Application for Waiver from Construction Standards for Public Water Systems

Water System Name Portland Water Bureau PWS ID 00657

Project or Facility Bull Run Filtration Finished Water Pipelines County Multnomah

Need for waiver identified: ☐ Water System Survey Date of Survey

☑ Plan Review # Exempt

Construction standard requested to be waived: OAR 333-061-0050 (9)(b) water sewer separation

As provided under OAR 333-061-0055, the Department may grant waivers from the construction standards prescribed by these rules:

(a) When it is demonstrated to the satisfaction of the Department that strict compliance with the rule would be highly burdensome or impractical due to special conditions or causes; and

(b) When the public or private interest in the granting of the waiver is found by the Department to clearly outweigh the interest of the application of uniform rules; and

(c) When alternate measures are provided which, in the opinion of the Department, will provide adequate protection to the health and safety of the public including the ability to produce water which does not exceed the maximum contaminant levels listed in rule 333-061-0030.

Describe situation that conflicts with the standard. A proposed 66-inch transmission conduit at the outlet of the future Bull Run Filtration Facility must pass underneath an existing residential property that currently includes two septic drain fields. The two septic drain fields will be decommissioned and new ones constructed further away from the water pipeline outside of the 100-foot water pipe easement. This vastly exceeds the 10-foot standard separation of a septic field from a water line defined in OAR 340-071-0800 Table 1 Page 2. A 4-inch sanitary sewer service from the residences to the new septic field must be provided that cross over the water pipe easement. Therefore the proposed water transmission main will cross 21-feet underneath the proposed 4" sanitary sewer service.

Describe why meeting the standard is highly burdensome or impractical. Sewer service must be provided to the property, and there is not room on the close side of the easement. Relocating the septic system further away from the water line will greatly reduce the risk of contamination.

Describe proposed alternate measure that provide adequate protection to public health and safety. OAR 333-061-0050(9)(b)(C) allows for a water line to be installed underneath a sewer line under certain conditions. First, the soil between the pipes must be thoroughly tamped to preent settlement of the sewer. For this project, the water line will be installed via directional drilling, so the 21-feet of soil between the two pipes will not be disturbed. The natural degree of compaction will be maintained, providing equivalent protection to excavating then tamping the refilled construction material. In addition, a geotechnical investigation has found that the soil

between the pipes provides adequate strength to mitigate risk of settling of the proposed sewer pipe. This report also identified a confining layer of soil that will mitigate risk of infiltraton from reaching the water pipe. Second, one stick of pipe must be centered at the crossing so that no joints are near the crossing. For this project, the water pipe will be continuous welded steel so that there are no water line joints and provide superior protection compared to centering a stick of pipe. Third, the sewer line must be inspected and if in poor condition mitigation taken. In this project the sewer pipe will be newly constructed and therefore in good condition with no evidence of leakage, however in an abundance of caution the mitigation will be included anyway. The mitigation will follow OAR 333-061-0050(9)(b)(B) by encasing the proposed sewer line in concrete. Instead of only encasing for 10-feet on either side of the crossing, the encasement will extend the full 100-foot length of the water line easement to make room for a possible future second conduit.

Mac Gifford
Signature

6-7-2024
Date

Name Mac Gifford
Address 1900 N Interstate Ave
City/State/Zip Portland, OR 97227
Telephone Number 503-823-1507

Attach plans of proposed waiver request or additional supporting information and
- Email your regulator; or
- Email dws.planreview@dhsoha.state.or.us; or
- Mail:
  Oregon Health Authority
  Drinking Water Services #640
  PO Box 14450
  Portland, OR 97293-0450

☐ Comments:

☒ Attachments: Bull Run Filtration Pipelines Finished Water Pipeline Plan and Profile, Geotechnical Data Report, PWB Design Exemption

OHA Use Only

Waiver ID 489-2024

Entered into waiver database ☑

☑ Plan Review Coordinator's notes: Proposed alternate measures appear to provide adequate protection to public health and safety.

After due consideration the above requested waiver from the construction standards of OAR 333-061-0050 is hereby:

☒ Approved Comments:

