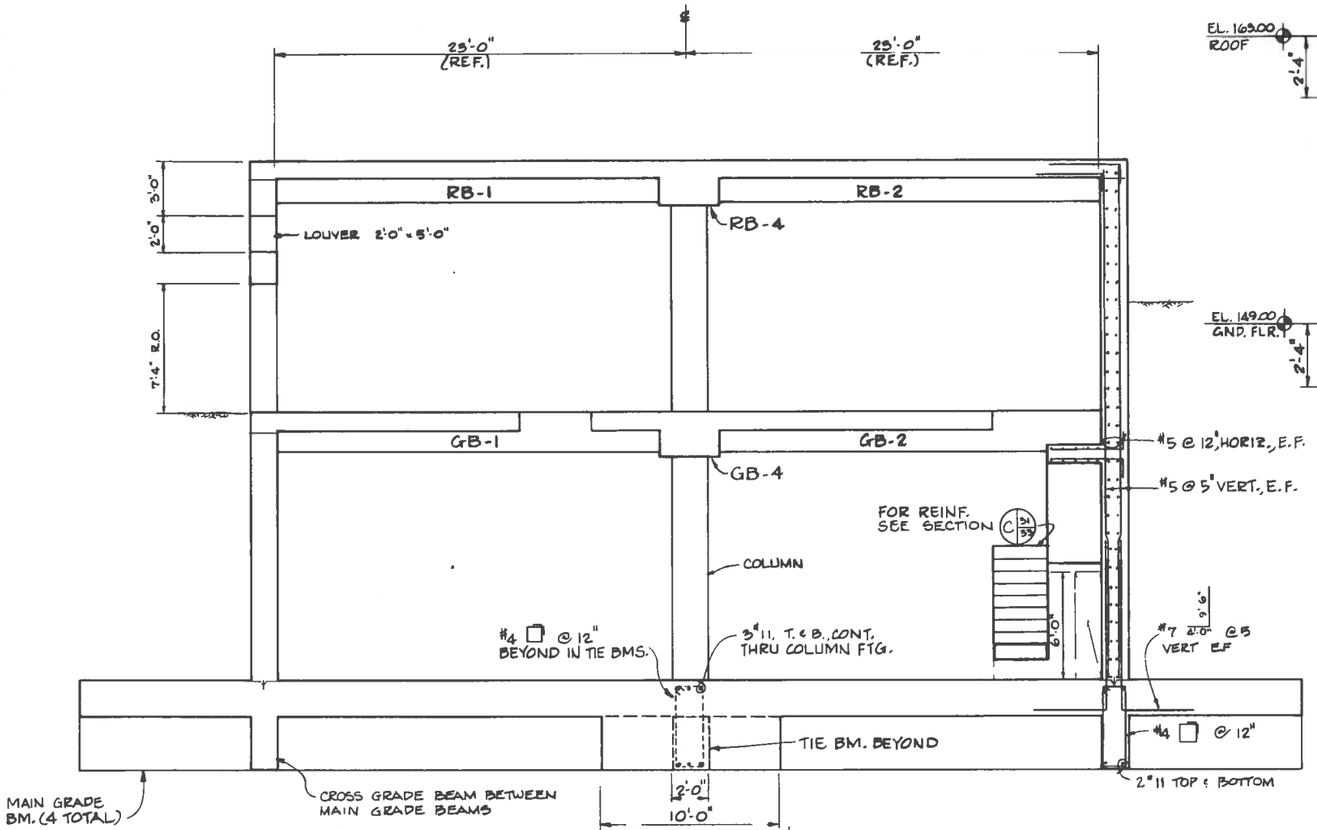
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
SECTION

SHEET S32
47

603A
T. 603



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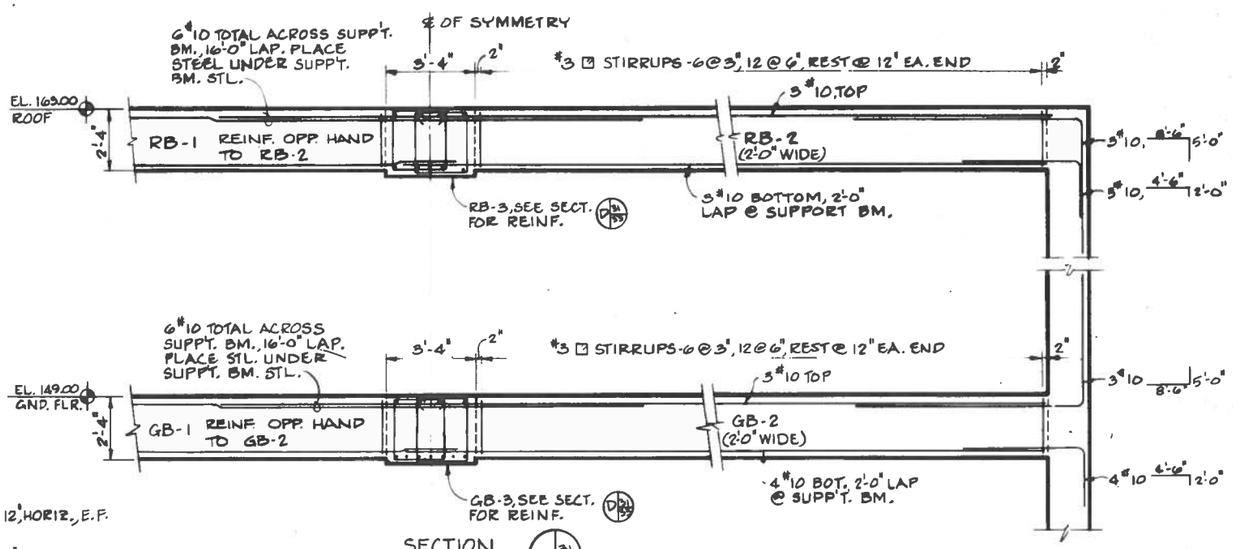

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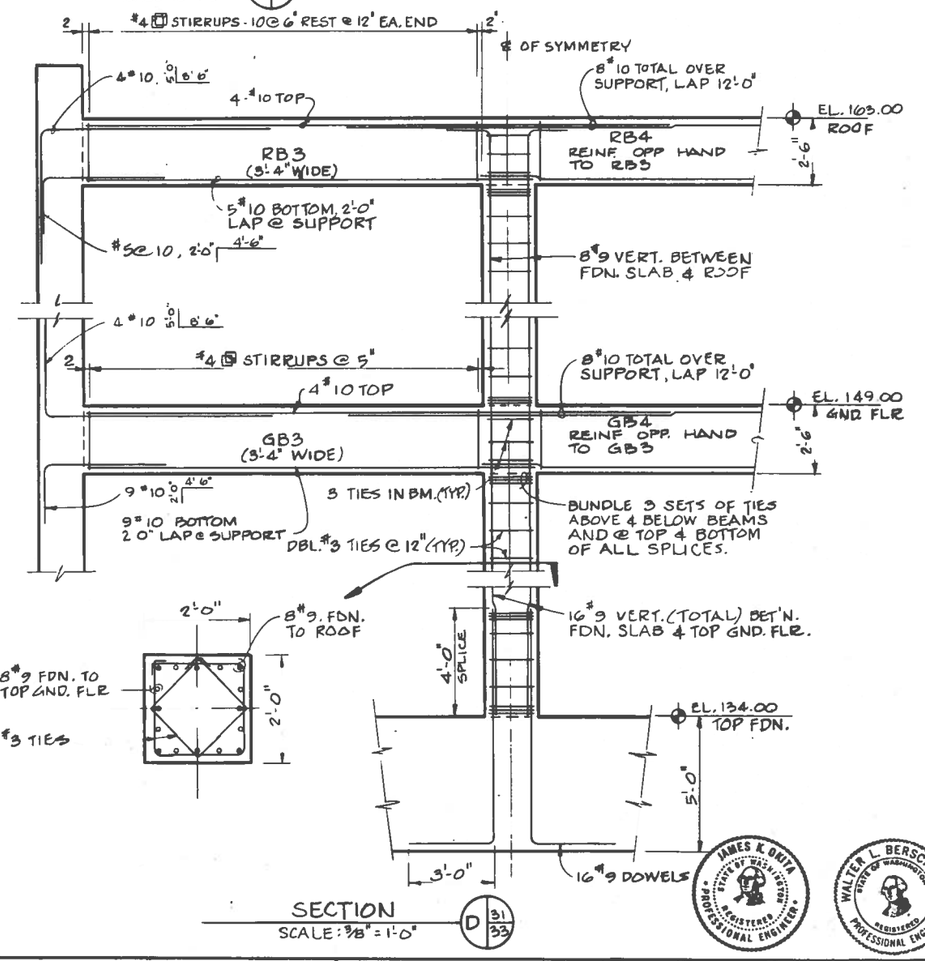

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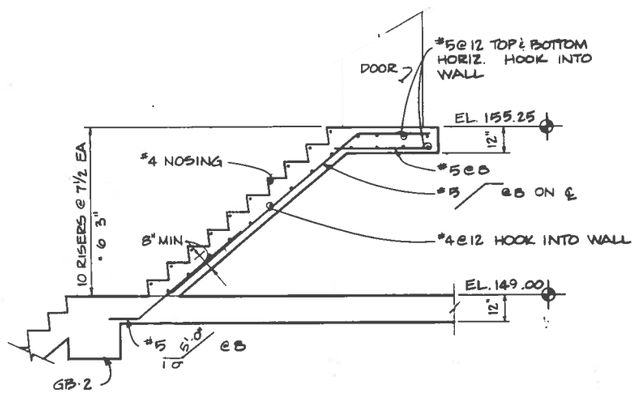

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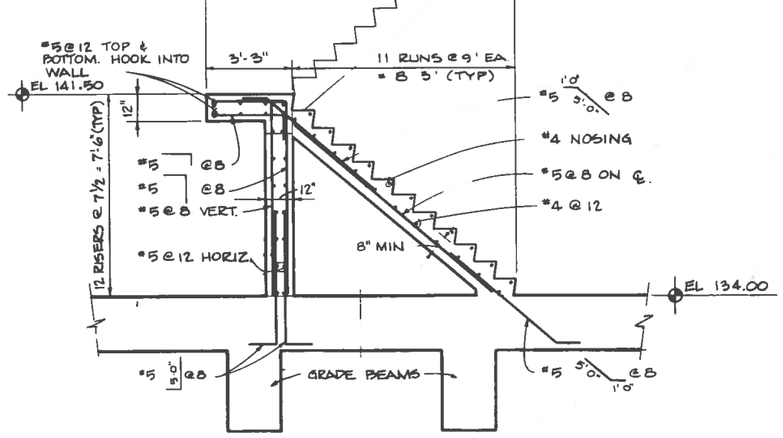


SECTION
SCALE: 3/8"=1'-0" C 31/33

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. ONITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No. 4469-07-99
SCALE AS SHOWN
Designed JO
Drawn by BW
Checked by AL
Pro Engr JB
Approved by WB
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
SECTIONS

SHEET S33
47

T 564
564A

SECONDARY DIGESTER

PRIMARY DIGESTER

PLAN

SLUDGE RECIRCULATION SECTION

FOR CONT SEE DWG NO M4 & M5

16" SLUDGE RECIRCULATION

2 4"x16" ELBO

14" M XING NOZZLE

DRAFT TUBE

4'-0"

0'-0"

4 S UCT FEED

6" SL DF

4" PRV (TYPICAL 3 PLACES)

2" PW

6" SL

TH CK

5" PUMP

6" SM

DIGESTER BUILDING

2" VTR

6" PV

6" SM PIST

DENSITY M

3 MH

3/4" SW DN

1" SW DRN

4" CV

SL GRINDER

TEMP IND/TRANSM.

TIT

4" SL

FD 3

6" THICK SLUDGE

1 1/2" SW DRN.

SL GRINDER

30 MH

UH-1

SLUDGE RECIRCULATION DISCHARGE PIPING SAME AS SECONDARY DIGESTER BUT OPPOSITE HAND.

6" PRV TYP 4 PLACES SEE SECONDARY DIGESTER

5" LW

1" DN TO NH3

CURB

HEAT EXCHGR.

FD 2

5 HW

3" HW

6" GAS

4" 3 WAY

16" SM BRR

16" CV

4" PV

16" 3 WAY PV

16" SLCT ON CROSS-OVER

4 D SCHARGE CROSS OVER

6" SL DF

FOR CONT SEE DWG NO M4 & M5

FLEXIBLE TUBE TO TEMPERATURE INDICATING TRANSMITTER

GATE VALVE (SIZE AS REQUIRED)

WELL

BULB INSIDE

WELL INSTALLATION THERMOMETER

NTS.

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

WALTER L. BERSCHAUER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

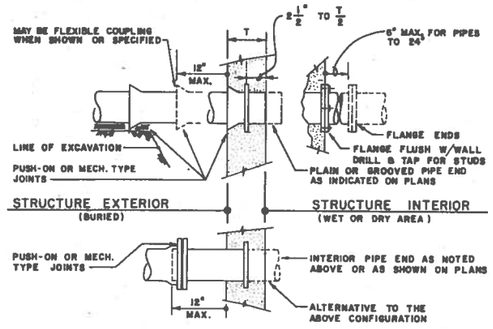
Job No 4464-07 99
SCALE 1/4"
Designed CJH
Drawn by MWC
Checked by JB
Proj Engr JB
Approved by WB
Date JUNE 1977

URS COMPANY
A Professional Services Organization
Seattle, Washington

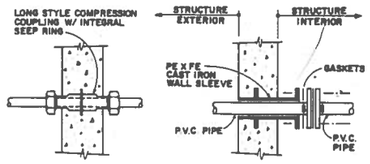
KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
BASEMENT PIPING

SHEET M30
51

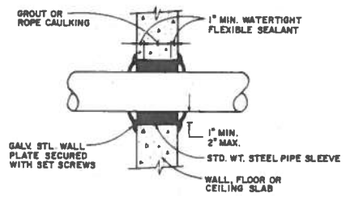


EXTERIOR-INTERIOR WALL PENETRATION 1 M49

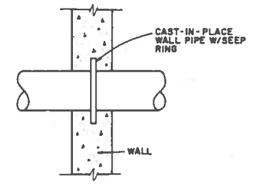


FOR PIPE 2"Ø OR SMALLER FOR PIPE LARGER THAN 2"Ø

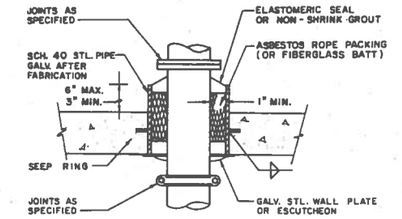
PVC WALL PENETRATION 2 M49



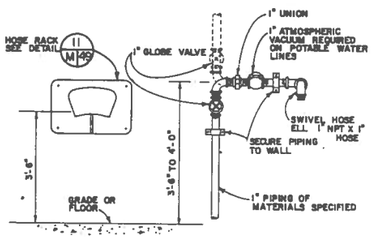
INTERIOR DRY WALL PENETRATION 3 M49



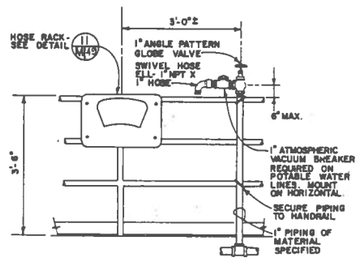
CAST-IN-PLACE INTERIOR WALL PENETRATION 4 M49



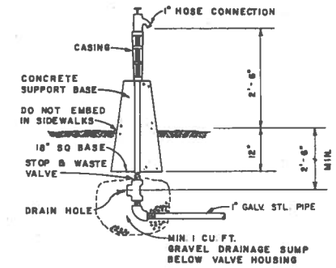
INTERIOR FLOOR PENETRATION 5 M49



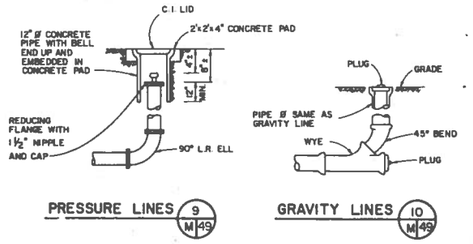
TYPICAL HOSE BIBB WALL MOUNTED 6 M49



TYPICAL HOSE BIBB HANDRAIL MOUNTED 7 M49



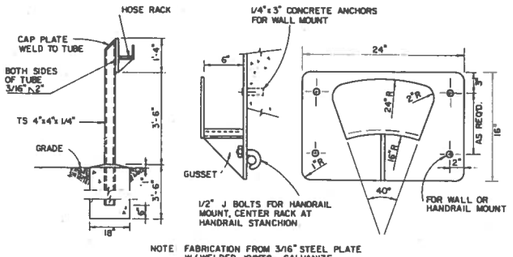
PROCESS WATER YARD FROST PROOF HOSE BIBB 8 M49
N.T.S.



PRESSURE LINES 9 M49 GRAVITY LINES 10 M49

NOTE PIPE AND FITTINGS USED IN CLEANOUT CONSTRUCTION SHALL BE THE SAME MATERIAL AS USED ON LINE TO BE CLEANED

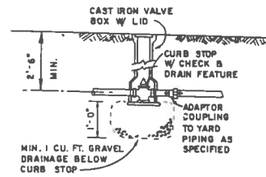
TYPICAL - CLEANOUTS



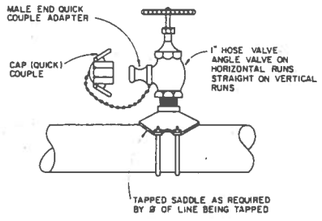
NOTE FABRICATION FROM 3/16" STEEL PLATE W/ WELDED JOINTS GALVANIZE AFTER FABRICATION

YARD MOUNT SIDE VIEW FRONT VIEW

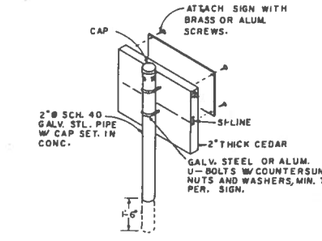
TYPICAL HOSE RACK 11 M49



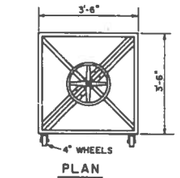
STOP AND WASTE VALVE 12 M49
N.T.S.



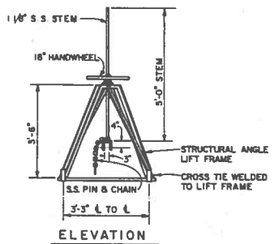
TYPICAL LINE FLUSHING INLET 13 M49



MOUNTING FOR YARD SIGNS 14 M49
N.T.S

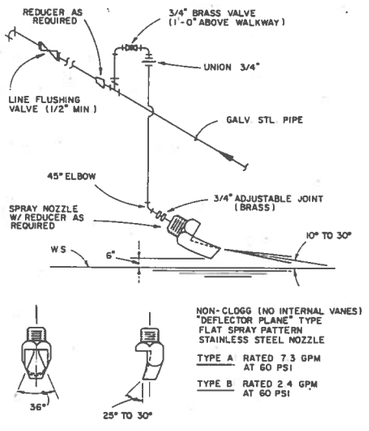


PLAN

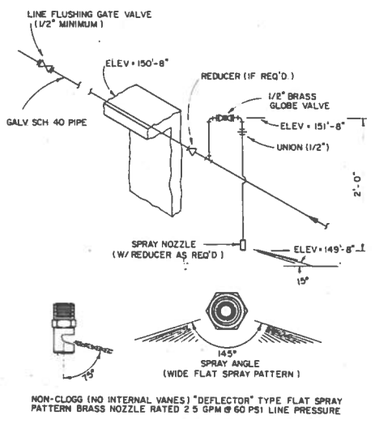


ELEVATION

PORTABLE HANDWHEEL LIFT 15 M49
SCALE ½"=1'-0"

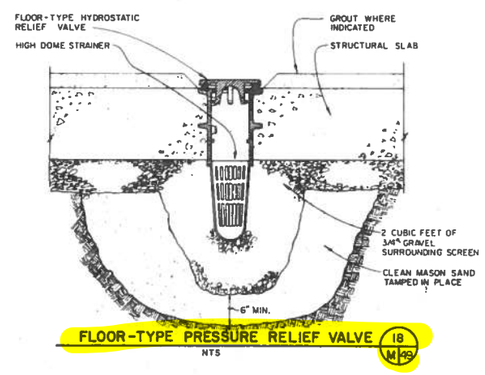


SCUM SKIMMER NOZZLES 16 M49

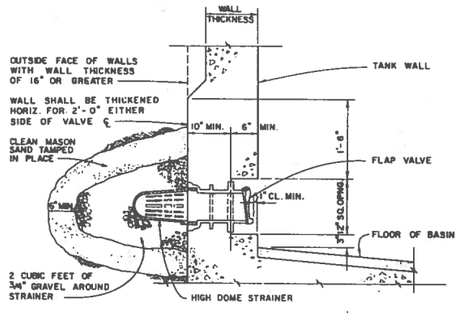


NON-CLOGG (NO INTERNAL VANES) "DEFLECTOR" TYPE FLAT SPRAY PATTERN BRASS NOZZLE RATED 2.5 GPM @ 60 PSI LINE PRESSURE

AERATION BASIN SPRAY NOZZLES 17 M49



FLOOR-TYPE PRESSURE RELIEF VALVE 18 M49
NTS



WALL-TYPE PRESSURE RELIEF VALVE 19 M49

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4464.07.99 | SCALE N.T.S. | Designed AT | Drawn by WW | Checked by JG | Proj. Engr. JB | Approved by W.B. | Date JUNE '77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

MECHANICAL STANDARD DETAILS

SHEET M49 / 51

APPENDIX G

DW-SW Well Condition Analysis Results

Date: December 30, 2021

Lab Report No. 22299

Ben Lee
Landau Associates
2107 South C Street
Tacoma, WA 98402

Project Description: Kitsap County, Well DW-SW; samples dated: 12/08/2021
Complete Well Profile (1), PO#1490009.01

Test Description:

The Complete Well Profile analysis is designed for comparative analysis of two samples, typically one static and one pumping sample. The Complete Well Profile utilizes a series of inorganic chemical and microbiological tests to identify fouling and corrosion issues with potential impacts on the operation of the sampled well. The tests include a number of inorganic chemical parameters such as pH, total dissolved solids/conductivity, hardness, alkalinity, oxidation reduction potential (ORP), bicarbonate, carbonates, silica, sodium, potassium, chloride, iron, manganese, phosphate, nitrate, sulfate, and total organic carbon (TOC). Biological assessment is designed to quantify the total bacterial population, identify two dominant populations of bacteria, assess anaerobic conditions, and identify the presence of iron related bacteria and sulfate reducing organisms. Also included are tests for Adenosine triphosphate (ATP), heterotrophic plate count (HPC), and a microscopic evaluation; and in potable systems, total coliform and E. coli coliform presence/absence.

Testing Procedures:

All laboratory testing procedures are performed according to the guidelines set forth in *Standard Methods for the Examination of Water and Wastewater* as established by the American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). Corrosion analyses are performed in accordance with the guidelines as set forth by the National Association of Corrosion Engineers (NACE). In general, these methods are approved by both the Environmental Protection Agency (EPA) and AWWA for the reporting of water and/or wastewater data.

Sample collection and shipment is the responsibility of the customer, performed according to protocol and procedures defined by the laboratory in advance of the sampling event with regards to the specific project and nature of the problem.

Disclaimer:

The data and interpretations presented are based on an evaluation of the samples and submitted data. Conclusions reached in this report are based upon the data available at the time of submittal and the accuracy of the report depends upon the validity of information submitted. Any recommendations presented are based on laboratory and field evaluations of similar fouling occurrences within potable water systems. Further investigative efforts, such as efficiency testing, site inspection, video survey, or other evaluation methods may offer additional insight into the system's condition and the degree of fouling present.

Client: Landau Associates
Date: December 30, 2021
Lab Report No. 22299

Re: Kitsap County, Well DW-SW; samples dated: 12/8/2021
Complete Well Profile (1), PO#1490009.01

ND - Not Detected NA - Not Applicable * as $CaCO_3$	**DW-SW Casing**	**DW-SW Aquifer**	**Detection Limits**
pH Value	7.32	7.16	NA
Phenolphthalein Alkalinity*	ND	ND	4 mg/l
Total Alkalinity*	200	160	4 mg/l
Hydroxide Alkalinity	ND	ND	4 mg/l
Carbonate Alkalinity	ND	ND	4 mg/l
Bicarbonate Alkalinity	200	160	4 mg/l
Total Dissolved Solids	431	417	1.0 mg/l
Conductivity (µm or µS/cm)	598	579	NA
ORP (mV)	160.5	161.5	NA
Langelier Saturation Index (at 16°C)	- 0.09	- 0.19	NA
Total Hardness*	176	200	4 mg/l
Carbonate Hardness	176	160	4 mg/l
Non Carbonate Hardness	ND	40	4 mg/l
Calcium*	128	184	4 mg/l
Magnesium*	48	16	4 mg/l
Sodium (as Na)	13.00	14.50	0.02 mg/l
Potassium (as K)	6.9	5.6	0.1 mg/l
Phosphorus, Reactive (as PO_4^{3-})	1.45	4.67	0.06 mg/l
Chlorides (as Cl)	32.0	38.4	2 mg/l
Nitrate (Nitrogen)	1.4	1.3	0.3 mg/l
Chlorine (as Cl)	ND	ND	0.02 mg/l
Dissolved Iron (as Fe^{2+})	ND	ND	0.02 mg/l
Suspended Iron (as Fe^{3+})	0.43	0.27	0.02 mg/l
Iron Total (as Fe)	0.43	0.27	0.02 mg/l
Iron (resuspended)	35.50	2.38	0.02 mg/l
Copper (as Cu)	ND	ND	0.04 mg/l
Manganese (as Mn)	0.50	0.40	0.1 mg/l
Sulfate (as SO_4)	15	65	2 mg/l
Silica (as SiO_2)	45.5	41.6	1.0 mg/l
Tannin/Lignin	1.0	0.8	0.1 mg/l
Total Organic Carbon (C)	4.0	4.4	0.3 mg/l

Biological Analysis:

	DW-SW Casing	DW-SW Aquifer	Detection Limit
Plate Count (colonies/ml)	400	17	NA
Anaerobic Growth (%)	20	50	NA
Sulfate Reducing Bacteria	Positive	Positive	NA
SRB Occurrence	*Low*	*Excessive*	NA
Fe/Mn Oxidizing Bacteria	Positive	Positive	NA
ATP (cells per ml) Initial	616,000	146,000	NA
ATP (cells per ml) 24 Hour	817,000	226,000	NA
Bacterial Identification	*Acidovorax delafieldii*	*Acidovorax delafieldii*	NA
Bacterial Identification	*Gallionella*	*Gallionella*	NA
Bacterial Identification	*Crenothrix*	*Crenothrix*	NA
Bacterial Identification	-	*Bacillus thuringiensis*	NA

Microscopic Evaluation:

Casing: Excessive visible bacterial activity, very low number of protozoa, heavy iron oxide, heavy iron oxide entrained biomass with moderate numbers of *Crenothrix* and very low numbers of *Gallionella.*

Aquifer: Moderate visible bacterial activity, low number of protozoa, low plant particulate, low iron oxide, moderate iron oxide entrained biomass with low numbers of *Gallionella* and very low numbers of *Crenothrix.*

Observations:

Water samples representing static and active pumping conditions, casing and aquifer, from DW-SW, were sent to the lab for chemical and biological analysis to evaluate the well environment. It was reported that the well had been idle for an extended time period prior to this round of sampling.

Chemical analysis identified neutral pH values with minimal fluctuation over the sampling interval. Alkalinity levels, as a measure of the natural buffering capacity towards acidic conditions, were moderate in each sample with highest levels recorded in the initial casing sample. Conductivity and total dissolved solids (TDS) levels were considered high and decreased slightly with pumping.

The oxidation-reduction potential (ORP) was consistently positive which is indicative of an oxidative groundwater environment trending toward the deposition of metal oxides in the presence of metal ions.

The calculated Langelier Saturation Index (LSI), which is an indication of the calcium carbonate mineral deposition potential, noted negative values for the samples, indicating that the water is mildly aggressive, with a tendency for corrosion within the well system.

Hardness levels were relatively moderate in each of the samples, with the majority of the hardness present represented as carbonate hardness. Testing for calcium, a common scale forming ion, recorded moderate levels. Moderate amounts of other scale forming ions, such as sodium and potassium, were also recorded.

Testing and analysis of iron content included testing for suspended, resuspended, and dissolved iron. Used as an indication of active corrosion, background iron, and chemically and biologically mobilized iron, results from these analyses revealed elevated levels in each of the submitted samples with excessively high amounts recorded in the initial casing sample. As a point of reference, levels above 1.5 mg/l are typically associated with more significant iron presence and the potential for accumulation. Manganese, a mineral which is often viewed similarly to iron in its function as a fouling mechanism, was also elevated in each sample. Levels such as these indicate areas of oxidation or turbid activity, such as within the pump bowls, could see increased levels of iron and manganese oxide scale accumulation.

Also of note, testing for phosphate showed very elevated levels which increased with pumping. Phosphate can be naturally occurring in the well environment but can also represent the presence of remnant drilling fluids or other chemical influences on the well from the surrounding area. Sulfate levels showed a similar trend, with low levels recorded in the initial casing sample and more moderate levels identified in the aquifer water. Additionally, phosphate and sulfate can serve as a prominent food source for bacteria.

Silica levels, serving as an indication of the propensity for migration of formation materials or as an indication of insufficient development efforts, were elevated and remained elevated over the sampling interval.

Total organic carbon (TOC), often used as a non-specific indicator of water quality and as a representation of the amount of carbon bound in organic, was consistently elevated in each sample. Tannin and Lignin, other organic compounds similar to humic substances, were also detected in each sample. Tannin is a complex organic compound found naturally in soil and in certain tree barks. Lignin is a compound common in woody plants and trees. Humic substances, tannin, and lignin are most common in surface water and shallow groundwater hydraulically connected to surface waters or wetlands. These organic substances may occasionally be found in well water, particularly if aquifer receives rapid recharge from the shallow subsurface or if the well is not properly constructed.

Biological testing conducted quantitative analysis of the bacterial populations present. Heterotrophic plate growth, a traditional measure of the available bacterial response to growth media in a laboratory setting, was moderate in the initial casing sample before decreasing significantly with pumping. Adenosine triphosphate (ATP) testing, another quantitative method based on measurement of a component of cellular material and a means of evaluating the total bacterial population, also noted elevated levels which decreased with pumping, although counts remained above recommended limits in each sample. As a point of reference, active potable water wells typically exhibit ATP values between 10,000 and 70,000 cells per milliliter for an active well sample, with values in excess of 100,000 cells per milliliter generally indicating biofouling. Further monitoring of ATP levels over a 24-hour period showed a noticeable increase

in bacterial populations in each sample, further suggesting conditions are suitable for continued bacterial growth and expansion.

Testing for sulfate reducing bacteria (SRB's), a group of nuisance anaerobic bacteria, was positive and increased to an very high rate of occurrence in the aquifer sample. Anaerobic growth, as a percentage of the total population, was also at an excessive level in the aquifer sample at fifty percent. A moderate to high level of anaerobic growth was present in the initial casing sample. Measurement of anaerobic growth and sulfate reducing bacteria is important since positive results can indicate a resident population in the lower regions of the well where low flow, anoxic conditions typically occur. These bacteria are often responsible for taste and odor problems in potable wells, and established populations of these bacteria can be problematic in all wells, since they are slime formers and tend to harbor other species of bacteria, such as coliforms.

Additional testing for iron related bacteria, another group of nuisance bacteria associated with microbially induced corrosion (MIC), identified multiple types in each sample. *Crenothrix* are a genus of sheathed bacteria that oxidize iron and manganese. *Crenothrix* cells are non-motile and can generally be found in a variety of aquatic environments with sufficient organic matter present. *Gallionella* are also naturally occurring, iron-oxidizing chemolithotrophic bacteria that have been identified in a variety of different aquatic habitats, including groundwater. Gallionella are a generally aerobic group of bacteria that utilize iron as an energy source and secrete an iron-oxy-hydroxide byproduct. This secretion is often responsible for accumulations of iron oxide in wells and piping systems. Oxidation, resulting from aeration including cascading water or rapid recharge, can stimulate the growth and activity of these bacteria.

In addition the SRB's and iron oxidizing bacteria, identification of other bacterial species present within the samples also identified *Acidovorax delafieldii* in each sample, as well as *Bacillus thuringiensis* in the aquifer water. *Acidovorax delafieldii* is an aerobic, gram-negative, soil bacterium. The bacteria's presence in the sample is likely a relation to the area of recharge for the well and aquifer, reflecting interaction with the upper soil horizons.

Bacillus thuringiensis is a gram-positive, soil-dwelling bacterium, commonly found in the environment. As with most Bacilli, the bacteria are considered slime forming bacteria as they are known to produce excessive slime or biofilm as a means of nutrient capture.

Portions of each of the samples were extracted and centrifuged for microscopic evaluation. Excessive amounts of visible bacterial activity were noted in the casing sample with a moderate level observed in the representative aquifer sample. Heavy amounts of biomass, entrained with iron oxides, were also observed in the casing sample with a moderate level noted in the aquifer water. *Crenothrix* and *Gallionella*, iron bacteria described above, were also observed in each sample with generally lower rates of occurrence recorded in the aquifer sample.

Iron oxide, as a precipitant, was noted at high levels in the casing sample and at a low level in the representative aquifer water. Results such as these are consistent with elevated bacterial counts and iron concentrations that decreased with pumping noted during chemical and biological testing.

Microscopic examination of the samples also noted low numbers of protozoa in each sample. Protozoa are single-celled eukaryotic organisms present in water. Protozoa are most often associated with surface water bodies, indicating large, diverse, and mature microbiological communities. The identification of Protozoa within a water sample is dependent on microscopic

evaluation, with neither heterotrophic plate tests nor total coliform tests indicating their presence.

Additionally, low amounts of plant particulate matter were also observed in the aquifer sample. In the microscopic evaluation of a water sample, the plant particulate matter designation refers to a standard biological classification used to make a distinction from observable mineral or crystalline material, and classify unidentifiable organic material. Examples of plant particulate matter would include miscellaneous fine root material, mold hyphae, organic fibrous material, and other unidentifiable organic matter observed in the evaluation. However, this designation does not include the identification of algae, a very large and diverse group of simple, typically autotrophic organisms. When noted in large amounts, plant particulate matter could be an indication of significant biofouling, potential surface influence on a well, or a breach of the well structure, and should be investigated.

Interpretations:

Laboratory analysis of the submitted water samples found a congested environment with high concentrations of chemical, biological, and physical fouling mechanisms identified. Profiling of the water chemistry found the water to be aggressive in nature with calculated LSI values signaling naturally corrosive tendencies. An especially high amount of iron was recorded in the casing sample which can also be attributed to the shallow washout hydrogeological setting of the well, as well as presence of iron oxidizing bacteria coupled with the oxygen content and generally aggressive nature of the water. The occurrence of iron oxidizing bacteria significantly increases the likelihood of microbial induced corrosion (MIC). Furthermore, the stalked nature of these bacteria can rapidly clog flow pathways and pump intakes, reducing flow into and out of wells.

Biological testing found the overall bacterial population was excessive in the immediate well structure and likely extends into the surrounding, large-diameter, borehole and near well formation. Known slime forming and iron oxidizing bacteria were identified in each sample, in addition to heavy accumulations of biomass recorded in the initial startup sample observed during microscopic evaluation. Biofilm, or biomass, is a naturally occurring expression of bacteria resulting from the extrusion of a slimy polysaccharide exopolymer. Bacteria exude this slime to attach themselves to a smooth surface for propagation, nutrient capture and growth. Biofilms act as suburban communities within a well system, developing in numerous locations, sustaining life and rapidly expanding throughout the well environment. Present throughout nature, biofilms are an excellent source for the development of mineral scale within a well system aiding in the entrainment of precipitating minerals, colloidal material, and sediment, limiting effective flushing and compounding fouling potential.

In addition to the sheer size of the microbial population present in the samples, the biodiversity and maturity of the dominant population is of concern, as evident by the increased level of anaerobic bacteria and sulfate reducing bacteria. A phenomenon commonly observed in biofilms is the stratification of the biofilm in which the primary layering differentiates an exposed aerobic stratum overlaying and protecting lower anaerobic layers. In addition to increasing the relative density and fouling potential of the biofilm, this stratification often results in the harboring of bacteria by effectively providing nutrients for the proliferation and often acting as a shield from disinfection efforts. Fouling within the lower extension of the well as well as the aquifer-interface zone is likely contributing to the propagation of these more problematic species.

While no crystalline debris, fine silts, sands, or drilling muds were observed during microscopic

evaluation, elevated levels of silica, phosphate, potassium, and sodium recorded during chemical evaluation are all strong indications of sediments and/or drilling remnants which are sufficient to impact performance. The presence of increased amounts of these materials can lead to multiple problems within a well and associated treatment systems. First, bulk accumulations can lead to interruptions in flow, treatment, and system efficiency. Second, fine sediment is an effective means of mechanical fouling, impacting system operation as well as increasing the rate of physical corrosion (abrasion or erosion corrosion). Lastly, the entrainment of fine sediment within biomass and precipitating mineral assemblages increases the difficulty in treating and mitigating these fouling mechanisms. It was reported that prior to the extended time off-line, the well was exhibiting a grittiness in the discharge which was suspected of damaging pump internals.

Recommendations:

Based on submitted well data regarding well history and design, and the concerns identified during laboratory testing of the submitted water samples, any attempted rehabilitation effort of Well DW-SW poses significant challenges with limited longevity suspected of any improvements gained from those efforts.

The overall congestion within the samples is likely a result of the well sitting idle for an extended period of time. However, the suspected chemical, biological, and physical influences on the well may also be a reflection of the shallow nature of the well setting, construction methods, and overall design of the well. A review of the well design suggests a number of challenges are in place which could serve to hinder future treatment efforts. These challenges include an exceptionally large borehole diameter in relation to the well diameter. As such, the expanded thickness of the gravel pack will serve to dissipate chemical and mechanical cleaning efforts and limit them from extending into the surrounding formation where additional fouling appears to reside. When coupled with the recorded low flow rates, the large annulus will reduce the self-cleaning capability of the well, even with aggressive pumping.

Another concern is the overall age and relatively shallow depth of the well, and suspected migration of formation materials into the borehole and near-well setting. A number of chemical markers within the samples suggest this to be a likely scenario, which indicate a redevelopment effort is needed. Again, such efforts entail extending mechanical and chemical forces outside the immediate well structure to clean and open flow pathways.

While no current production data was available, the degree of fouling identified within the samples often correlates with significant levels of decline in performance. As a general benchmark, decreases in specific capacity greater than 5% from original warrant investigation, with changes of 10% or more signifying more significant plugging of the well intake that warrant mitigation. Once performance declines accelerate past this level, efforts to regain capacity can exponentially increase in time and cost, making rehabilitation less viable economically. A strong likelihood of exceeding these benchmarks exists given the age, design, setting, and apparent current condition of the well.

Although redevelopment and rehabilitation of the DW-SW Well may result in temporary improvement, given the concerns outlined above, the well will likely see continued influence going forward. As such, pulling the existing well and redesigning a new well in its place may be a more viable option for achieving the long term operational goals of the system. A reduced filter pack thickness, properly sized screen slot, and a plan to limit extended periods of inactivity

should be considered during the design phase as potential means of reducing the fouling potential in the future.

If you have any questions regarding the analyses or the information presented, please contact our office.

Eric Duderstadt
Water Chemist and Microbiologist

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An Ovivo Company

VAREC 2010B / 2020B Series
PRESSURE AND VACUUM RELIEF VALVE

Model Number
2011B102TFFOP0202

The 2010B / 2020B protects tanks from damage or deformation, and minimizes emissions to the environment, as well as loss of product due to evaporation.

Introduction

The Varec 2010B and 2020B Pressure and Vacuum Relief Valves are designed for use on atmospheric and low pressure storage tanks. The 2010B vents to atmosphere. The 2020B allows vapors to be piped away for recovery or destruction.

The primary function of both models is to protect the tank from physical damage or permanent deformation caused by increases in internal pressure or vacuum encountered in normal operations. On smaller tanks, the valve may also provide sufficient flow capacity for emergency venting. The "air-cushion" seating design keeps the valve tightly sealed until the pressure inside the tank approaches the valve setting. Valve selection should be in accordance with American Petroleum Institute Standard 2000 or other applicable standard.

By controlling tank venting, the 2010B and 2020B not only minimize emissions to the environment, but also minimize the loss of product to evaporation. When combined with a well-designed vapor recovery system, the loss can be cut to essentially zero.

An "All-Weather" option (2011B/ 2021B) is offered for freezing climates. The design features a special non-frosting and icing-resistant coating on the pallet perimeter, stem, guide posts and tip-of-seat ring. The coating, along with the flexible PTFE seat insert, provides additional protection against pallets freezing closed.

For high temperature and chemical applications, Varec recommends one of the extended service options, which offers the selection of O-ring, gasket, and screen material.

Features

- Choice of vent to atmosphere or pipe away models
- Modular design provides flexibility of field installation and allows easy reconfiguration, repair or on-site upgrading
- Oversized pressure and vacuum ports provide maximum flow capacity
- Easily removable hood and cover for inspection and maintenance
- Seat rings are both interchangable and field replaceable
- Protective screens at pressure and vacuum ports prevent entrance of foreign matter
- Outlet adapter on the 2020B Series is one pipe size larger than the valve inlet flange to optimize flow capacity
- Zero product loss when combined with a vapor recovery system
- Replaceable and interchangeable pressure and vacuum seat rings
- "All-weather" non-frosting and ice-resistant coating option available for valve seats and guides
- Extended service options available for high temperature and chemical applications

Available Materials

- Aluminum
- Carbon Steel
- Stainless Steel
- Ductile Iron
- Special Materials on Application

Specifications

The 2010B and 2020B Series Pressure and Vacuum Relief Valves are available in a variety of configurations to meet your specific needs.

Sizes

2010B/ 2011B:	2020B/ 2021B:
2” [50 mm]	2” x 3” [50x80 mm]
3” [80 mm]	3” x 4” [80x100mm]
4” [100 mm]	4” x 6” [100x150 mm]
6” [150 mm]	6” x 8” [150x200 mm]
8” [200 mm]	8” x 10” [200x250 mm]
10” [250 mm]	10”x12” [250x300 mm]
12” [300 mm]	12”x14” [300x350 mm]

Flanged Connections

(STANDARD FLANGE DRILLING)

Aluminum

Drilled to ANSI Class 150 Dimensions (Flat-Faced)

Drilled to DIN 2633 [16 Bar] Dimensions (Flat-Faced)

CS, DI and SS Body

Drilled to ANSI Class 150 Dimensions, (Raised or Flat-Faced)

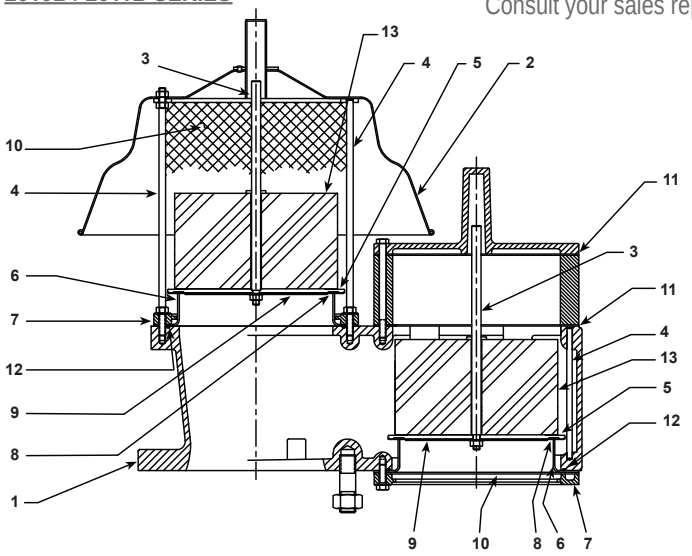
Drilled to Imperial DIN 2633 [16 bar] Dimensions (Raised or Flat-Faced)

Drilled to JPI or JIS (Raised or Flat-Faced)
Consult your sales representative

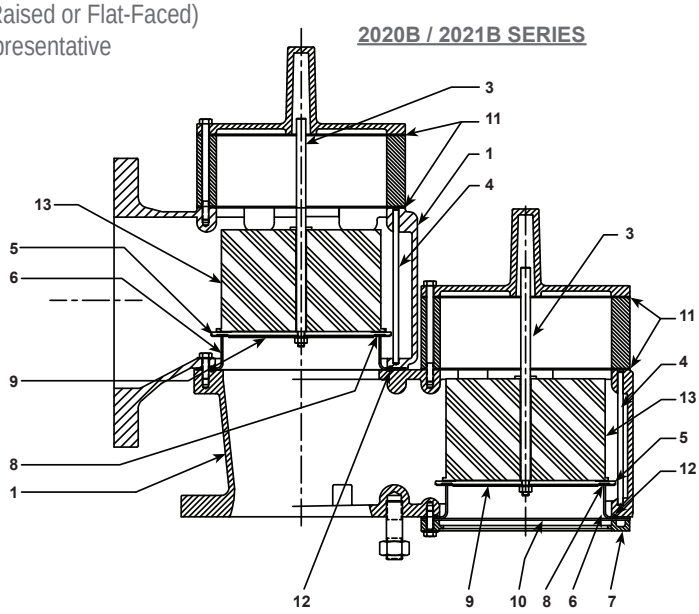
Testing

Each valve is tested for proper setting and for a leakage rate of less than 1 SCFH (0.03 Nm^3/ hr) of air at 90 percent of the set point. Each valve is tested for leak tightness at 75 percent of set point as required in API Standard 2000.

2010B / 2011B SERIES



2020B / 2021B SERIES



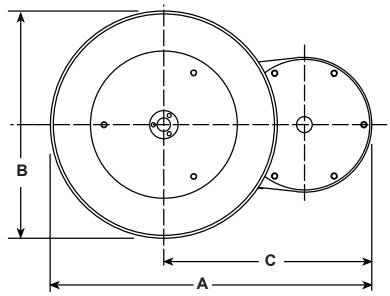
Parts and Materials Table

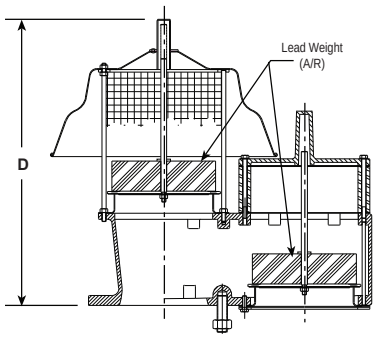
	Item	Material Code 1	2	3	4
1	Body	Aluminum	Aluminum	Carbon Steel	316 SS
2	Weatherhood	Aluminum	Aluminum	Carbon Steel	316 SS
3	Guide Stem	Aluminum	316 SS	316 SS	316 SS
4	Guide Posts	316 SS	316 SS	316 SS	316 SS
5	Pallet	Aluminum	316 SS	316 SS	316 SS
6	Seat Ring	Aluminum	316 SS	316 SS	316 SS
7	Seat Ring Retainer [1]	Polypropylene	Polypropylene	Polypropylene	Polypropylene
8	Insert [1]	PTFE	PTFE	PTFE	PTFE
9	Insert Retainer	Aluminum	316 SS	316 SS	316 SS
10	Screen [1]	HDPE	HDPE	HDPE	HDPE
11	Gaskets [1]	Fiber	Fiber	Fiber	Fiber
12	O-Ring [1]	NBR	NBR	NBR	NBR
13	Weights	Lead	Lead	Lead	Lead

Note: 1 - Materials are as standard. See model option code for other materials and their associated temperature ranges.
2 - PTFE coated aluminum may be supplied with material codes 2 - 4 to achieve lower settings.
3 - All nuts and cap screws are 316 SS.

Specifications

2010B / 2011B SERIES





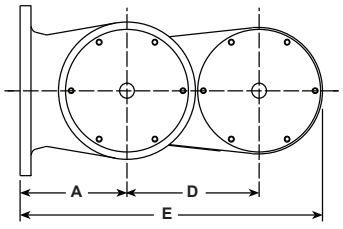
Dimensions, inches [mm]

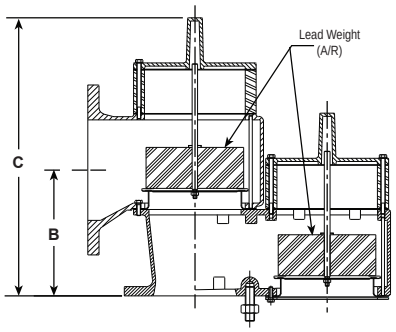
Size Code	2	3	4	6	8	0	1
Nominal Pipe Size	2 [50]	3 [80]	4 [100]	6 [150]	8 [200]	10 [250]	12 [300]
A	14 1/8 [359]	17 9/16 [446]	19 1/8 [486]	24 [610]	29 7/8 [759]	38 7/16 [976]	46 5/8 [1184]
B	8 1/2 [216]	10 3/4 [273]	13 3/8 [340]	17 [432]	20 5/8 [524]	27 [686]	34 [864]
C	9 7/8 [251]	12 1/4 [311]	12 1/4 [311]	15 1/2 [394]	19 9/16 [497]	24 15/16 [633]	29 3/8 [746]
D Low Set	10 7/16 [265]	12 5/16 [313]	12 7/16 [368]	18 3/16 [462]	21 5/8 [549]	27 7/16 [697]	31 7/8 [810]
D High Set	13 5/16 [338]	15 1/4 [387]	16 5/8 [422]	21 1/2 [546]	24 3/4 [629]	29 7/16 [748]	31 7/8 [810]

Note: Figure shown is for high set option.

Dimensions are for preliminary general information and should not be used for construction purposes. Certified dimensional drawings are available upon request.

2020B / 2021B SERIES





Dimensions, inches [mm]

Size Code	2	3	4	6	8	0	1
Nominal Pipe Size	2 x 3 [50 x 80]	3 x 4 [80 x 100]	4 x 6 [100 x 150]	6 x 8 [150 x 200]	8 x 10 [200 x 250]	10 x 12 [250 x 300]	12 x 14 [300 x 350]
A	4 15/16 [125]	6 3/8 [162]	8 [203]	8 9/16 [217]	11 3/16 [284]	13 5/8 [346]	15 3/8 [391]
B	5 1/4 [133]	5 7/8 [149]	6 13/16 [173]	10 [254]	12 1/8 [308]	16 1/8 [410]	18 3/4 [476]
C Low Set	9 1/16 [230]	10 3/4 [273]	12 3/4 [324]	18 3/4 [476]	22 1/8 [562]	27 9/16 [700]	32 [813]
C High Set	13 1/2 [343]	15 1/2 [394]	16 13/16 [427]	22 [559]	24 1/2 [622]	29 1/4 [743]	32 [813]
D	6 3/4 [171]	8 3/8 [213]	8 7/16 [214]	10 1/2 [267]	13 1/8 [333]	16 7/8 [429]	19 3/4 [502]
E	14 3/4 [375]	18 9/16 [471]	20 7/16 [519]	24 1/4 [616]	30 3/4 [781]	38 9/16 [979]	44 11/16 [1135]

Note: Figure shown is for high set option.

Dimensions are for preliminary general information and should not be used for construction purposes. Certified dimensional drawings are available upon request.

Specifications

Setting Information

Size	Minimum Pressure Set, oz/ in²		Minimum Vacuum Set, oz/ in²		Low Set Range		High Set Range	
2010B	Aluminum	316 SS	Aluminum	316 SS	Pressure (min. to oz/in²)	Vacuum (min. to oz/in²)	Pressure (oz/in² to psig)	Vacuum (oz/in² to psig)
2”	0.29	0.70	0.26	0.62	^16	^10	16.01 - 2	10.01 - 2
3”	0.23	0.55	0.21	0.49	^16	^10	16.01 - 2	10.01 - 2
4”	0.29	0.60	0.27	0.56	^16	^16	16.01 - 2	16.01 - 2
6”	0.26	0.61	0.26	0.61	^16	^16	16.01 - 2	16.01 - 2
8”	0.25	0.55	0.25	0.55	^16	^16	16.01 - 2	16.01 - 2
10”	0.25	0.63	0.25	0.63	^16	^16	16.01 - 2	16.01 - 2
12”	0.23	0.59	0.23	0.59	^16	^16	16.01 - 2	16.01 - 2
2011B								
2”	0.29	0.70	0.26	0.62	^16	^10	16.01 - 2	10.01 - 2
3”	0.23	0.55	0.21	0.49	^16	^10	16.01 - 2	10.01 - 2
4”	0.29	0.60	0.27	0.56	^16	^16	16.01 - 2	16.01 - 2
6”	0.26	0.61	0.26	0.61	^16	^16	16.01 - 2	16.01 - 2
8”	0.25	0.55	0.25	0.55	^16	^16	16.01 - 2	16.01 - 2
10”	0.49	1.33	0.49	1.33	^16	^16	16.01 - 2	16.01 - 2
12”	0.47	1.28	0.47	1.28	^16	^16	16.01 - 2	16.01 - 2
2020B								
2”	0.26	0.62	0.26	0.62	^10	^10	10.01 - 2	10.01 - 2
3”	0.21	0.49	0.21	0.49	^10	^10	10.01 - 2	10.01 - 2
4”	0.27	0.56	0.27	0.56	^16	^16	16.01 - 2	16.01 - 2
6”	0.26	0.61	0.26	0.61	^16	^16	16.01 - 2	16.01 - 2
8”	0.25	0.55	0.25	0.55	^16	^16	16.01 - 2	16.01 - 2
10”	0.25	0.63	0.25	0.63	^16	^16	16.01 - 2	16.01 - 2
12”	0.23	0.59	0.23	0.59	^16	^16	16.01 - 2	16.01 - 2
2021B								
2”	0.26	0.62	0.26	0.62	^10	^10	10.01 - 2	10.01 - 2
3”	0.21	0.49	0.21	0.49	^10	^10	10.01 - 2	10.01 - 2
4”	0.27	0.56	0.27	0.56	^16	^16	16.01 - 2	16.01 - 2
6”	0.26	0.61	0.26	0.61	^16	^16	16.01 - 2	16.01 - 2
8”	0.25	0.55	0.25	0.55	^16	^16	16.01 - 2	16.01 - 2
10”	0.49	1.33	0.49	1.33	^16	^16	16.01 - 2	16.01 - 2
12”	0.47	1.28	0.47	1.28	^16	^16	16.01 - 2	16.01 - 2

Lower settings may be available. Please consult your sales representative.

All valves are factory tested for leakage and correct setting prior to shipment. Certification of valve setting is available upon request.

The mixed pressure/vacuum set ranges , 0204 and 0402 (Low Pressure/ High Vacuum and High Pressure/ Low Vacuum) use heavier pallets, and therefore have higher low set range minimums. For these cases, add the applicable value from the table (right) to the low set range minimum. (This increase does not apply for 10" and 12" 2011B/2021B.)

Size	Aluminum	316 SST
2”	0.30	0.72
3”	0.27	0.70
4”	0.21	0.62
6”	0.20	0.55
8”	0.21	0.44
10”	0.25	0.61
12”	0.26	0.67

Ordering Information

Model	Description
20	Air Cushion Pressure/ Vacuum Relief Valve

Code	Model
1	Vent-to-Atmosphere
2	Pipe-Away

Code	Configuration
0B	Standard Air Cushion Type
1B	All Weather Type (-25°F to 200°F)

Code	Size
2	2" (2" x 3")
3	3" (3" x 4")
4	4" (4" x 6")
6	6" (6" x 8")
8	8" (8" x 10")
0	10" (10" x 12")
1	12" (12" x 14")

Code	Body/ Trim Material
1	Aluminum/ Aluminum (-65°F to 250°F)
2	Aluminum/ 316 Stainless Steel (-65°F to 250°F)
3	Carbon Steel/ 316 Stainless Steel (-20°F to 350°F)
4	316 Stainless Steel/ 316 Stainless Steel (-65°F to 350°F)
5	Ductile Iron/ 316 Stainless Steel (2 to 8 inch Only) (-20° to 325°F)

Code	Insert Material
T	PTFE (-65°F to 400°F)
B	NBR (-40°F to 250°F)
V	FKM (-15°F to 400°F)

Code	Flange Connection
FF	Flat Face flange drilled to ANSI 150 with Fractional Studs
MF	Flat Face flange drilled to ANSI 150 with Metric Studs
FR	Raised Face flange drilled to ANSI 150 with Fractional Studs (Not Available in Aluminum)
MR	Raised Face flange drilled to ANSI 150 with Metric Studs (Not Available in Aluminum)
DF	DIN Flat Face Flange Drilling
DR	DIN Raised Face Flange Drilling (Not Available in Aluminum)

Code	Gasket/ O-Ring/ and Retainer/ Screen Material
OP	Standard Fiber/ NBR and Plastic (-40°F to 250°F)
OS	Standard Fiber/ NBR and Stainless Steel (-40°F to 250°F)
TP	PTFE and Plastic (-65°F to 250°F)
TS	PTFE and Stainless Steel (-65°F to 350°F)
BP	NBR and Plastic (-40°F to 250°F)
BS	NBR and Stainless Steel (-40°F to 250°F)
VP	FKM and Plastic (-15°F to 250°F)
VS	FKM and Stainless Steel (-15°F to 350°F)

Code	Pressure Setting Range (See Table)
02	Low Setting
04	High Setting

Code	Vacuum Setting Range (See Table)
02	Low Setting
04	High Setting

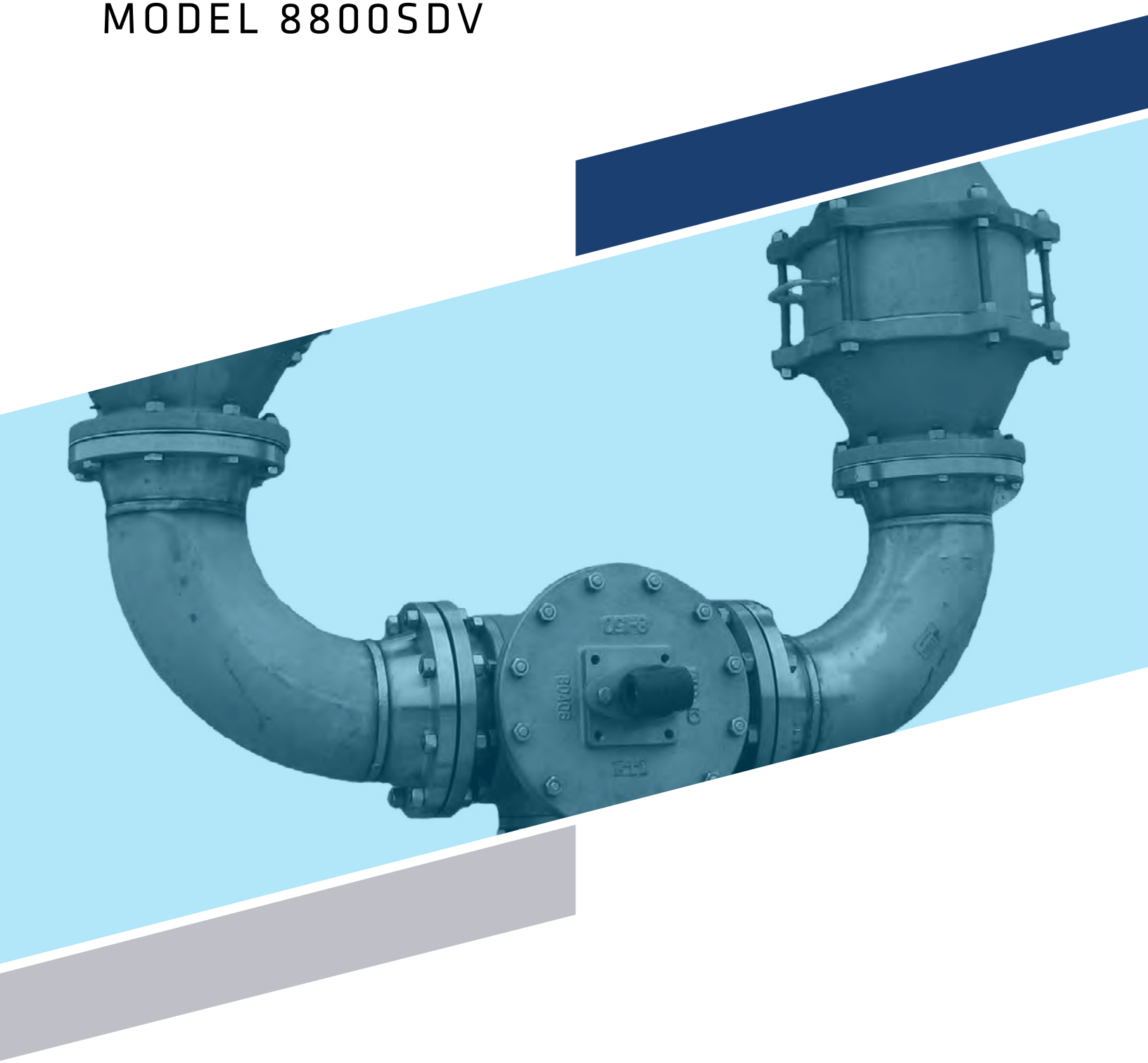
20	1	0B	1	2	T	FF	OP	02	02	(Example)

Example: 12" Size Aluminum Body/ 316SS Trim, PTFE Insert, 150 FF Flanges, Standard Fiber/ NBR Gaskets, Low Set Pressure and Vacuum, Temperature Range: -20°F to 250°F.

GROTH®
CORPORATION

SAFETY DIVERTER VALVE

MODEL 8800SDV



MODEL 8800SDV

The Groth Model 8800 Safety Diverter Valve (SDV) is a 3-way, multi-port ball valve, offering a safe, quick and easy way for valve "changeover" used quite commonly on bio-digesters for ease of inspection, maintenance and cleaning. This allows for redundant pressure vacuum relief valve (PVRV) and flame arrester (FA) assemblies allowing no process interruption, while providing continuous system overpressure or vacuum protection due to pumping-in (influent) and pumping-out (effluent).

Technical Details

- Size: 2" (DN 50) through 12" (DN 250)
- Material: Carbon Steel and Stainless Steel

Features

- 3-way, multi-port, full bore design
- L Port (90 degrees)
- Live-loaded stem packing for positive sealing (sizes 6" and larger)
- High sphericity and mirror surface finish of ball ensures positive shut-off and low operating torque.
- Handlever (sizes 2" thru 4"), gear-operator (sizes 6" and larger)
- Visual indicator for indicating active relief valve and flow path of the media
- Lock-out mechanism (standard) prevents unwanted access
- Stopping mechanism prevents shutting off both valves at the same time
- Ability to perform maintenance without interrupting service or vessel protection
- Flow area is never restricted
- Balanced internal forces
- Smoother valve switching
- Able to apply pressure to any port

Options

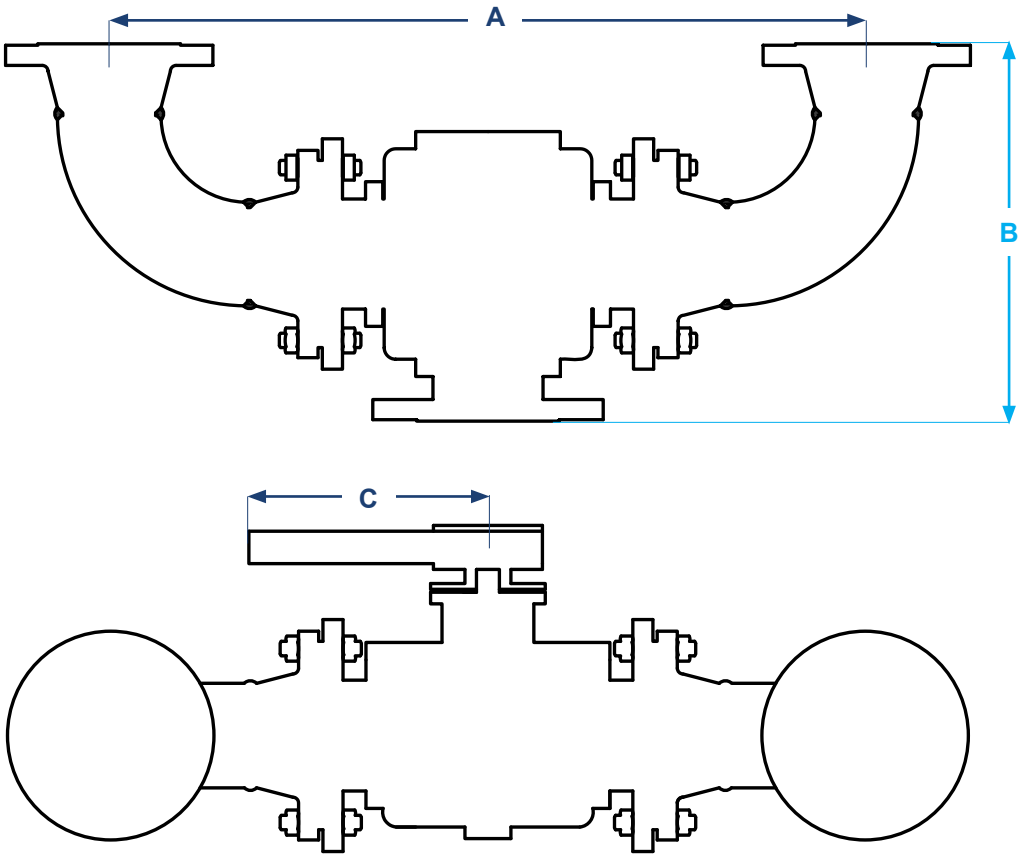
- Threaded ports with manual valves allows pressure testing and field calibration

*Model 8392B only

SPECIFICATIONS

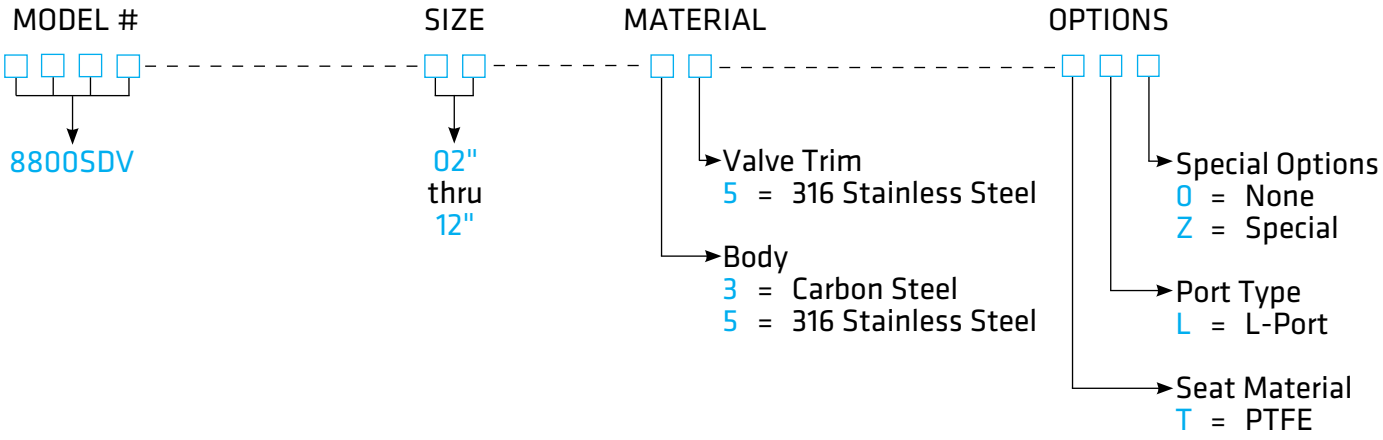
Size Inches (mm)	A Inches(mm)	B Inches (mm)	C Inches (mm)	Weight Stainless Steel Lb (kg)
2 (50)	20.5 (521)	10.3 (261)	15.75 (400)	67 (30)
3 (80)	27.3 (693)	13.7 (347)	17.72 (450)	131 (59)
4 (100)	32.3 (820)	16.1 (410)	19.68 (500)	183 (83)
6 (150)	42.3 (1074)	21.1 (537)	19.68 (500)	438 (199)
8 (200)	53.8 (1366)	26.9 (683)	ø 15.75 (400)	759 (344)
10 (250)	61.8 (1570)	30.9 (785)	ø 15.75 (400)	1155 (524)
12 (300)	72.4 (1840)	36.2 (920)	ø 23.62 (600)	1834 (832)

* ASME 150# class flange connection.
ø -Wheel Handle Dimension



HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

- Include model number when ordering.
- For special options, consult factory.

