McDonald Excavating, Inc
Work Plan for:
Centennial Mills Tanner Creek Sewer Mitigation

Start Date: August 9/19/2022

Project Team Contact Information

McDE:		
Joe Armstrong	Superintendent	360-798-6093
John Donahue	Foreman	360-833-3833
Mike Logan	Project Manager	360-772-6351
Timothy Moore	Safety Director	503-929-1213
Prosper Portland:		
Colin Polk	Project Lead	503-936-9541
Kevin Flagg	Construction Coordinator	240-463-1724
Wendy Wilcox	Compliance Coordinator	971-255-9774
Haley & Aldrich:		
Jennifer Casler	PP Client Contact	971-979-5089
Stephen Ahlquist	TCS Project PM	301-651-4785

Subcontractors/Suppliers:
Glacier – Install Dewatering Wells
Stratus Corp – Vacuum Excavation
DPNicoli
CDF-Calportland
Rock Backfill – Calportland
Asphalt - TBD

Work Activities:
1. Mobilization
   - moving equipment in and out of site
2. Erosion Control
   - use best management practices to prevent silt run off
3. Dewatering
   - install dewatering wells to control the flow of water within our work zone

4. Excavate Pits
    - Excavation and shoring to access work area.
    - Material will go to one of three disposal facilities.
        - Waste Management
        - Patriot Environmental Services
5. Remove Timbers
    - This activity will happen simultaneously to
        - Disposed of at Waste Management
6. Shoring Installation
    - Will happen as we excavate pits
7. Tunneling Under Pits
    - Will be combination of Vac Ex and Hand Shoveling
8. CDF Backfill
    - Under sewer line
    - Sides of sewer line
9. Crushed Surfacing Base Course
    - Install agg base prior to pavement installation
10. Asphalt Restoration

Safety Planning:

McDonald Excavating Inc places a high value on the safety. We are committed to providing a safe workplace for all employees and have developed programs for accident and injury prevention, involving management, supervisors, and employees. We use several methods of identifying and eliminating hazards that we may encounter in performing our work.

It is the basic safety policy of this company that no task is so important that an employee must violate a safety rule or take a risk of injury or illness to get the job done.

Below is a list of some of the safety planning we use on our projects.

1. Site Specific Health and Safety Plan – job specific safety plan
2. Job Hazard Analysis – for different project tasks
3. Daily Pre-Task Plan/Morning Tailgate Safety Meeting – prior to work each day
4. Company Wide Monthly Safety meeting at McDonald Main Office – all employees are required to attend.
5. Hazwoper Training – McDonald Employees who will be working directly in or around contaminated media will have Hazwoper Training. We will follow protocol outlined in HASP.

Disposal Locations:

1. Patriot Environmental Services – Wet Material/Water
2. Waste Management - Dry Material
3. Waste Management – Wood Debris/Garbage

Project Narrative:

This project takes place on a relatively small footprint of the Centennial Mills Property. Maintaining traffic flow onsite and keeping an organized work area will be of critical importance. It is anticipated that water will be present in our excavations, so control of water will be important to successful completion of the project. Since contaminants are present in the water and soil, the materials excavated will be taken to disposal facilities that accept contaminated media. Employees who will be in contact with the soil or site water will be Hazwoper trained. We will have rental trucks and delivery drivers that will not be required to have Hazwoper training. Any inspectors who need to access the excavations or work on in the exclusion zone will need to have adequate training which will be verified by their employer. For safety sake, McDonald Excavating will have control of the construction site and all visitors will be required to check in with the site supervisor and will only have access to areas they are qualified to be in.

Upon mobilization to the site, erosion control will be set up using straw waddles in downhill areas along fence to protect the river from run off. All catch basins will have silt sacks in them. Traffic Delineators and orange fencing will define the work zone and staging area. Excavated material will be hauled off site. Any water that is removed from the excavation will be temporarily stored in the baker tanks.

Excavation will be performed using an excavator and vacuum truck. Excavations will be dug first using an excavator which will remove the top layer of material down to the top of the pipe and a bit down the sides of the culvert in the four predetermined locations of the cut off collars. Wood cribbing will be encountered and removed using a chainsaw.

Excavations will be shored to allow safe access for employees. We have attached our shoring design for reference. Shoring will be installed as we excavate.

Once our excavations have reached adequate depth, width and acceptable dimensions under the culvert we will begin backfill using control density fill. Shoring will be removed during pours to protect the integrity of the surrounding embanked material. CDF will be pumped under the culvert to ensure voids are adequately filled. We will use a vibrating stinger, when needed, to make sure the backfill settles and avoids pocketing of air.

Backfill will be witnessed by the owner provided geotech representative when it is placed. Compaction testing and quality control testing will be performed by geotech representative.

CDF will fill underneath the culvert, up the side and over the top according to the project documents. Once it has properly set-up we will place ¾”-0 rock over the top. Following adequate compaction and testing, asphalt will be placed and rolled.

After work is complete and has been approved the site will be swept and all erosion control will be removed.

We encourage open and honest communication throughout the construction process so that all owner and engineer needs are met.

We look forward to a successful project and welcome questions about this plan and other safety submittals which will be forthcoming.

Schedule:

McDonald Excavating Inc.

Project Schedule

Project # 21082
Project: Centennial Mills Tanner Creek Sewer Remediation

Project Superintendent Joe Armstrong
Project Manager: Mike Logan

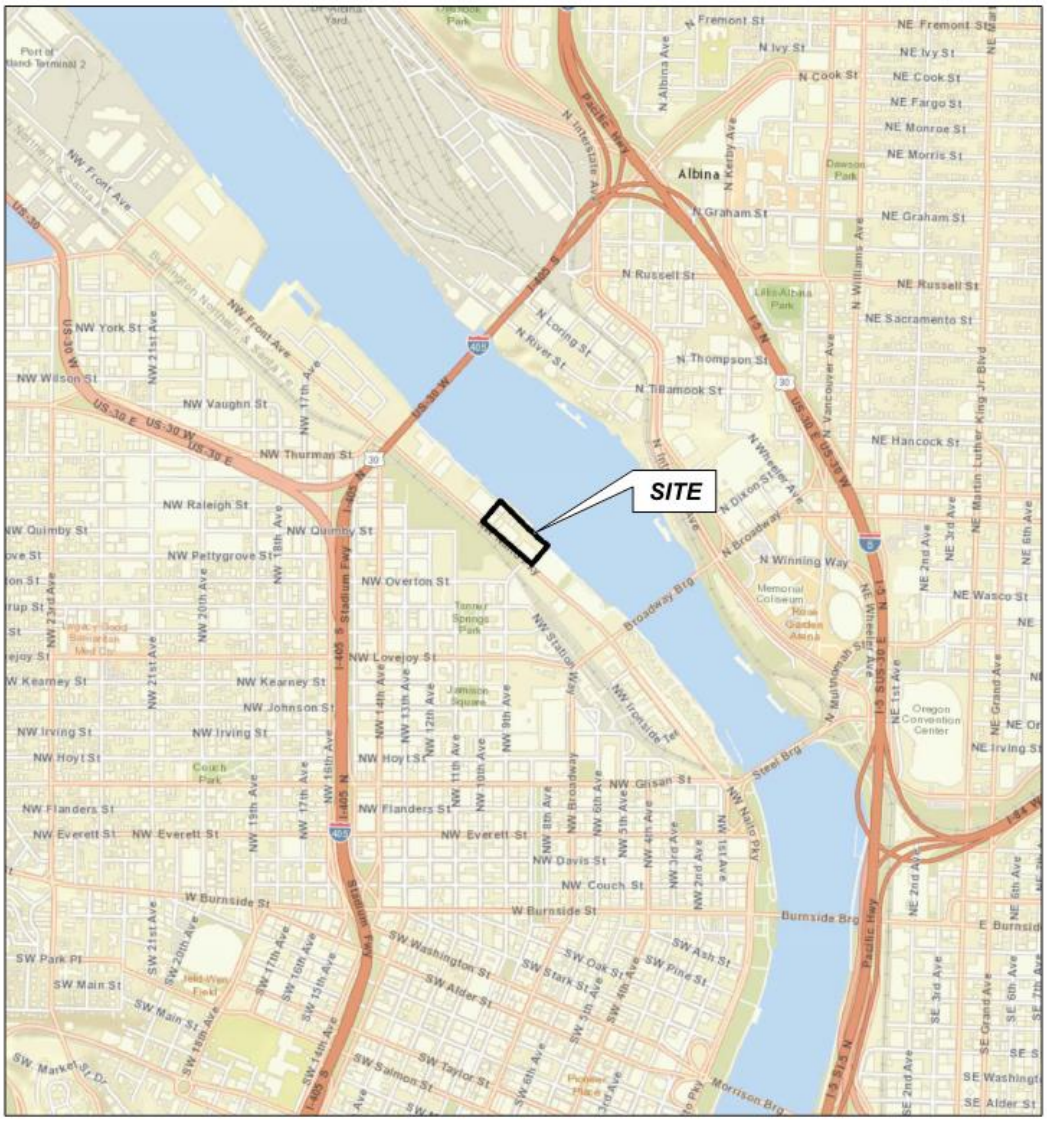
Date: 9/2/2022
Date Range: 9/19/2022
to 10/8/2022

Task Name	Subs/Supplies	Crew	Workforce	1-Week Look Ahead 9/19/2022 - #REF!							2-Week Look Ahead 9/26/2022 - #REF!							3-Week Look Ahead 10/3/2022 - #REF!						
				M	T	W	TH	F	SA	SU	M	T	W	TH	F	SA	SU	M	T	W	TH	F	SA	SU
				9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9
Mobilization	McDE	John D & Co	M, A, F																					
Set Up Exclusion Zone		John D & Co	M, A, F																					
Build Containment Bunkers		John D & Co	M, A, F																					
Vac/Ex Pothole	Stratus	John D & Co	M, A, F																					
Set Up Dewatering Tansk	Rain for Rent	John D & Co	M, A, F																					
Drill 4 Wells	Glacier	John D & Co	M, A, F																					
Install Discharge Pipe	Glacier	John D & Co	M, A, F																					
Pump Start up	Glacier	John D & Co	M, A, F																					
Shoring Delivery	McDE	John D & Co	M, A, F																					
Excavate and Shore 14' - East		John D & Co	M, A, F																					
Vac Ex East Collars	Stratus	John D & Co	M, A, F																					
Pour Concrete	Calportland	John D & Co	M, A, F																					
Excavate and Shore 14' - West		John D & Co	M, A, F																					
Vac Ex Collars - West	Stratus	John D & Co	M, A, F																					
Pour Concrete	Calportland	John D & Co	M, A, F																					
Backfill / Restore	Calportland	John D & Co	M, A, F																					
De-Commision Wells	Galcier	John D & Co	M, A, F																					
De-Mobe Tanks	Rain for Rent	John D & Co	M, A, F																					
De-Mobe Equipment	McDE	John D & Co	M, A, F																					

Site Address:

1362 NW Naito Parkway
Portland, Oregon

SITE LOCATION MAP



4120 S Lincoln St • Washougal, WA 98671 • (360) 835-8794 • FAX (360) 835-1514

Shoring Installation, Collar Pour and Shoring Removal Plan Narrative

Shoring Installation:

1. Finalize shoring plan with design team
2. Review engineer stamped plan with crew
3. Confirm equipment, shoring, rigging, etc.
4. Mobilization to site
5. Pre-Installation meeting with crew
6. Assemble shoring
7. Stage equipment, steel sheets, shoring
8. Pothole utilities/confirm locations/depths/etc.
9. Begin excavation/installation of 12 x 12 octagon shoring box to depth of 7' below ground surface
10. Continue excavation within/slightly below 12 x 12 box to install 8l x 5dw x 8d
11. Continue excavating inside 8' box and push shoring down as we excavate.
12. Steel sheets and sheet pile will be used behind the shoring box(side adjacent to the equipment, away from the culvert) and will also be used on the outside of the shoring to prevent migration of wet soil into the shoring system and help to avoid creating voids behind the shoring system.
13. Once we have excavated as deep as we can using a hydraulic excavator we will continue excavation using a vac truck.
14. As we vac down we will be pushing steel sheets, sheet pile and shoring into the ground. We anticipate that we will have approximately 8' of excavation using the vac truck.
15. The reason we use the vac truck is because we can keep a tight excavation and it can access hard to reach places.
16. Once we have reached the bottom of the excavation we will do some hand shoveling and tunneling under the culvert for the lower concrete collar.
17. Wood cribbing will be removed using an excavator and a chain saw as we excavate down.
18. We will excavate slightly below the bottom of our bottom of collar location in one corner of the pit to install a sump pump which will take any residual water away while we perform our work.

Placement of Concrete Collar:

1. Once we have reached the bottom of the excavation, our sump is installed and all the tunneling under the culvert is complete we will begin placing concrete for the collar.
2. Concrete will be deliver in trucks and tail gated in to the hole.
3. We will periodically vibrate the concrete to remove air bubbles and help to push it into the adjacent soil to fill inconsistent pockets of earth surrounding. Steel sheets, sheet pile and shoring will be remove once we have approximately 1' of coverage over the bottom of the shoring, sheets, etc.
4. We will install as much concrete as allowed. The bottom section will be installed in 8'-10' increment(assuming the engineer will allow). This will bring us up to the halfway point of the culvert.
5. The second pour will be approximately 6' to meet the top of the culvert.
6. As we place concrete we will keep an eye out to verify that we are getting good settlement of the concrete and that the adjacent soil is not compromising the pour.
7. Since we will be placing concrete prior to raising/removing shoring and steel sheets we expect that we will be able to keep the materials separated enough to maintain the integrity of the collar.

Shoring Removal:

1. Shoring will be systematically as mentioned above.
2. Concrete placement will proceed removal.
3. We will pour concrete to approximately 1' above the bottom of the shoring system and pull the shoring and sheets as we go.
4. The intent is to have either the shoring of the concrete in place keep pressure against the side walls.

Shoring Design:

SHORING DESIGN PLAN

PRELIMINARY DESIGN ONLY
NOT FOR CONSTRUCTION

GROUT COLLAR CUTOFF IMPROVEMENTS
CENTENNIAL MILLS
PORTLAND, OR

MCDONALD EXCAVATING, INC.

NOTES:

1. SHORING DESIGN IS BASED ON SOILS CONSISTING OF LOOSE TO MEDIUM DENSE SAND FROM ~0'–10' BELOW GRADE, UNDERLAIN BY SOFT CLAY FROM ~10'–17' BELOW GRADE, UNDERLAIN BY MEDIUM DENSE SAND AND MEDIUM STIFF CLAY FOR THE REMAINING DEPTH OF THE EXCAVATION, USING A UNIFORM LATERAL EARTH PRESSURE (26H) PSF, AS OUTLINED IN THE GEOTECHNICAL REPORT DATED 11/30/21, PREPARED BY HART CROWSER (PROJECT NO. 150–012–004) AND PROVIDED BY THE CONTRACTOR. CONTRACTOR'S COMPETENT PERSON SHALL CONFIRM SITE SOILS AND CONTACT ENGINEER IF DIFFERING SOIL CONDITIONS ARE ENCOUNTERED. CONTRACT ENGINEER IF ALTERNATE DESIGN PARAMETERS APPLY.
2. PE STAMPED TABULATED DATA FOR TRENCH SHIELDS TO BE USED SHALL BE PROVIDED AT JOBSITE, AND MANUFACTURER'S TABULATED DATA APPLIES EXCEPT AS IS NOTED HERE.
3. PROVIDE ACCESS, BARRICADING, AND FALL PROTECTION, IN ACCORDANCE WITH ALL OSHA GUIDELINES.
4. SHORING MUST BE PROPERLY INSTALLED PRIOR TO WORKERS ENTERING EXCAVATION. WORKERS MAY ONLY ENTER, EXIT, AND WORK WITHIN SHORED AREAS.
5. SHEET PILE TO BE ASTM A572 GR. 50 OR EQUAL STEEL, MIN Fy = 50 KSI. STEEL PIPE TO BE ASTM A53 GRADE B, MIN Fy = 35 KSI.
6. DO NOT LEAN PLATE, SHEET PILES, OR SHEATHING OF ANY KIND AGAINST TRENCH SHIELD SPREADERS UNLESS SPECIFICALLY SHOWN ON THESE PLANS. DO NOT SUSPEND LOAD FROM TRENCH SHIELD SPREADERS AT ANY TIME.
7. ALL VOIDS BETWEEN THE EXCAVATED SOIL AND THE FACE OF THE SHORING SYSTEM MUST BE BACKFILLED WITH EXCAVATED SOIL OR OTHER APPROVED BACKFILL PRIOR TO WORKERS ENTERING THE EXCAVATION. FOR EXCAVATIONS ADJACENT TO TRAFFIC LOADING, ALL VOIDS SHALL BE BACKFILLED WITH SAND OR CLASS II AGGREGATE BASE MATERIAL.
8. GROUNDWATER LEVEL MUST BE MAINTAINED AT OR BELOW THE MINIMUM LEVEL SHOWN ON THESE PLANS AT ALL TIMES. IF DEWATERING SYSTEM IS NECESSARY TO ACHIEVE THIS, IT IS THE CONTRACTOR'S RESPONSIBILITY FOR DEVELOPING, INSTALLING, AND MONITORING DEWATERING SYSTEM, AND VERIFYING THAT THE GROUNDWATER LEVEL BEHIND THE SHORING WALLS HAS BEEN LOWERED AT LEAST TO THE MINIMUM LEVEL SHOWN ON THESE PLANS AT ALL TIMES. IF CONTRACTOR IS UNABLE TO LOWER THE GROUNDWATER TO THE LEVEL SHOWN, CONTACT THE SHORING ENGINEER IMMEDIATELY.
9. D.H. CHARLES ENGINEERING, INC. WILL NOT SUPERVISE, DIRECT, CONTROL OR HAVE AUTHORITY OVER OR BE RESPONSIBLE FOR CONTRACTOR'S MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OF CONSTRUCTION, OR THE SAFETY PRECAUTIONS AND PROGRAMS INCIDENT THERETO, OR FOR ANY FAILURE OF CONTRACTOR TO COMPLY WITH LAWS AND REGULATIONS APPLICABLE TO THE FURNISHING OR PERFORMANCE OF WORK.
10. VERIFY THE ACCURACY OF ALL DIMENSIONS FOR BOTH EXISTING AND PROPOSED WORK. VERIFY THAT REQUIRED CLEARANCES ARE OBTAINED PRIOR TO COMMENCEMENT OF THE WORK.
11. VERIFY THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING THE EXCAVATION.
12. D.H. CHARLES ENGINEERING, INC. BEARS NO RESPONSIBILITY OR LIABILITY FOR ANY SETTLEMENT, MOVEMENT, OR DAMAGE OF ANY KIND THAT MAY OCCUR TO SURROUNDING SOILS, EXISTING BUILDING STRUCTURES, EXISTING SEWER, OR UTILITIES DUE TO SHORING INSTALLATION, DEFLECTION, REMOVAL, OR OTHER CONSTRUCTION ACTIVITIES.

REVISIONS	
NO.	DATE

11x17 SHEET
IF THIS BAR IS NOT 1" DRAWING IS NOT TO SCALE

SHORING DESIGN PLAN
GROUT COLLAR CUTOFF IMPROVEMENTS
CENTENNIAL MILLS
PORTLAND, OR
MCDONALD EXCAVATING, INC.

McDONALD EXCAVATING, INC.
2719 MAIN STREET
WASHOUGAL, WA 98671
PHONE: (360) 835–8794
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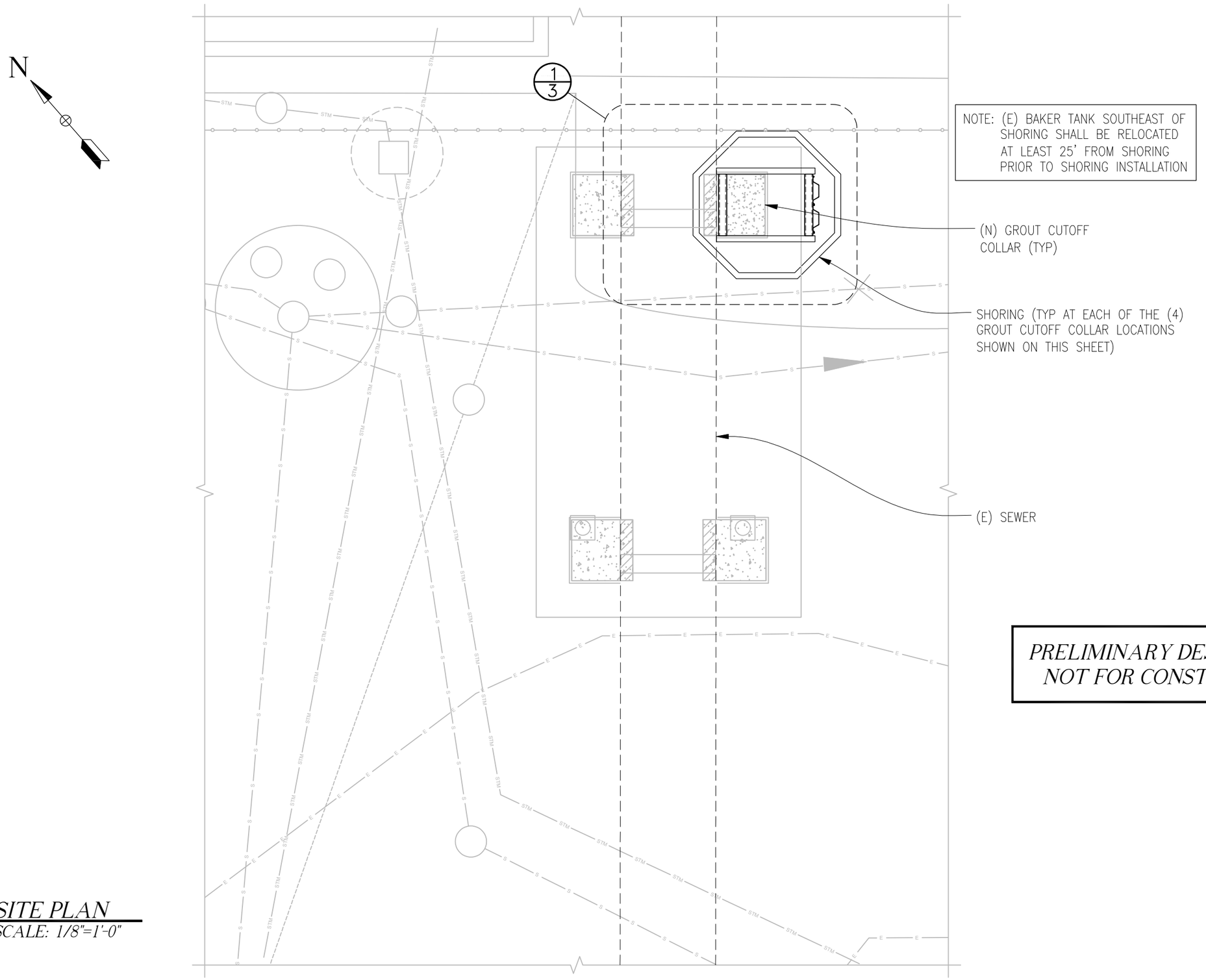
D.H. CHARLES ENGINEERING, INC.
901 Brutscher Street, Suite 200
Newberg, OR 97132
(971) 323-0044 www.charlesengineering.com

DATE: 8–18–22
DRAFTER: CDV
CHECKED BY: JCM
SHEET 1 OF 4
DRAWING NO.: 22–1428A
REV 0



SITE PLAN
SCALE: 1/8"=1'-0"