☐ Denied

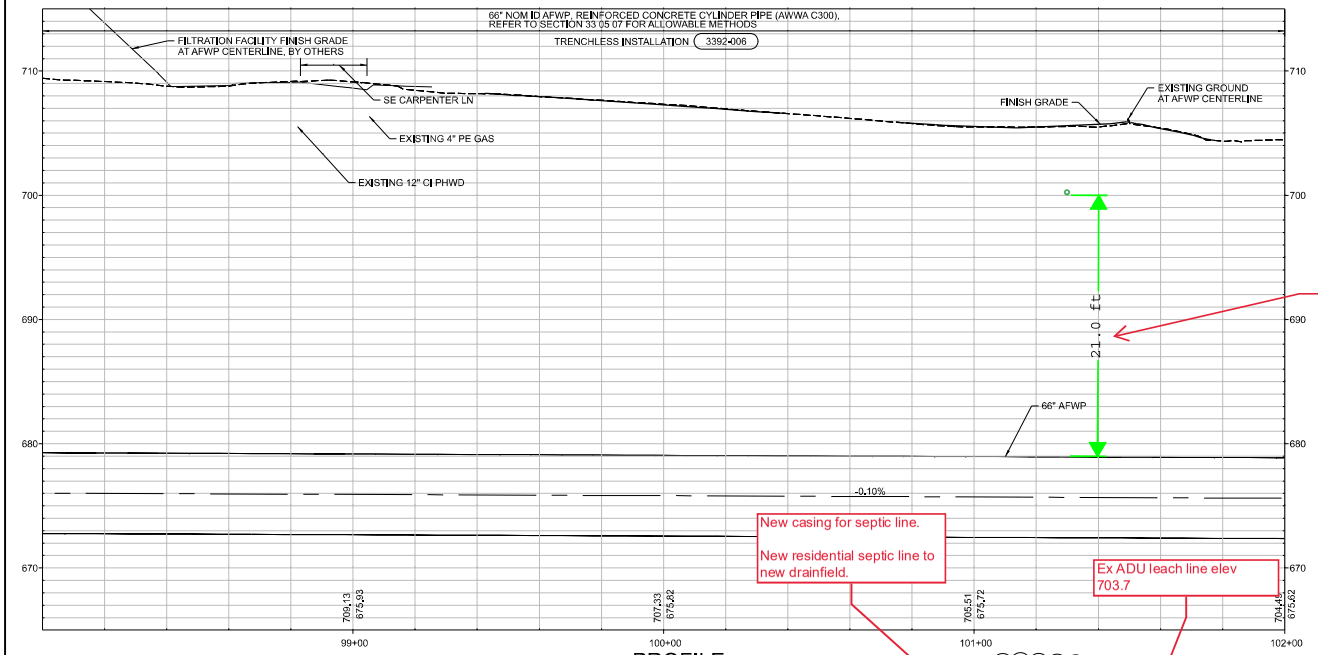
Kari Sabis

6/12/2024

Drinking Water Regional Manager Signature
Oregon Health Authority

Date

Waiver database updated ☒



PROFILE

SCALE: HORIZ - 1"=20'
VERT - 1"=5'

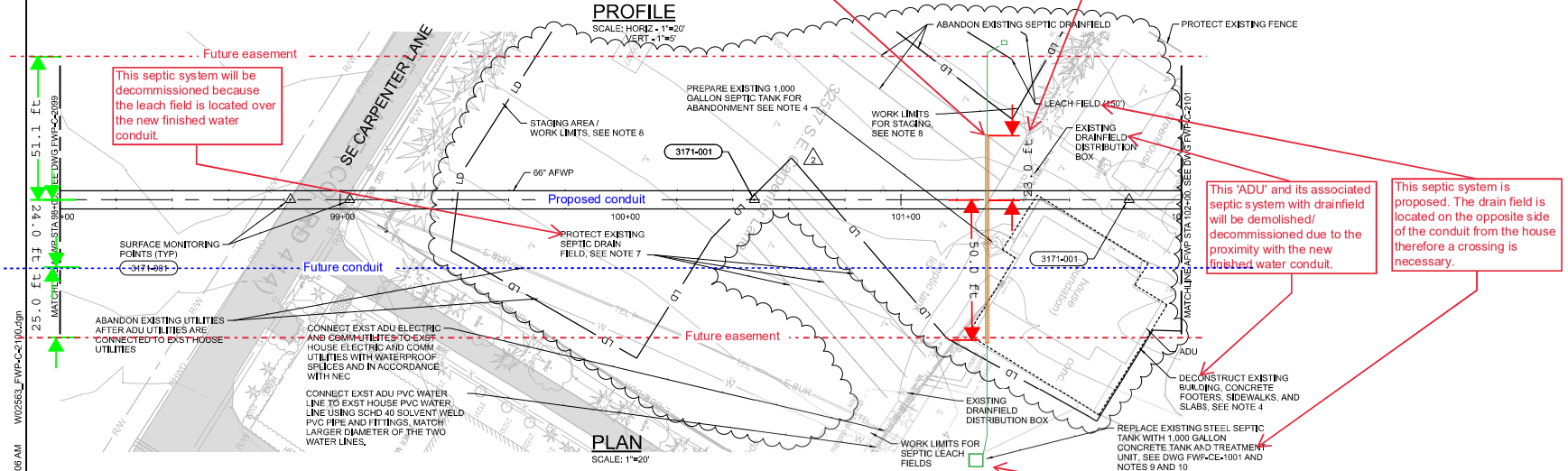
Comparing the existing systems with the likely design for the new septic tank drain line, the drain line is very likely to be above 700' elevation at the crossing.

Safe estimate is a 21' vertical clearance at the crossing.

New casing for septic line.

New residential septic line to new drainfield.

Ex ADU leach line elev 703.7



PLAN

SCALE: 1"=20'

This 'ADU' and its associated septic system with drainfield will be demolished/ decommissioned due to the proximity with the new finished water conduit.

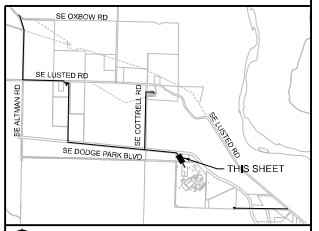
This septic system is proposed. The drain field is located on the opposite side of the conduit from the house therefore a crossing is necessary.