EXAMPLE 8 8 0 0 S D V — 0 2 — 5 5 — T L 0

Indicates 2" Model 8800SDV with 316 SS Valve Trim, 316 SS Body Material, PTFE, L-Port and no other options.

GROTH CORPORATION®

GROTHCORP.COM

VAREC 5000/5010 SERIES FLAME ARRESTERS

Model
501001S

Group 'D' end-of-line flame arresters with a unique extensible bank frame designed to stop the propagation of flame from external sources

5010 SERIES -
HORIZONTAL

5000 SERIES -
VERTICAL

FEATURES

- Models available for vertical or horizontal configurations.
- Heavy wall cast housing in 356 T6 aluminum, carbon steel or 316 stainless steel.
- Net free area through banks three to four times the unit pipe size, resulting in increased flow capacity with minimal pressure drop.
- Bank's large surface area improves heat dissipation.
- Removable cover plate and extensible bank assembly for easy inspection, cleaning or replacement.
- Unitized housing does not require support for proper bank alignment during maintenance.
- 'Off-set' housing design ensures flow capacity unaffected by condensate accumulation, even when installed in horizontal piping.
- 5010 Series ½" NPT drain plug at the low point is located conveniently for routine draining*.
- UL approved**.

* A Varec drip trap should be specified for field installation at this connection to provide for safe removal of condensate.

** For approved sizes please see page 2.

GENERAL APPLICATION

The 5000 and 5010 Series, Group 'D', end-of-line flame arresters are used in gas piping systems, petroleum storage tank roofs and digester covers to prevent the propagation of a flame into the system.

TECHNICAL DATA

Materials:	Aluminum, carbon steel, stainless steel
Sizes:	2" to 12" (50 to 300 mm)
Connections:	Drilled flanges
Pressure rating:	To 10 psi (0.7 bar)

VAREC 5000/5010 SERIES FLAME ARRESTERS
SPECIFICATIONS

MODELS OVERVIEW

5000 and 5010 Series flame arresters stop the propagation of a flame by absorbing and dissipating heat through the surface area of the bank sheets. Ignited vapor attempting to pass through the arrester is forced through small passages within the bank assembly. Heat is absorbed, lowering the temperature of the gas below its ignition point and quenching the flame.

5000 Series is for vertical installation; 5010 Series is for horizontal or vertical installation.
They can be mounted up to 15 feet (4.6 m) upstream of the ignition source in accordance with UL approval, or 10 pipe diameters in accordance with FM approval requirements.

Sizes
2", 3", 4", 6", 8", 10" and 12"

Connections
Aluminum drilled to ANSI Class 150 dimensions, flat face flange.
Carbon steel and 316 stainless steel drilled to ANSI Class 150 dimensions, raised face flange.
Special drilling of flange connections to DIN, JPI or JIS standards available upon request.
Consult your local sales representative for further details.

Pressure rating
Leak proof to 10 psi (69.0 kPa), standard.
Higher ratings available: consult sales.

Pressure drop
Should not exceed 1 psi (6.9 kPa).

Location [1]
Within 15 feet (4.6 m) upstream of flame source.

Configuration
Net free area
Three to four times the corresponding size standard pipe.

Bank assembly
Extensible aluminum bank frame with corrugated rectangular shaped bank sheets.
Fixed 316 stainless steel bank frame.

Provision for draining
5000 Series self draining.
5010 Series includes ½" NPT connection at low point.

Housing materials
356 - T6 low copper aluminum - standard.
Carbon steel (ASTM A216 grade WCB) - optional.
316 stainless steel - optional.

Bank assembly material
Low copper aluminum extensible frame with aluminum bank sheets - standard.
Low copper aluminum extensible frame with 316 stainless steel bank sheets - optional.
All 316 stainless steel fixed frame with 316 stainless steel bank sheets - optional
(available with carbon steel or 316 stainless steel housing only).

Approvals
5000 Series UL (Underwriters Laboratories) listed in all aluminum construction with extensible bank assembly in 2", 3", 4", 6" and 10" sizes[1].
5010 Series UL listed in all aluminum construction as above in 2", 3" and 4" sizes[1].

EXTENSIBLE ALUMINUM BANK FRAME

Closed

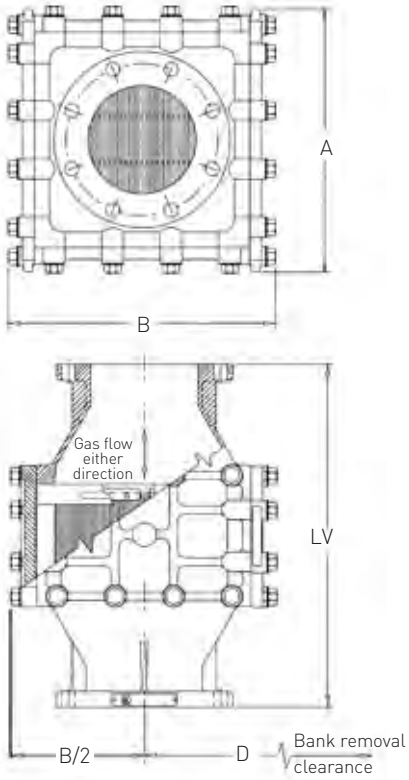
Open

NOTE
1. For use on hydrocarbon storage tanks, installed NOT MORE THAN 15 FEET from the open end of the vent pipe. These test conditions may not represent the actual service conditions of piping system design.
   It is recommended that the arrester be independently tested under actual service conditions before installation.

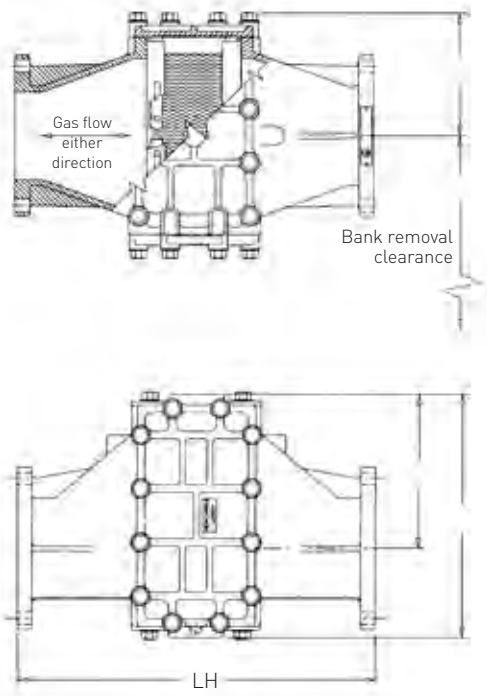
VAREC 5000/5010 SERIES FLAME ARRESTERS

DIMENSIONS AND WEIGHTS

5000 SERIES



5010 SERIES



DIMENSIONS, INCHES AND POUNDS (millimeters and kilograms)

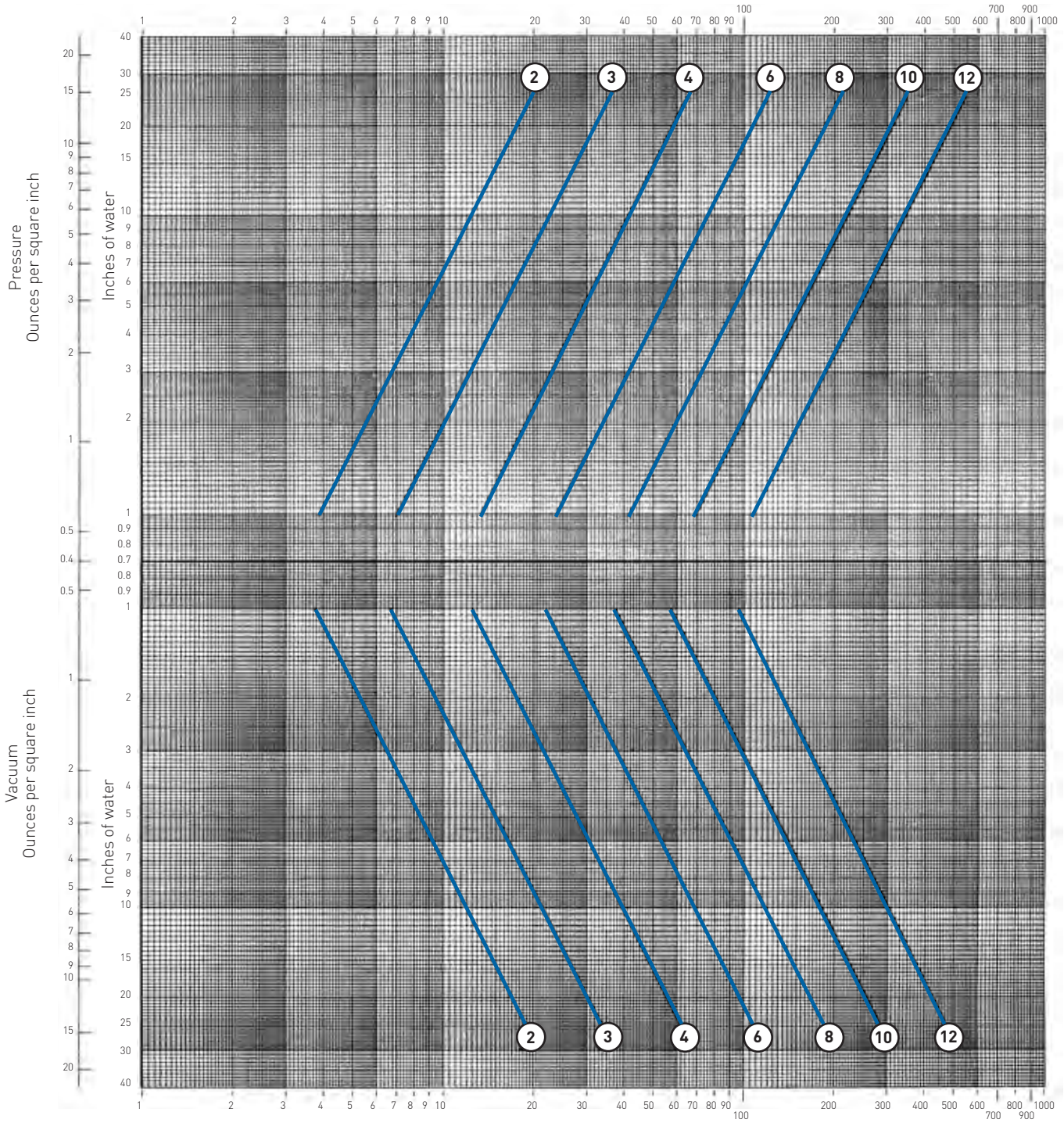
Size code	Nominal pipe size	L_V length (5000)	L_H length (5010)	A Width	B Depth	C CL offset (5010)	D Bank clearance	Aluminum Shipping wt. (5000)	Aluminum Shipping wt. (5010)
2	2 (50)	12⅝ (321)	14½ (368)	9 (229)	8⅝ (219)	5⅜ (137)	19 (483)	25 (11)	30 (14)
3	3 (80)	13⅞ (352)	16 (406)	11¾ (298)	11½ (292)	7¼ (184)	23¼ (591)	45 (20)	50 (23)
4	4 (100)	16⅝ (422)	20 (508)	14½ (368)	14¾ (375)	9 (229)	28⅛ (714)	65 (30)	70 (32)
6	6 (150)	21½ (546)	24⅜ (619)	16½ (419)	16¾ (425)	10¾ (273)	31⅛ (791)	100 (45)	115 (52)
8	8 (200)	27¼ (692)	32⅛ (816)	21⅝ (549)	21¾ (552)	14⅜ (365)	38⅝ (981)	200 (91)	220 (100)
0	10 (250)	28⅜ (721)	35½ (902)	24 (610)	23¾ (603)	16 (406)	41⅝ (1057)	240 (109)	270 (123)
1	12 (300)	34⅜ (873)	34⅜ (873)	31 (787)	29¼ (743)	20 (508)	50 (1270)	350 (159)	375 (170)

Flange drilling per ANSI Class 150 flat face flange (aluminum); per ANSI Class 150 raised face flange (carbon steel and 316 stainless steel).

VAREC 5000/5010 SERIES FLAME ARRESTERS

FLOW CURVES

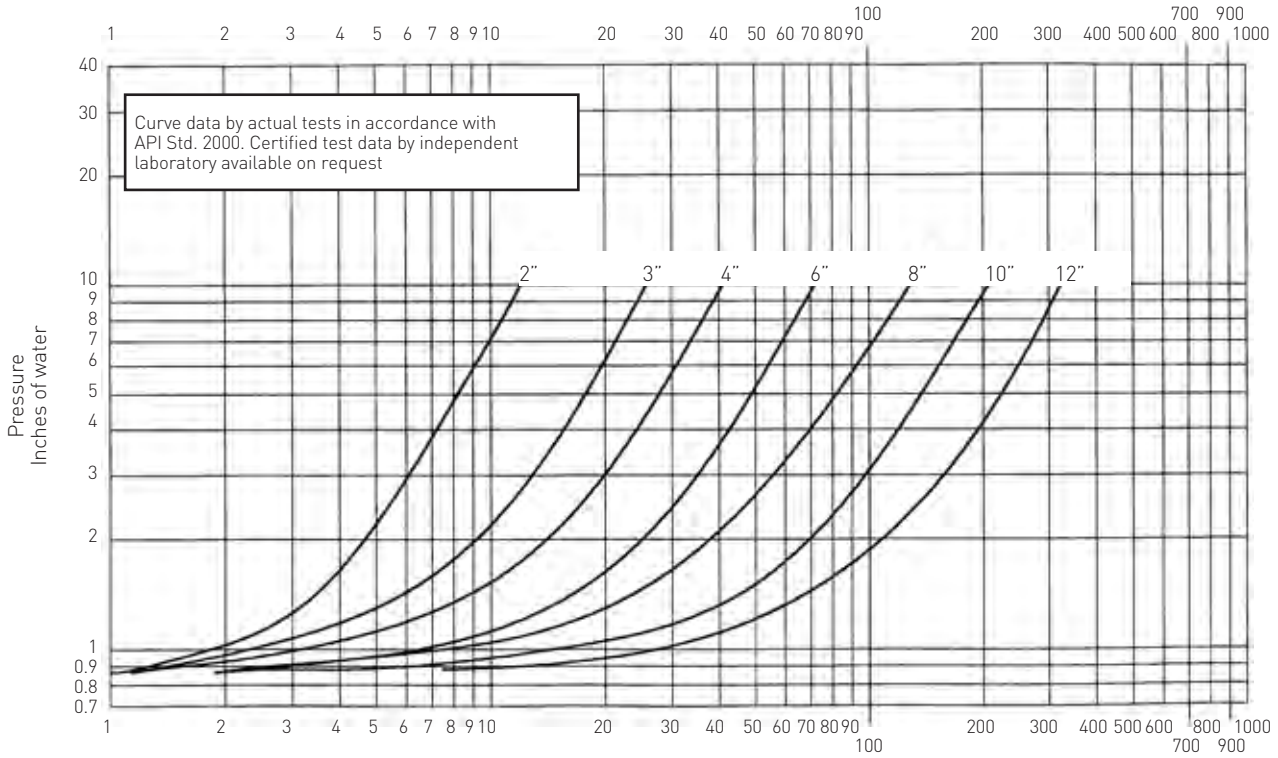
5000 AND 5010 FLAME ARRESTERS



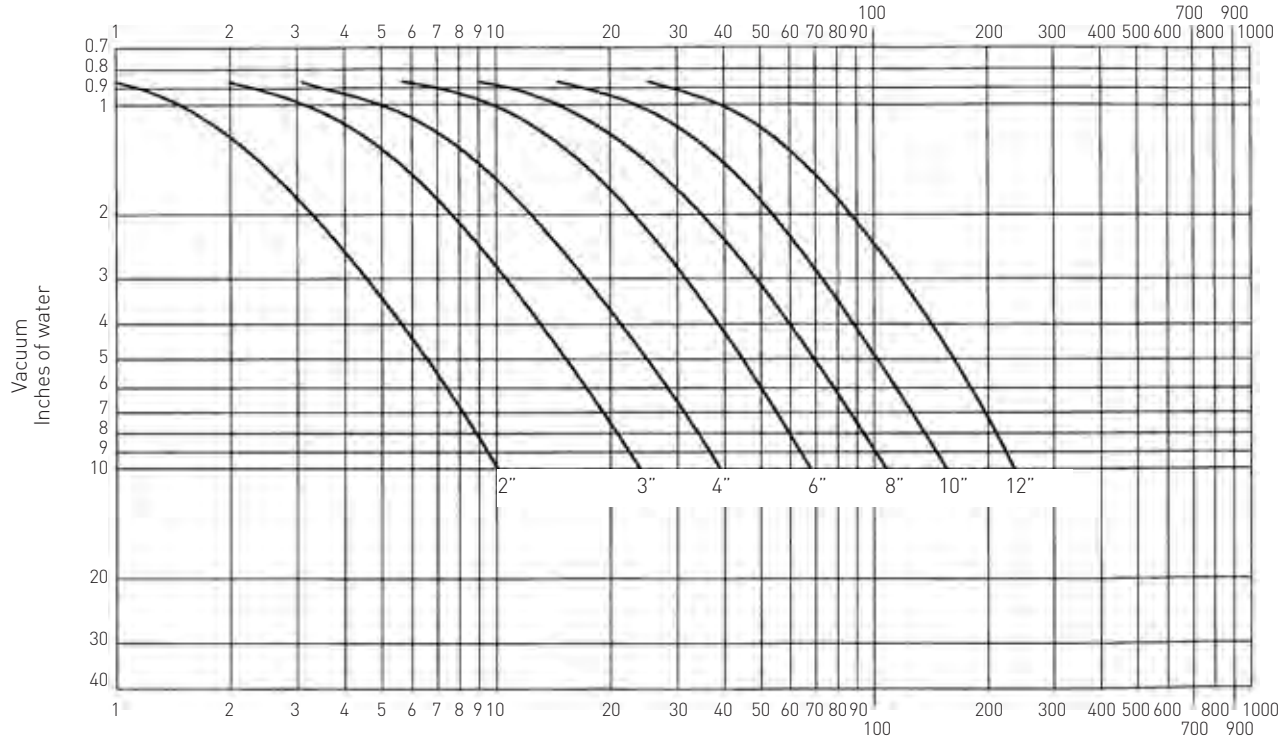
VAREC 5000/5010 SERIES FLAME ARRESTERS

FLOW CURVES

Combination 2010B valve and 5000 flame arrester, set at 0.865 inch of water



Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)

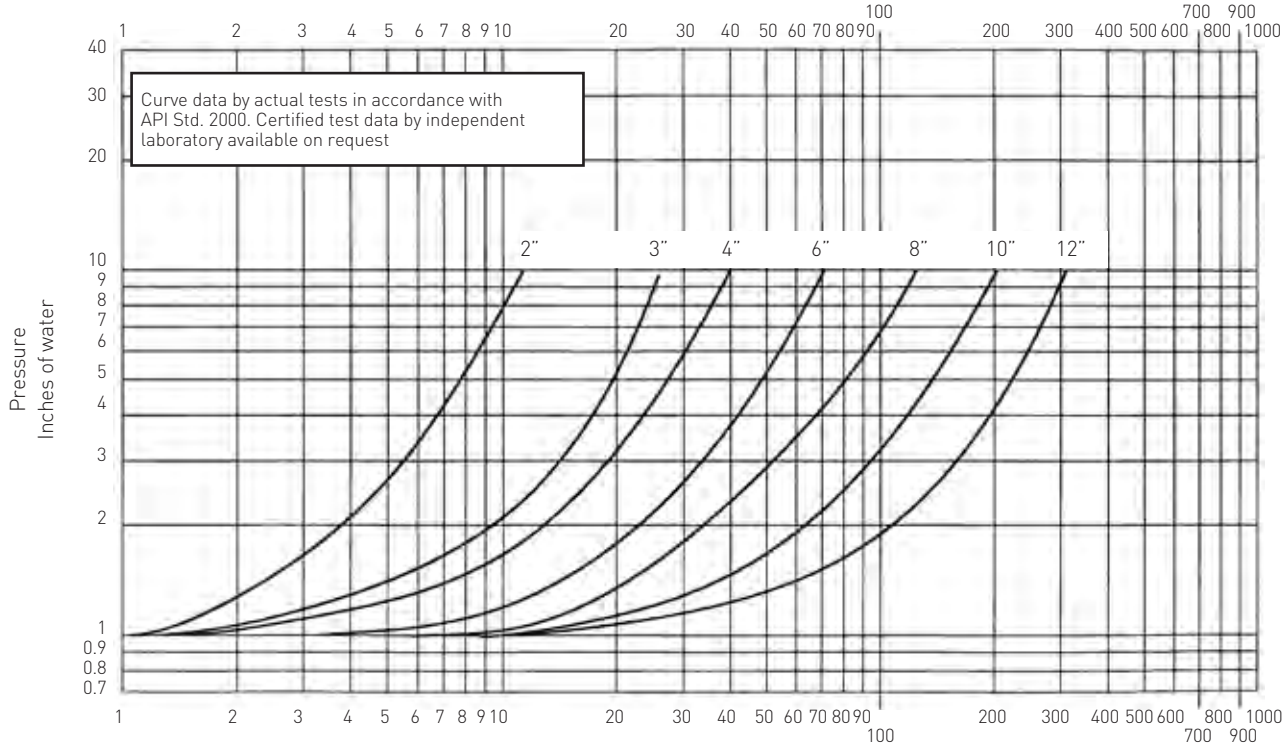


Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)

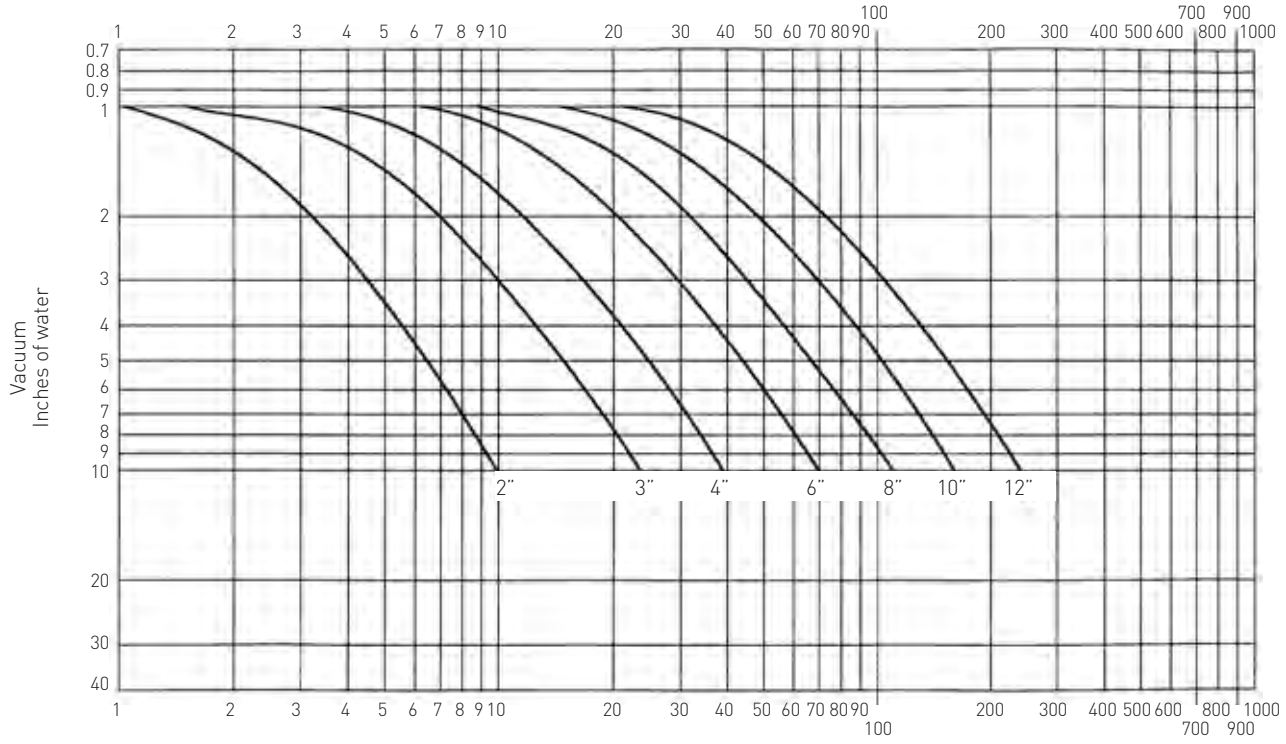
VAREC 5000/5010 SERIES FLAME ARRESTERS

FLOW CURVES

Combination 2010B valve and 5000 flame arrester, set at 1 inch of water



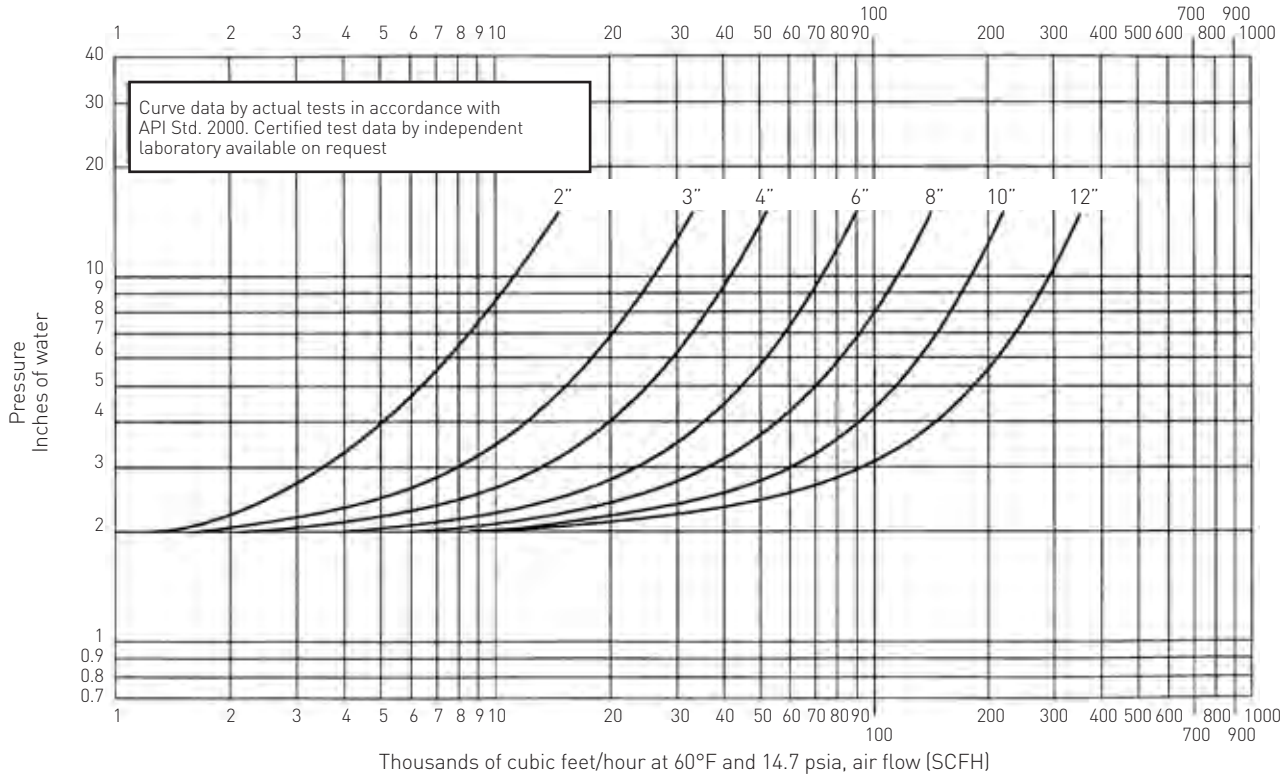
Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)

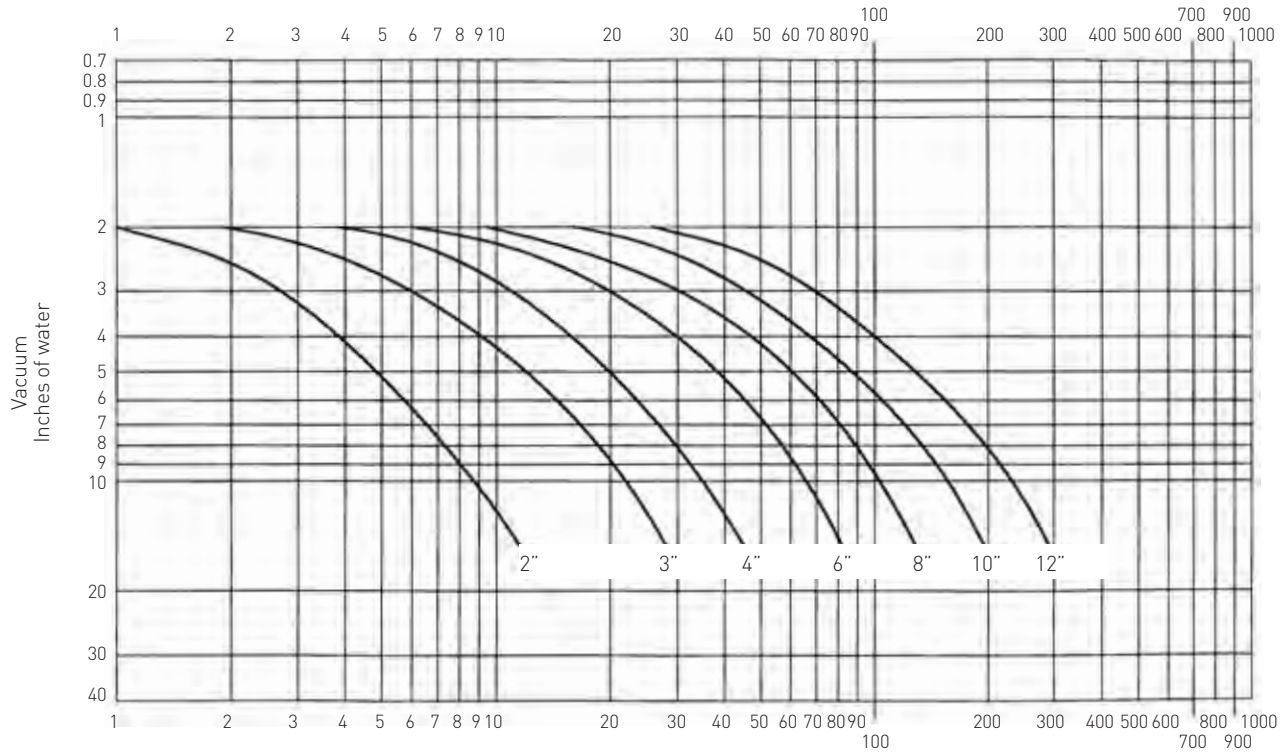


Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)

FLOW CURVES

Combination 2010B valve and 5000 flame arrester, set at 2 inches of water

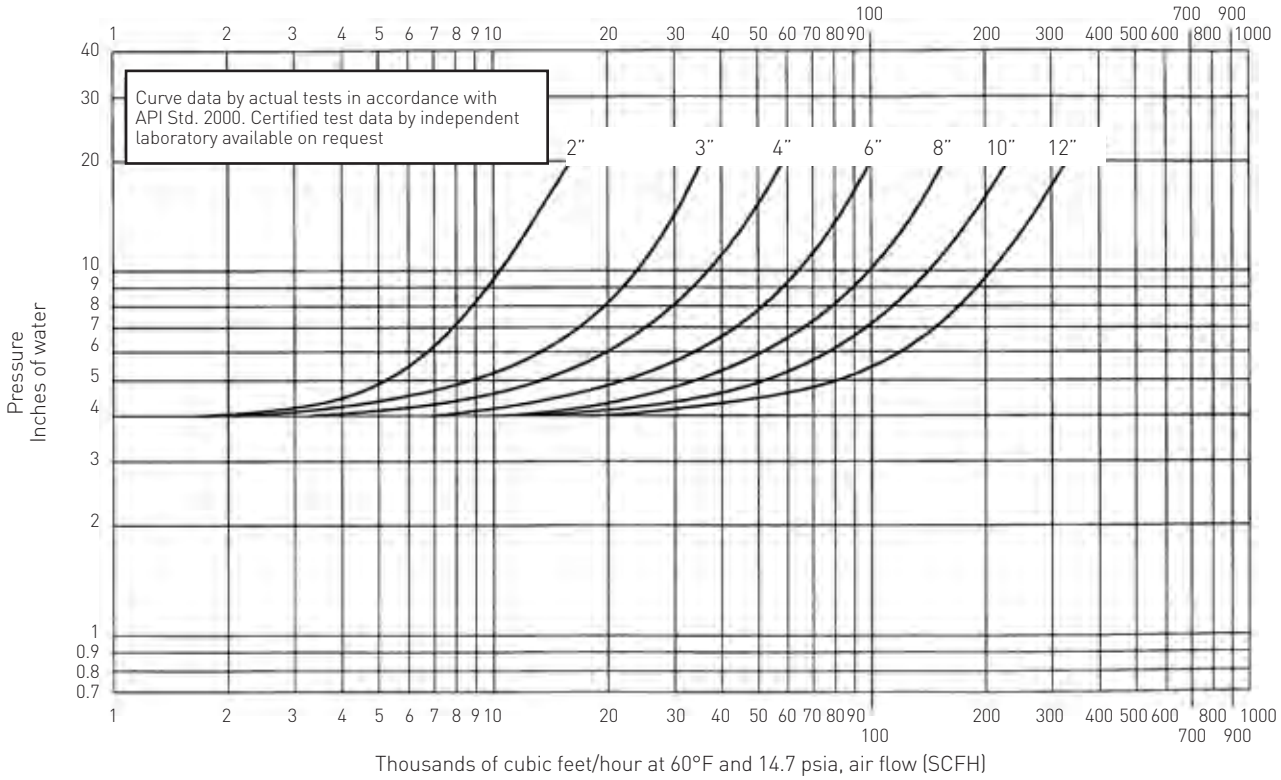


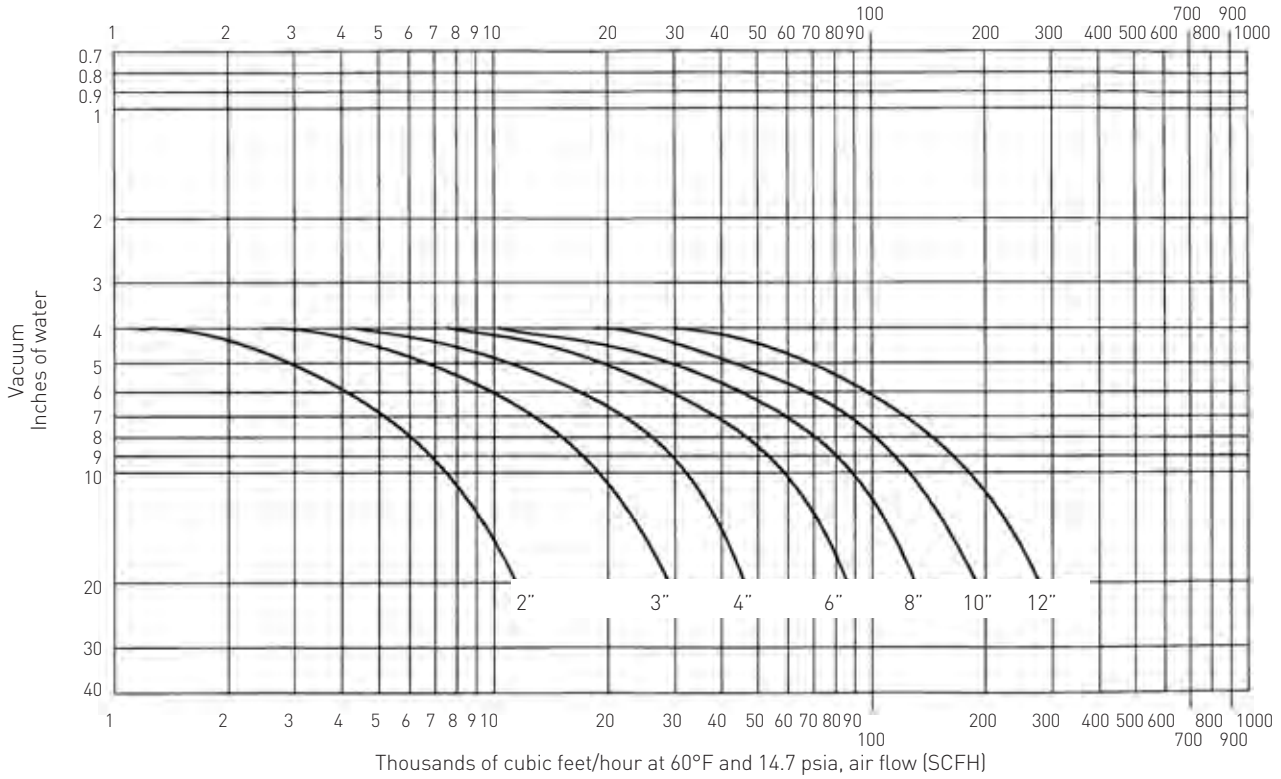


VAREC 5000/5010 SERIES FLAME ARRESTERS

FLOW CURVES

Combination 2010B valve and 5000 flame arrester, set at 4 inches of water

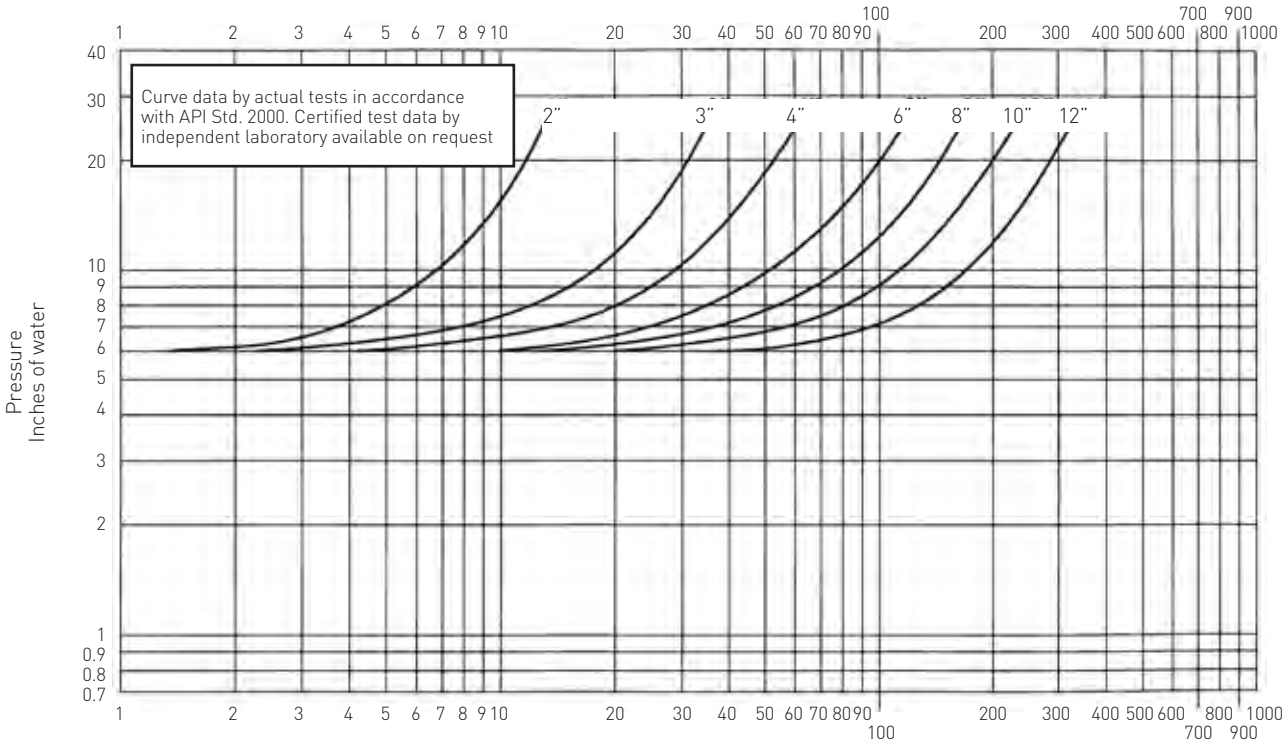




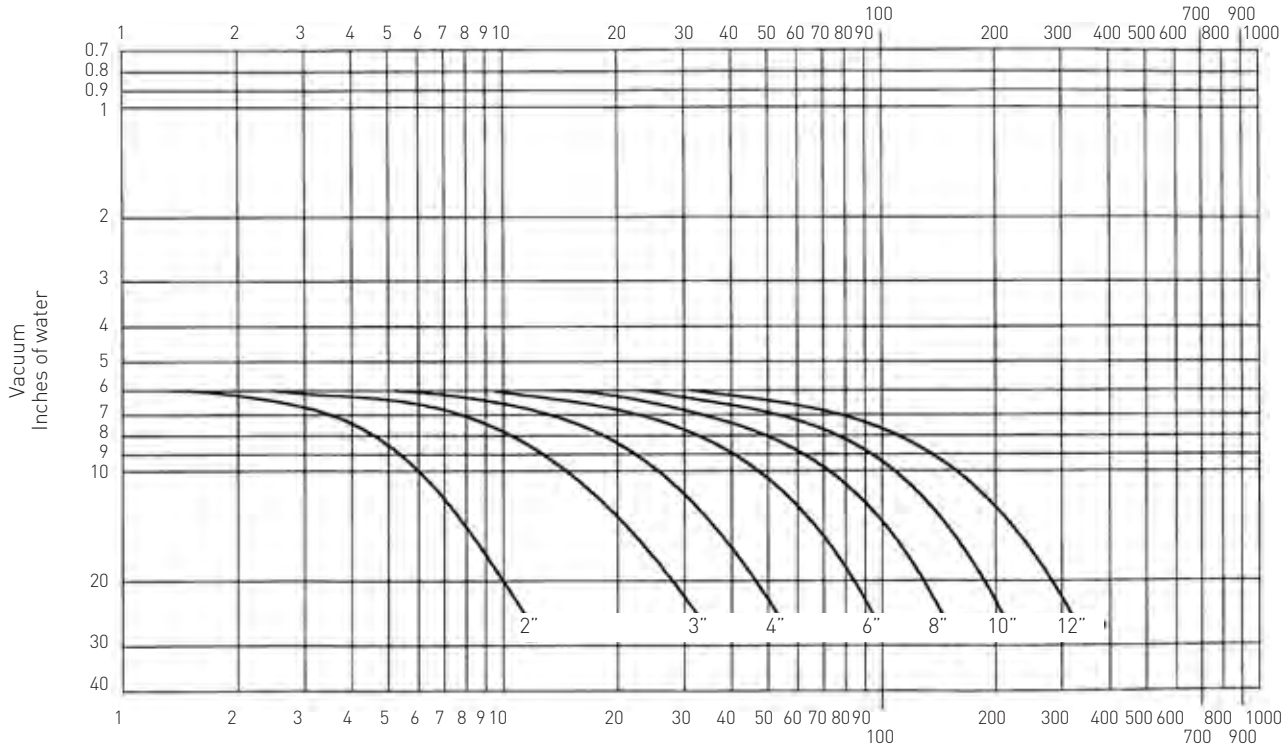
VAREC 5000/5010 SERIES FLAME ARRESTERS

FLOW CURVES

Combination 2010B valve and 5000 flame arrester, set at 6 inches of water



Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)



Thousands of cubic feet/hour at 60°F and 14.7 psia, air flow (SCFH)

SELECTION GUIDE

Example:		50	00	2	6	S
Model						
50	Flame arrester					
Configuration						
00	Vertical					
10	Horizontal					
Size						
2	2"					
3	3"					
4	4"					
6	6"					
8	8"					
0	10"					
1	12"					
Housing/bank assembly frame/sheet material						
1	Aluminum/aluminum (extensible frame)/aluminum					
2	Aluminum/aluminum (extensible frame)/316 stainless steel					
3	Carbon steel/316 stainless steel (fixed frame)/316 stainless steel					
6	316 stainless steel/316 stainless steel (fixed frame)/316 stainless steel					
Hardware material						
S	Stainless steel					
*	Zn plated carbon steel (standard) - leave blank					

Example: vertical configuration flame arrester. 2" size all 316 stainless steel construction with stainless steel hardware.

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Beaver Equipment, LLC
15112 NE 198th Street
Woodinville, WA 98072
855-878-6386
GaryL@Beaver-Equipment.com
www.beaver-equipment.com

Quote

ADDRESS
Kitsap Co. Public Works
12351 Brownsville Hwy NE
Poulsbo, WA 98370

SHIP TO
Kitsap Co. Sewer Utility
c/o Floyd Bayless
Central Kitsap Treatment Plant
12351 Brownsville Hwy NE
Poulsbo, WA 98370

QUOTE # E220128B
DATE 01/28/2022
EXPIRATION DATE 02/28/2022

SHIP VIA	TRACKING NO.	REP INITIALS	P.O. NUMBER	ORDER NUMBER
NA	NA	MGM	TBD	TBD

ACTIVITY	DESCRIPTION	QTY	RATE	AMOUNT
Services	Varec Biogas Service Site Visit Not-to-Exceed-Estimate; One (1) Trip of One (1) Day, Service Engineer to Inspect Installed Varec Flame Arresters and Pressure Relief Valves on the East Digester, Approximately September 1st, 2022.	1	8,500.00	8,500.00T
Services	Varec Biogas Service Site Visit Not-to-Exceed-Estimate; One (1) Trip of One (1) Day, Service Engineer to Inspect Installed Varec Flame Arresters and Pressure Relief Valves on the West Digester, Approximately October 15th, 2022.	1	8,500.00	8,500.00T
Services	Varec Biogas Service Site Visit, Not-to-Exceed-Estimate; One (1) Trip of One (1) Day, Service Engineer to Inspect Varec Gas Safety Equipment and Inspect and Tune Waste Gas Burner Equipment, While Both East & West Digesters are at Full Gas Production. Approximately December 27th, 2022.	1	8,500.00	8,500.00T
Notes	Notes: 1. Pricing does not include spare parts. If spare parts are needed, they will quoted and invoiced separately. 2. Varec Biogas does not guarantee performance of Groth equipment or any other equipment manufactured by others.	1	0.00	0.00T

*Unless otherwise noted above, this estimate is for equipment and parts only and does not include additional hardware, connections,

SUBTOTAL	25,500.00
TAX	2,295.00

inspection, startup services, or installation of equipment.
**Terms & Conditions Apply and are attached.
***Beaver Equipment can receive payment via credit card or direct deposit, please contact us if you would like to pay using a method other than with a mailed check

TOTAL **$27,795.00**

Accepted By

Accepted Date

Terms and Conditions, Beaver Equipment LLC

General

Customer's order is binding only when accepted in writing at the principal office of Beaver Equipment. The terms and conditions of sale are only those stated below. If any other terms and conditions are in Customer's order, they are hereby rejected unless independently approved in writing by our authorized representative. The parties agree there are no agreements between the parties, oral or written, with respect to the goods sold hereunder (including any made or implied from past dealings) except as expressed herein.

Shipping dates are estimates only and are not guaranteed. We will attempt to make shipments as scheduled and may make partial shipments. However, the completion of the order is subject to acts of God or the public enemy, fires, floods, severe weather, delays caused by governments (including government priorities, preferences or allocations), delays of suppliers in furnishing materials and services, and any other causes beyond our control.

Prices quoted, unless otherwise stated are F.O.B. factory and the Customer bears the risk of loss while in transit. Prices quoted, unless otherwise stated do not include sales, use, excise or similar taxes or duties: Customer will pay these items directly if the law permits or will reimburse us if we are required to pay them. Customer will provide tax exemption certificates or evidence of tax payment on request.

Invoices will be sent to the customer when the equipment is shipped. In cases of billable work performed prior to shipment of equipment, or split shipments, invoices will be sent when the task has been completed or the partial shipment made. Payment is due and payable 10 days from the date of invoice.

In the event credit has not been established we reserve the right to require payment in advance of shipment. Any amounts not paid when due shall bear interest at the rate of 1 1/2% per month or at the highest rate permitted by law (whichever is less), from the date of shipment until paid. We reserve a purchase money security interest in each item shipped, which will be satisfied by payment in full. We have the right to file a copy of this document as a financing statement.

Customer's order will be deemed a representation that Customer is solvent and able to pay for the items ordered. If Customer fails to make payments when due or if bankruptcy or insolvency proceedings are instituted by or against Customer, or if Customer makes an assignment for the benefit of creditors, Customer will be deemed in default and we will have the right to terminate our obligations by written notice to Customer, but such termination will not affect Customer's obligation to pay for items delivered and work in progress.

No goods may be returned without prior written approval of Beaver Equipment. Orders placed with and accepted by us may not be canceled except upon our written consent prior to shipment and Buyer's acceptance of our cancellation charges, which shall protect us against all costs and losses. We reserve the right to cancel any sale hereunder without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

We reserves the right to discontinue the manufacture of, or change or modify the design and/or construction of the goods sold pursuant to this document, without incurring any obligation to Buyer.

Title and Damage in Shipment

All items should be inspected and tested as soon as received. If any damage is discovered, a claim should be filed with the carrier. A full report of the damage should be forwarded to us so that we can arrange for repair or replacement.

If this sale is F.O.B. factory, title to items passes to Customer when delivered to carrier, and we are not responsible for damage or loss in transit. We can arrange for in-transit insurance at Customer's expense, but will not do so without Customer's written instructions. If this sale is F.O.B. destination, title to items passes upon tender of delivery by carrier to Customer, and if items are damaged we must receive Customer's claim for loss or damage in transit within ten (10) days after receipt of shipment, which must be signed by the carrier.

Warranty

All items that we manufacture are warranted, when paid for and properly installed, operated and maintained, to be free from defects in material and workmanship. The warranty period is one year from the date of installation by the first user of the goods, or eighteen (18) months from the date of shipment to the first user, whichever occurs first. No warranty is given for goods which have been subject to misuse, improper installation, corrosion, or which have been modified or repaired by unauthorized persons. We must receive written notice of defect within the warranty period. Our liability is limited to servicing or adjusting any item supplied under this contract. If a fault has been caused by improper installation, maintenance or use, or by abnormal conditions of operation, repairs will be billed at normal rates. If any fault develops, the following steps should be taken: Notify us by giving the item model number, serial number and details of the difficulty. On receipt of this information, we will determine the best available way to solve the problem and implement the solution. WE DISCLAIM STATUTORY AND IMPLIED WARRANTIES, SUCH AS WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE. WE ALSO DISCLAIM ALL WARRANTIES REGARDING ANY ANCILLARY SERVICES RENDERED.

Use of Drawings

Any drawings submitted herewith are to show only the general style, arrangement, and approximate dimensions of the goods offered. No work is to be based on drawings unless the drawings are certified. In no event will manufacturing or proprietary drawings be supplied.

Limitation of Damages

IN NO EVENT SHALL BEAVER EQUIPMENT BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY, LAWS RELATING TO THE PROTECTION OF THE ENVIRONMENT, OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, REGARDLESS OF WHETHER WE WERE INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL OUR LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

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February 28th, 2022

Floyd Bayless
Kitsap County
Central Kitsap Treatment Plant

Subject: Proposal for the supply of pumping equipment

APSCO offers pumping equipment per the attached Bill of Materials. Our price is firm for an order per following schedule:

Price is firm for an order within 60 days of bid date.
Submittals 10 weeks from receipt of acceptable order.
Customer approval and release to manufacture 4 weeks after submittals.
Manufacturing time 24 weeks after release to manufacture.
Price escalation may apply for shipments held beyond 38 weeks after order.

Terms and Conditions of this offer are solely and exclusively based on Flowserve Worldwide Terms and Conditions of Sale Rev 6b, April 2018, attached hereto. Warranty is extended to 12 months from startup not to exceed 18 months from shipment. Payment terms per the attached schedule are required. All extensions of credit are subject to the approval of APSCO's Credit Department.

Any additional or different terms and conditions included in any acceptance of this offer are expressly disclaimed in advance and unless there is prior mutual agreement otherwise, shall not become a part of any contract resulting from this offer. If our offer is otherwise attractive we are willing to consider any other specific areas of concern you may have.

Send responding purchase orders to APSCO LLC, attention of the writer at the address below

Sincerely,

Joe Kernkamp
President
APSCO LLC
jkernkamp@apsco-llc.com

Copy: Joshua Clark, Application Engineer II, APSCO LLC

Att: APSCO LLC Terms & Conditions

APSCO is acting as an equipment supplier only, not as a subcontractor. This proposal is limited to the supply of equipment for the detailed specifications listed below. No other commercial or technical specifications, referenced or not, have been considered in the preparation of this proposal, or the costing of this equipment.

Reference: Central Kitsap WWTP

I. Specification sections applicable to this proposal:

A. None Reviewed

II. Solids handling pump equipment and accessories included as applicable:

Services

A. **West Mixing Pump:** One (1)14MNC16A-FR7L vertical closed coupled with elbow solids handling pump, clockwise rotation, with a flexible coupling, coupling guard, and 15HP motor.
B. **East Mixing Pump:** One (1)14MNC16A-FR7L vertical closed coupled with elbow solids handling pump, counter-clockwise rotation, with a flexible coupling, coupling guard, and 15HP motor.

Materials of Construction:

A. Class 30 Cast Iron casing, 125# FF flanges
B. **West Mixing Pump:** Class 30 Cast Iron suction elbow, 125# FF flanges, in nozzle position C
C. **East Mixing Pump:** Class 30 Cast Iron suction elbow, 125# FF flanges, in nozzle position G
D. Class 30 Cast Iron impeller
E. Impeller balanced to ISO Gr 6.3
F. AISI 440A 300-350 BHN suction elbow wearing ring
G. Gr CA15 Stainless steel, 200-250 BHN impeller wearing ring
H. Gr 1045 Carbon steel pump shaft
I. Gr CA15 Stainless steel, 325-400 BHN shaft sleeves
J. Class 30 Cast Iron stuffing box, with Flowserve double cartridge type ISC2 mechanical seal with carbon/silicon carbide faces
K. Flush water by Others
L. Cast iron bearing frame with opposed tapered roller bearings, grease lubrication
M. Flexible grid coupling, non-spacer type, manufactured by Falk
N. Fabricated steel motor pedestal
O. Paint: Surface prep and Gray enamel coating applied to the pump exterior.
P. Motor: 15HP, 600rpm, TEFC, 460V, 60Hz, 3-Phase, 1.15 S.F., inverter duty

Q. Testing:
- Non-witness factory performance test, performed with a calibrated shop test motor, per HI level 1U. Factory equipment testing certification and curves to be sent to owner prior to shipment.

R. Pump Analysis:
- None

S. Spare parts for each pump:
- (1) Set of Bearings
- (1) Set of Gaskets & O-rings
- (1) Set of Mechanical Seals

T. 2 Days/1 Trip for installation assistance, verification of proper installation, and owner training.

U. Documentation:
- Submittals including shop drawings, technical literature, bulletins, and catalog cut sheets of the equipment.
- Operation and Maintenance manuals in PDF format.

III. Items **not** included

A. Off-loading at jobsite, any labor or tools for Assembly or Installation, Field operation, Field performance testing including Field vibration or noise testing instruments or analysis
B. Suction or Discharge piping, mechanical couplings, supports, tie rods, leveling screws, fittings, etc.
C. Air relief valves / Vacuum valves / Isolation valves, etc.
D. Vibration isolation equipment
E. Seal water or drain accessories such as piping, flow indicators, pressure reducing valves, Y strainers, fittings or tubing
F. Gauges, T cocks, anchor bolts, templates or accessories
G. VFDs or any type of Controls, Instrumentation, MCCs, Starters, Power Factor Correction Capacitors, Panels, cable, wiring, conduits, temperature or vibration probes, remote controls, *or any auxiliary electrical equipment extraneous to the pump motors*
H. Standard tools or tool chests, lubricants, grease fitting extensions or guns
I. Field painting, touch-up paint supply

IV. Disclaimers:

- This Proposal is being issued in the midst of the global Coronavirus pandemic. Given these highly unusual and unpredictable circumstances, notwithstanding as otherwise provided in this Proposal and in addition to any other remedies provided hereunder, Flowserve shall be entitled to any time extension or other reasonable contractual adjustment, if any consequences whether directly or indirectly resulting out of, or in connection with the Coronavirus pandemic, lead to delays or other impacts in the delivery of goods or provision of services, or otherwise affect Flowserve's contractual obligations or duties hereunder.
- Pump equipment guarantees are based on certified factory tests only. Should BUYER's field tests indicate that SELLER's equipment does not meet the specified performance requirements, SELLER shall make its field service representative available, at SELLER's

published field service rates, for consultation purposes and to assist in identifying the root cause of the performance discrepancy. If such root cause is determined to be SELLER's fault or responsibility, then Contract warranty provisions apply and SELLER's sole obligation and BUYER's sole remedy is repair of the defect at issue to comply with the specified performance requirements

V. Coordination Notes/Comments:

- Pumps shall be rated at 4,200gpm at 9.8ft per request.
- Materials shall be similar to serial numbers 78Z001684-1/2.
- The original pumps were supplied with packing. Per the request of Floyd Bayless, the pumps in this proposal are to be provided with a double mechanical seal. For the double mechanical seal, flush water piping and flush water drain piping are required. Seal flush piping is to be provided by owner.
- Pumps to be provided with ½" NPT (Plugged) suction gauge connection and ¾" NPT (plugged) discharge gauge connection per Flowserve standard.

VI. **Price for all forgoing……$ 192,299.00**

VII. **Freight to Jobsite……..$ 2,300.00**

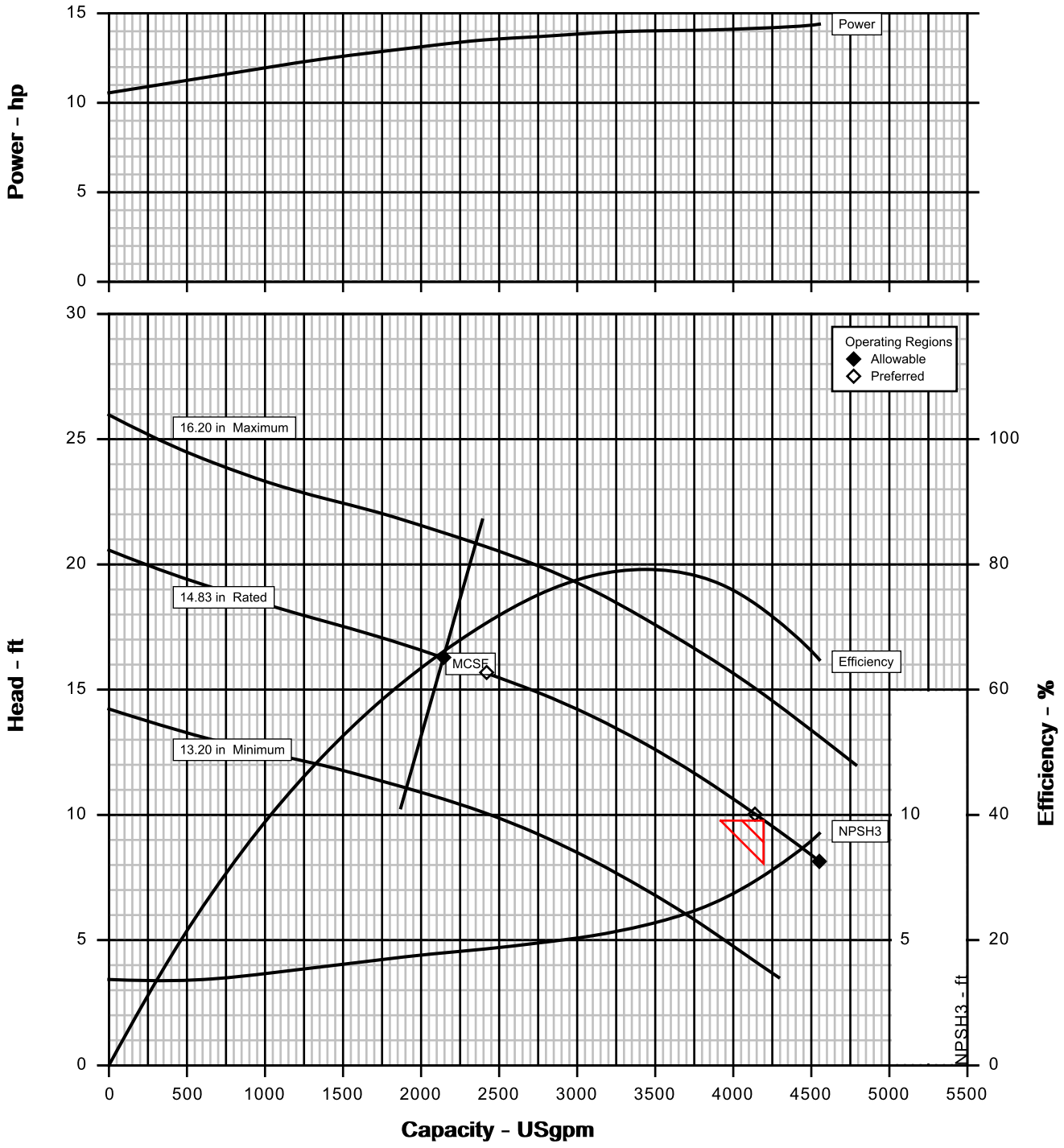
TERMS OF PAYMENT

100% Net 30 Days

Pump size & type / Stages	: 14MN16A FR7L	/ 1	
Based on curve no.	: 89117287		
Impeller diameter	: 14.83 in		

Customer	: APSCO INC	Capacity	: 4,200.0 USgpm
Item number	: 78Z001684-1	Head	: 9.80 ft
Service	: -	Density / Specific gravity	: - / 1.000
Flowserve reference	: 3890735540	Pump speed	: 580 rpm
Date	: February 18, 2022	Ns / Nss (per eye)	: 4,241 / 9,830 (US)
		Test tolerance	: ANSI/HI 14.6 Grade 1U

CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS; CAPACITY, HEAD, AND EFFICIENCY.



Hydraulic Datasheet

Customer	: APSCO INC	Pump / Stages	: 14MN16A FR7L	/ 1
Customer reference	: -	Based on curve no.	: 89117287	
Item number	: 78Z001684-1	Flowserve reference	: 3890735540	
Service	: -	Date	: February 18, 2022	

Operating Conditions

Capacity (rated/normal)	: 4,200.0 USgpm / -
Water capacity (CQ=1.00)	: -
Total developed head	: 9.80 ft
Water head (CH=1.00)	: -
NPSHa/NPSHa less margin	: 34.0 ft / -
Maximum suction pressure	: 0.0 psig

Liquid

Liquid type	: Other
Liquid description	: -
Temperature	: 60 °F
Density / Specific gravity	: - / 1.000
Solid Size - Actual / Limit	: - / 5.30 in
Viscosity / Vapor pressure	: 1.00 cSt / -

Materials / Specification

Material column code	: 10
Pump specification	: -

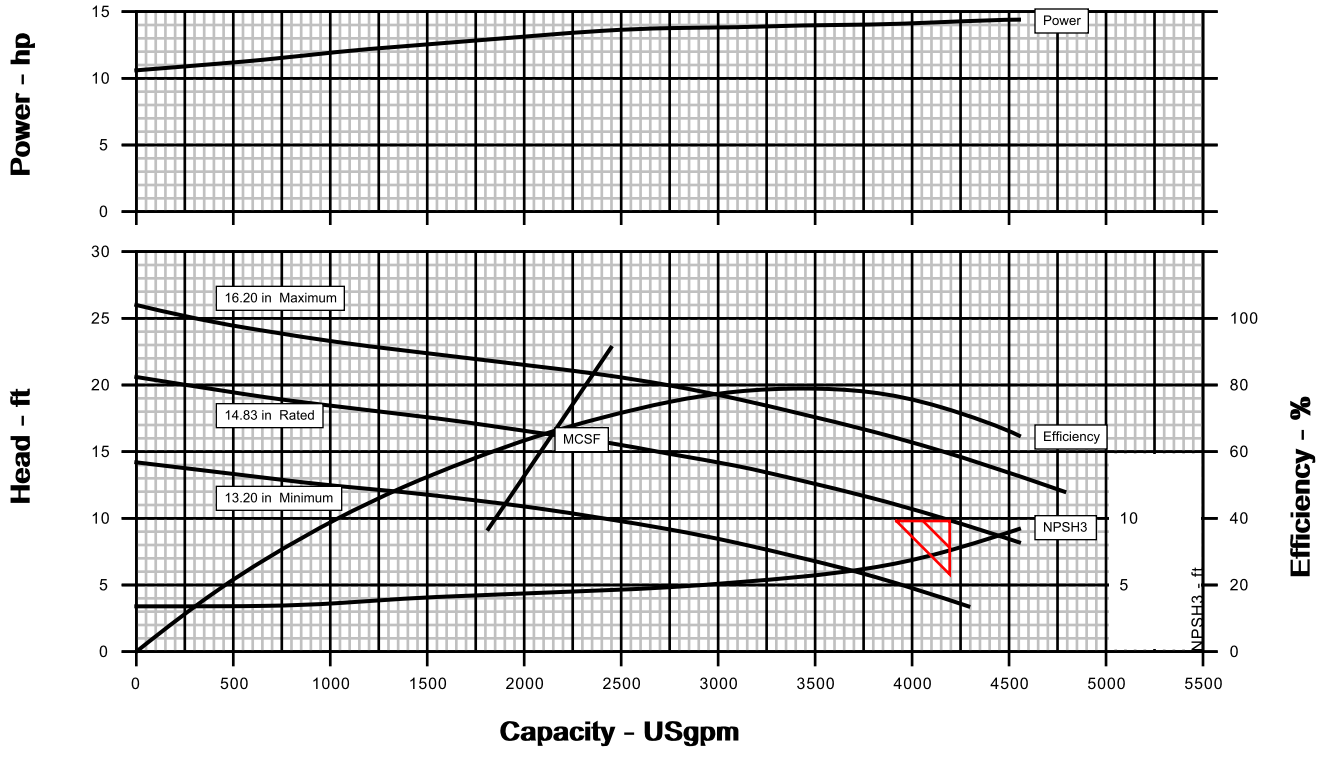
Other Requirements

Hydraulic selection : No specification
Construction : No specification
Test tolerance : ANSI/HI 14.6 Grade 1U
Speed Set : 580 rpm
Driver Sizing : Max Power + 3%

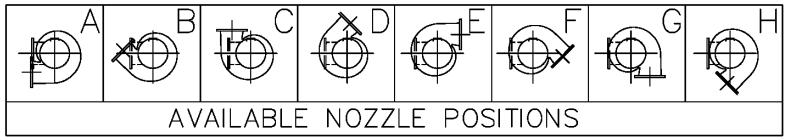
Performance

Hydraulic power	: 10.4 hp	Impeller diameter	
Pump speed	: 580 rpm	Rated	: 14.83 in
Pump overall efficiency (CE=1.00)	: 73.3 %	Maximum	: 16.20 in
NPSH required (NPSH3)	: 7.5 ft	Minimum	: 13.20 in
Rated brake power	: 14.2 hp	Ns / Nss (per eye)	: 4,241 / 9,830 (US)
		Minimum continuous flow	: 2,146.3 USgpm
Maximum brake power	: 14.4 hp	Maximum head at rated diameter	: 20.60 ft
Driver power rating	: 15.0 hp / 11.2 kW	Flow at BEP	: 3,454.0 USgpm
Casing working pressure	: 8.9 psig	Flow as % of BEP	: 121.6 %
(based on shut off @ cut dia/rated SG)		Efficiency at normal flow	: -
Maximum allowable	: 50.0 psig	Impeller diameter ratio (rated/max)	: 91.5 %
Hydrostatic test pressure	: 70.0 psig	Head rise to shut off	: 110.2 %
Estimated rated seal chamber pressure	: -	Total head ratio (rated / max) / (max / rated)	: 66.2 % / 151.2 %

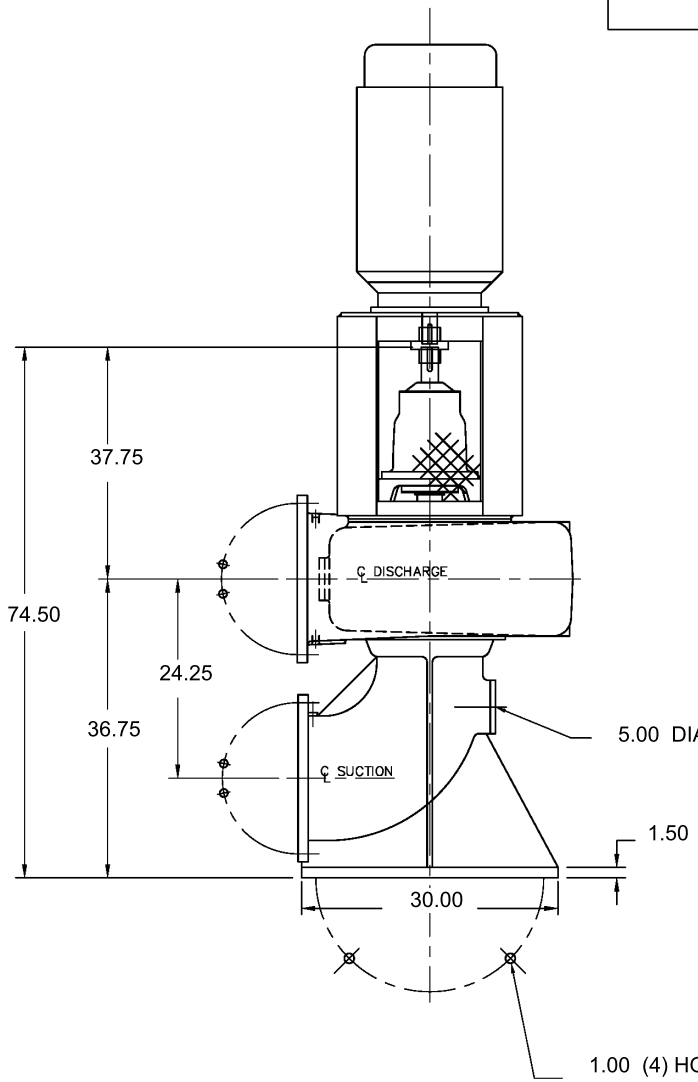
CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS; CAPACITY, HEAD, AND EFFICIENCY.