PRELIMINARY DESIGN ONLY
NOT FOR CONSTRUCTION

REVISIONS	
NO.	DATE

11x17 SHEET
IF THIS BAR IS NOT 1" DRAWING IS NOT TO SCALE

SHORING DESIGN PLAN
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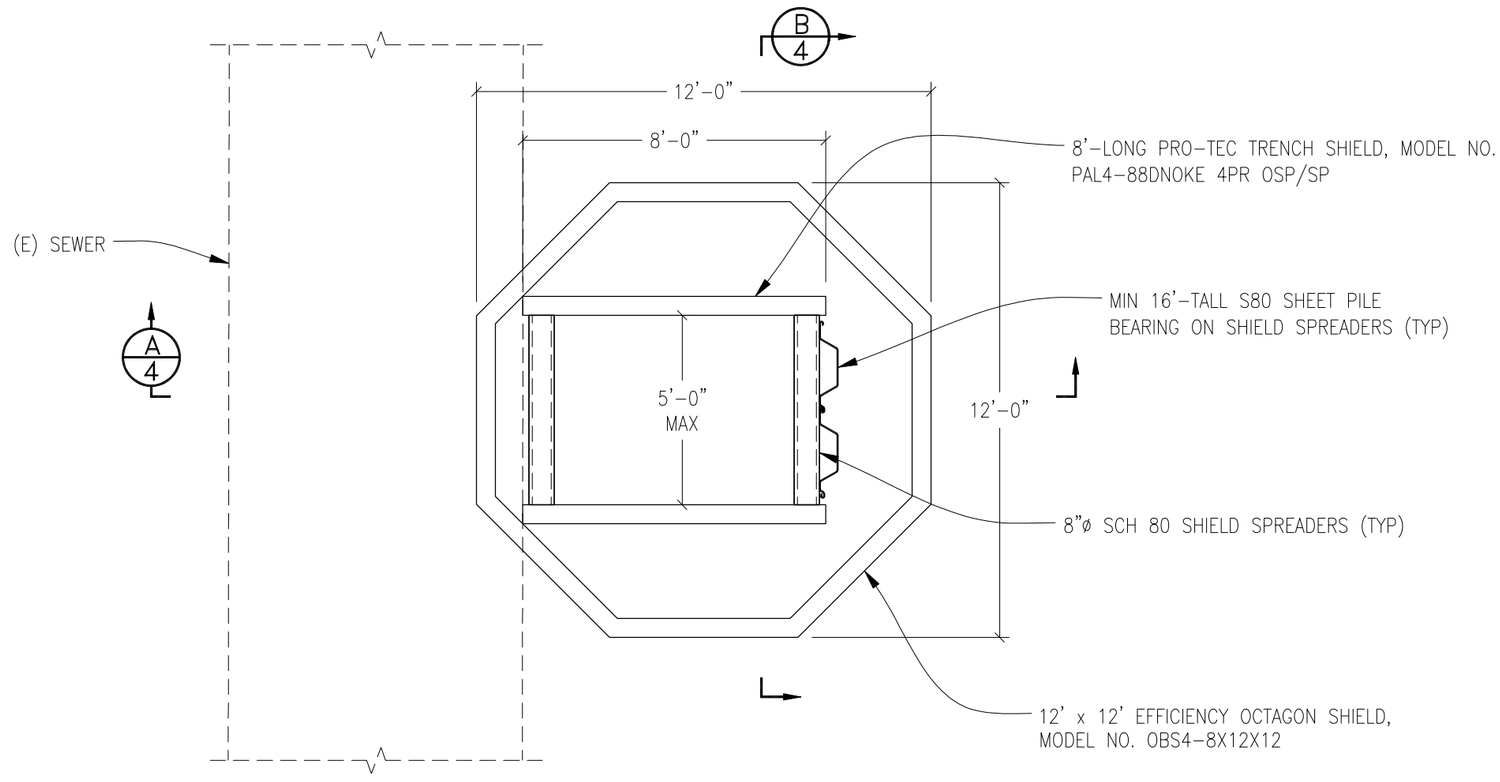
DATE: 8-18-22
DRAFTER: CDV
CHECKED BY: JCM
SHEET 2 OF 4
DRAWING NO.: 22-1428A
REV 0

PRELIMINARY DESIGN ONLY
NOT FOR CONSTRUCTION



1/3 *DETAIL - PLAN VIEW*
SCALE: 1/4"=1'-0"

REVISIONS	
NO.	DATE

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SHEET 3 OF 4
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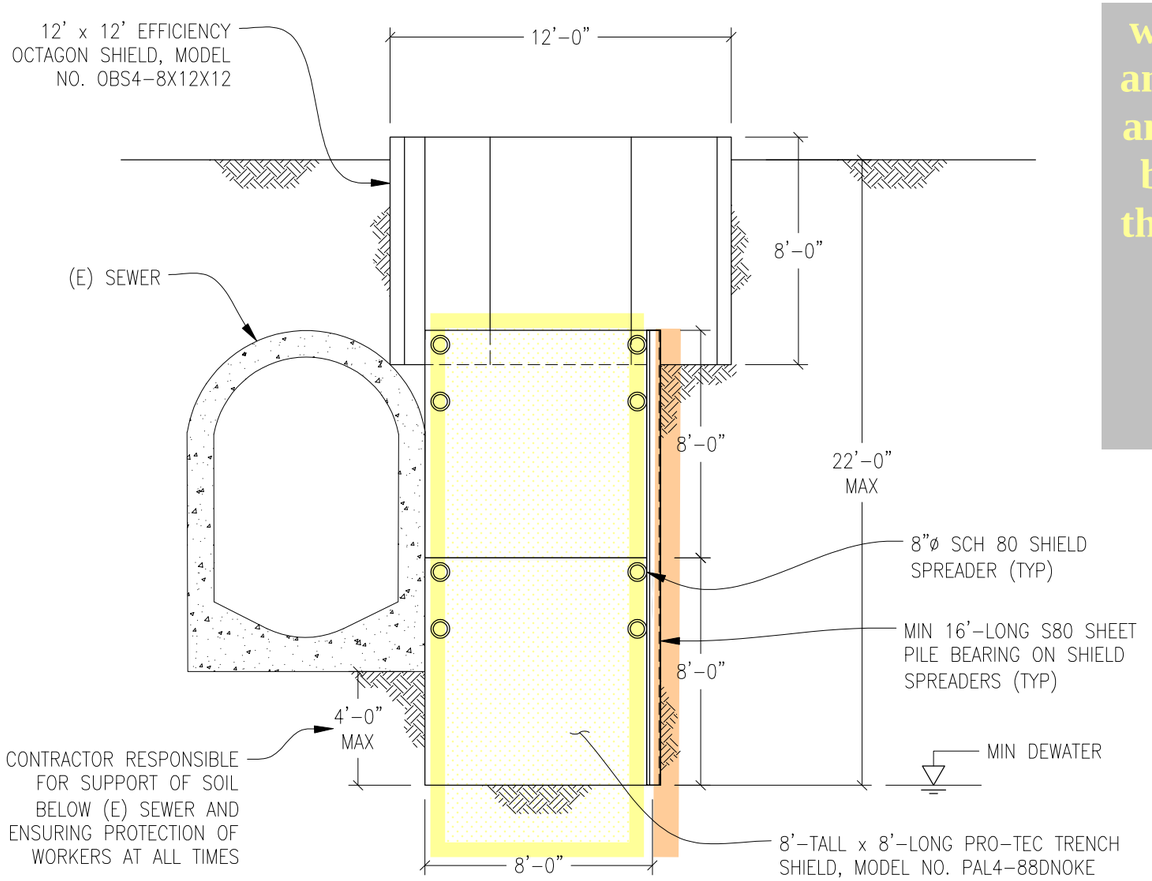
REV 0



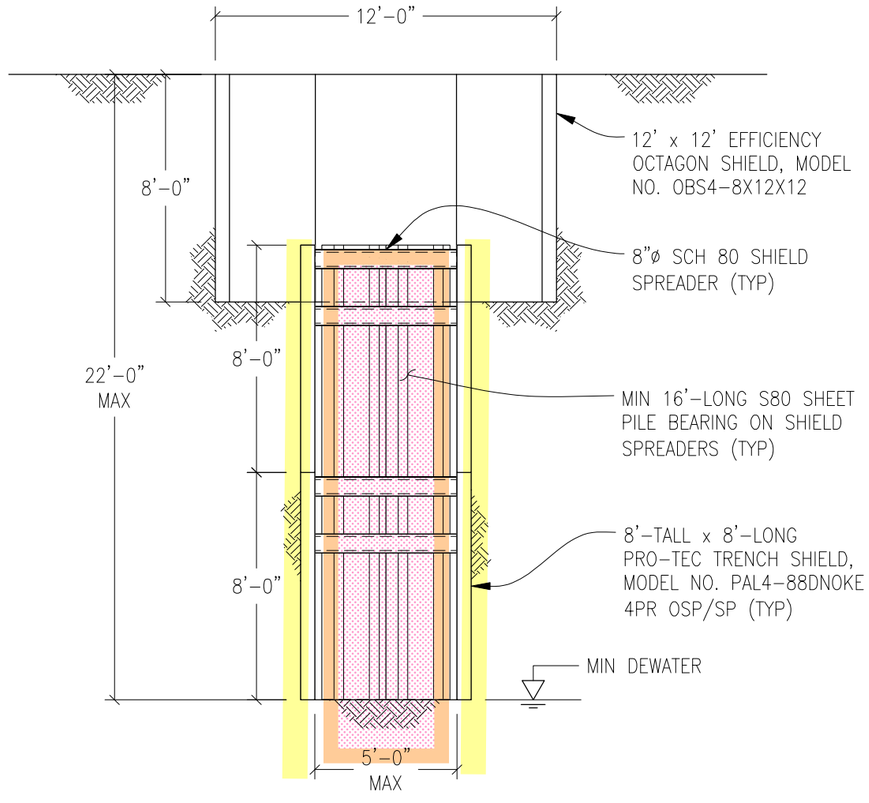
A/4 SECTION
SCALE: 3/16"=1'-0"

we plan to use steel sheet and sheet pile on the sides and at the end to advance below the boxes to keep the wet sandy material on the outside contained. Shoring Plan will be updated with this information.

PRELIMINARY DESIGN ONLY
NOT FOR CONSTRUCTION

SETBACK TABLE	
CRANE TO 30 TON MAX	X = 12'
CAT 325 EXCAVATOR	X = 7'
CAT 345 EXCAVATOR	X = 10'
CAT 365 EXCAVATOR	X = 12'
5 CY LOADER	X = 5'
DUMPTRUCK	X = 5'
SPOIL PILE (4'-TALL)	X = 6'
CONCRETE TRUCK	X = 8'
BUILDING STRUCTURES	X = 50'
RAILROAD TRACKS	X = 100'
STREET TRAFFIC	X = 15'

ABOVE LISTED SETBACKS SHALL BE MAINTAINED A DISTANCE "X" FROM ALL EDGES OF SHORING AND ALL TOPS OF SLOPES AT ALL TIMES.



B/4 SECTION
SCALE: 3/16"=1'-0"

REVISIONS	
NO.	DATE

11x17 SHEET
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SHORING DESIGN PLAN
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DATE: 8-18-22
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SHEET 4 OF 4
DRAWING NO.: 22-1428A
REV 0

Site Specific Health and Safety Plan:

HEALTH AND SAFETY PLAN

For Excavation and Construction Activities at the

Centennial Mills, Tanner Creek Sewer, Cutoff Collar Installations

1362 NW Naito Parkway, Portland Oregon

August 18, 2022 – *Draft* 11:30 am

Prepared for
McDonald Excavating

Prepared by
Greg Baker Safety, LLC
3104 NE 35th Place, Portland Oregon, 97212

GBS Project No. 8.12.22 -1
McDE Project No. 22044

HEALTH AND SAFETY PLAN

Centennial Mills, Tanner Creek Sewer, Cutoff Collar Installations

Excavation and Construction Activities

This HASP was prepared under the supervision and direction of the undersigned:

Mike Logan, Site Safety Officer
McDonald Excavating

This HASP was co-developed with McDonald Excavating and reviewed by the undersigned:

Greg Baker, CIH, CSP
Greg Baker Safety, LLC

Table of Contents

7.0 Safety Equipment
    7.1 Personal Protective Equipment
    7.2 Safety Equipment
    7.3 Air Monitoring Equipment
    7.4 Communications Equipment
    7.5 Engineering Controls Equipment

8.0 Decontamination Procedures
    8.1 Partial Decontamination Procedure
    8.2 Full Decontamination Procedure
    8.3 Decontamination of General Site Workers

9.0 Medical Surveillance (not applicable)

10.0 Air Monitoring

11.0 Site Control Measures

12.0 Emergency Response/Spill Containment/Confined Spaces

13.0 Pre-Entry Briefing

14.0 Periodic Evaluation

15.0 Safe Work Practices

16.0 Acknowledgment

Appendices

Appendix A: Job Hazard Analysis (JHA)
- A.1 - Excavation JHA
- A.2 - Shoring JHA
- A.3 - Lifting and Rigging JHA
- A.4 - Emergency Response
- A.5 - Confined Spaces
- A.5.1 - Confined Space Program v4.22 - 8.18.22
- A.5.2 - Confined Space Entry Permit v4.22 - 8.18.22

Appendix B: Phase 2 Remedial Action Plan, Hart Crowser. 11.30.21

Appendix C: Apex Lab Report A11E268 Centennial Mills – HartCrowser 7.12.11

Appendix D: Apex Lab Report A11ED270 Centennial Mills - HartCrowser 7.3.11

Appendix E: McDE Accident Prevention Program v5.22

Appendix F: McDE Lead Compliance Plan

Appendix G: Safety Data Sheets (SDS) - lead, diesel fuel
- G.1 - Lead
- G.2 - Diesel Fuel
- G.3 - Gasoline (for fuel brought on site in vehicles)
- G.4 - Hydraulic Fluid (for equipment brought on site)

Appendix H: Shoring and Trenching Plan
- H.1 – Conceptual Shoring Plan Correspondence 8.18.22
- H.2 - McDE's Site Specific Engineered Shoring and Trenching Plan

1.0 Emergency Medical Care and First Aid Services

1.1 Emergency Medical Care

In the event of a medical emergency including potentially life-threatening injuries, McDE will call 911.

1.2 First Aid Services

For non-life-threatening injuries McDE will retain the services of an independent provider – On-site Health & Safety, 866.998.2750.

2.0 Plan Summary

This site-specific health and safety plan (HASP) was developed to describe the procedures and practices necessary to protect the health and safety of employees conducting excavation and construction-related activities on the Centennial Mills, Tanner Creek Sewer, Cutoff Collar Installations project.

The planned activities include:

- Managing/handling soils during cleanup activities
- Controlling access to the Site during cleanup activities
- Controlling off-Property migration of contaminated soil via erosion and/or track-off
- Minimizing worker exposures to potentially hazardous substances in the soil that are likely to be discovered during excavation activities
- Excavating and shoring by McDonald Excavating (McDE)
- Cutoff Collar Installations by McDE
- Removing fill and potentially contaminated media, hauling off side and disposal at Wasco County Landfill, 2550 Steele Road in The Dalles, Oregon. Loads will be direct hauled to the landfill by McDE crew or by subcontractor.
- Handling of potentially contaminated media for offsite disposal. Temporary stockpiling of contaminated media is not anticipated; however, if stockpiling becomes

necessary for unforeseen circumstances, McDE would install double lined 6 mil plastic containments over stockpiles, covered top/bottom and properly secured under several cubic yards of clean fill material.

- Placement of demarcation fabric and backfilling with general trench material to ground level.
- Contaminated wet material and water will be collected by Patriot Environmental Services for disposal.
- Solid waste (wood debris and garbage) will be collected by Waste Management for disposal.

The plan applies to employees of the following contractors (covered employees):

- McDonald Excavating (McDE)
- Trucking haul-off subcontractor

Other employers, including contractors and subcontractors, are expected to develop and implement their own HASPs to manage the health and safety of their personnel.

The property is the site of the former Centennial Mill. Previous environmental investigations are summarized Appendix C: Phase 2 Remedial Action Plan, Hart Crowser, 11.30.21.

The 11.30.21 documented the presence of the following chemicals of concern:

- Total Petroleum Hydrocarbons (TPHs) as diesel fuel hydrocarbons
- Minor concentrations of polycyclic aromatic hydrocarbons (PAHs)
- Toxic metals consistent with naturally occurring background levels (e.g., arsenic)
- Lead

This plan describes excavation and construction related activities scheduled to be performed two locations along the Tanner Creek Sewer (TCS) where installations of cutoff collars are scheduled to be conducted by McDE. McDE will be perform the work consistent with Oregon Occupational Safety and Health Administration (OR-OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) provisions that are set forth in the Oregon Administrative Rules (OAR) 1910.120 and 1910.1200 (Hazard Communications).

Covered employees are responsible for understanding and adhering to this HASP. Each day before fieldwork begins, the site safety officer (SSO) who is familiar with health and safety procedures and with the Site will be designated by the on-site personnel. Safety deficiencies

must be immediately communicated to the SSO and, if necessary, the health and safety coordinator (HSC). Contractors and subcontractors have primary responsibility for the safety of their own personnel on the Site. Personnel on the Site have "stop work" authority if they observe conditions that they believe create an imminent danger.

This HASP is intended to cover the work tentatively scheduled to commence on or soon after August 22, 2022. This plan will be updated and modified, as necessary, if Site conditions are determined to differ, or are changed. This HASP will be reviewed and updated as necessary by the HSE or designee to ensure that it accurately reflects the known hazards, conditions, and requirements associated with the Site.

Personnel who will be working on the Site are required to read and understand this HASP. Personnel entering the work area must sign the Personnel Acknowledgment Sheet (Section 16), certifying that they have read and that they understand this HASP and agree to abide by i

3.0 Key Project Personnel

Owner's Team (Prosper Portland)

Name	Role	Phone
Colin Polk	Project Lead	503.936.9541
Kevin Flagg	Construction Coordinator	240.463.1724
Wendy Wilcox	Compliance Coordinator	971.255.9774

Owner's Environmental Consultant Team (Haley & Aldrich/Hart Crowser)

Name	Role	Phone
Jennifer Casler	PP Client Contact	971.979.5089
Stephen Ahlquist	TCS Project PM	301.651.4785

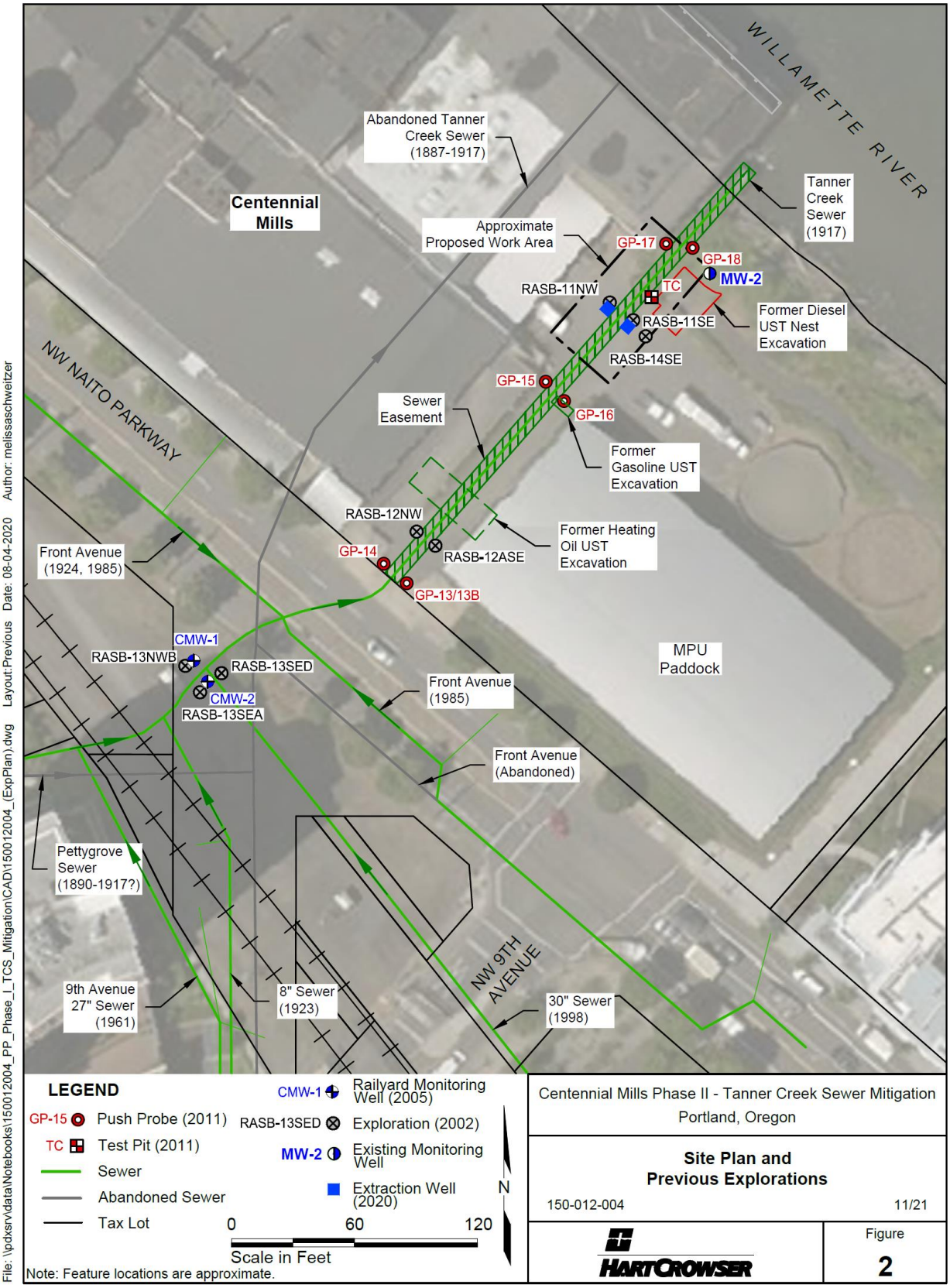
Contractor's Team – MacDonald Excavating (McDE)

Name	Role	Phone
Mike Logan	Project Manager	360-772-6315
Joe Armstrong	Superintendent/Site Safety Officer (SSO)	360-798-6093
Tim Moore	Safety Director/Manager/Health Safety Coordinator (HSC)	503-929-1213
John Donahue	Foreman, Site Safety Supervisor	360-833-3833

4.0 Site Description and Background

4.1 Type of Site

This industrial Site is located in NW Portland Oregon perpendicular to the west the bank of the Willamette River. See the following Figure 2. The address is 1362 NW Naito Parkway, Portland Oregon.


WILLAMETTE RIVER
Abandoned Tanner Creek Sewer (1887-1917)
Centennial Mills
Tanner Creek Sewer (1917)
Approximate Proposed Work Area
GP-17
GP-18
MW-2
RASB-11NW
TC
RASB-11SE
Former Diesel UST Nest Excavation
RASB-14SE
GP-15
GP-16
NW NAITO PARKWAY
Sewer Easement
Former Gasoline UST Excavation
RASB-12NW
Former Heating Oil UST Excavation
Front Avenue (1924, 1985)
GP-14
RASB-12ASE
GP-13/13B
CMW-1
RASB-13NWB
RASB-13SED
CMW-2
RASB-13SEA
MPU Paddock
Front Avenue (1985)
Front Avenue (Abandoned)
Pettygrove Sewer (1890-1917?)
NW 9TH AVENUE
9th Avenue 27" Sewer (1961)
8" Sewer (1923)
30" Sewer (1998)
LEGEND
GP-15 Push Probe (2011)
TC Test Pit (2011)
Sewer
Abandoned Sewer
Tax Lot
CMW-1 Railyard Monitoring Well (2005)
RASB-13SED Exploration (2002)
MW-2 Existing Monitoring Well
Extraction Well (2020)
0
60
120
Scale in Feet
N
Note: Feature locations are approximate.
Centennial Mills Phase II - Tanner Creek Sewer Mitigation
Portland, Oregon
Site Plan and Previous Explorations
150-012-004
11/21
HARTCROWSER
Figure
2
File: \\pdxsrv\data\Notebooks\150012004_PP_Phase_I_TCS_Mitigation\CAD\150012004_(ExpPlan).dwg Layout:Previous Date: 08-04-2020 Author: melissaschweitzer

4.2 Buildings/Structures

Several industrial buildings are located adjacent to the Tanner Creek Sewer system. McDE's scope of work does not include impacts on any existing buildings or structure.

McDE's scope of work includes:

- excavation work (in two contaminated areas along the subsurface Tanner Creek Sewer) to depths of approximately 20+ feet bgs
- trench work at the bottom of each excavation

4.3 Topography

The Site consist of relatively flat ground sloping towards the Willamette River.

4.4 General Geologic/Hydrologic Setting

The Site is on the past geologic historical floodplains of the Columbia River. Consequently, shallow natural soils are comprised primarily of alluvial (flood-related) deposit. Man-introduced fill is present as backfill along the Tanner Creek Sewer.

Wetlands, flowing surface waters, ponds and lakes are not present on Site. Ground water levels are variable, and are expected to be encountered by McDE's activities. Subsurface water within the sewer may fluctuate considerably and McDE will monitor this condition for leaks.

Note: McDE will manage standing water in the trenches as necessary to execute the work. A tank will be positioned onsite (at a reasonable distance from the excavation perimeter) for containment. McDE will utilize Stratus for pumping/vacuuming and disposal as needed. Liquid wastes will be disposed at Patriot (formerly Pacific Power Vac).

Details of expected seasonal ground water levels are presented in the Hart Crowser 11.30.21 Remedial Action Plan report.

4.5. Site Status

The Site is located in an industrial area on an easement between industrial buildings.

McDE is responsible for installing temporary fencing to protect the public and workers.

4.6 General History

The Tanner Creek Sewer was excavated and installed in 1917 to drain wetlands and to divert Tanner Creek into a sewer. Several adjacent underground storage tanks (USTs) were decommissioned in the past.

Details of site's history are presented in the Hart Crowser 11.30.21 Remedial Action Plan report.