Rim elevation of existing tank is 708.1

GENERAL SHEET NOTES

1. THE NUMBER OF SURVEY MONITORING POINTS SHOWN IS THE MINIMUM REQUIRED. CONTRACTOR MAY ELECT TO INSTALL ADDITIONAL POINTS.
2. LOCATION OF MONITORING POINTS ARE APPROXIMATE. LOCATIONS MAY BE ADJUSTED AS APPROVED BY OWNER'S REPRESENTATIVE.
3. MAINTAIN GROUND CONDITIONS BETWEEN LAUNCH AND RECEIVING SHAFTS AND SE CARPENTER LN. IMMEDIATELY FILL ANY SETTLEMENT OR SINKHOLE AREAS CREATED BY TRENCHLESS CONSTRUCTION PROCEDURES.
4. SEE SPECIFICATION SECTION 02 41 19 DEMOLITION FOR BUILDING DECONSTRUCTION AND SEPTIC SYSTEM ABANDONMENT REQUIREMENTS, BACKFILL BUILDING FOOTPRINT AND CONCRETE SLAB/SIDEWALK AREAS TO GRADE AFTER DECONSTRUCTION.
5. CONTRACTOR SHALL VERIFY LOCATION OF AND PROTECT ALL EXISTING UTILITIES.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIR OF ALL DAMAGE TO EXISTING UTILITIES AND ROADWAY CAUSED BY CONSTRUCTION ACTIVITIES.
7. EQUIPMENT SHALL NOT BE DRIVEN OVER SEPTIC SYSTEMS AND NO MATERIAL (PIPE, SUPPLIES, BACKFILL, SPOILS, EQUIPMENT, ETC.) WILL BE PLACED OVER SEPTIC SYSTEMS.
8. FOR ACCESS AND OVERALL WORK LIMITS ON PARCEL, SEE DWG FWP-CE-1001.
9. DISPOSE OF EXISTING STEEL SEPTIC TANK IN ACCORDANCE WITH SPECIFICATION SECTION 02 41 19 DEMOLITION.
10. DESIGN AND INSTALL REPLACEMENT LEACH FIELD, TANK, AND TREATMENT UNIT IN COMPLIANCE WITH OAR 340-071. SEE DWG FWP-CE-1001 FOR CONTINUATION OF NEW LEACH FIELD AND LOCATION OF FUTURE BACKUP LEACH FIELD. (2)

Scale In Feet: 0 20 40 60



KEYPLAN

CONFIDENTIAL

No	Date	Description	Appd
2	10/2023	DCM-01	BJP
1	6/7/23	ADDENDA NO. 1 - 100% REVIEW COMMENT UPDATE	BJP
		Revision	
		Survey	

Jacobs

ISSUED FOR CONFORMED SET ONLY

FOR STAMPED DESIGN PLEASE REFER TO JUNE 6, 2023 100% FINAL DESIGN PACKAGE

Designed By	EF
Drawn By	BSH
Checked By	SSW
Project Mgr	BJP
Program Mgr	DH
Const Mgr	BN
CMH Eng Mgr	JB
Date	9/29/23

WARNING

0 1"