REFERENCE ONLY (NOT TO SCALE)



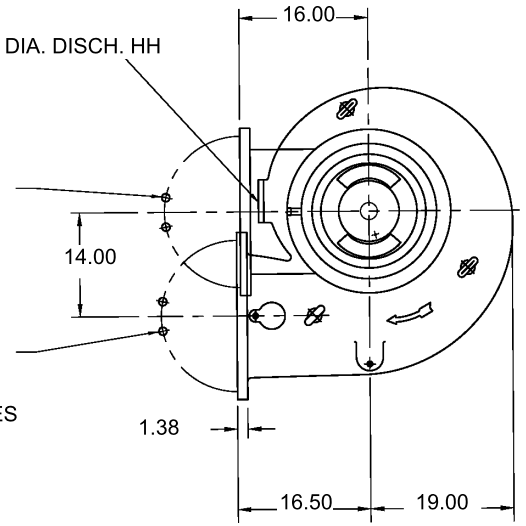
C NOZZLE POSITION FURNISHED



14.00 125# SUCT.
21.00 DIA. FLANGE
12 1.13 DIA. HOLES
ON A 18.75 DIA. BC

14.00 125# DISCH.
21.00 DIA. FLANGE
12 1.13 DIA. HOLES
ON A 18.75 DIA. BC

TOP VIEW



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Customer	: APSCO INC	Pump size & type	: 14MN16A FR7L	Drawing number	: -
Item number	: 78Z001684-1	Pump speed / Stages	: 580 rpm / 1	Date	: February 18, 2022
Service	: -	Flow / Head	: 4,200.0 USgpm / 9.80 ft	Certified by / Date :	: -
Customer PO #	: -	Driver power / Frame	: 15.0 hp / 11.2 kW / -	Seal type	: Double Mechanical Seal
Flowserve reference	: 3890735540	Volts / Phase / Hz	: 460 / -1 / 60 Hz	Seal flush plan	: -

APSCO, LLC • PO Box 2639 • Kirkland, WA 98083-2639
PH: (425) 822-3335 • FAX: (425) 827-6171 • www.apsco-llc.com

APSCO LLC TERMS AND CONDITIONS OF SALE

1. SCOPE: Unless otherwise agreed in writing, Seller's (APSCO, LLC) acceptance of Purchaser's purchase order is conditioned upon Purchaser accepting these terms and conditions. Seller sells its equipment in accordance with the following provisions.

2. PRICES: Prices are F.O.B. Seller's or its supplier's plant. Prices do not include any federal, state or local sales, use or other taxes and taxes will be added to the sale price for Purchaser's account.

3. TERMS: Unless otherwise agreed, all invoices are due and payable 100% net 30 days from date of shipment or notification of readiness to ship. All credit terms are offered subject to Purchaser's credit worthiness with said worthiness to be determined solely by the Seller. Full payment is due as indicated and late payment may be subject to a specified service charge. Purchaser shall pay the full invoiced amount to Seller, regardless of any payment schedule between Purchaser and the Owner, or others. If Purchaser is in default in any payment, Seller may offset any monies of Purchaser available to Seller or in Seller's possession; declare all payments for work completed immediately due and payable; stop all further work until payments are brought current and/or require advance payment for future shipments.

4. ITEMS INCLUDED: Each sale includes only the equipment described in the order. Responsibility for proper operation of equipment if not installed or operated in accordance with Seller's instructions, rests entirely with Purchaser. Seller shall supply only those safety devices, if any, described in the order or in its proposal and drawings, and shall comply with those provisions of the federal Occupational Health and Safety Act of 1970 which Purchaser and Seller have identified as specifically applicable to the manufacture of Seller's equipment hereunder. Seller shall not be responsible for compliance with state or local safety and health statutes of special application unless it has accepted such responsibility in writing.

5. SECURITY INTEREST: Seller retains a security interest in and right of repossession to the equipment until the full purchase price has been paid. Purchaser will not encumber nor permit others to encumber said equipment by any liens or security instruments. In the event legal action is necessary to enforce Purchaser's obligations under this order, Seller shall be entitled to recover its court costs and reasonable attorney's fees if it prevails. Purchaser shall provide insurance for Seller's benefit to protect Seller's interest against loss or damage until invoice is fully paid.

6. SHIPMENTS AND DELIVERY: Seller shall use its reasonable efforts to meet all shipment or delivery dates recited herein or in Purchaser's order, but any such dates are estimates only and are not guaranteed. Seller shall have no liability to Purchaser for damages or penalties, direct or indirect, for any delay in shipment or delivery, whether such delay is minor or substantial, nor shall Purchaser have the right to declare a breach of contract because of any such delay. Delivery of schedules are subject to prompt receipt by Seller of all necessary information and instructions from Purchaser, including any required approval of drawings, and establishment of agreed terms of payment. Unless otherwise agreed, all shipments are F.O.B. Seller's factory and all claims for damage, delay, or shortage arising from any shipment shall be made directly against the carrier by the Purchaser. When shipments are specified F.O.B. destination, Purchaser shall inspect the equipment, and notify Seller of any damage or shortage within seven days of receipt. Failure to so notify Seller shall constitute acceptance by Purchaser, relieving Seller of liability for damages or shortages. Unless prohibited by Purchaser, Seller shall make partial shipments of completed items for payment under terms of order.

7. WARRANTY: Seller warrants equipment of its manufacture only in accordance with its current applicable Seller's Product warranty against defects in workmanship and materials, which warranty is incorporated by reference and made a part hereof.

8. PATENTS: Seller agrees that it will defend and indemnify Purchaser against damages arising from proceedings, alleging that Seller's equipment infringes any apparatus claim of a patent existing as of date of order, provided Seller is given prompt written notice of such proceeding or threat thereof under a patent, and Purchaser accords Seller full control of the defense, applicable patent/fraud counterclaims, settlement or compromise thereof and any recoveries thereunder. Purchaser agrees that it shall furnish Seller, on request, all needed information, assistance and authority to enable Seller so to defend. Seller will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in rendering assistance at Seller's request. The foregoing states the entire liability of Seller with respect to patent infringement. Purchaser agrees that it shall indemnify the Seller against all claims, demands, damages, penalties, costs and expenses to which the Seller may become liable by reason of any infringement or alleged infringement of a patent or patents arising out of performance of this order if the equipment is constructed in accordance with Purchaser's detailed drawings or designs submitted to Seller.

9. CANCELLATION, SUSPENSION OR DELAY: If Purchaser requests or causes a cancellation, suspension or delay of Seller's work, Purchaser shall pay Seller all appropriate charges incurred up to date of such cancellation, suspension or delay, plus Seller's overhead and reasonable profit. Additionally, all charges related to and risks incident to storage, disposition, and/or resumption of work shall be borne solely by Purchaser.

10. LIMITATION OF LIABILITY: Seller shall not be liable to Purchaser for any consequential or incidental damages of any nature for any reason whatsoever, whether such damages are based in contract or in tort, including strict liability or negligence. The remedies stated in Seller's warranty attached hereto constitute the sole and exclusive remedy of Purchaser for any defect in material and workmanship or performance failure of Seller's equipment. Seller's liability for direct damages shall not exceed the material portion of the contract price for the defective equipment.

11. CHANGES AND BACKCHARGES: Seller shall not be obligated to make any changes in or additions to the scope of the work unless Seller agrees thereto and an equitable adjustment is made to price and/or delivery. Seller will not approve or accept returns of or backcharges for labor, materials or other costs incurred in modification, adjustment, service or repair or equipment unless previously approved in writing by an authorized employee of Seller.

12. CHANGES IN DESIGN: With proper notification in writing to Purchaser, Seller reserves the right to modify the design and construction of equipment in order to incorporate improvements or to substitute material equal or superior to that originally specified. No charge shall be made to Purchaser for modifications made to Seller's option.

13. PROPRIETARY INFORMATION: All information furnished by Seller is solely for Purchaser's use in connection with the equipment purchased herein, and shall not be disclosed to any third party without Seller's prior written consent, unless required by law.

14. FORCE MAJUERE: The Seller shall be relieved of its obligations hereunder and of any liabilities contained herein whenever and to the extent to which the fulfillment of such obligations is prevented, frustrated or impeded by conforming to any statue or any rule, regulation, order or requisition made thereunder, or any consequence thereof, by state, federal, national or international prohibition or sanction, by war (whether declared or not), military activity, terrorism, acts of public enemies, accidents, fire, flood, nuclear fallout, acts of God or any cause of like or different kind beyond its control, or by reason of any industrial dispute, or any consequence thereof.

APSCO, LLC • PO Box 2639 • Kirkland, WA 98083-2639
PH: (425) 822-3335 • FAX: (425) 827-6171 • www.apsco-llc.com

15. GOVERNING LAW: This agreement shall be interpreted in accordance with the laws of the State of Washington, U.S.A., which laws shall be deemed to be the governing law of this contract with regard to any disputes or questions of interpretation between the parties.

16. ENTIRE AGREEMENT: This proposal expresses the entire agreement between the parties hereto and supersedes any previous communications, representations, or agreements, whether oral or written, and is not subject to modification except in writing, signed by an authorized officer of each party.

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State of Washington
Department of Labor & Industries
Prevailing Wage Section - Telephone 360-902-5335
PO Box 44540, Olympia, WA 98504-4540

Washington State Prevailing Wage

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, worker's wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements are provided on the Benefit Code Key.

Journey Level Prevailing Wage Rates for the Effective Date: 2/3/2022

County	Trade	Job Classification	Wage	Holiday	Overtime	Note	*Risk Class
Kitsap	Asbestos Abatement Workers	Journey Level	$54.62	5D	1H		View
Kitsap	Boilermakers	Journey Level	$70.79	5N	1C		View
Kitsap	Brick Mason	Journey Level	$63.32	7E	1N		View
Kitsap	Brick Mason	Pointer-Caulker-Cleaner	$63.32	7E	1N		View
Kitsap	Building Service Employees	Janitor	$14.49		1		View
Kitsap	Building Service Employees	Shampooer	$14.49		1		View
Kitsap	Building Service Employees	Waxer	$14.49		1		View
Kitsap	Building Service Employees	Window Cleaner	$14.49		1		View
Kitsap	Cabinet Makers (In Shop)	Journey Level	$23.72		1		View
Kitsap	Carpenters	Acoustical Worker	$68.24	7A	4C		View
Kitsap	Carpenters	Bridge, Dock And Wharf Carpenters	$68.19	7A	4C		View
Kitsap	Carpenters	Carpenter	$68.19	7A	4C		View
Kitsap	Carpenters	Floor Finisher	$68.19	7A	4C		View
Kitsap	Carpenters	Floor Layer	$68.19	7A	4C		View
Kitsap	Carpenters	Scaffold Erector	$68.19	7A	4C		View
Kitsap	Cement Masons	Application of all Composition Mastic	$67.41	7A	4U		View
Kitsap	Cement Masons	Application of all Epoxy Material	$66.91	7A	4U		View
Kitsap	Cement Masons	Application of all Plastic Material	$67.41	7A	4U		View
Kitsap	Cement Masons	Application of Sealing Compound	$66.91	7A	4U		View
Kitsap	Cement Masons	Application of Underlayment	$67.41	7A	4U		View
Kitsap	Cement Masons	Building General	$66.91	7A	4U		View
Kitsap	Cement Masons	Composition or Kalman Floors	$67.41	7A	4U		View
Kitsap	Cement Masons	Concrete Paving	$66.91	7A	4U		View
Kitsap	Cement Masons	Curb & Gutter Machine	$67.41	7A	4U		View
Kitsap	Cement Masons	Curb & Gutter, Sidewalks	$66.91	7A	4U		View
Kitsap	Cement Masons	Curing Concrete	$66.91	7A	4U		View

Kitsap	Cement Masons	Finish Colored Concrete	$67.41	7A	4U		View
Kitsap	Cement Masons	Floor Grinding	$67.41	7A	4U		View
Kitsap	Cement Masons	Floor Grinding/Polisher	$66.91	7A	4U		View
Kitsap	Cement Masons	Green Concrete Saw, self-powered	$67.41	7A	4U		View
Kitsap	Cement Masons	Grouting of all Plates	$66.91	7A	4U		View
Kitsap	Cement Masons	Grouting of all Tilt-up Panels	$66.91	7A	4U		View
Kitsap	Cement Masons	Gunite Nozzleman	$67.41	7A	4U		View
Kitsap	Cement Masons	Hand Powered Grinder	$67.41	7A	4U		View
Kitsap	Cement Masons	Journey Level	$66.91	7A	4U		View
Kitsap	Cement Masons	Patching Concrete	$66.91	7A	4U		View
Kitsap	Cement Masons	Pneumatic Power Tools	$67.41	7A	4U		View
Kitsap	Cement Masons	Power Chipping & Brushing	$67.41	7A	4U		View
Kitsap	Cement Masons	Sand Blasting Architectural Finish	$67.41	7A	4U		View
Kitsap	Cement Masons	Screed & Rodding Machine	$67.41	7A	4U		View
Kitsap	Cement Masons	Spackling or Skim Coat Concrete	$66.91	7A	4U		View
Kitsap	Cement Masons	Troweling Machine Operator	$67.41	7A	4U		View
Kitsap	Cement Masons	Troweling Machine Operator on Colored Slabs	$67.41	7A	4U		View
Kitsap	Cement Masons	Tunnel Workers	$67.41	7A	4U		View
Kitsap	Divers & Tenders	Bell/Vehicle or Submersible Operator (Not Under Pressure)	$122.49	7A	4C		View
Kitsap	Divers & Tenders	Dive Supervisor/Master	$86.04	7A	4C		View
Kitsap	Divers & Tenders	Diver	$122.49	7A	4C	8V	View
Kitsap	Divers & Tenders	Diver On Standby	$81.04	7A	4C		View
Kitsap	Divers & Tenders	Diver Tender	$73.60	7A	4C		View
Kitsap	Divers & Tenders	Manifold Operator	$73.60	7A	4C		View
Kitsap	Divers & Tenders	Manifold Operator Mixed Gas	$78.60	7A	4C		View
Kitsap	Divers & Tenders	Remote Operated Vehicle Operator/Technician	$73.60	7A	4C		View
Kitsap	Divers & Tenders	Remote Operated Vehicle Tender	$68.64	7A	4C		View
Kitsap	Dredge Workers	Assistant Engineer	$73.62	5D	3F		View
Kitsap	Dredge Workers	Assistant Mate (Deckhand)	$73.05	5D	3F		View
Kitsap	Dredge Workers	Boatmen	$73.62	5D	3F		View
Kitsap	Dredge Workers	Engineer Welder	$75.03	5D	3F		View
Kitsap	Dredge Workers	Leverman, Hydraulic	$76.53	5D	3F		View
Kitsap	Dredge Workers	Mates	$73.62	5D	3F		View
Kitsap	Dredge Workers	Oiler	$73.05	5D	3F		View
Kitsap	Drywall Applicator	Journey Level	$67.54	5D	1H		View
Kitsap	Drywall Tapers	Journey Level	$67.91	5P	1E		View
Kitsap	Electrical Fixture Maintenance Workers	Journey Level	$33.19	5L	1E		View
Kitsap	Electricians - Inside	Cable Splicer	$94.22	7C	4E		View
Kitsap	Electricians - Inside	Cable Splicer (tunnel)	$101.27	7C	4E		View
Kitsap	Electricians - Inside	Certified Welder	$91.00	7C	4E		View

Kitsap	Electricians - Inside	Certified Welder (tunnel)	$97.74	7C	4E		View
Kitsap	Electricians - Inside	Construction Stock Person	$44.78	7C	4E		View
Kitsap	Electricians - Inside	Journey Level	$87.80	7C	4E		View
Kitsap	Electricians - Inside	Journey Level (tunnel)	$94.22	7C	4E		View
Kitsap	Electricians - Motor Shop	Craftsman	$15.37		1		View
Kitsap	Electricians - Motor Shop	Journey Level	$14.69		1		View
Kitsap	Electricians - Powerline Construction	Cable Splicer	$82.39	5A	4D		View
Kitsap	Electricians - Powerline Construction	Certified Line Welder	$75.64	5A	4D		View
Kitsap	Electricians - Powerline Construction	Groundperson	$49.17	5A	4D		View
Kitsap	Electricians - Powerline Construction	Heavy Line Equipment Operator	$75.64	5A	4D		View
Kitsap	Electricians - Powerline Construction	Journey Level Lineperson	$75.64	5A	4D		View
Kitsap	Electricians - Powerline Construction	Line Equipment Operator	$64.54	5A	4D		View
Kitsap	Electricians - Powerline Construction	Meter Installer	$49.17	5A	4D	8W	View
Kitsap	Electricians - Powerline Construction	Pole Sprayer	$75.64	5A	4D		View
Kitsap	Electricians - Powerline Construction	Powderperson	$56.49	5A	4D		View
Kitsap	Electronic Technicians	Journey Level	$57.07	7E	1E		View
Kitsap	Elevator Constructors	Mechanic	$100.51	7D	4A		View
Kitsap	Elevator Constructors	Mechanic In Charge	$108.53	7D	4A		View
Kitsap	Fabricated Precast Concrete Products	Journey Level	$14.49		1		View
Kitsap	Fabricated Precast Concrete Products	Journey Level - In-Factory Work Only	$14.49		1		View
Kitsap	Fence Erectors	Fence Erector	$46.29	7A	4V	8Y	View
Kitsap	Fence Erectors	Fence Laborer	$46.29	7A	4V	8Y	View
Kitsap	Flaggers	Journey Level	$46.29	7A	4V	8Y	View
Kitsap	Glaziers	Journey Level	$72.41	7L	1Y		View
Kitsap	Heat & Frost Insulators And Asbestos Workers	Journey Level	$82.02	15H	11C		View
Kitsap	Heating Equipment Mechanics	Journey Level	$91.83	7F	1E		View
Kitsap	Hod Carriers & Mason Tenders	Journey Level	$57.31	7A	4V	8Y	View
Kitsap	Industrial Power Vacuum Cleaner	Journey Level	$29.89		1		View
Kitsap	Inland Boatmen	Boat Operator	$61.41	5B	1K		View
Kitsap	Inland Boatmen	Cook	$56.48	5B	1K		View
Kitsap	Inland Boatmen	Deckhand	$57.48	5B	1K		View
Kitsap	Inland Boatmen	Deckhand Engineer	$58.81	5B	1K		View
Kitsap	Inland Boatmen	Launch Operator	$58.89	5B	1K		View
Kitsap	Inland Boatmen	Mate	$57.31	5B	1K		View
Kitsap	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Cleaner Operator, Foamer Operator	$14.49		1		View

Kitsap	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Grout Truck Operator	$14.49		1		View
Kitsap	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Head Operator	$14.49		1		View
Kitsap	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Tv Truck Operator	$24.17		1		View
Kitsap	Insulation Applicators	Journey Level	$68.19	7A	4C		View
Kitsap	Ironworkers	Journeyman	$78.53	7N	1O		View
Kitsap	Laborers	Air, Gas Or Electric Vibrating Screed	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Airtrac Drill Operator	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Ballast Regular Machine	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Batch Weighman	$46.29	7A	4V	8Y	View
Kitsap	Laborers	Brick Pavers	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Brush Cutter	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Brush Hog Feeder	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Burner	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Caisson Worker	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Carpenter Tender	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Cement Dumper-paving	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Cement Finisher Tender	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Change House Or Dry Shack	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Chipping Gun (30 Lbs. And Over)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Chipping Gun (Under 30 Lbs.)	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Choker Setter	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Chuck Tender	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Clary Power Spreader	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Clean-up Laborer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Concrete Dumper/Chute Operator	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Concrete Form Stripper	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Concrete Placement Crew	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Concrete Saw Operator/Core Driller	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Crusher Feeder	$46.29	7A	4V	8Y	View
Kitsap	Laborers	Curing Laborer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Demolition: Wrecking & Moving (Incl. Charred Material)	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Ditch Digger	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Diver	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Drill Operator (Hydraulic, Diamond)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Dry Stack Walls	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Dump Person	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Epoxy Technician	$54.62	7A	4V	8Y	View

Kitsap	Laborers	Erosion Control Worker	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Faller & Bucker Chain Saw	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Fine Graders	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Firewatch	$46.29	7A	4V	8Y	View
Kitsap	Laborers	Form Setter	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Gabian Basket Builders	$54.62	7A	4V	8Y	View
Kitsap	Laborers	General Laborer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Grade Checker & Transit Person	$57.31	7A	4V	8Y	View
Kitsap	Laborers	Grinders	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Grout Machine Tender	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Groutmen (Pressure) Including Post Tension Beams	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Guardrail Erector	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Hazardous Waste Worker (Level A)	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Hazardous Waste Worker (Level B)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Hazardous Waste Worker (Level C)	$54.62	7A	4V	8Y	View
Kitsap	Laborers	High Scaler	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Jackhammer	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Laserbeam Operator	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Maintenance Person	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Manhole Builder-Mudman	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Material Yard Person	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Motorman-Dinky Locomotive	$55.62	7A	4V	8Y	View
Kitsap	Laborers	nozzleman (concrete pump, green cutter when using combination of high pressure air & water on concrete & rock, sandblast, gunite, shotcrete, water blaster, vacuum blaster)	$57.31	7A	4V	8Y	View
Kitsap	Laborers	Pavement Breaker	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Pilot Car	$46.29	7A	4V	8Y	View
Kitsap	Laborers	Pipe Layer (Lead)	$57.31	7A	4V	8Y	View
Kitsap	Laborers	Pipe Layer/Tailor	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Pipe Pot Tender	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Pipe Reliner	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Pipe Wrapper	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Pot Tender	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Powderman	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Powderman's Helper	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Power Jacks	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Railroad Spike Puller - Power	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Raker - Asphalt	$57.31	7A	4V	8Y	View
Kitsap	Laborers	Re-timberman	$56.31	7A	4V	8Y	View
Kitsap	Laborers	Remote Equipment Operator	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Rigger/Signal Person	$55.62	7A	4V	8Y	View

Kitsap	Laborers	Rip Rap Person	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Rivet Buster	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Rodder	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Scaffold Erector	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Scale Person	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Sloper (Over 20")	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Sloper Sprayer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Spreader (Concrete)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Stake Hopper	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Stock Piler	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Swinging Stage/Boatswain Chair	$46.29	7A	4V	8Y	View
Kitsap	Laborers	Tamper & Similar Electric, Air & Gas Operated Tools	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Tamper (Multiple & Self-propelled)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Timber Person - Sewer (Lagger, Shorer & Cribber)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Toolroom Person (at Jobsite)	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Topper	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Track Laborer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Track Liner (Power)	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Traffic Control Laborer	$49.50	7A	4V	9C	View
Kitsap	Laborers	Traffic Control Supervisor	$52.45	7A	4V	9C	View
Kitsap	Laborers	Truck Spotter	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Tugger Operator	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 0-30 psi	$142.82	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 30.01-44.00 psi	$147.85	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 44.01-54.00 psi	$151.53	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 54.01-60.00 psi	$157.23	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 60.01-64.00 psi	$159.35	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 64.01-68.00 psi	$164.45	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 68.01-70.00 psi	$166.35	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 70.01-72.00 psi	$168.35	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Compressed Air Worker 72.01-74.00 psi	$170.35	7A	4V	9B	View
Kitsap	Laborers	Tunnel Work-Guage and Lock Tender	$57.41	7A	4V	8Y	View
Kitsap	Laborers	Tunnel Work-Miner	$57.41	7A	4V	8Y	View
Kitsap	Laborers	Vibrator	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Vinyl Seamer	$54.62	7A	4V	8Y	View
Kitsap	Laborers	Watchman	$42.08	7A	4V	8Y	View

Kitsap	Laborers	Welder	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Well Point Laborer	$55.62	7A	4V	8Y	View
Kitsap	Laborers	Window Washer/Cleaner	$42.08	7A	4V	8Y	View
Kitsap	Laborers - Underground Sewer & Water	General Laborer & Topman	$54.62	7A	4V	8Y	View
Kitsap	Laborers - Underground Sewer & Water	Pipe Layer	$55.62	7A	4V	8Y	View
Kitsap	Landscape Construction	Landscape Construction/Landscaping Or Planting Laborers	$42.08	7A	4V	8Y	View
Kitsap	Landscape Construction	Landscape Operator	$72.44	15J	11G	8X	View
Kitsap	Landscape Maintenance	Groundskeeper	$14.49		1		View
Kitsap	Lathers	Journey Level	$67.54	5D	1H		View
Kitsap	Marble Setters	Journey Level	$63.32	7E	1N		View
Kitsap	Metal Fabrication (In Shop)	Fitter	$26.96		1		View
Kitsap	Metal Fabrication (In Shop)	Laborer	$14.49		1		View
Kitsap	Metal Fabrication (In Shop)	Machine Operator	$14.49		1		View
Kitsap	Metal Fabrication (In Shop)	Welder	$14.49		1		View
Kitsap	Millwright	Journey Level	$69.64	7A	4C		View
Kitsap	Modular Buildings	Cabinet Assembly	$14.49		1		View
Kitsap	Modular Buildings	Electrician	$14.49		1		View
Kitsap	Modular Buildings	Equipment Maintenance	$14.49		1		View
Kitsap	Modular Buildings	Plumber	$14.49		1		View
Kitsap	Modular Buildings	Production Worker	$14.49		1		View
Kitsap	Modular Buildings	Tool Maintenance	$14.49		1		View
Kitsap	Modular Buildings	Utility Person	$14.49		1		View
Kitsap	Modular Buildings	Welder	$14.49		1		View
Kitsap	Painters	Journey Level	$47.70	6Z	2B		View
Kitsap	Pile Driver	Crew Tender	$62.69	7A	4C		View
Kitsap	Pile Driver	Crew Tender/Technician	$62.69	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 0-30.00 PSI	$85.00	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 30.01 - 44.00 PSI	$90.00	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 44.01 - 54.00 PSI	$94.00	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 54.01 - 60.00 PSI	$99.00	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 60.01 - 64.00 PSI	$101.50	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 64.01 - 68.00 PSI	$106.50	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 68.01 - 70.00 PSI	$108.50	7A	4C		View

Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 70.01 - 72.00 PSI	$110.50	7A	4C		View
Kitsap	Pile Driver	Hyperbaric Worker - Compressed Air Worker 72.01 - 74.00 PSI	$112.50	7A	4C		View
Kitsap	Pile Driver	Journey Level	$68.64	7A	4C		View
Kitsap	Plasterers	Journey Level	$64.14	7Q	1R		View
Kitsap	Plasterers	Nozzleman	$67.64	7Q	1R		View
Kitsap	Playground & Park Equipment Installers	Journey Level	$14.49		1		View
Kitsap	Plumbers & Pipefitters	Journey Level	$80.97	5A	1G		View
Kitsap	Power Equipment Operators	Asphalt Plant Operators	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Assistant Engineer	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Barrier Machine (zipper)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Batch Plant Operator: concrete	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Boat Operator	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators	Bobcat	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Brokk - Remote Demolition Equipment	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Brooms	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Bump Cutter	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Cableways	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Chipper	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Compressor	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Concrete Finish Machine - Laser Screed	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Conveyors	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Cranes Friction: 200 tons and over	$75.90	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes, A-frame: 10 tons and under	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: 100 tons through 199 tons, or 150’ of boom (including jib with attachments)	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: 20 tons through 44 tons with attachments	$73.01	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: 200 tons- 299 tons, or 250’ of boom including jib with attachments	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: 300 tons and over or 300’ of boom including jib with	$75.90	7A	11H	8X	View

		attachments					
Kitsap	Power Equipment Operators	Cranes: 45 tons through 99 tons, under 150' of boom(including jib with attachments)	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: Friction cranes through 199 tons	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators	Cranes: through 19 tons with attachments, a-frame over 10 tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Crusher	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Deck Engineer/Deck Winches (power)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Derricks, On Building Work	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Dozers D-9 & Under	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Drill Oilers: Auger Type, Truck Or Crane Mount	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Drilling Machine	$74.39	15J	11G	8X	View
Kitsap	Power Equipment Operators	Elevator and man-lift: permanent and shaft type	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Forklift: 3000 lbs and over with attachments	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Forklifts: under 3000 lbs. with attachments	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Gradechecker/Stakeman	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Guardrail Punch	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Horizontal/Directional Drill Locator	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Horizontal/Directional Drill Operator	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Hydralifts/Boom Trucks Over 10 Tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Hydralifts/boom trucks: 10 tons and under	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Leverman	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Loaders, Overhead Under 6 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Loaders, Plant Feed	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Loaders: Elevating Type Belt	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Locomotives, All	$73.00	15J	11G	8X	View

Kitsap	Power Equipment Operators	Material Transfer Device	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Mechanics: all (Leadmen - $0.50 per hour over mechanic)	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators	Motor Patrol Graders	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Outside Hoists (elevators and manlifts), Air Tuggers, Strato	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Overhead, bridge type: 100 tons and over	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators	Overhead, bridge type: 45 tons through 99 tons	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators	Pavement Breaker	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Pile Driver (other Than Crane Mount)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Plant Oiler - Asphalt, Crusher	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Posthole Digger, Mechanical	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Power Plant	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Pumps - Water	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Quad 9, Hd 41, D10 And Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Remote Control Operator On Rubber Tired Earth Moving Equipment	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Rigger and Bellman	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators	Rigger/Signal Person, Bellman(Certified)	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Rollagon	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Roller, Other Than Plant Mix	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Roller, Plant Mix Or Multi-lift Materials	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Roto-mill, Roto-grinder	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Saws - Concrete	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Scraper, Self Propelled Under 45 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Scrapers - Concrete & Carry All	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Scrapers, Self-propelled: 45 Yards And Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Service Engineers: equipment	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Shotcrete/Gunite Equipment	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Shovel, Excavator, Backhoes:	$74.39	15J	11G	8X	View

		Over 50 Metric Tons To 90 Metric Tons					
Kitsap	Power Equipment Operators	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$75.15	15J	11G	8X	View
Kitsap	Power Equipment Operators	Slipform Pavers	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Spreader, Topsider & Screedman	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Subgrader Trimmer	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Tower Bucket Elevators	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Tower Crane: over 175' through 250' in height, base to boom	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators	Tower crane: up to 175' in height base to boom	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators	Tower Cranes: over 250’ in height from base to boom	$75.90	7A	11H	8X	View
Kitsap	Power Equipment Operators	Transporters, All Track Or Truck Type	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators	Trenching Machines	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators	Truck crane oiler/driver: under 100 tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators	Truck Mount Portable Conveyor	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators	Welder	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators	Wheel Tractors, Farmall Type	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators	Yo Yo Pay Dozer	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Asphalt Plant Operators	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Assistant Engineer	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Barrier Machine (zipper)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Batch Plant Operator, Concrete	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Boat Operator	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Bobcat	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Brokk - Remote Demolition Equipment	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Brooms	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Bump Cutter	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cableways	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Chipper	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Compressor	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Concrete Finish Machine - Laser Screed	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Concrete Pump - Mounted Or Trailer High Pressure Line	$72.44	15J	11G	8X	View

		Pump, Pump High Pressure					
Kitsap	Power Equipment Operators-Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Conveyors	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes Friction: 200 tons and over	$75.90	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes, A-frame: 10 tons and under	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 100 tons through 199 tons, or 150’ of boom (including jib with attachments)	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 20 tons through 44 tons with attachments	$73.01	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 20 tons through 44 tons with attachments	$73.01	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 200 tons- 299 tons, or 250’ of boom including jib with attachments	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 300 tons and over or 300’ of boom including jib with attachments	$75.90	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: 45 tons through 99 tons, under 150’ of boom(including jib with attachments)	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: Friction cranes through 199 tons	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Cranes: through 19 tons with attachments, a-frame over 10 tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Crusher	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Deck Engineer/Deck Winches (power)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Derricks, On Building Work	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Dozers D-9 & Under	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Drill Oilers: Auger Type, Truck Or Crane Mount	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Drilling Machine	$74.39	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Elevator and man-lift: permanent and shaft type	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Forklift: 3000 lbs and over with attachments	$72.45	7A	11H	8X	View

Kitsap	Power Equipment Operators-Underground Sewer & Water	Forklifts: under 3000 lbs. with attachments	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Gradechecker/Stakeman	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Guardrail Punch	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Horizontal/Directional Drill Locator	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Horizontal/Directional Drill Operator	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Hydralifts/boom trucks: 10 tons and under	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Hydralifts/boom trucks: over 10 tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Leverman	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Loaders, Overhead Under 6 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Loaders, Plant Feed	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Loaders: Elevating Type Belt	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Locomotives, All	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Material Transfer Device	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Mechanics: all (Leadmen - $0.50 per hour over mechanic)	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Motor Patrol Graders	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Outside Hoists (elevators and manlifts), Air Tuggers, Strato	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Overhead, bridge type: 100 tons and over	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Overhead, bridge type: 45 tons through 99 tons	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators-	Pavement Breaker	$69.27	15J	11G	8X	View

	Underground Sewer & Water						
Kitsap	Power Equipment Operators-Underground Sewer & Water	Pile Driver (other Than Crane Mount)	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Plant Oiler - Asphalt, Crusher	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Posthole Digger, Mechanical	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Power Plant	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Pumps - Water	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Quad 9, Hd 41, D10 And Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Remote Control Operator On Rubber Tired Earth Moving Equipment	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Rigger and Bellman	$69.28	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Rigger/Signal Person, Bellman(Certified)	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Rollagon	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Roller, Other Than Plant Mix	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Roller, Plant Mix Or Multi-lift Materials	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Roto-mill, Roto-grinder	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Saws - Concrete	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Scraper, Self Propelled Under 45 Yards	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Scrapers - Concrete & Carry All	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Scrapers, Self-propelled: 45 Yards And Over	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Service Engineers: equipment	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shotcrete/Gunite Equipment	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	$74.39	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$75.15	15J	11G	8X	View
Kitsap	Power Equipment Operators-	Slipform Pavers	$73.65	15J	11G	8X	View

	Underground Sewer & Water						
Kitsap	Power Equipment Operators-Underground Sewer & Water	Spreader, Topsider & Screedman	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Subgrader Trimmer	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Tower Bucket Elevators	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Tower Crane: over 175' through 250' in height, base to boom	$75.17	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Tower crane: up to 175' in height base to boom	$74.40	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Tower Cranes: over 250’ in height from base to boom	$75.90	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Transporters, All Track Or Truck Type	$73.65	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Trenching Machines	$72.44	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Truck Crane Oiler/Driver: 100 tons and over	$73.01	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Truck crane oiler/driver: under 100 tons	$72.45	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Truck Mount Portable Conveyor	$73.00	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Welder	$73.66	7A	11H	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Wheel Tractors, Farmall Type	$69.27	15J	11G	8X	View
Kitsap	Power Equipment Operators-Underground Sewer & Water	Yo Yo Pay Dozer	$73.00	15J	11G	8X	View
Kitsap	Power Line Clearance Tree Trimmers	Journey Level In Charge	$55.03	5A	4A		View
Kitsap	Power Line Clearance Tree Trimmers	Spray Person	$52.24	5A	4A		View
Kitsap	Power Line Clearance Tree Trimmers	Tree Equipment Operator	$55.03	5A	4A		View
Kitsap	Power Line Clearance Tree Trimmers	Tree Trimmer	$49.21	5A	4A		View
Kitsap	Power Line Clearance Tree Trimmers	Tree Trimmer Groundperson	$37.47	5A	4A		View
Kitsap	Refrigeration & Air Conditioning Mechanics	Journey Level	$80.96	5A	1G		View
Kitsap	Residential Brick Mason	Journey Level	$22.01		1		View
Kitsap	Residential Carpenters	Journey Level	$26.25		1		View
Kitsap	Residential Cement Masons	Journey Level	$39.88		1		View
Kitsap	Residential Drywall Applicators	Journey Level	$48.17	7A	4C		View
Kitsap	Residential Drywall Tapers	Journey Level	$25.84		1		View
Kitsap	Residential Electricians	Journey Level	$44.11		1		View
Kitsap	Residential Glaziers	Journey Level	$47.80	7L	1H		View
Kitsap	Residential Insulation Applicators	Journey Level	$18.03		1		View
Kitsap	Residential Laborers	Journey Level	$14.71		1		View

Kitsap	Residential Marble Setters	Journey Level	$22.01		1		View
Kitsap	Residential Painters	Journey Level	$20.85		1		View
Kitsap	Residential Plumbers & Pipefitters	Journey Level	$35.92		1		View
Kitsap	Residential Refrigeration & Air Conditioning Mechanics	Journey Level	$40.21		1		View
Kitsap	Residential Sheet Metal Workers	Journey Level	$32.91		1		View
Kitsap	Residential Soft Floor Layers	Journey Level	$22.03		1		View
Kitsap	Residential Sprinkler Fitters (Fire Protection)	Journey Level	$31.53		1		View
Kitsap	Residential Stone Masons	Journey Level	$63.32	7E	1N		View
Kitsap	Residential Terrazzo Workers	Journey Level	$14.86		1		View
Kitsap	Residential Terrazzo/Tile Finishers	Journey Level	$39.09		1		View
Kitsap	Residential Tile Setters	Journey Level	$35.40		1		View
Kitsap	Roofers	Journey Level	$57.30	5A	3H		View
Kitsap	Roofers	Using Irritable Bituminous Materials	$60.30	5A	3H		View
Kitsap	Sheet Metal Workers	Journey Level (Field or Shop)	$91.83	7F	1E		View
Kitsap	Shipbuilding & Ship Repair	New Construction Boilermaker	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Carpenter	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Crane Operator	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Electrician	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Heat & Frost Insulator	$82.02	15H	11C		View
Kitsap	Shipbuilding & Ship Repair	New Construction Laborer	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Machinist	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Operating Engineer	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Painter	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Pipefitter	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Rigger	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Sheet Metal	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Shipfitter	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Warehouse/Teamster	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	New Construction Welder / Burner	$39.58	7V	1		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Boilermaker	$47.45	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Carpenter	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Crane Operator	$45.06	7Y	4K		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Electrician	$47.42	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Heat & Frost Insulator	$82.02	15H	11C		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Laborer	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Machinist	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Operating Engineer	$45.06	7Y	4K		View

Kitsap	Shipbuilding & Ship Repair	Ship Repair Painter	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Pipefitter	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Rigger	$47.45	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Sheet Metal	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Shipwright	$47.35	7X	4J		View
Kitsap	Shipbuilding & Ship Repair	Ship Repair Warehouse / Teamster	$45.06	7Y	4K		View
Kitsap	Sign Makers & Installers (Electrical)	Journey Level	$53.62	0	1		View
Kitsap	Sign Makers & Installers (Non-Electrical)	Journey Level	$34.43	0	1		View
Kitsap	Soft Floor Layers	Journey Level	$51.91	5A	3J		View
Kitsap	Solar Controls For Windows	Journey Level	$14.49		1		View
Kitsap	Sprinkler Fitters (Fire Protection)	Journey Level	$87.99	5C	1X		View
Kitsap	Stage Rigging Mechanics (Non Structural)	Journey Level	$14.49		1		View
Kitsap	Stone Masons	Journey Level	$63.32	7E	1N		View
Kitsap	Street And Parking Lot Sweeper Workers	Journey Level	$16.00		1		View
Kitsap	Surveyors	Assistant Construction Site Surveyor	$72.45	7A	11H	8X	View
Kitsap	Surveyors	Chainman	$69.28	7A	11H	8X	View
Kitsap	Surveyors	Construction Site Surveyor	$73.66	7A	11H	8X	View
Kitsap	Surveyors	Drone Operator (when used in conjunction with survey work only)	$69.28	7A	11H	8X	View
Kitsap	Telecommunication Technicians	Journey Level	$57.07	7E	1E		View
Kitsap	Telephone Line Construction - Outside	Cable Splicer	$38.27	5A	2B		View
Kitsap	Telephone Line Construction - Outside	Hole Digger/Ground Person	$25.66	5A	2B		View
Kitsap	Telephone Line Construction - Outside	Telephone Equipment Operator (Light)	$31.96	5A	2B		View
Kitsap	Telephone Line Construction - Outside	Telephone Lineperson	$36.17	5A	2B		View
Kitsap	Terrazzo Workers	Journey Level	$57.71	7E	1N		View
Kitsap	Tile Setters	Journey Level	$57.71	7E	1N		View
Kitsap	Tile, Marble & Terrazzo Finishers	Finisher	$48.54	7E	1N		View
Kitsap	Traffic Control Stripers	Journey Level	$50.51	7A	1K		View
Kitsap	Truck Drivers	Asphalt Mix Over 16 Yards	$69.20	15J	11I	8L	View
Kitsap	Truck Drivers	Asphalt Mix To 16 Yards	$68.36	15J	11I	8L	View
Kitsap	Truck Drivers	Dump Truck	$68.36	15J	11I	8L	View
Kitsap	Truck Drivers	Dump Truck & Trailer	$69.20	15J	11I	8L	View
Kitsap	Truck Drivers	Other Trucks	$69.20	15J	11I	8L	View
Kitsap	Truck Drivers - Ready Mix	Transit Mix	$69.20	15J	11I	8L	View
Kitsap	Well Drillers & Irrigation Pump Installers	Irrigation Pump Installer	$14.49		1		View
Kitsap	Well Drillers & Irrigation Pump	Oiler	$14.49		1		View

	Installers						
Kitsap	Well Drillers & Irrigation Pump Installers	Well Driller	$14.49		1		View

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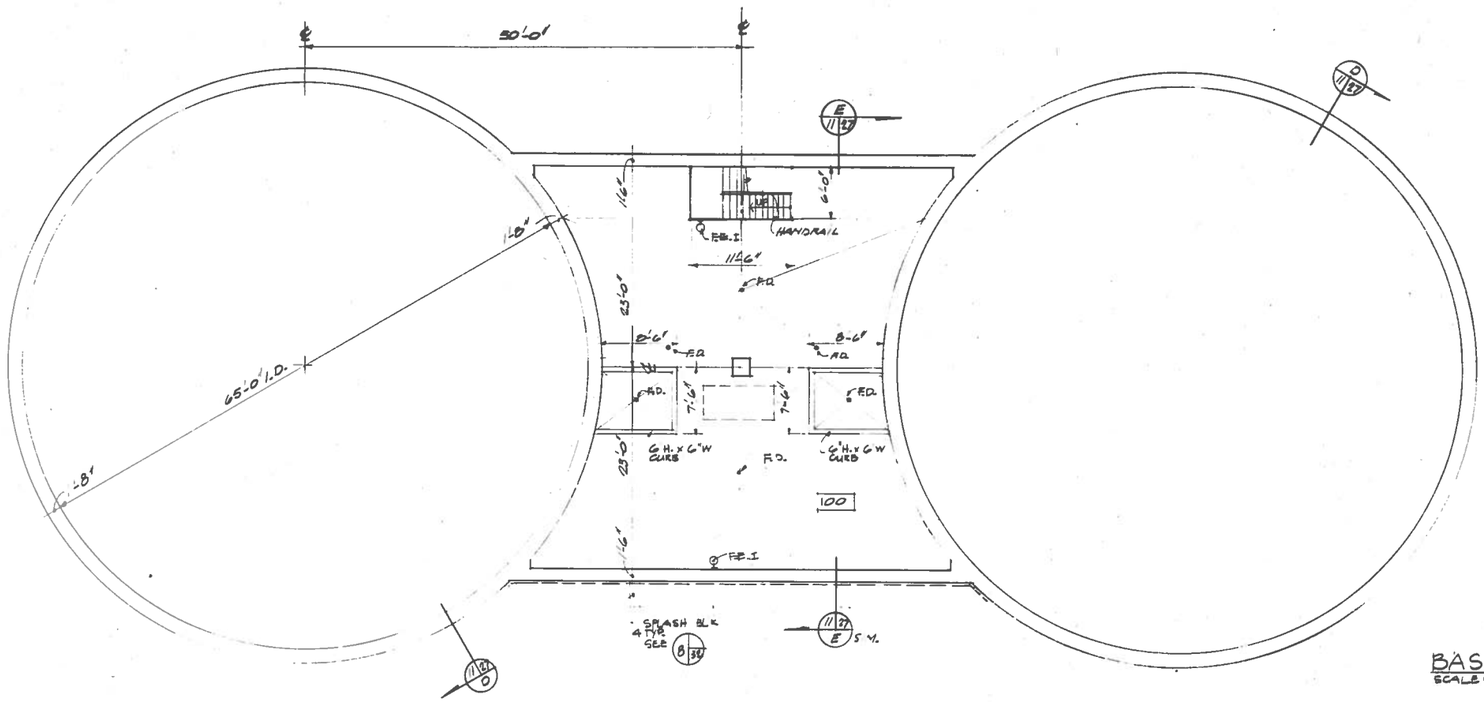
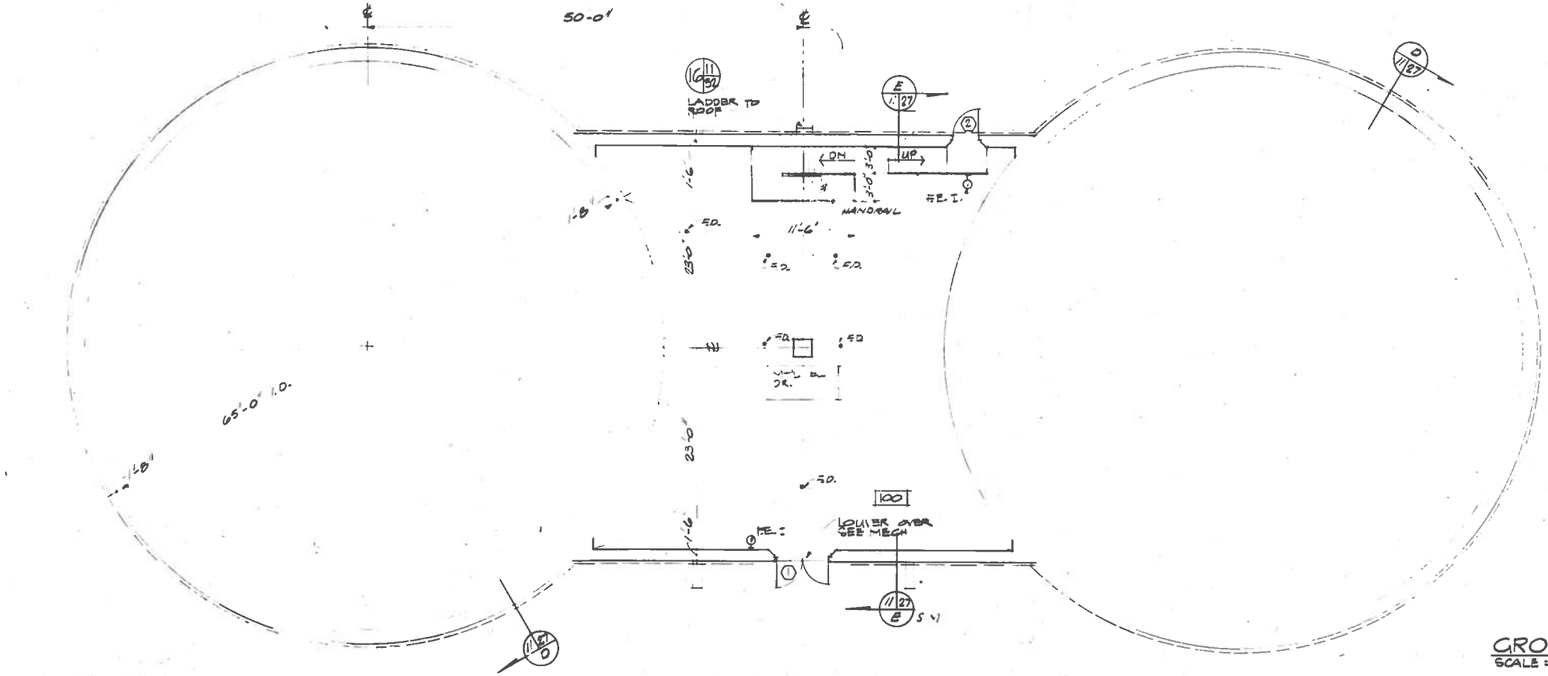


BASEMENT PLAN
SCALE: 1/8"=1'-0"



NOTE:
VERIFY F.D. LOCATIONS W/ MECH. SLOPE FLR TO ALL F.D.'S @ 1/8"=1'-0"

GROUND FL. PLAN
SCALE: 1/8"=1'-0"

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

Job No 4464-07-99
SCALE 1/8"=1'-0"
Designed JO
Drawn by JE
Checked by GK
Proj. Engr JB
Approved by WB
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM FLOOR PLANS

SHEET A11 / 35

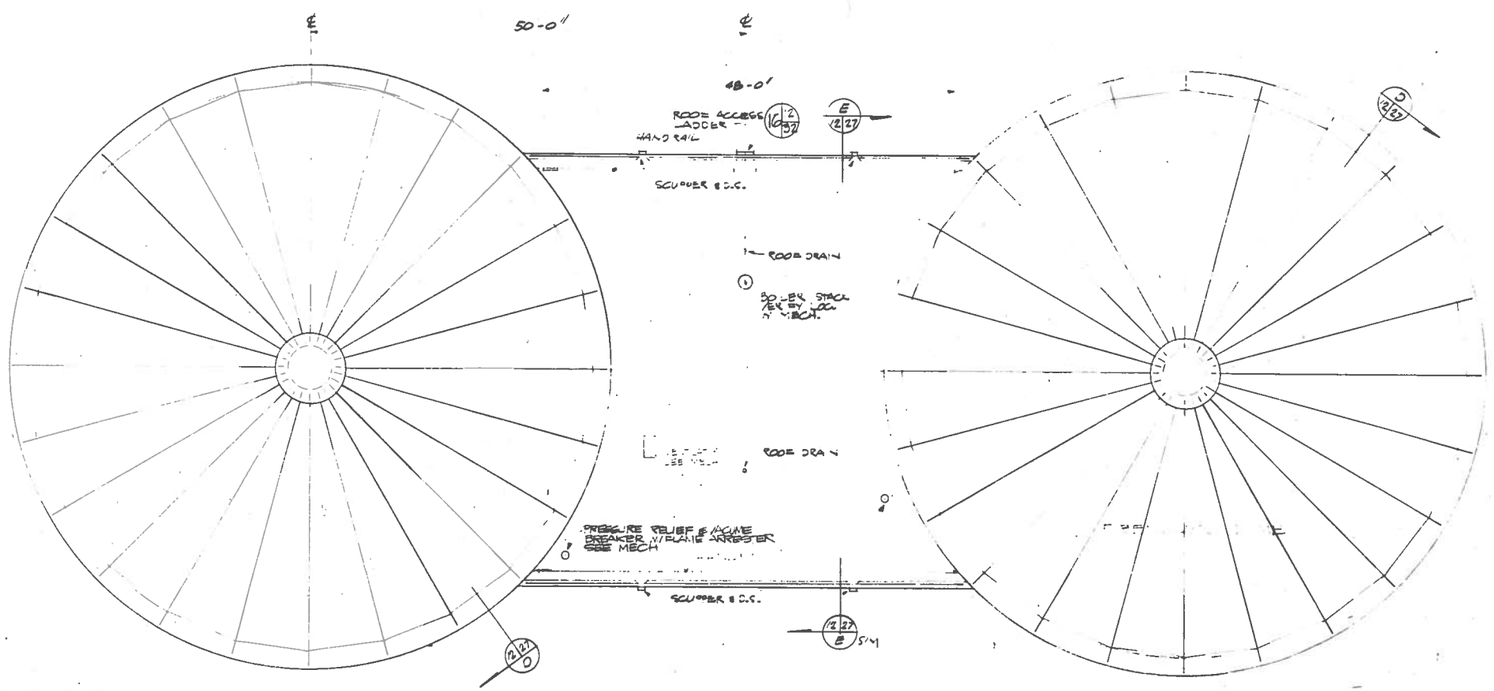
A 11

ROOM FINISH SCHEDULE

NO.	ROOM	FLOOR	F	BASE	F	NORTH	F	EAST	F	SOUTH	F	WEST	F	CEILING	F	MISC.		REMARKS
101	BASEMENT	CONC	/U4	-	/	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	EQUIP & PIPING	M4	DAMPROOF EXT
100	GROUND FL.	CONC	/U4	-	/	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	CONC	CA/F4	EQUIP & PIPING	M4	DAMPROOF EXT. TO 1'-0" BEL. GRADE
	STAIR	CONC.	/U6	-	/	-	/	-	/	-	/	-	/	-	/			
	INTERIOR DIGESTER TANKS	CONC	C1/U3	—		•				ALL WALLS			C1 F4	—		EQUIP & PIPING	M1	

DOOR SCHEDULE

NO	TYPE	HDW.	SIZE	THK.	FRM	DETAIL JAMB	DETAIL SILL	REMARKS
1	C	13	PR. 3'-0" x 7'-0"	1¾	H.M.	4/A27	5/A27	
2	A	16	3'-0" x 7'-0"	1¾	H.M.	4/A27	5/A27	



ROOF PLAN
SCALE: 1/8" = 1'-0"

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

REGISTERED ARCHITECT GERALD H. KUMATA STATE OF WASHINGTON

No.	DATE	BY	REVISION

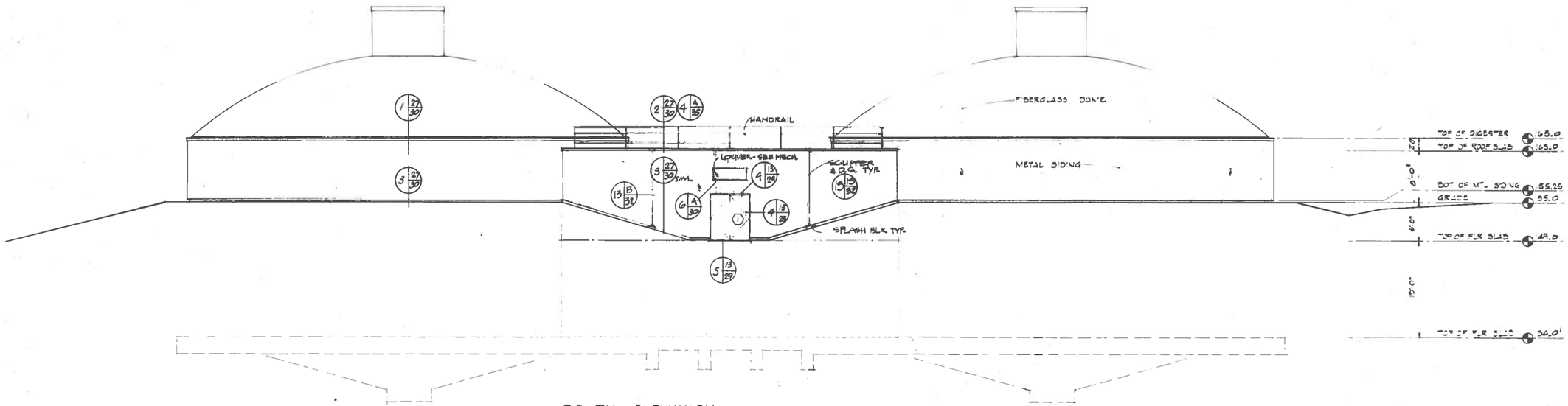
Job No. 4464-07-99
SCALE 1/8"=1'-0"
Designed JE
Drawn by JE
Checked by GK
Proj. Engr JB
Approved by WB
Date JUNE 77

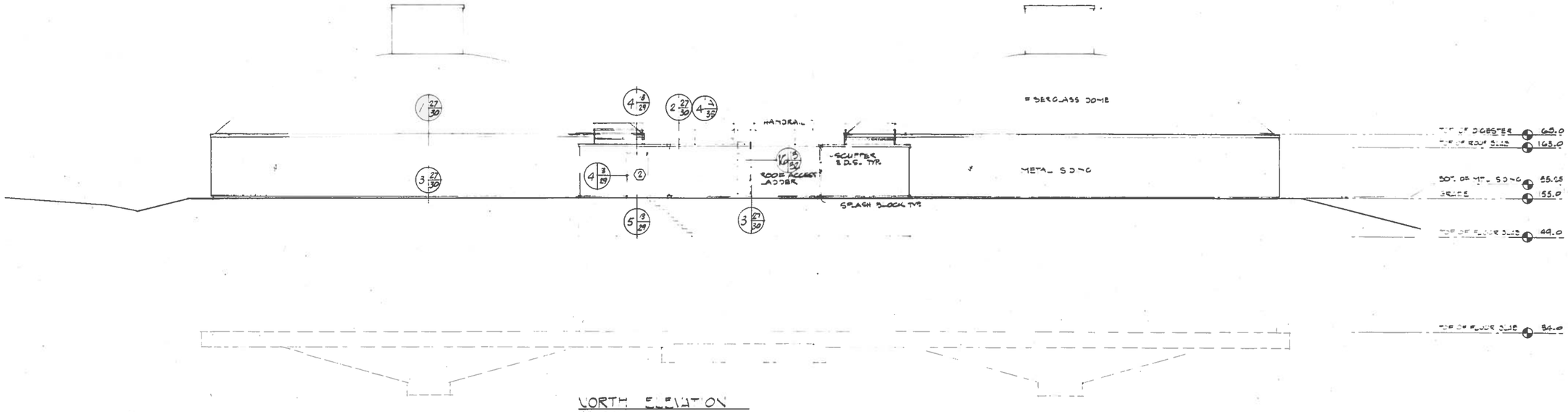
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
ROOF PLAN & SCHEDULES

SHEET A12 / 35





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REGISTERED ARCHITECT 1964 GERALD M. KUMATA STATE OF WASHINGTON

No.	DATE	BY	REVISION

Job No 4464-07-99
SCALE 1/8"=1'-0"
Designed JB
Drawn by JE
Checked by GK
Proj. Engr JB
Approved by WB
Date JUNE 77

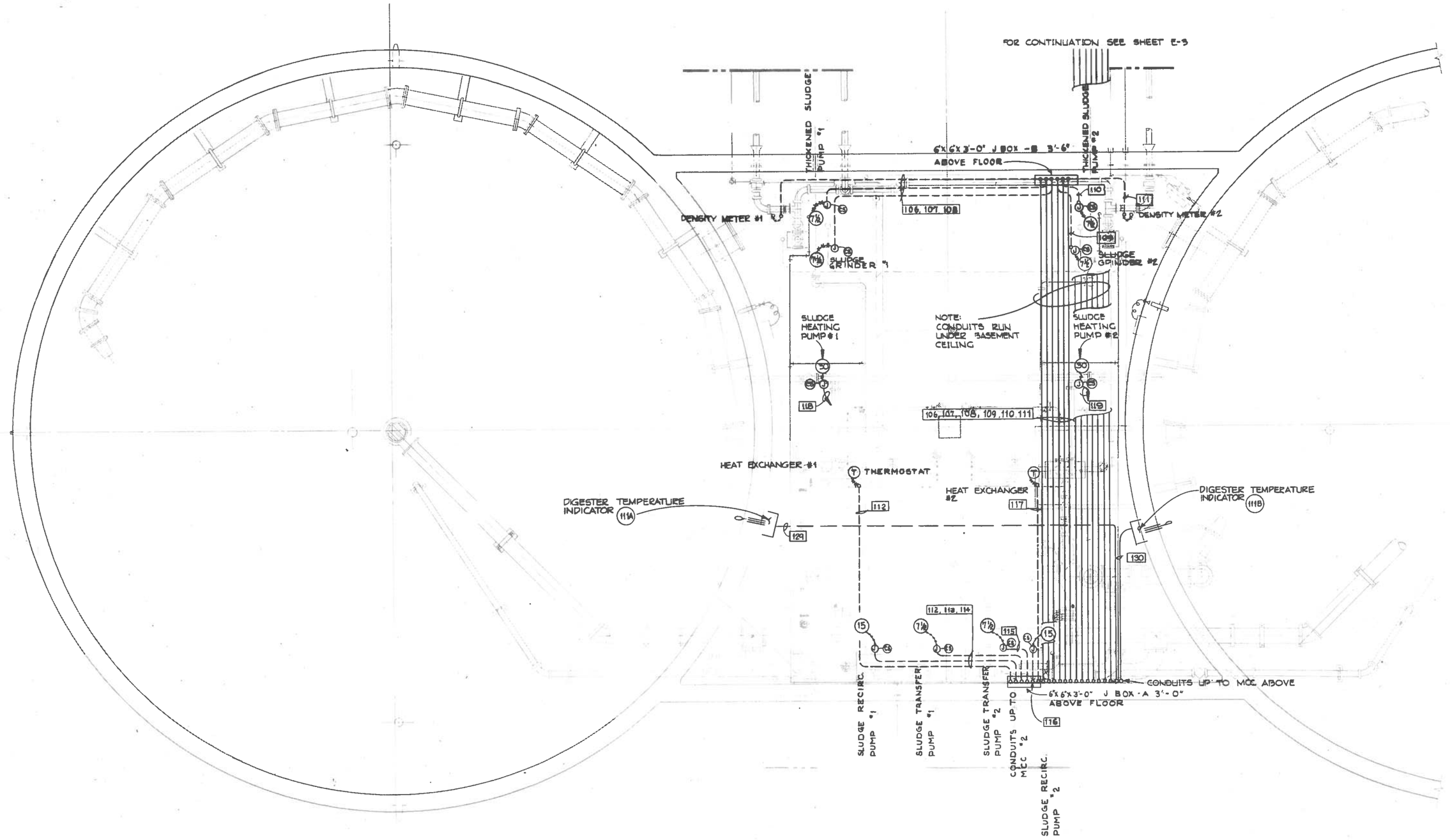
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
ELEVATIONS

SHEET A13 / 35

A13



THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

ELECTRICAL E-0 | MECHANICAL M-1 | ARCHITECTURAL | STRUCTURAL | GENERAL

No.	DATE	BY	REVISION

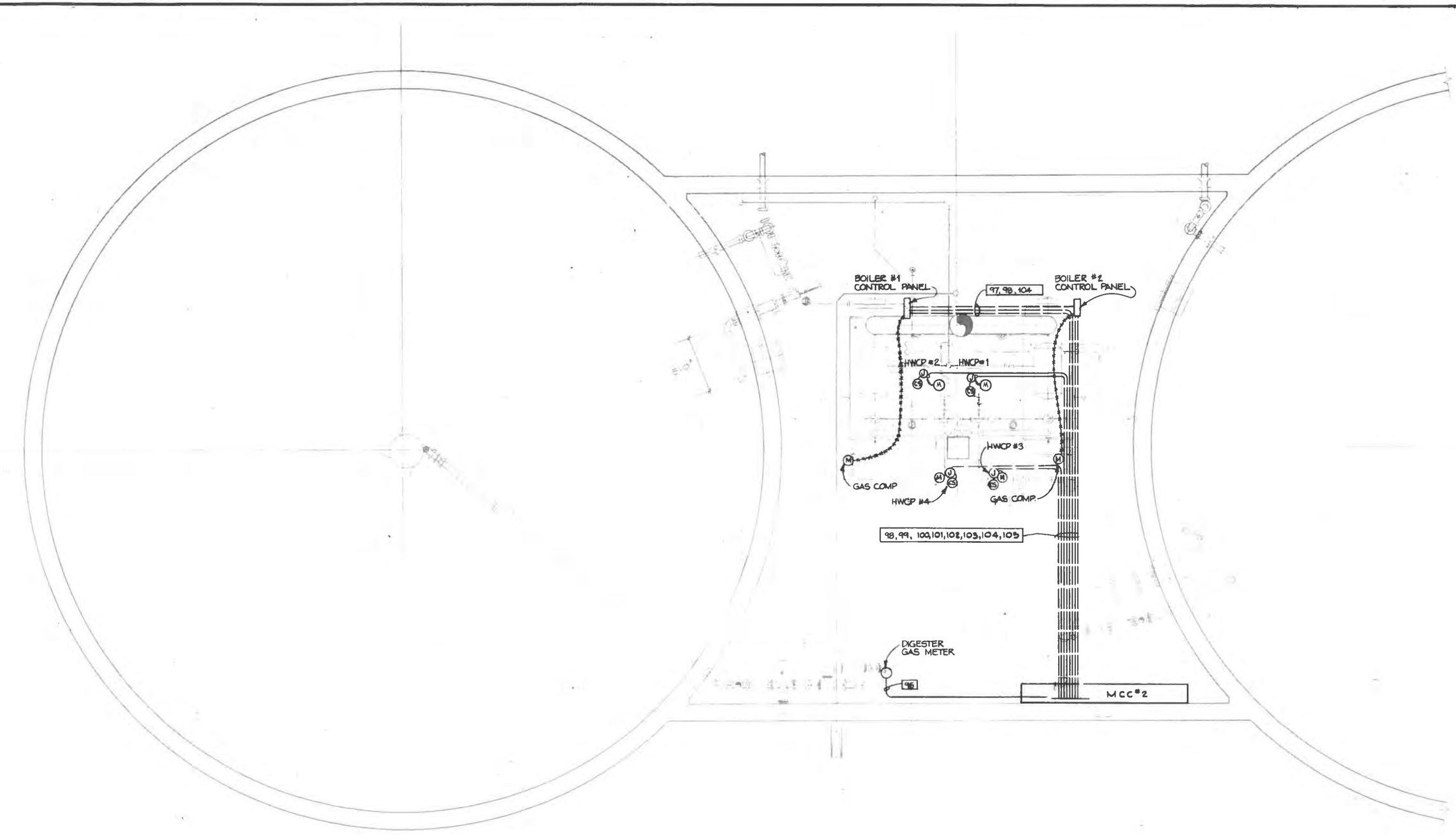
Job No 4464-07-99
SCALE AS NOTED
Designed BT
Drawn by R L/LA
Checked by E D
Proj. Engr JB
Approved by WLB
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTER CONTROL ROOM
BASEMENT FLOOR
POWER CONDUIT PLAN