5.0 Hazard Evaluation

5.1 Site Tasks and Operations

Job hazard analyses (JHAs) have been developed for specific tasks that are scheduled to be completed on the Site under MCDE's scope of work. McDE's tasks/JHAs are provided in Appendix A. The following list summarizes planned tasks and operations:

- Excavation: McDE
- Shoring: McDE
- Rigging: McDE

The control measures that field personnel must use to eliminate or minimize these hazards, such personal protective equipment (PPE), and decontamination procedures, are detailed in the AHAs in Appendix A and in subsequent sections of this plan.

5.2 Potential Chemical Hazards

Apex laboratory analytical reports of soil and water testing and discussed and presented in Appendices B, C and D.

Although overexposure to potential contaminants of concern during site activities is not expected, potential exposure to contaminants, from hand-to-mouth contact with soils is possible and must be controlled. Exposures to potential contaminants associated with airborne dust are not anticipated as the subsurface soil is expected be wet. Surface soils will be wetted as necessary via active dust suppression to maintain a "no visible emissions" standard for airborne dust particles.

Potential contaminants of concerns (COCs) in the Site soils include low, detectable concentrations of the following:

Toxic metals

- Lead
- Arsenic and others

Total Petroleum Hydrocarbons (TPHs)

- Diesel

Polycyclic Aromatic Hydrocarbons (PAHs) associated with diesel

Other potential chemical hazards that could impact Site activities include any chemical products introduced on Site by McDE, its subcontractors or others. Other potentials chemical hazards commonly include fuels (e.g., gasoline, diesel fuel), solvents/cleaning agents (e.g., isopropyl alcohol, acetone), and hydraulic fluids.

5.3 Physical Hazards

Physical hazards on the site include typical construction hazards, such as impacts from construction equipment; excavations; trenches; nuisance dust; uneven terrain; slips, trips, and falls; exposure to the elements (sun, wind and rain); and possible hot work/torch cutting.

McDE does not anticipate any need to enter any existing Permit-required confined spaces over the course of this project.

However, the excavations and trenches installed by McDE will become constructed confined spaces. McDE will not coordinate with the owner for planned entries. McDE will abide by our confined space entry program, air monitoring/space characterization and site specific JHAs. The excavation and trench area where the cutoff collar installations are scheduled are McDE permit-required confined spaces that will be screened initially with a photo ionization detector (PID) and continuously monitored on laborers via 4-gas meters that detect oxygen, explosive gas limits, carbon monoxide and hydrogen sulfide. McDE has four of these inhouse and will calibrate according to the manufacturer's specifications.

Exposure to cold wind is not anticipated. Rain and flooding are possible. Excessive ambient temperatures and exposure to intense sunlight are likely. McDE will direct workers to wear appropriate weather-resistant launderable work clothing, remain dry, and take breaks as necessary to remain comfortable, hydrated, alert and productive. McDE will provide bottled water and facilitate an OSHA-compliant work/rest regimen to address fluctuating ambient temperatures.

The specific physical hazards and associated controls to reduce operational risks for Site work are presented in Appendix A, JHAs.

5.4 Biological Hazards

Biological hazards on site are likely to be limited to contact with vegetation scheduled for removal, and possible exposures to blood-borne pathogens (e.g., from discarded hypodermic needles).

If discarded hypodermic needles are discovered, McDE will suspend activities temporarily in the immediate area and develop a JHA to remove the offending needles (i.e., points and sharps) in a safe and appropriate manner.

6.0 Health and Safety Training

6.1 40-hour HAZWOPER Training

Employees who engage in soil disturbing work, such as excavation, trenching, backfilling, cutoff collar installations and other similar tasks, that could be exposed to potential COCs that may exceed Oregon DEQ construction worker Risk-based Concentrations (RBCs) would be required to have completed training consistent with OAR 1910.120. Prosper Portland's contract documents require McDE to utilize 40-hour HAZWOPER-trained personal to conduct excavation activities inside the trenches scheduled for impacts. ***Respirator use is <u>not</u> anticipated on this project.***

Covered employees would have received a minimum of 40 hours of initial instruction offsite, and a minimum of three days of actual field experience under direct supervision of a trained, experienced supervisor. Covered employees shall have received the initial HAZWOPER training or eight hours of refresher training no more than 12 months before working on the site. The training will include:

- Identity of site safety and health personnel
- Safety and health hazards identified on the Site
- Proper use of required personal protective equipment (PPE)
- Safe work practices required on the Site, e.g., general safety rules; hot work; heavy equipment operations and driving, including procedures for backing up
- Safe use of engineering controls and equipment on the Site
- Medical surveillance requirements, including the recognition of signs and symptoms that <u>might</u> indicate overexposure to hazards, <u>if</u> applicable (e.g., excessive heat, total petroleum hydrocarbons (TPHs), volatile organic compounds (VOCs).
- The site emergency response plan/spill containment plan (which includes and fuels, solvents and hydraulic fluids brought onto the site by McDE and its subcontractors).

Affected contractors include:

- McDE – excavation work
- McDE – trenching work

6.2 24-hour HAZWOPER Training (not applicable)

This level of training does not meet Prosper Portland's specification of 40-hours durations, so it is not applicable at this site.

6.3 Hazard Communication (HAZCOM) and Site Orientation Training

Each person, including site visitors, shall receive Site Orientation Training as a pre-requisite for providing services on site. In addition, all McDE personnel and subcontractor personnel shall receive training that includes an overview of McDE's relative JHA tasks, and an overview of the Safety Data Sheets (SDS) presented in Appendix G.

7.0 Safety Equipment

7.1 Personal Protective Equipment (PPE)

PPE required on the Site is modified Level D, which consists of:

- Type 1 hard hat
- High-visibility vest
- Work boots
- Safety glasses with side shields
- Nitrile gloves or equivalent when handling known or potentially impacted media
- Work gloves (if handling materials that that might have sharp edges, protrusions, or splinters)

- Respiratory protection, N-95 respirators and Covid -19 style masks as needed

Additional PPE may be necessary for specific tasks with additional hazards. The SSO will be responsible for designating additional PPE for specific tasks. Depending on the activity, additional PPE may include:

- Hearing protection (during high-noise tasks that exceed 85 decibels (dBA) as measured with a sound pressure level meter)
- Hot work as torch cutting of metal (if encountered) as needed
- Face shield (for projectiles during disruptive activities such as demolition)
- Respiratory protection (for Covid-19 protection) only if working within 6 feet of other employees, following McDE's Covid-19 policy
- Weather-resistant clothing
- Disposable "Tyvek" coveralls. **Note:** Not recommended for working under hot ambient temperatures as they cause intense sweating and could contribute to heat stress.

PPE used at the Site must meet the requirements of recognized consensus standards (e.g., American National Standards Institute, National Institute for Occupational Safety and Health [NIOSH]) and respiratory protection (if used voluntarily) shall comply with the requirements set forth in OAR 1910.134.

Project personnel are not permitted to reduce the level of specified PPE without approval from the SSO or the HSC.

Note: Workers who could contact potentially contaminated soil must wear additional PPE. The PPE may include the following:

- Light-weight, breathable, launderable work clothing
- Chemical-resistant goggles
- Standard leather work boots (with applied water proofing); knee-high rubber boots with steel toes
- Standard work gloves

Diesel fuel contamination and contaminated media are *expected* at this site. The removal of a limited amount of these materials is required during excavation, and necessary to implement cutoff collar installations.

Additional PPE may be required if workers discover *unexpected* contamination. Characteristics of *unexpected* contamination could include unusual odors, discolored media, white powdery materials/fabric, a visible sheen, etc. The SSO and, if necessary, the HSC will be contacted as soon as possible after the discovery of *unexpected* contamination, and the SSO and/or the HSC will determine the need for additional controls and/or training.

7.2 Safety Equipment

The SSO will be responsible for ensuring that the following safety equipment is available on site and is properly inspected and maintained:

- Soap and water for decontamination
- Caution tape, traffic cones, and/or barriers
- First-aid kit
- Automated external defibrillator
- Fire extinguishers (ABC)
- Fluids for hydration, e.g., drinking water or sports drink
- A hand washing station (required for lead handling compliance)

7.3 Air Monitoring Equipment

McDE plans to suppress dust to a "no visible emissions standard" in lieu of employee exposure monitoring for airborne dust. The soil is expected to wet, which will also inhibit visible emissions.

McDE's retained Certified Industrial Hygienist, Greg Baker, has determined per professional judgement that employee personal exposure monitoring, and ambient air monitored are not warranted on this project.

McDE will utilize up to four multi-meter (4-gas) meters for continuous, confined space conditions monitoring while working in protected trenches during hand excavations, and cutoff collar installations. McDE will maintain this equipment in calibration. These meters are

alarm set and continuous monitor ambient concentrations of oxygen, carbon monoxide, hydrogen sulfide and explosive gas limits.

McDE will also utilize a 10.6 eV (electron volt) photo ionization detector (PID) as a screening device to identify unanticipated (higher than expected) concentrations of volatile organic compounds (VOCs) during the initial hand excavation of diesel-contaminated media.

7.4 Communications Equipment

The SSO will have a mobile phone or a radio available in case of emergency.

7.5 Engineering Controls Equipment

The SSO will provide and install one high volume area fan (HVAF) at each cutoff collar installation site. The purpose the HVAF is to provide comfort and heat relief to laborers inside each trench. The added benefit it the HVAF will provide multiple air exchanges with the fresh ambient air above ground level, minimizing personal exposures to diesel constituents, including but not limited to any remnant VOCs that may be liberated during hand excavations and cutoff collar installations.

8.0 Decontamination Procedures

8.1 Partial Decontamination Procedure

Covered employees will have different decontamination procedures for workers who could contact potentially contaminated soil. McDE employees will use the partial decontamination procedures when exiting the excavation area but remaining on the Site.

- Wash and rinse boots and outer gloves in containers at the perimeter of the excavation area. The rinse solution will include a mild detergent (e.g., *Alconox, Tide, laundry detergent, liquid dish soap*).
- If rain gear is used, full decontamination will be performed as described in Section 8.2 and left on site in a designated area.
- Remove outer gloves, if worn. Inspect and discard in a container labeled for disposable items if ripped or damaged.

- Remove respirator, if worn, and clean with pre-moistened alcohol wipes. Discard used cartridges at the frequency dictated by the SSO.
- Wash hands and face with soap and water.

McDE will provide hand-washing facilities and liquid soap to assist workers with decontamination procedures.

8.2 Full Decontamination Procedure

Covered employees will follow the full decontamination procedures listed below when exiting the excavation area and leaving the Site, e.g., at the end of the work shift.

- Wash and rinse boots, raingear and outer gloves in containers in the contamination-reduction zone. The rinse solution will include a mild detergent (e.g., *Alconox, Tide, laundry detergent, liquid dish soap*).
- Change dirty work clothes and bag up for off-site laundering. Do not wear in vehicles, or when returning home or to the home office. Put on fresh street clothes at the end of each work shift. Shower off site as soon as possible. Return to work the next day in clean, launderable work clothes.
- Remove soiled work gloves and deposit in a container labeled for disposable items.
- Remove respirator (if worn) and discard used cartridges at the frequency dictated by the SSO.
- Wash and rinse respirator in a "respirators only" decontamination container.
- Remove work boots and put on street shoes. Place work boots in a plastic bag or container for later reuse.
- Wash hands and face with soap and water.
- Again, shower as soon after the work shift as possible.

McDE will provide hand-washing facilities and liquid soap to assist workers with decontamination procedures.

8.3 Decontamination of General Site Workers

Employees are not required to follow decontamination procedures unless they perform excavation/trenching activities with "boots on the ground."

As a good industrial hygiene practice, all employees must wash hands before eating, drinking, using tobacco products, or applying cosmetics. Employees must also minimize tracking of material from the Site by removing obvious visible debris and dirt from boots and clothing before leaving the Site.

In the event of PPE failure, worker and/or buddy will cease work, and perform personal decontamination procedures.

9.0 Medical Surveillance (not anticipated)

Employees who meet the following criteria are enrolled in a medical surveillance program consistent with OAR 1910.120(f):

- The employees are, or may be, exposed to hazardous substances or health hazards at or above established permissible exposure limits for 30 or more days per year.
- The employees are required to wear a respirator for 30 or more days per year.
- The employees exhibit signs or symptoms consistent with overexposure to site contaminants.
- The employees are members of a HAZMAT team.

McDE does not anticipate that any employees on the Site will require medical surveillance consistent with OAR 1910.120(f).

Employees who are authorized to wear respirators are medically evaluated consistent with the respiratory protection standard OAR 1910.134. The HSC or administrative designee (e.g., human resources manager) will maintain medical evaluation records.

10.0 Air Monitoring

McDE will continuously monitor workers conducting hand excavation work in the trenches, and cutoff collar installation. The monitoring will be done with McDE's 4-gas multi-meters per Section 7.3.

The site superintendent will continuously and visually monitor the air for "visual emissions" of airborne dust, which are prohibited. Soil will be wetted and kept adequately wet to avoid the liberation of visual emissions of airborne dust.

11.0 Site Control Measures

Access to the Site will be controlled as part of the site preparation. Control measures may include fencing, gates, and signs limiting access to everyone except authorized personnel.

Vehicles will not require robust wet decontamination because they will be driven on hard surfaces. However, vehicle operators will be required to remove any loose soil with a broom; that soil will then be shoveled up and placed back into the excavation.

12.0 Emergency Response/Spill Containment/Confined Spaces

Covered employees on site will follow the emergency response, spill response, and confined space procedures described in the McDE site-specific safety plan. Vehicle fuel spills, oil spills and hydraulic fluid spills shall be cleaned up immediately. Incidents will be documented on a McDE incident report form.

13.0 Pre-Entry Briefing

Covered employees on site will conduct pre-entry briefings, e.g., tailgate meetings, before starting work on the Site and/or as the scope of work changes throughout the project to ensure that employees are familiar with the HASP and that the plan is being followed. Attendance and discussion topics will be documented on sign-in sheets, which will be maintained by the SSO.

14.0 Periodic Evaluation

The HSC will evaluate the effectiveness of this HASP. As part of the evaluation, the HSC will track ongoing health and safety feedback from field personnel on the project. This feedback will be reviewed and incorporated into either immediate or periodic updates of the HASP. The HASP will be reviewed and updated on an ongoing basis. Updating the plan as necessary

ensures that it reflects the known hazards, conditions, and requirements associated with the Site. McDE will maintain periodic evaluation records and will track HASP revisions.

15.0 Safe Work Practices

The following safe work practices are provided to supplement the other information included within this HASP.

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in areas with contaminate and/or potentially contaminated materials.

2. Field personnel will, whenever practicable, remain upwind of soil-disturbing activities, open excavations, and other site-disturbing activities.

3. Subsurface work shall not be performed at any location until the area has been confirmed by a utility-locator firm to be free of underground utilities or other obstructions.

4. All employees have stop work authority and shall report any of the following immediately to the SSO or HSC:

- Unsafe conditions
- Unsafe acts
- At risk behaviors

16.0 Acknowledgment

McDE cannot guarantee the health or safety of any person entering the Site. Because of the potentially hazardous nature of visits to active sites, it is not possible to discover, evaluate, and provide protection against possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury and illness at the Site. The health and safety guidelines in this plan were prepared specifically for the Site and should not be used on any other site without prior evaluation by trained health and safety personnel.

Covered employees who will work at the Site are to read, understand, and agree to comply with the specific practices and guidelines described in this HASP regarding field safety and health hazards.

Acknowledgment

I have read and I understand this HASP and attachments, and agree to comply with the requirements described herein:

Name	Title	Date

Job Hazard Analysis

Risk Assessment Code (RAC) Matrix					
Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA

RAC Chart

E = Extremely High-Risk

H = High Risk

M = Moderate Risk

L = Low Risk

Activity: **A.1 - EXCAVATION**

Project Name: **Centennial Mills, Tanner Creek Sewer Remediation**

Location: **NW Naito Parkway Portland OR**

Date Prepared: **8/18/2022**

Prepared By:_**Tim Moore,** **McDE Safety Director**_

Reviewed By: **Mike Logan**

Overall Risk Assessment: **Low Risk**

Task	Hazards	Controls	RAC
Site Specific/ Job Specific Training	Employees not trained in safe work practices may harm themselves or others.	- Use this JHA and other formal and informal training as a means to train workers. - If the scope of work detailed below changes, complete an amendment to this JHA.	L
Locate Utilities	Damaging utilities. Explosions, Burns, Electrocution, Communications black-outs.	- Call 811 utility notification center and obtain a locate ticket number. - Pot-hole all known utilities to determine their exact location. - Ensure all utilities have responded and marked their lines. -Maintain utility locate marks for the duration of the job. - Refresh locate tickets every 45 days. - Hand excavate within 24in. of utility.	L
Personal Protective Equipment (PPE)	Injuries to hands, feet and head. Being struck by automobiles. Hearing loss.	- Workers on the job will wear a reflective vest, hard hat, and work boots. - Safety glasses and face shields are task specific and will be worn when foreign objects may enter the eye. - Gloves will be worn when handling tools or sharp objects. Wear the correct glove for the job. - Wear ear plugs or ear muffs in high noise areas. - Replace work or damages PPE as soon as possible.	L

Inspect equipment and tools	Equipment break downs, Tool failure. Cuts, burns, Fire, Broken bones.	- Inspect each piece of heavy equipment before each shift. - Complete a maintenance checklist weekly. - Ensure back-up alarms are functioning and audible over background noise.	L
Spotters	Damage to utilities, Damage to equipment, Injuries, Workers being run over.	- Spotters are required when digging. - Ground guide trucks and equipment backing on site. - Use a spotter when working near any overhead utility, power pole, or transformer.	L
Set up barriers and caution off areas.	Entry of unwanted people, damage to structures, hydrants, trees.	- When possible, fence the site. - Set up warning barricades or temporary fencing like snow fence. - Use jersey barriers or water filled barriers whenever possible in traffic. - Caution tape (yellow) or Danger tape (red) around excavations.	L
Preparatory instructions, layout, communication.	Lack of coordination. Mistakes, injuries.	- Before beginning each phase the foreman will explain to the workers what needs to be done and how the work will proceed safely.	L
Adjacent Structures	Collapse of the adjacent structure	- Do not excavate below the level of the footing of an adjacent structure (home, building, retaining wall) except under the direction of an approved engineering plan.	L
Establish and maintain safe excavation & trench conditions	Type C soils. Standing water. Collapse of trench & excavation walls.	Follow McDE's engineered trench and excavation plan. Inspect conditions at beginning of shift, then monitor conditions continuously. Dewater continuously.	M
Hand Digging	Back and Muscle strains	- Don't be too aggressive when moving heavy or wet materials. - Make sure wooden handles are free from damage. cracks, splinters. - Wear boots and gloves.	L
Spoil Piles	Sluffing off, rocks rolling into excavations, cave in.	- Maintain spoil piles a minimum of 2 ft. back from trench or other excavations. - Note maximum spoil pile height allowed in tabulated data or shoring plan. - Competent person to consider the lateral earth pressures of materials placed in the affected zone of excavations.	L

Material Stockpiles	Material sluffing off.	- Maintain stockpiles at the angle of repose for the given material. - Do not cut faces of stockpiles vertical.	L
Place and Compact Fill	Caught between, struck by, cave in	- Look in the direction of travel - Mechanical vibration increases the likelihood of cave in. - Work perpendicular to an edge/drop off.	L
Heavy Equipment	Caught between, Struck by	- Operators will be aware of the location of workers on the ground. - Workers will stand away from heavy equipment and in a place where operators can keep track of them. - Maintain communication verbal or non-verbal between ground personnel and operators. - Do not walk behind equipment with-out telling the operator. - Operators will stop if they lose track of the position of a ground person. - Never move excavated material over workers. - Workers will not stand or walk under the elevated portion of equipment. - Follow the manufacturers recommendations regarding operation of heavy equipment. - Know the limits of your machine; do not overload equipment. - Operator Training. Equipment will be operated by a qualified operator. - Each machine will have an operator's manual. - Wear your seat belt - Clean glazing / maintain good visibility	L

Roll up equipment and clean up	Slips trips falls work delays theft	- Store materials out of the way, blocked to prevent shifting. - Pick up scraps and trash daily, keep site looking professional. - Store tools in a secure location. - Park heavy equipment so fueler can access fuel tanks from one side. - Park equipment out of the right of way when possible, or place road cones beside equipment.	L
Responding to an emergency	Delays in getting help	- Follow the Emergency Response Plan listed in the site job hazard assessment (HASP) - Call 911 when the situation warrants emergency response. - Know the location of first aid kits, fire extinguishers.	L
First Aid	Exposure to disease from bodily fluids	- Use appropriate PPE - Wash using soap and water - Dispose of soiled garments/ bandages in a leak proof container.	L
Competent Person	Lack of qualified leadership	- Knowledgeable - Possess authority in make changes to work practices, including stop work authority. - Designated by employer	L
Labor	Heat stress and exposure to sunlight	- Inform laborers of hazards - Continuously monitor heat and worker performance - Implement a work/rest regiment, and increase break durations as temperatures rise - Provide bottle drinking water and encourage consumption - Wear light breathable, launderable work clothing - Wear sunblock on exposed skin each day	L
Rain	Flooding; slippery conditions; slope stability compromised by rainfall	- Inspect at beginning of shift, then monitor continuously. Dewater continuously. Stop work and re-evaluate work if rain is forecast. - Proceed after Safe evaluation	L

Job Hazard Analysis

Risk Assessment Code (RAC) Matrix					
Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

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Step 2: Identify the RAC (Probability/Severity) as E, H, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA

RAC Chart

E = Extremely High-Risk

H = High Risk

M = Moderate Risk

L = Low Risk

Activity: **A.2 SHORING**

Project Name: **CENTENNIAL MILLS**

Location: **NW Naito Parkway, Tanner Creek Sewer Remediation**

Date Prepared: **8/2022**

Prepared By:_**Tim Moore,** **McDE Safety Director**_

Reviewed By: **Mike Logan***

Overall Risk Assessment: M – Moderate Risk

Task	Hazards	Controls	RAC
Site Specific Training	Unique site hazards my injure workers	-Use this JHA and other site- specific training to unform workers of site hazards. -If the scope of work changes stop work, hold a crew meeting and amend this JHA. -Train workers to recognize danger areas.	L
Shoring Shielding Sloping of trenches	Material caving in to smother workers.	- Follow 29 CFR 1926 Part P or (when required) the design of a licensed engineer. - The use of shoring and shielding will be done in accordance with the manufacturer's recommendations. -Use trench Box Enginmeered design per DH Charles Engineering - Maintain tabulated data on-site when shores or shields are in use.	M
Access Egress	Being stuck in an excavation	- Maintain a method of egress within 25 ft of workers in an excavation. - Ladder, walkway, ramp	L
Ladders	Falls	- Store ladders in a ladder rack on the trench shield. - Remove ladders from ladder rack to exit the shield. - Secure ladder from movement by placing feet against opposite side of the shield. - Extend ladder at least 3 feet above shield or use ladder extensions.	L

Walkways	Falls, being trapped between box and trench wall.	- Use walkways to access ladder in trench shields when the shield is more than 24in above the ground level. - Use a walkway to access ladders in shields or cans where a gap of more than 18in must be crossed to access the ladder. - Walk way must have handrails. - Walk way slope not to exceed 2.75:1	L
Fall Protection	Falls	- Fall protection is not required in trenching operations for the immediate members of the crew. - Bystanders will stay back, and out of the affected area (equal to depth of trench) or be tied off following fall protection guidelines.	L
Assembling shores and shields	Injuries from falls, caught between, struck by. Pinching or amputations	- Follow manufacturers recommendations. - Never swing materials over people. - No worker will go under unsupported shield components during assembly/disassembly operations.	L
Installing, Removing shores and shields	Falls, Caught Between, Struck By, Cave in hazards.	- Follow manufacturers recommendations. - Never swing materials over people. - Workers will Exit Shields before moving them vertically.	
Working in shored systems	Cave in, Struck by.	- Follow manufacturers recommended procedures. - Have manufacturers tabulated date available, onsite. -Workers will remain inside of shores/shields. - A method of access and egress will be within 25ft of workers.	M
Depth Ratings	Failure of systems	- Shores and shields will not be used beyond their depth ratings. - Shores and shields will be inspected by a competent person before each use, and units with structural damage will not be used.	L
Spoil Pile	Cave in, rocks rolling into excavation	- Maintain spoil pile at least 2ft. back from trench. - Maintain spoil pile height according to tabulated data/engineering plan.	L

Job Hazard Analysis

Risk Assessment Code (RAC) Matrix					
Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA

RAC Chart

E = Extremely High-Risk

H = High Risk

M = Moderate Risk

L = Low Risk

Activity: **A.3 - LIFTING & RIGGING**

Project Name: **Centennial Mills, Tanner Cr**.