If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

KENNETH M. ACKERMAN, PRINCIPAL ENGINEER, PE #19424 Date

CITY OF PORTLAND OREGON 1851

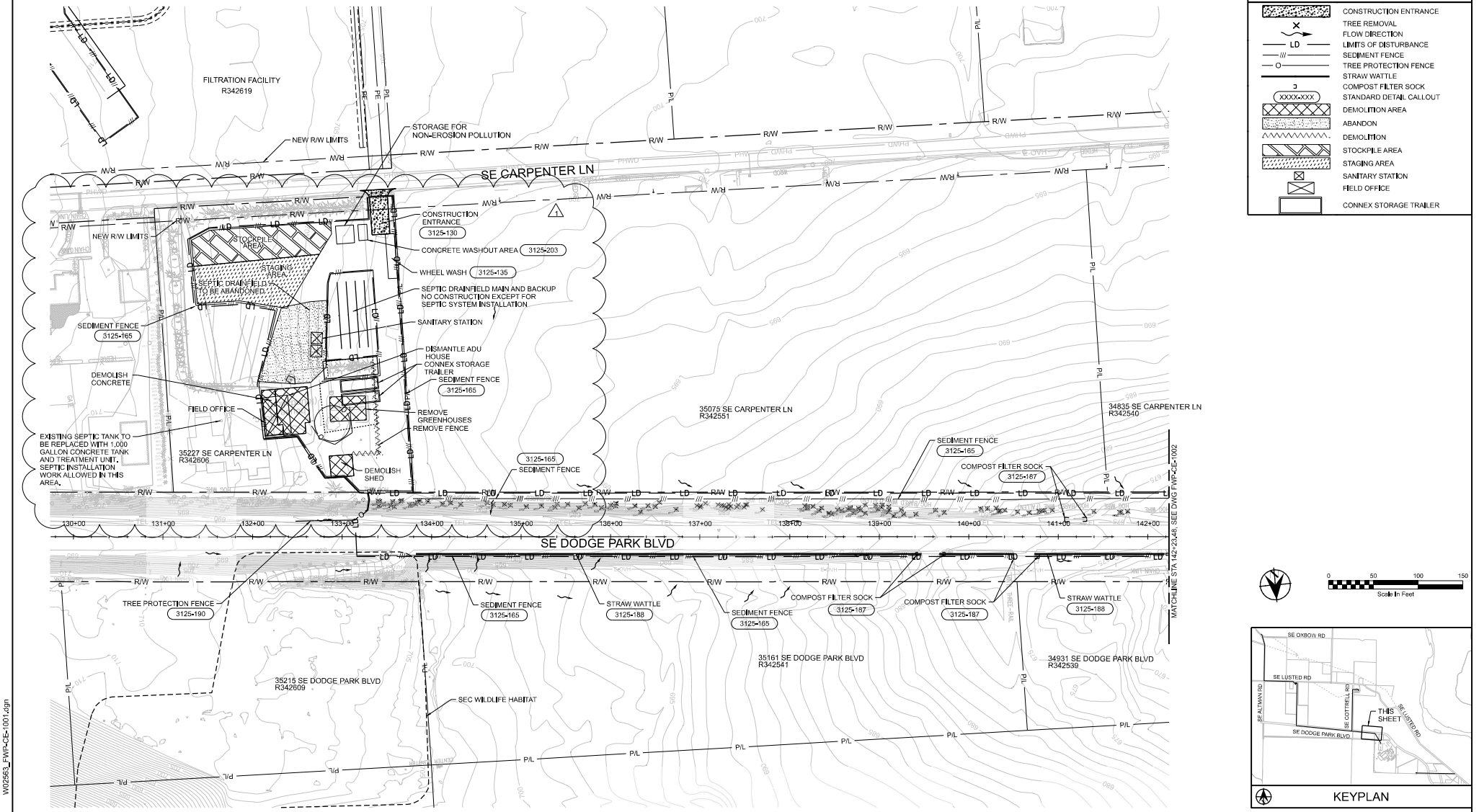
Bull Run Filtration Pipelines

FINISHED WATER PIPELINE PLAN AND PROFILE

ALTMAN STA 98+00 TO 102+00

SAP Project No	W02563
1/4 Section	3866
Sheet No	FWP-C-2100
	185 of 623

10/10/2023 10:33:06 AM W02563_FWP-C-2100.dgn



CONFIDENTIAL

W02563_FWP-CE-1001.dgn

4-OCT-2023 18:56

No	Date	Description	Appd
1	10/2023	DCN-01	BJP
Revision			
Survey			

EMERIO ENGINEERING • SURVEYING • DESIGN

ISSUED FOR CONFORMED SET ONLY

FOR STAMPED DESIGN PLEASE REFER TO JUNE 6, 2023 100% FINAL DESIGN PACKAGE

Designed By	Program Mgr: DH
Drawn By: BN	Const Mgr: BN
Checked By	CMH Eng Mgr: JB
Project Mgr	Date: 9/29/23

WARNING

0 1"