SHEET E14
40



THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

Job No 4464-07-99
SCALE AS NOTED
Designed B T
Drawn by R L/LA
Checked by E D
Proj. Engr JB
Approved by WLB
Date JUNE 77

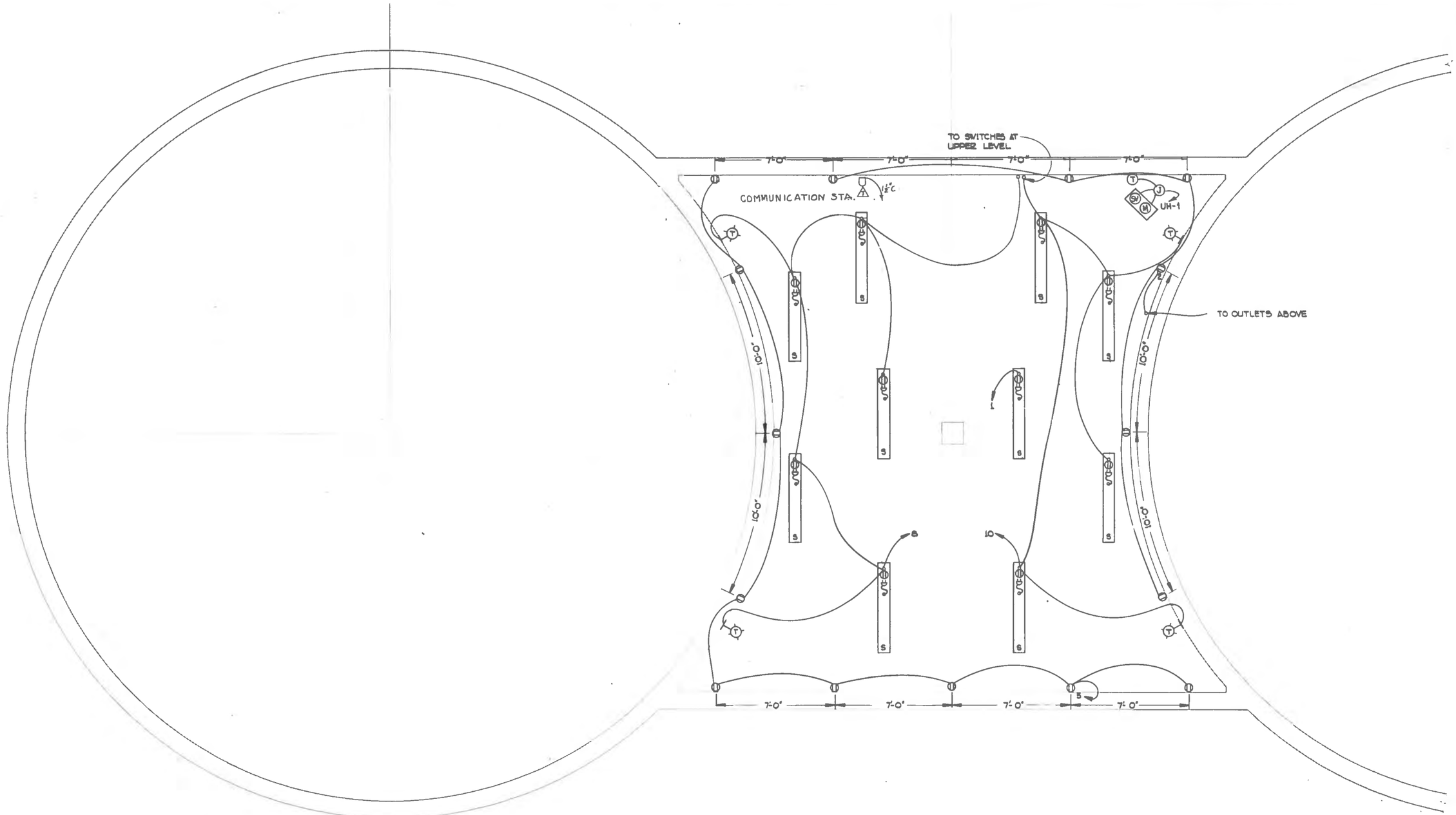
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTER CONTROL ROOM
FIRST FLOOR POWER CONDUIT PLAN

SHEET E15 / 40

ELECTRICAL
MECHANICAL
ARCHITECTURAL
STRUCTURAL
GENERAL



THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

ELECTRICAL
E-3A
MECHANICAL
ARCHITECTURAL
STRUCTURAL
GENERAL

No.	DATE	BY	REVISION

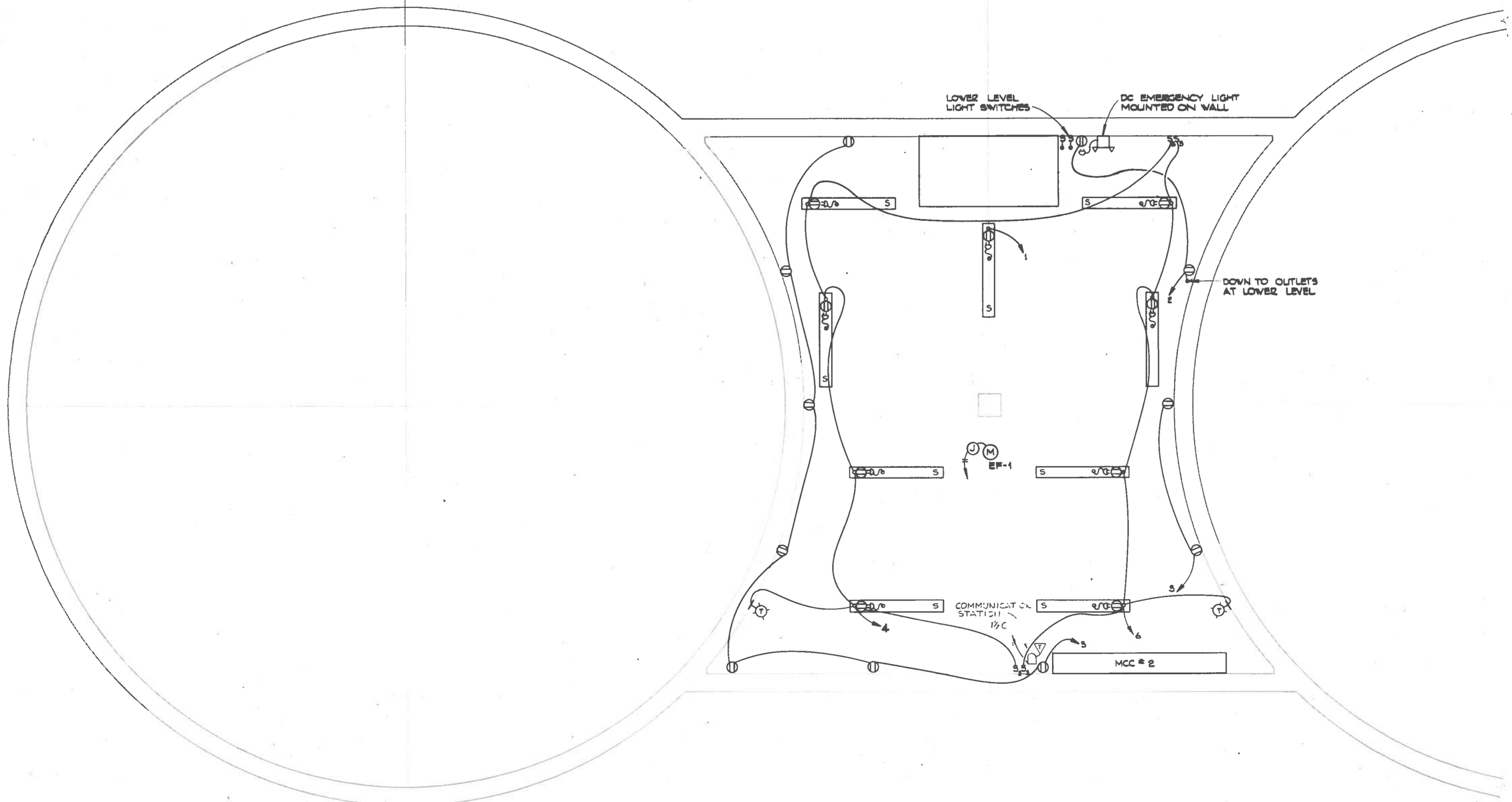
Job No 4466-07-99
SCALE AS NOTED
Designed BT
Drawn by LA
Checked by ED
Proj. Engr JB
Approved by WLB
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTER CONTROL BUILDING
BASEMENT LIGHTING
RECEPTACLE PLAN

SHEET E16 / 40



ELECTRICAL E-DA
MECHANICAL
ARCHITECTURAL
STRUCTURAL
GENERAL

THIS DRAWING HAS BEEN REDUCED TO
APPROXIMATELY ONE HALF THE ORIGINAL SCALE

BENJAMIN U. TIU
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

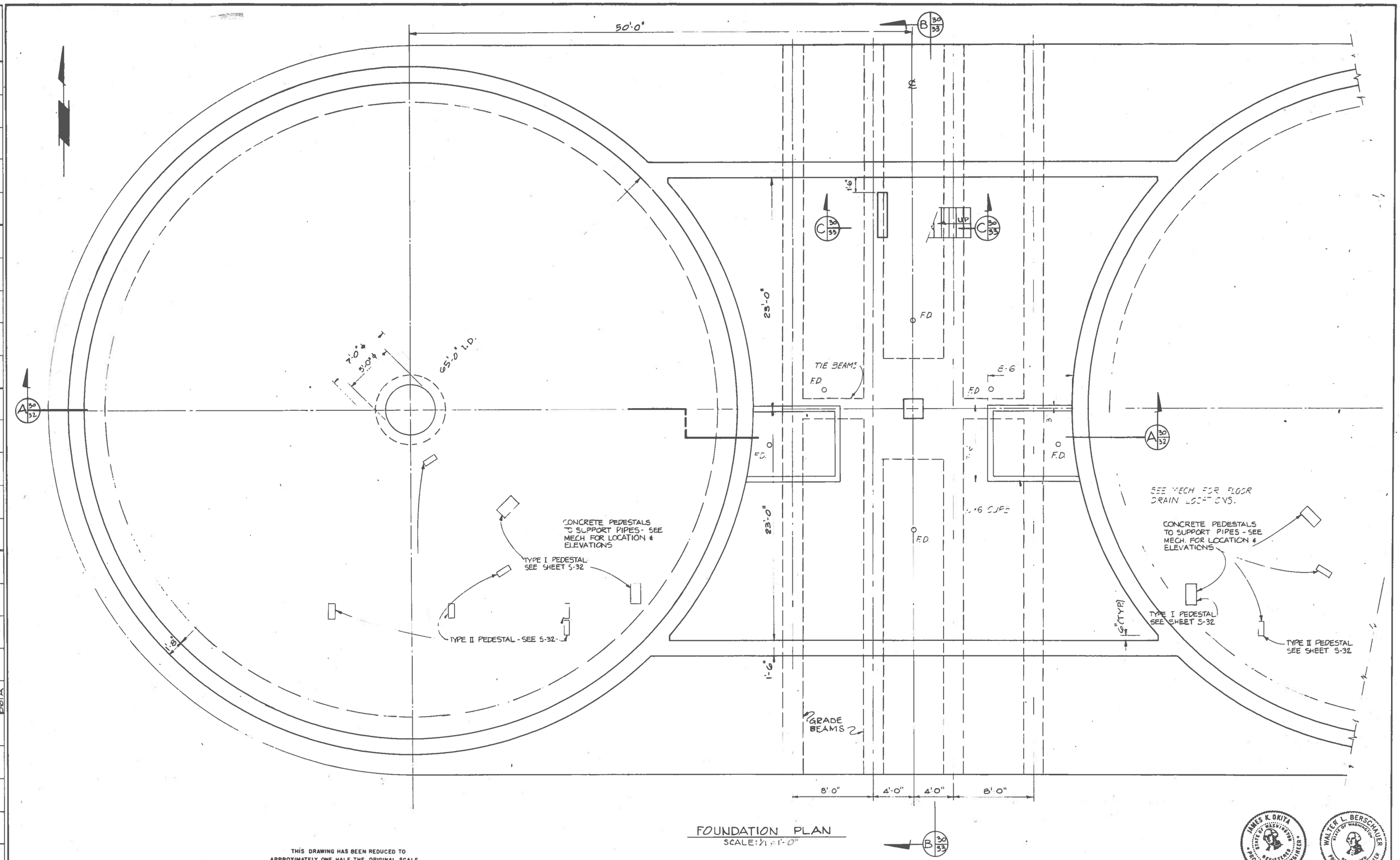
Job No 4464-07-99
SCALE AS NOTED
Designed ST
Drawn by LA
Checked by ED
Proj. Engr JB
Approved by WLB
Date June 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTER CONTROL BUILDING
FIRST FLOOR LIGHTING
RECEPTACLE PLAN

SHEET E17
40



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

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. OKITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4469-07-02
SCALE 1/4" = 1'-0"
Designed JO
Drawn by BW
Checked by AL
Proj. Engr JB
Approved by WB
Date JUNE 77

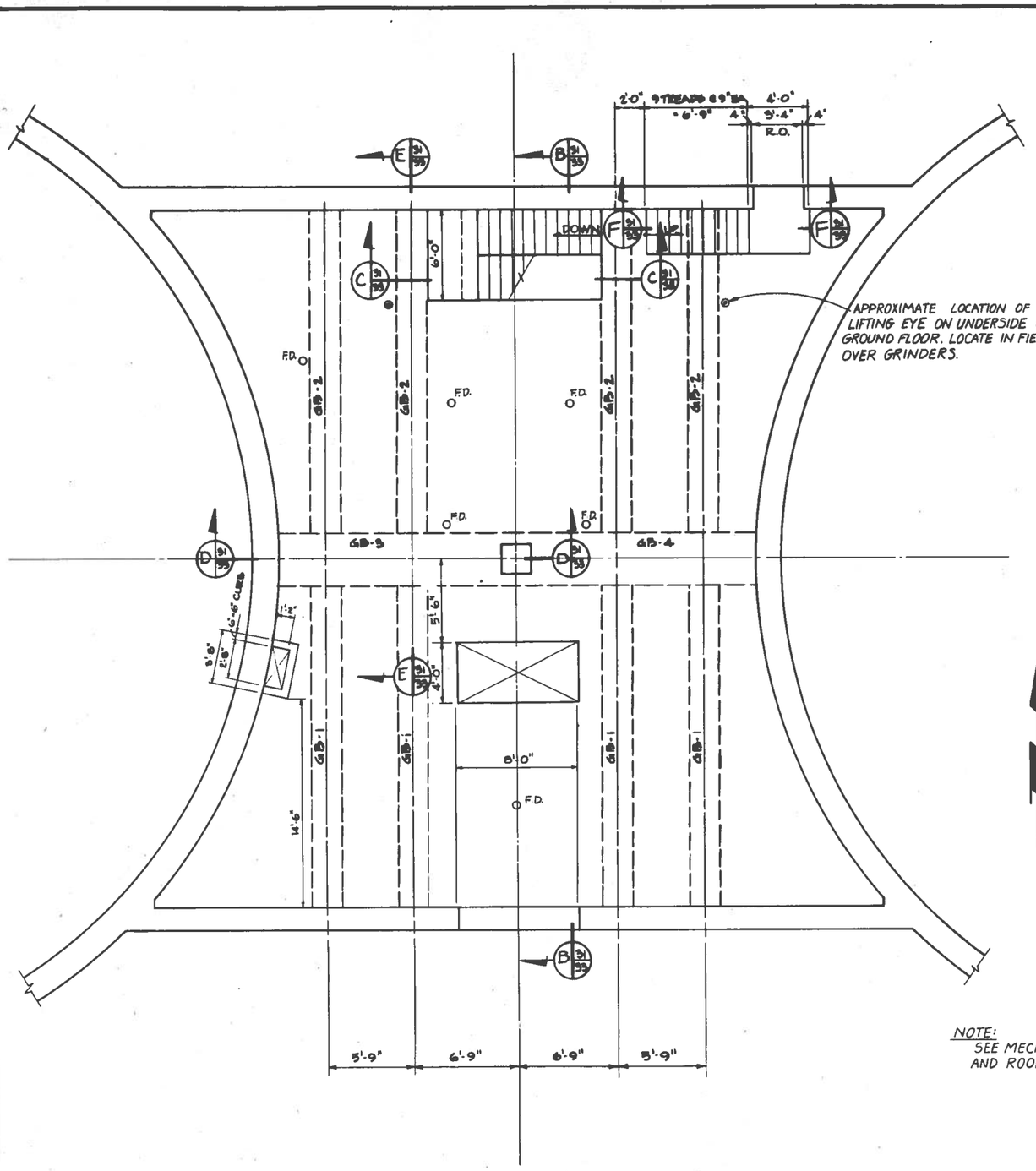
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

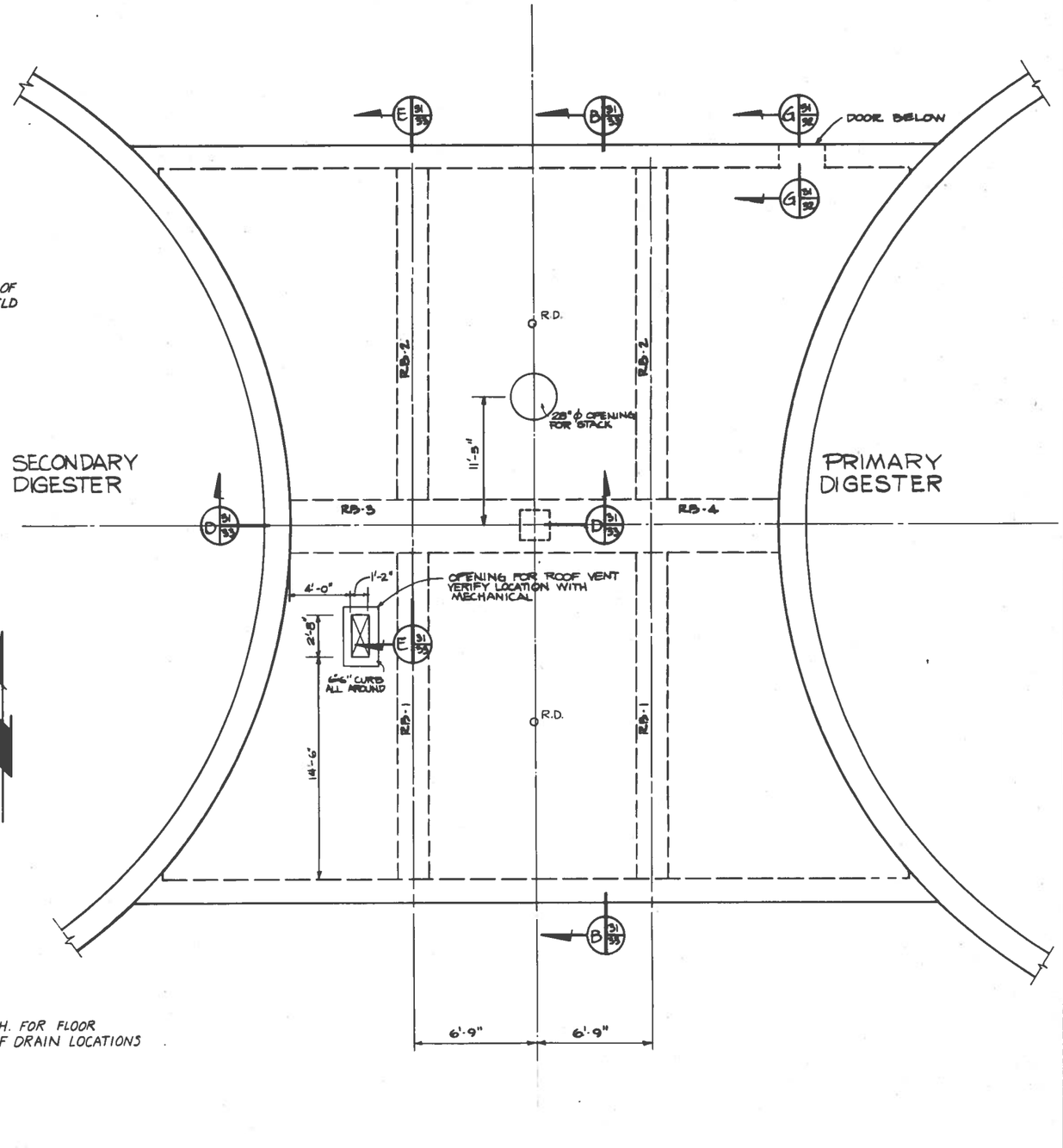
DIGESTERS & CONTROL ROOM
FOUNDATION PLAN

SHEET S30 / 47

B61A



GROUND FLOOR PLAN



ROOF PLAN

NOTE:
SEE MECH. FOR FLOOR AND ROOF DRAIN LOCATIONS

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

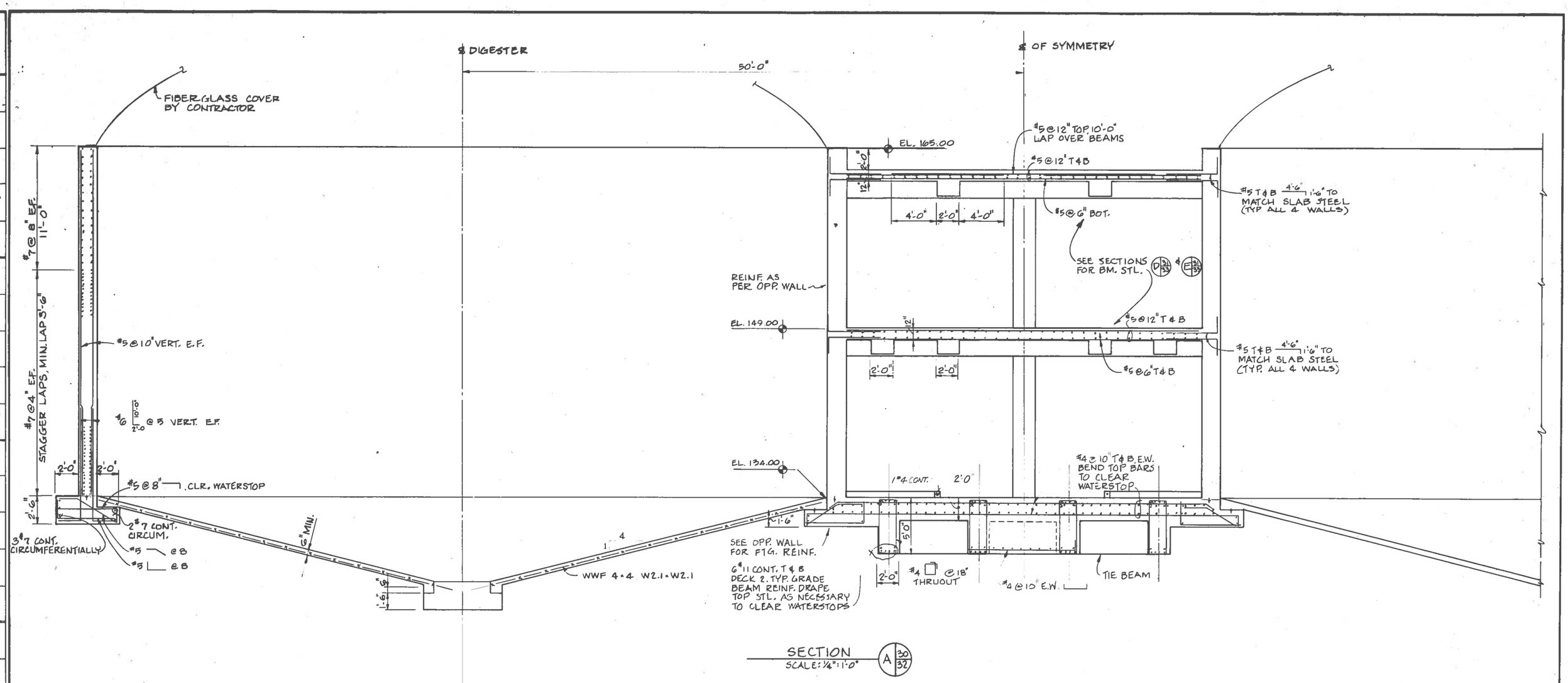
Job No 1461-07-99
SCALE 1/4" = 1'-0"
Designed JO
Drawn by BW
Checked by AL
Proj. Engr. JB
Approved by WB
Date JUNE '99

URS COMPANY
A Professional Services Organization
Seattle, Washington

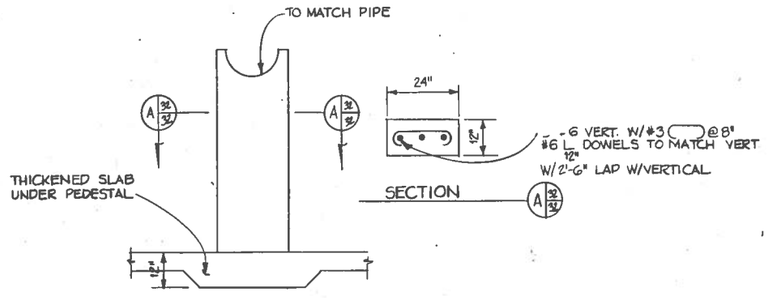
KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
GROUND FLOOR & ROOF PLAN

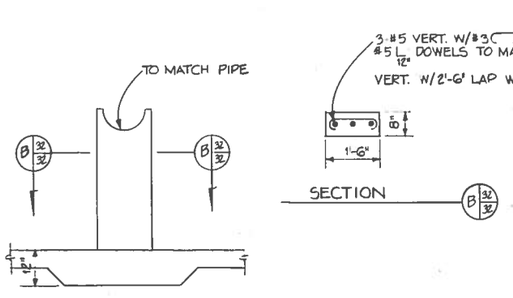
SHEET S31
47



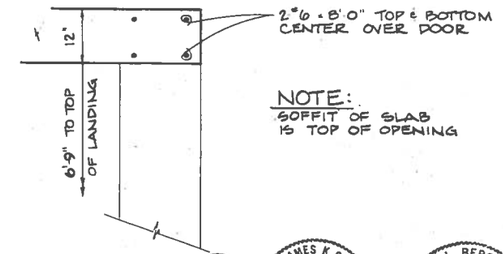
SECTION
SCALE: 1/4" = 1'-0"
A 30/32



TYPE I PEDESTAL ELEV.
SCALE 1/2" = 1'-0"



TYPE II PEDESTAL ELEV.
SCALE 1/2" = 1'-0"



THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. OKITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4464-07-02
SCALE AS NOTED
Designed JO
Drawn by BW
Checked by AL
Proj. Engr
Approved by
Date JUNE '77

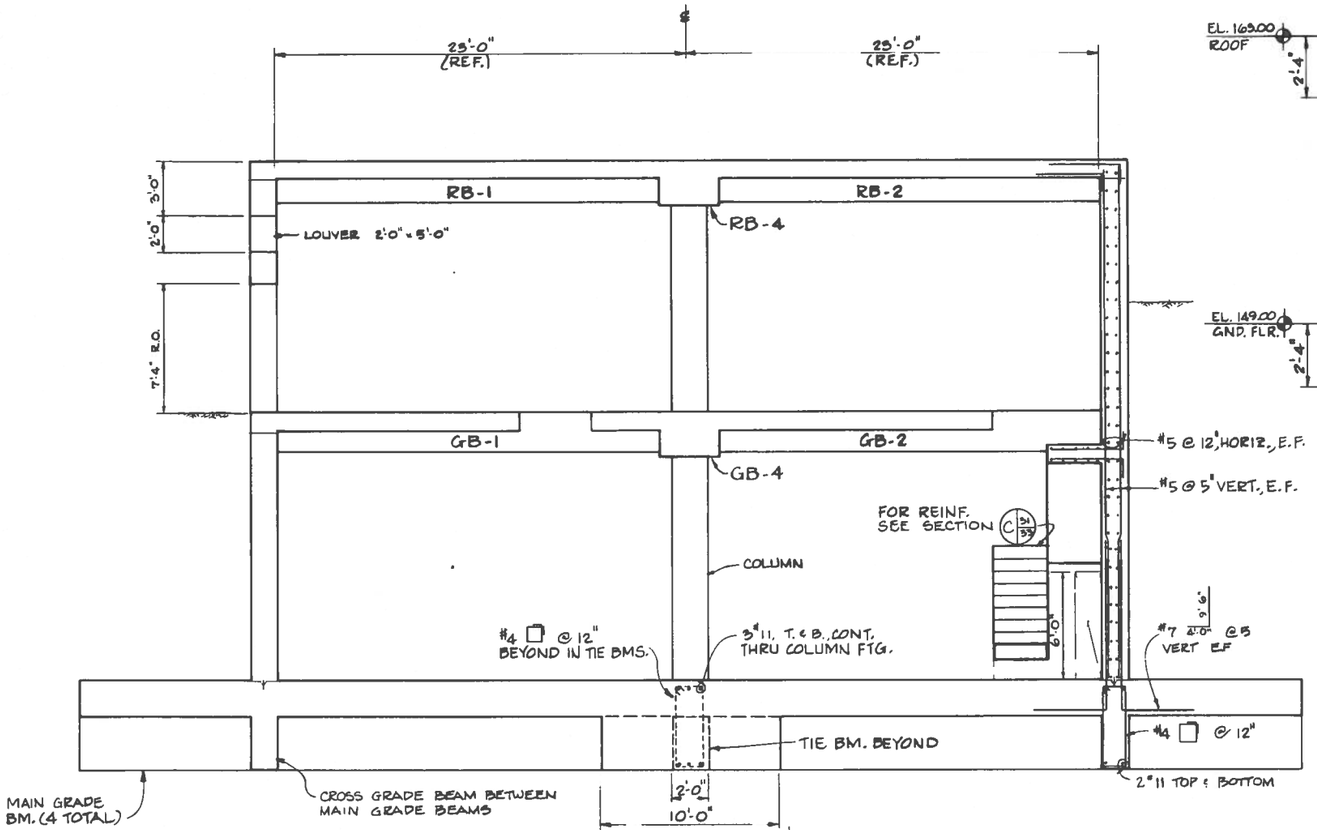
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

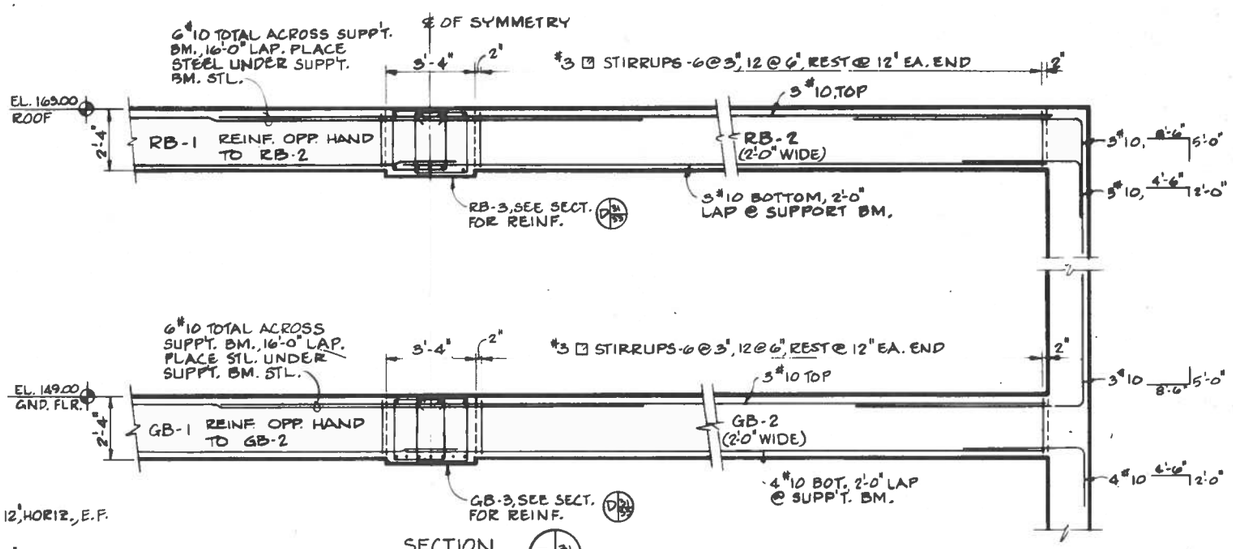
DIGESTERS & CONTROL ROOM
SECTION

SHEET S32
47

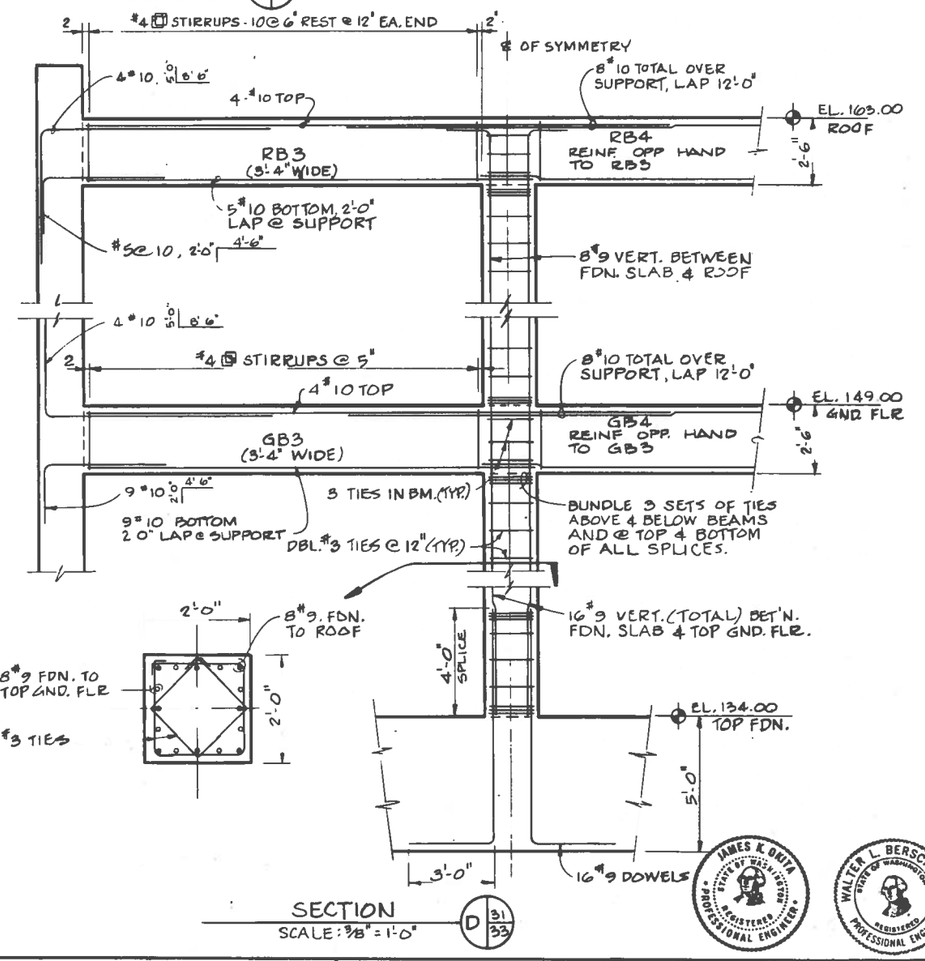
603A
T. 603



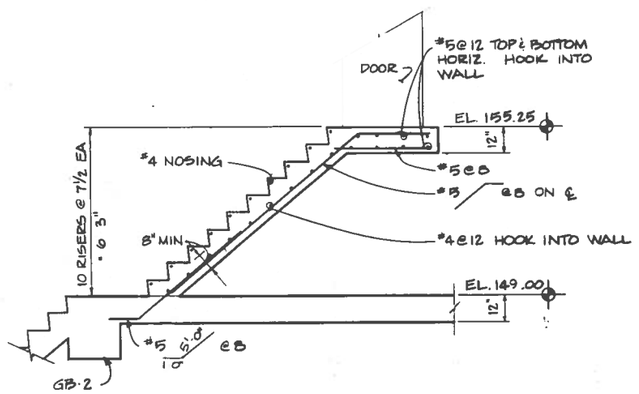
SECTION
SCALE: 1/4"=1'-0" B 30/33



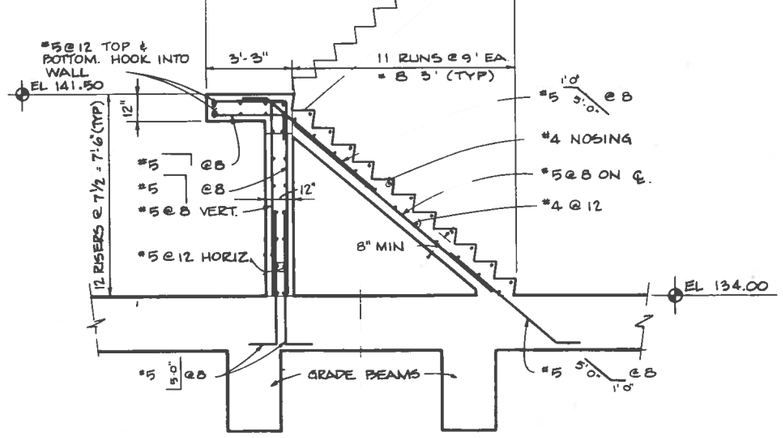
SECTION
SCALE: 3/8"=1'-0" E 31/33



SECTION
SCALE: 3/8"=1'-0" D 31/33



SECTION
SCALE: 3/8"=1'-0" F 31/33



SECTION
SCALE: 3/8"=1'-0" C 31/33

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

JAMES K. ONITA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No. 4469-07-99
SCALE AS SHOWN
Designed JO
Drawn by BW
Checked by AL
Pro Engr JB
Approved by WB
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
SECTIONS

SHEET S33
47

T 564
564A

SECONDARY DIGESTER

PRIMARY DIGESTER

PLAN

SLUDGE RECIRCULATION SECTION

FOR CONT SEE DWG NO M4 & M5

16" SLUDGE RECIRCULATION

2 4"x16" ELBO

14" M XING NOZZLE

DRAFT TUBE

4'-0"

0'-0"

4 S UCT FEED

6" SL DF

4" PRV (TYPICAL 3 PLACES)

2" PW

6" SL

TH CK

5" PUMP

6" SM

DIGESTER BUILDING

2" VTR

6" PV

6" SM PIST

DENSITY M

3 MH

3/4" SW DN

1" SW DRN

4" CV

SL GRINDER

TEMP IND/TRANSM.

TIT

4" SL

FD 3

6" THICK SLUDGE

1 1/2" SW DRN.

SL GRINDER

30 MH

UH-1

SLUDGE RECIRCULATION DISCHARGE PIPING SAME AS SECONDARY DIGESTER BUT OPPOSITE HAND.

6" PRV TYP 4 PLACES SEE SECONDARY DIGESTER

5" LW

1" DN TO NH3

CURB

HEAT EXCHGR.

FD 2

5 HW

3" HW

6" GAS

4" 3 WAY

16" SM BRR

16" CV

4" PV

16" 3 WAY PV

16" SLCT ON CROSS-OVER

4 D SCHARGE CROSS OVER

6" SL DF

FOR CONT SEE DWG NO M4 & M5

FLEXIBLE TUBE TO TEMPERATURE INDICATING TRANSMITTER

GATE VALVE (SIZE AS REQUIRED)

WELL

BULB INSIDE

WELL INSTALLATION THERMOMETER

NTS.

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

WALTER L. BERSCHAUER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4464-07 99
SCALE 1/4"
Designed CJH
Drawn by MWC
Checked by JB
Proj Engr JB
Approved by WB
Date JUNE 1977

URS COMPANY
A Professional Services Organization
Seattle, Washington

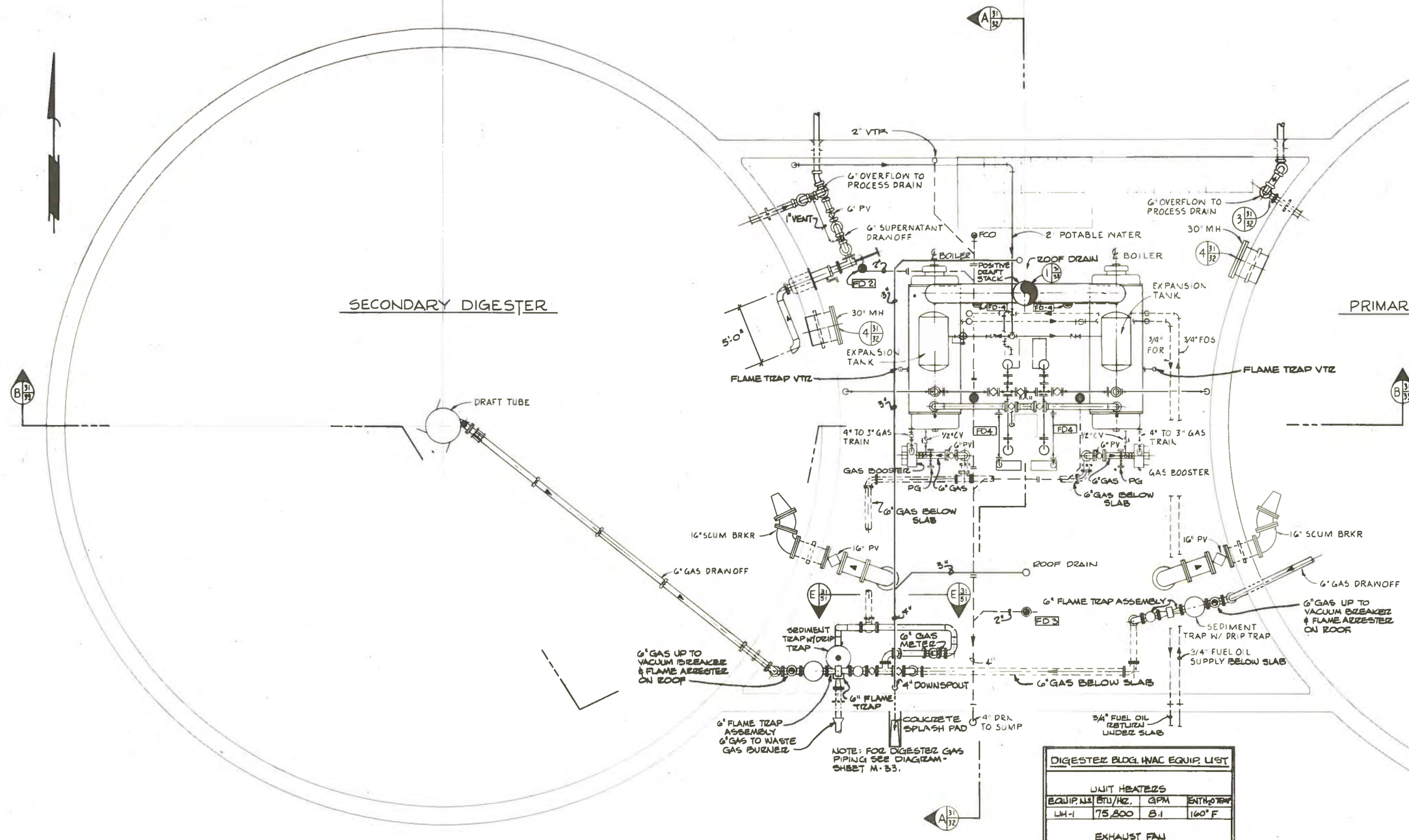
KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
BASEMENT PIPING

SHEET M30
51

SECONDARY DIGESTER

PRIMARY DIGESTER



DIGESTER BLDG. HVAC EQUIP. LIST

UNIT HEATERS

EQUIP. NO.	BTU/HR.	GPM	ENT H_2O TEMP
UH-1	75,800	8.1	160° F

EXHAUST FAN

EQUIP. NO.	CFM	STATIC PRES. W.G.
EF-1	2625	.250

HOT WATER CIRCULATING PUMPS

EQUIP. NO.	GPM	HEAD	MAX. RPM
HWCP-1	250	25' W.G.	1850
HWCP-2	250	25' W.G.	1850
HWCP-3	120	40' W.G.	1850
HWCP-4	50	20' W.G.	1850

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

No.	DATE	BY	REVISION

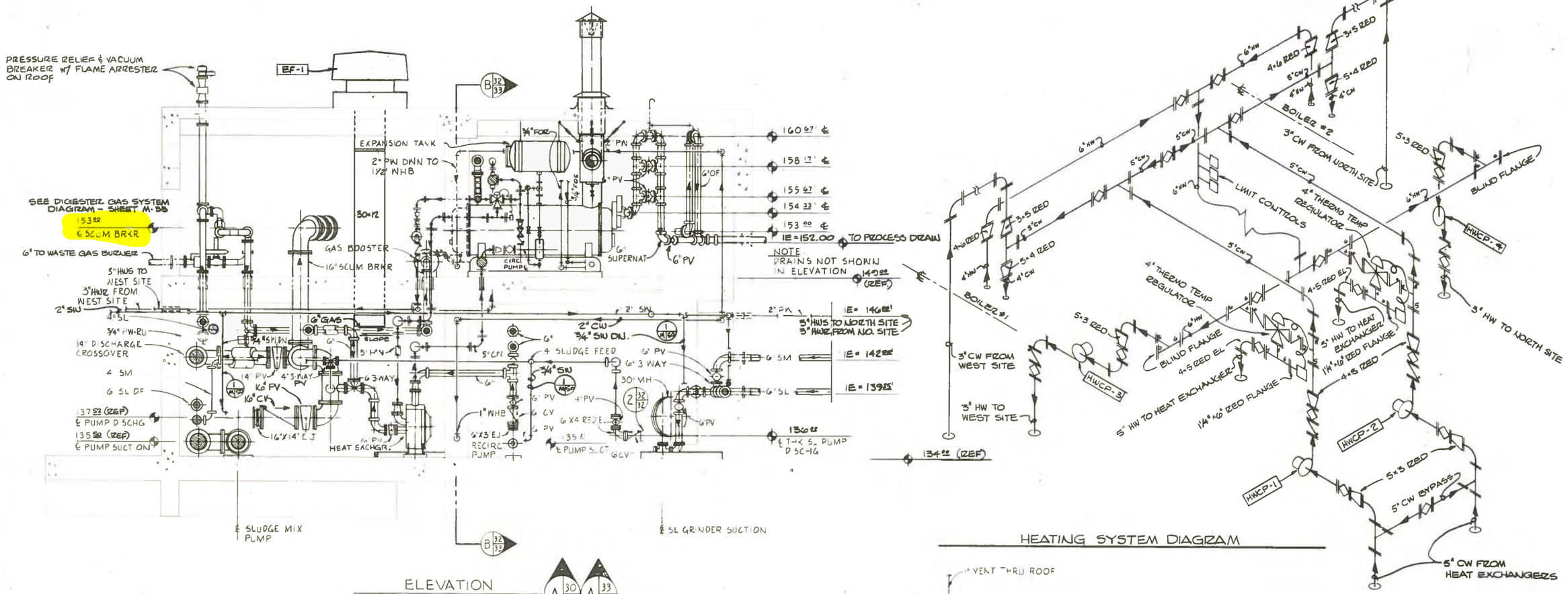
Job No 4464-07-99
SCALE 1/4" = 1'-0"
Designed SW
Drawn by M.C.W.
Checked by J.L.B.
Proj. Engr JB
Approved by MB
Date JUNE 1977

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

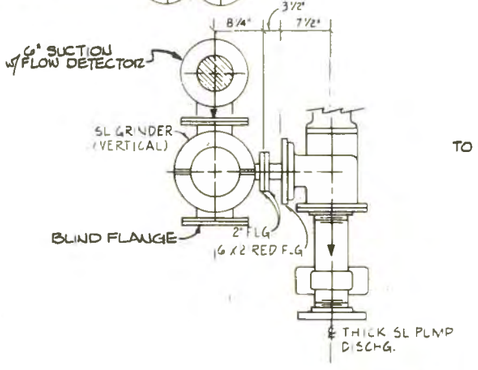
DIGESTERS & CONTROL ROOM
GROUND FLOOR PIPING

SHEET M31 / 51

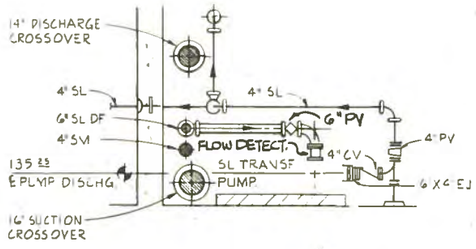


HEATING SYSTEM DIAGRAM

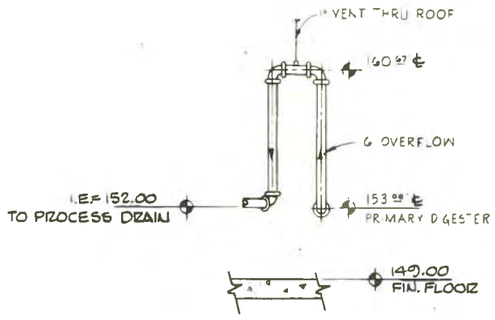
ELEVATION
SCALE 1/4"=1'-0"
A 30/32 A 33/32



DETAIL
NTS
2 30/32 2 32/32

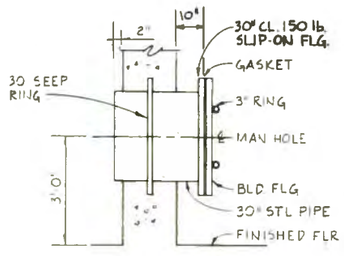


ELEVATION
SCALE 1/4"=1'-0"
C 30/32



IE EL 137.75
TO PR DRN

DETAIL
SCALE 1/4"=1'-0"
3 31/32



DETAIL
SCALE 1/2"=1'-0"
4 30/32 4 31/32

THIS DRAWING HAS BEEN REDUCED TO APPROXIMATELY ONE HALF THE ORIGINAL SCALE

WALTER L. BERSCHAUER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

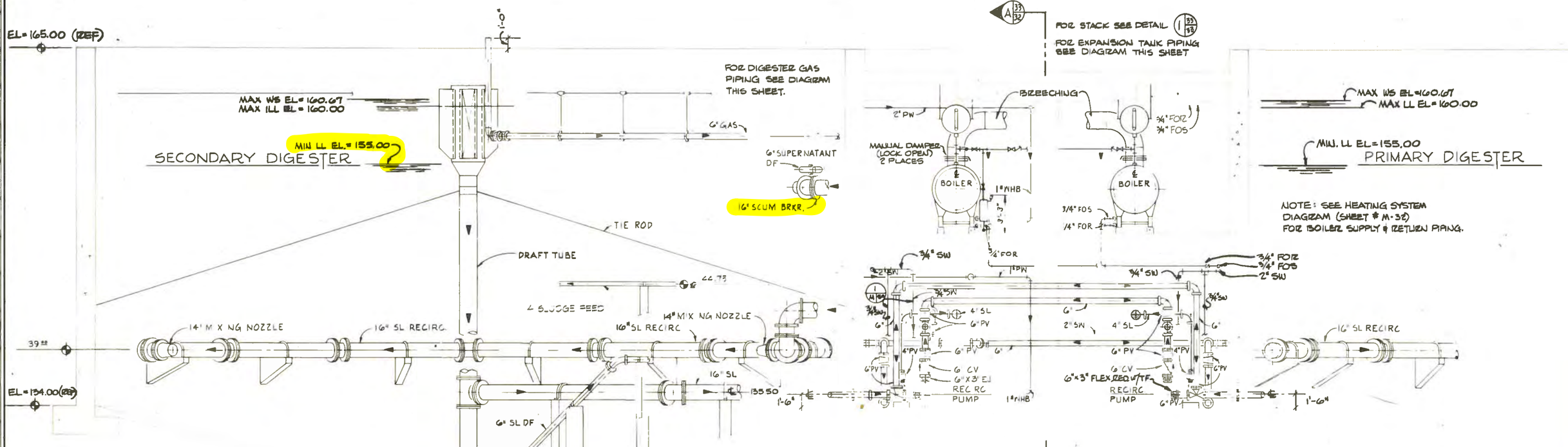
Job No 4464-07-99
SCALE 1/4" = 1'-0"
Designed S.N.
Drawn by MCW
Checked by J.L.B.
Proj. Engr. -
Approved by -
Date JUNE 1977

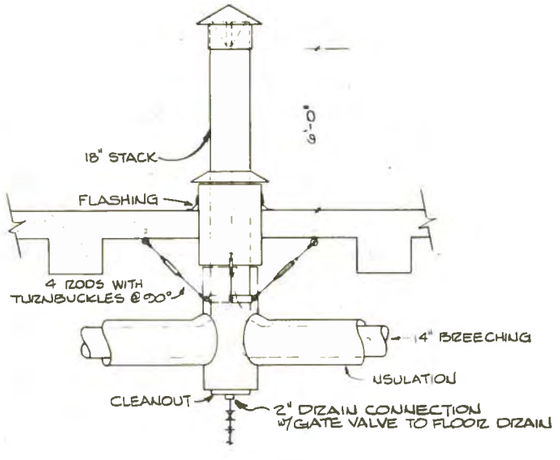
URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
ELEVATION & DETAILS

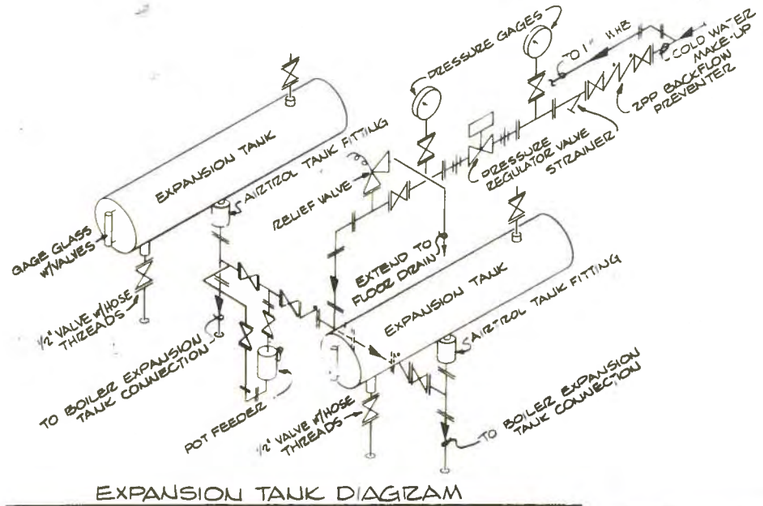
SHEET M32
51





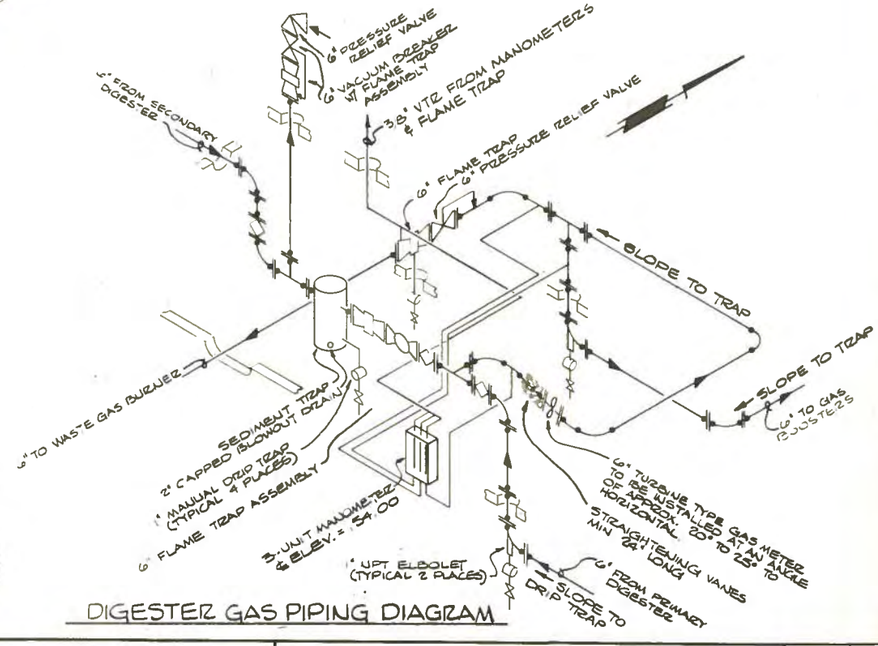
DETAIL
SCALE: 3/8"=1'-0"

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



EXPANSION TANK DIAGRAM

NOTE: DRAINS NOT SHOWN IN ELEVATION



DIGESTER GAS PIPING DIAGRAM

WALTER L. BERSCHAUER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

No.	DATE	BY	REVISION

Job No 4464.07-99
SCALE VARIES
Designed S.N.
Drawn by M.C.W.
Checked by J.L.B.
Proj Engr
Approved by
Date JUNE 77

URS COMPANY
A Professional Services Organization
Seattle, Washington

KITSAP COUNTY
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS & CONTROL ROOM
ELEVATIONS & DETAILS

SHEET M33
51

SCADA

YL 6194 ZSL

YL 6194 ZSH

YL 6194 REMOTE

HS DIGESTER WITHDRAWAL SELECTOR

YL 6193 ZSL

YL 6193 ZSH

YL 6193 REMOTE

YL 6191 RNG

KQ 6191 RUN TIME

HIGHWAY DATA BUS

PLC OR MCC

NC 6194

NC 6193

NC 6191

MCC

MCC

MCC

NOTES:

1. PROVIDE TYPICAL FLUSHING CONNECTIONS FOR ALL PUMPS AS SHOWN ON M7.

PLANT

4" WP-RU

4" 3WHP

1" 3WHP

1" 3WHP

1/4" 3WHP

1" V

1" 3WHP

1" V

1" 3WHP

1" V

1" 3WHP

1" 3WHP

10" OF

10" OF

4" OF

4" OF

10" OF

10" OF

8" DS

DIGESTER 1

T 6100

ZSC 6194

ZSO 6194

M

HS 6194 RSL

HS 6194 Z/L

ZSC 6193

ZSO 6193

M

HS 6193 RSL

HS 6193 Z/L

1" DS

CV 6193

CU 6191

2W

C

M

HS 6191 HOA

HS 6191 ESP

PI 0-60 PSIG

8" DS

8" DS

P602 D d

1" DS

D

1" DS

D

DIGESTER WITHDRAWAL PUMP 1

P 6191

SPEC: 11355

P602 G g

P602 H h

4" 3WHP

P602 J j

C P602 c

8" DS

8" DS

P602 E e

8" DS

1" DS

10" OF

10" OF

TO THICKENER OVERFLOW DRAIN

B P701 B

12" DS

8" DS

FROM SLUDGE PROCESSING BUILDING

8" DS

CV 6194

8" DS

P602 F f

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: William Perrault PROJECT MANAGER DATE: 7/26/99

APPROVED: D. Lang BROWN AND CALDWELL DATE: 7/26/99

APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399

DRAWN S. PLANCIC

DESIGNED J. HENNESSY

CHECKED _____

CHECKED _____

JAMIE BRIAN HENNESSY STATE OF WASHINGTON 33898 REGISTERED PROFESSIONAL ENGINEER 7/26/99

EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

PROCESS AND INSTRUMENTATION DIAGRAM
DIGESTER 1
WITHDRAWAL PUMP 1

SEPT 1999

DRAWING NUMBER
P601

SHEET NUMBER

P:\5399\CAD\P 5399P600 07-19-99 DSA 1=1

SCADA

PLC OR MCC

YL 6192 RNG

KQ 6192 RUN TIME

HIGHWAY DATA BUS

NC 6192

MCC

G P601 g

H P601 h

J P601 j

4" 3WHP

1" 3WHP

1" 3WHP

1/4" 3WHP

1" V

1" 3WHP

1" V

10" OF

1" 3WHP

1" 3WHP

8" DS

DIGESTER 2
T 6200

10" OF

10" OF

4" OF

4" OF

10" OF

10" OF

8" DS

P601 C c

1" DS

CU 6192

2W

C

M

HS 6192 HOA

HS 6192 ESP

PI 0-60 PSIG

E P601 e

8" DS

8" DS

F P601 f

8" DS

1" DS

1" DS

D

DIGESTER WITHDRAWAL PUMP 2
P 6192
SPEC: 11355

1" DS

D

8" DS

10" OF

TO THICKENER OVERFLOW DRAIN

D P601 d

8" DS

8" DS

12" DS

P701 A a

TO SLUDGE PROCESSING BUILDING

NOTES:

1. PROVIDE TYPICAL FLUSHING CONNECTIONS FOR ALL PUMPS AS SHOWN ON M7.

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: Wilkes Persich PROJECT MANAGER DATE: 7/26/99
APPROVED: D. Fancy BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399
DRAWN S. PLANCIC
DESIGNED J. HENNESSY
CHECKED _____
CHECKED _____

JAIME BRIAN HENNESSY — STATE OF WASHINGTON — 15898 — REGISTERED PROFESSIONAL ENGINEER — 7/26/99

EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

PROCESS AND INSTRUMENTATION DIAGRAM
DIGESTER 2
WITHDRAWAL PUMP 2

SEPT 1999

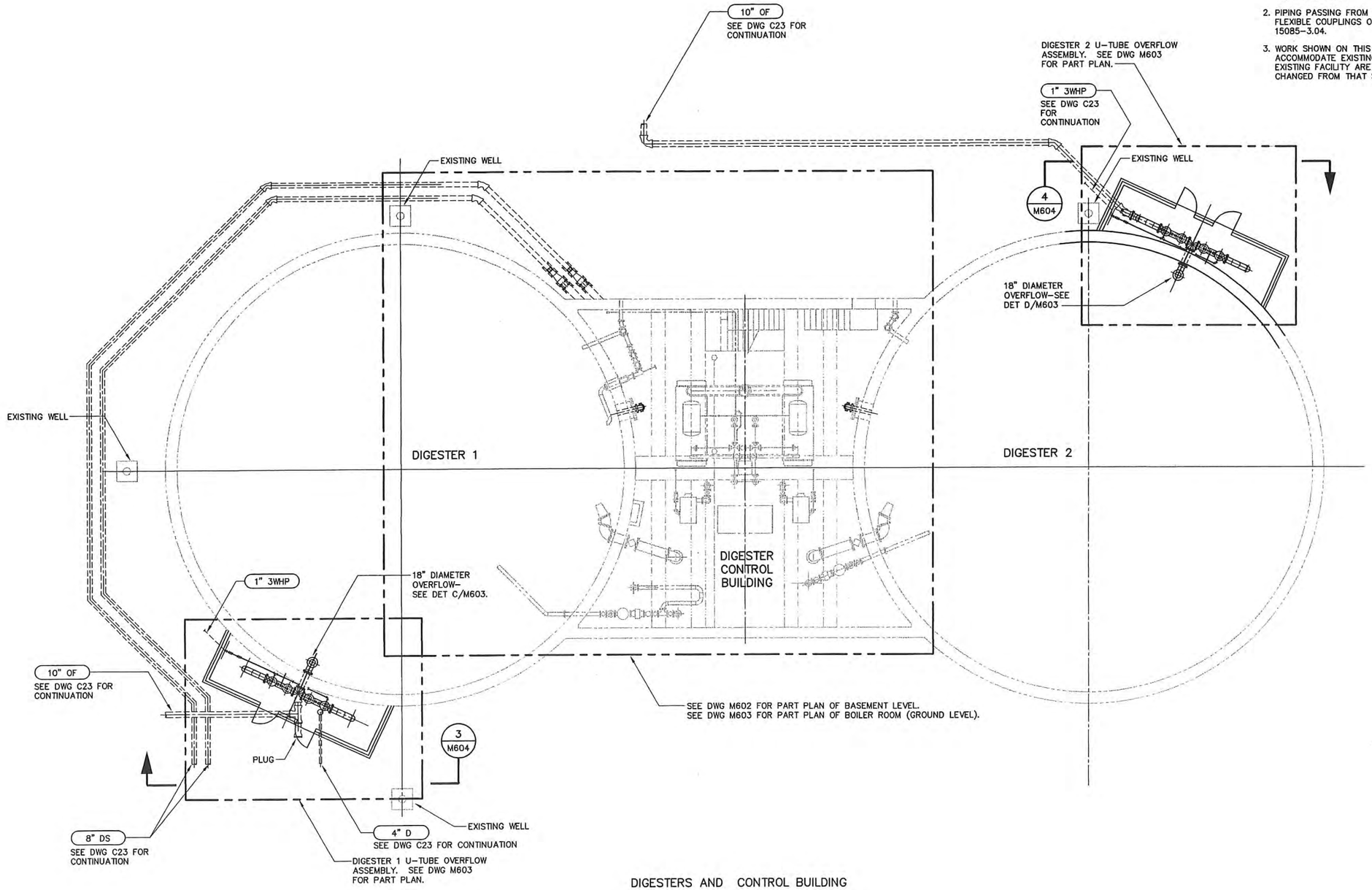
DRAWING NUMBER
P602

SHEET NUMBER

P:\5399\CAD\P 5399P600 07-12-99 DSA 1=1

GENERAL NOTES:

1. ALL DEMOLITION SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 01014.
2. PIPING PASSING FROM CONCRETE TO EARTH SHALL HAVE TWO FLEXIBLE COUPLINGS OR JOINTS PER SPECIFICATION SECTION 15085-3.04.
3. WORK SHOWN ON THIS DRAWING WILL REQUIRE MODIFICATIONS TO ACCOMMODATE EXISTING FACILITIES. SOME FEATURES OF THE EXISTING FACILITY ARE NOT SHOWN; OTHER FEATURES MAY HAVE CHANGED FROM THAT SHOWN. SEE SPECIFICATION DIVISION 1.