Location:_**NW Naito Parkway Portland OR**

Date Prepared:_**8/11/2022**

Prepared By:_**Tim Moore,** **McDE Safety Director**

Reviewed By: **Mike Logan** Overall Risk Assessment: **Moderate Risk**

Task	Hazards	Controls	RAC
Site Specific Training	Unique site hazards my injure workers	-Use this JHA and other site- specific training to unform workers of site hazards. -If scope of work changes, amend this JHA. -Train workers to recognize danger areas.	L
Safe Working Loads (SWL)	Loads falling Caught between or Struck by injuries	- Rigging will not be loaded past its SWL as prescribed in the manufacturer's identification markings	L
Tags or Markings	Struck by or Caught between injuries	- Rigging must have permanently affixed and legible identification markings as prescribed by the manufacturer, that indicate the Safe working load (SWL) - Will not be used without legible markings/tags.	L
Storing Rigging	Damage or deterioration of rigging	- Rigging when not being used will be stored away from the immediate work area. - Store rigging out of the weather. - Roll or hang slings in an orderly fashion.	L
Inspections	Damaged rigging being used	- Inspect rigging before each use. - Remove damaged rigging from service and de-commission it.	L
Chain Slings	Damaged rigging being used	- Periodically inspect chain slings (at least yearly) Keep records of the last month that the chain slings was inspected. - Remove from service if, at any spot, wear exceeds 20% - Do not shock load	L

Synthetic Slings	Breaking slings	- Out of service when Burns, Melting, Snags, Punctures, Cuts, Tears, Broken stitching, or Distortion are present. - Keep a record of the last month a sling was inspected. Do not shock load.	M
Wire Rope Slings	Parting of wire	- Wire rope clips will not be used to make eyes in bridals or slings. - Out of service when Broken wires. In a length of 8 diameters the number of broken wires exceeds 10% of the total number of wires, or the rope shows other signs of wear corrosion, defects or kinks. - Do not shock load	M
Shackles & Hooks	Failing of Shackles or Hooks	- Out of service if any sign of twisting or opening-up are present. - Out of service if gouges or wear of more than 10% of original diameter is present. - Out of service if proper pins are not used. - Secure screw pins in shackles, do not back them off ¼ turn. - Do not shock load	M
Sling Angles	Overloading Rigging failure.	- The preferred sling angle is 60^{o} - Use 45^{o} and 30^{o} angles sparingly. Note that sling capacities are greatly reduced below 45^{o} and severely reduced below 30^{o} - Beating down the connection of a choker hitch is not a recommended procedure as it can create severe reductions in sling capacity due to the less than 30^{o} angle created by beating down the choked connection. - Sing angles below 30^{0} are not recommended because the capacity of a sling is not indicated on a tag. NOTE: Tension in a sling leg can be determined by a qualified rigger and then a sling may be used below 30^{0} but this must be noted in the start card.	M

Lifting Points on Machines	Attachment point or rigging failure	- Rig to manufacturer designated lifting points only. Consult the operator's manual for more information. - Remove the bucket when lifting from the quick attach/ quick coupler of an excavator. - Always test the attachment after attaching buckets, breakers, etc. before beginning to dig by pressing down to ensure bucket is secure.	M
Load Charts	Overloading machines	- Before lifting, consult the load chart. check that radius and weight of load are within the machines safe operating limits.	M
The Lift	Falling loads	- Test the load before making the actual lift by raising the load only 1 foot. - Slowly raise all loads. - Swing all loads slowly. - Never raise or lower any load over workers. - Do not lift loads higher than necessary	M
Tag Lines	Uncontrolled loads	- Use tag lines to control the load, unless the use of a tag line would itself create a hazard. - Guide loads using hands only in the final stage of landing the load and only when exact placement is required.	L
Qualified Riggers	Improper rigging practices	- Rigging will take place by, or under the supervision of a qualified rigger. - A qualified rigger is someone who has a recognized degree or certificate or who has extensive knowledge, training and experience.	L
Pre-Lift Meeting	Caught between Struck by	- Conduct a pre-lift meeting include all people involved in the lift. Operator, rigger, signal person, spotter, foreman. - Discuss item to be lifted, it's weight, machine capacity (over front and over side) Pick and set locations and rigging to be used.	L

Job Hazard Analysis

Risk Assessment Code (RAC) Matrix					
Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA

RAC Chart

E = Extremely High-Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Activity: **A.4 – EMERGENCY RESPONSE**

Project Name: **Centennial Mills, Tanner Cr**.

Location: **NW Naito Parkway Portland OR**

Date Prepared: 8/18/2022

Prepared By: **Tim Moore, McDE Safety Director**

Reviewed By: **Mike Logan**

Overall Risk Assessment: **Moderate Risk**

Task	Hazards	Controls	RAC
Site Specific Training	Unique site hazards my injure workers	-Use this Job Hazard Analysis (JHA) and other site specific training to unform workers of hazards. -If the scope of work changes amend this JHA -Train workers to recognize danger areas and to avoid and report them.	L
Don PPE	Head, Foot, Hand and Eye Injury	- Workers will wear Hard Hat, Vest, Boots and sturdy work clothes on site. - Glasses and Gloves are task specific. - Wear ear plugs in loud environments. - Inspect PPE for damage or defects daily.	L
Emergency Response	Delayed Emergency Response. Further injury. Loss of Life.	- Train workers on Emergency Response Plan - Know the chain of command and how to reach supervisors. - Know locations of First Aid Kits and AED - Know locations of Fires Extinguishers - Work as a team to control the emergency - Render First Aid onsite when possible - For serious Life-Threatening injuries call 911	L
First Aid	Minor Injuries	- Provide First Aid onsite where possible - Call **On-Site Health and Safety** 24 hours a day at (866) 998- 2750	L

Task	Hazards	Controls	RAC
Hypodermic Needles	Needle Sticks	- Train workers on "Sharps" (K, Safety, Training, Needles) - Temporarily stop work in immediate area - Contact your supervisor - Delineate the immediate area (5ft diameter) - Supervisor or Safety will retrieve the Sharp - Wear leather gloves - Use pliers to pick up Sharp - Store Sharp in approved/sealed container with a label. - Dispose of labeled container at Dump	M
Working around soils containing animal scat or human excrement.	Exposure to feces or urine. Inhalation, Ingestion, absorption of feces or urine. Sickness	- Be aware of your surroundings - Manage risks and prepare ahead of time - Use a flashlight or area illumination at night. - When disturbing material containing bird, bat, or rodent droppings use dust suppression techniques - Earthmoving equipment: close cab doors. - Laborers and Operators in open cab machines should wear N95 respirators. - Wash your hands. The single most effective preventative measure is handwashing. - Never smoke, drink, or eat without washing your hands. - Wear Tyvek or launderable coveralls; coveralls should be laundered separately at work. - Minor cuts and abrasions should be immediately cleansed using antibacterial soap and then protected from exposure.	M
Rats & Wild Animals	Bites Sickness, Disease	- Manage Risks - Always be aware of your surroundings. Watch out for rats, mice, skunks, and other wildlife. - Burrows may indicate the presence of rats, but could also indicate other burrowing animals such chipmunks. - Never attempt to control wildlife.	M

Task	Hazards	Controls	RAC
Insects & Spiders	Pain/Swelling Headache/Convulsions Difficulty breathing Blurred vision Sweating and salivating Numbness in face and limbs Paralysis/Anaphylaxis	- Brown Recluse Spider bites can cause serious skin damage, nausea, and muscle pain. - Watch where you place your hands and feet when removing debris. If possible, don't place your fingers under debris you are moving. - Wear gloves to protect yourself from biting and stinging insects. - Wear long pants, socks, and long-sleeved shirts. - Use insect repellents that contain DEET or Picaridin. - Treat bites and stings with over-the-counter products that relieve pain and prevent infection. - Know what poisonous insects look like, be able to identify poisonous insects.	L
Snakes	Bites Pain / Swelling Headache/Convulsions Difficulty breathing Blurred vision Sweating and salivating Numbness in face and limbs Paralysis/Anaphylaxis Death	- Watch where you place your hands and feet. - Wear gloves and Boots 10" high - If you see a snake, step back and allow it to proceed. - Watch for snakes sunning on fallen trees, limbs or rocks. - A snake's striking distance is about 1/2 of it's total length. - If bitten, note the color and shape of the snake's head to help with treatment. - Keep bite victims still and calm to slow the spread of venom. -Seek medical attention as soon as possible. - Do not cut the wound or attempt to suck out the venom. - Apply first aid: lay the person down so that the bite is below the level of the heart, and cover the bite with a clean, dry dressing. - <u>All rattlesnake bites should be considered life threatening</u>. - Seek medical attention immediately. If possible, call ahead to the emergency room so anti-venom can be ready when the patient arrives.	M

Task	Hazards	Controls	RAC
General Public Transients	People entering the work area. Interactions w/hostile or irrational individuals. Bodily Injury	- Fence the site, where possible. - Use barriers to limit entry. - Make initial contact and point out the EXIT - Avoid eye contact after initial contact. - Do not interact with them, if possible. - Maintain a professional demeanor. - Never touch/ shove/ or fight with them. - Call the Police if they persist and will not leave the work site.	**L**

Job Hazard Analysis

Risk Assessment Code (RAC) Matrix					
Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA

RAC Chart

E = Extremely High-Risk

H = High Risk

M = Moderate Risk

L = Low Risk

Activity: **A.5 – CONFINED SPACES**

Project Name: **Centennial Mills, Tanner Cr**.

Location: **NW Naito Parkway Portland OR**

Date Prepared: 8/18/2022

Prepared By: **Tim Moore, McDE Safety Director**

Reviewed By: **Mike Logan**

Overall Risk Assessment: **Moderate Risk**

Task	Hazards	Controls	RAC
Site Specific Training	Unique site hazards my injure workers	-Use this JHA and other site- specific training to unform workers of site hazards. -If the scope of work changes amend this hazard analysis. -Train workers to recognize danger areas and to avoid and report them.	L
Don PPE	Head, Foot, Hand and Eye Injury	- Workers will wear Hard Hat, Vest, Boots and Sturdy work clothes on site. - Glasses and Gloves are task specific. - Wear ear plugs in loud environments. - Inspect PPE for damage or defects daily.	L
Confined Spaces	Asphyxiation Gas poisoning (Hydrogen sulfide, Carbon monoxide, Methane) Death	- Never enter a confined space such as man-holes, silos, vaults, pipe, etc. without authorization - Always have a rescue plan in place. - Competent Person must identify & evaluate each confined space on site.	L

Task	Hazards	Controls	RAC
Permit Required Confined Space (PRCS) Entry Protocol	Improperly trained employees. Improper equipment. Unauthorized entrants. Injury/Death	- As a minimum, an Entry Supervisor (Competent Person), Attendant, and Entrant shall be designated to participate in all permit required confined space entries. - Employees shall be trained in the position they are designated for. -The Entry Supervisor shall establish rescue and emergency procedures prior to employees entering a Permit Required Confined Spaces. - All relevant emergency service provider numbers shall be noted prior to entry. - Obtain, inspect and set-up safety equipment required including but not limited to barriers, blowers, full body harness, and rescue tripod. - Install traffic control systems where applicable. - Attendant will ensure there will be no unauthorized personnel or spectators near or within the confined space. - The space will be evaluated by the Entry supervisor prior to entry to determine the condition of the space and they type of entry to be undertaken. - Continuous atmospheric monitoring is required when the entrant is in the space. - Follow 29 CFR 1910.146M	M
Evaluate the Confined Space	Respiratory illness Physical injury Death	- Complete a confined space evaluation form to determine the type of entry to be performed. • Permitted Entry • Alternate Entry DO NOT ENTER THE CONFINED SPACE FOR TESTING - Test the space for a hazardous atmosphere. - Use a calibrated gas meter. - Verify oxygen content 19.5% to 23.5%. - Verify combustible gases are below the Lower explosive Limit (LEL) - Verify toxic gases are below the Permissible Exposure Limit (PEL) - Record results on evaluation form. - Verify internal configuration or engulfment hazards are not present.	M

Task	Hazards	Controls	RAC
Complete an Entry Permit	Entering hazardous conditions. Unattended entry	- Complete a confined space entry permit if using the permitted entry protocols. - Supervisor, Entrant, and Attendant must sign the entry permit. - Permits are only valid for up to 12 hours. - When work is completed, cancel the permit and return it to the Safety Officer. - Cancelled permits remain on file for 1 year.	M
Conduct Pre-entry meeting	Lack of communication	- Supervisor, Entrant, and Attendant attend a safety meeting before beginning the entry. - Review hazards of the space. - Review self-rescue procedures.	L
Entry	Respiratory injury Death	- Continuously ventilate the trenches from fans above, to disperse potential contaminants, ambient heat, and to provide comfort during trench work/occupancy. -Make positive connection to the SRL and the rescue tripod. - Entrant shall use the three points of contact rule when descending and ascending the approved, installed, method of egress. - Entrant shall maintain communication with the attendant at all times. - Entrant will carry a gas monitor when in the space. - Exit the space immediately if gas monitor alarms or if low batters signal sounds.	M
Work	Unable to complete work	- Attendant shall be posted at entrance for duration of work. - Attendant shall maintain the permit for the duration of the entry.	L
Communicate with Entrant	Loss of communication	- Attendant shall be in constant communication with the entrants while the work is in progress. - Use Visual, Voice, or Radio communication	L
Close Out Permit	No record of entries	- Upon completion of entry. The entry permit shall be completed and closed out. - A copy will be given to safety. - Permits are kept on file for one year.	L
Tripod/Rescue Equipment	Equipment Failure	- Inspect daily for broken parts/damage. - Any equipment found defective will be tagged, taken out of service.	L

Confined Spaces

Purpose:

This program is intended to ensure employee safety in confined spaces. A confined space is a space that is large enough for an employee to fully enter the space and work. It has limited or restricted entry or exit and is not intended for continuous human occupation.

Ref: 1926.1200 J, OAR437-002-1046, WAC296-809 v4.21

Hazards:

In confined spaces workers are exposed to multiple hazards, any of which may cause injury, illness, or death. Workers are injured and killed from a variety of atmospheric factors and physical hazards in confined spaces every year.

- Restricted access and egress can make getting in and out difficult.
- Configuration hazards may prevent quick escape.
- Physical hazards such as crushing or drowning.
- Atmospheric hazards.

General:

The construction standard requires that companies follow procedures when working in confined spaces. All information required by the confined space standard is available to our employees, through their leadership chain.

A confined space has three characteristics. A space must have <u>all three</u> characteristics to be considered a confined space.

- Large enough to get your body entirely inside.
- Not designed or intended for continuous human occupation.
- Restricted entry or exit.

Confined spaces must not be entered until they have been evaluated for hazards to determine what type of entry procedure may be used. Before entering a confined space three things must occur.

- Identify the space
- Control access to the space
- Evaluate the space for hazards.

Locate the space:

A person with the knowledge, skills, and ability will identify the confined spaces on the worksite. Employers of mobile workers are not required to perform an evaluation for the entire site. Instead, the employers of mobile workers need only evaluate the areas they are responsible for or where their employees will be working. Identification of a confined space is a three-step process.

It is important to know where confined spaces are on a work site. A space must have all of the following characteristics in order to be considered a confined space.

- Large enough and arranged so an employee could fully enter the space and work
- Has limited or restricted entry or exit
- Is not primarily designed for continuous human occupancy

Control Entry:

It is required that employee access to confined spaces be controlled. Confined spaces must not be entered until they have been evaluated to determine what type of entry procedure may be used.

Do not allow access to untrained personnel. Confined spaces should not be entered until the space has been evaluated for hazards. No personnel trained or untrained should open or enter a confined space until it has been evaluated.

Evaluating the Space:

A competent person must determine the hazards, if any, that a confined space has. A competent is someone with the knowledge, skills, and abilities, and who is capable of identifying actual and potential hazards, and who has the authority to make decisions regarding the confined pace. This competent person must document the evaluation of the space on a Confined Space Evaluation/Entry Permit form (see appendix) and note on the form what type of entry may be performed.

NOTE: Always evaluate and control hazards before entering any confined space.

Check the atmosphere:

Test for atmospheric hazards in the entire space, particularly where employees will be working. Test the atmosphere for:

- Oxygen.
- Combustible gases and vapors.
- Toxic gases and vapors.

Check for Engulfment Hazards:

Evaluate the space to determine if the space contains a material with the potential for engulfing someone who enters the space.

Check the Internal Configuration:

Evaluate the space to determine if the space has an internal configuration that could allow someone entering it to be trapped by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.

Check for Physical Hazards:

Evaluate the space to determine if the space contains any physical hazard such as electrical shock or moving parts.

Check for Other Hazards:

Evaluate the space to determine if it contains any other recognized serious safety or health hazard that could either:

- Impair an entrant's ability to self-rescue
- Result in a situation that presents an immediate danger to life or health.

Check that Acceptable Conditions exist:

Determine that acceptable conditions exist for entry and that these conditions can be maintained during entry operation.

Choose type of entry:

Decide the type of entry protocol to be used.

- Permit Required Entry
- Alternate Entry

Do the Paperwork:

Document the evaluation on a confined space evaluation form or electronically in your I Pad.

Types of Entry:

It is the company's responsibility to identify confined spaces and to inform employees of their presence. The types of confined spaces we typically encounter are manholes and vaults. These confined spaces may require a permit to be entered. Depending on their configuration at the time there are two acceptable methods of entering a permit required confined space. It is the competent persons

responsibility to identify confined spaces on job sites. The company will designate competent person/persons onsite who will control entry to permit required confined spaces.

There are two protocols used to enter permit required confined spaces.

- Permitted Entry
- Alternate Entry

Permit-Entry Procedures:

Most confined space entries undertaken should be Permit Required Confined Space entries and rescue equipment should be used. Rescue equipment is recommended because an employee could have an illness or injury not identifiable by an air monitor, and therefore no warning would be given. Active permits are available for review by entrants at the time of entry.

Before employees enter a permit space:

- Identify the space
- Evaluate the space
- Complete an entry permit
- Set up self-rescue equipment
- Continually monitor the atmosphere

Complete the Permit: Permits may be filled out electronically on the foreman's tablet, or on paper. Permits are kept open while work is ongoing and closed (cancelled) when the work is finished. Previous closed (cancelled) permits are available for review. Identify any difficulties or problems encountered during the entry on the permit. This information is valuable for future entries into that confined space. Indicate the type of rescue equipment to be used on the permit.

Identify the personal: Enter the names of the Supervisor, the attendant, and entrant on the permit. Supervisor and Attendant can be the same person.

- Supervisor - Leads crew, fills out permit and signs authorizing entry.
- Attendant - Stationed outside the space and monitors Entrant.
- Entrant - Enters the space and performs work.

Rescue System: Determine if acceptable entry conditions are present. Indicate the type of rescue system used on the permit. Only the entrant, or rescue personnel are allowed in a permit required confined space. Inspect and set up rescue retrieval equipment or coordinate with a rescue service. Calling 911 is not our rescue plan. We use non-entry rescue as our means of extracting ill or injured workers from confined spaces.

Monitor the Atmosphere: Continuously monitor the atmosphere in the space. Use a 4-gas air monitor (sniffer) placed either on the entrant or in close proximity to the entrant.

Perform the work: Entrant only enters the space and performs the work. Attendant stays at the entrance to the space and monitors the Entrant. We use verbal communication between the Entrant and the Attendant.

Cancel the Permit: After the work is completed close (cancel) the permit and then turn it in to the Safety Dept. Paper permits may be scanned and turned in electronically or brought to the office.

Alternate Entry Procedures:

Alternate entry is a process for entering a permit required confined space under very specific conditions, without the requirement for an entry permit or the use of rescue retrieval equipment. The space remains a "permit space" even though no entry permit is required.

Before employees enter a space classified as alternate entry:

- Identify the space
- Evaluate the space
- Sign the evaluation indicating the space meets the requirements of an Alternate Entry space
- Continually monitor the atmosphere
- Continuously ventilate the space

Identify the space: A competent person will locate the space and control entry.

Evaluate the space: A competent person will evaluate the space and record the evaluation on the Confined Space Evaluation/ Entry Permit form located in the appendix.

Check the Atmosphere: Determine if acceptable atmospheric conditions exist by sniffing the space with an air monitor.

Ventilate the Space: Continuous ventilation is mandatory. Continuous ventilation controls potentially hazardous atmospheric conditions that may arise in the space. The atmosphere in the space must also be monitored with a sniffer while the entrant is in the space.

Note: Alternate entry cannot be used to enter a conscious system, unless the area to be entered can be isolated from the rest of the system and continuous ventilation is sufficient to control potential atmospheric hazards.

Keep Others Out: Prevent unauthorized access to the confined space. Implement procedures to prevent unauthorized persons from entering permit required confined spaces. No one but the entrant, or rescue personnel are allowed in a permit required confined space.

Perform the Work: Entrant enters the space. Attendant monitors the entrant. Communication is verbal between entrant and attendant.

Close the Space: After the work is completed it is not necessary to maintain a copy of the evaluation for an Alternate Entry confined space.

Rescue and Emergency Services:

Before employees enter a permit required confined space, develop, and implement procedures to remove entrants in the event of an emergency. Adequate rescue equipment or emergency services must be available on-site during a permit required confined space entry operations.

> Note: We conduct Non-Entry Rescue using rescue retrieval harnesses and self-retracting lifelines attached to tripods, where feasible, unless it would be impractical to do so or would increase the overall risk to the entrant.

Rescue teams:

When used a rescue team must.

- Be able to respond to a rescue call in a timely manner
- Be proficient in rescuing employees from a permit-required confined space
- One member of the rescue team must hold a current certification in first aid
- Be trained in rescue techniques annually

Employee Supporting the Entrant:

The attendant is the employee assigned to support the entrant. The attendant will be provided with,

- Personal protective equipment (PPE)
- Proper rescue retrieval equipment
- Training

  Note: Practice training sessions for confined space rescues are conducted, at least every twelve (12) months. Practice rescue training includes removing persons/dummies from actual or representative spaces. Rescuers must have practice performing permit space rescues prior to entry, or not more than 12 months before an entry.

Unauthorized/Untrained Persons:

Unauthorized or untrained persons will not be involved in rescue operations.

Information Required on an Entry Permit:

Confined Space Entry Permits must include all of the following information:

The space to be entered:

Purpose of the entry:

Date and duration of the entry:

Hazards: Include all known information of the hazards in the space and any known potential hazards in the space.

Acceptable entry conditions:

Results of atmospheric tests: Log the results of initial and periodic atmospheric tests performed to evaluate and identify the hazards and conditions of the space, accompanied by the names or initials of the testers and by an indication of when the tests were performed.

Measures taken to isolate space: Log the measures taken to isolate the space before entry of the space to eliminate or control hazards.

Names of supervisor, entrant and attendant.

Signature of supervisor:

Communication method: List communication procedures to be used for entrant and attendant during the entry.

Equipment or tools needed: List equipment needed to perform entry, such as:

- Personal protective equipment (PPE).
- Testing equipment, such as air monitor (sniffer).
- Tools needed to perform work.

Rescue equipment: List the type of rescue equipment or rescue services to be used.

Other information: List any other information needed for safety in the confined space.

Keep and Review Entry Permits:

Keep closed (cancelled) confined space entry permits for one year to facilitate the review of the permit required confined space program. We update our written permit required confined space entry processes, as necessary, to correct deficiencies.

- We keep employee exposure records according to chapter WAC 296-802, CRF 1910.1020. employee medical and exposure records.

Proper Equipment:

We will provide, at no cost to employees, the equipment that is required for them to perform their duties in confined spaces safely and efficiently.

- Testing and monitoring and ventilation equipment used to maintain acceptable entry conditions.
- Communication equipment used to facilitate communication when standard verbal and visual communication techniques will not work.
- PPE - Personal protective equipment needed to protect employees from hazards in the space and from hazards generated by work performed in the space.
- Lighting inside the space so employees can see to perform their work and see to exit the space in an emergency.
- Barriers to protect employees from hazards outside of the space, pedestrian, vehicular, etc.
- Ladders as needed to aid in safe access to spaces. As well as rescue equipment to facilitate safe and effective rescues in the event of an emergency.

Maintenance of Equipment:

The equipment used for confined space entry and rescue is maintained by the company as per the manufacturer's recommendations. Employee's individual respirators are maintained by the individual employee using supplies provided by the company.

Employee Training:

Employees are trained at no cost to themselves. Training is provided so that employees can obtain knowledge, understanding and develop the skills necessary to perform their tasks. The goal of training is to establish proficiency in job tasks and to introduce new or revised procedures.

Training Topics:

Training topics include but are not limited to.

- Roles and responsibilities.
- Hazards of the permit space.
- Procedures of the program created to protect employees.
- The dangers of attempting unauthorized rescue.