If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

KENNETH M. ACKERMAN, PRINCIPAL ENGINEER, PE #19424 Date

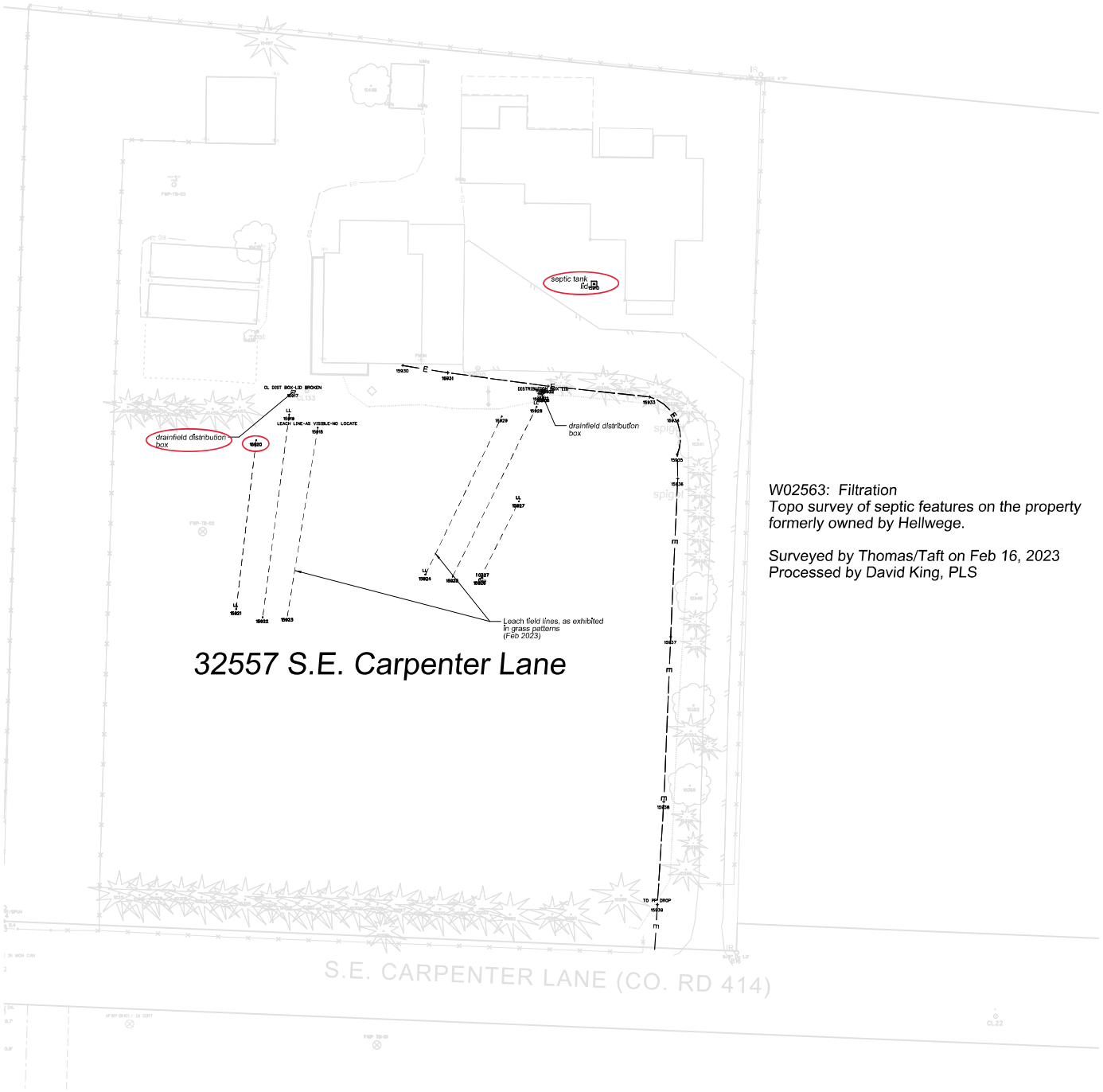
CITY OF PORTLAND OREGON 1851

Bull Run Filtration Pipelines

FINISHED WATER PIPELINE EROSION AND SED. CONTROL

EXISTING CONDITIONS AND DEMOLITION DODGE PARK BLVD

SAP Project No	W02563
1/4 Section	3664 / 3764
Sheet No	FWP-CE-1001
	283 of 623



W02563: Filtration
Topo survey of septic features on the property formerly owned by Hellwege.

Surveyed by Thomas/Taft on Feb 16, 2023
Processed by David King, PLS

W02563: Filtration
Topo survey of septic features on the property
formerly owned by Hellwege.

Surveyed by Thomas/Taft (PWB) on Feb 16, 2023
Processed by David King, PLS

15910	661745.725	7741148.254	708.063	Generic Pt	24" SEPTIC LID
15911	661744.517	7741149.967	708.553	Ground shot	
15912	661705.998	7741129.820	706.258	Edge of Concrete	DISTRIBUTION BOX LID
15913	661705.164	7741129.385	706.280	Edge of Concrete	
15914	661705.755	7741128.123	706.187	Edge of Concrete	
15915	661705.883	7741128.985	706.235	Concrete shot	
15916	661705.305	7741130.140	707.367	Ground shot	
15917	661706.486	7741038.482	703.713	Generic Pt	CL DIST BOX-LID BROKEN
15918	661693.316	7741047.471	705.063	Generic Line	LEACH LINE-AS VISIBLE-NO LOCATE
15919	661698.123	7741037.082	704.851	Generic Line	LL
15920	661688.721	7741025.012	704.367	Generic Line	
15921	661627.136	7741017.718	703.958	Generic Line	LL
15922	661624.182	7741027.374	704.440	Generic Line	
15923	661624.777	7741036.417	704.600	Generic Line	
15924	661639.752	7741086.714	706.034	Generic Line	LL
15925	661639.022	7741096.661	706.502	Generic Line	
15926	661638.168	7741106.660	706.654	Generic Line	
15927	661666.383	7741120.812	706.996	Generic Line	LL
15928	661700.909	7741127.277	707.534	Generic Line	LL
15929	661697.402	7741114.580	707.049	Generic Line	
15930	661716.022	7741078.475	706.851	Elec line	
15931	661713.348	7741094.963	707.224	Elec line	
15932	661708.454	7741131.532	707.643	Elec line	
15933	661704.554	7741168.488	708.544	Elec line	
15934	661697.904	7741177.283	708.625	Elec line	
15935	661683.528	7741178.575	708.657	Elec line	
15936	661674.742	7741178.746	708.620	Elec line	
15937	661617.036	7741176.170	708.652	Elec line	
15938	661556.916	7741173.646	708.864	Elec line	
15939	661519.417	7741171.334	708.828	Elec line	TO PP DROP
15906	659274.155	7745996.760	506.456	Telephone line	

Portland Water Bureau
From forest to faucet, we deliver the best drinking water in the world.

PWB DESIGN/POLICY EXCEPTION FORM

DESIGN EXCEPTION NO. 2024-0043

PROJECT (PERMIT) NAME:	PROJECT (PERMIT) NO.:
Bull Run Filtration Pipelines Project	W02563
APPLICANT NAME & TITLE:	**REQUEST DATE:**
Brad Phelps PE, Design Manager, Jacobs Engineering Group	3/28/24

STANDARD, GUIDELINE, CODE, OR POLICY THAT WILL NOT BE MET:

☒ OAR 333-061/OAR 340-052-App A	☐ PWB Public Works Process Manual
☐ Title 21	☐ PWB Standard Drawings
☐ PWB Admin Rule	☐ PWB Policy
☐ PWB Design Manual	☐ Other

EXCEPTIONS - CONFLICTS WITH WATER SYSTEM:

☐ Pipeline Layout	☒ Waterline/Sewer Line/Storm Line Separation
☐ Vault and structure separation	☐ Separation to Other Utilities
☐ Pipe Cover	☐ Meter box/small service location
☐ Valve Locations	☐ Above Ground Clearance
☐ Hydrants	☐ Connections
☐ Other	

DESIGN/POLICY EXCEPTION DESCRIPTION (CITE THE STANDARD, GUIDELINE, OR POLICY THAT WILL NOT BE MET):

333-061- 0050(9)(c)(A) Wherever possible, the bottom of the water line shall be 1.5 feet or more above the top of the sewer line and one full length of the water line shall be centered at the crossing.