DIGESTERS AND CONTROL BUILDING

OVERALL PLAN

SCALE: 1/8"=1'-0"

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: Willard Persich PROJECT MANAGER DATE: 7/26/99
APPROVED: D. Fenney BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399
DRAWN BEW
DESIGNED JBH/bew
CHECKED B. PERSICH
CHECKED T. KELLEY

JAIME BRIAN HENNESS — STATE OF WASHINGTON — 33898 — REGISTERED PROFESSIONAL ENGINEER — 7/26/99
EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

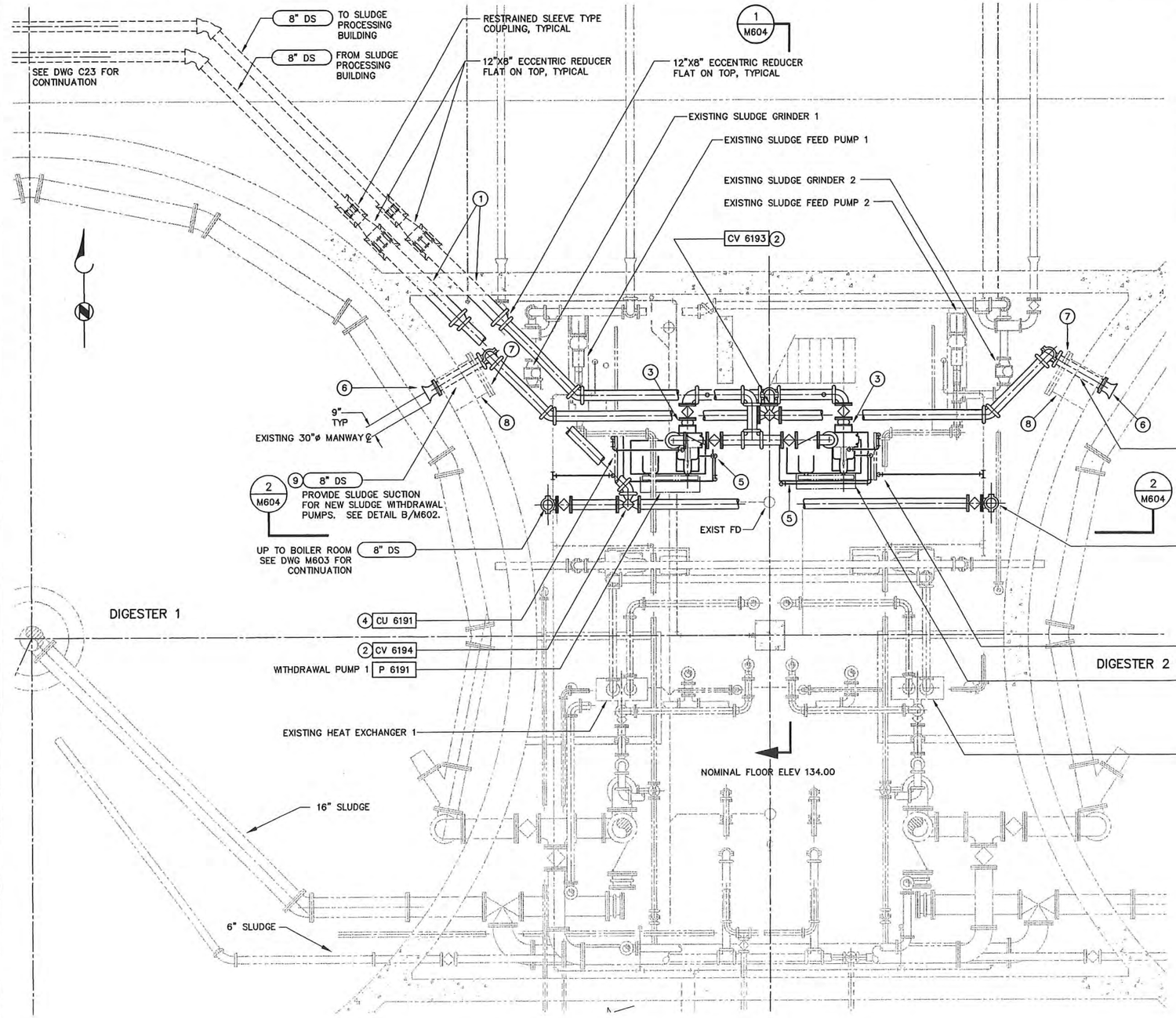
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
MODIFICATIONS
OVERALL PLAN

SEPT 1999
DRAWING NUMBER M601
SHEET NUMBER .

5390M601.DWG_7-16-99_1:1

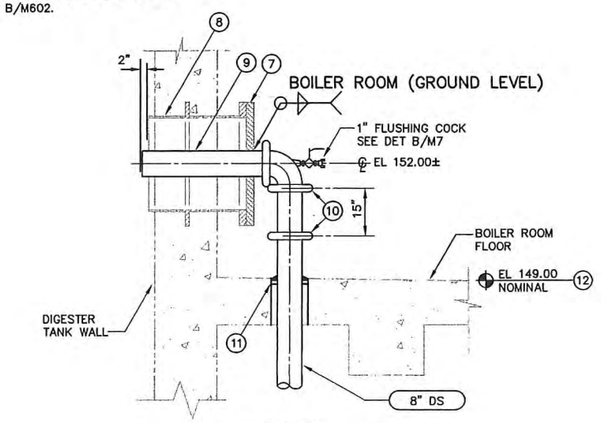


DIGESTER CONTROL BUILDING
BASEMENT PLAN
SCALE: 1/4"=1'-0"

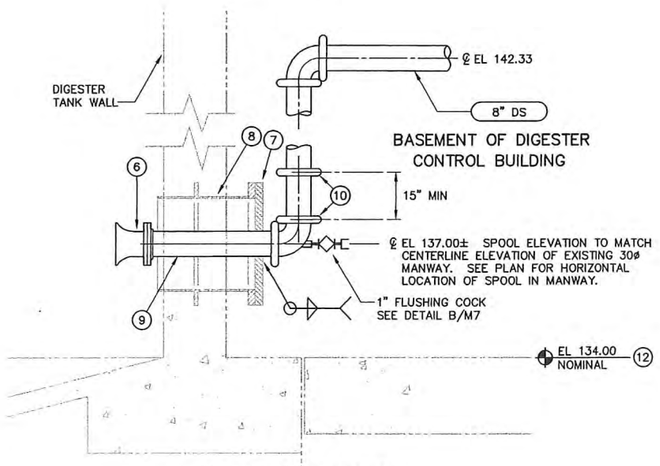
NOTE
SEE DRAWING M601 FOR GENERAL NOTES APPLICABLE TO THE DRAWINGS IN THE M600 SERIES.

KEY NOTES:
1. 12" TYPE X2 WALL PENETRATION. SEE DWG M4.
2. 8" 3 WAY VALVE.
3. SPHERICAL ARCH COUPLING, TYPICAL
4. TYPE A PUMP SEAL CONTROL UNIT. LOCATE WATER SUPPLY TO EXISTING PUMP SEAL CONTROL UNITS. CONNECT NEW CONTROL UNITS TO THIS WATER SUPPLY. ROUTE PIPING AS REQUIRED.
5. 3/4" PUMP CASING DRAIN. ROUTE AS SHOWN.
6. 8" FLANGE X FLARE FITTING
7. EXISTING MANWAY FLANGE. CUT HOLE FOR 8" PIPE SPOOL AS SHOWN ON DETAILS A/M602 AND B/M602.

KEY NOTES, CONTINUED:
8. EXISTING 30" ø MANWAY – TYPICAL.
9. 8" SPOOL, GROOVED END X FLANGED (BASEMENT); GROOVED END X PLAIN END (GROUND FLOOR). INSTALL IN EXISTING FLANGE AND WELD IN PLACE AS SHOWN.
10. PROVIDE GROOVED COUPLINGS AT POSITIONS SHOWN TO ALLOW REMOVAL OF PIPE SPOOL AND MANWAY FLANGE.
11. CORE 12" DIAMETER HOLE IN FLOOR AND INSTALL 8" PIPE. PROVIDE BACKING ROD AND CAULK TO FORM FILLET BETWEEN FLOOR AND PIPE TO PREVENT WATER ACCUMULATION AROUND PIPE AND PENETRATION.
12. ACTUAL ELEVATION WILL VARY ACCORDING TO TOPPING CONCRETE THICKNESS.



DS RETURN
DETAIL A/M603
SCALE: 1/2"=1'-0"



WITHDRAWL PUMP SUCTION
DETAIL B/M602
SCALE: 1/2"=1'-0"

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: Walter Perrin PROJECT MANAGER DATE: 7/26/99
APPROVED: D. Lane BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399
DRAWN BEW
DESIGNED JBH/je/bew
CHECKED B. PERSICH
CHECKED T. KELLEY

JAIME BRIAN HENNESSY STATE OF WASHINGTON 33698 REGISTERED PROFESSIONAL ENGINEER 7/26/99
EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

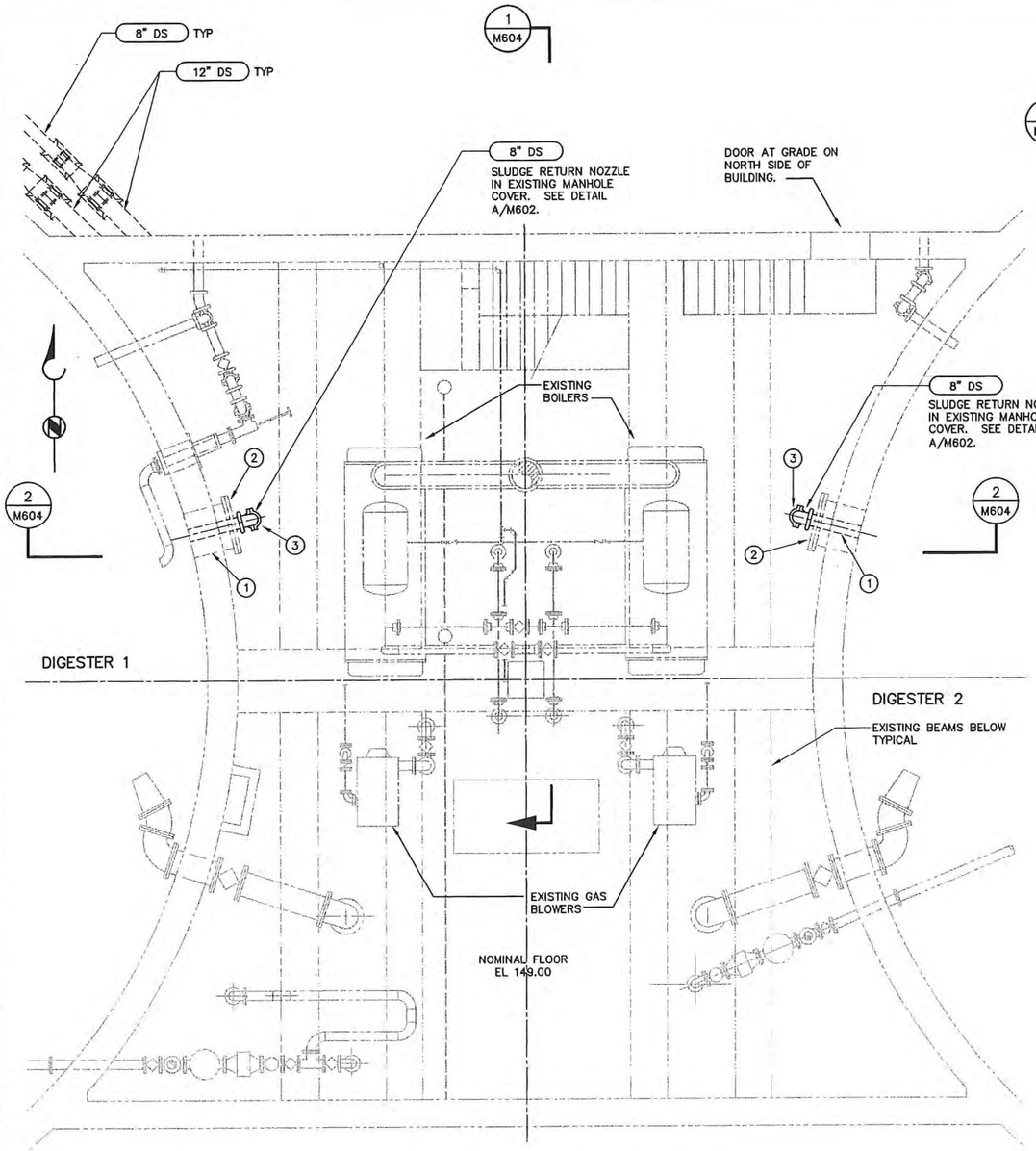
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
BASEMENT LEVEL MODIFICATIONS
PART PLAN AND DETAILS

SEPT 1999
DRAWING NUMBER M602
SHEET NUMBER

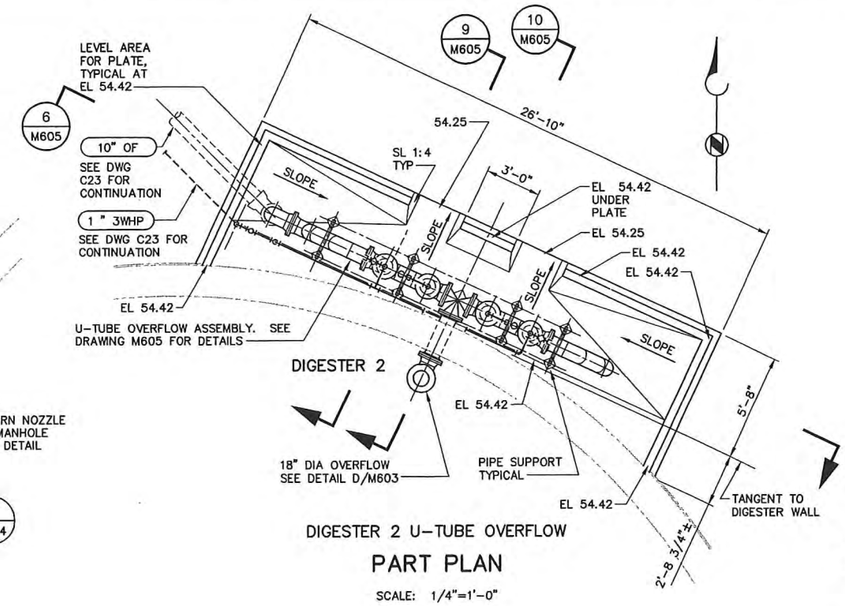
5304M602 7-16-99 1=1



DIGESTER CONTROL ROOM

GROUND FLOOR PLAN

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



DIGESTER 2 U-TUBE OVERFLOW

PART PLAN

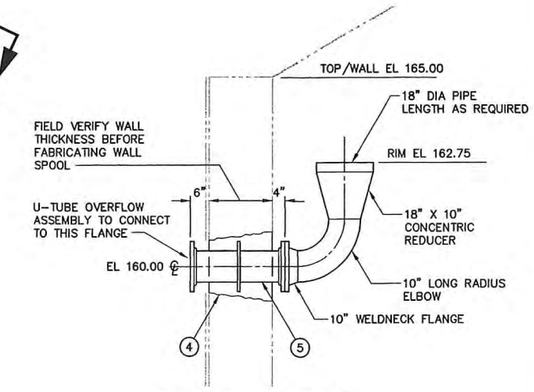
SCALE: 1/4"=1'-0"

NOTE

SEE DRAWING M601 FOR GENERAL NOTES APPLICABLE TO THE DRAWINGS IN THE M600 SERIES.

KEY NOTES:

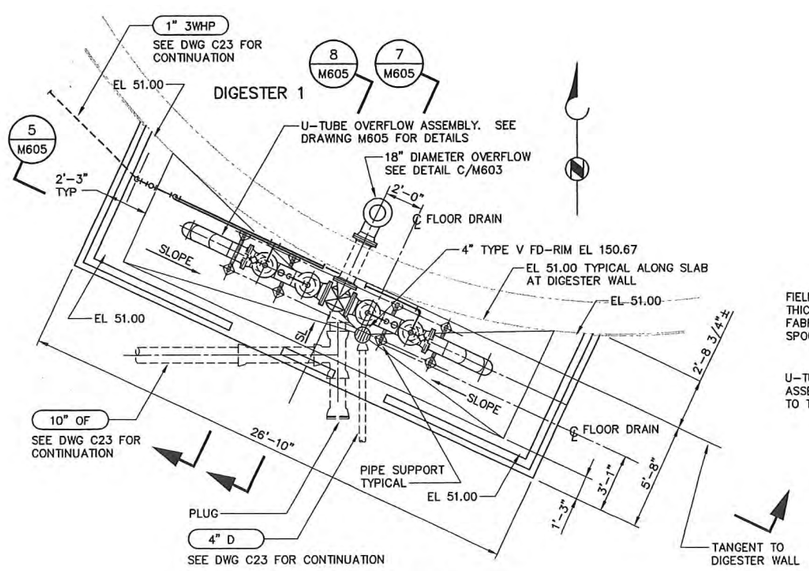
1. 8" SPOOL, PLAIN END X GROOVED END. SEE DETAIL A/M602.
2. EXISTING FLANGE FOR 30" MANWAY. SEE DETAILS A/M602 AND B/M602.
3. CORE HOLE IN EXISTING FLOOR SLAB. SEE KEY NOTE 3, DRAWING M603.
4. BREAK OUT CIRCULAR, TAPERED OPENING FOR PIPE PENETRATION. OPENING SHALL CLEAR WEEP RING BY A MINIMUM OF 1". SEE DRAWING S1, NOTE REGARDING MODIFICATIONS TO EXISTING CONCRETE.
5. 10" WALL PIPE WITH 3/8" X 3" WEEP RING. PROVIDE SLIP-ON FLANGE AT EACH END.



DIGESTER 1 OVERFLOW

DETAIL C/M601

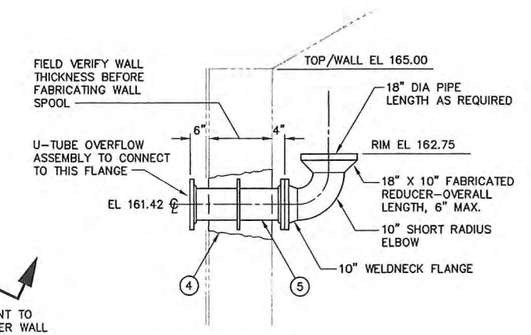
SCALE: 1/2"=1'-0"



DIGESTER 1 U-TUBE OVERFLOW

PART PLAN

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



DIGESTER 2 OVERFLOW

DETAIL D/M601

SCALE: 1/2"=1'-0"

BROWN AND CALDWELL CONSULTANTS SEATTLE, WASHINGTON SUBMITTED: William Persich PROJECT MANAGER DATE: 7/26/99 APPROVED: D. Brown BROWN AND CALDWELL DATE: 7/26/99 APPROVED: DATE:	LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY) FILE 5399 DRAWN BEW DESIGNED JBH/bew CHECKED B. PERSICH CHECKED T. KELLEY	JAMES BRIAN HENNESSY STATE OF WASHINGTON 33899 REGISTERED PROFESSIONAL ENGINEER 7/26/99 EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

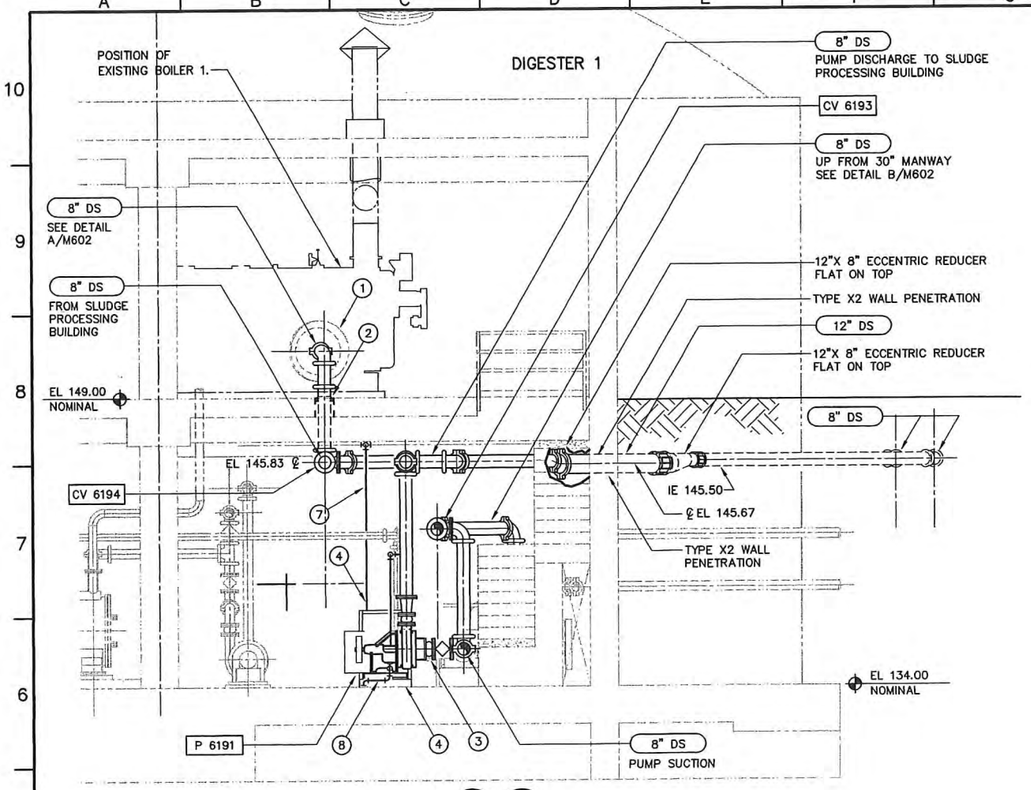
DIGESTERS
GROUND LEVEL MODIFICATIONS
PLANS AND DETAILS

SEPT 1999

DRAWING NUMBER
M603

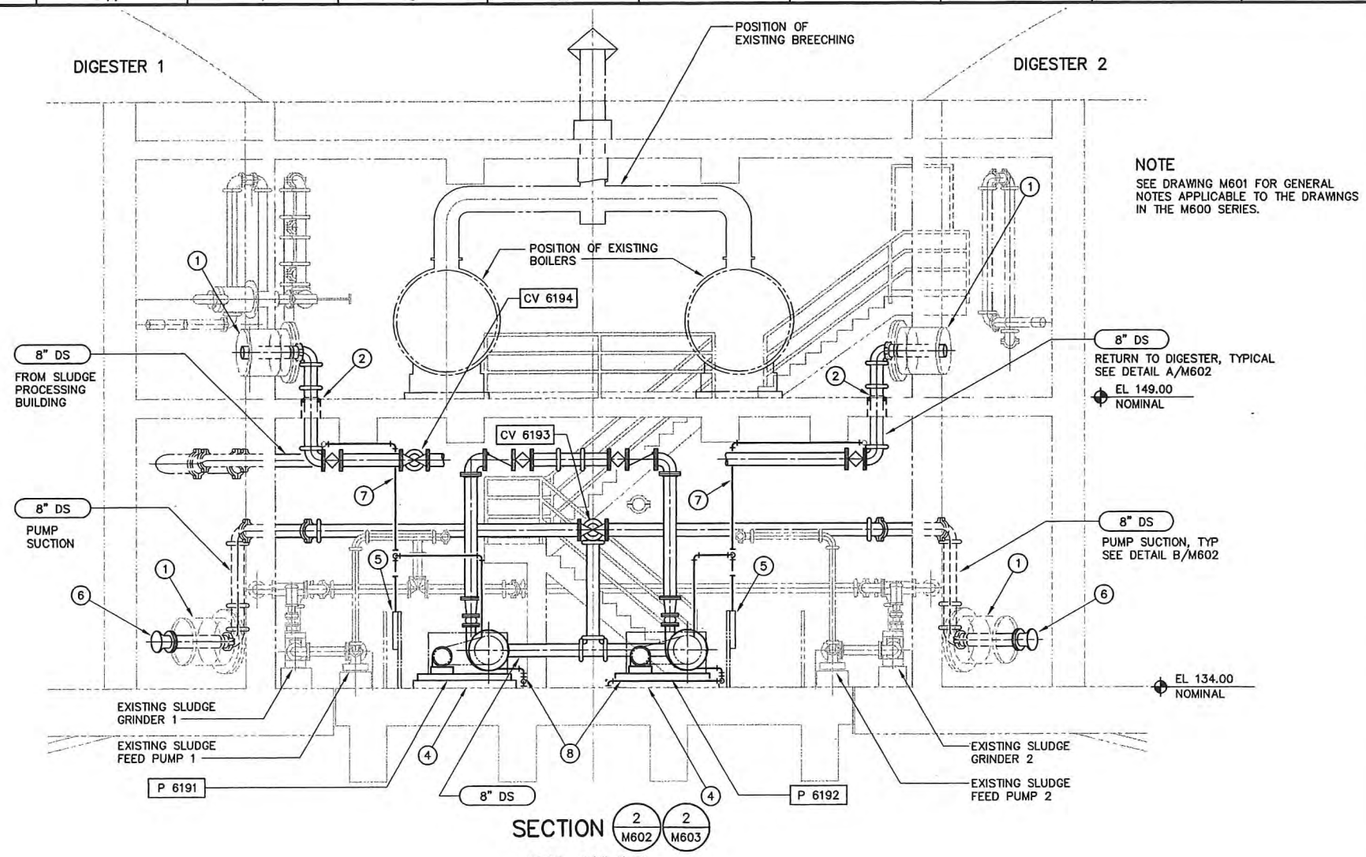
SHEET NUMBER
.

S:\2M603.DWG_7-16-99_1:1



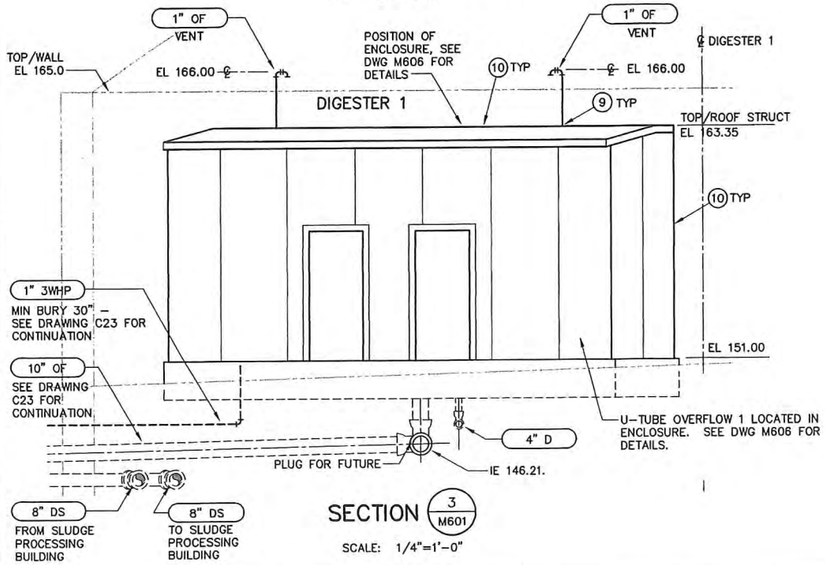
SECTION 1/M602 1/M603

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



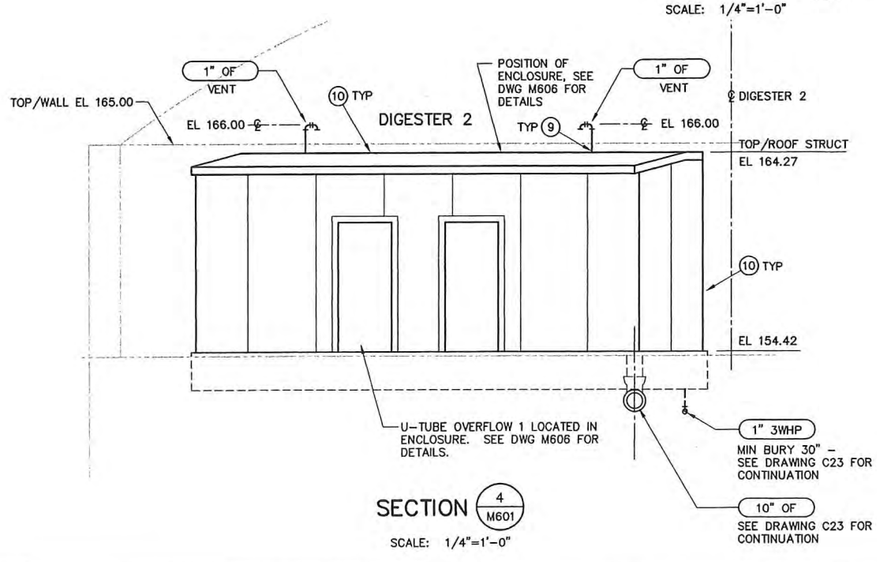
SECTION 2/M602 2/M603

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



SECTION 3/M601

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



SECTION 4/M601

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

KEY NOTES:

1. EXISTING 30"ø MANWAY–FOR TWO IN BOILER ROOM, MODIFY AS SHOWN ON DETAIL A/M602. FOR TWO IN BASEMENT, MODIFY AS SHOWN ON DETAIL B/M602.
2. CORE HOLE IN EXISTING FLOOR SLAB. SEE KEY NOTE 3, DRAWING M603.
3. SPHERICAL ARCH FLEXIBLE COUPLING, TYPICAL EACH PUMP SUCTION.
4. CONCRETE EQUIPMENT BASE. SEE DETAIL F/S2.
5. TYPE A CONTROL UNIT, SEE DETAIL DRAWING M6. TYPICAL EACH PUMP. SEE PLAN, DRAWING M602 FOR CONTINUATION.
6. 8" FLANGE BY FLARE FITTING
7. LOCATE WATER SUPPLY TO EXISTING PUMP CONTROL UNITS. CONNECT NEW CONTROL UNITS TO THIS WATER SUPPLY. ROUTE PIPING AS REQUIRED.
8. 3/4" PUMP CASING DRAIN. SEE PLAN, DWG M602.
9. PROVIDE FLASHING WHERE VENT PENETRATES ENCLOSURE ROOF, TYPICAL.
10. REMOVE METAL CLADDING AND THE RIGID INSULATION BEHIND ENCLOSURE. PROVIDE CLOSURE STRIP WHERE WALLS AND ROOF MET EXISTING STRUCTURE.

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: William A Persich PROJECT MANAGER DATE: 7/26/99
APPROVED: B. Persich BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"–SCALE ACCORDINGLY)

FILE 5399
DRAWN BEW
DESIGNED JBH/bew
CHECKED B. PERSICH
CHECKED T. KELLEY

JAIMIE BRIAN HENNESSY — STATE OF WASHINGTON — 36908 — REGISTERED PROFESSIONAL ENGINEER
7/26/99
EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

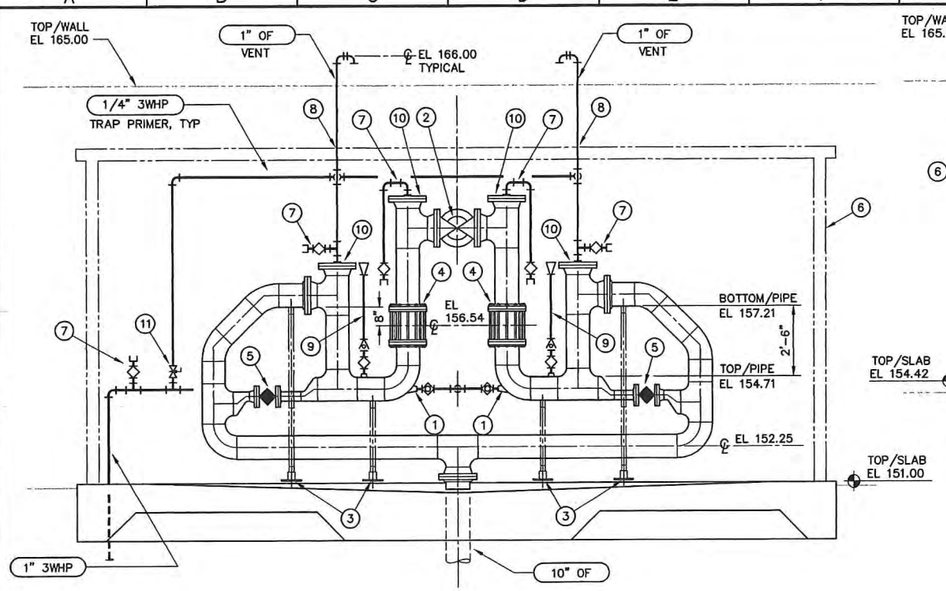
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
CONTROL BUILDING MODIFICATIONS AND OVERFLOWS – SECTIONS

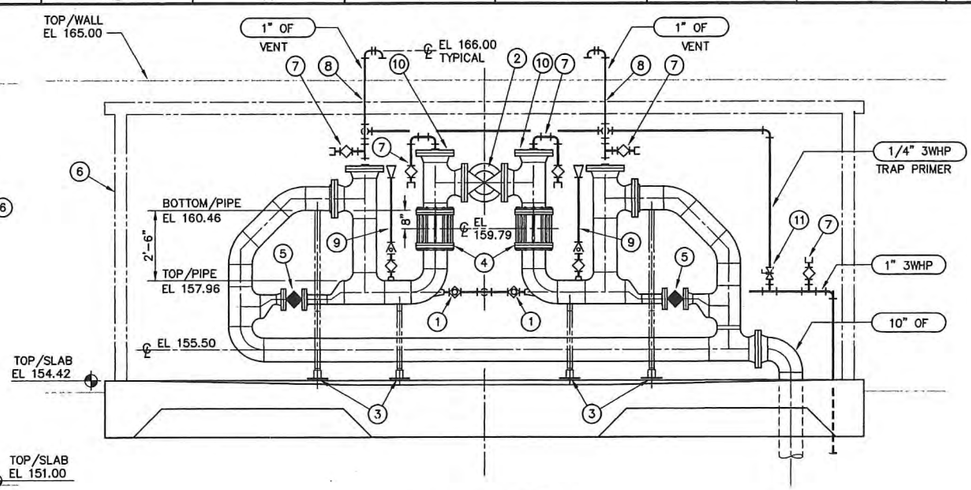
SEPT 1999
DRAWING NUMBER M604
SHEET NUMBER

539com604.dwg 7-16-99 1:1



SECTION 5/M603

SCALE: 3/8"=1'-0"



SECTION 6/M603

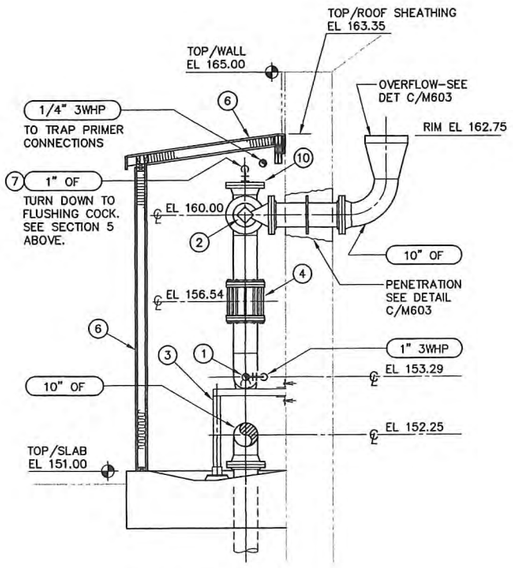
SCALE: 3/8"=1'-0"

NOTE

SEE DRAWING M601 FOR GENERAL NOTES APPLICABLE TO THE DRAWINGS IN THE M600 SERIES.

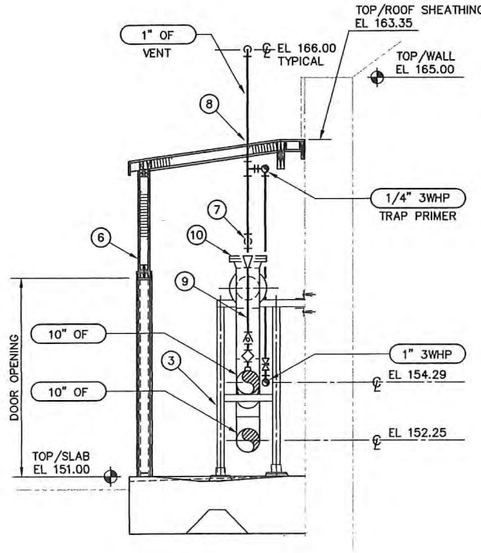
KEY NOTES:

1. PIPELINE PURGE. PROVIDE THREADED CONNECTION (ELBOLET) ON HORIZONTAL CENTERLINE OF ELBOW. CONNECT 1" 3WHP PURGE. PROVIDE 1" BALL VALVE, NORMALLY CLOSED.
2. 10" 3-WAY VALVE. SEE SPECIFICATION SECTION 15112.
3. POSITION OF PIPE SUPPORT SYSTEM. SEE SPECIFICATION SECTION 15096.
4. 10" DIAMETER BY 12" LONG SIGHT GLASS. SEE SPECIFICATION SECTION 15095.
5. 4" ECCENTRIC PLUG VALVE.
6. POSITION OF ENCLOSURE. SEE DRAWINGS M603 FOR PART PLANS AND M606 FOR CONSTRUCTION DETAILS.
7. 1" FLUSHING COCK, SEE DETAIL B/M7.
8. FLASH 1" VENT PIPE AT ROOF PENETRATION.
9. 1" CONNECTION TO 10" PIPE SIMILAR TO FLUSHING COCK DETAIL B/M7. PROVIDE LIFT CHECK AND 3" X 1" REDUCER TO ACT AS FUNNEL FOR ANTI-FREEZE ADDITION.
10. PROVIDE BLIND FLANGE WITH 1" NPT TAP.
11. 1/4" NEEDLE VALVE TO CONTROL TRAP PRIMER.



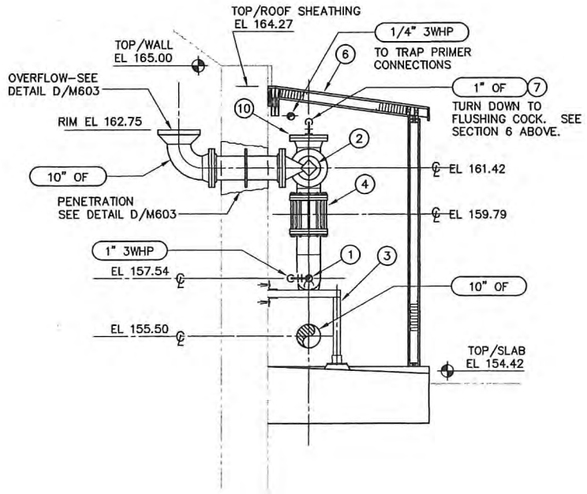
SECTION 7/M603

SCALE: 3/8"=1'-0"



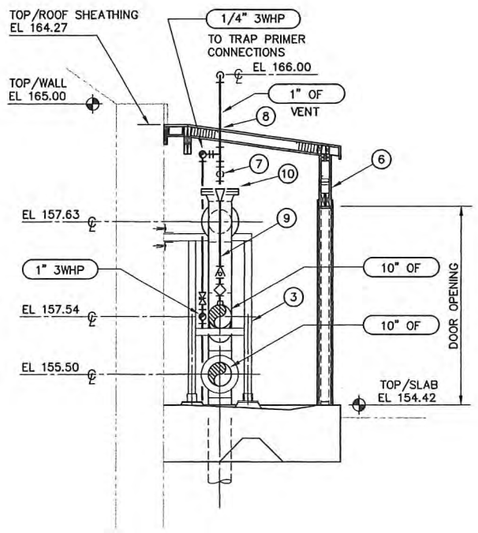
SECTION 8/M603

SCALE: 3/8"=1'-0"



SECTION 9/M603

SCALE: 3/8"=1'-0"



SECTION 10/M603

SCALE: 3/8"=1'-0"

BROWN AND CALDWELL CONSULTANTS SEATTLE, WASHINGTON SUBMITTED: William Persich PROJECT MANAGER DATE: 7/26/99 APPROVED: D. Kenny BROWN AND CALDWELL DATE: 7/26/99 APPROVED: _____ DATE: _____	LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY) FILE 5399 DRAWN BEW DESIGNED JBH/bew CHECKED B. PERSICH CHECKED T. KELLEY	JAMIE BRIAN HENNESSY STATE OF WASHINGTON 33898 REGISTERED PROFESSIONAL ENGINEER 7/26/99 EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

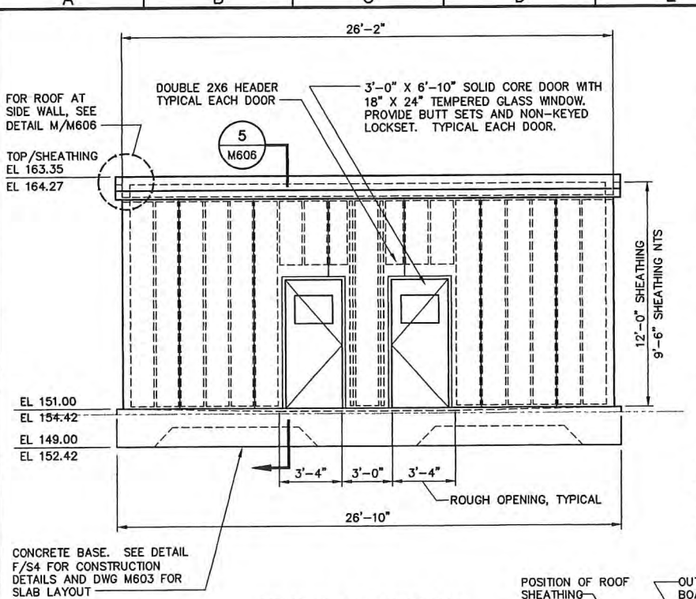
DIGESTERS
U-TUBE OVERFLOW ASSEMBLIES
SECTIONS

SEPT 1999

DRAWING NUMBER
M605

SHEET NUMBER

5390M605 6-16-99 1:1

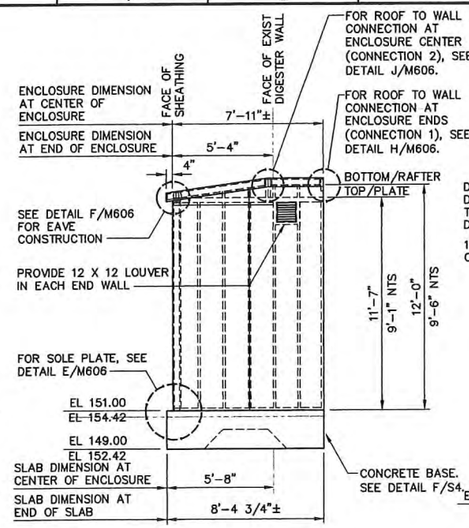


FRONT ELEVATION

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

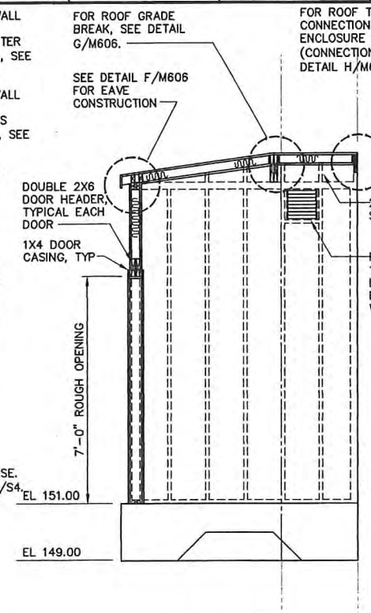
NOTE

1. SEE DRAWING M601 FOR GENERAL NOTES APPLICABLE TO THE DRAWINGS IN THE M600 SERIES.
2. WHERE TWO DIMENSIONS OR ELEVATIONS ARE SHOWN, THE TOP NUMBER REPRESENTS THE VALUE FOR DIGESTER 1 AND THE BOTTOM NUMBER REPRESENTS THE VALUE FOR DIGESTER 2.



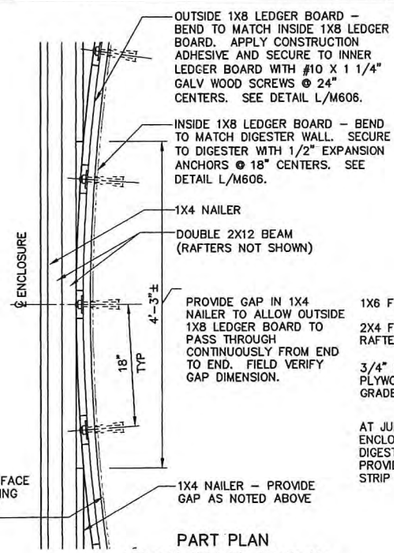
END ELEVATION

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



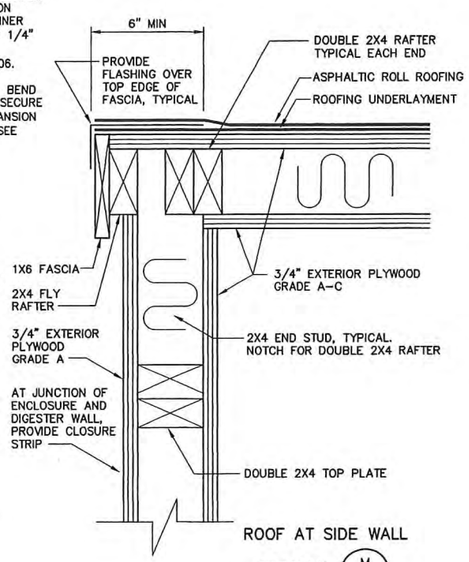
SECTION 5/M606

SCALE: 3/8"=1'-0"



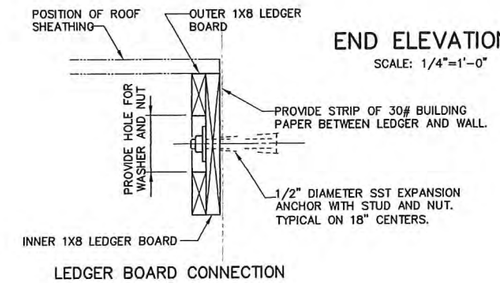
PART PLAN LEDGER BOARD AT BEAM DETAIL K/M606

SCALE: 3"=1'-0"



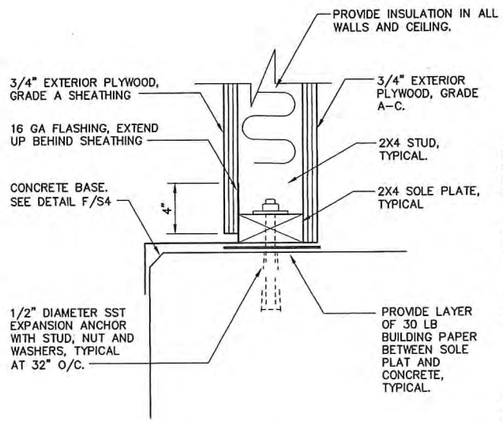
ROOF AT SIDE WALL DETAIL M/M606

SCALE: 3"=1'-0"



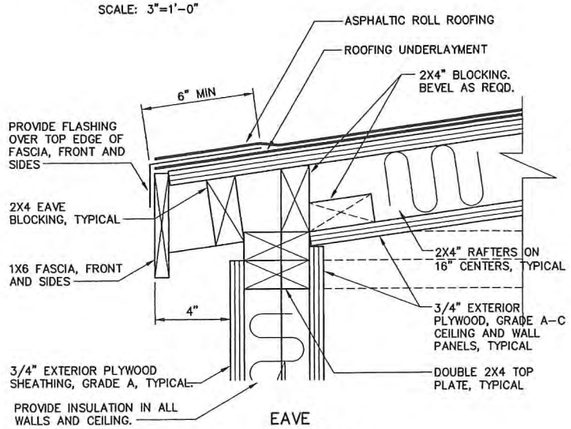
LEDGER BOARD CONNECTION DETAIL L/M606

SCALE: 3"=1'-0"



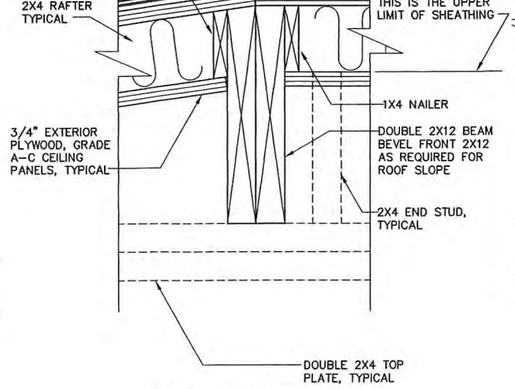
SOLE PLATE DETAIL E/M606

SCALE: 3"=1'-0"



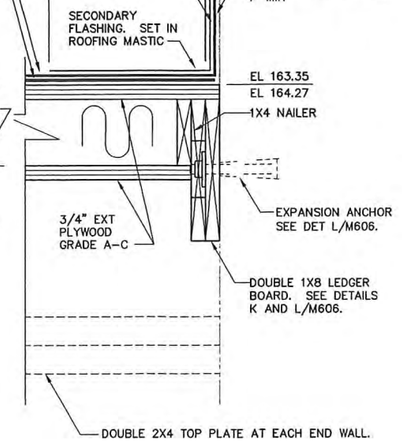
EAVE DETAIL F/M606

SCALE: 3"=1'-0"



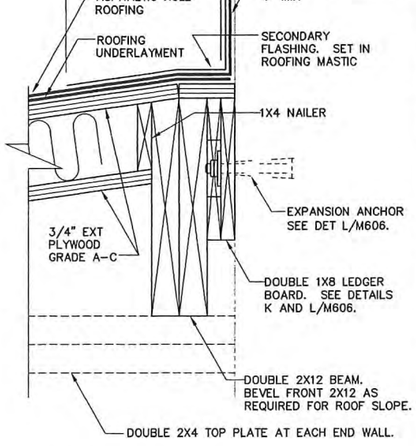
ROOF GRADE BREAK DETAIL G/M606

SCALE: 3"=1'-0"



ROOF TO WALL CONNECTION 1 DETAIL H/M605

SCALE: 3"=1'-0"



CENTER OF ENCLOSURE ROOF TO WALL CONNECTION 2 DETAIL J/M605

SCALE: 3"=1'-0"

BROWN AND CALDWELL CONSULTANTS SEATTLE, WASHINGTON SUBMITTED: William Breit PROJECT MANAGER DATE: 7/26/99 APPROVED: D. Perry BROWN AND CALDWELL DATE: 7/26/99 APPROVED: DATE:	LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY) FILE 5399 DRAWN BEW DESIGNED JBH/bew CHECKED B. PERSICH CHECKED T. KELLEY

JAIME BRIAN HENRIKSEN — STATE OF WASHINGTON — 33898 — REGISTERED PROFESSIONAL ENGINEER — 7/26/99
EXPIRES 7/4/01

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

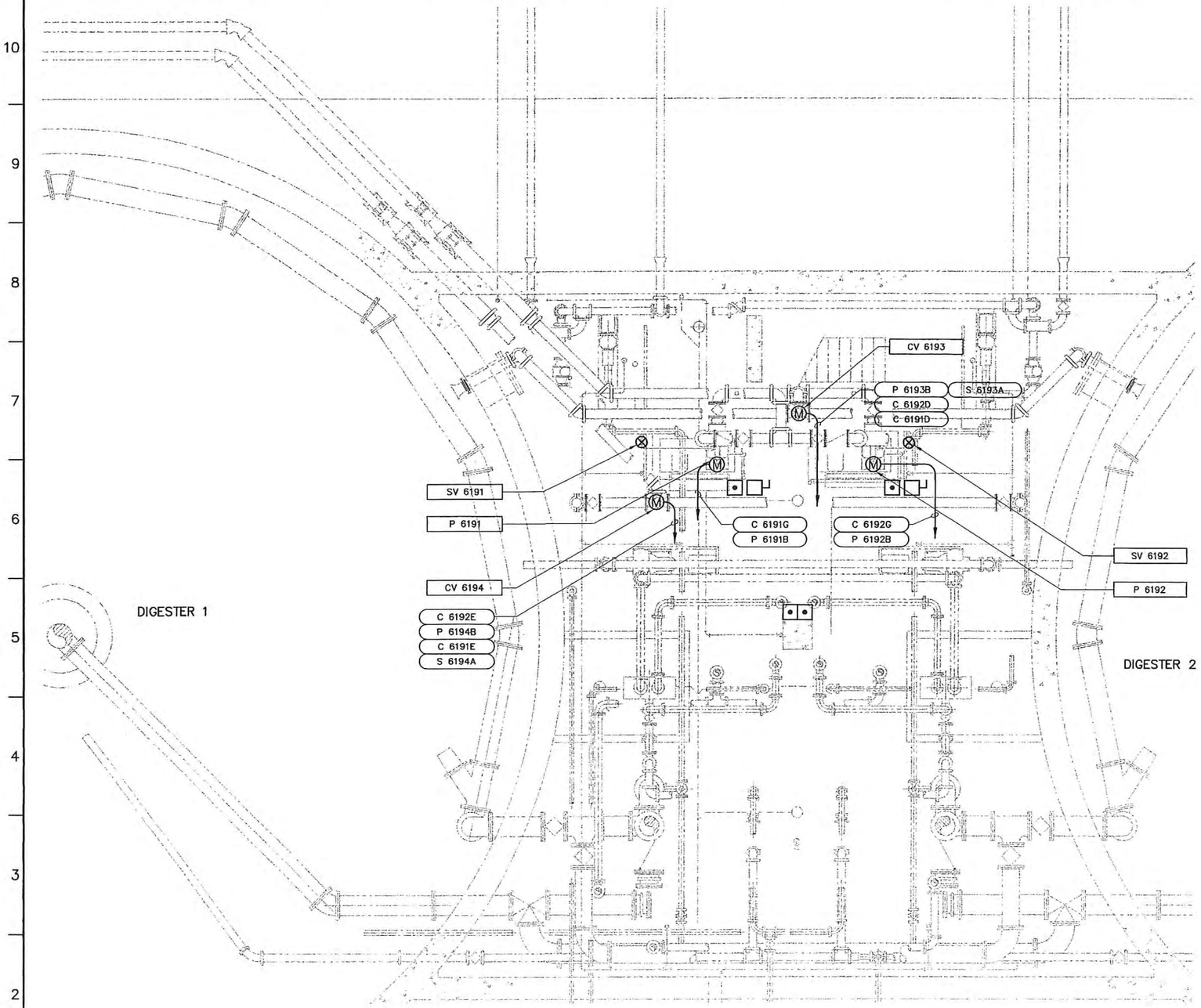
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
U-TUBE OVERFLOW ENCLOSURES
ELEVATIONS, SECTIONS AND DETAILS

SEPT 1999
DRAWING NUMBER M606
SHEET NUMBER

5392M606 7-16-99 tj1



DIGESTER CONTROL BUILDING
BASEMENT PLAN
SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL NOTE THAT NOT ALL CONDUITS ARE TAGGED ON THESE DRAWINGS. GENERALLY, ONLY THE HOMERUN CONDUITS ARE INDICATED. THE CONTRACTOR SHALL REFER TO THE CABLE AND CONDUIT SCHEDULES, CONTROL DIAGRAMS, OR EQUIPMENT SPECIFICATIONS FOR THE COMPLETE CONDUIT AND WIRING REQUIREMENTS.

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: William Perreira PROJECT MANAGER DATE: 7/26/99
APPROVED: D. Parsons BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399
DRAWN A. KRUGER
DESIGNED J. PARSONS
CHECKED J. PARSONS
CHECKED G. KUMATAKA

GREGORY K. KUMATAKA — STATE OF WASHINGTON — 28030 — REGISTERED PROFESSIONAL ENGINEER — 8/2/99
EXPIRES 12/2/00

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

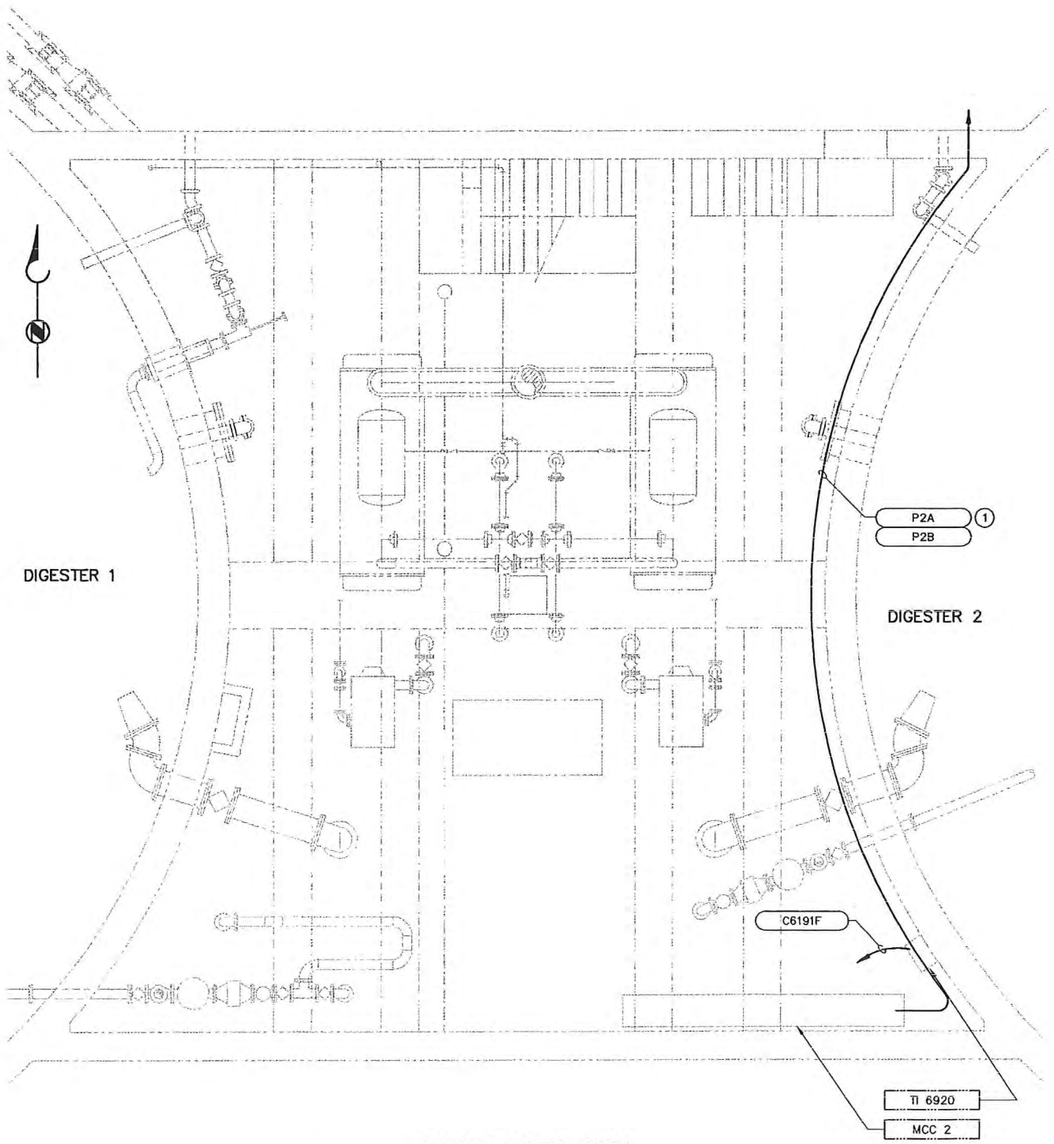
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
BASEMENT
POWER AND CONTROL PLAN

SEPT 1999
DRAWING NUMBER
E602
SHEET NUMBER

XREF: ZLOAT 7-21-99 ALK 1=1
539\E602



DIGESTER CONTROL ROOM

GROUND FLOOR PLAN

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

GENERAL NOTES:

1. CONTRACTOR SHALL NOTE THAT NOT ALL CONDUITS ARE TAGGED ON THESE DRAWINGS. GENERALLY, ONLY THE HOMERUN CONDUITS ARE INDICATED. THE CONTRACTOR SHALL REFER TO THE CABLE AND CONDUIT SCHEDULES, CONTROL DIAGRAMS, OR EQUIPMENT SPECIFICATIONS FOR THE COMPLETE CONDUIT AND WIRING REQUIREMENTS.

KEY NOTES:

(1) CONTINUED ON DWG E34.

BROWN AND CALDWELL
CONSULTANTS
SEATTLE, WASHINGTON

SUBMITTED: William Perrault PROJECT MANAGER DATE: 7/26/99
APPROVED: D. Carey BROWN AND CALDWELL DATE: 7/26/99
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5399
DRAWN A. KRUGER
DESIGNED J PARSONS
CHECKED J. PARSONS
CHECKED G. KUMATAKA

GREGORY K. KUMATAKA — STATE OF WASHINGTON — 18090 — REGISTERED PROFESSIONAL ENGINEER — 8/2/99
EXPIRES 12/2/00

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

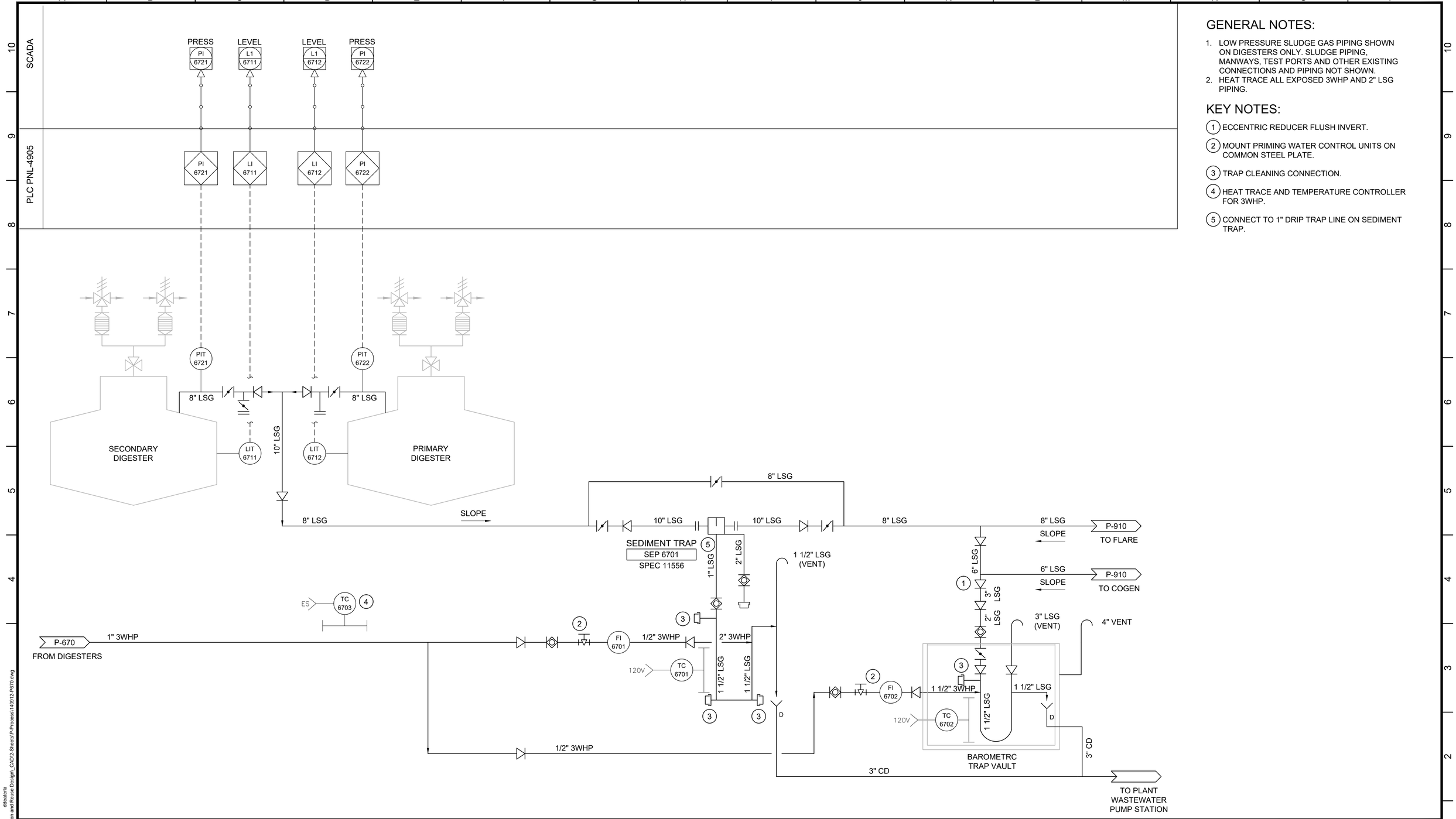
KITSAP COUNTY

CONTRACT IIC PLANT EXPANSION
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT

DIGESTERS
GROUND FLOOR
POWER AND CONTROL PLAN

SEPT 1999
DRAWING NUMBER E603
SHEET NUMBER

XREF: 2CX2
SSXCE603.DWG 7-30-99 ALK 1:1



GENERAL NOTES:

1. LOW PRESSURE SLUDGE GAS PIPING SHOWN ON DIGESTERS ONLY. SLUDGE PIPING, MANWAYS, TEST PORTS AND OTHER EXISTING CONNECTIONS AND PIPING NOT SHOWN.
2. HEAT TRACE ALL EXPOSED 3WHP AND 2" LSG PIPING.

KEY NOTES:

1. ECCENTRIC REDUCER FLUSH INVERT.
2. MOUNT PRIMING WATER CONTROL UNITS ON COMMON STEEL PLATE.
3. TRAP CLEANING CONNECTION.
4. HEAT TRACE AND TEMPERATURE CONTROLLER FOR 3WHP.
5. CONNECT TO 1" DRIP TRAP LINE ON SEDIMENT TRAP.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: E. Jacobson
DRAWN: S. Plancic
CHECKED: E. Jacobson
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg

RECORD DRAWING

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

PROCESS AND INSTRUMENTATION DIAGRAM
DIGESTER GAS

FILENAME 140912-M670.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER P-670
SHEET NUMBER 101 OF 508

Mar 21, 2016 - 9:34am dfeiseris
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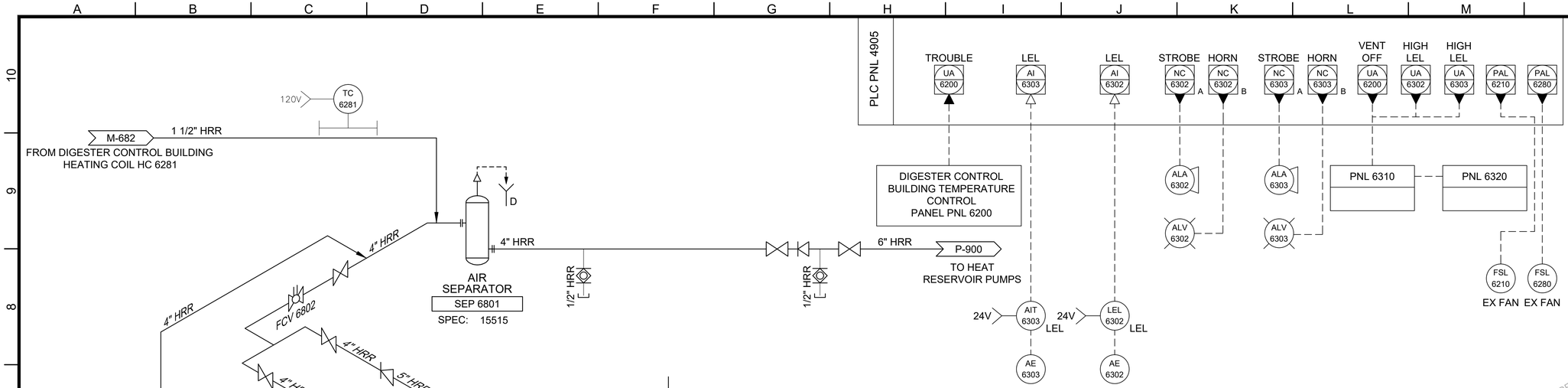
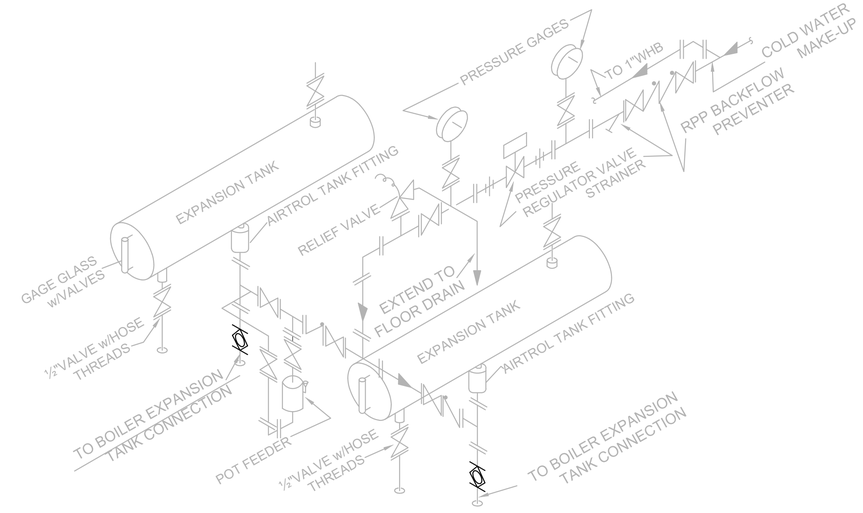


GENERAL NOTES:

1. NEW PARTS OF DRAWING ARE NOT DRAWN AS ISOMETRICS.
2. EXISTING PIPING NOT CONFIRMED. CONFIRM EXISTING PIPING IN FIELD.

KEY NOTES:

(1) CONNECT TO BOTTOM OF PIPE.