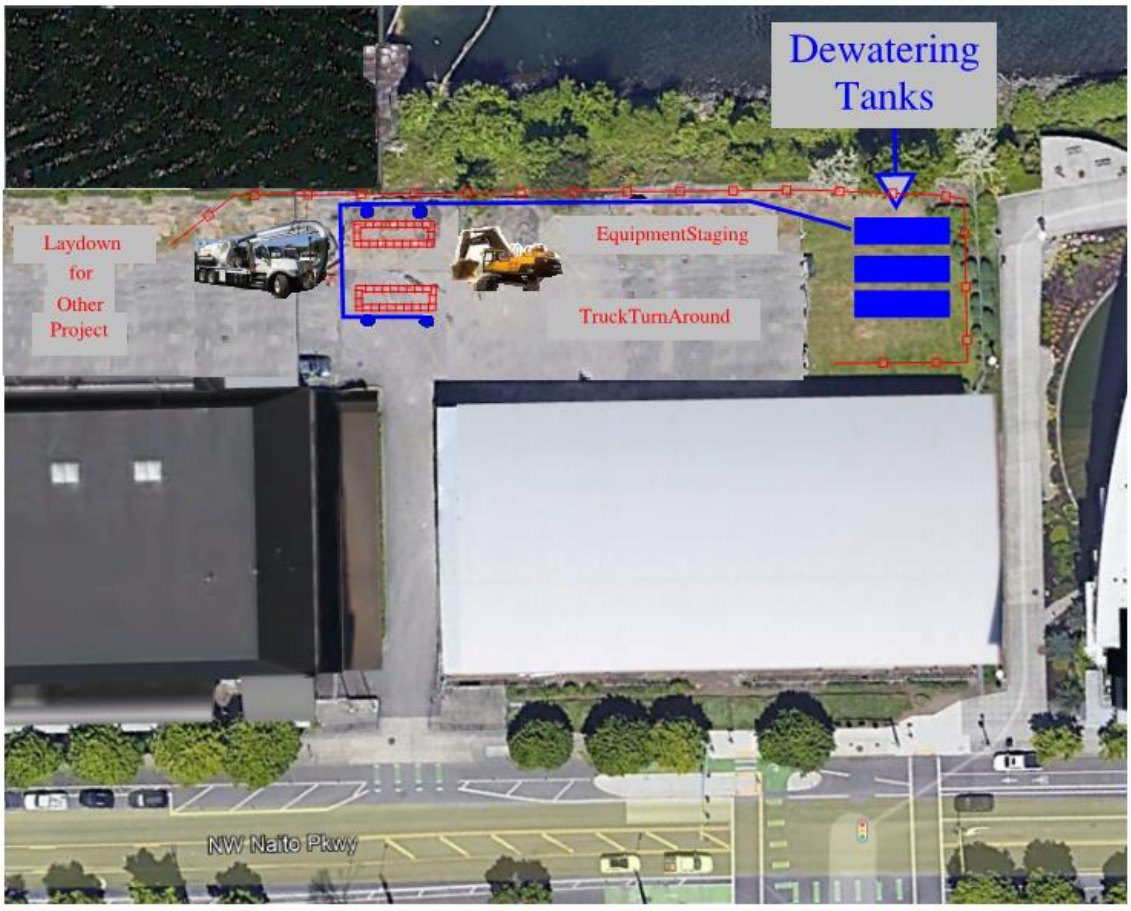
Proficiency Certifications:

Proficiency certifications are completed by the employee's supervisors and include:

- Employee name
- Training topic
- Instructor's signature
- Date of training

Dewatering Plan:

We will Install Deep Wells in four locations adjacent to our proposed excavations. See attached Groundwater Control Plan prepared by Lombardini Geological Services, LLC.
Deep Wells will be Drilled by Glacier Drilling and Dewatering.
The water removed from tanks will be temporarily held in holding tanks provided by Rain for Rent. See attached detail showing plan layout and proposed location of Tanks.
We plan to haul initial loads of water in Tanker trucks to Patriot for disposal.
We have submitted an application for discharge of clean water to the City storm or sewer system. If the application is accepted we will process the water on site using barrier booms in containment tanks and a combination of sand and carbon filters to produce clean water.
The volume of water which will be removed and disposed of is unknown at this time. .



4120 S Lincoln St • Washougal, WA 98671 • (360) 835-8794 • FAX (360) 835-1514

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5/20/2022

Centennial Mills Tanner Creek Sewer-
1362 NW Naito Parkway
Portland, Oregon 97209

-Groundwater Control Plan-

Shawn Lombardini LHG RG
PRINCIPAL HYDROGEOLOGIST

LOMBARDINI
GEOLOGICAL
SERVICES LLC

May 20, 2022

Mr. Terry Neigel
Glacier Dewatering and Drilling
10306 35th Lane SE
Olympia, WA 98513

Project: ***Centennial Mills Tanner Creek Sewer- Groundwater Control Plan***

Dear Mr. Neigel:

Lombardini Geological Services, LLC (LGS) has conducted a Site specific hydrogeologic review and constructed a Groundwater Control Plan for the proposed *Centennial Mills Tanner Creek Sewer* project, in Portland, OR. This design is intended to provide recommendations based on the information provided in the Hart Crowser Construction Drawings January, 2022, in conjunction with the Geotechnical report recommendations by Hart Crowser November 30, 2021. This design has been prepared based on our experience and our opinion based on reasonably ascertainable project information and details.

The design presented follows generally accepted hydrogeologic industry principles and standards. This report is exclusively for Terry Neigel's use only. It is at the discretion of Terry Neigel to distribute this design to others as needed. This is in lieu of other warranties, expressed, or implied.

1.0 PROJECT DESCRIPTION & SCOPE OF WORK -

Prosper Portland (owner) is proposing the following project described by the Hart Crowser geotechnical report; "The cutoff collar is detailed in plans by Hart Crowser (Hart Crowser 2020) and generally includes the excavation of 5-foot by 5-foot pits on the sides of the sewer. Existing obstructions, such as the original timber cribbing, will be removed from adjacent to the sewer, and the pits extended approximately 4 feet lower than the base of the sewer. A cutoff collar extension will be excavated below the sewer structure. The pits and the extension will be interconnected and backfilled with a cement-bentonite slurry to create a relatively impermeable "cutoff collar" around the sides and base of the sewer. Two collar systems will be constructed. The recommendations herein relate to geotechnical considerations in support of construction of the cutoff system".

The structures will be installed in open excavation methods. Figure 1- *Site Map* identifies the general location of the work. Figure 2-3 *Construction Sheets 3 & 4* shows the construction drawing sequence with water table depths and desired target dewatering elevations in respect to the grout cutoff collars installation. Figure 4, *2D and 3D Dewatering Contours* show the theoretical calculations for dewatering.

The scope of LGS Groundwater Control Plan is based on the Final Construction Drawings by Hart Crowser Construction Drawings January, 2022, in conjunction with the Geotechnical report recommendations by Hart Crowser November 30, 2021.

The dewatering venue for this plan includes installation of grout collars to the existing sewer structure known as Tanner Creek Sewer which includes open excavation for infrastructure at depths outlined from construction drawing 3 and 4 shown in Figure 2 and 3 respectively, designed by Hart Crowser Construction Drawings January, 2022.

Dewatering Venue: -Deep Well System;

Adjacent to the excavation, following topographical elevations, in two mobilizations/excavations, four total, 12" diameter deep wells; two deep wells adjacent to the grout collar 1 & 2 and two deep wells adjacent to grout collar 3 & 4, 35' deep for all wells to penetrate the uppermost aquifer. 4 deep wells are planned in total described below on construction drawings 3 and 4 shown in Figure 2 and 3 respectively.

1) Construction drawing Sheet 3, (2) deep wells, adjacent to grout collar 1 and 2 excavation, 35' deep, 200 GPM.

2) Construction drawing Sheet 3, (2) deep wells, adjacent to grout collar 3 and 4 excavation, 35' deep, 200 GPM.

Installing 4 total deep wells, 12" diameter, deep wells installed to 35' below the surface, from a surface elevation of approximately 8' AMSL (Google Earth) corresponding to a maximum well depth of -27' BMSL.

The anticipated construction of the deep well dewatering system will be as close to the open excavations as practicable. The following figures show the anticipated/estimated layout by construction drawing sheets; Figure 2, *Sheet 3 Construction Drawing;* Figure 3, and *Sheet 4 Construction Drawing.*

In the design construct, these 4 deep wells will be adjacent to the excavations and follow the topography no greater than 5-8' from the excavation limits. Generally, the groundwater depth appears to be at approximately 3' AMSL. To illustrate the drawdown needed is generally to lower the groundwater level from 3' AMSL to approximately -18' AMSL. See Figure 4 for the profile view of the existing groundwater elevation compared to the target dewatering elevation desired.

Initially, the down-well pumps will be set at 200 GPM until the unconfined aquifer storage is depleted then the total gallons of groundwater extracted will reduce to the in-situ hydraulic conductivity/permeability stabilization flow rate, where dewatering can capitalize on and reduce the groundwater elevations to the appropriate levels for excavation.

One groundwater monitoring well appears to be installed in MW-2. If this well is still in place it should be measured as soon as possible and measured periodically prior to the work to be performed and right before work commences and if it can remain in place during dewatering, measuring when the system is active to give a Radius of Influence proof of concept measurement. The installed dewatering wells can also be measured for depth to water prior to system startup. The anticipated drawdown needed is approximately 21'.

Discharge of the dewatering water will need to be initially be pumped through a GAC or similar style

remedial system, which could limit the overall gallons per minute unless a series of carbon vessels were used in lead-lag orientation.

Due to the potentially silty matrix, the initial pumping and construction may produce silty water and should be routed through a 18,000-20,000 gallon over under weir storage tank (or comparable) which will likely be a part of the groundwater treatment train. Depending on permitting requirements for this system, some batching/turbidity testing may be needed prior to discharge. It is anticipated that sewer discharge would be appropriate due to the known contamination at the site.

2.0 SURFICIAL GEOLOGIC SETTING-

Site surficial geology was identified in the Geologic map of the Portland quadrangle, Multnomah and Washington counties, Oregon, and Clark County, Washington, by *Beeson, M.H., Tolan, T.L, and Madin, I.P. 1991* which identify the site as an artificial fill or Quaternary alluvium deposited from the Willamette River. With the knowledge of the past activities of the Tanner Creek sewer pipe installation, the location of the dewatering wells will likely be in fill at the surface and in the alluvial deposits beneath the disturbed previous excavation.

Qal is described as; "River and stream deposits of silt, sand, and organic-rich clay with subordinate gravel of mixed lithologies; largely confined to Columbia nad Willamette River channels and valley bottoms of tributary streams; may included local lacustrine, paludal, and eolian deposts. Unit Qal reaches maximum thickness of 45 m".

Based on the borings by Hart Crowser, to a maximum of 20' below surface grade, field observations from the boring logs are interpreted by LGS to be the Qal consistent with the Geologic map of the Portland quadrangle, Multnomah and Washington counties, Oregon, and Clark County, Washington, by *Beeson, M.H., Tolan, T.L, and Madin, I.P. 1991* where the sand in GP-17 and GP-18 begin at 17-18' below the surface. The silt appears to have wood and brick debris which are likely from the construction of the Tanner Creek structures, and the deeper (20'+) geological sequences will be explored during the dewatering well installation to 35' total depth by design. The cross section shows that the Qal likely extends for the remainder of the depth to be explored.

The hydrogeology is further described in the next section.

3.0 HYDROGEOLOGIC SUBSURFACE SETTING-

LGS dewatering recommendations presented in this dewatering design report are based on the Hart Crowser Construction Drawings January, 2022, in conjunction with the Geotechnical report recommendations by Hart Crowser November 30, 2021.

3.1 Soil Conditions

The soil conditions anticipated within the open excavation are described the well borings logs for GP-17 and GP-18. Generally described as the following; Surficial Fill to approximately 10-15' below the surface which is a GM/SM/ML, and Silty Sand SM, Qal, Quaternary alluvium, to the extent explored of 20' below the surface. The dewatering focus will likely be from 17-35 feet of the soil matrix based on the depth of the proposed structures excavations. Below 20' to 35' will most likely continue to be the same soil matrix, if alluvial gravels become present the large well will likely be able to handle the extra flow to extract. If

gravels are encountered screen size may need to be increased depending of what is observed at the time of drilling.

Based on the dewatering venue design deeper theoretical wells terminate at 35’ below the surface and will encounter possible differing geologic units that have not been identified by previous work at the site.

The bottom of the excavations will likely be in the SM shown in the boring logs.

The soils are further described for GP-17 and GP-18 are as follows;

GP-17, the soil consists of the following soil matrix descriptions from the boring log; From the surface to 7.5’ below the surface, Elevation 8’ AMSL to 0.5’ AMSL, a Gravel fill, *GM, Loose, wet, brown, silty, sandy, 1” minus,* from 7.5’ to 11’ below the surface, elevation of 0.5’ AMSL to -3’ BMSL, a Silty Sand, *SM, Loose, wet, brown, becomes gravelly at 10’,* From 11’ to 17’ below the surface, elevation -3’ BMSL to -9 BMSL, a silt, *ML, soft, gravelly, clayey, sandy silt with wood debris and petroleum-like odor, product,* from 17’ to 20’ below the surface, elevation of -9 BMSL to -12 BMSL, a silty sand, *SM, medium stiff, wet, gray to brown, silty sand, with strong petroleum-like odor.*

GP-18, the soil consists of the following soil matrix descriptions from the boring log; From the surface to 1’ below the surface, Elevation 8’ AMSL to 7’ AMSL, a Gravel fill, *GM, medium dense, damp, brown, silty, sandy gravel with brick debris,* from 7’ to 5.5’ below the surface, elevation of 7’ AMSL to 3’ AMSL, a Silty Sand, *SM, Medium dense, moist, brown, silty Sand overlaying 6” concrete and gravel fill,* From 5.5’ to 17’ below the surface, elevation 3’ AMSL to -9 BMSL, a silt, *ML, soft, dark gray, and clayey silt, with intermittent large gravel and wood debris and strong petroleum odor. Product. Gravel lens at 16’,* from 17’ to 20’ below the surface, elevation of -9 BMSL to -12 BMSL, a silty sand, *SM, medium dense, wet, gray, slightly coarse sand with moderate petroleum-like odor. Product.*

Geology in borings extends to a maximum of 20’ below surface grade, to a maximum depth of -12’ BMSL in GP-17 and GP-18 borings. If at the time of the installation of the extraction wells, if gravel layers are encountered, common in alluvial soils, screens may need to be increased in size to accommodate the potential for more groundwater flow. This will need to be determined at the time of drilling. The screens should reside within the water bearing soil matrix, which has been identified to be 17-35’, in Qal, and to some degree the water will drain from within the soils closer to the surface.

Table 1- Soil Profile

Interval Depth (ft)	Unit & USCS	Elevation *AMSL**	Description – Hart Crowser boring logs May19, 2011 generalized combination of GP-17 and GP-18
0-7	Fill *GM/SM/ML*	8' to 1'	*GM, Loose, wet, brown, silty, sandy, 1" minus*
7-10	Qal/Fill? *SM/ML*	1' to -2'	*SM/ML, Loose, wet, brown,*
10-17	Qal/Fill? *ML*	-2' to -9'	*ML, soft, dark gray, and clayey silt, with intermittent large gravel and wood debris and strong petroleum odor*
17-20+	Qal *SM*	-9' to -12'+	*SM, medium dense, wet, gray, slightly coarse sand with moderate petroleum-like odor. Product*

*Surface elevation derived from Google Earth, AMSL/BMSL.

3.2 Soil Matrix Hydraulic Properties

LGS has reviewed the available boring logs to interpret the *k* values for design. Hydraulic conductivity (permeability) - *k,* is the two-dimensional area of soil matrix upon which groundwater can flow through. This multiplied by the depth of the aquifer, *b,* is the Transmissivity, *T,* which is the column of water that will intercept the excavations and is of the primary focus of this design.

Based on boring logs, which shows the conductivity is in Qal which aligns with the majority of the proposed work to be dewatered. This material is a SM soil matrix, using hydraulic conductivity empirical data from Freeze & Cherry 1979, and Heath 1983 the interpreted data shows an estimated soil hydraulic conductivity ranging from .1-50 ft/day, LGS is estimating approximately 1 ft/day. The aquifer depth *b* is approximately 30' for areas that are within Upper unconsolidated sedimentary aquifer within Qal. Approximately 21' of hydraulic head will need to be dewatered to achieve the target dewatering elevation of approximately -18' BMSL. For the column of water to be dewatered the Transmissivity is estimated to be approximately 200 FTSQ/Day.

The hydraulic conductivity averaged is represented by the soil matrix; From 17' to 35' below the surface, -9 BMSL to -27 BMSL, a Silty Sand, *SM, medium dense, wet, gray, slightly coarse sand with moderate petroleum-like odor. Product.* This is the primary dewatering zone, static groundwater elevation of 3' AMSL reducing to -18' AMSL.

Slug tests were not performed however a recharge rate can be used to determine discharge rates at the time of drilling the extraction wells if needed.

The aquifer storage for an unconfined aquifer is approximately .1 (dimensionless) which was used in

calculating the transmissivity. This affects the overall time it takes to overcome the hydraulic head and being dewatered (typically well points within 3-5 days, and deep wells 7-14 days). This head, or storage volume, will be reduced and an equilibrium of hydraulic conductivity flow will be reached, ultimately reducing the amount of groundwater, GPM to be handled and discharged.

*Transmissivity interpretations and averages are based on experience and may increase or decrease once operations begin. These are strictly estimates, and should be treated as such. There are interpretation variabilities and native soil variations that can be as large as three orders of magnitude of soil classification within a short distance in these unconsolidated formations. Based on the variability more or less dewatering may be needed which will be determined at the time of initial startup of the proposed system. These values are estimates.

3.3 Measured Depth to Groundwater Elevations

Groundwater high water table was measured at a maximum of 3' AMSL by Hart Crowser by hand measurements at the time of drilling. The groundwater can be observed within the existing monitoring well MW-2 (if still operational), as well as the dewatering wells at the time of drilling to determine what to anticipate as the project proceeds.

3.4 Groundwater Management System Design & Calculations

Centennial Mills Tanner Creek Sewer; Installing 4 total deep wells, 12" diameter, deep wells installed to 35' below the surface, from a surface elevation of approximately 8' AMSL corresponding to a maximum well depth of -27 BMSL.

The static groundwater level will be reduced approximately 21' within the excavation limits. Initially, the down-well pumps will be set at 200 GPM until the unconfined aquifer storage is depleted then the total gallons of groundwater extracted will reduce to the in-situ hydraulic conductivity/permeability stabilization, where dewatering can reduce the groundwater elevations to the appropriate levels for excavation.

A groundwater monitoring well may be present at the Site, MW-2 appears on the Site Map from Hart Crowser but has not been confirmed if it still exists. This monitoring well could potentially be used prior to Site activities. The deep dewatering wells can be used for observation of static groundwater and performance of the dewatering system if not in use.

This deep well installation will penetrate the upper unconfined aquifer and primarily dewater Silty Sand, *SM, medium dense, wet, gray, slightly coarse sand with moderate petroleum-like odor. Product.* This is the primary dewatering zone, static groundwater elevation of 3' AMSL reducing to -18' BMSL, upper unconsolidated sedimentary Qal aquifer.

The dewatering design calculations was performed using analytical methods by Neuman 1974 for unconfined aquifers using AQTESOLV hydrogeological software and Surfer modeling software. The calculations were used to determine the optimal well spacings and locations for dewatering of the excavation. Based on these calculations 4 deep wells were placed adjacent to the proposed grout collar excavations. Based on the theoretical calculations, the deep wells would need to be operated for a period of approximately 10-12 days to lower the groundwater to a target groundwater elevation of -18' BMSL for the project. These wells should be spaced approximately 20' apart, on the outside edges of the

excavation limits and as close to the structures as allowable, as shown in Figure 2, *Sheet 3* and Figure 3, *Sheet 4*. The deep wells will initially be set at 200 gpm. This dewatering flow will reduce as the aquifer storage and head is reduced to just the flow associated with stabilized hydraulic conductivity through the soil matrix.

Figure 4, *2D & 3D Dewatering Contours* presents the theoretical calculation results (contours) for the deep wells in 2-dimensional plan/profile view and 3-dimensional oblique profile view.

Depending on average aquifer soil matrix properties, the large diameter dewatering wells could run dry relatively quickly in areas where hydraulic conductivity is low if screened in any substantial silty/clayey formations unknown until drilling is performed. Pump controls should be provided to prevent the dewatering well pumps from overheating.

3.5 The following provides specific recommendations for construction of the system.
-Large Diameter Deep Dewatering Wells

Dewatering Wells: The dewatering wells will be drilled with bucket auger methods with a minimum hole diameter of 30-inches. The borings should be drilled with temporary casing to depth. Beginning at an average elevation 8' AMSL the deep wells should extend 35' deep into the; Silty Sand, *SM, medium dense, wet, gray, slightly coarse sand with moderate petroleum-like odor. Product.* This is the primary dewatering zone, static groundwater elevation of 3' AMSL reducing to -18' BMSL, upper unconsolidated sedimentary Qal aquifer.

The dewatering wells will be constructed of 12-inch-diameter Schedule 40 PVC. 10-20 slot Schedule 40 PVC screens should be installed in each boring. The maximum amount of screen should be installed to adequately dewater the proposed excavation determined at the time of drilling. It is anticipated that at least a minimum of 10 feet of screen should be installed in each boring but will likely be as much as 20 feet of screen based on the soil matrix, this will be determined at the time of drilling. An engineered/ screened washed gravel should be placed in the annular space of the wells; the filter pack should be placed to a minimum of 3 feet above the top of the screen section. A bentonite chip or pellet seal should be installed above the filter pack and the remainder of the hole sealed according to the driller's preference. The wells should be constructed in accordance with OAR 690-210. Each dewatering well boring should be logged and observed for lithologic contacts and potential design changes at the time of drilling.

Development: The dewatering wells should be developed after completion. Development methods should utilize flow surging and pumping. Development will improve the hydraulic connection with the aquifer and should provide minimal turbidity with time. Development water should be discharged per the specifications approved by the engineer of record.

Pumps: Standard dewatering pumps may be used for this project. We recommend a pump that will yield over 200-250GPM under 50 feet of head. The head requirement may be modified depending on the length and diameter of the discharge piping.

Piping and Discharge: Discharge from the wells will be routed to an appropriately sized mainline header determined in the field. Discharge piping should be dedicated to the dewatering wells.

Valves: Check valves will be placed on the horizontal pump riser pipe at the top of the well that prevents extracted groundwater to re-enter the excavation if a pump failure occurs. A gate valve should be placed on the header just downstream of the check valve to control pump flow rates once extraction rates are reduced.

Power: Power will be supplied to the pumps by line power or portable generators. A backup generator and automatic transfer switch are necessary for this site to maintain pump operation and excavation stability in the event of a power failure from the primary source.

Flowmeter: A flowmeter should be installed on the mainline header for the dewatering system. The flowmeter should have a totalizer. The flowmeter should be installed according to the manufacturer recommendations regarding elbows, valves and other connections that could distort the flow path. The flowmeter should be installed such that pipe full conditions and backpressure on the meter will always be present.

Well Decommissioning: The wells should be decommissioned according to OAR 690-210 upon completion of dewatering.

Operation: We recommend that the deep well dewatering begins at a minimum of 10-12 days prior to deep excavation. Groundwater levels could be measured in lead dewatering wells and at the time of drilling to assess performance and static water levels. Groundwater elevations should be dewatered to an elevation of -18' BMSL prior to excavations work and maintained at this level to assure a dewatered state for excavation and construction.

Monitoring: Groundwater levels could be measured in the existing monitoring well MW-2 or dewatering wells installed at the time of drilling to assess static water levels. Groundwater elevations should be dewatered to an elevation of -18' BMSL prior to excavations work and maintained at this level to assure a dewatered state for excavation and construction. Groundwater levels should be measured prior to dewatering and daily during dewatering until the target drawdown has been reached; the levels should then be measured at a minimum daily, prior to in excavation work, for safety and optimization of the system. Since the monitoring well appears to be within the excavation, groundwater can be observed from the excavation itself or estimated from the level in the dewatering well. Flow rates from the system should be recorded on a daily basis. Settleable solids content from each well should be measured after development.

The dewatering design recommendations provided herein have been based on the reasonably ascertainable information, based on geotechnical investigations to date, and proposed construction drawings. Based on the information and interpretations, the calculations and design were built. Variations in soil may exist. Since variations exist, a qualified hydrogeologist from our firm should be present during installation and system startup. If the groundwater level drawdown is not as anticipated, we should be contacted to assess the system performance and revise our design to accomplish the proposed dewatering goals.

This groundwater control design has been prepared to meet the groundwater level elevations necessary to perform the proposed project work. Potential impacts to off-site structures or facilities have not been considered as part of this work. If there are potential affects to structures, such as groundwater drawdown inducing ground settlement, then the Owner is responsible for identifying these risks and what constraints

they may have on operation of the dewatering system. This design has not considered the effects of pumping or movement of contaminated groundwater, and we hold no liability for consequences associated with such effects.