SUPPORTING DOCUMENTION SHALL BE SUBMITTED WITH APPLICATION THAT INCLUDES SITE PLAN, PROFILE, CROSS SECTIONS AND DETAILS.

PROJECT DESCRIPTION: A residential sanitary line is proposed to be located over a new 66" C300 concrete cylinder potable water transmission conduit. The C300 pipe has a steel can. The joints of the pipe will be welded together. Design plans for the conduit are complete and have been signed by the Bureau. The septic system has not yet been designed though the location of the drainfield has gone through a Multnomah County Site Evaluation SER# 10-23 with approval June 15, 2023. It is unclear whether the sanitary line will be a gravity or pressure line.

LOCATION (STREET, STATIONING, AND OFFSET):

Bull Run Filtration Pipelines FWP-C-2100 and FWP-CE-1001. AFWP Stationing 101+30

35227 SE Carpenter Lane. Filtration Project Property A.

REASON(S) FOR DESIGN EXCEPTION (ATTACH BACKGROUND DOCUMENTS AS APPLICABLE):

The proposed sanitary line will likely be a 1.5" pressure line or 4" gravity line located above a potable transmission main. A crossing though Oregon Administrative Rules require that new water mains be 1.5' over sanitary lines at crossings.

DESCRIBE ALTERNATES & MITIGATION CONSIDERED AS APPLICABLE:

Jacobs Engineering and Portland Water Bureau have coordinated on multiple design iterations to avoid designing a new conduit under a future sanitary line. A longer alignment along the south and west property lines of the subject lot or the west and north property lines of the Filtration site could avoid the sanitary conflict but at the PWB expense 1) of additional length of the 66" conduit, 2) additional fittings on the 66" conduit, 3) potential modification of the trenchless straight-line jacking method, 4) additional hydraulic headloss at the fittings, and 5) disruption of planned construction and access on the above lots.

The future sanitary line will cross the AFWP between the septic tank and the drainfield will be approximately 21' or more above the crown of the filtered water conduit, regardless of whether the sanitary line is designed as a gravity or pressure line. The proposed mitigation strategies will assure permanent protection from cross contamination.

The C300 concrete cylinder pipe will be manufactured as a continuous steel cylinder for each length of pipe and encased in concrete. During installation, the cylinders will be welded at each joint thereby completing a single continuous steel pipe below the sanitary line.

The sanitary line will be designed to be within a casing that will extend over the proposed and future conduits at least 20’ from the skin of the conduits. A 100’ wide easement will be established over the alignment of the transmission conduits across the subject property when/if the property is transferred from City ownership. A continuous or pressure tested casing for the sanitary crossing is recommended.

Attached Geotechnical Data Report, dated January 2023, demonstrates ‘Fat Clay’ starting from 10’ below ground surface to 28’ bgs. Therefore, there is a 10’ confining layer between the sanitary line and the transmission main. Since the potable water transmission pipe will be installed using trenchless means (microtunneling) and jacked in place, this layer will not be trenched near the sanitary crossing.

No appurtenances are proposed within 100’ of the future sanitary line or drainfield.

PROPOSED MITIGATION (TO BE SHOWN ON PLANS FOR APPROVAL AS APPLICABLE):

More than 20’ vertical separation at the crossing.

Continuous C300 concrete cylinder pipe for the finished water.

Casing of the sanitary line 23’ west and perpendicular from the centerline of the proposed conduit and 50’ east and perpendicular from the centerline of the proposed conduit, which likely encompasses the future conduit.

Undisturbed fat clay providing a confining layer between water conduit and sewer line.

PREPARED BY (Check and complete all boxes that apply):

☐ APPLICANT	ADDRESS & PHONE
	2020 SW 4th Ave, Suite 300 Portland, OR 97201
☒ ENGINEER OF RECORD	
Brad Phelps, P.E.	503.360.7413
COMPANY NAME	EMAIL ADDRESS
Jacobs Engineering Group	Brad.Phelps@jacobs.com

EOR PE Stamp and Seal

Bull Run TREATMENT PROJECTS | Pipelines

PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

CITY OF PORTLAND, OREGON 1851

FINAL

Geotechnical Data Report Filtration Pipelines Project – Finished Water Pipeline

January 2023

Prepared by:

Jacobs

In association with
McMILLEN JACOBS ASSOCIATES
and other firms

Geotechnical Data Report: Filtration Pipelines Project - Finished Water Pipeline

Prepared for

January 2023

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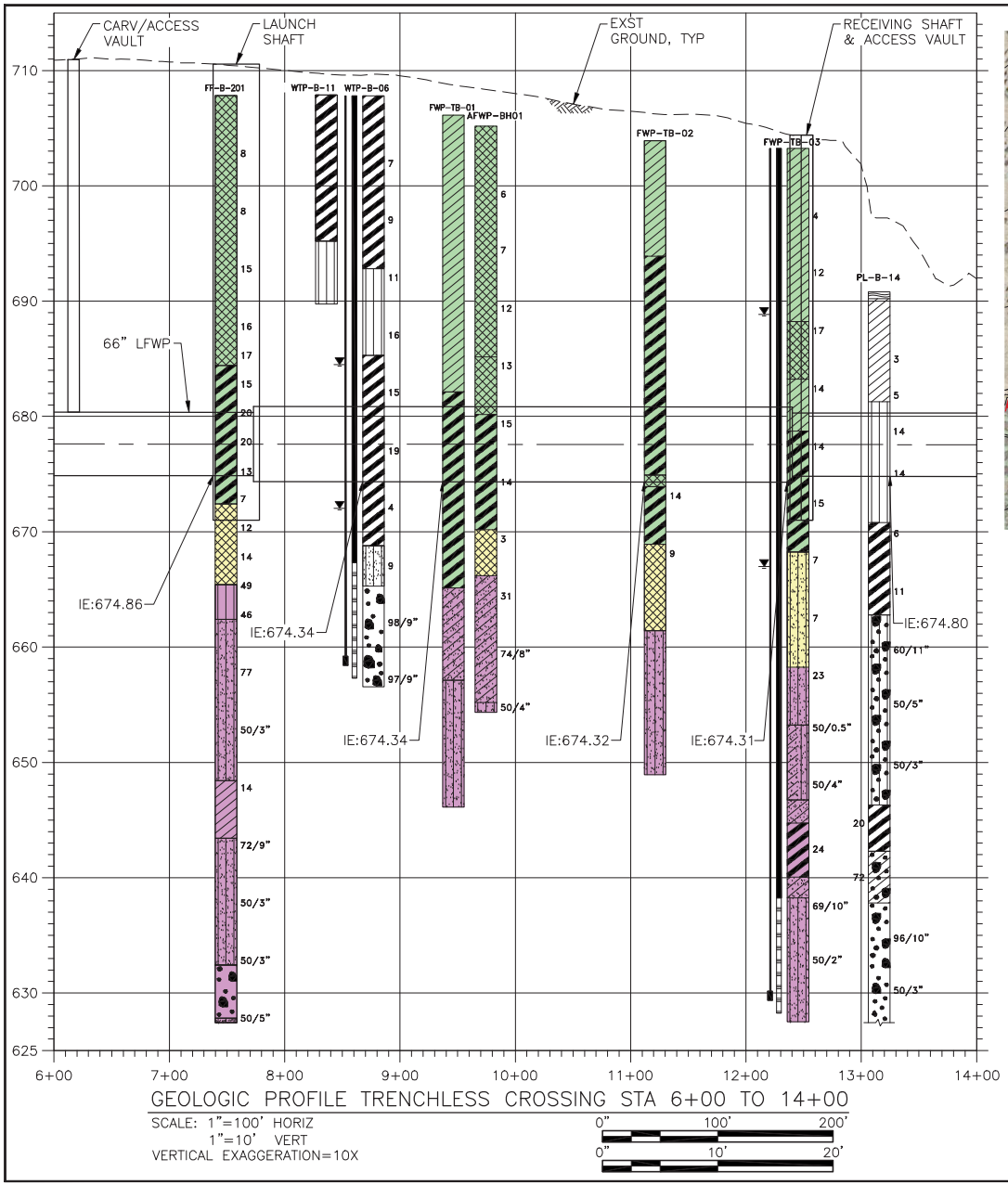
Appendices

Figures

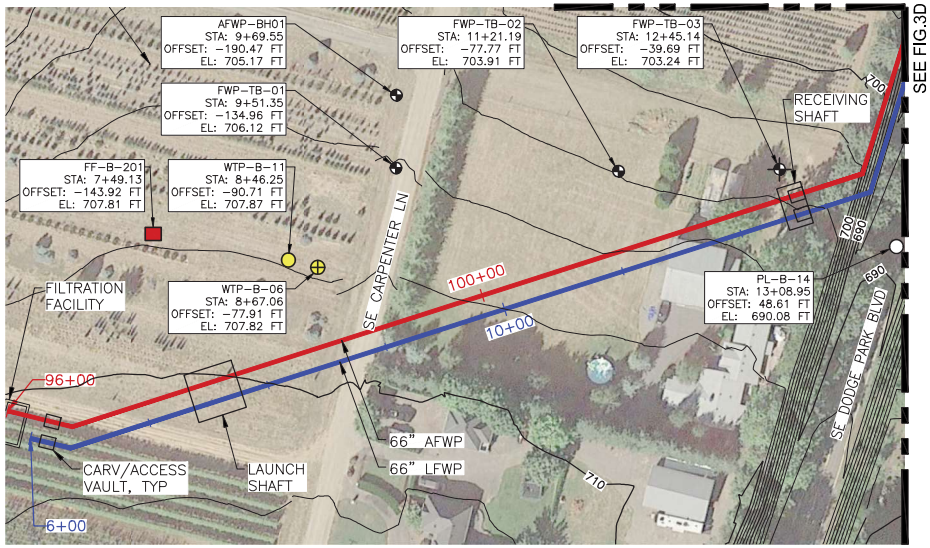
Tables



GEOLOGIC PROFILE TRENCHLESS CROSSING STA 6+00 TO 14+00

SCALE: 1"=100' HORIZ
1"=10' VERT
VERTICAL EXAGGERATION=10X

0" 100' 200'
0" 10' 20'



SEE FIG.3D

EXPLORATION PLAN TRENCHLESS CROSSING STA 6+00 TO 14+00

SCALE: 1"=100'