EXPANSION TANK DIAGRAM

Brown AND Caldwell SEATTLE, WASHINGTON	LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	EXTERNAL REFERENCE FILES 140912-G-001-TBLK.dwg
SUBMITTED: _____ DATE: _____ PROJECT MANAGER APPROVED: _____ DATE: _____ BROWN AND CALDWELL	DESIGNED: E. Jacobson DRAWN: S. Plancic CHECKED: E. Jacobson CHECKED: T. Thramer APPROVED: T. Giesbrecht	

RECORD DRAWING

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

PROCESS AND INSTRUMENTATION DIAGRAM
BOILERS

FILENAME	140912-P680.dwg
BC PROJECT NUMBER	140912
CLIENT PROJECT NUMBER	
DRAWING NUMBER	P-680
SHEET NUMBER	102 OF 508

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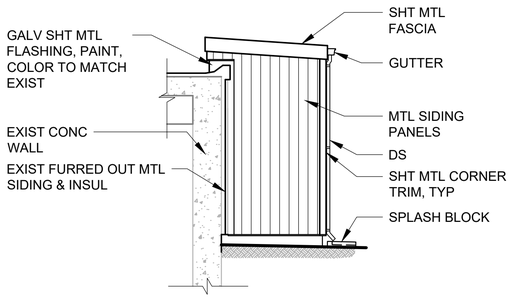
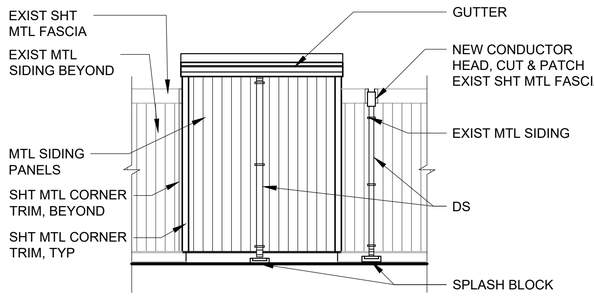


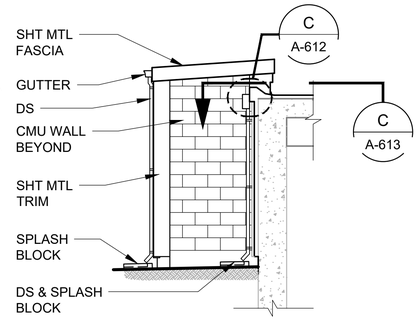
WEST ELEVATION

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



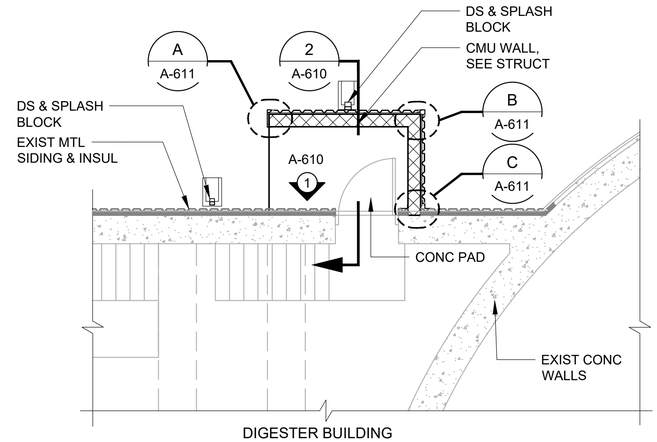
EAST ELEVATION

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



NORTH ELEVATION

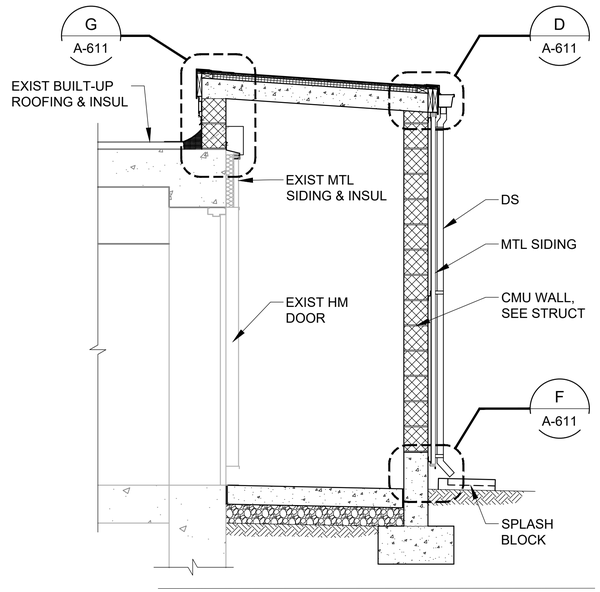
SCALE: 1/4" = 1'-0"



DIGESTER BUILDING

PARTIAL FLOOR PLAN

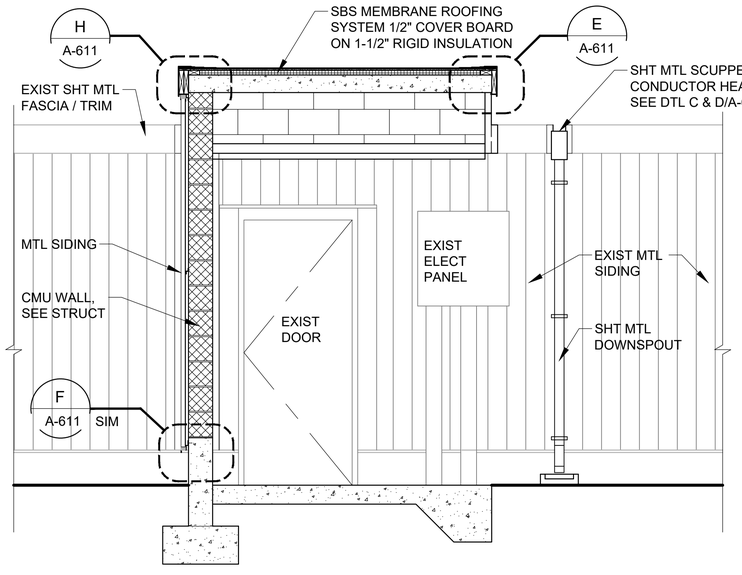
SCALE: 1/4" = 1'-0"



BUILDING SECTION

SECTION 2 / -

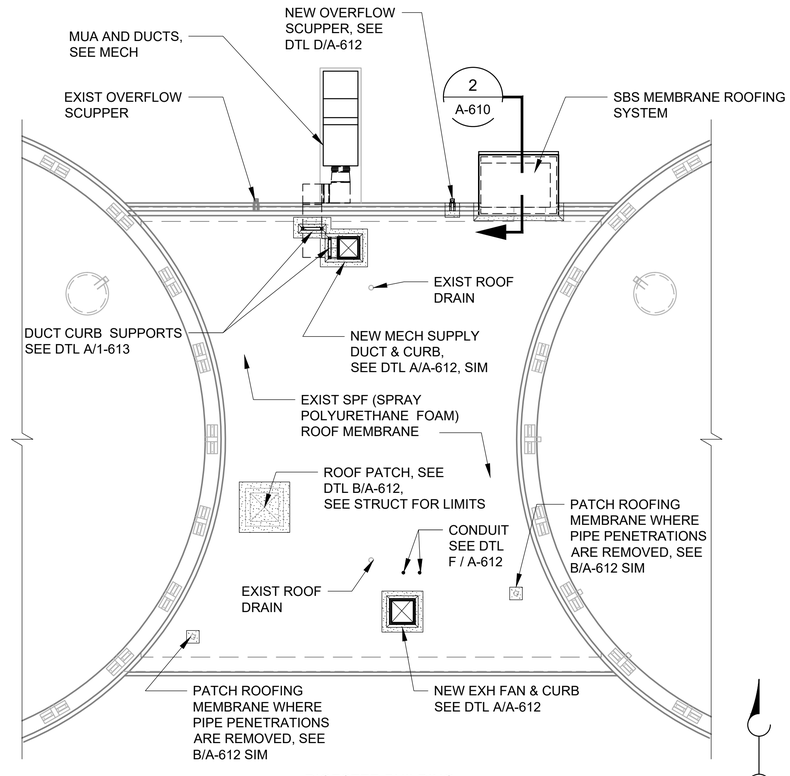
SCALE: 1/2"=1'-0"



BUILDING SECTION

SECTION 1 / -

SCALE: 1/2"=1'-0"



DIGESTER BUILDING

PARTIAL ROOF PLAN

SCALE: 1/8" = 1'-0"

NOTES:

1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DIMENSIONAL INFORMATION.

Brown AND Caldwell

SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:

DRAWN:

CHECKED:

CHECKED:

APPROVED:

EXTERNAL REFERENCE FILES

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140912-92-PLAN-KPG.dwg
140912-92-ELEV-KPG.dwg
140912-92-DTLS-KPG.dwg

RECORD DRAWING

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ARCHITECTURAL

DIGESTER BUILDING FLOOR AND ROOF PLANS, ELEVATIONS AND SECTIONS

FILENAME 140912-A610

BC PROJECT NUMBER 140912

CLIENT PROJECT NUMBER

DRAWING NUMBER A-610

SHEET NUMBER 139 OF 508

Mar 21, 2016 - 9:28am
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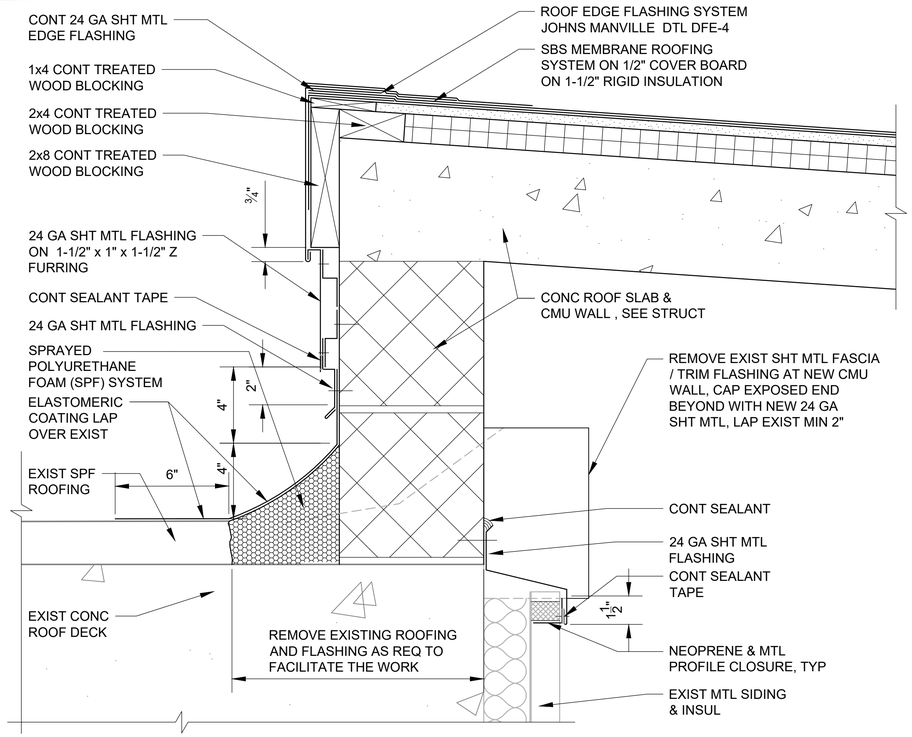
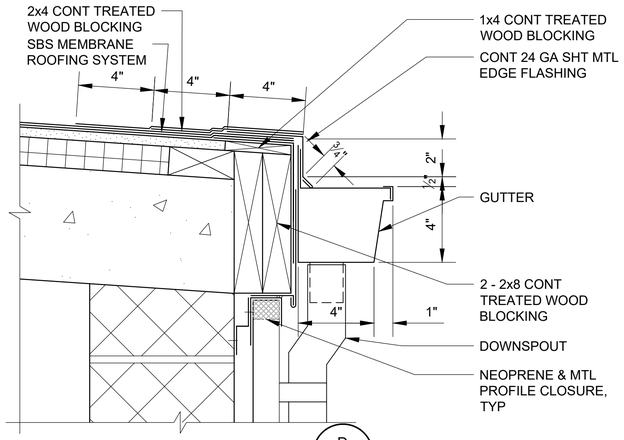


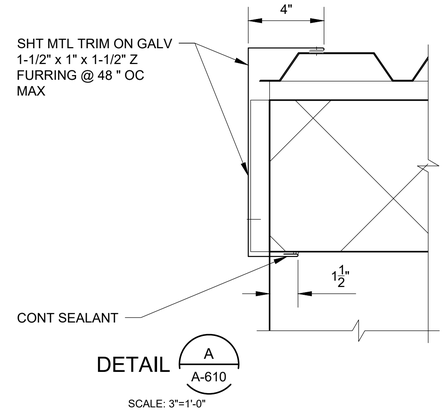
DETAIL G A-610

SCALE: 3"=1'-0"



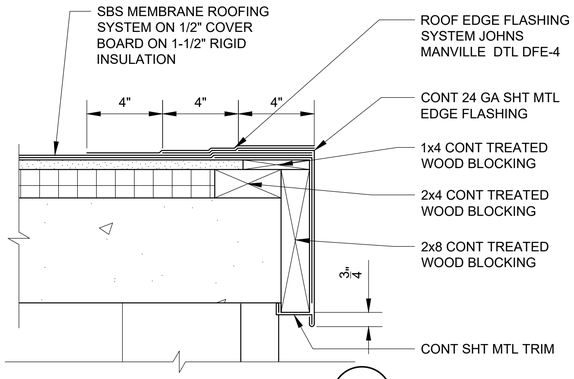
DETAIL D A-610

SCALE: 3"=1'-0"



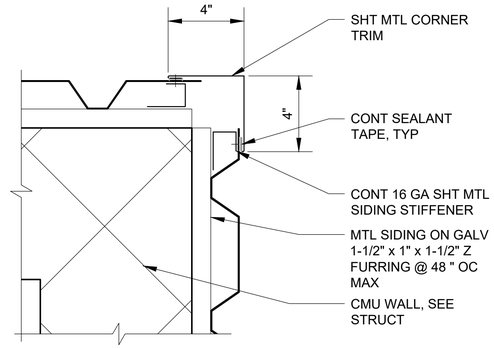
DETAIL A A-610

SCALE: 3"=1'-0"



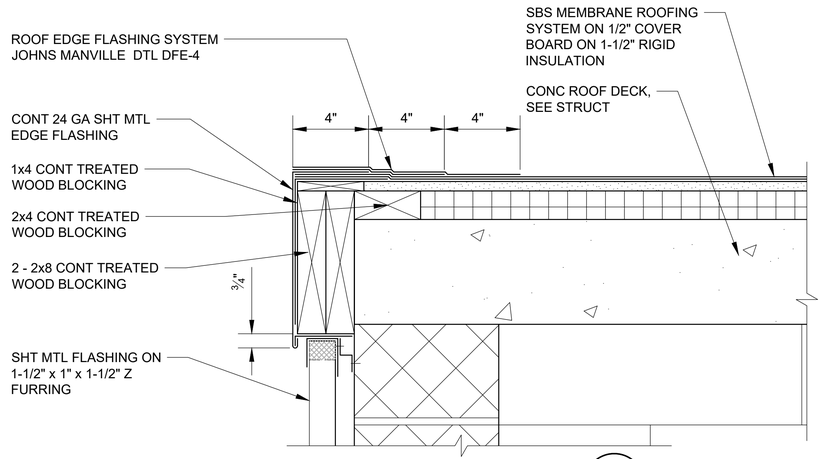
DETAIL E A-610

SCALE: 3"=1'-0"



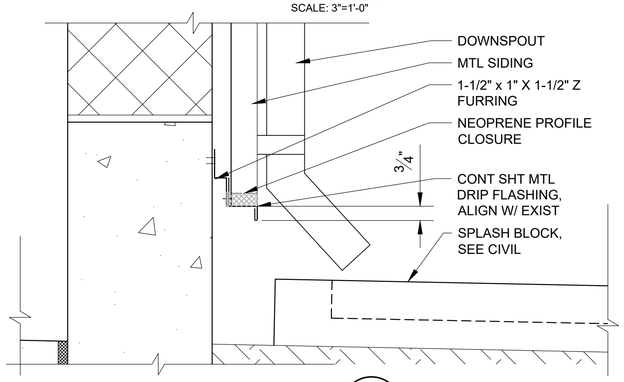
DETAIL B A-610

SCALE: 3"=1'-0"



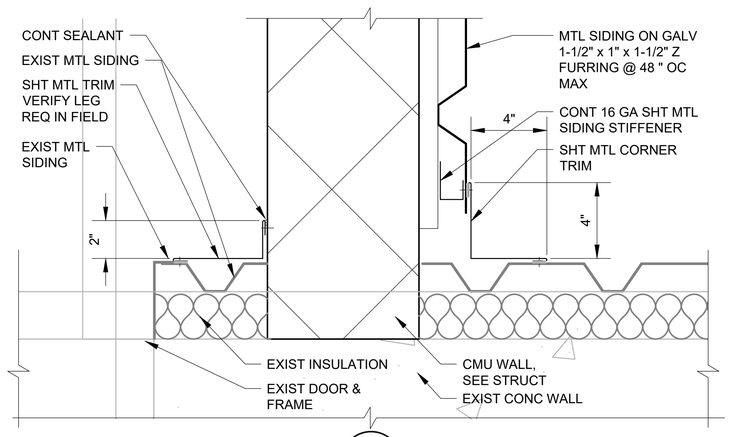
DETAIL H A-610

SCALE: 3"=1'-0"



DETAIL F A-610

SCALE: 3"=1'-0"



DETAIL C A-610

SCALE: 3"=1'-0"

NOTES:

1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DIMENSIONAL INFORMATION.

Brown AND Caldwell

SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ (PROJECT MANAGER)

APPROVED: _____ DATE: _____ (BROWN AND CALDWELL)

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES
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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ARCHITECTURAL

DIGESTER BUILDING DETAILS

FILENAME 140912-A611

BC PROJECT NUMBER 140912

CLIENT PROJECT NUMBER

DRAWING NUMBER A-611

SHEET NUMBER 140 OF 508

Mar 21, 2016 - 9:28am
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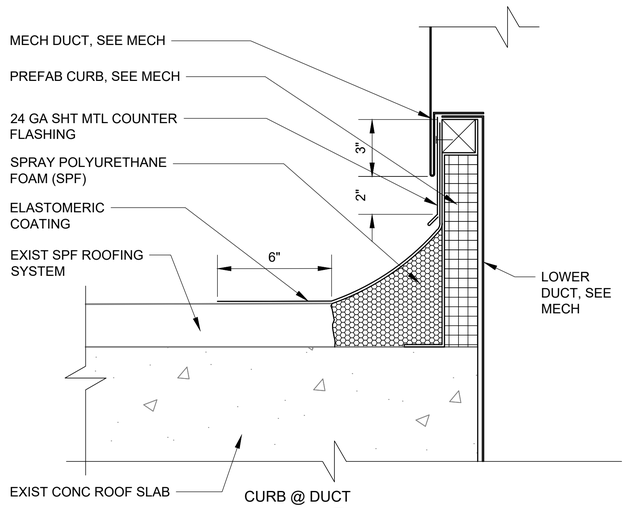
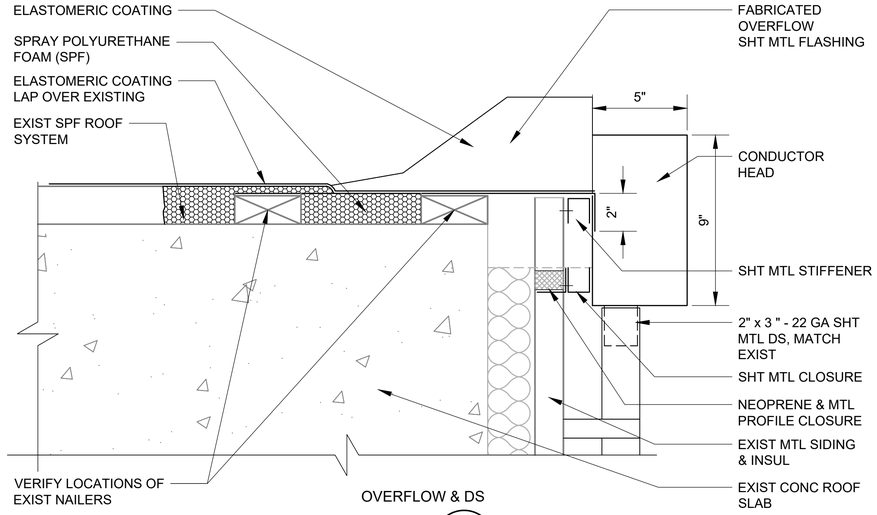


CURB @ DUCT

DETAIL E / A-610

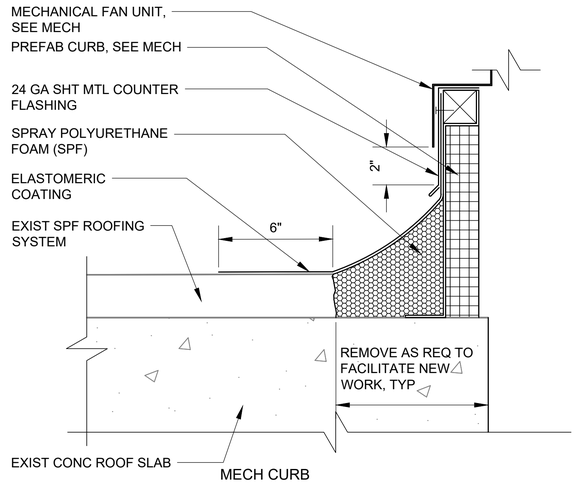
SCALE: 3"=1'-0"



OVERFLOW & DS

DETAIL C / A-610

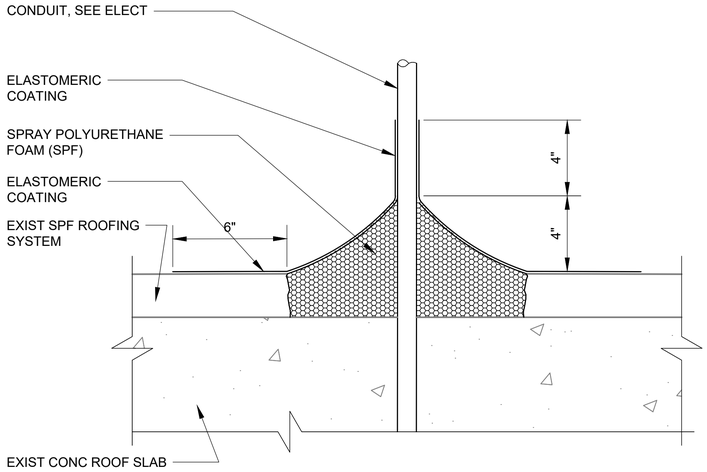
SCALE: 3"=1'-0"



MECH CURB

DETAIL A / A-610

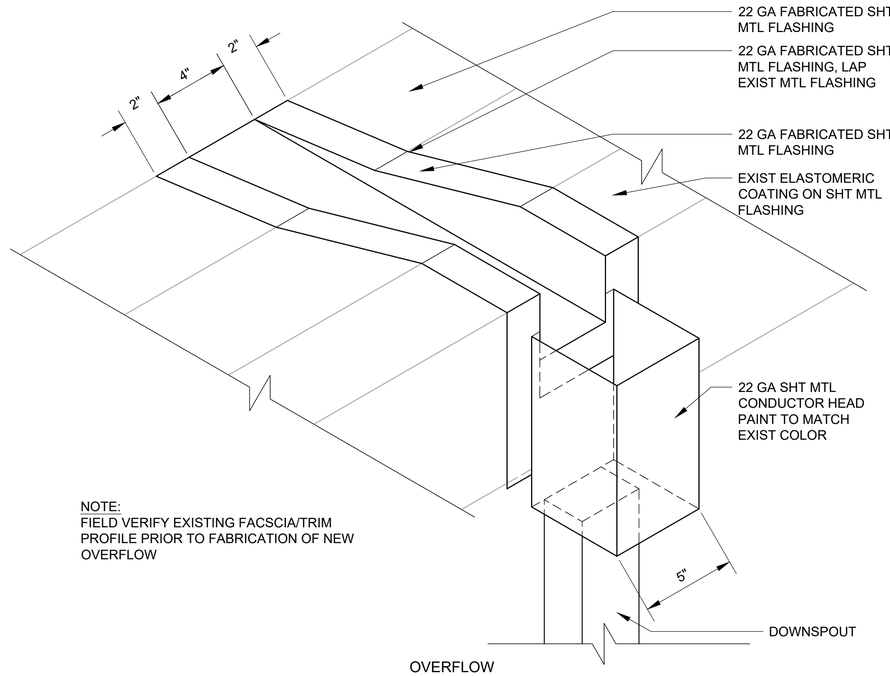
SCALE: 3"=1'-0"



CONDUIT PENETRATION

DETAIL F / A-610

SCALE: 3"=1'-0"

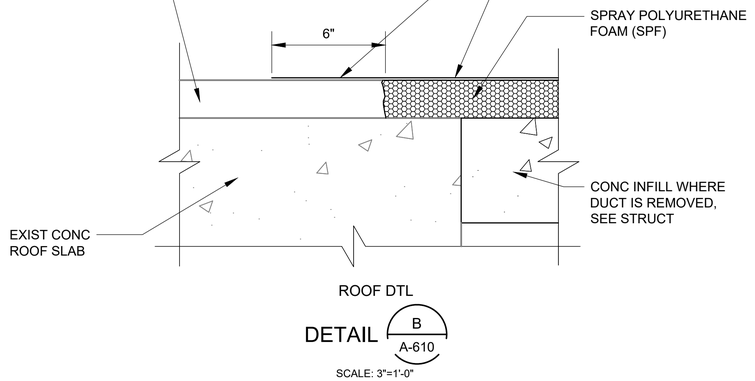


NOTE:
FIELD VERIFY EXISTING FACSCIA/TRIM PROFILE PRIOR TO FABRICATION OF NEW OVERFLOW

OVERFLOW

DETAIL D / A-610

SCALE: 3"=1'-0"



ROOF DTL

DETAIL B / A-610

SCALE: 3"=1'-0"

NOTES:

1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DIMENSIONAL INFORMATION.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ (PROJECT MANAGER)

APPROVED: _____ DATE: _____ (BROWN AND CALDWELL)

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES
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140912-92-DTLS-KPG.dwg

RECORD DRAWING

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ARCHITECTURAL

DIGESTER BUILDING DETAILS

FILENAME 140912-A612
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER A-612
SHEET NUMBER 141 OF 508

Mar 21, 2016 - 9:28am
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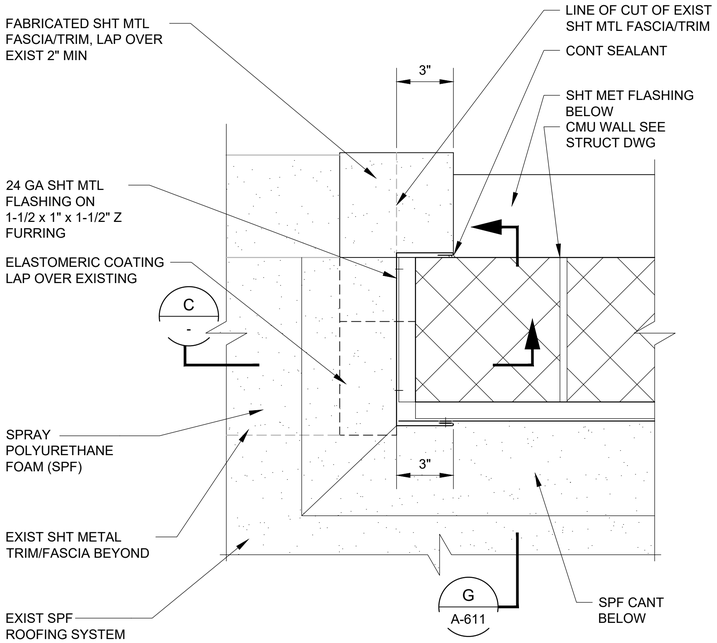
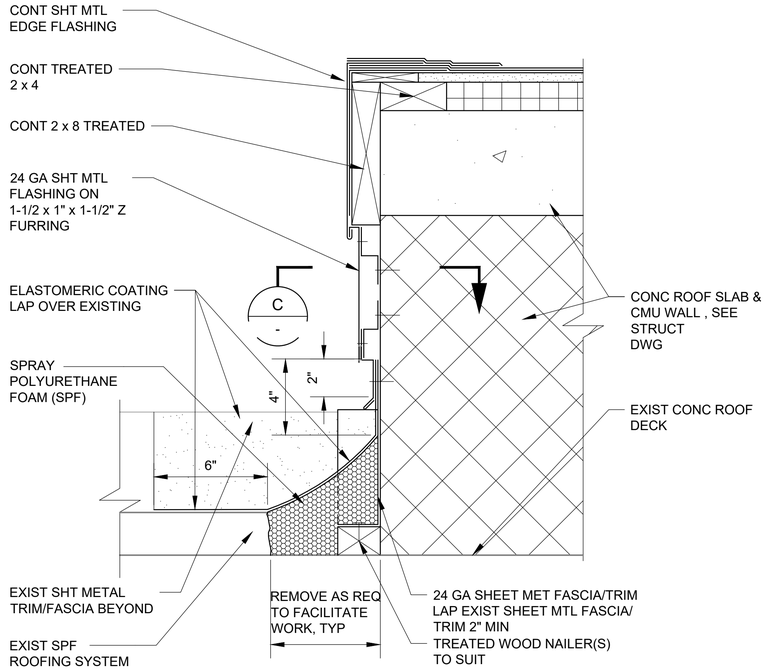
dfeiserla



FLASHING PLAN DETAIL

DETAIL C - , A-610

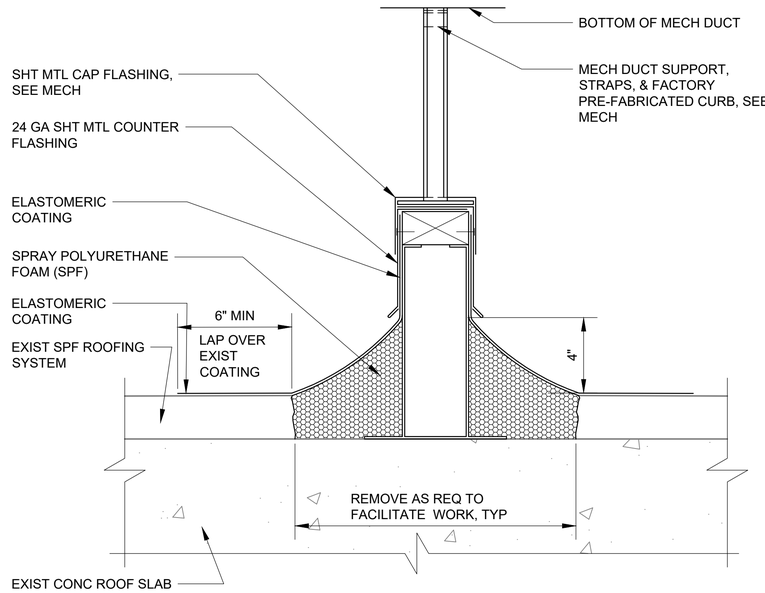
SCALE: 3"=1'-0"



FLASHING

DETAIL B -

SCALE: 3"=1'-0"



DUCT SUPPORT CURB

DETAIL A A-610

SCALE: 3"=1'-0"

NOTES:

1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DIMENSIONAL INFORMATION.

Brown AND Caldwell

SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ (PROJECT MANAGER)

APPROVED: _____ DATE: _____ (BROWN AND CALDWELL)

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:

DRAWN:

CHECKED:

CHECKED:

APPROVED:

EXTERNAL REFERENCE FILES

140912-G-001-TBLK.dwg
140912-92-DTLS-KPG.dwg

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ARCHITECTURAL

DIGESTER BUILDING DETAILS

FILENAME 140912-A613

BC PROJECT NUMBER 140912

CLIENT PROJECT NUMBER

DRAWING NUMBER A-613

SHEET NUMBER 142 OF 508

Mar 21, 2016 - 9:28am
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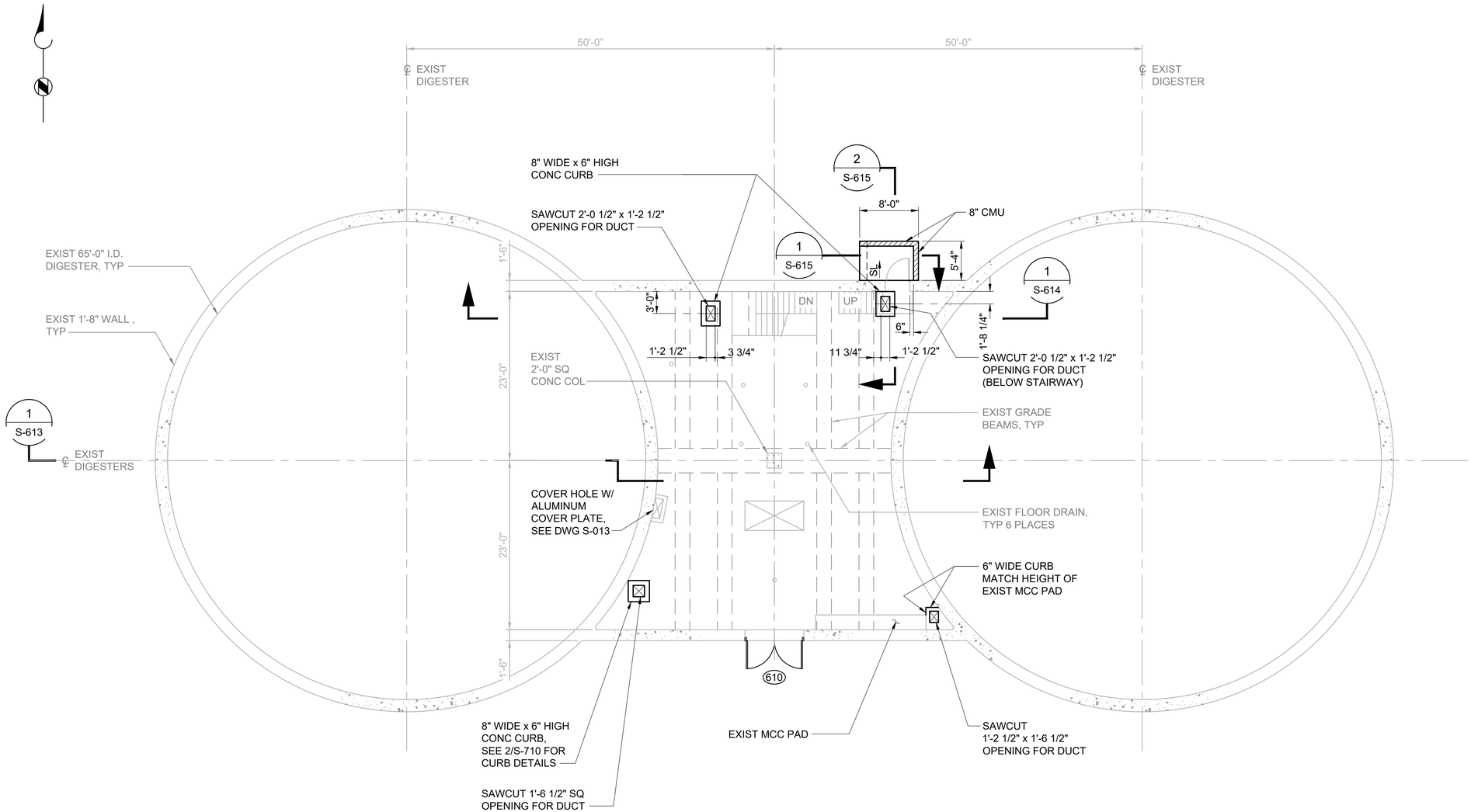
ddeatels

GENERAL NOTES:

1. (610) INDICATES DOOR NUMBER, SEE DRAWING A-002.



GRADE FLOOR PLAN

SCALE: 1/8" = 1'-0"

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: L. Ramey
DRAWN: J. Tu
CHECKED: D. McCleary
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-S-1-XE-WALL-BC.dwg
140912-92-S-2-XE-WALL-BC.dwg

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

STRUCTURAL
DIGESTERS
GRADE FLOOR PLAN

FILENAME 140912-S611.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-611
SHEET NUMBER 217 OF 508

Mar 22, 2016 - 2:34pm mpise
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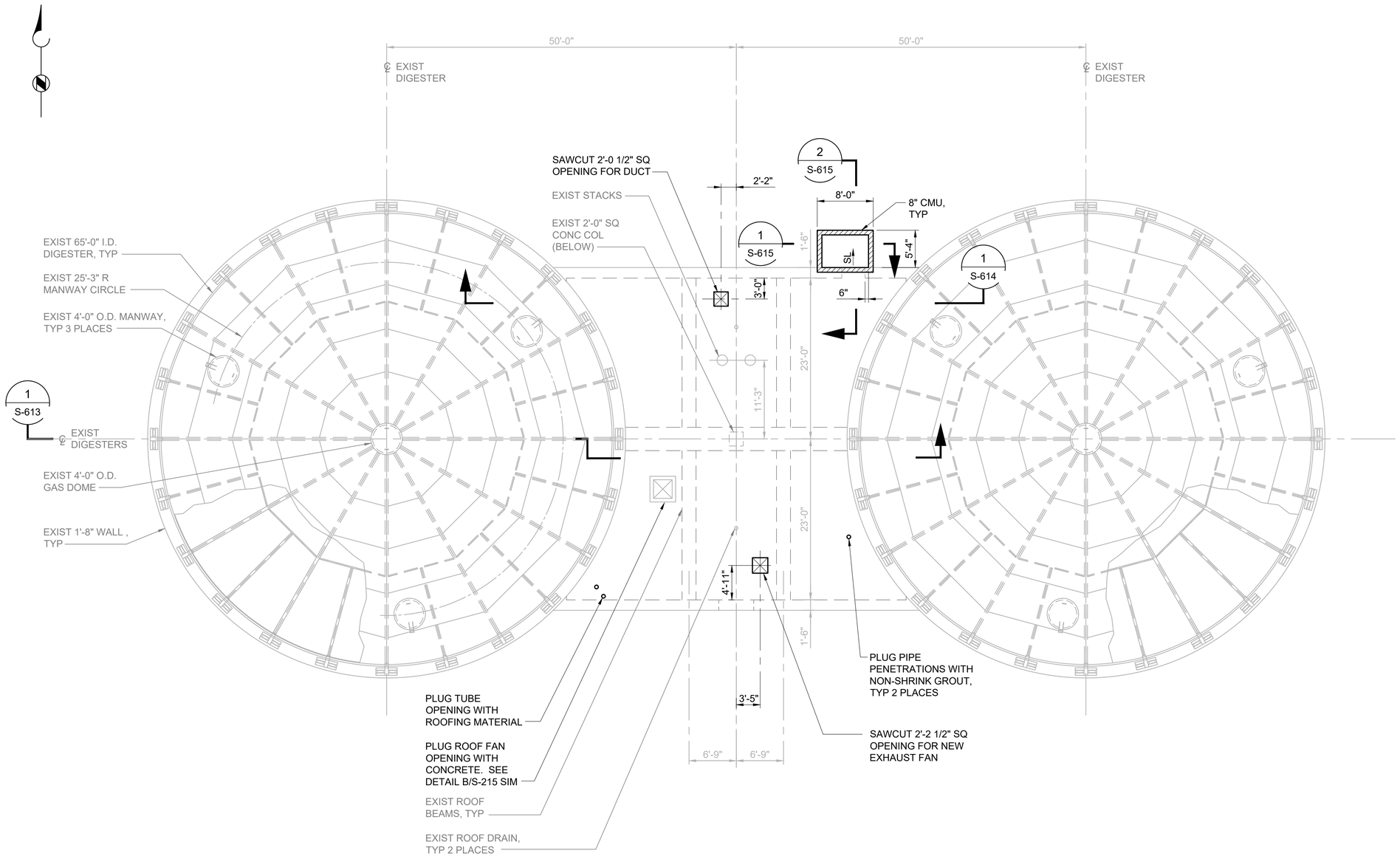

ROOF PLAN

SCALE: 1/8" = 1'-0"

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: L. Ramey
DRAWN: J. Tu
CHECKED: D. McCleary
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-S-1-XE-WALL-BC.dwg
140912-92-S-2-XE-WALL-BC.dwg
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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

STRUCTURAL
DIGESTERS
ROOF PLAN

FILENAME 140912-S612.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-612
SHEET NUMBER 218 OF 508

Mar 22, 2016 - 2:34pm mgise
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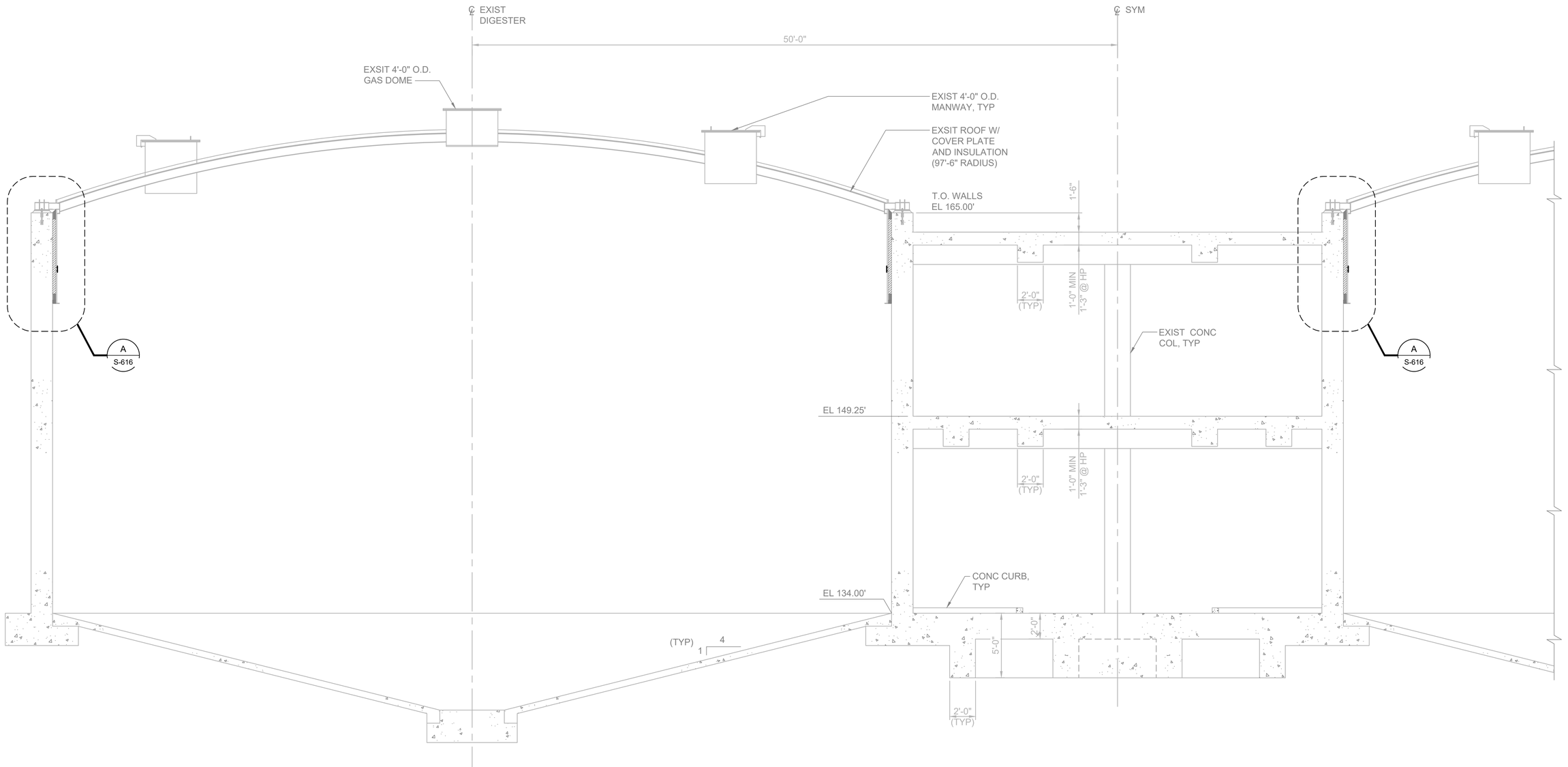

SECTION 1/S-611 1/S-612

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

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Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: L. Ramey
DRAWN: J. Tu
CHECKED: D. McCleary
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-S-9-XE-SECT-BC.dwg

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

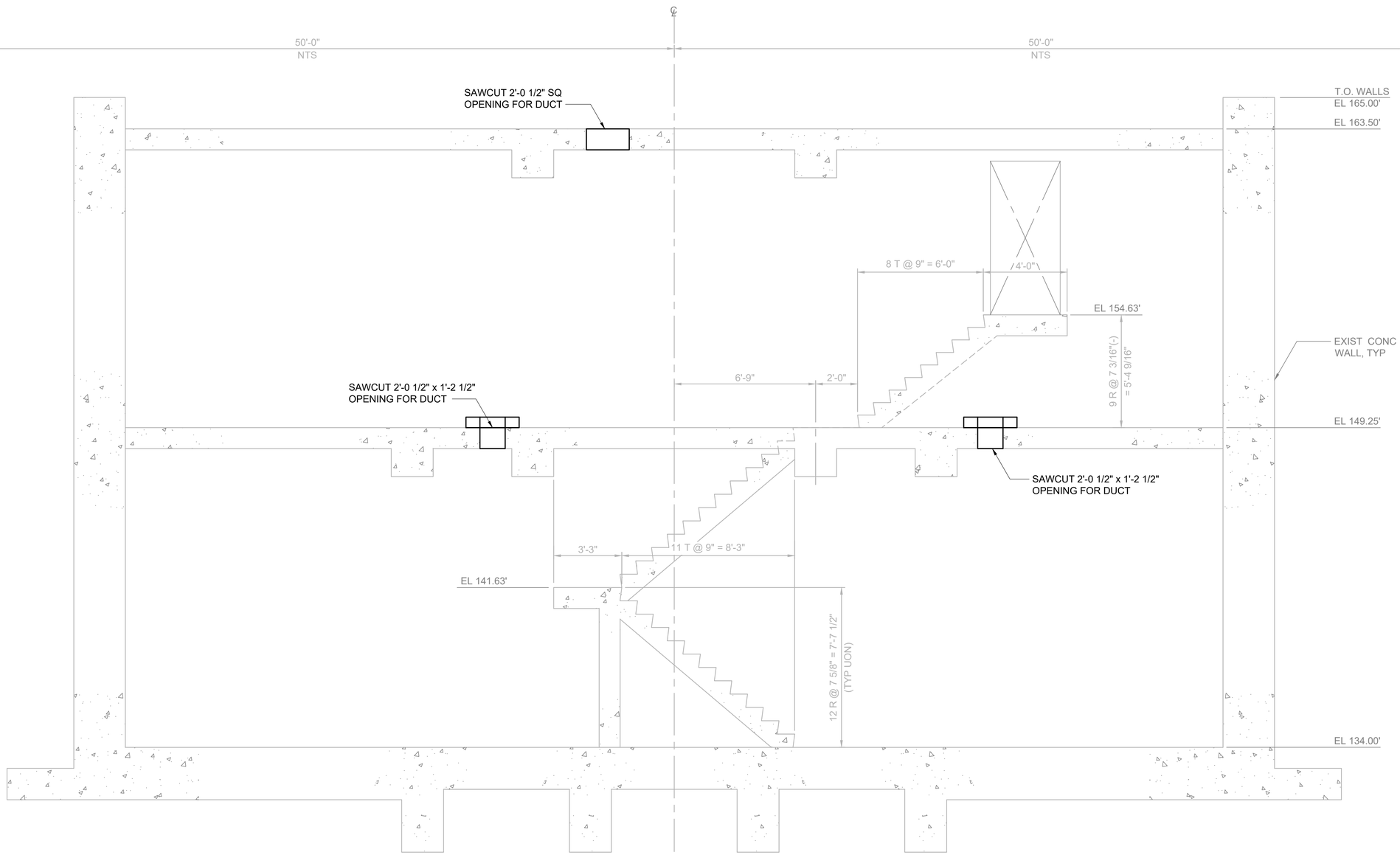
KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

STRUCTURAL
DIGESTERS
SECTION - 1

FILENAME 140912-S613.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-613
SHEET NUMBER 219 OF 508



SECTION 1/S-611 1/S-612

SCALE: 3/8"=1'-0"

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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DESIGNED: L. Ramey
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EXTERNAL REFERENCE FILES
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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

STRUCTURAL
DIGESTERS
SECTION - 2

FILENAME 140912-S614.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-614
SHEET NUMBER 220 OF 508

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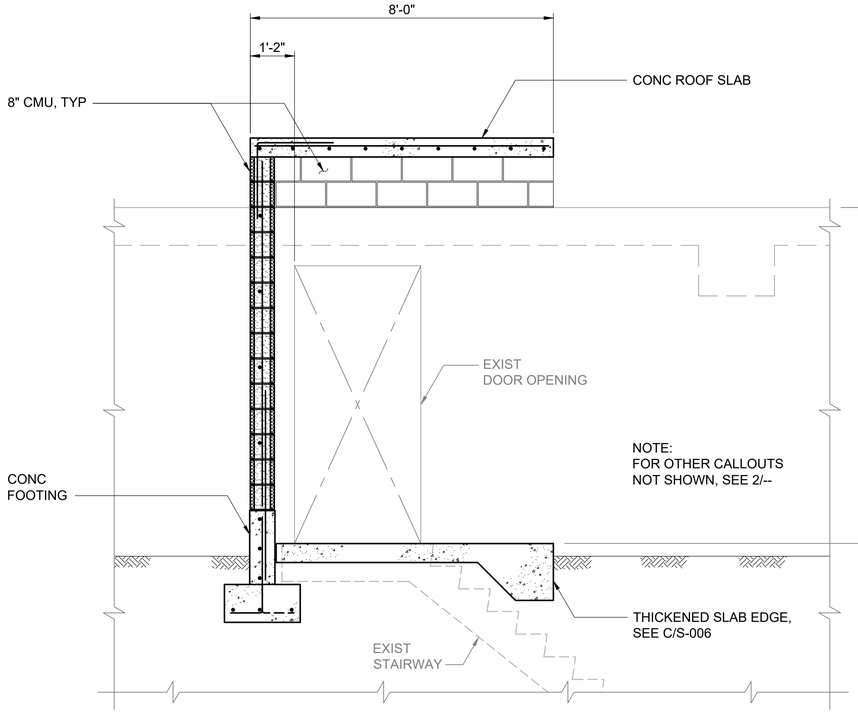

SECTION 1/S-611 1/S-612

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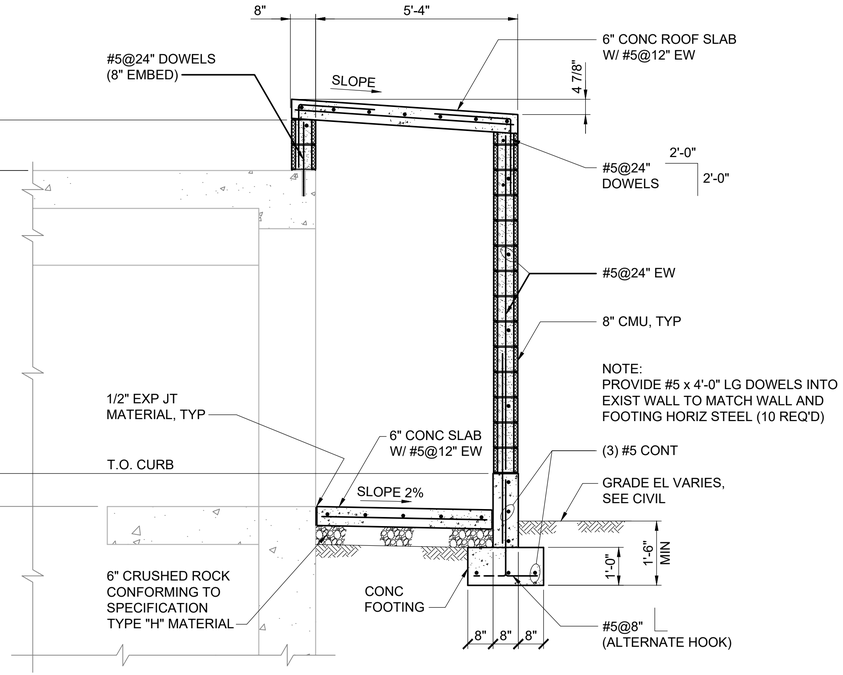
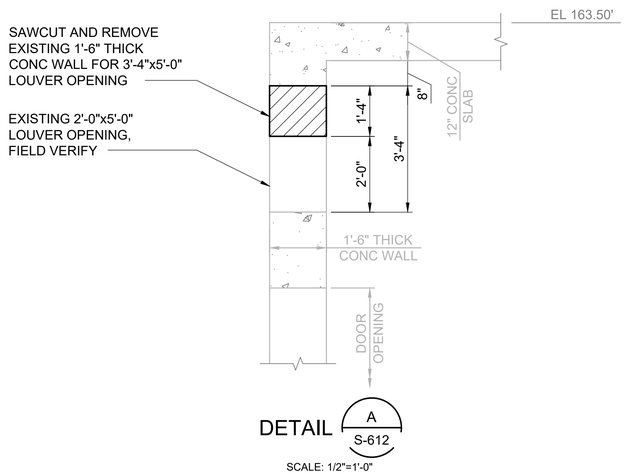


SECTION 2/S-611 2/S-612

SCALE: 1/2"=1'-0"



DETAIL A/S-612

SCALE: 1/2"=1'-0"

Brown AND Caldwell

SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
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(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: L. Ramey
DRAWN: J. Tu
CHECKED: D. McCleary
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
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140912-92-S-9-XE-SECT-BC.dwg

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		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

STRUCTURAL
DIGESTERS
SECTION - 3

FILENAME 140912-S615.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-615
SHEET NUMBER 221 OF 508

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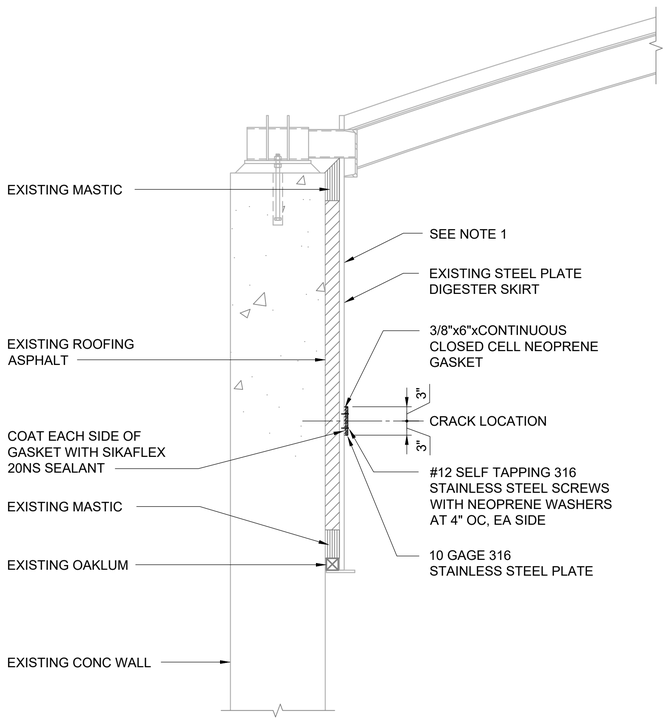
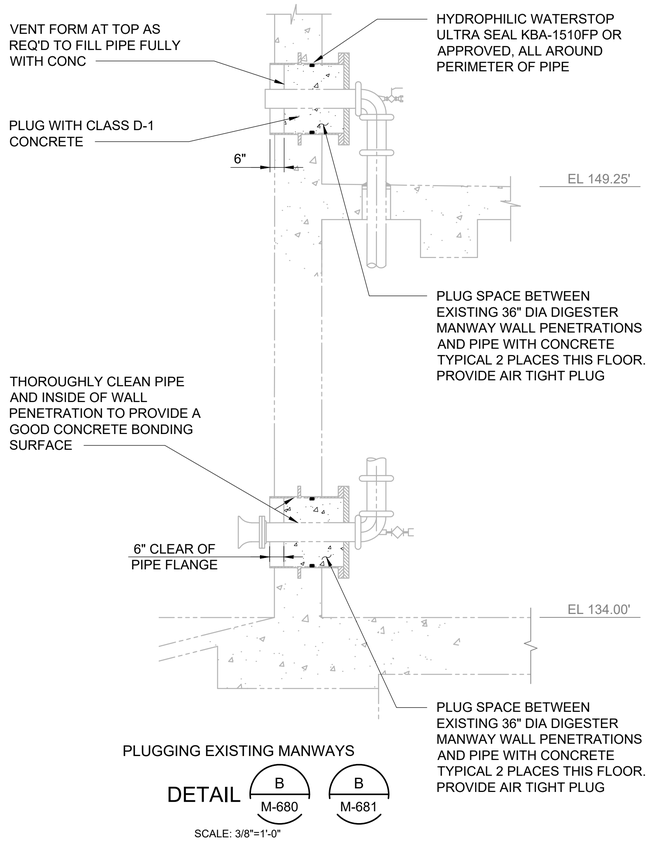


DIGESTER SKIRT CRACK REPAIR

DETAIL A / S-613

SCALE: 3/4"=1'-0"



PLUGGING EXISTING MANWAYS

DETAIL B / M-680 B / M-681

SCALE: 3/8"=1'-0"

GENERAL NOTES:

1. CLEAN DIGESTER STEEL SKIRT TO EXISTING COATING SYSTEM. INSPECT FOR CRACKS. REPAIR ALL CRACKS IN SKIRT AS DIRECTED BY CONSTRUCTION MANAGER.

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Mar 22, 2016 - 2:34pm
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Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: L. Ramey
DRAWN: J. Tu
CHECKED: D. McCleary
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-S-9-XE-SECT-BC.dwg

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

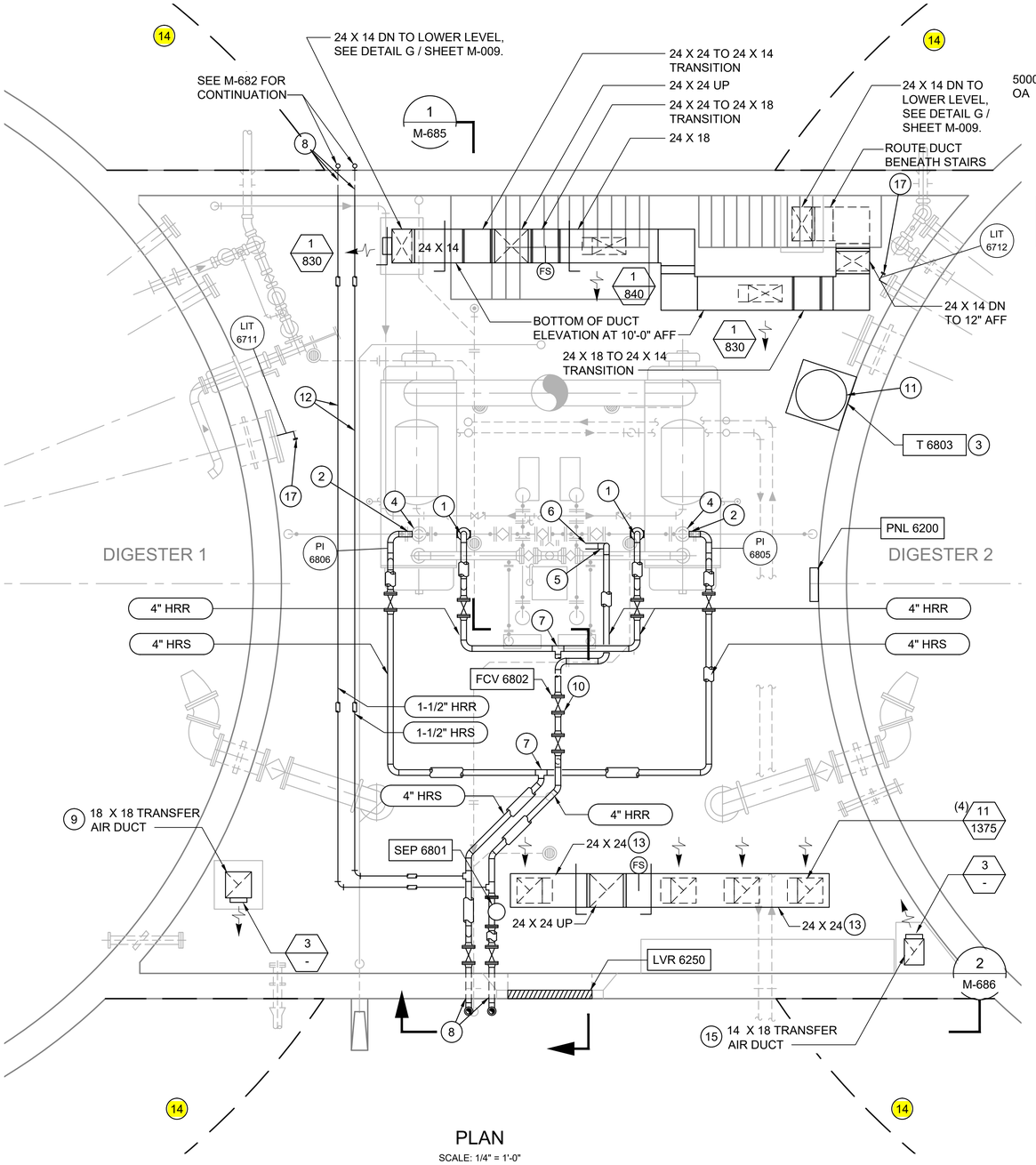
KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

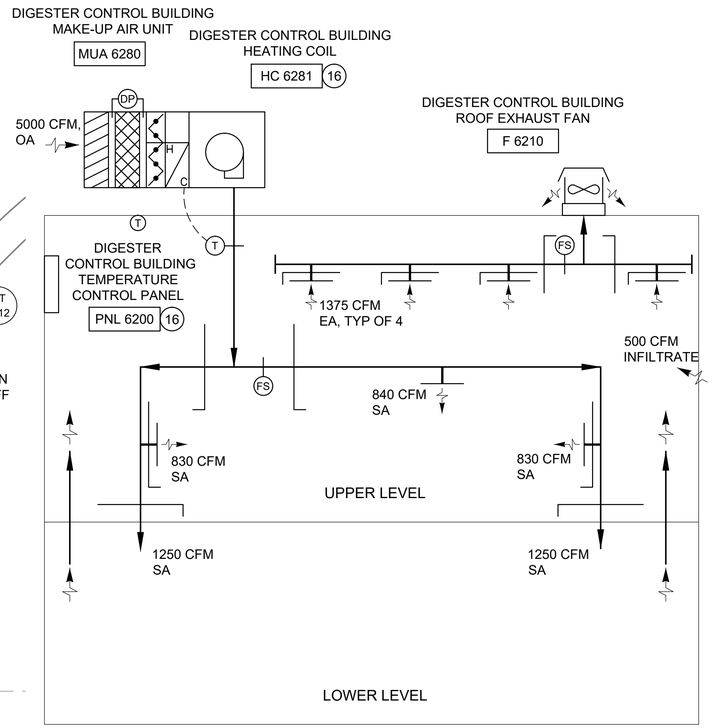
STRUCTURAL
DIGESTERS
SECTION - 4

FILENAME 140912-S616.dwg
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER S-616
SHEET NUMBER 222 OF 508



PLAN

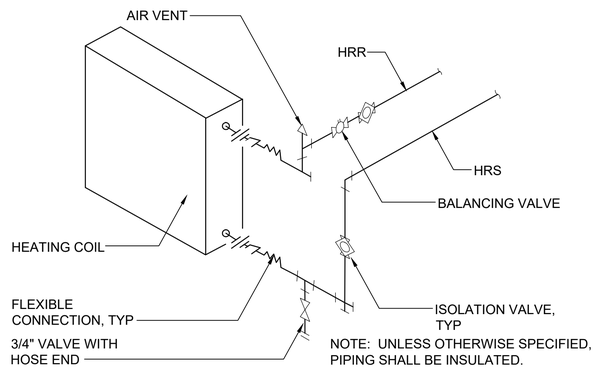
SCALE: 1/4" = 1'-0"



DIGESTER CONTROL BUILDING

AIR FLOW SCHEMATIC

SCALE: NONE



HOT WATER COIL PIPING DIAGRAM

DETAIL A M-682

SCALE: NONE

GENERAL NOTES:

1. EXISTING PIPING AND CONDUIT NOT CONFIRMED. CONFIRM EXISTING PIPING AND CONDUIT ROUTING IN FIELD AND ROUTE PIPING TO AVOID CONFLICT.
2. DO NOT ROUTE PIPING ABOVE ELECTRICAL CABINETS.
3. FOR CONTINUATION OF UNDERGROUND PIPING, SEE CIVIL DRAWINGS.
4. ALL MITERED ELBOWS AND TEES SHALL HAVE TURNING VANES.
5. ALL DIFFUSERS, REGISTERS, AND GRILLES SHALL HAVE MANUAL BALANCING DAMPERS.