4.0 LIMITATIONS-

LGS has prepared this report for the use of Terry Neigel and his authorized agents. LGS's interpretations regarding subsurface conditions rely on information gathered from geotechnical reports and construction drawings which have limitations. One of the limitations is the actual location of the borings and structures, the other is the accuracy of the descriptions which LGS has interpreted based on experience. The interpretations are not to be a warranty of subsurface conditions.

Within the limitations of the scope and budget, LGS's services have been completed in accordance with generally accepted practices of hydrogeology when this report was prepared. No other conditions, expressed or implied, should be understood.

5.0 REFERENCES-

Text Resources;

Geologic map of the Portland quadrangle, Multnomah and Washington counties, Oregon, and Clark County, Washington, by *Beeson, M.H., Tolan, T.L, and Madin, I.P. 1991*

Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington. *United States Geological Survey 1998*

Basic Ground-Water Hydrology, U.S. Geological Survey Water-Supply Paper 2220, 86p. *Heath, R.C., 1983*

Groundwater. Englewood Cliffs, N.J.: Prentice-Hall. Harvard (18th ed.) *Freeze, R. Allan, and John A. Cherry*. 1979.

Website Resources; *Accessed 05.15.22 through 05.19.22*

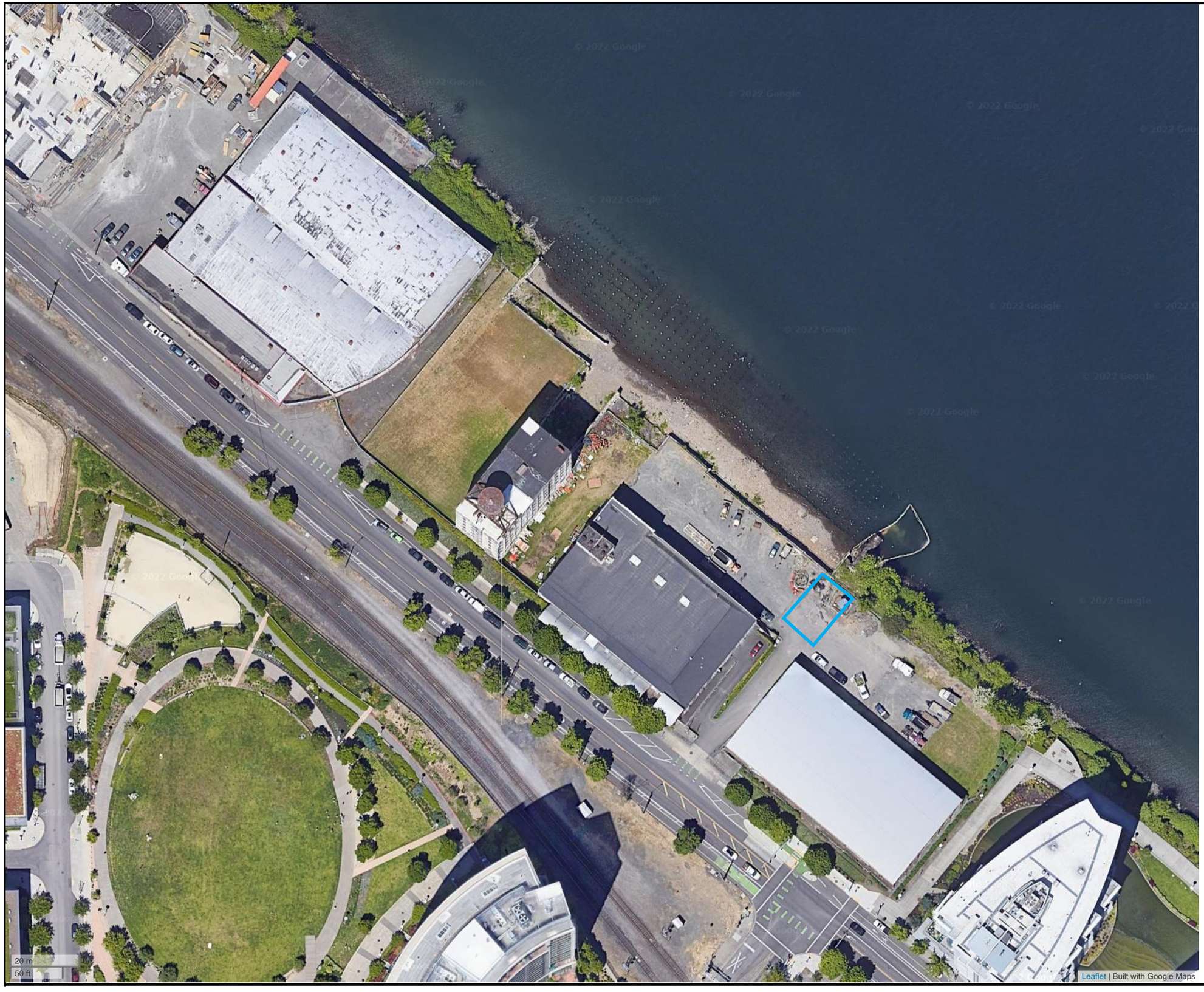
https://ngmdb.usgs.gov/mapview/?center=-122.681,45.534&zoom=15

LOMBARDINI
GEOLOGICAL
SERVICES LLC

LGS appreciates the opportunity to assist you with this project. Please contact LGS if you have any questions regarding this report.

Regards,

Shawn Lombardini LHG, RG
Principal Hydrogeologist
05.20.22



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Legend

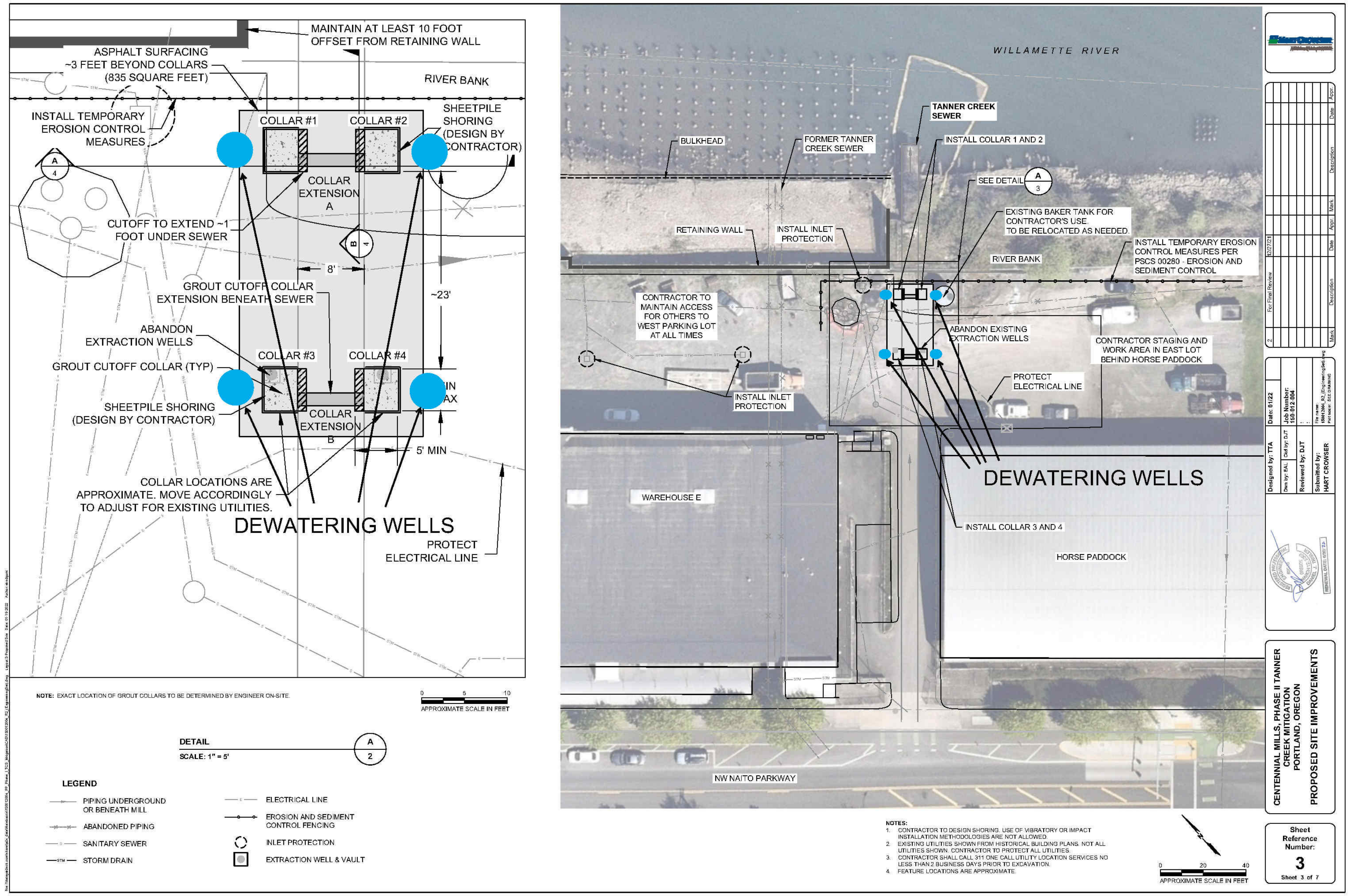
WORK AREA

Latitude: 45.53388, Longitude: -122.68052

LOMBARDINI GEOLOGICAL SERVICES LLC

FIGURE 1
SITE MAP

LGS
22-124
Centennial Mills Tanner Creek Sewer
1362 NW Naito Parkway
Portland, Oregon



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APPROVED BY	SL 5/15/2022
CHECKED BY	SL 5/15/2022
DRAWN BY	ICD 5/15/2022
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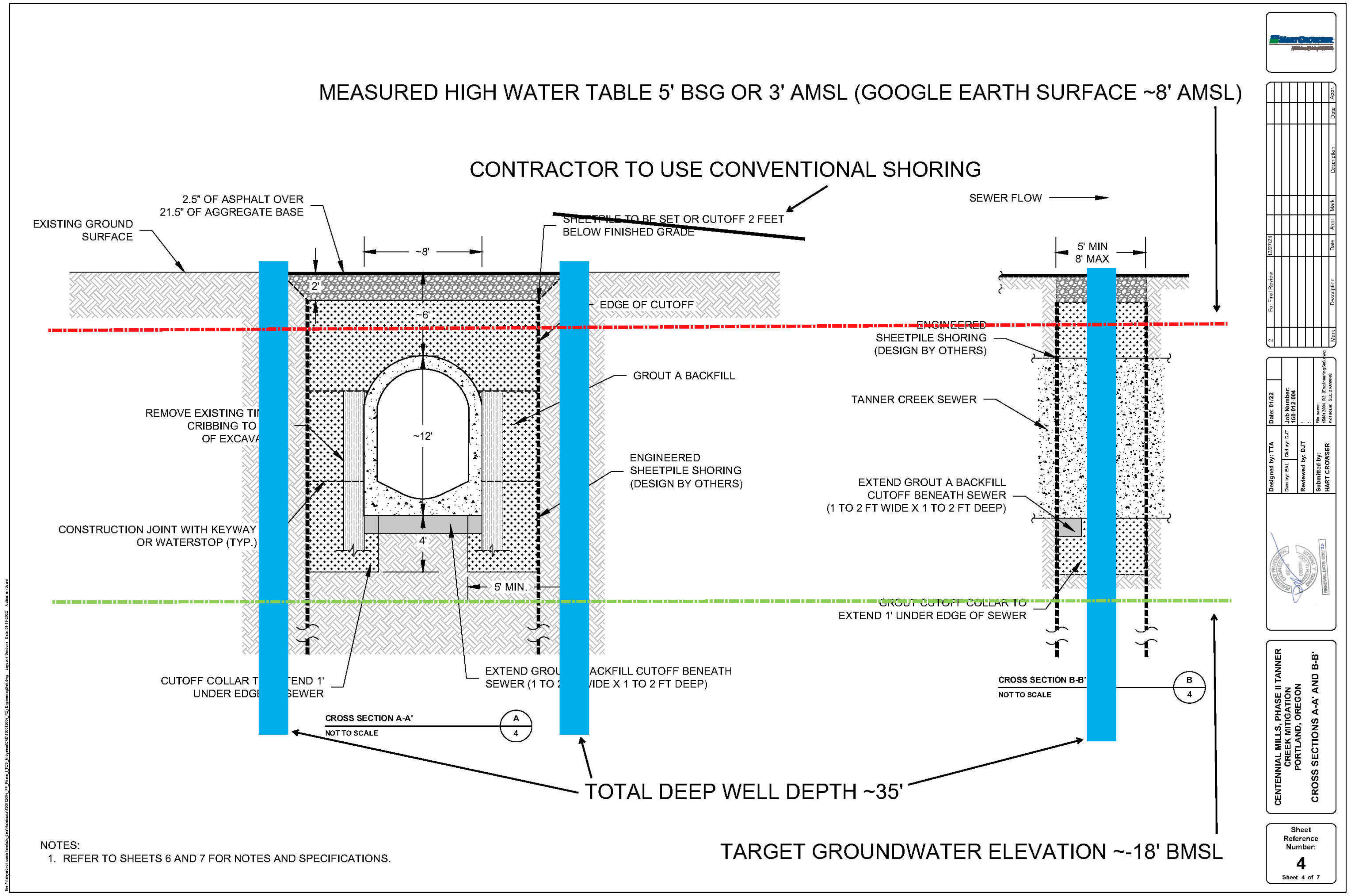
LGS LOMBARDINI GEOLOGICAL SERVICES LLC

FIGURE 2
SHEET 3

CENTENNIAL MILLS — TANNER CREEK SEWER
1362 NW NAITO PARKWAY
PORTLAND, OR

PROJECT NUMBER	22-124
APPROVED BY	SL 5/15/2022
CHECKED BY	SL 5/15/2022
DRAWN BY	ICD 5/15/2022
FILENAME	BLANK TEMPLATE.DWG



LGS LOMBARDINI GEOLOGICAL SERVICES LLC

FIGURE 3
SHEET 4

CENTENNIAL MILLS – TANNER CREEK SEWER
1362 NW NAITO PARKWAY
PORTLAND, OR

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
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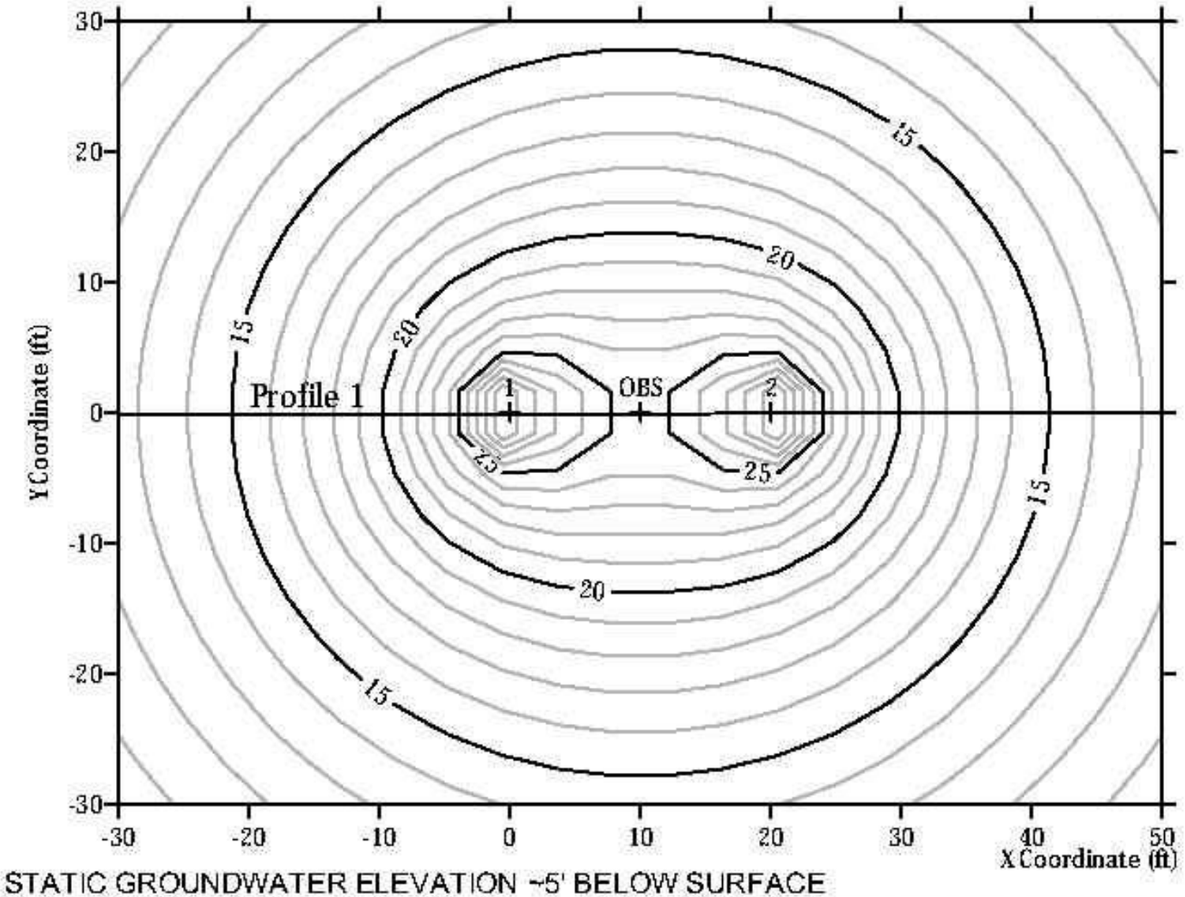
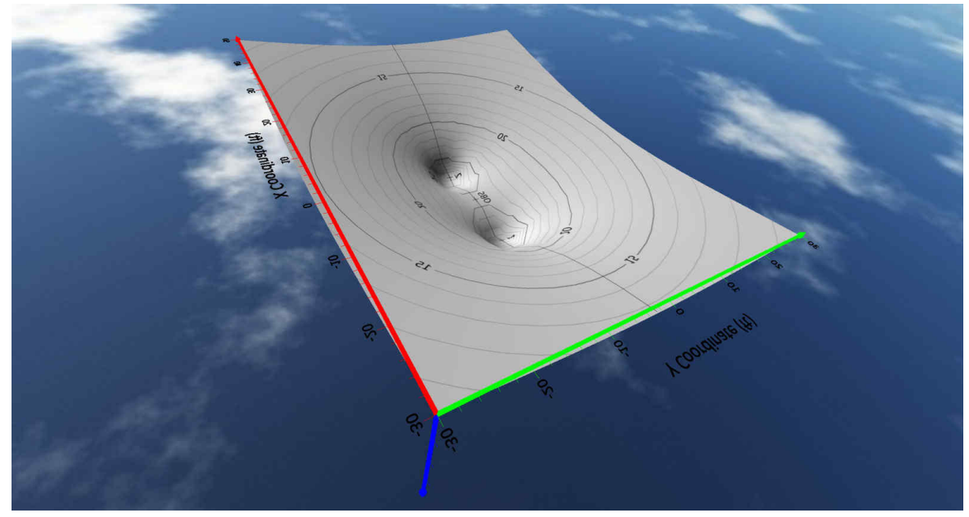
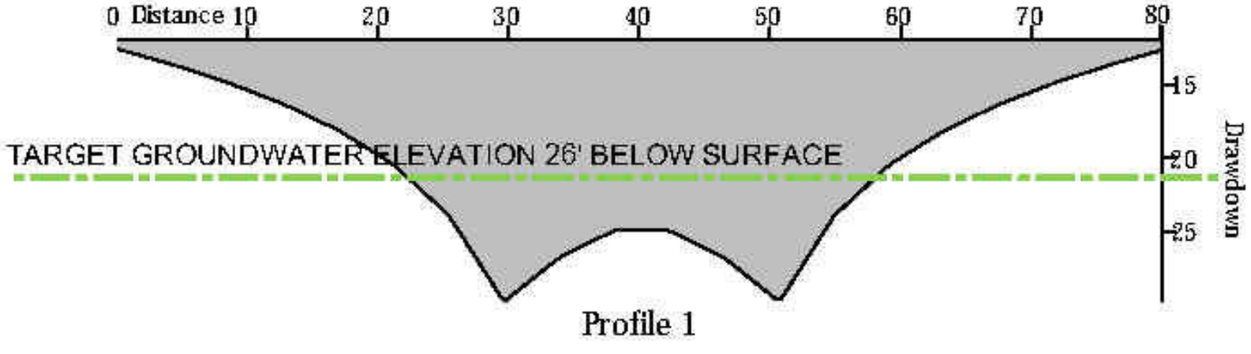






LOMBARDINI GEOLOGICAL SERVICES LLC

FIGURE 4
2D AND 3D DEWATERING CONTOURS

CENTENNIAL MILLS – TANNER CREEK SEWER
1362 NW NAITO PARKWAY
PORTLAND, OR

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

GEOLOGIC MAP OF THE PORTLAND QUADRANGLE, MULTNOMAH AND WASHINGTON COUNTIES, OREGON, AND CLARK COUNTY, WASHINGTON

1991

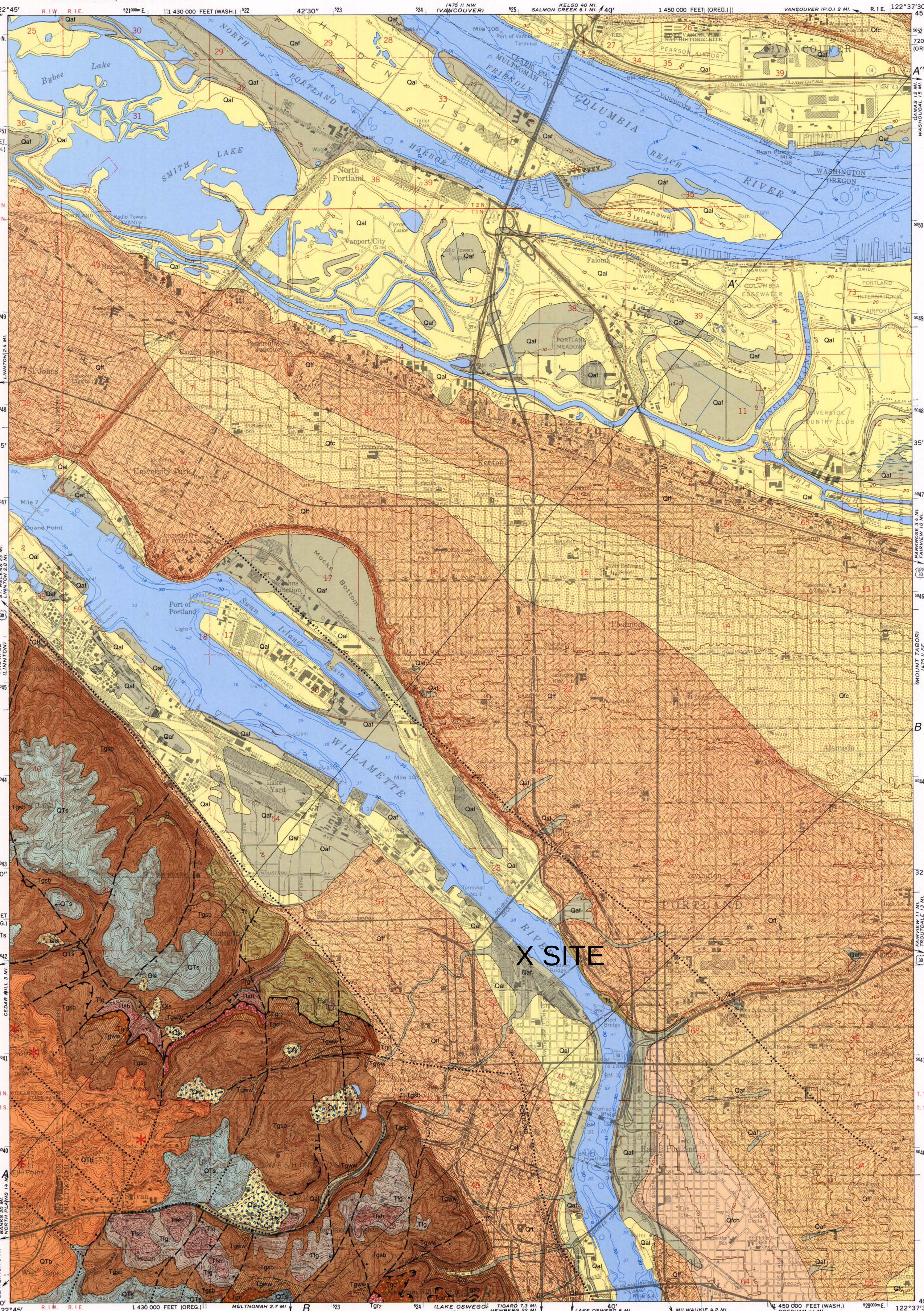
ISSN 0270-952X

GMS-75

Geologic Map of the Portland Quadrangle,
Multnomah and Washington Counties, Oregon, and Clark County, Washington