0" 100' 200'

N

Jacobs	PORTLAND WATER BUREAU FILTRATION PIPELINES PROJECT - FINISHED WATER PIPELINE GEOTECHNICAL DATA REPORT EXPLORATION PLAN AND GEOLOGIC PROFILE TRENCHLESS CROSSING STA 6+00 TO 14+00	FIG.3C JAN 2023

Jacobs

PROJECT NUMBER:	BORING NUMBER:
D3460500	FWP-TB-02 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Bull Run Filtration Pipelines Project - Finished Water Pipeline LOCATION : Water Bureau property, Gresham, OR (661655.46 N, 7741005.48 E)

ELEVATION : 703.56 ft DRILLING CONTRACTOR : Western States Soil Conservation Inc., Joe Bohach, Alex McCan

DRILLING METHOD AND EQUIPMENT : GeoProbe 8150LS, Rotosonic, SV5 Sonic Head, Track #10, 4" I.D. core barrel, 2" O.D. Split-Barrel Sampler, 140-lb Auto Trip Hammer

WATER DEPTH : Not recorded START : 11/15/21 09:20 END : 11/15/21 12:15 LOGGER : L. Bhaumik

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	TYPE/ NUMBER	PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0.0						**LEAN CLAY (CL)** Reddish / orangish brown, moist, firm to stiff, medium plasticity, trace reddish-brown iron oxide staining, black Mn nodules, ±5% fine to coarse sand, trace fine subangular gravel, trace organics consisting of fine roots (Residual Soil of the Springwater Formation)	Driller reported softer soil Low recovery
5		3.40	S-1				
							9-10 ft: Grab Sample GS-2
10	10.0					**FAT CLAY (CH)** Reddish/ orangish brown, moist, soft to firm, medium plasticity, trace reddish-brown iron oxide staining, black Mn nodules, ±5% fine to coarse sand, trace fine subangular gravel (Residual Soil of the Springwater Formation)	
15		4.50	S-3				
							19-20 ft: Grab Sample GS-4 WC = 29.7% LL = 51, PL = 28, PI = 23
20							

Jacobs

PROJECT NUMBER:	BORING NUMBER:
D3460500	FWP-TB-02 SHEET 2 OF 3

SOIL BORING LOG

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ELEVATION : 703.56 ft DRILLING CONTRACTOR : Western States Soil Conservation Inc., Joe Bohach, Alex McCan

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WATER DEPTH : Not recorded START : 11/15/21 09:20 END : 11/15/21 12:15 LOGGER : L. Bhaumik

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	TYPE/ NUMBER	PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	20.0					S-5, 20-29 ft: Similar to S-3	
25		5.00	S-5				
						S-5, 29-30 ft: **ELASTIC SILT (MH)** Brown, mottled gray, moist, stiff, medium to high plasticity, trace reddish-brown iron oxide staining, black Mn nodules, trace fine to coarse sand, trace fine subangular gravel (Residual Soil of the Springwater Formation)	29-30 ft: Grab Sample GS-6
30	30.0	1.50	SS-7	4-5-9 (14)			WC = 42.9% LL = 124, PL = 30, PI = 94
	31.5					**FAT CLAY (CH)** Gray, mottled brown to red, moist, stiff, high plasticity, ±5% fine to coarse sand, trace black Mn nodules (Residual Soil of the Springwater Formation) S-8, 30-35 ft: Similar to SS-7 except ±10% fine to coarse sand, black Mn nodules, seams of sand	
		2.50	S-8				
35	35.0	1.50	SS-9	2-2-7 (9)		**SANDY ELASTIC SILT (MH)** Dark brown with black and gray spots, moist, loose, 68.7% fines, 31.3% fine to coarse sand, trace fine subangular gravel, black Mn nodules (Sensitive Saprolite of the Springwater Formation) S-10, 35-42.5 ft: Similar to SS-9 except ±10% subrounded to subangular gravel up to 2.5" diameter, brown gravel pieces, some basalt gravel	WC = 60.4% Fines = 68.7%, Sand = 31.3%, Gravel = 0.0%
	36.5						
40							

Jacobs

PROJECT NUMBER:	BORING NUMBER:	
D3460500	FWP-TB-02	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Bull Run Filtration Pipelines Project - Finished Water Pipeline LOCATION : Water Bureau property, Gresham, OR (661655.46 N, 7741005.48 E)

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DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	TYPE/ NUMBER	PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		10.00	S-10				
						S-10, 42.5-45 ft: **SILTY SAND WITH GRAVEL (SM)** Gray, moist, loose, fine to coarse sand, 21.6% fines, 31.7% fine to coarse subangular to subrounded gravel up to 2.5" diameter, gray and brown gravel (Less Weathered Springwater Formation)	43-44 ft: Grab Sample GS-11 WC = 16.1% Fines = 21.6%, Sand = 46.7%, Gravel = 31.7%
45	45.0						
						S-12, 45-55 ft: Similar to S-10 from 42.5-45 ft except gravel up to 3" diameter	45-46 ft: Grab Sample GS-13
50		10.00	S-12				
55	55.0					Bottom of Boring at 55 ft below ground surface	Driller reported borehole terminated at 54.5 ft, however, recovery in S-12 was 10 ft Backfilled with: 0-2 ft: Bentonite chips and topsoil to match existing conditions 2-55 ft: Bentonite grout
60							