KEY NOTES:

1. CONNECT NEW 4" HRR PIPING TO EXISTING.
2. CONNECT NEW 4" HRS PIPING TO EXISTING.
3. FIELD ROUTE 1 1/2" HRS AND CONNECT TO EXISTING PIPING. PROVIDE UNION AT TANK CONNECTION. FIELD ROUTE 1" HRS TO DRAIN.
4. LOCATE ISOLATION VALVE IN VERTICAL. VALVE SHALL BE INSTALLED IN EXISTING PIPE ABOVE NEW BRANCH CONNECTION.
5. LOCATE ISOLATION VALVE IN VERTICAL.
6. CONNECT TO EXISTING BLIND FLANGE.
7. LOCATE TEE WITHIN 2' OF PIPE MIDPOINT.
8. TYPE X1 PENETRATION PER DRAWING M-001. ROUTE PIPE TO AVOID LOUVERS AND DOOR. WALL PENETRATION FLASHING SHALL COMPLY WITH FIGURE 6-36 OF THE SMACNA ARCHITECTURAL SHEET METAL MANUAL-5TH EDITION.
9. TRANSFER AIR DUCT SHALL BE CAPPED AT TOP. TOP OF DUCT SHALL BE 2'-6" ABOVE FINISHED FLOOR. SEE DETAIL G ON SHEET M-009 FOR TRANSFER AIR DUCT CURB CONNECTION.
10. INSTALL FLOW BALANCING VALVES WITH ADEQUATE STRAIGHT RUNS UPSTREAM AND DOWNSTREAM OF VALVE PER MANUFACTURER'S RECOMMENDATION.
11. TYPE E EQUIPMENT PAD PER DRAWING S-008. ANCHORAGE OF TANK BY EQUIPMENT SUPPLIER PER NOTE 3 ON DRAWING S-008. ANCHOR TO DEVELOP IN EXISTING 12" CONCRETE SLAB BELOW EQUIPMENT PAD.
12. ROUTE PIPE AT MINIMUM ELEVATION OF 7 FT ABOVE FLOOR TO BOTTOM OF PIPE.
13. ROUTE EXHAUST DUCT AT ELEVATION THAT DOES NOT CONFLICT WITH EXISTING LIGHTS AND CONDUIT.
14. HAZARDOUS / CLASSIFIED AREA. ALL EQUIPMENT SHALL BE RATED CLASS 1, DIVISION 1.
15. TRANSFER AIR DUCT SHALL BE CAPPED AT TOP. TOP OF DUCT SHALL BE BELOW OPENING RADIUS OF EXISTING ELECTRICAL PANEL. SEE DETAIL G ON SHEET M-009 FOR TRANSFER AIR DUCT CURB CONNECTION.
16. PROVIDE AN ELECTRIC TWO POSITION SWITCH AT 8-AMPS MINIMUM AT 120 VOLTS WITH MANUAL RESET AND 20-FOOT AVERAGING BULB. RANGE SHALL BE 35° F TO 55° F WITH STOP AT 35° F. THE SUMMATION OF ANY 12 INCHES OF BULBS AT TEMPERATURE 1° F BELOW SET POINT OF TEMPERATURE SWITCH SHALL BREAK TEMPERATURE SWITCH CONTACTS.
17. DIGESTER LEVEL INSTRUMENT.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: E. Jacobson
DRAWN: J. Moffat
CHECKED: E. Jacobson
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-92-M-2-XE-PIPE-BC.dwg
140912-G-001-TBLK.dwg
140912-92-M-3-XN-PIPE-BC.dwg

RECORD DRAWING

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REVISIONS

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KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL

DIGESTER HOT WATER CONNECTION PLAN

FILENAME 140912-M680.DWG
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER M-680
SHEET NUMBER 291 OF 508

Mar 21, 2016 - 9:52am d4eatella
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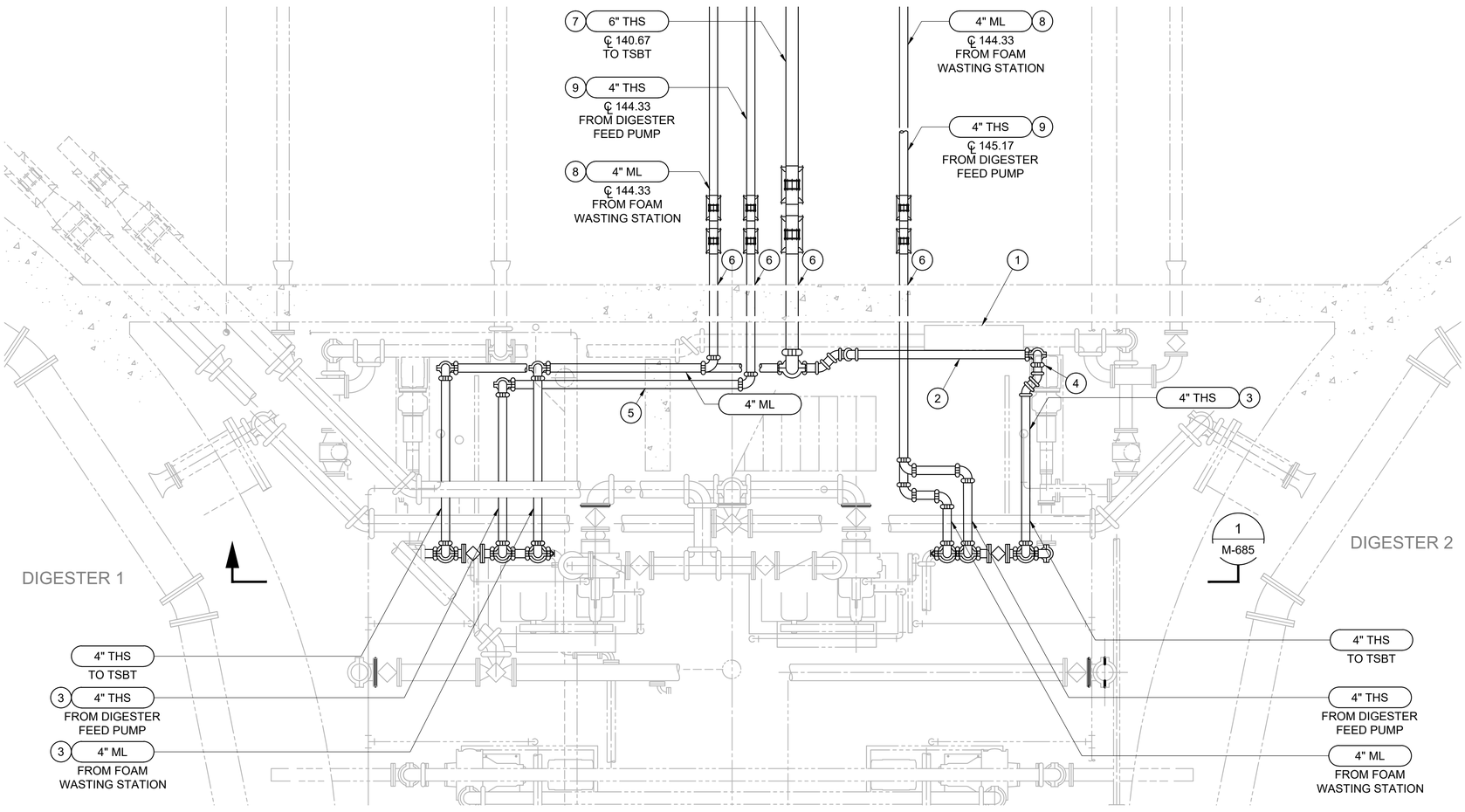

BASEMENT
PLAN
SCALE: 3/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION OF EQUIPMENT, PIPING, AND ELECTRICAL CONDUIT AND ROUTE PIPING TO AVOID CONFLICTS.
2. LAYOUT OF EXISTING PIPES AND ROUTING OF NEW PIPES BASED ON PRIOR DESIGN DRAWING. CONTRACTOR SHALL FIELD VERIFY ALL PIPES AND INCORPORATE THESE INTO SUBMITTED PIPING LAYOUT IN ACCORDANCE WITH SPECIFICATION SECTION 15050.
3. INSULATE ANY PIPING OVER CONTROL PANELS, MOTORS, AND OTHER ELECTRICAL EQUIPMENT. SPECIFIC INSULATION REQUIREMENTS ARE LISTED BY KEYNOTES. ADDITIONAL OR OTHER INSULATION REQUIREMENTS MAY BE NEEDED BASED ON ACTUAL FIELD CONDITIONS AND CONTRACTOR'S PROPOSED PIPE ROUTING.

KEY NOTES:

1. APPROXIMATE LOCATION OF PANEL.
2. PIPING SHALL CLEAR PANEL.
3. INSULATE HORIZONTAL PIPING RUN OVER PANEL. EXTEND INSULATION 12" BEYOND PANEL ON BOTH SIDES.
4. INSULATE HORIZONTAL PIPING RUN OVER MOTOR. EXTEND INSULATION 12" BEYOND MOTOR ON BOTH SIDES.
5. CORE DRILLS SHALL BE AS SMALL AS POSSIBLE.
6. TYPE X2 WALL PENETRATION , TYPICAL.
7. SEE DRAWING P-450 FOR P&ID REFERENCE.
8. SEE DRAWING P-250 FOR P&ID REFERENCE.
9. SEE DRAWING P-452 FOR P&ID REFERENCE.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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DESIGNED: E. Jacobson
DRAWN: J. Moffat
CHECKED: B. Vestergaard-Hansen
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-92-M-1-XN-PIPE-BC.dwg
140912-G-001-TBLK.dwg
140912-92-M-1-XE-PIPE-BC.dwg

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KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL
DIGESTER CONTROL ROOM
BASEMENT PIPING
THS PIPING MODIFICATIONS

FILENAME 140912-M681.DWG
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER M-681
SHEET NUMBER 292 OF 508

Mar 30, 2016 - 11:46am dkeatells
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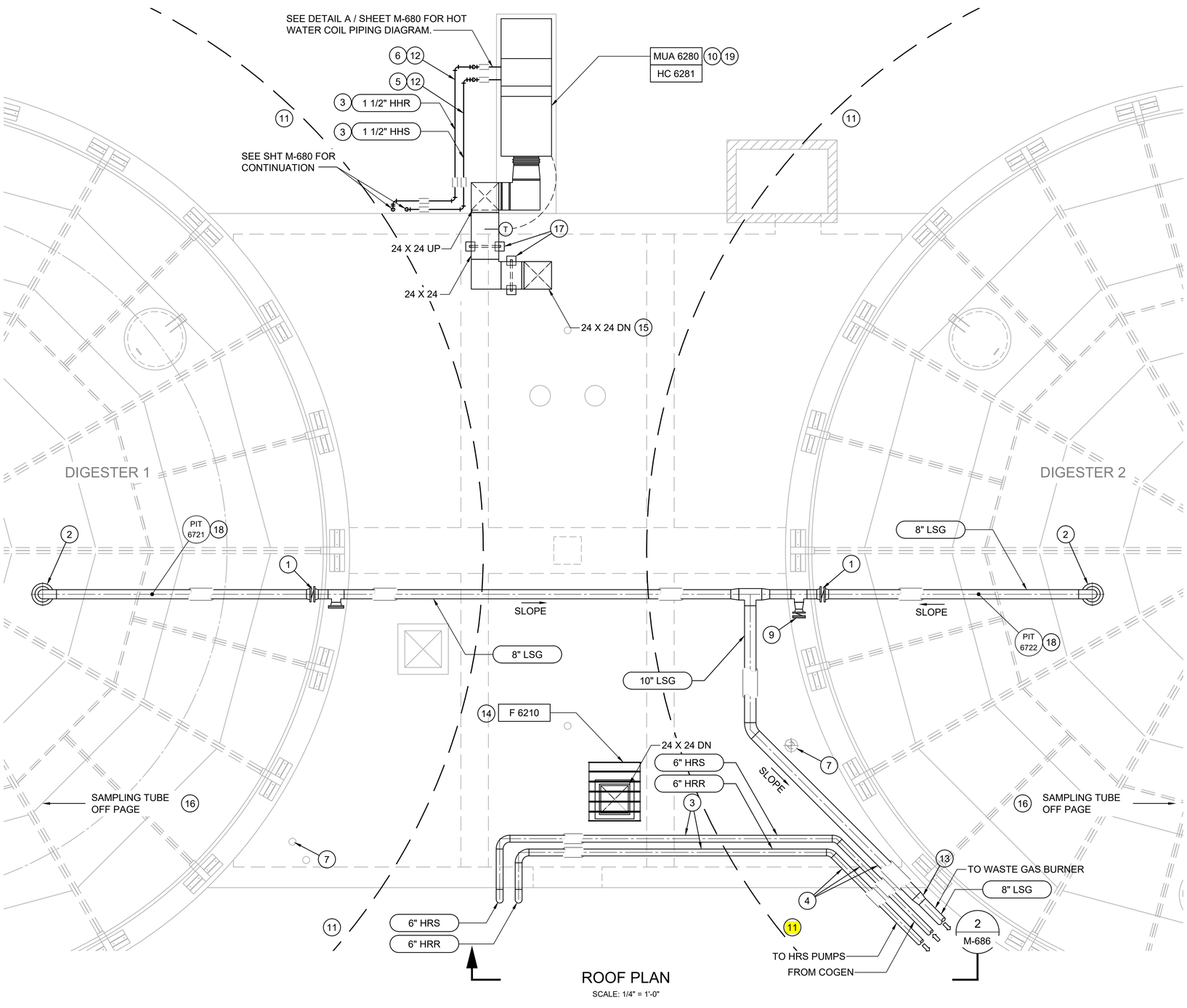

ROOF PLAN

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

GENERAL NOTES:

1. EXISTING PIPING AND CONDUIT NOT CONFIRMED. CONFIRM EXISTING PIPING AND CONDUIT ROUTING IN FIELD AND ROUTE NEW PIPING TO AVOID CONFLICT.
2. DO NOT ROUTE PIPING ABOVE ELECTRICAL CABINETS.
3. ALL MITERED ELBOWS SHALL HAVE TURNING VANES.
4. SLOPE LSG PIPE AT 2% MINIMUM.
5. LOCATE ROOF PENETRATIONS A MINIMUM OF 10 FEET FROM DIGESTER WALLS.

KEY NOTES:

(1) LOCATE VALVE 12 INCHES FROM COVER EDGE.

(2) SEE DETAIL G SHT M-005 FOR ROOF PENETRATION DETAIL. LOCATE PENETRATION CENTERED BETWEEN STRUCTURAL SUPPORTS AT 12 FEET FROM COVER CENTER. CONTRACTOR TO FIELD VERIFY COVER ORIENTATION AND ROUTE PIPING ACCORDINGLY.

(3) PROVIDE MANUAL AIR VENTS AT HIGH POINTS.

(4) ROUTE PIPE TO AVOID GUARD RAIL.

(5) INSULATE AND HEAT TRACE PER SECTION 15250 AND SECTION 15265 (TC 6281).

(6) INSULATE AND HEAT TRACE PER SECTION 15250 AND SECTION 15265 (TC 6282).

(7) EXISTING 6" DIGESTER GAS CONNECTION WITH BLIND FLANGE.

(8) TEMPORARY 6" LSG PIPING FOR TESTING OF NEW WASTE GAS BURNER. CONNECT TO EXISTING 6" DIGESTER GAS SYSTEM PER SECTION 0104. DEMOLISH 6" LSG PIPING AFTER FLARE COMMISSIONING. PROVIDE BLIND FLANGE AFTER COMMISSIONING.

(9) LOCATE BRANCH CONNECTION AND BUTTERFLY VALVE (WHERE SHOWN) WITHIN 1-FOOT AND INTERIOR OF DIGESTER WALL.

(10) MAKE-UP AIR UNIT LOCATED AT GRADE.

(11) HAZARDOUS / CLASSIFIED AREA. ALL EQUIPMENT SHALL BE RATED CLASS 1, DIVISION 1.

(12) ROUTE PIPE A MINIMUM 7 FEET ABOVE FINISHED GRADE.

(13) ECCENTRIC REDUCER WITH FLAT ON BOTTOM TO ALLOW CONDENSATE DRAINAGE.

(14) FOR EQUIPMENT CURB ON INSULATED ROOF INSTALLATION, SEE DETAIL A ON DRAWING A-610.

(15) FOR DUCT PENETRATION THRU INSULATED ROOF, SEE DETAIL E ON DRAWING A-610.

(16) FOR SAMPLE TUBE, SEE DETAIL D ON DRAWING M-004.

(17) ROOF MOUNTED DUCT SUPPORTS SHALL BE COOPER B-LINE DB-DS SERIES, OR EQUAL. SPECIFIC SUPPORT LOCATIONS SHALL BE DETERMINED BY CONTRACTOR. FOR DUCT SUPPORT ROOF MOUNTING, SEE DETAIL F ON DRAWING M-009.

(18) DIGESTER GAS PRESSURE TRANSMITTER.

(19) PROVIDE AN ELECTRIC TWO POSITION SWITCH AT 8-AMPS MINIMUM AT 120 VOLTS WITH MANUAL RESET AND 20-FOOT AVERAGING BULB. RANGE SHALL BE 35° F TO 55° F WITH STOP AT 35° F. THE SUMMATION OF ANY 12 INCHES OF BULBS AT TEMPERATURE 1° F BELOW SET POINT OF TEMPERATURE SWITCH SHALL BREAK TEMPERATURE SWITCH CONTACTS.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:	J. Novak
DRAWN:	J. Novak
CHECKED:	T. Gatlin
CHECKED:	T. Thramer
APPROVED:	T. Giesbrecht

EXTERNAL REFERENCE FILES

140912-G-001-TBLK.dwg
140912-92-S-3-XE-WALL-BC.dwg
140912-92-M-3-XN-PIPE-BC.dwg

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KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL

DIGESTER CONTROL BUILDING

ROOF PLAN

FILENAME	140912-M680.DWG
BC PROJECT NUMBER	140912
CLIENT PROJECT NUMBER	
DRAWING NUMBER	M-682
SHEET NUMBER	293 OF 508

Mar 21, 2016 - 9:53am dfeiserla
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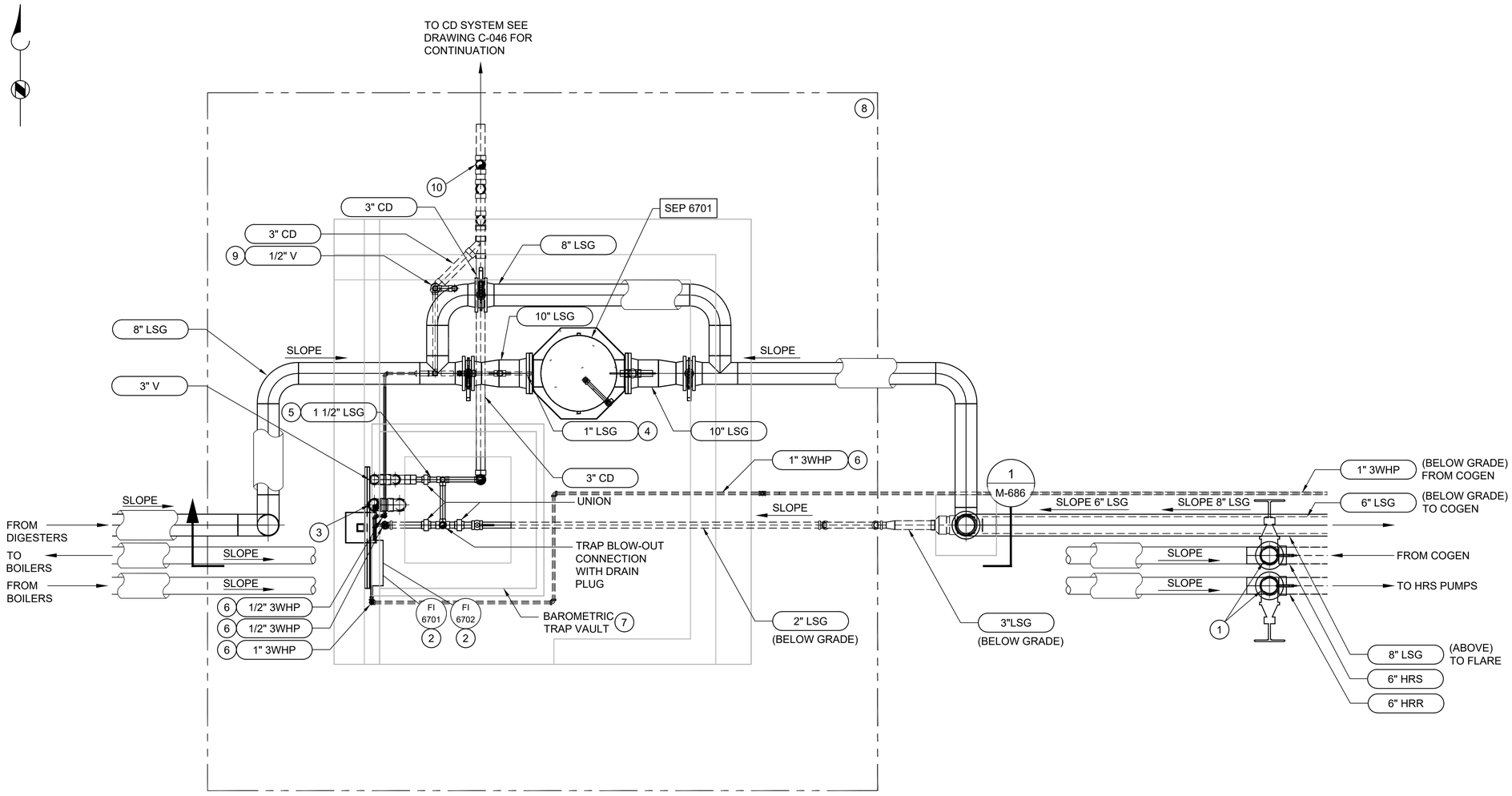

PLAN

SCALE: 1/2" = 1'-0"

GENERAL NOTES:

1. FOR CONTINUATION OF UNDERGROUND PIPING, SEE CIVIL DRAWINGS.
2. SLOPE ALL ABOVE GROUND LSG PIPING TOWARDS SEDIMENT TRAP WITH MINIMUM 2% SLOPE.
3. SLOPE ALL BURIED LSG PIPING AT 4% MINIMUM SLOPE.

KEY NOTES:

(1) LOCATE ISOLATION VALVES IN VERTICAL AS CLOSE AS PRACTICAL TO GRADE. INSTALL DRAIN VALVES IMMEDIATELY ABOVE ISOLATION VALVES.

(2) PROVIDE PRIMING WATER FLOW CONTROL UNITS, INCLUDING ROTAMETERS AND NEEDLE VALVES, MOUNTED AND SUPPORTED ON COMMON GALVANIZED STEEL PLATE.

(3) PROVIDE 4" PVC VENT FOR BAROMETRIC TRAP VAULT.

(4) INSULATE AND HEAT TRACE ALL EXPOSED LSG CONDENSATE PIPING PER SECTION 15250 AND SECTION 15265 (TC 6701)

(5) INSULATE AND HEAT TRACE ALL LSG EXPOSED CONDENSATE PIPING PER SECTION 15250 AND SECTION 15265 (TC 6702)

(6) INSULATE AND HEAT TRACE ALL EXPOSED 3WHP PIPING PER SECTION 15250 AND SECTION 15265 (TC 6703)

(7) PROVIDE WATER TIGHT VAULT COVER PER CIVIL DRAWINGS.

(8) HAZARDOUS CLASSIFIED AREA SHALL EXTEND 1" FROM SEDIMENT TRAP, BAROMETRIC TRAP, AND ALL LSG VALVES AND VENTS. ELECTRICAL COMPONENTS SHALL BE RATED CLASS 1, DIV 1.

(9) TYPE 1 EQUIPMENT DRAIN PER DRAWING M-002.

(10) VENTED P-TRAP PER DETAIL D/M-002. VENT AT A MINIMUM HEIGHT OF 8 FEET ABOVE GRADE.

(11) AIR-GAP DRAIN. SEE KEYNOTE 10 ON DWG M-686.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: E. Jacobson
DRAWN: J. Moffat
CHECKED: E. Jacobson
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-92-M-2-XE-PIPE-BC.dwg
140912-G-001-TBLK.dwg
140912-92-M-1-ZN-PIPE-BC.dwg
140912-92-M-0-ZN-PIPE-BC.dwg

RECORD DRAWING

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL
DIGESTER
DIGESTER GAS SEDIMENT TRAP PLAN

FILENAME 140912-M680.DWG
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER M-683
SHEET NUMBER 294 OF 508

Mar 30, 2016 - 11:46am
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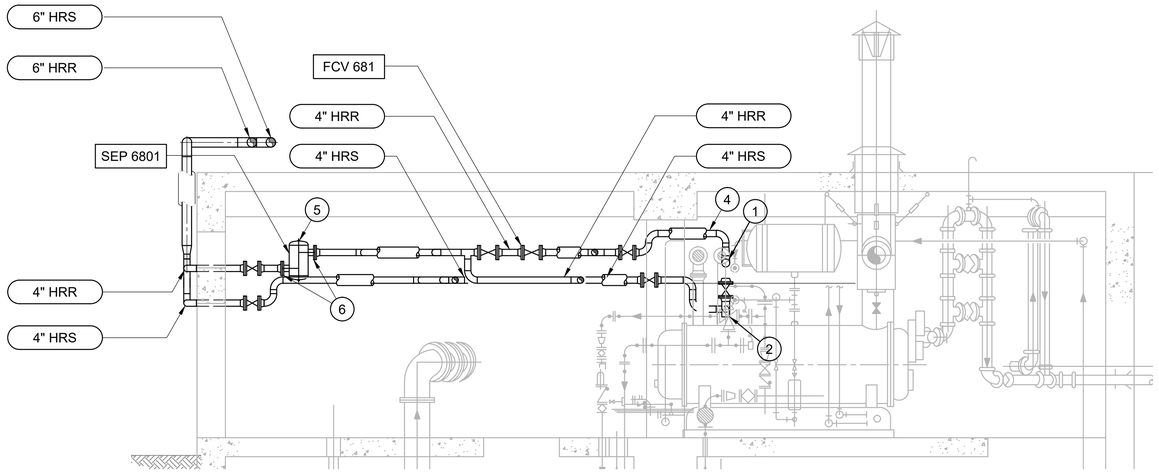
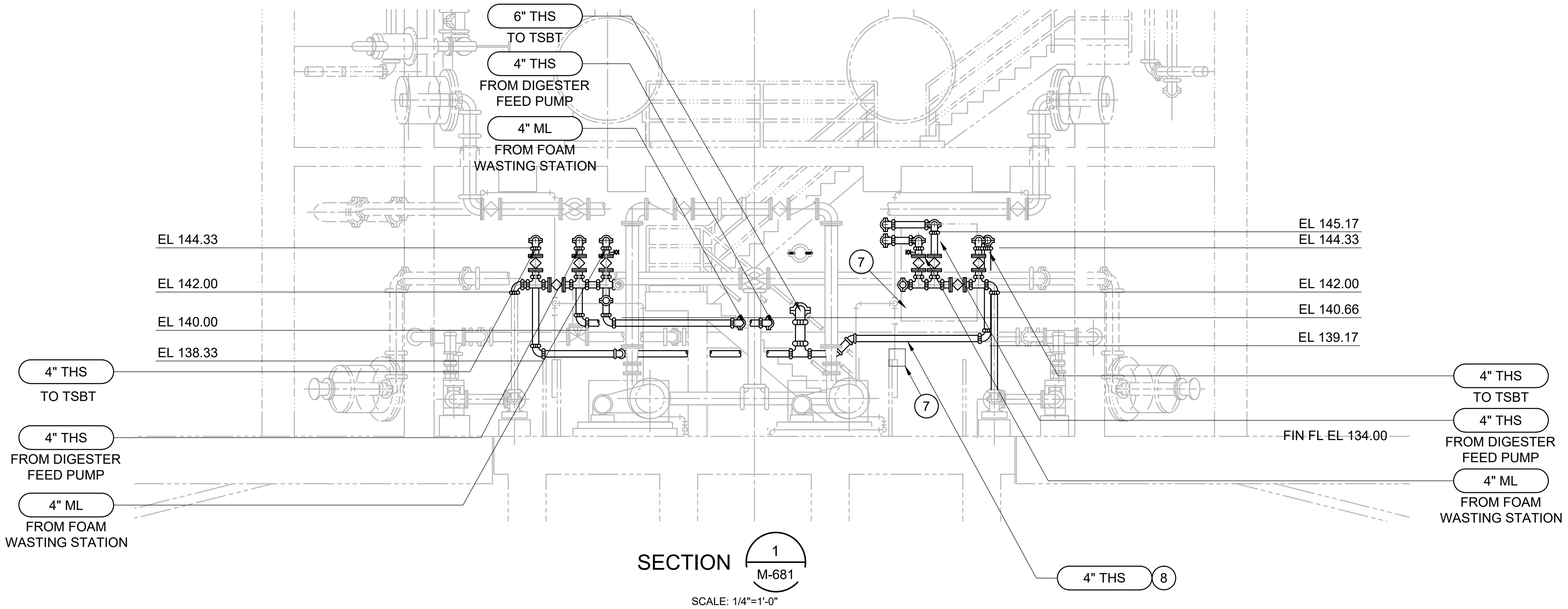


SECTION 1 / M-680

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



SECTION 1 / M-681

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

GENERAL NOTES:

1. EXISTING PIPING AND CONDUIT NOT CONFIRMED. CONFIRM EXISTING PIPING AND CONDUIT ROUTING IN FIELD AND ROUTE NEW PIPING TO AVOID CONFLICT.
2. ROUTE ALL PIPING AT MINIMUM ELEVATION OF 7' ABOVE FLOOR MEASURED TO BOTTOM OF PIPE.
3. ROUTE PIPING TO NOT BLOCK DOOR OR AIR LOUVERS.
4. FOR CONTINUATION OF UNDERGROUND PIPING, SEE CIVIL DRAWINGS.

KEY NOTES:

1. CONNECT NEW 4" HRR PIPING TO EXISTING (EXISTING PIPING SHOWN AS SINGLE LINE IN PLAN VIEW).
2. CONNECT NEW 4" HRS PIPING TO EXISTING (EXISTING PIPING SHOWN AS SINGLE LINE IN PLAN VIEW).
3. PROVIDE AND LOCATE ISOLATION 1/2" VALVES. ROUTE 1/2" DRAIN LINES TO DRAIN.
4. PROVIDE MANUAL AIR VENTS AT HIGH POINTS.
5. ROUTE CONNECTION FROM TOP OF AIR SEPARATOR AND VENT VALVE TO DRAIN.
6. SUPPORT AIR SEPARATOR IN THE PIPING SYSTEM. PROVIDE SUPPORTS ON EACH NOZZLE CLOSE TO VESSEL PER THE MANUFACTURER'S RECOMMENDATIONS.
7. APPROXIMATE LOCATION OF PANEL.
8. ALL PIPING SHALL CLEAR THE PANEL.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

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DESIGNED: E. Jacobson
DRAWN: J. Moffat
CHECKED: E. Jacobson
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-M-2-XE-PIPE-BC.dwg
140912-92-M-2-XE-SECT-BC.dwg

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		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL
DIGESTER
HOT WATER CONNECTIONS
SECTIONS

FILENAME 140912-M685.DWG
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER M-685
SHEET NUMBER 295 OF 508

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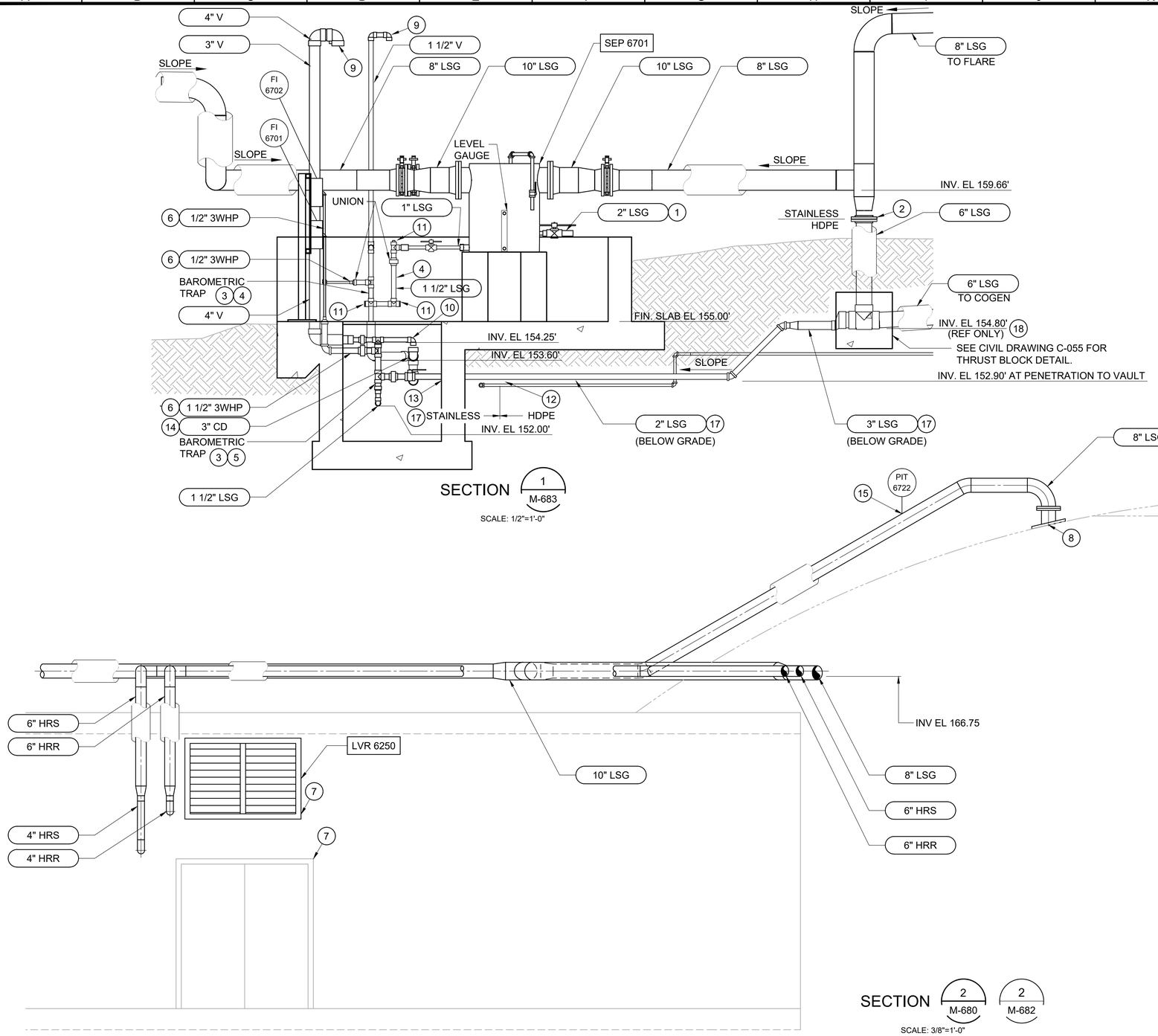

GENERAL NOTES:

1. EXISTING PIPING, HANDRAILS, AND CONDUIT NOT CONFIRMED. CONFIRM EXISTING PIPING, HANDRAILS, AND CONDUIT ROUTING IN FIELD AND ROUTE PIPING TO AVOID CONFLICT.
2. NOT USED.
3. ROUTE PIPING TO NOT BLOCK DOOR OR AIR LOUVERS.
4. FOR CONTINUATION OF UNDERGROUND PIPING, SEE CIVIL DRAWINGS.
5. SLOPE ALL ABOVE GROUND LSG PIPING TOWARDS SEDIMENT TRAP WITH MINIMUM 2% SLOPE.
6. SLOPE ALL BURIED LSG PIPING AT 4% MINIMUM SLOPE, TO BAROMETRIC TRAP.

KEY NOTES:

(1) LOCATE VALVE AS CLOSE TO SEP 6701 AS POSSIBLE.

(2) TRANSITION TO HDPE PIPE PER SECTION 15256 JUST ABOVE GRADE PER DETAIL A / M-004

(3) BAROMETRIC TRAP. LENGTH BETWEEN TOP AND BOTTOM OF TRAP SHALL BE A MINIMUM OF 24 INCHES CENTER-TO-CENTER. PROVIDE UNIONS AS SHOWN FOR EACH TRAP. PROVIDE CLEAN OUT AND BLOW OUT CONNECTIONS WITH PLUGS FOR EACH TRAP. CONNECT BAROMETRIC TRAP ON SEDIMENT TRAP TO 1" DRIP TRAP CONNECTION.

(4) INSULATE AND HEAT TRACE ALL EXPOSED LSG CONDENSATE PIPING AND BAROMETRIC TRAP PER SECTION 15250 AND SECTION 15265 (TC 6701)

(5) INSULATE AND HEAT TRACE ALL EXPOSED LSG CONDENSATE PIPING AND BAROMETRIC TRAP PER SECTION 15250 AND SECTION 15265 (TC 6702)

(6) INSULATE AND HEAT TRACE ALL EXPOSED 3WHP PIPING PER SECTION 15250 AND SECTION 15265 (TC 6703). ALL PIPING INSIDE VAULT SHALL BE STAINLESS STEEL PER SECTION 15067.

(7) NEW LOUVER AND DOORS. SEE ARCHITECTURAL DRAWINGS. ROUTE PIPING TO AVOID CONFLICT.

(8) SEE CONNECTION DETAIL G / M-005. LSG PIPING AND CONNECTION SAME ON DIGESTER 1 AND DIGESTER 2 TO DIGESTER BUILDING ROOF TOP.

(9) VENT AT A MINIMUM 8' ABOVE GRADE. PROVIDE BIRD SCREENS ONE 4" VENT, ONE 3" VENT, AND ONE 2" VENT.

(10) PROVIDE 1" GAP BETWEEN THE 1 1/2" LSG 90° ELBOW AND 3" CD 90° ELBOW. LSG 90° ELBOW SHALL BE 1 1/2" x 1" REDUCING ELBOW.

(11) TRAP CLEANING CONNECTIONS WITH DRAIN PLUGS.

(12) TRANSITION TO STAINLESS STEEL JUST OUTSIDE OF VAULT PER DETAIL A / M-004. FLANGE SHALL BE 316 STAINLESS STEEL AND SHALL BE ANSI B16.1 CLASS 125. VAN STONE FLANGE SHALL NOT BE ALLOWED. STAINLESS STEEL PIPE TO VAULT SHALL BE SCHEDULE 40S. ALL HARDWARE SHALL BE 316 STAINLESS STEEL.

(13) TYPE K PENETRATION PER DWG M-001.

(14) TYPE E OR J PENETRATION PER DWG M-001.

(15) DIGESTER GAS PRESSURE TRANSMITTER.

(16) PROVIDE POLYETHYLENE TAPE FOR BURIED STAINLESS STEEL PIPE, FITTINGS, AND VALVES IN ACCORDANCE WITH SECTION 15067.

(17) PROVIDE HDPE PIPE PER SECTION 15065 WITH DR 11. PRE-INSULATED PIPE NOT REQUIRED FOR BURIED 2" AND 3" HDPE PIPE.

(18) 1 1/2" LSG INVERT EL. AT 154.25' SHALL BE A MINIMUM OF 6" BELOW 6" LSG INVERT EL. AT 154.80'.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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DESIGNED: E. Jacobson
DRAWN: J. Moffat
CHECKED: E. Jacobson
CHECKED: T. Thramer
APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-M-2-XE-PIPE-BC.dwg
140912-92-M-2-XE-SECT-BC.dwg
140912-92-M-1-ZN-SECT-BC.DWG

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REVISIONS

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		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

MECHANICAL

DIGESTER

HOT WATER CONNECTION & DIGESTER GAS SEDIMENT TRAP - SECTIONS

FILENAME 140912-M686.DWG
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER M-686
SHEET NUMBER 296 OF 508

Mar 30, 2016 - 11:47am dfeterris
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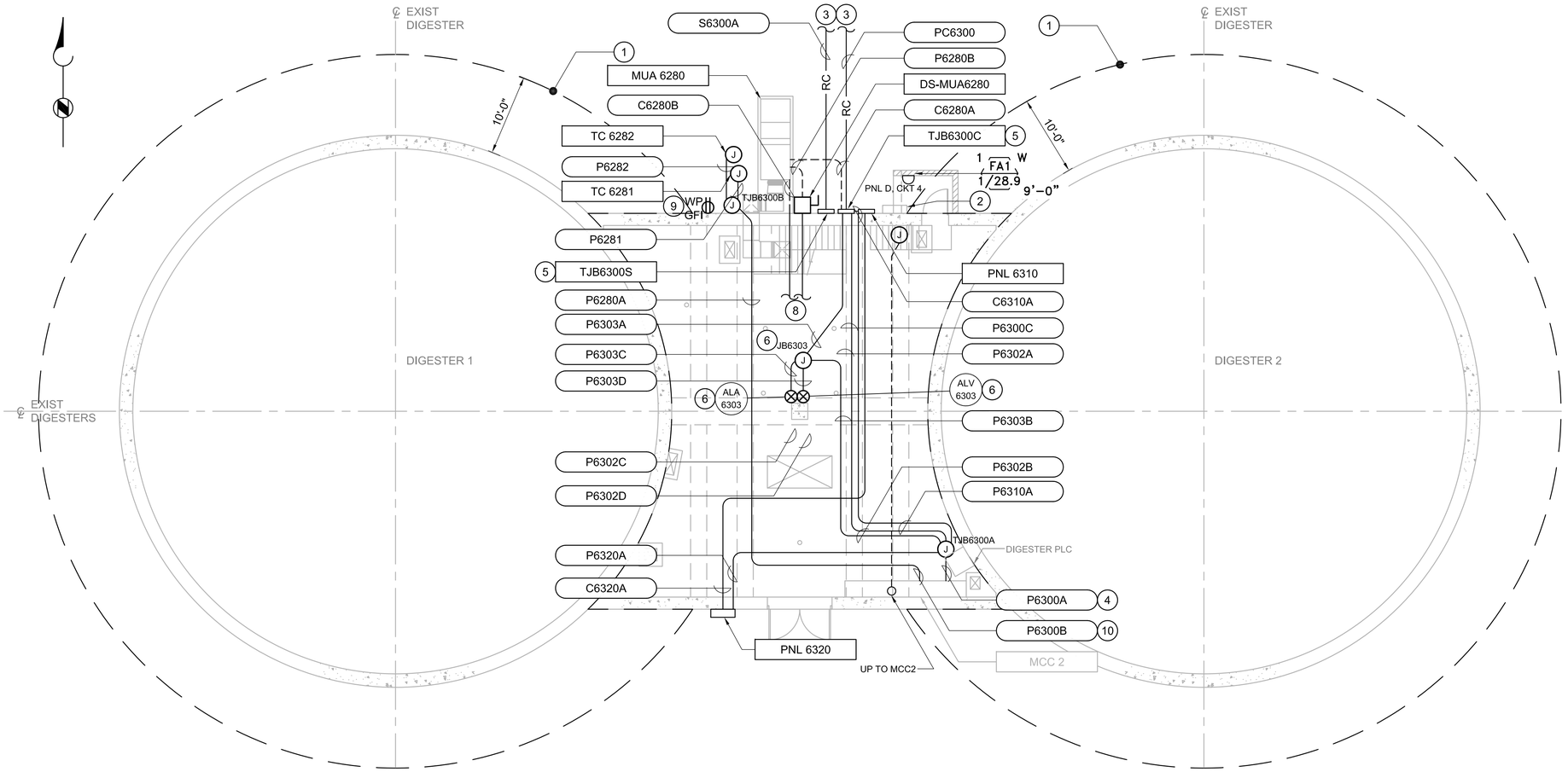

GRADE FLOOR PLAN

SCALE: 1/8" = 1'-0"

KEY NOTES:

1. CLASS I, DIV II HAZARDOUS ENVIRONMENT WITHIN 10 FEET. ALL ELEMENTS SHALL CONFORM TO THE REQUIREMENTS OF NEC ART. 500.
2. EXISTING JUNCTION BOX FOR INCOMING FEED TO MCC-2. PROTECT JUNCTION BOX DURING CONSTRUCTION.
3. TO WAS THICKENING BUILDING, SEE DRAWING E-014 FOR CONTINUATION.
4. TO PNL D(1) CKT #4 IN MCC 2. PROVIDE 20 AMP BREAKER IN EXISTING PANEL.
5. PROVIDE 12"H x 12"W x 6"D, NEMA 4X TERMINAL JUNCTION BOX.
6. MOUNT ON COLUMN AS HIGH AS POSSIBLE IN UPPER LEVEL.
7. MOUNT ON COLUMN AS HIGH AS POSSSIBLE IN LOWER LEVEL.
8. SEE DRAWING E-680 FOR CONTINUATION.
9. PROVIDE CONDUIT AND CONDUCTOR FROM TJB6300A TO NORTH EXTERIOR WALL RECEPTACLE. MOUNT RECEPTACLE AT 36" AFF.
10. TO PNL D(1) CKT #6 IN MCC 2. PROVIDE 20 AMP BREAKER IN EXISTING PANEL.
11. MOUNT PANEL 48" ABOVE GROUND.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: K. Kimball
DRAWN: R. Delos Santos
CHECKED: G. Kumataka
CHECKED: T. Thramer
APPROVED: T. Glesbrecht

EXTERNAL REFERENCE FILES
140912-92-S-1-XE-WALL-BC.dwg
140912-92-S-2-XE-WALL-BC.dwg
140912-G-001-TBLK.dwg
140912-92-M-3-XN-PIPE-BC.dwg

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		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ELECTRICAL
DIGESTER
GRADE FLOOR PLAN

FILENAME 140912-E611
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER E-611
SHEET NUMBER 406 OF 508

Apr 04, 2016 - 10:48am jlmiller
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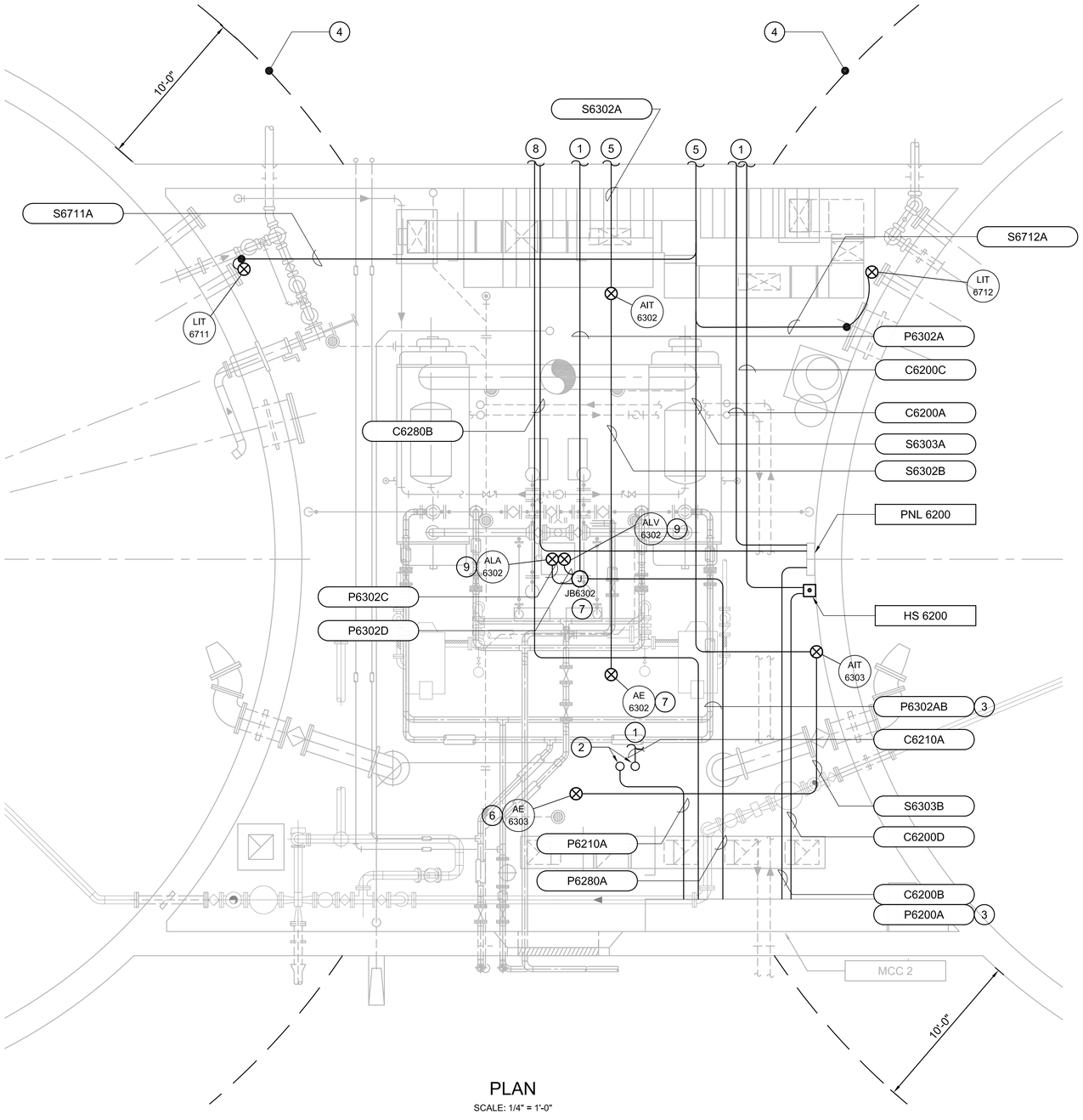

PLAN

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

KEY NOTES:

1. TO TJB6300C, SEE DRAWING E-611 FOR CONTINUATION.
2. TO THE ROOF, SEE DRAWING E-682 FOR CONTINUATION.
3. TO TJB6300A, SEE DRAWING E-611.
4. CLASS I, DIV II HAZARDOUS ENVIRONMENT WITHIN 10 FEET OF DIGESTER 1 AND DIGESTER 2. ALL ELEMENTS SHALL CONFORM TO THE REQUIREMENTS OF NEC ART. 500.
5. TJB6300S LOCATED OUTSIDE OF THE BUILDING. SEE E-611 FOR THE LOCATION.
6. CONTRACTOR TO FIELD LOCATE AS HIGH AS POSSIBLE IN THE DIGESTER CONTROL BUILDING UPPER LEVEL IN THE VICINITY OF THE EXHAUST FAN (F6210) INTAKE.
7. CONTRACTOR TO FIELD LOCATE AS HIGH AS POSSIBLE IN THE DIGESTER CONTROL BUILDING LOWER LEVEL.
8. TO MUA 6280, SEE DRAWING E-611 FOR CONTINUATION.
9. MOUNT ON COLUMN AS HIGH AS POSSIBLE IN THE DIGESTER CONTROL BUILDING LOWER LEVEL.

Brown AND Caldwell
SEATTLE, WASHINGTON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: K. Kimball
DRAWN: R. Delos Santos
CHECKED: G. Kumataka
CHECKED: T. Thramer
APPROVED: T. Glesbrecht

EXTERNAL REFERENCE FILES
140912-92-M-2-XE-PIPE-BC.dwg
140912-G-001-TBLK.dwg

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		RECORD DRAWING			

KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ELECTRICAL
DIGESTER
HOT WATER CONNECTION PLAN

FILENAME 140912-E680
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER E-680
SHEET NUMBER 407 OF 508

jjmiller
Apr 04, 2016 - 10:48am
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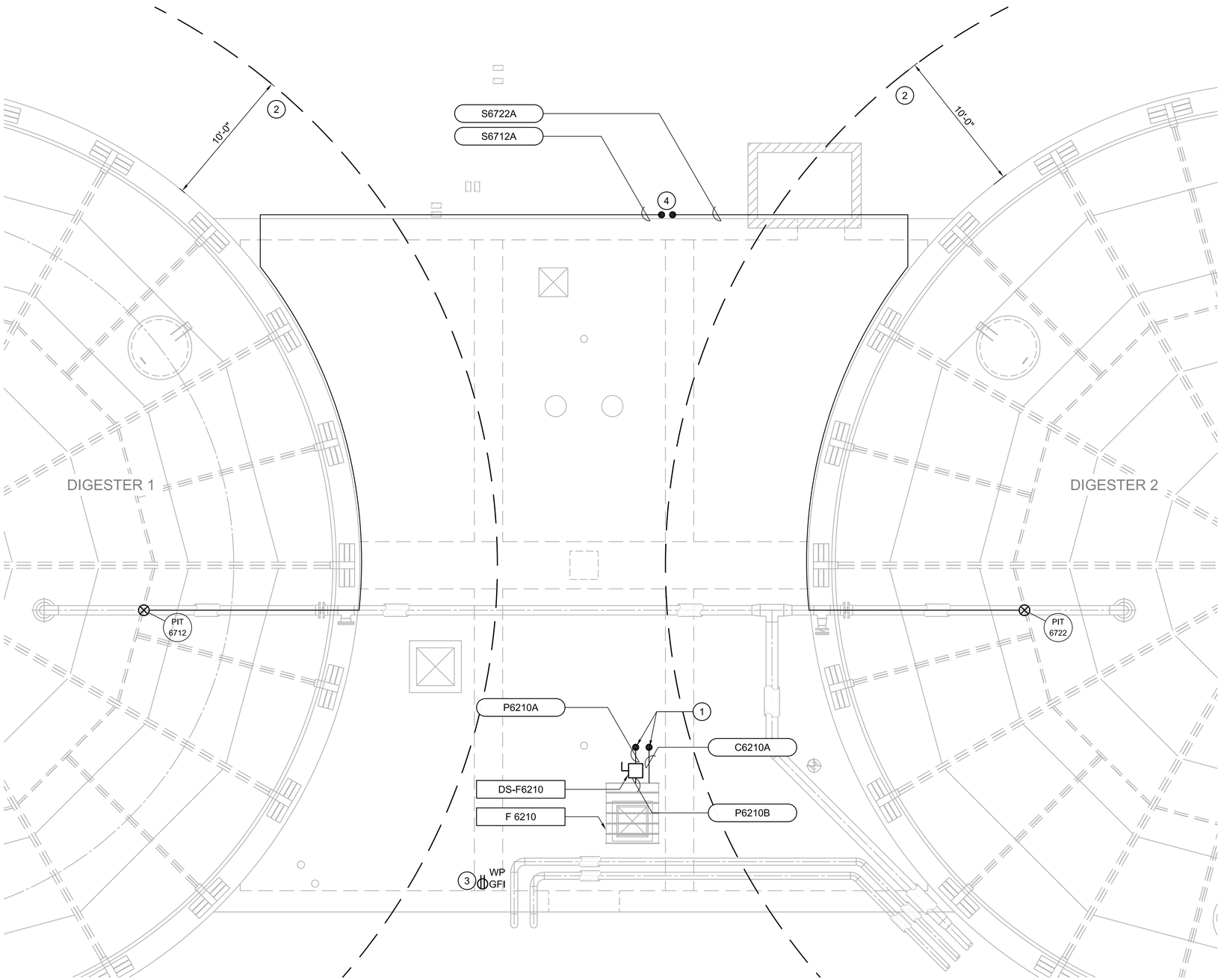

ROOF PLAN

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

KEY NOTES:

1. DOWN TO NEXT LEVEL, SEE E-680 FOR CONTINUATION.
2. CLASS I, DIV I HAZARDOUS ENVIRONMENT WITHIN 10 FEET OF DIGESTER 1 AND DIGESTER 2. ALL ELEMENTS SHALL CONFORM TO THE REQUIREMENTS OF NEC ART. 500.
3. MOUNT RECEPTACLE TO RAILING. PROVIDE CONDUIT AND CONDUCTOR FROM TJB6300A TO ROOF RECEPTACLE.
4. TO TJB6300S, SEE DRAWING E-611 FOR CONTINUATION.

Brown AND Caldwell
SEATTLE, WASHINGTON

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APPROVED: T. Giesbrecht

EXTERNAL REFERENCE FILES
140912-G-001-TBLK.dwg
140912-92-S-3-XE-WALL-BC.dwg
140912-92-M-3-XN-PIPE-BC.dwg

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KITSAP COUNTY

CENTRAL KITSAP TREATMENT PLANT

RESOURCE RECOVERY PROJECT

ELECTRICAL
DIGESTER CONTROL BUILDING
ROOF PLAN

FILENAME 140912-E682
BC PROJECT NUMBER 140912
CLIENT PROJECT NUMBER
DRAWING NUMBER E-682
SHEET NUMBER 408 OF 508

Apr 04, 2016 - 10:48am jlmiller
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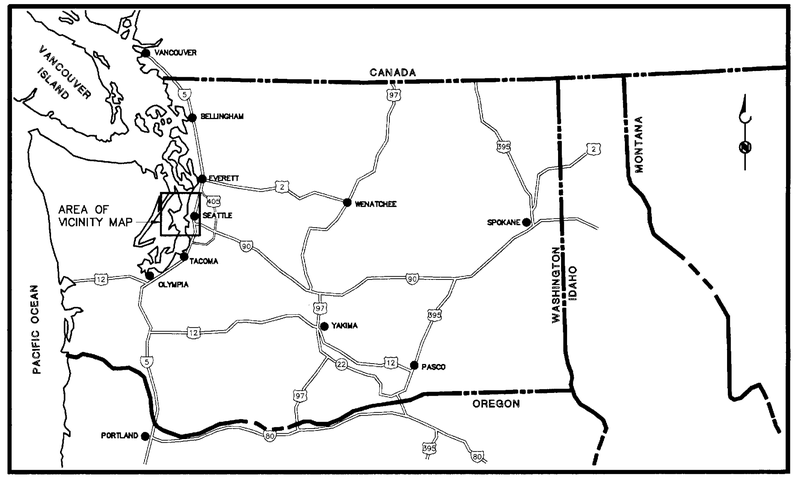
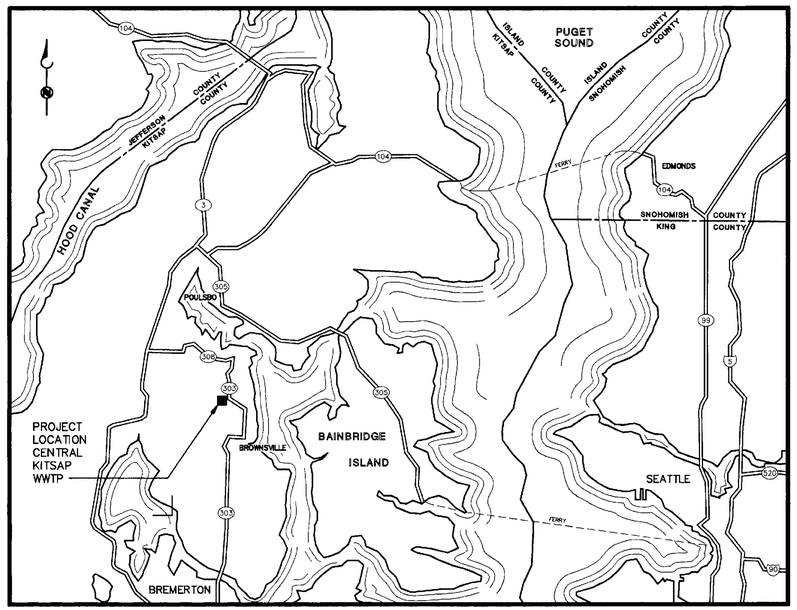


LOCATION MAP
SCALE: NONE



VICINITY MAP
SCALE: NONE

INDEX OF DRAWINGS

SHEET NUMBER	DRAWING NUMBER	DRAWING TITLE
		GENERAL
1	G1	INDEX OF DRAWINGS, LOCATION MAP, VICINITY MAP, GENERAL NOTES, SYMBOLS AND ABBREVIATIONS
2	G2	SITE PLAN AND NOTES
3	G3	DIGESTER AREA – PLANS AND DETAILS
4	G4	DIGESTER AREA – SECTION AND DETAILS
5	G5	MISCELLANEOUS DETAILS

ABBREVIATIONS

AB	ANCHOR BOLT
ADD	ADDITION(AL)
ADJ	ADJUSTABLE
AL	ALUMINUM, ALUM
ALT	ALTERNATE
ANC	ANCHOR
ARCH	ARCHITECTURAL
ASSY	ASSEMBLY
BLDG	BUILDING
BLK	BLOCK
BM	BEAM, BENCHMARK
BOP	BOTTOM OF PIPE, BACK OF PIPE
BOT	BOTTOM
BRG	BEARING
BRK	BREAK
C/C	CENTER TO CENTER
CEM	CEMENT
CF	CUBIC FEET
CI	CAST IRON
℄	CENTERLINE
CL	CLEAR, CLEARANCE
CL_2	CHLORINE
CO	CLEANOUT
COL	COLUMN, COLLECTION
CONC	CONCRETE, CONCENTRIC
CONF	CONFERENCE
CONT	CONTINUOUS
CONTD	CONTINUED
CONST	CONSTRUCTION
CP	CENTER POINT
CTR	CENTER
C/W	COMPLETE WITH
DEC	DECREASING
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGRAM
DIM	DIMENSION
DIR	DIRECTION
DN	DOWN
DWG(S)	DRAWING(S)
DWL	DOWEL
E	EAST
EA	EACH
EL	ELEVATION (ELEV)
EMBD	EMBEDDED
EQ	EQUAL
ES	EXISTING SURFACE
EXIST	EXISTING
EXT	EXTERIOR
FAB	FABRICATE(D), FABRICATION
FIN	FINISHED
FL	FLOOR, FLOW LINE
FLR	FLOOR
FND	FOUNDATION
FTG	FOOTING
FUT	FUTURE
GEN	GENERAL
GI	GALVANIZED IRON
GRD	GRADE
GRT	GROUT
GSKT	GASKET
HOR	HORIZONTAL
HR	HANDRAIL
HT	HEIGHT
HWTR	HIGH WATER
ID	INSIDE DIAMETER
IN	INCH
INT	INTERIOR
INV	INVERT, INVERT ELEVATION
INV EL	INVERT ELEVATION
LB	POUND(S)
LEV	LEVEL
LG	LONG
MAN	MANUAL
MAX	MAXIMUM
MBH	THOUSAND BTUs PER HOUR
MME	MISCELLANEOUS MECHANICAL EQUIPMENT
MECH	MECHANICAL
MFR	MANUFACTURER
MGR	MANAGER
MH	MANHOLE
MI	MALLEABLE IRON
MIN	MINIMUM, MINUTE
MTL	METAL
N	NORTH
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN, NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OVERALL
OC	ON CENTERS
OH	OVERHEAD
O/O	OUT TO OUT
P	PUMP
PEN	PENETRATION
PK	PEAK
PL	PLATE, PIPELINE
PRES	PRESSURE
PSH	PRESSURE SWITCH HIGH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE
PVT	PAVEMENT
Q	RATE OF FLOW
RD	ROOF DRAIN, ROAD
RECIRC	RECIRCULATION
RED	REDUCE(R)
REF	REFERENCE
REM	REMOVABLE
REQ'D	REQUIRED
S	SOUTH
SCFM	STANDARD CUBIC FEET PER MINUTE
SECT	SECTION
SEP	SEPARATOR
SHT	SHEET
SIM	SIMILAR
SL	SLOPE
SPEC	SPECIFICATIONS
SST	STAINLESS STEEL
STL	STEEL
STRUCT	STRUCTURE
SUPT	SUPPORT
SYM	SYMMETRICAL
THK	THICK
THRU	THROUGH
TOC	TOP OF CONCRETE
TOP	TOP OF PIPE
TOS	TOP OF STEEL
TP	TANGENT POINT, TRAP PRIMER
TYP	TYPICAL
UG	UNDERGROUND
UL	ULTIMATE LOAD
U/S	UNDERSIDE
USC&GS	UNITED STATES COAST AND GEODETIC SURVEY
V	VALVE VENT, VERTICAL
VAC	VACUUM, VOLTS ALTERNATING CURRENT
VAR	VARIES, VARIABLE
VB	VALVE BOX
VERT(S)	VERTICAL(S)
W	WEST
WD	WOOD
WG	WASTE GAS
W/O	WITHOUT
WS	WATER SURFACE
XP	EXPLOSIONPROOF
#	NUMBER, POUNDS
&	AND
@	AT
ø	DIAMETER, PHASE

VALVE SYMBOLS

N.O. NORMALLY OPEN
N.C. NORMALLY CLOSED

PLUG VALVE (N.O. / N.C.)

THREE-WAY VALVE

GENERAL SYMBOLS

EXISTING

CENTER LINE

HIDDEN LINE OR FUTURE

FENCE

HANDRAIL (IN PLAN VIEW)

NATURAL GROUND OR GRADE

STEEL OR STAINLESS STEEL

ALUMINUM

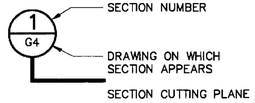
WOOD

NEOPRENE RUBBER OR GASKET

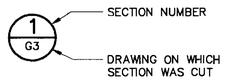
N 0000.0000 / W 0000.0000 COORDINATES

TYPICAL SECTION AND DETAIL NUMBERING SYSTEM

(1) SECTION CUT ON DWG G3



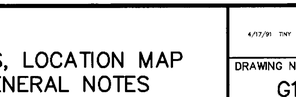
(2) ON DWG G4 THIS SECTION IS IDENTIFIED



(3) DETAILS ARE CROSS-REFERENCED IN A SIMILAR MANNER. EXCEPT THAT DETAILS ARE IDENTIFIED BY LETTER RATHER THAN BY NUMBER.

EQUIPMENT DESIGNATIONS

EQUIPMENT IS CALLED OUT BY A NUMBER, ENCLOSED AS SHOWN:



NOTES:

1. THE MATERIAL PRESENTED ON THIS DRAWING IS FOR REFERENCE USE. SOME OF THE DETAILS OR INFORMATION PRESENTED ON THIS DRAWING MAY NOT BE REQUIRED AS PART OF THIS CONTRACT.

Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: 4/30/91
APPROVED: _____ BROWN AND CALDWELL DATE:
APPROVED: _____ DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5769G001.DWG
DRAWN CADD TEAM
DESIGNED CC, GN
CHECKED EF
CHECKED EF

William A. Perrin

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

KITSAP COUNTY

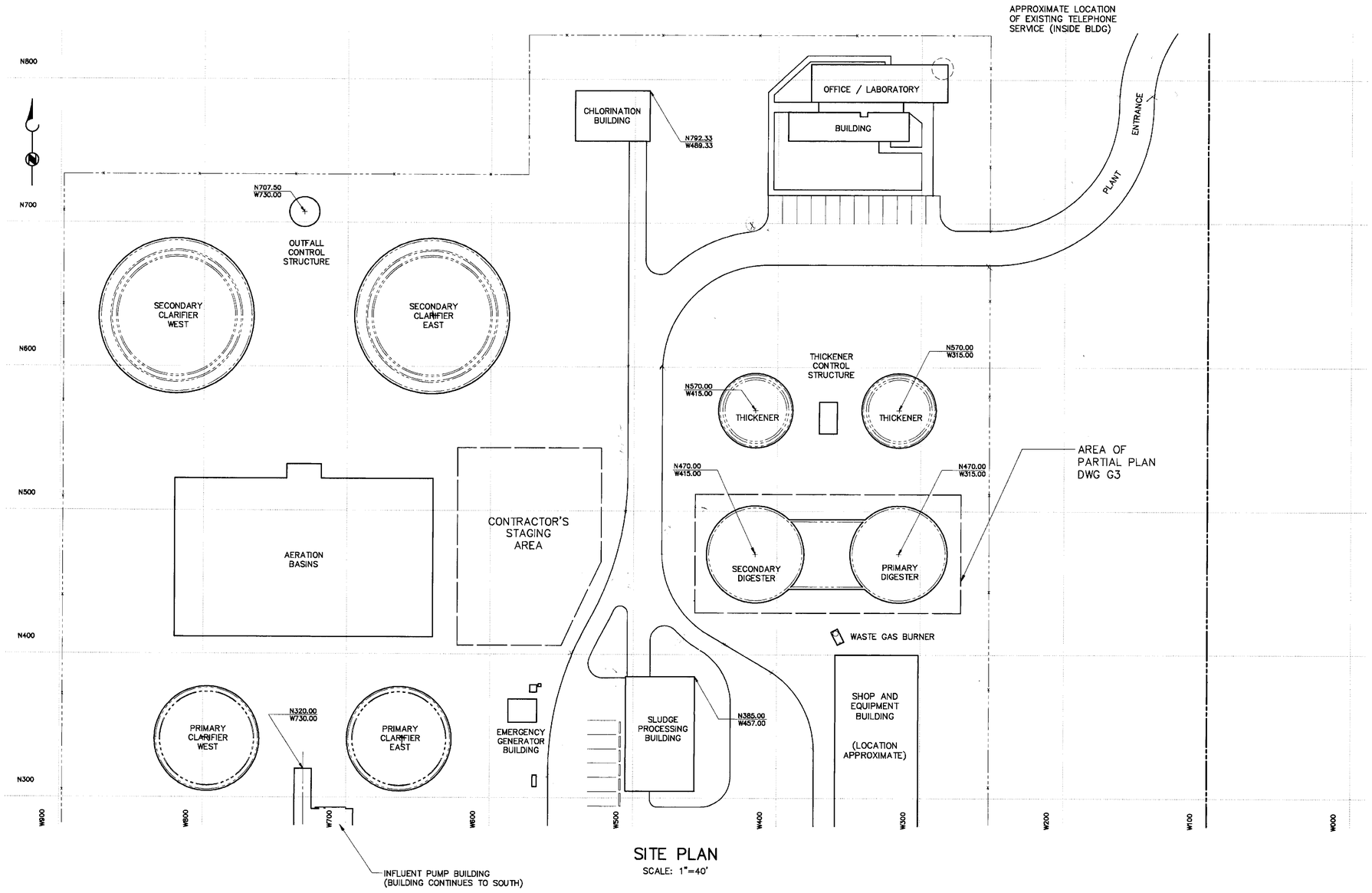
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT
DIGESTER COVER REPLACEMENT

INDEX OF DRAWINGS, LOCATION MAP
VICINITY MAP, GENERAL NOTES
SYMBOLS AND ABBREVIATIONS

4/17/91 TNY

DRAWING NUMBER
G1

SHEET NUMBER
1



SITE PLAN
SCALE: 1"=40'

NOTES:

1. ALL COORDINATES SHOWN BASED ON SITE GRID. SITE GRID NOT PARALLEL TO TRUE NORTH SOUTH LAMBERT COORDINATE SYSTEM.
2. SITE GRID LINE WEST 100 PARALLEL TO EAST PROPERTY LINE, TRUE BEARING N 2° 29' 45" E.
3. ELEVATIONS BASED ON USC&GS DATUM.
4. THE CONTRACTOR SHALL ESTABLISH ONE BENCH MARK AND ONE BASELINE.
5. ALL FACILITIES SHOWN ON THIS SITE PLAN ARE EXISTING.
6. ONE OF THE TWO DIGESTERS WILL BE IN OPERATION AT ALL TIMES. TRACE QUANTITIES OF DIGESTER GAS, INCLUDING METHANE WILL LIKELY BE PRESENT AT ALL TIMES. VENTING OF DIGESTER GAS THROUGH THE EXISTING PRESSURE/VACUUM RELIEF ASSEMBLY MAY OCCUR AT ANY TIME.
7. ALL COSTS ASSOCIATED WITH THE REMOVAL OF BOTH EXISTING DIGESTER COVERS SHALL BE COVERED IN SEPARATE BID ITEMS C AND D AS SPECIFIED. THE CONTRACTOR SHALL INSPECT THE SITE PRIOR TO THE BID DATE TO DETERMINE SCOPE OF WORK REQUIRED FOR THE REMOVAL OF THE EXISTING COVERS. EACH COVER SHALL BE REMOVED AS A SINGLE UNIT AND PLACED ON THE PLANT SITE. THE EXACT LOCATION SHALL BE INDICATED DURING THE PREBID CONFERENCE. THE REMOVAL OF THE EXISTING COVERS AS CONTAINED IN BID ITEMS C AND D SHALL NOT INCLUDE SURFACE PREPARATION REQUIRED FOR NEW COVER INSTALLATION.
8. UNDER BID ITEMS A AND C, CONTRACTOR IS RESPONSIBLE FOR ALL CONCRETE TANK SURFACE PREPARATION REQUIRED FOR INSTALLATION OF THE COVER SYSTEM SPECIFIED, INCLUDING ANCHORS (SEE NOTES 2 AND 3, DETAIL F/G5), COATING, SKIRT AND ANNULAR SEAL.