By M. H. Beeson and others

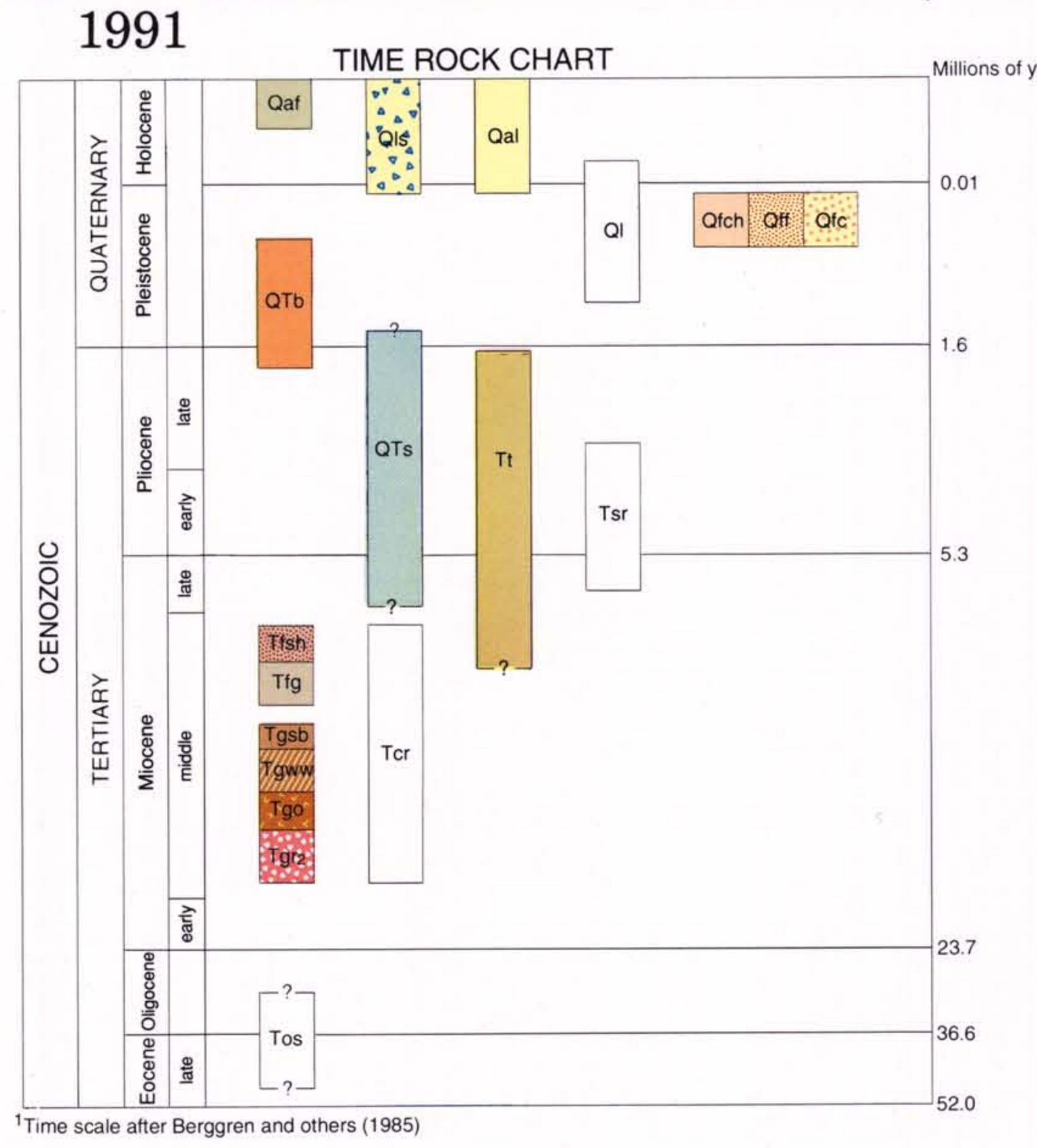
Partial funding provided by National Earthquake Hazard Reduction Program through
U.S. Geological Survey Cooperative Agreement 14-08-0001-A0512



Reconnaissance mapping of bedrock and structural geology in the Tualatin Mountains by Marvin H. Beeson and Terry L. Tolan, Geology Department, Portland State University. Quaternary and subsurface geology in the remainder of the quadrangle by Ian P. Madin, Oregon Department of Geology and Mineral Industries

Field work completed in 1990

Cartography by Paul E. Staub



MAP SYMBOLS

Contact — Approximately located

Fault — Dashed where inferred; dotted where concealed; queried where doubtful; ball and bar on downthrown side

Thrust fault — Dashed where inferred; dotted where concealed; queried where doubtful; sawteeth on upper plate

Strike and dip of bed

Volcanic vent

ACKNOWLEDGMENTS

The authors would like to thank the geotechnical engineering firms of Dames and Moore; Shannon and Wilson; Squier Associates; Geotechnical Resources, Incorporated; Rittenhouse-Zeman Associates; and Kelly-Strazer for providing subsurface data for this map. Saleem Farooqui and Gary Peterson provided assistance with the Zoo landslide. Preston Jannsen provided well cuttings, and Ron Jennison and the staff at the Oregon Department of Transportation, Region 1, geology office provided valuable data. We would also like to thank Ken Robbins and Bob Deacon for providing critical review, and Jerry Black for final editing.

EXPLANATION

Columbia River Basalt Group (middle Miocene) — Miocene tholeiitic flood-basalt flows that were erupted from linear fissure systems in northeastern Oregon, eastern Washington, and western Idaho from approximately 17 to 6 Ma (Swanson and others, 1979; Hooper, 1982). Individual flows cover thousands to tens of thousands of square kilometers and range from hundreds to thousands of cubic kilometers in volume (Tolan and others, 1989). These flows entered western Oregon via a wide gap in the northern Oregon Miocene Cascade Range (Beeson and others, 1985; Beeson and Tolan, 1990); ...

STRUCTURE OF THE TUALATIN MOUNTAINS

The upland in the southwest corner of the Portland quadrangle is part of the Tualatin Mountains (locally referred to as the Portland or West Hills). The interpretation of the structure of the Tualatin Mountains has ranged from a simple anticline (Treasher, 1942; Trimble, 1963) to a dextral wrench zone that is both folded and faulted (Beeson and others, 1975) and forms the western edge of a pull-apart basin (Beeson and others, 1985, 1989a; Yelin and Patton, 1991). The linear character of the east front of the hills has been interpreted by many workers as evidence for a "Portland Hills Fault" (Diller, 1915; Dehlinger and others, 1963; Schlicker and others, 1964; Newton, 1969; Balsillie and Benson, 1971; Beeson and others 1975). The present mapping has added little to the interpretation of the Portland Hills Fault except in the southern third of the quadrangle, where water-well logs are consistent with a northwest-trending fault parallel to the front of the hills. Gravity data (Beeson and others, 1975) and topography strongly suggest a continuation of this fault along the base of the Tualatin Mountains north of downtown Portland.

Our present interpretation is that the Tualatin Mountains are part of a larger northwest-trending, dextral wrench fault zone (Beeson and others, 1989a; Beeson and Tolan, 1990). The Tualatin Mountains mark the southwestern side of this zone that includes the Portland basin, which we have interpreted to be a fault-bounded pull-apart basin (Beeson and others, 1985, 1989a; Beeson and Tolan, 1990). The basic form of the Tualatin Mountains in the Portland quadrangle is that of an asymmetrical anticline that has been extensively modified by faulting. Several distinct sets of faults are present, with some sets having a transverse orientation to the overall northwest trend of the Tualatin Mountains. Field evidence suggests that these fault sets originated and developed at various stages during the growth of the Tualatin Mountains. For example, the transverse thrust faults appear to have begun as a series of relatively low-amplitude, transverse anticlines and synclines during middle Miocene time. Frenchman Springs Member flows inundated these lows in the Burlingame (Lake Oswego quadrangle), Canyon Road, and Balch Canyon areas but did not cover the adjacent highs. Continuing deformation in post-middle Miocene time eventually resulted in the development of thrust faults along the limbs of these transverse folds. The transverse thrust faults are in turn displaced by apparently younger sets of faults, which indicates continued structural evolution. This structural complexity may be in large part due to the influence of a volcanic high that is located south of the Portland quadrangle on the Lake Oswego quadrangle. The high is composed of late Eocene-age Waverly Heights basalt and is transected by this structural zone. To the south of the Waverly Heights high, in the Lake Oswego quadrangle, the dextral movement along the Portland Hills-Clackamas River structural zone tends to pull the Columbia River basalt away from the Waverly Heights high, creating a near-surface environment of extension that results in normal and oblique-slip faults. To the north of this high, from the Burlingame area on the Lake Oswego quadrangle through the Portland quadrangle, the Columbia River basalt tends to be compressed against the high, initially producing folds and thrust faults. Continued deformation has allowed through-going, northwest-trending faults to develop and overprint the preexisting transverse folds and faults.

Although considerable new data have allowed us to show the detailed stratigraphy of the Columbia River Basalt Group in this area, many details of the structure are uncertain and must yet be considered preliminary. Currently, no evidence is available to determine whether any of the mapped faults are still active.

REFERENCES CITED

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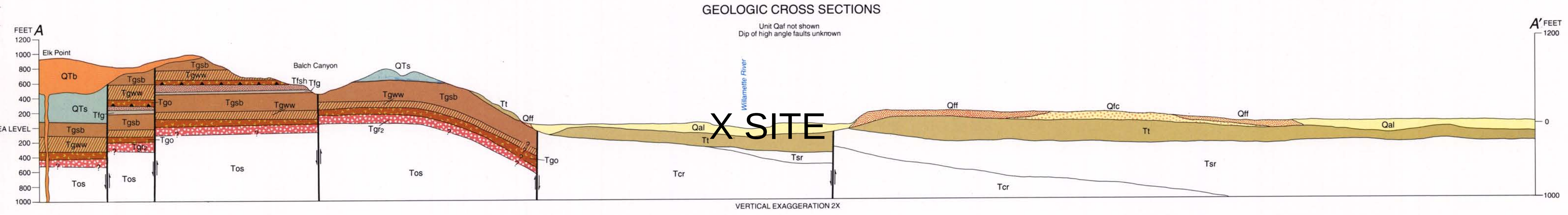
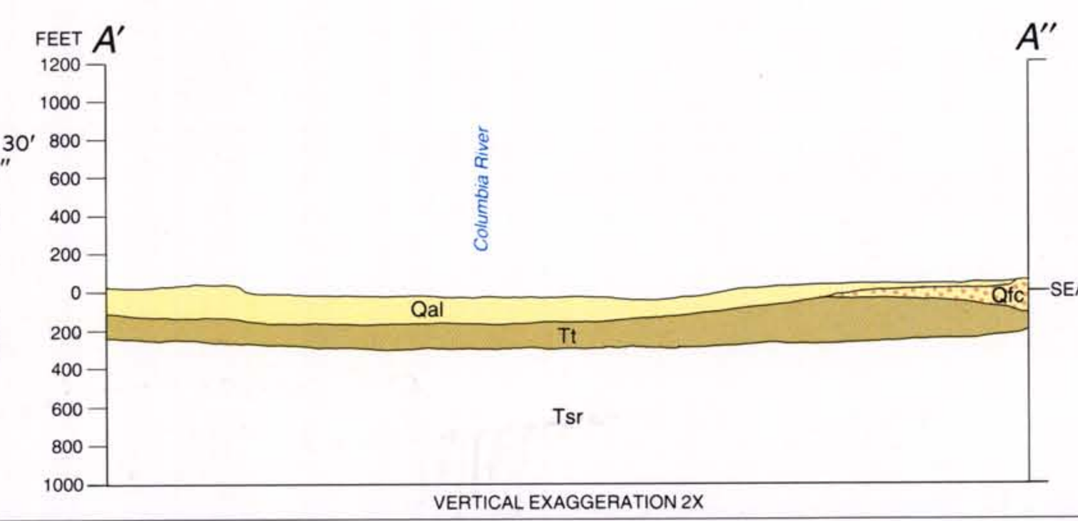
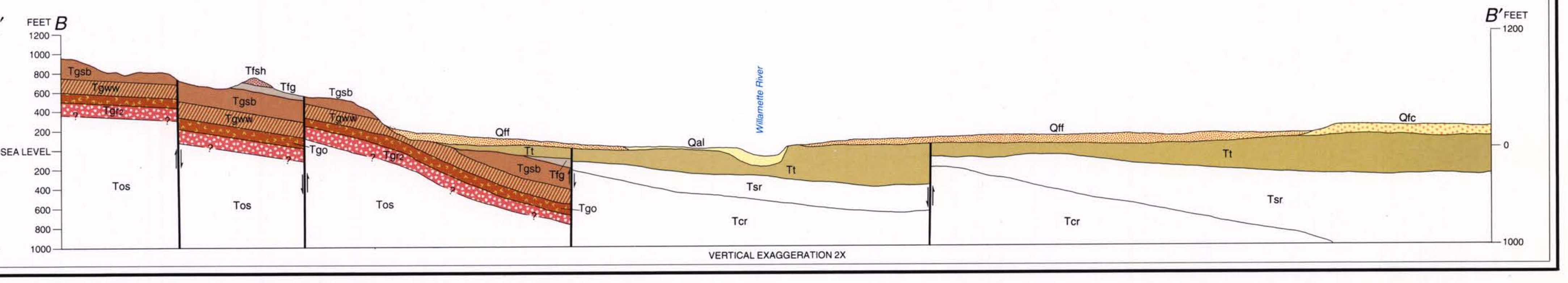
Allison, I.S., 1953, Geology of the Albany quadrangle, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 37, 18 p.

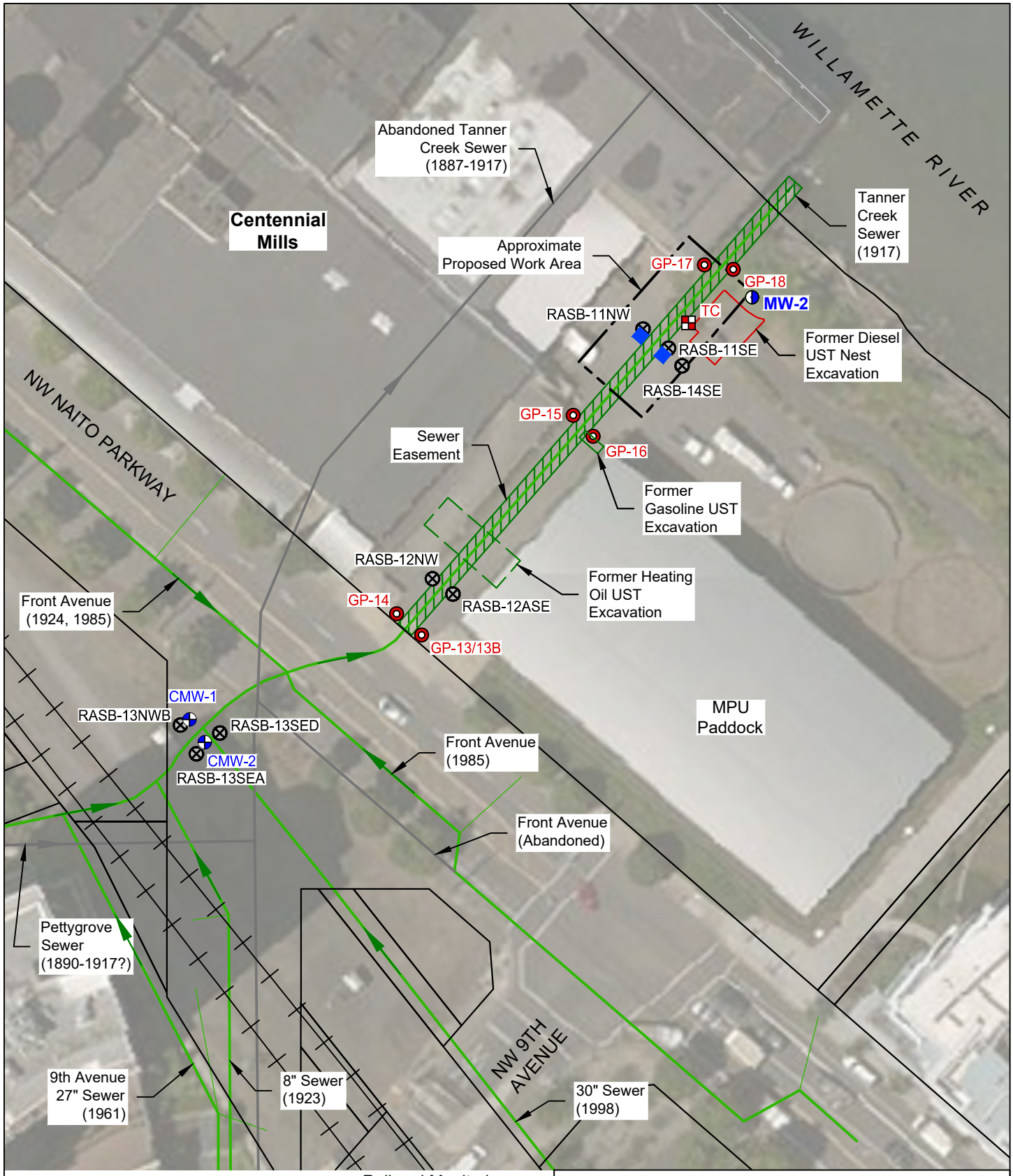
Baker, V.R., and Nummedal, D., eds., 1978, The Channeled Scabland: Washington, D.C., National Aeronautics and Space Administration, 186 p.

GEOLOGIC CROSS SECTIONS









LEGEND

- GP-15 Push Probe (2011)
- TC Test Pit (2011)
- Sewer
- Abandoned Sewer
- Tax Lot
- CMW-1 Railyard Monitoring Well (2005)
- RASB-13SED Exploration (2002)
- MW-2 Existing Monitoring Well
- Extraction Well (2020)

0 60 120

Scale in Feet

N

Note: Feature locations are approximate.

Centennial Mills Phase II - Tanner Creek Sewer Mitigation
Portland, Oregon

Site Plan and Previous Explorations

150-012-004 11/21

HARTCROWSER

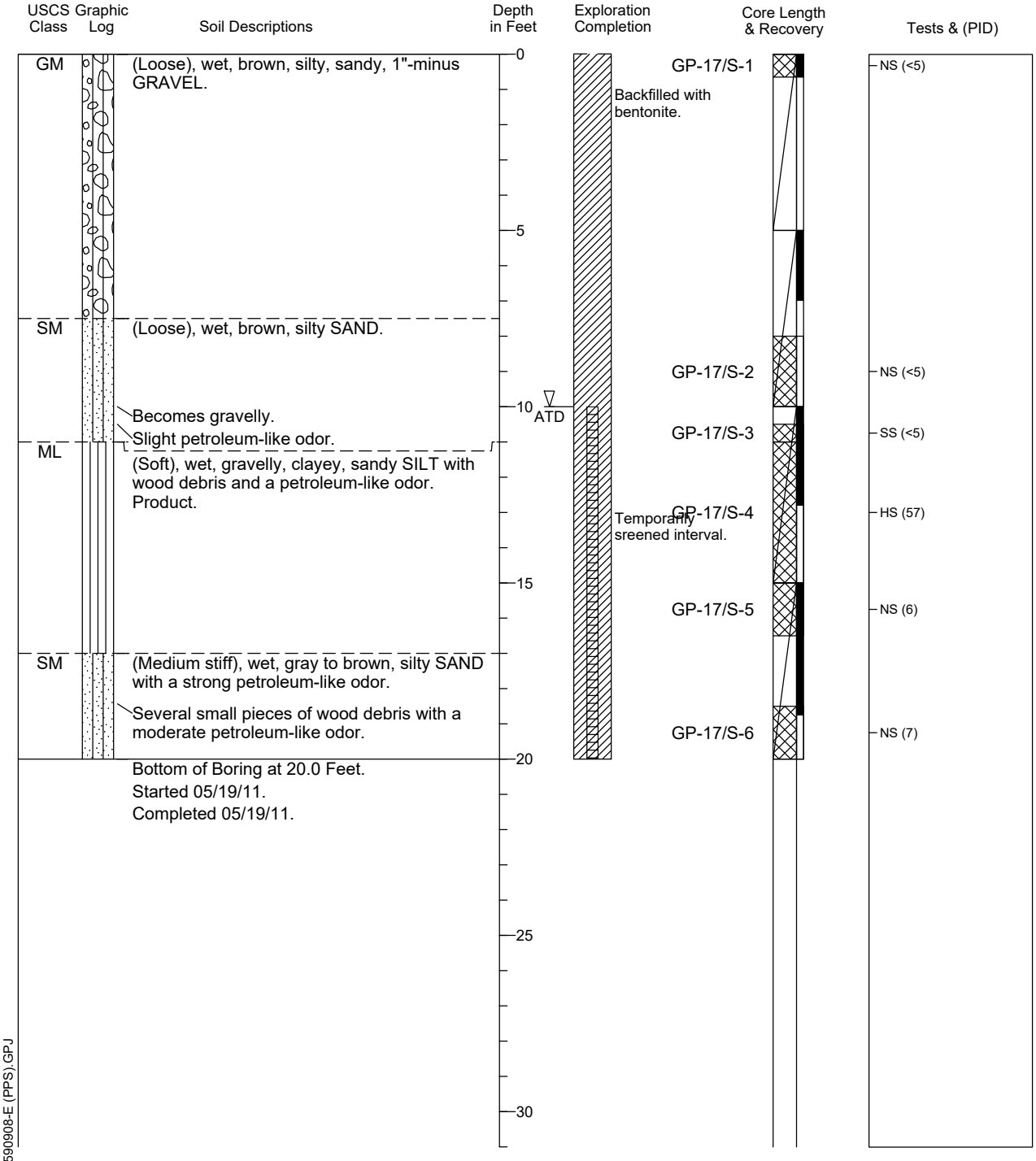
Figure **2**

File: \\pdxsrv\data\Notebooks\150012004_PP_Phase_I_TCS_Mitigation\CAD\150012004_(ExpPlan).dwg Layout:Previous Date: 08-04-2020 Author: melissaschweitzer

Push Probe Log for GP-17

Location: Centennial Mills
Logged By: Jason Miles
Reviewed By: Rick Ernst

Drilling Type: Push Probe
Soil Sampler: 5-Foot Core
Hole Diameter: 2"



1. Refer to Figure E-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Sample interval based on interpretation of core recovery, geological observations, and drilling action.
5. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
6. Drilled By: Pacific Soil and Groundwater

HARTCROWSER

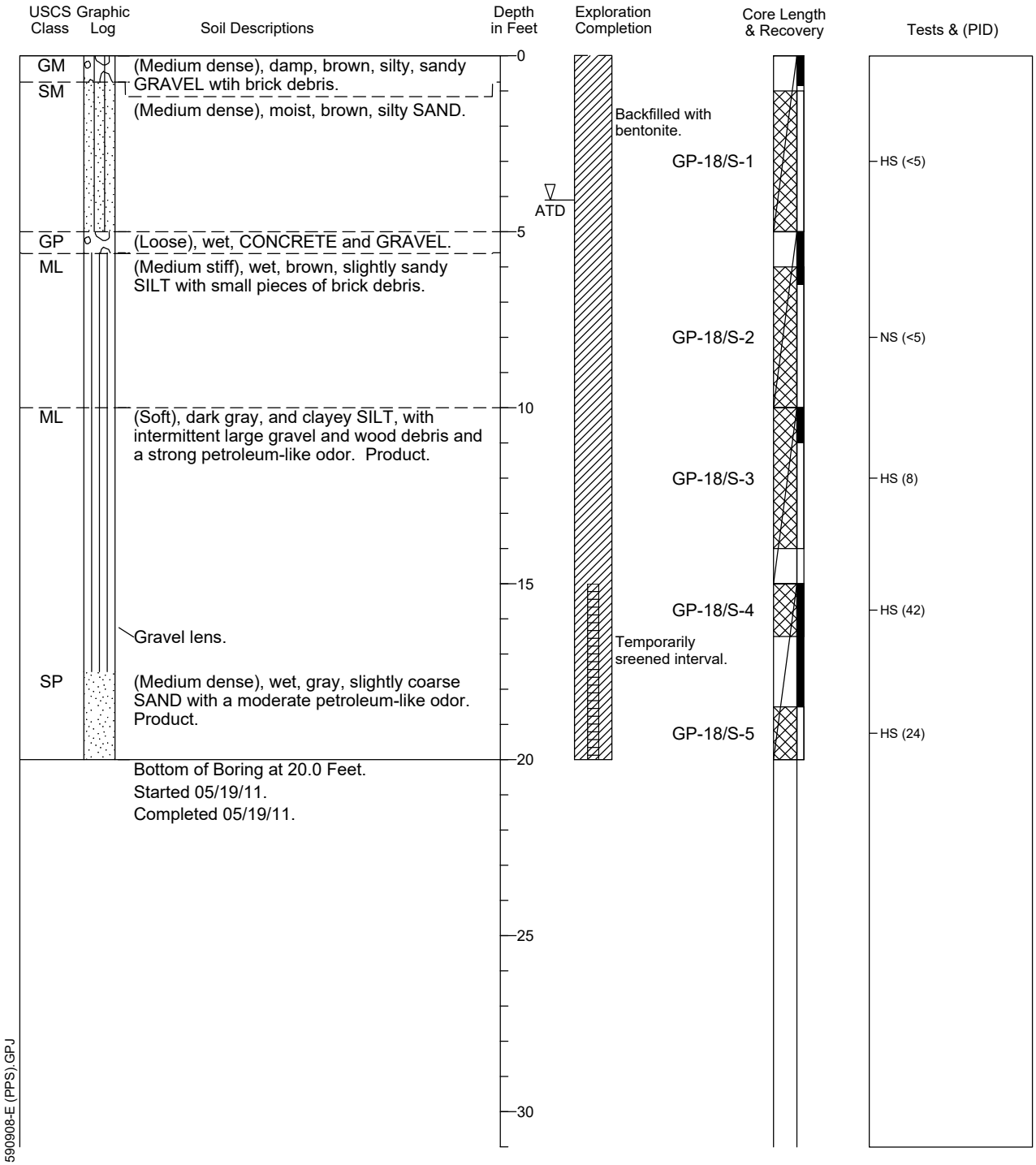
5909-08 ***5/11***

Figure E-7

Push Probe Log for GP-18

Location: Centennial Mills
Logged By: Jason Miles
Reviewed By: Rick Ernst

Drilling Type: Push Probe
Soil Sampler: 5-Foot Core
Hole Diameter: 2"