Brown and Caldwell
Consultants
Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: 4/30/91
APPROVED: _____ BROWN AND CALDWELL DATE: 5/2/91
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5769G002.DWG
DRAWN CADD TEAM
DESIGNED CC, GN
CHECKED [illegible]
CHECKED [illegible]

William A. Pennell

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

KITSAP COUNTY

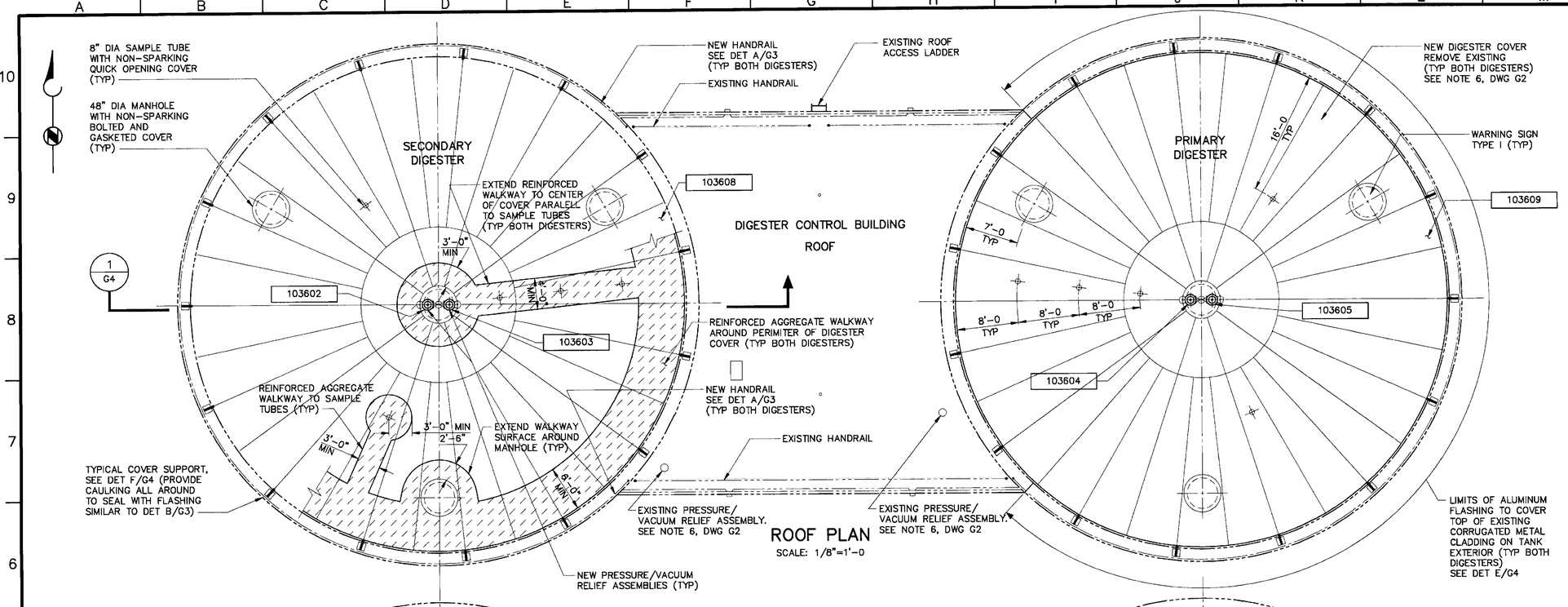
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT
DIGESTER COVER REPLACEMENT

SITE PLAN AND NOTES

4/17/91 TNY

DRAWING NUMBER
G2

SHEET NUMBER
2



Brown and Caldwell
Consultants
Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: 4/30/91
APPROVED: _____ BROWN AND CALDWELL DATE: 5-1-91
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5769G003.DWG
DRAWN CADD TEAM
DESIGNED CC, GN
CHECKED _____
CHECKED _____

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

CENTRAL KITSAP
WASTEWATER TREATMENT PLANT
DIGESTER COVER REPLACEMENT

DIGESTER AREA
PLANS AND DETAILS

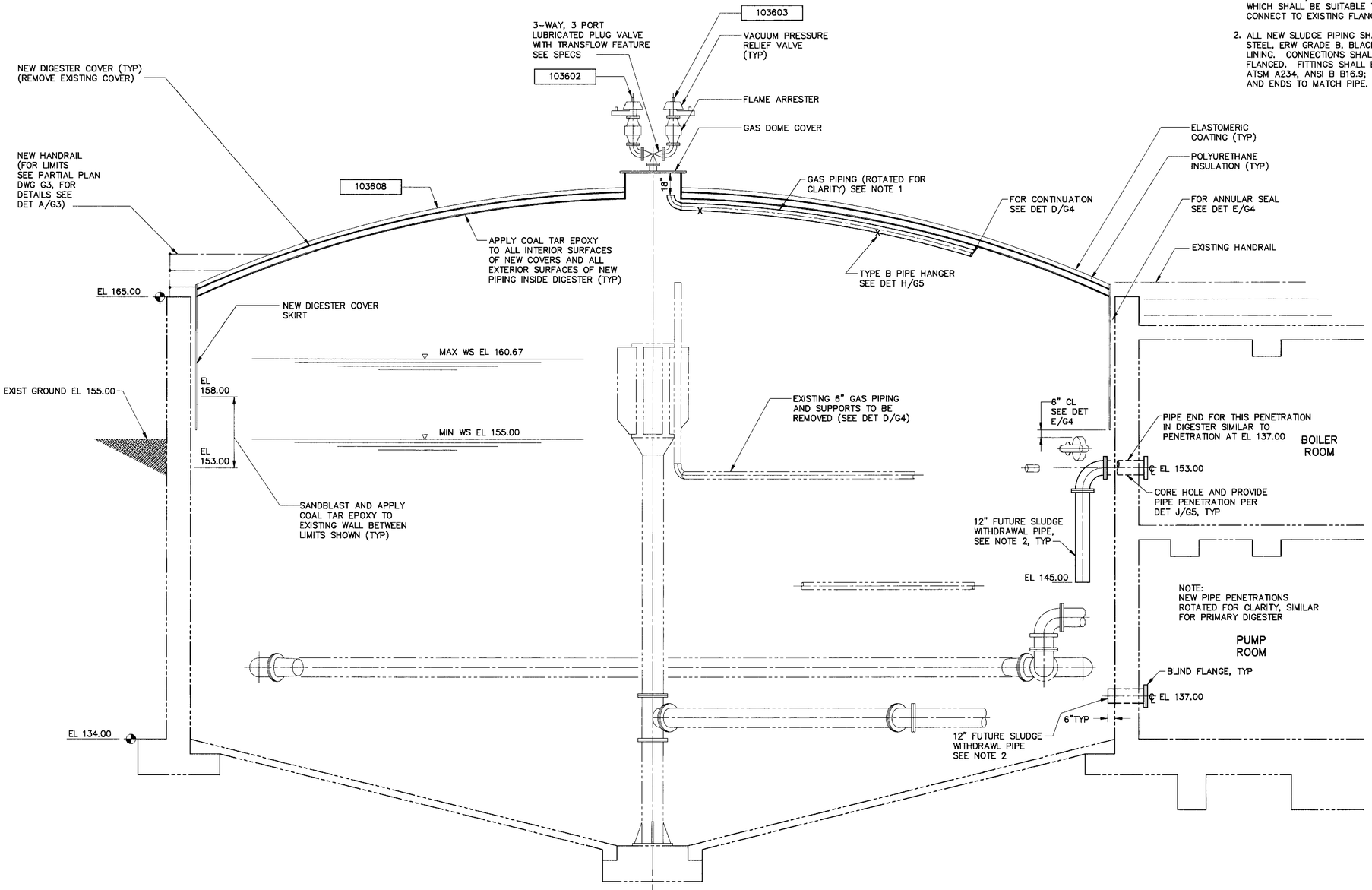
4-25-91 TNT

DRAWING NUMBER
G3

SHEET NUMBER
3

NOTES:

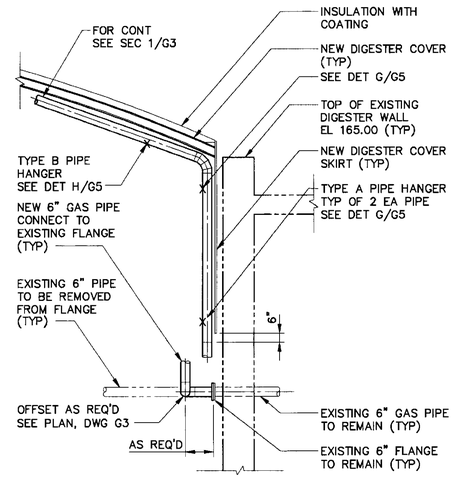
1. GAS PIPING SHALL BE 316L SST, SCHEDULE 5S. BUTT WELDED CONNECTIONS, EXCEPT FLANGE WHICH SHALL BE SUITABLE TO CONNECT TO EXISTING FLANGE.
2. ALL NEW SLUDGE PIPING SHALL BE STEEL, ERW GRADE B, BLACK, NO LINING. CONNECTIONS SHALL BE FLANGED. FITTINGS SHALL BE STEEL, ATSM A234, ANSI B 816.9; LININGS AND ENDS TO MATCH PIPE.



SECONDARY DIGESTER

SECTION (1/G3)

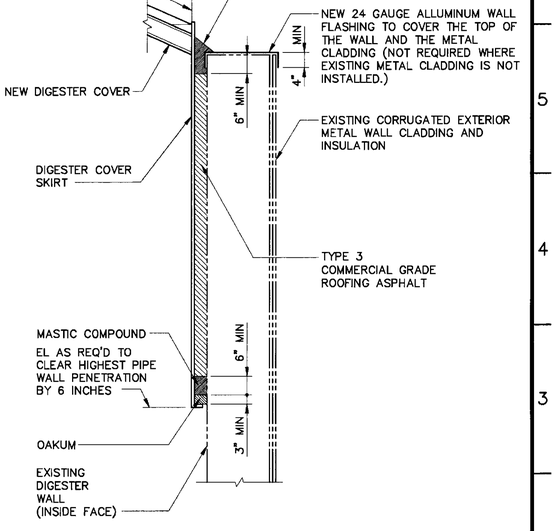
SCALE: 1/4"=1'-0



TYPICAL RELOCATED 6" GAS PIPE

DETAIL (D/G3 D/G4)

SCALE: 1/4"=1'-0



DIGESTER WALL AND COVER SKIRT FLASHING AND ANNULAR SEAL

DETAIL (E/G4)

SCALE: 1/2"=1'-0

Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: _____ DATE: 4/30/91
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5769G004.DWG
DRAWN CADD TEAM
DESIGNED CC, GN
CHECKED _____
CHECKED _____

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

KITSAP COUNTY

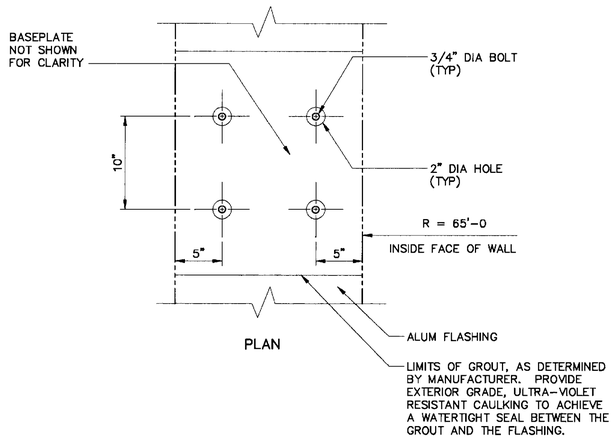
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT
DIGESTER COVER REPLACEMENT

DIGESTER AREA
SECTION AND DETAILS

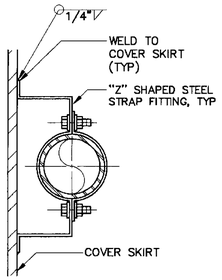
←23-91 TNY

DRAWING NUMBER G4

SHEET NUMBER 4



PLAN



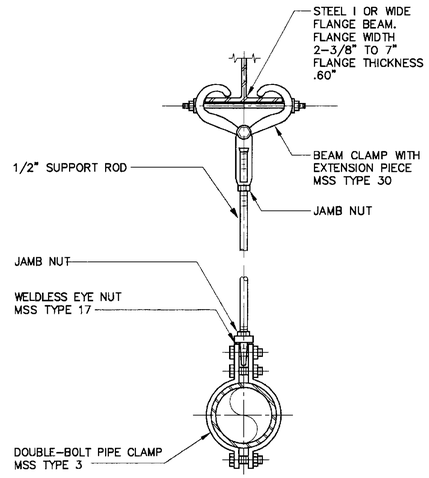
NOTE: ALL HANGER HARDWARE SHALL BE TYPE 316L SST

FOR VERTICAL RUNS
FOR 6" GAS PIPE

TYPE A PIPE HANGER

DETAIL (G / G4)

NO SCALE



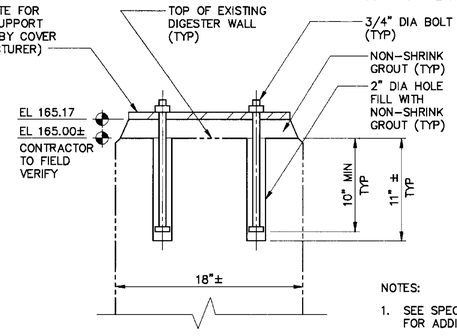
NOTE: ALL HANGER HARDWARE SHALL BE TYPE 316L SST

FOR HORIZONTAL RUNS
FOR 6" GAS PIPE

TYPE B PIPE HANGER

DETAIL (H / G4)

NO SCALE



SECTION

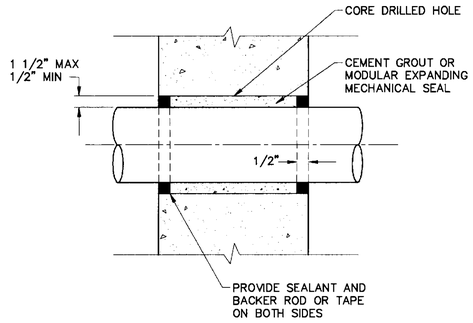
TYPICAL COVER SUPPORT ANCHORAGE

DETAIL (F / G3)

SCALE: 1 1/2"=1'-0

NOTES:

1. SEE SPECIFICATIONS PARAGRAPH 11547-2.03B.4 FOR ADDITIONAL ANCHOR BOLT SYSTEM REQUIREMENTS
2. EXISTING ANCHOR BOLTS FOR EXISTING COVERS NOT SHOWN. CONTRACTOR SHALL CUT-OFF ALL EXISTING ANCHOR BOLTS FLUSH WITH TOP OF WALL.
3. CONTRACTOR SHALL LOCATE NEW ANCHOR BOLTS AND HOLES TO AVOID EXISTING, OR REMOVE EXISTING AS REQUIRED.
4. RADIAL ARCHED RIB NOT SHOWN FOR CLARITY.



PIPE PENETRATION
FOR WALLS

SECTION (J / G4)

NO SCALE

Brown and Caldwell
Consultants
Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: 4/30/91
APPROVED: _____ BROWN AND CALDWELL DATE: 5.6.91
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE 5769G005.DWG
DRAWN CADD TEAM
DESIGNED CC, GN
CHECKED _____
CHECKED _____

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

KITSAP COUNTY

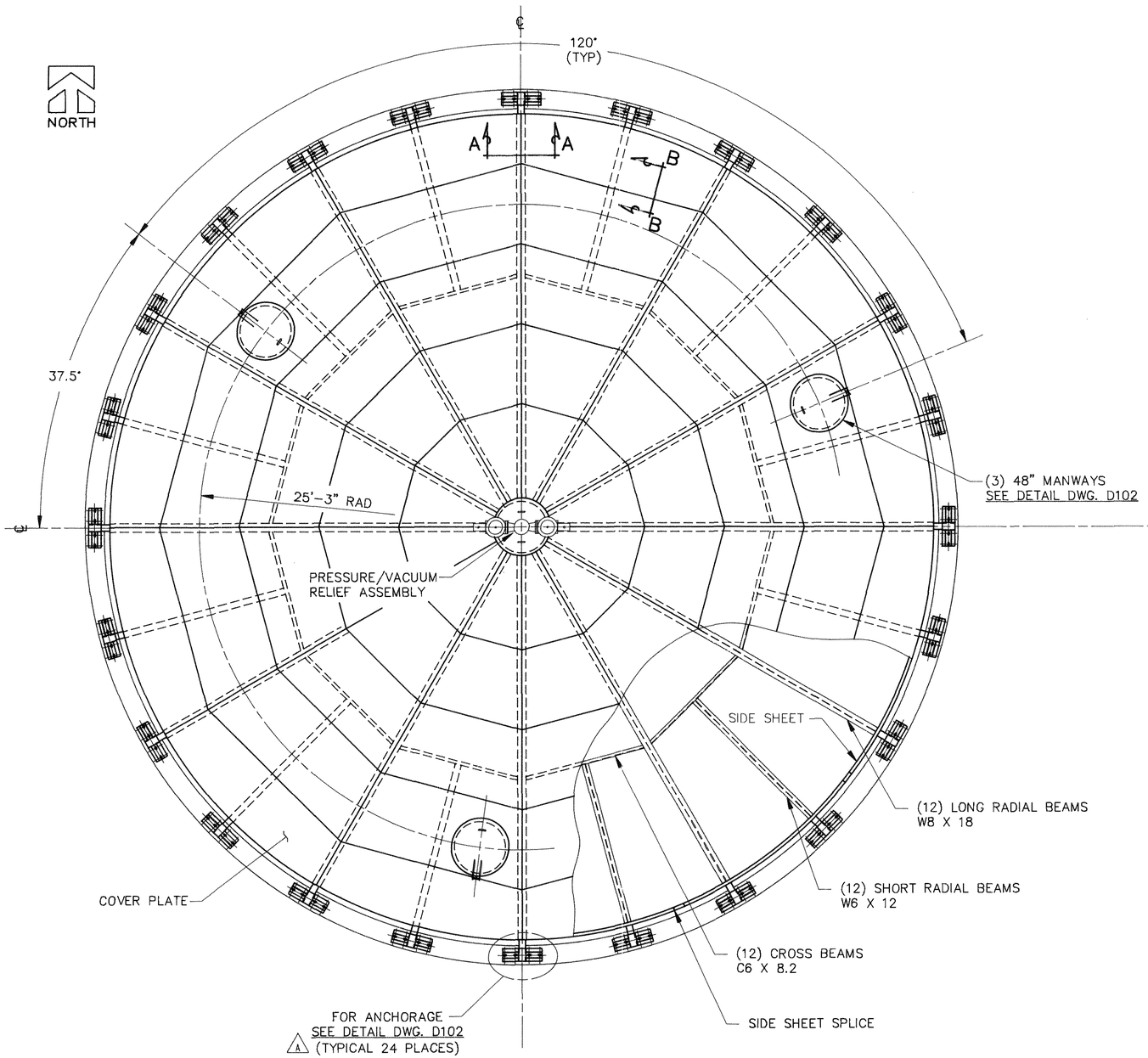
CENTRAL KITSAP
WASTEWATER TREATMENT PLANT
DIGESTER COVER REPLACEMENT

MISCELLANEOUS DETAILS

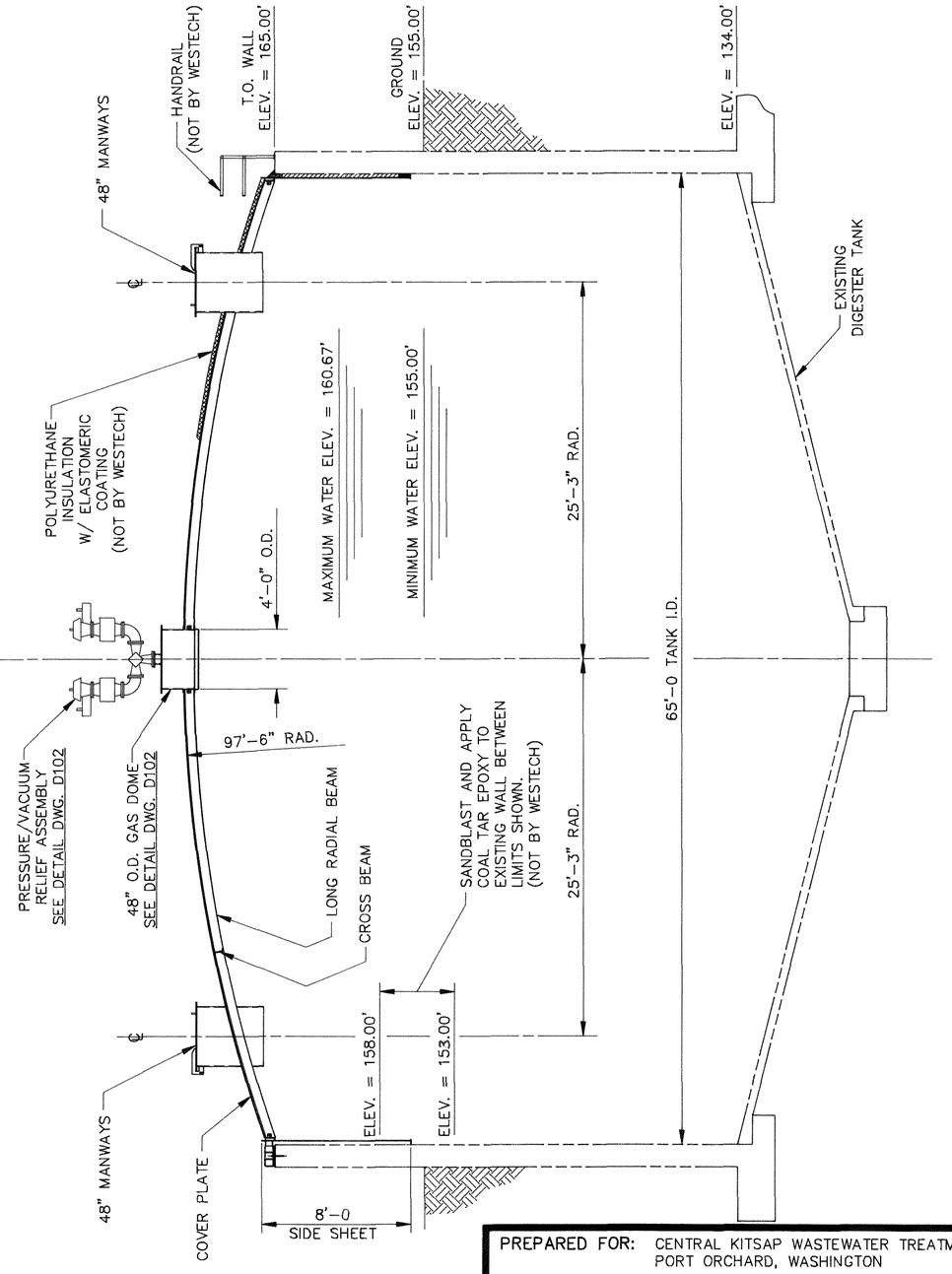
4/17/91 TNY

DRAWING NUMBER
G5

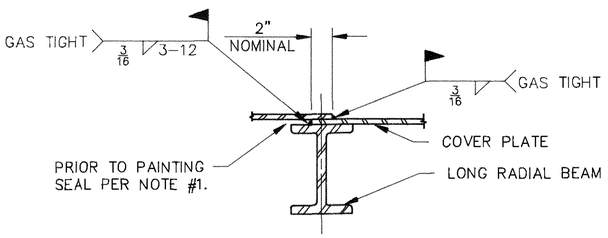
SHEET NUMBER
5



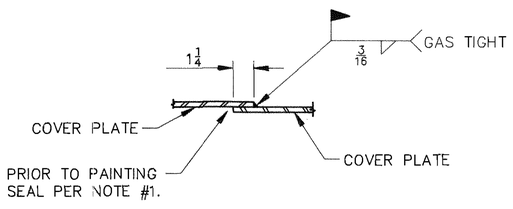
PLAN VIEW



ILLUSTRATIVE SECTION



SECTION A-A



SECTION B-B

NOTES:

1. AT LAPS ON THE UNDERSIDE OF THE COVER, BETWEEN ROOF PLATES AND WHERE CRACKS OF UP TO 1/4" OCCUR, CRACKS SHALL BE SEALED TO A MAXIMUM OF 1/64" TO ENSURE COMPLETE COVERAGE BY THE COATING SYSTEM. SEAL OPENINGS WITH MASTIC OR SEALANT COMPATIBLE WITH AND APPROVED BY THE COATING MANUFACTURER. (SEALANT NOT BY WESTECH)

2. WORK THIS DRAWING WITH DRAWINGS D102 & B103.

PREPARED FOR: CENTRAL KITSAP WASTEWATER TREATMENT PLANT
PORT ORCHARD, WASHINGTON

ENGINEER: BROWN AND CALDWELL CONSULTANTS
SEATTLE, WASHINGTON

CONTRACTOR: OLYMPIC WESTERN COMPANY
SEATTLE, WASHINGTON

SUPPLY CONTRACT NO. 9205-1

GENERAL ARRANGEMENT
DESCRIPTION

FIXED DIGESTER COVER | 65'-0 DIA.
TYPE | SIZE

1875 = 1'

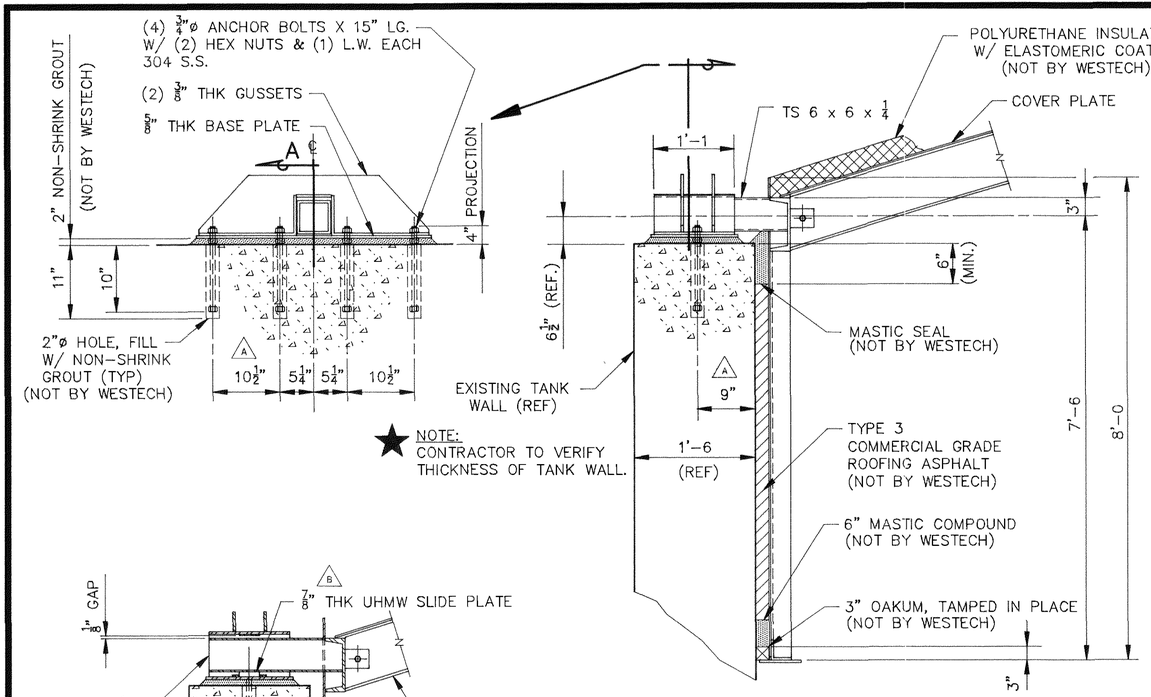
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD
				NONE	2-92	Rick	MLK	RRP

ALL COMPONENTS MUST BE FABRICATED AND MACHINED ACCORDING TO WESTECH STANDARD SPECIFICATION (DRAWING P24Z-024A), UNLESS SPECIFICALLY NOTED ON THIS DRAWING.

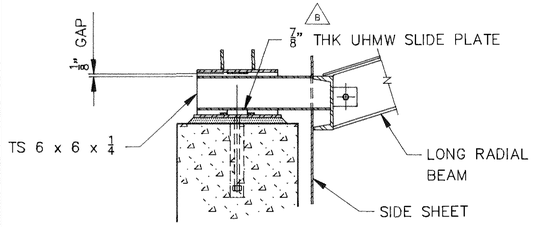
REVISION	BY	CHKD	DATE	LTR
REVISED ANCHOR BOLT PATTERN, SUPPORTS WERE AT (12) LOCATIONS.	RICK	MLK	7-92	A

WesTech ENGINEERING INC

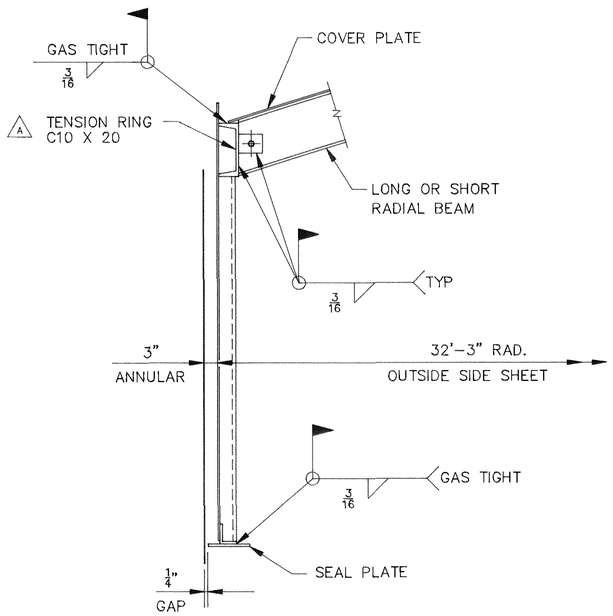
DRAWING NUMBER	PROJECT NUMBER	REV.
D101	4193	A



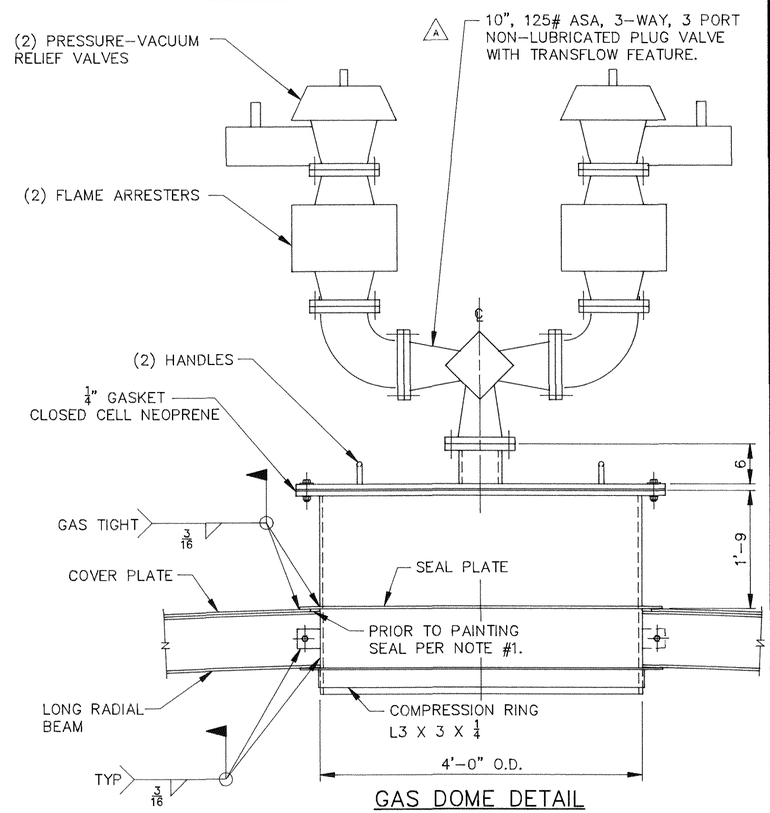
SUPPORT DETAIL



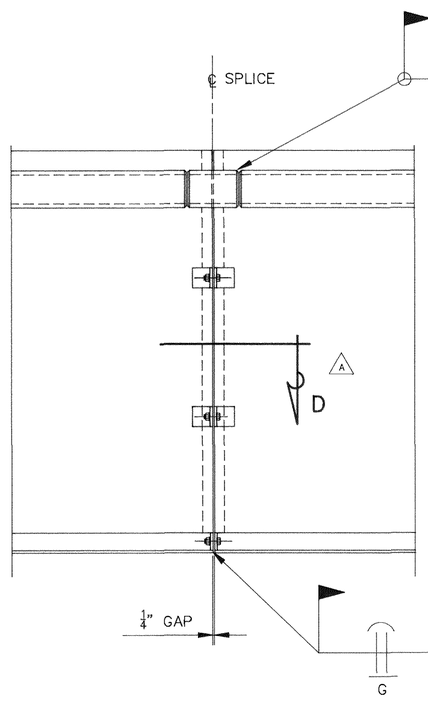
A SECTION A



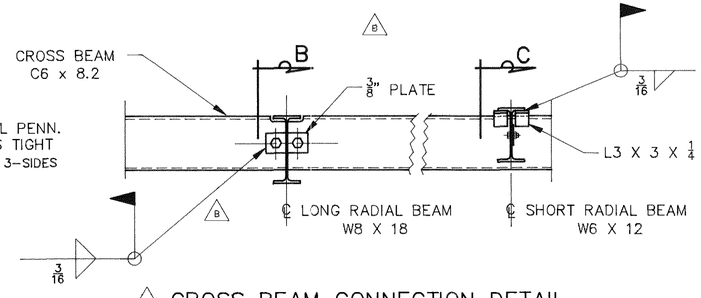
RADIAL BEAM CONNECTION



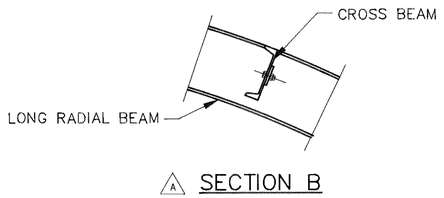
GAS DOME DETAIL



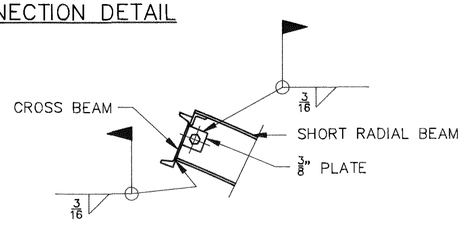
SIDE SHEET CONNECTION DETAIL
LOOKING FROM THE INSIDE



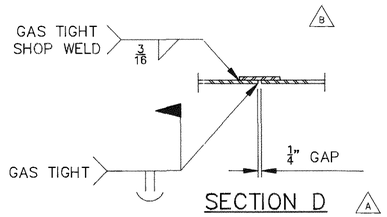
A CROSS BEAM CONNECTION DETAIL



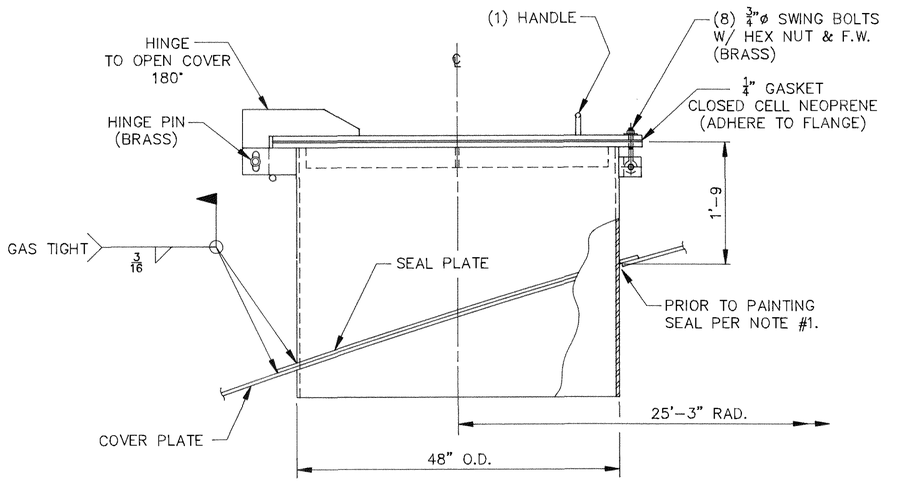
A SECTION B



A SECTION C



SECTION D



48" MANWAY DETAIL

NOTES:

1. AT LAPS ON THE UNDERSIDE OF THE COVER, BETWEEN ROOF PLATES AND WHERE CRACKS OF UP TO 1/4" OCCUR, CRACKS SHALL BE SEALED TO A MAXIMUM OF 1/64" TO ENSURE COMPLETE COVERAGE BY THE COATING SYSTEM. SEAL OPENINGS WITH MASTIC OR SEALANT COMPATIBLE WITH AND APPROVED BY THE COATING MANUFACTURER. (SEALANT NOT BY WESTECH)
2. WORK THIS DRAWING WITH DRAWINGS D102 & B103.

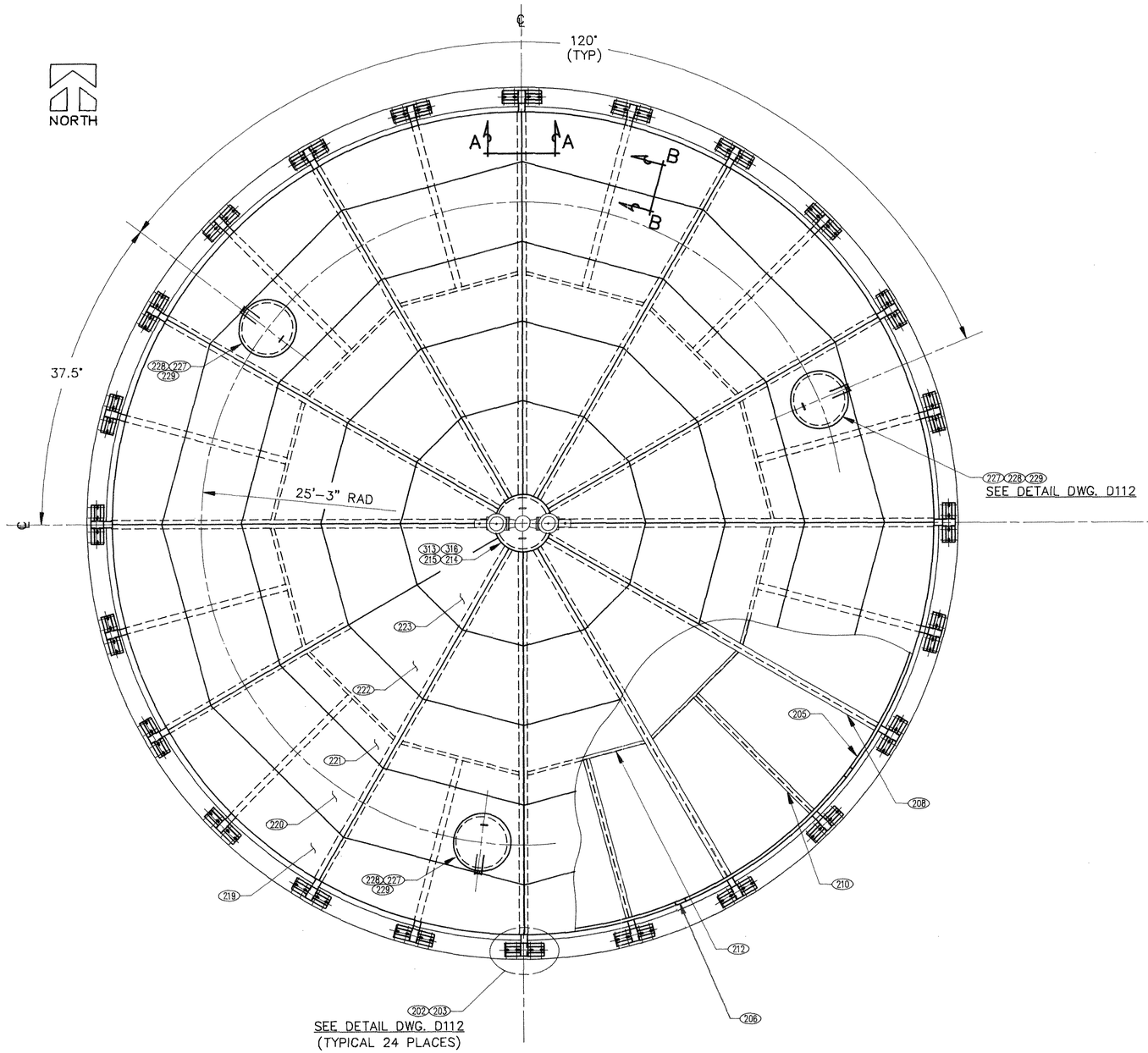
REVISION	BY	CHKD	DATE	LTR
7/8" UHMW WAS 3/8", DELETED SEAL WELD FROM CROSS BEAM CONNECTION, DELETED FILLET WELD FROM SECTION D.	RICK	MLK	9-92	B
DELETED SIDE SHEET VIEW FROM OUTSIDE, ADDED CROSS BEAM DETAIL, ADDED SECT. B,C,D, REVISED A/B DETAILS, TENSION RING WAS C8.	RICK	MLK	7-92	A

GENERAL ARRANGEMENT DETAILS

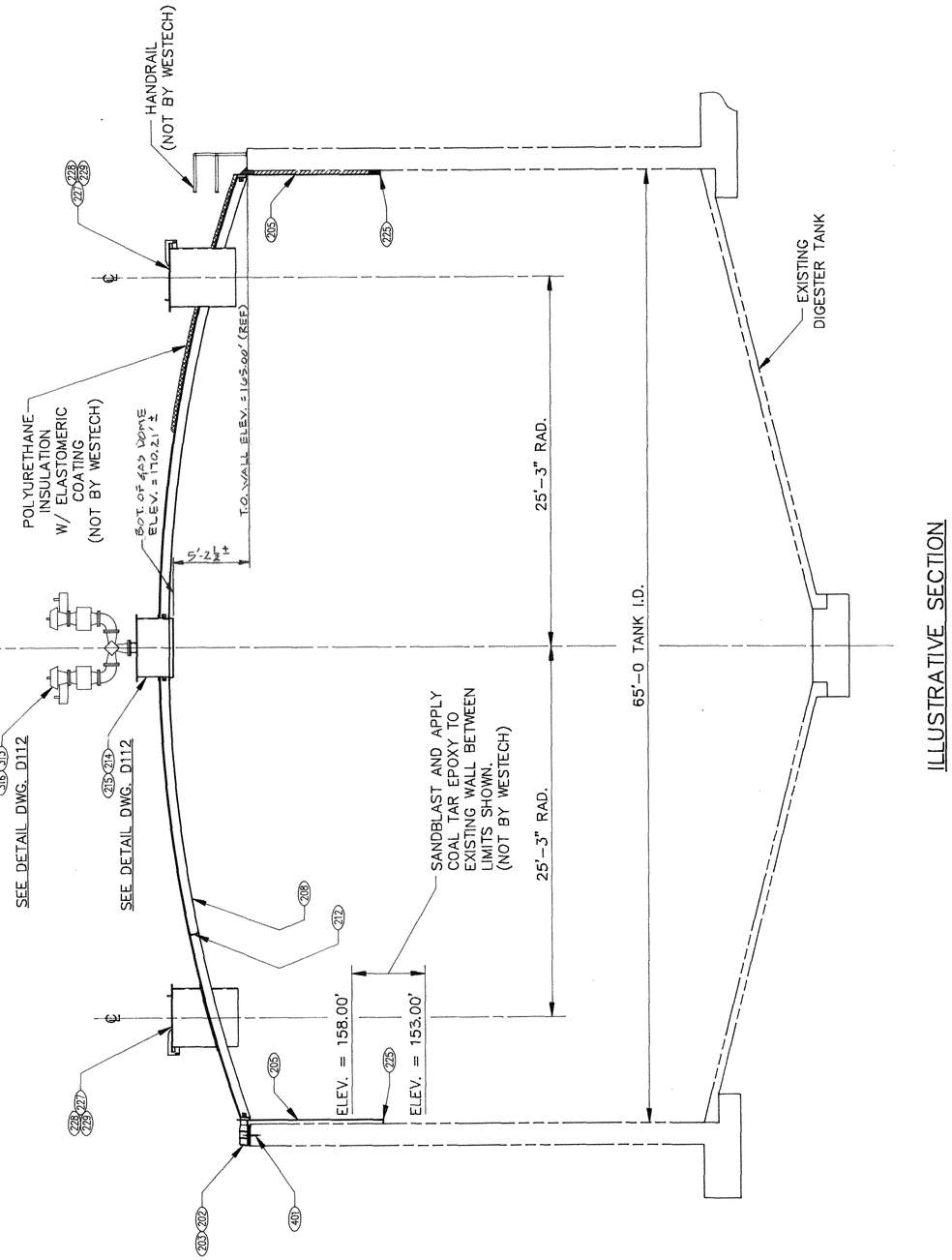
DESCRIPTION								
FIXED DIGESTER COVER					65'-0 DIA.			
TYPE					SIZE 1 = 1'			
				NONE	2-92	Rick	MLK	RRP
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD

WesTech ENGINEERING INC

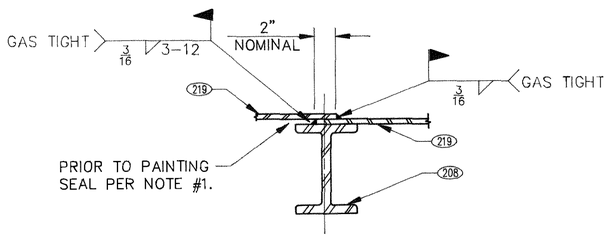
DRAWING NUMBER	PROJECT NUMBER	REV.
D102	4193	B



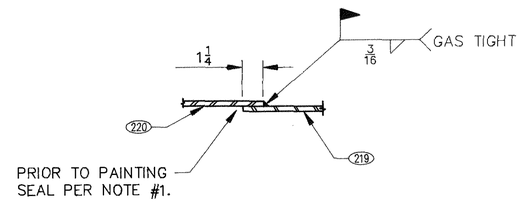
PLAN VIEW



ILLUSTRATIVE SECTION



SECTION A-A



SECTION B-B

NOTES:

1. AT LAPS ON THE UNDERSIDE OF THE COVER, BETWEEN ROOF PLATES AND WHERE CRACKS OF UP TO 1/4" OCCUR, CRACKS SHALL BE SEALED TO A MAXIMUM OF 1/64" TO ENSURE COMPLETE COVERAGE BY THE COATING SYSTEM. SEAL OPENINGS WITH MASTIC OR SEALANT COMPATIBLE WITH AND APPROVED BY THE COATING MANUFACTURER. (SEALANT NOT BY WESTECH)
2. WORK THIS DRAWING WITH DRAWING D112.

REVISION	BY	CHKD	DATE	LTR

GENERAL ASSEMBLY

DESCRIPTION: FIXED DIGESTER COVER | 65'-0 DIA.

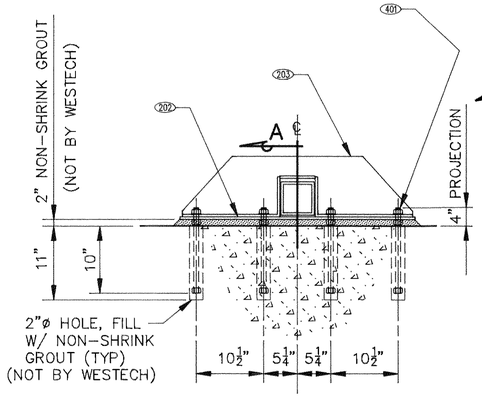
TYPE | SIZE 1875 = 1

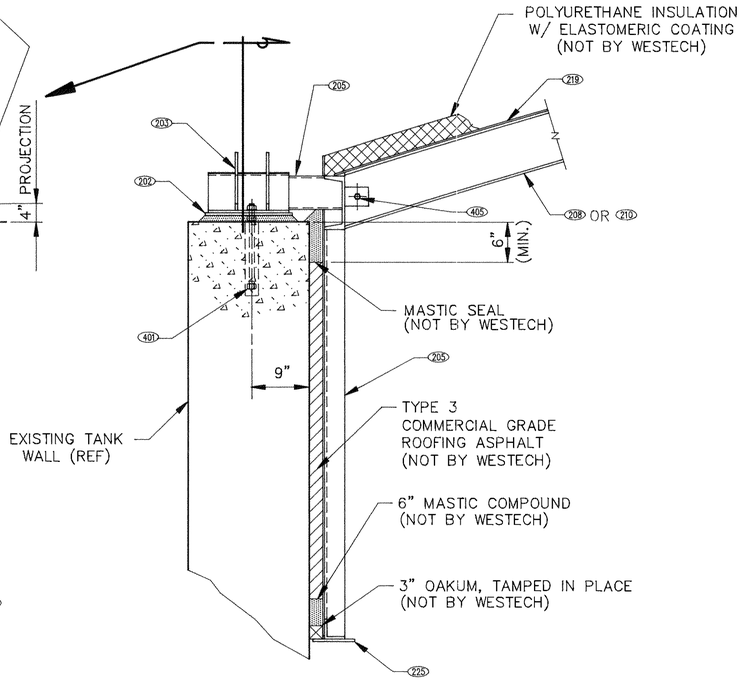
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD
				NONE	8-92	Rick	MLK	ARS

ALL COMPONENTS MUST BE FABRICATED AND MACHINED ACCORDING TO WESTECH STANDARD SPECIFICATION (DRAWING P24Z-024A), UNLESS SPECIFICALLY NOTED ON THIS DRAWING.

WesTech ENGINEERING INC

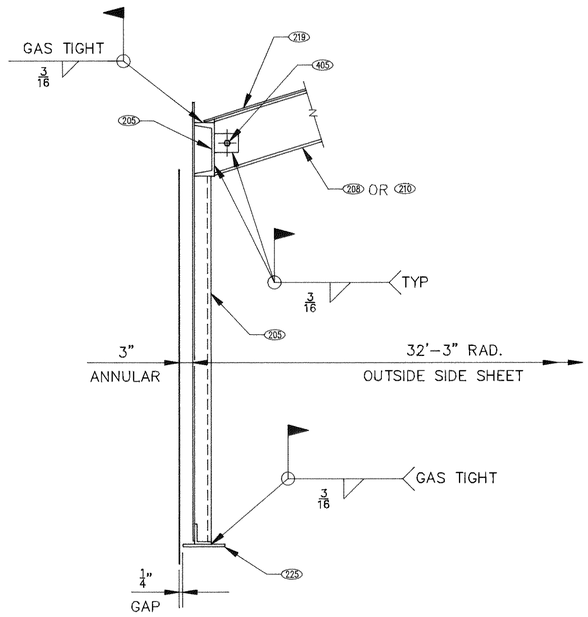
DRAWING NUMBER	PROJECT NUMBER	REV.
D111	4193	△



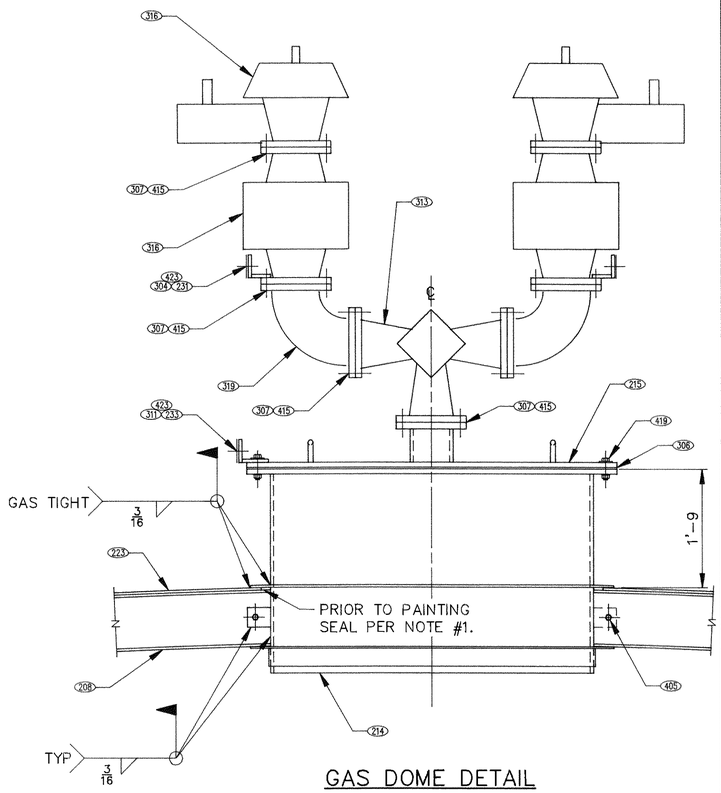


SUPPORT DETAIL

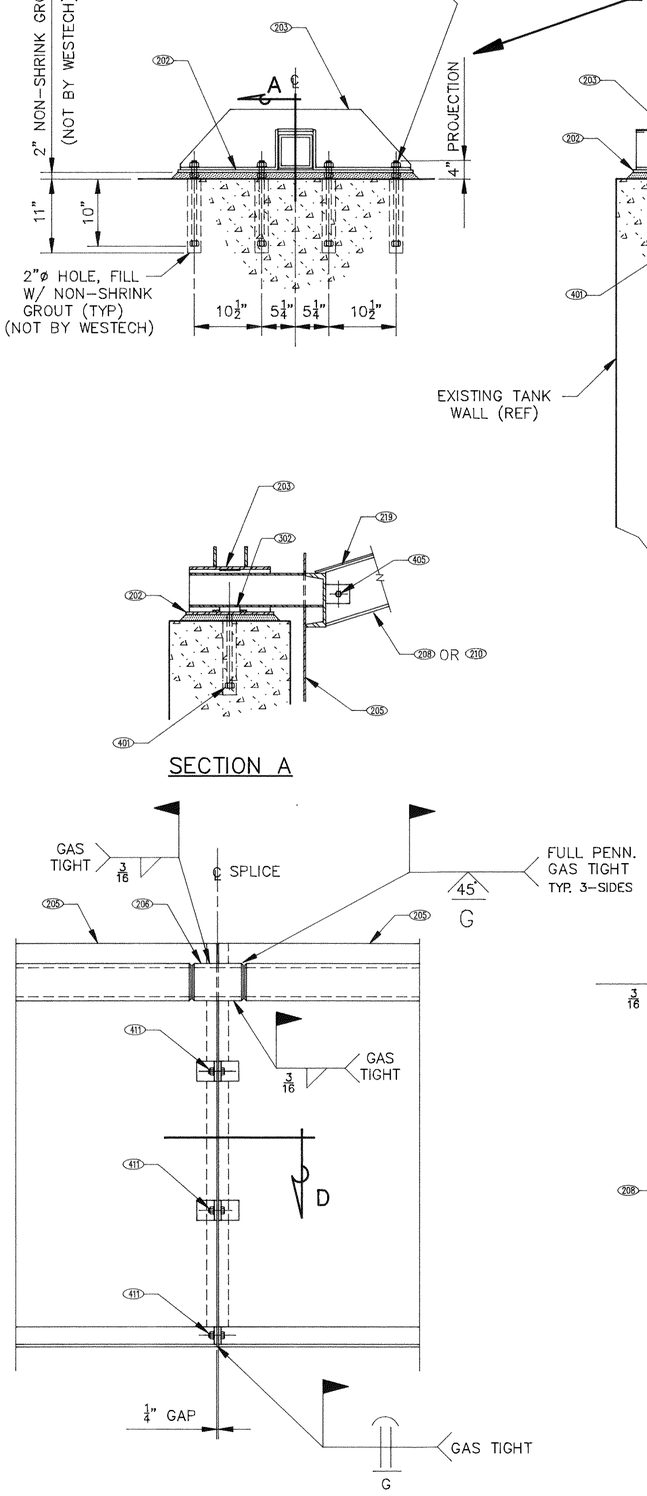
SECTION A



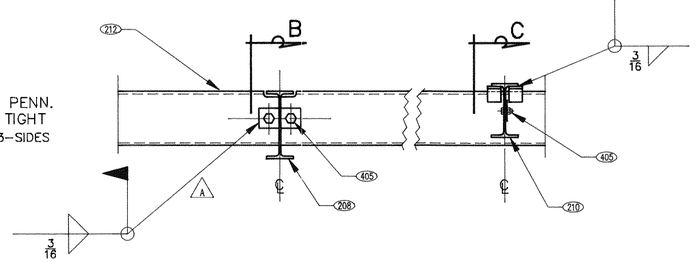
RADIAL BEAM CONNECTION



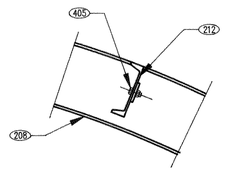
GAS DOME DETAIL



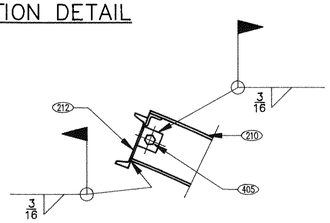
SIDE SHEET CONNECTION DETAIL
LOOKING FROM THE INSIDE



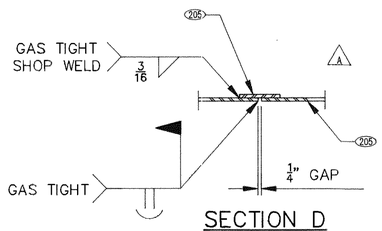
CROSS BEAM CONNECTION DETAIL



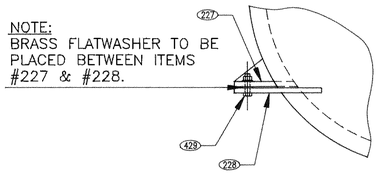
SECTION B



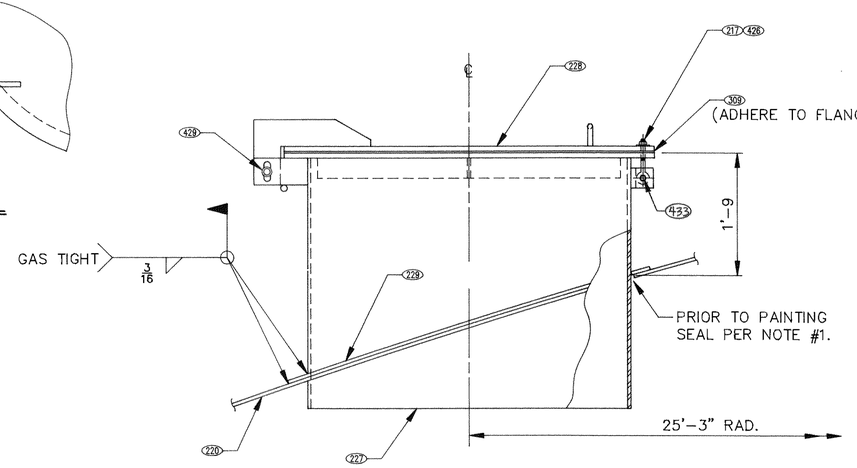
SECTION C



SECTION D



HINGE DETAIL



48" MANWAY DETAIL

NOTES:

1. AT LAPS ON THE UNDERSIDE OF THE COVER, BETWEEN ROOF PLATES AND WHERE CRACKS OF UP TO 1/4" OCCUR, CRACKS SHALL BE SEALED TO A MAXIMUM OF 1/64" TO ENSURE COMPLETE COVERAGE BY THE COATING SYSTEM. SEAL OPENINGS WITH MASTIC OR SEALANT COMPATIBLE WITH AND APPROVED BY THE COATING MANUFACTURER. (SEALANT NOT BY WESTECH)
2. WORK THIS DRAWING WITH DRAWING D111.

REVISION	BY	CHKD	DATE	LTR
DELETED FIELD FILLET WELD FROM SECTION D, REVISED WELD @ CROSS BEAM CONNECTION.	RICK	MLK	9-92	A

GENERAL ASSEMBLY DETAILS								
DESCRIPTION								
FIXED DIGESTER COVER				65'-0 DIA.				
TYPE				SIZE				1 = 1"
				NONE	8-92	Rick	MLK	ARS
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD

WesTech ENGINEERING INC

DRAWING NUMBER	PROJECT NUMBER	REV.
D112	4193	A

1. A STAR DENOTES VARIANCE FROM CONTRACT DOCUMENTS AND SHOULD BE PARTICULARLY NOTED. ★

2. CONTRACTOR TO VERIFY OR SUPPLY ON APPROVAL ALL DIMENSIONS SHOWN IN CLOUD.

3. THE FOLLOWING DEFINES THE RESPONSIBILITY OF WESTECH ENGINEERING INC. WITH REGARD TO THE INFORMATION AND DIMENSIONS SHOWN ON THE DRAWINGS.

   (A) THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNTIL IT BEARS THE APPROVAL OF THE OWNER, THE ENGINEER OR THEIR DULY AUTHORIZED REPRESENTATIVE.

   (B) DIMENSIONS, LOADS, AND OTHER INFORMATION ARE PROVIDED TO ACCOMMODATE THE EQUIPMENT TO THE STRUCTURE AS SHOWN.

   (C) WESTECH IS NOT RESPONSIBLE FOR CONCRETE DESIGN. THE CUSTOMER IS TO PROVIDE REINFORCING STEEL AND DETERMINE SIZES TO SUIT LOCAL REQUIREMENTS.

   (D) WESTECH IS NOT RESPONSIBLE FOR DAMAGE, INJURY OR LOSS RESULTING FROM INCORPORATION OR USE OF THIS EQUIPMENT.

   (E) CHARGES FOR MODIFICATIONS, ADDITIONS OR CORRECTIONS TO THE EQUIPMENT WILL NOT BE ACCEPTED BY WESTECH, UNLESS PRIOR APPROVAL IS OBTAINED IN WRITING FROM AN AUTHORIZED WESTECH REPRESENTATIVE.

4. WESTECH DOES NOT FURNISH CONCRETE, GROUT, CONCRETE REINFORCING,PIPING, VALVES, PIPE SUPPORTS OR FITTINGS, WALL BRACKETS, CORBELS, ELECTRICAL EQUIPTMENT, ERECTION FIELD PAINTING OR PAINT, FIELD WELDING OR WELD ROD,, WATER FOR TESTING, OR TANK MANHOLES, EXCEPT WHERE SPECIFICALLY NOTED.

5. ALL STRUCTURAL STEEL USED IN THE FABRICATION OF THE COVER SHALL CONFORM TO THE REQUIREMENTS OF "STANDARD SPECIFICATIONS FOR STEEL, FOR BRIDGES AND BUILDINGS," ASTM DESIGNATION A-36. STEEL SHAPES AND PLATES MININUM 1/4" THICK.

6. ALL WELDS TO BE GAS TIGHT AND CONFORM TO THE LATEST REVISION OF THE "STANDARD CODE FOR ARC AND GAS WELDING" OF THE AMERICAN WELDING SOCIETY. WELDERS SHALL BE CERTIFIED.

7. COVER DESIGNED TO RESIST AN INTERNAL GAS PRESSURE OF 13" WATER COLUMN AND A MAXIMUM VERTICAL LOAD OF 73 LBS. PER SQUARE FOOT DEAD, LIVE, SNOW, AND VACUUM LOAD. SEISMIC ZONE 3. WIND LOAD OF 70 MPH, EXPOSURE B.

8. PRESSURE RELIEF AND VACUUM BREAKER WILL BE SET TO RELIEVE AT 10" W.C. PRESSURE AND 2" W.C. VACUUM.

9. TOTAL ESTIMATED WEIGHT OF COVER IS 77,250 LBS.

10. —

11. FOR FURTHER CONCRETE AND PIPING DETAILS REFER TO PLANS AND DETAILS BY CONSULTING ENGINEER.

12. WORK THIS DRAWING WITH DRAWINGS D101 & D102

13. WESTECH WILL PROVIDE TWO FIXED DIGESTER COVERS AS SHOWN AND NOTED.

14. SURFACE PREPARATION: NONE BY WESTECH.
    PAINTING: NONE BY WESTECH.

15. ANCHOR BOLTS: 304 S.S.
    ERECTION FASTENERS: A307
    FLANGE FASTENERS: A307
    MANWAY FASTENERS: BRASS SWING BOLTS

REVISION	BY	CHKD	DATE	LTR
				D
				C
				B
				A

GENERAL NOTES

DESCRIPTION								
FIXED DIGESTER COVER				65'-0 DIA.				
TYPE				SIZE				1, X 1
				NONE	2-92	Rick	MLK	RRP
DATE	STD. BY	STD.CHKD.	STD.APPVD.	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD

WesTech ENGINEERING INC

DRAWING NUMBER	PROJECT NUMBER	REV.
B103	4193	△