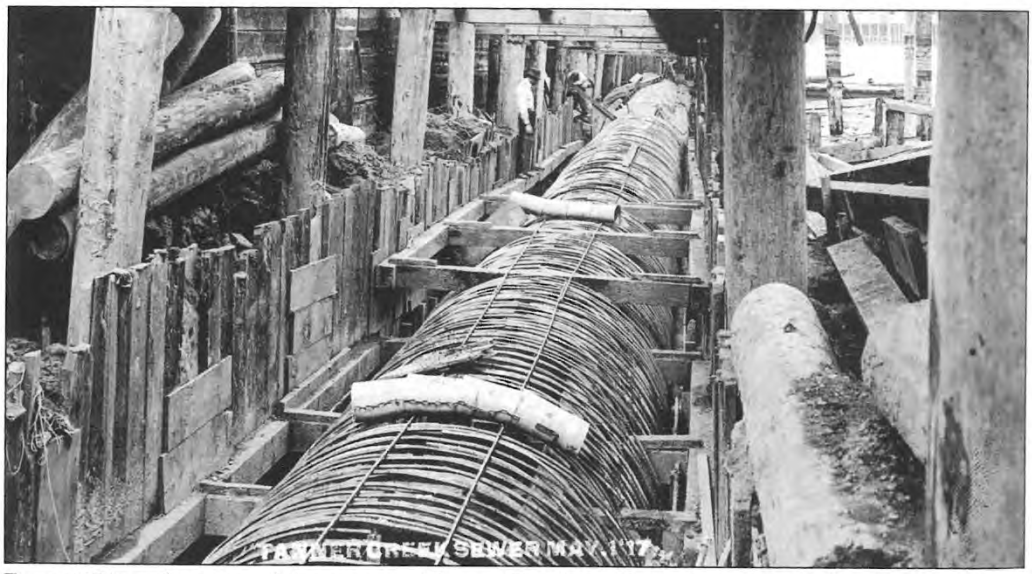


1. Refer to Figure E-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Sample interval based on interpretation of core recovery, geological observations, and drilling action.
5. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
6. Drilled By: Pacific Soil and Groundwater

HARTCROWSER

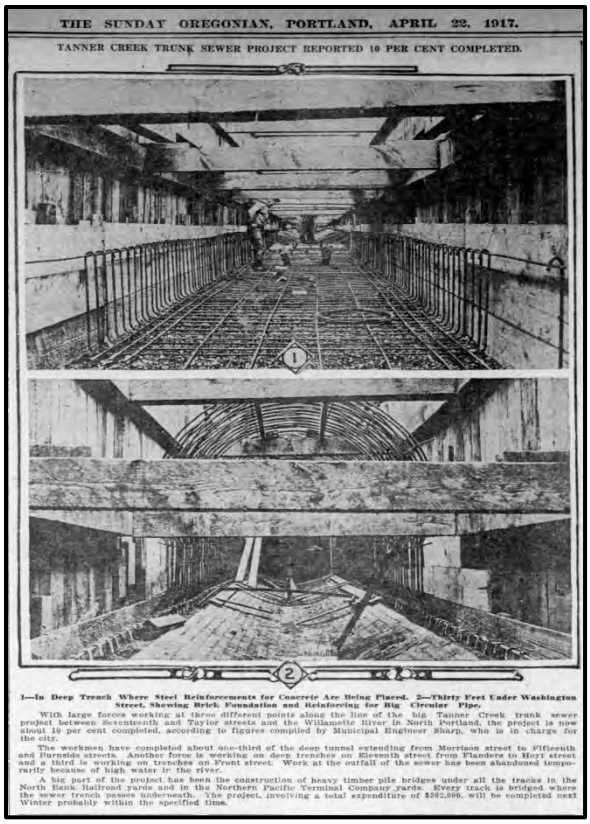
5909-08 *5/11*

Figure E-8



From 1873 to the turn of the century, Tanner Creek was buried to control flooding and drain wetlands. The waterway was sometimes nicknamed Old Barrels Creek because of the tannery vats that apparently remained visible until Multnomah Field was built. Though this image, from 1917, is near Couch Lake, a similar method was used to divert the creek underground in Goose Hollow around Southwest Eighteenth Avenue. (CoPA.)

Photograph B-1: *1917 construction – significant timber cribbing*



THE SUNDAY OREGONIAN, PORTLAND, APRIL 22, 1917.

TANNER CREEK TRUNK SEWER PROJECT REPORTED 10 PER CENT COMPLETED.

1—In Deep Trench Where Steel Reinforcements for Concrete Are Being Placed. 2—Thirty Feet Under Washington Street, Showing Brick Foundation and Reinforcing for Big Circular Pipe.

With large forces working at three different points along the line of the big Tanner Creek trunk sewer project between Seventeenth and Taylor streets and the Willamette River in North Portland, the project is now about 10 per cent completed, according to figures compiled by Municipal Engineer Sharp, who is in charge for the city.

The workmen have completed about one-third of the deep tunnel extending from Morrison street to Fifteenth and Burnside streets. Another force is working on deep trenches on Eleventh street from Flanders to Hoyt street and a third is working on trenches on Front street. Work at the outfall of the sewer has been abandoned temporarily because of high water in the river.

A big part of the project has been the construction of heavy timber pile bridges under all the tracks in the North Bank Railroad yards and in the Northern Pacific Terminal Company yards. Every track is bridged where the sewer trench passes underneath. The project, involving a total expenditure of $392,000, will be completed next Winter probably within the specified time.

Photograph B-2: *1917 construction – general construction methods*

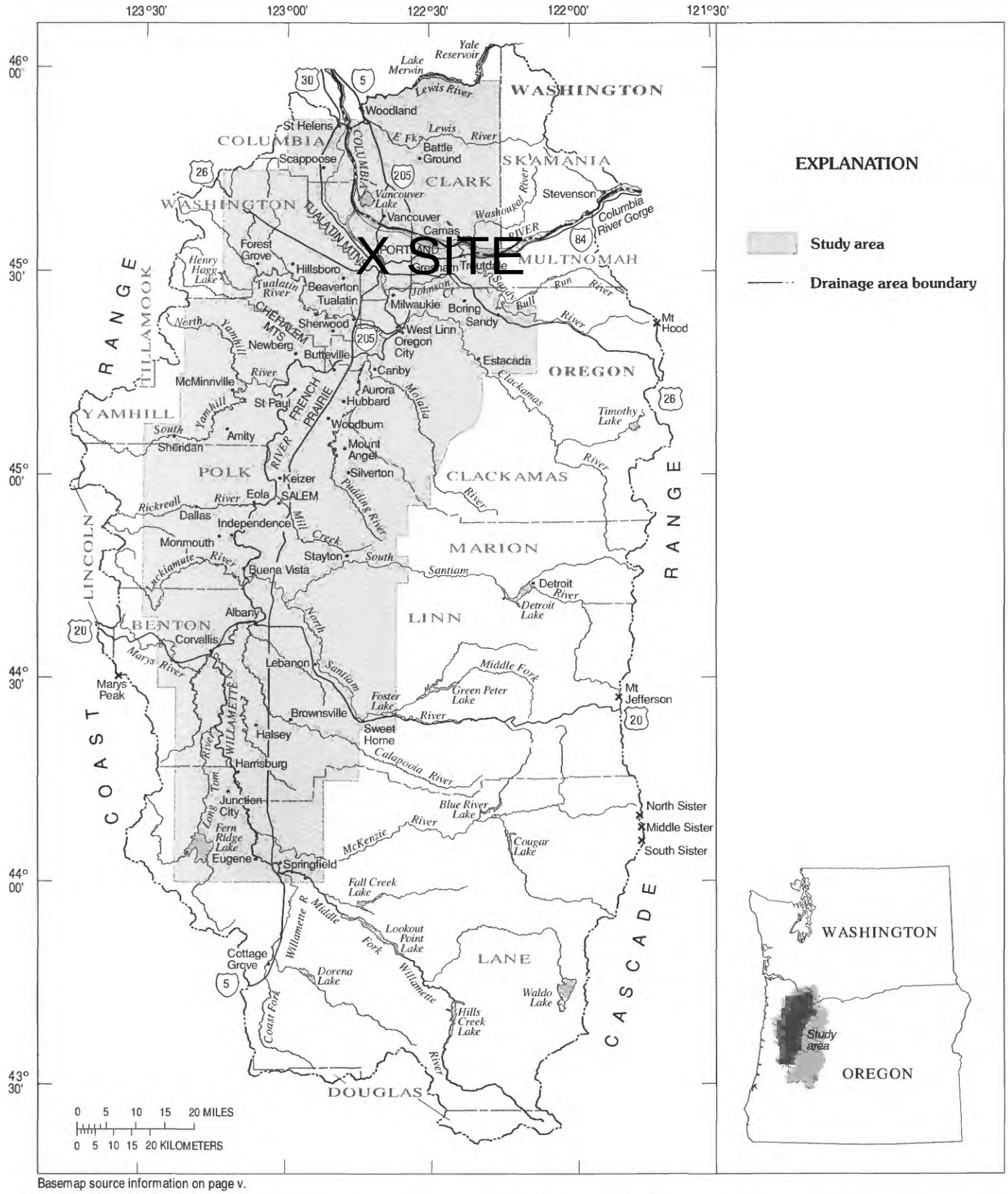
Photograph B-3: *Current condition of cribbing*

Photograph B-4: *In situ condition of cribbing*

HYDROGEOLOGIC FRAMEWORK OF THE WILLAMETTE LOWLAND AQUIFER SYSTEM, OREGON AND WASHINGTON

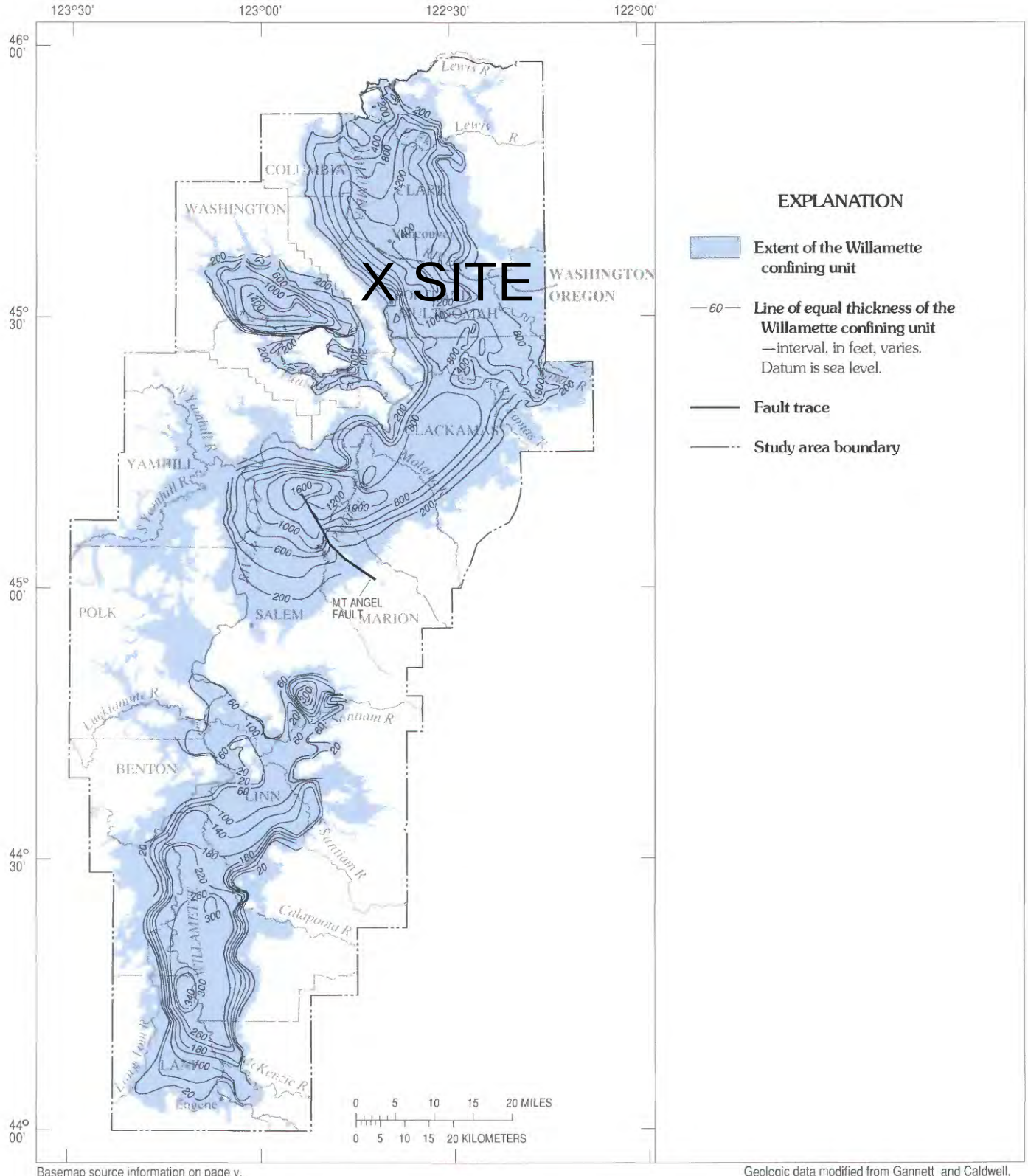
PROFESSIONAL PAPER 1424—B

USGS
science for a changing world



Basemap source information on page v.

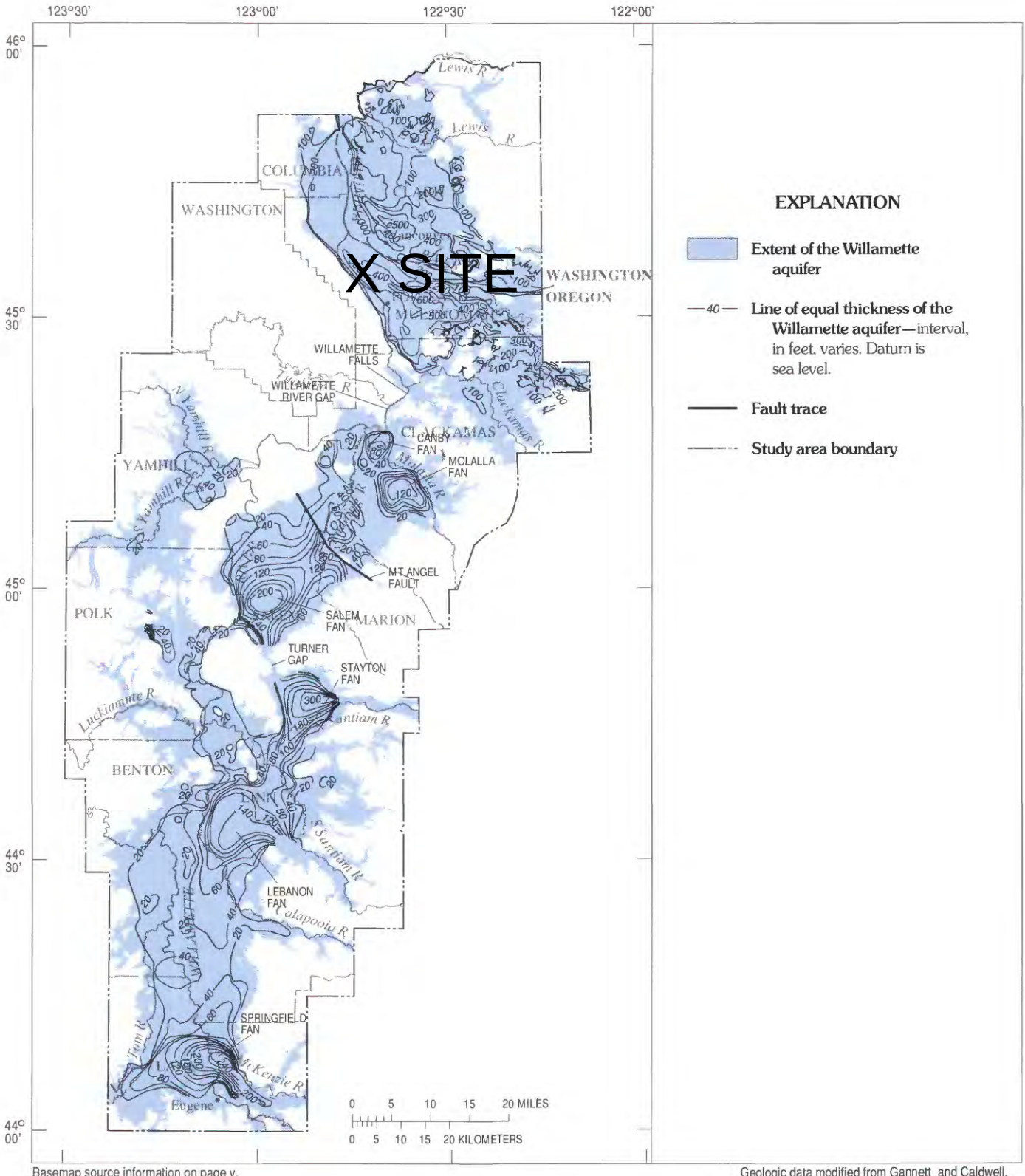
FIGURE 1.—Outline of the study area with major geographic features in the Willamette River drainage basin, Oregon, and adjacent drainages in southwestern Washington.



Basemap source information on page v.

Geologic data modified from Gannett and Caldwell, 1998, USGS Professional Paper 1424–A.

FIGURE 12.—Extent and thickness of the Willamette confining unit.



Basemap source information on page v.

Geologic data modified from Gannett and Caldwell, 1998, USGS Professional Paper 1424–A.

FIGURE 13.—Extent and thickness of the Willamette aquifer.

Professional Engineer and/or Licenced Hydrogeologist:

Name: Shawn Lombardini LHG (WA), RG (OR)
Company: Lombardini Geological Services LLC
Address: PO Box 4301 Spanaway, WA 98387
Phone: 253.334.4782

List five or more projects within the last three years, with the most current occuring within the last twenty-four months, designing and directing operation of a dewatering system in the Pacific Northwest. Use additional sheets if necessary. Attach a copy of the certification for the Professional Engineer or Licensed Hydrogeologist.

#1 Project Name: Sewer Extension to Industrial Park
Description of Dewatering System: 2, 12" Deep wells to 45' deep for pump station and 30 2" well points to 23' deep
Owner: City of Winlock — Contact Person: Terry - Glacier Dewatering
Contaminants Treated: N/A — Equipment Used: 250gpm Downwell pumps and diesel vacuum pump 20gpm/well
System Capacity (gpm): 1,100 — Dewatering Duration: N/A
Discharge Location and Permit Type: N/A
Project Location: 509 WA - 505, Starting at pump station 300' east.
Completion Date: 2021

#2 Project Name: 46th Ave Pump Station - Project #1936
Description of Dewatering System: 2, 12" Deep wells to 30' for pump station
Owner: City of Longview — Contact Person: Terry - Glacier dewatering
Contaminants Treated: N/A — Equipment Used: 250 gpm Downwell pumps
System Capacity (gpm): 500 — Dewatering Duration: N/A
Discharge Location and Permit Type: N/A
Project Location: 2401 46th Ave Longview, WA
Completion Date:2021

#3 Project Name: NE 99th Street Trenchless sewer
Description of Dewatering System: 8, 12" Deep Wells to 50' for sending/receiving/MH pits for trenchless sewer
Owner: Clark County — Contact Person: Terry - Glacier/Randy Odhiambo- Tapani
Contaminants Treated: N/A — Equipment Used: 250 gpm downwell pumps and Weir Baker tank
System Capacity (gpm): 2,000 — Dewatering Duration: N/A
Discharge Location and Permit Type: County Infiltration galleries/ storm, county discharge
Project Location: NE 99th Street and NE 105th Ave Vancouver WA
Completion Date: 2022

#4 Project Name: Rock Creek Sanitary Trunk Line Upsizing Project
Description of Dewatering System: 5, 12" Deep Wells to 30' for sewer upgrades
Owner: City of Sherwood, OR — Contact Person: Terry- Glacier/ Shawn Frackell - Moore Excavation
Contaminants Treated: N/A — Equipment Used:
System Capacity (gpm): 1,250 — Dewatering Duration:
Discharge Location and Permit Type: N/A
Project Location: 14450 SW Tualatin Road – Sherwood Road Sherwood Oregon
Completion Date: 2022

#5 Project Name: S21st Street and Fawcett Ave.
Description of Dewatering System: 35, 12" Deep wells to 25' for sewer and infrastructure install
Owner: City of Tacoma — Contact Person: Terry- Glacier/ Randy - Tucci
Contaminants Treated: TCE/VC — Equipment Used: 250 GPM downwell pumps, 3 baker tanks (lead tank weir)
System Capacity (gpm): 5 wells, 1,250 — Dewatering Duration: N/A
Discharge Location and Permit Type: Local Manholes TBD, SAD
Project Location: S21st Street & Fawcett Ave
Completion Date: 2022

#6 Project Name:I5 Pump Station and Force Main Upgrades
Description of Dewatering System: 4, 12" Deep wells to 65' for wet well installation inside of Cecant Wall
Owner: City of Woodburn OR — Contact Person: Terry- Glacier/ Zack Toney K&E Excavating
Contaminants Treated: -- — Equipment Used: 250 GPM downwell pumps, 1 baker tank (lead tank weir)
System Capacity (gpm): 4 wells, 1,000 — Dewatering Duration: N/A
Discharge Location and Permit Type: Surface dispersion infiltration
Project Location: 3002 Stacy Allison Way, Woodburn, OR
Completion Date: 2022

#7 Project Name:Naggar Pool Dewatering
Description of Dewatering System: 7, 12" Deep wells to 25' for pool excavation
Owner: Naggar resident — Contact Person: Terry- Glacier
Contaminants Treated: -- — Equipment Used: 250 GPM downwell pumps, 1 baker tank (lead tank weir)
System Capacity (gpm): 7 wells, 1,750 — Dewatering Duration: N/A
Discharge Location and Permit Type: Surface dispersion infiltration trench per Washington Stormwater Manual
Project Location: 6226 Lakeshore Drive South Seattle, WA
Completion Date:2022

#8 Project Name: Cox Creek Sewer Interceptor
Description of Dewatering System: 38, 12" Deep wells to 60'
Owner: City of Albany — Contact Person:Terry- Glacier
Contaminants Treated: -- — Equipment Used: 250 GPM downwell pumps, 1 baker tank (lead tank weir)
System Capacity (gpm): 38 wells, 1,250 — Dewatering Duration: N/A
Discharge Location and Permit Type: Storm and Sewer
Project Location: 2780 Pacific Blvd SE Albany, OR
Completion Date:N/A

#9 Project Name: PLM 5.3 Pipeline- Grabhorn Road to Rosedale Road
Description of Dewatering System: 17, 12" Deep wells to 40', 106 well points to 21' deep.
Owner: City of Willamette — Contact Person:Terry- Glacier
Contaminants Treated: -- — Equipment Used: 250 GPM downwell pumps, vacuum diesel
System Capacity (gpm): 17 wells, 4,250 GPM — Dewatering Duration: N/A
Discharge Location and Permit Type: Storm and Sewer
Project Location: Grabhorn Road to Rosedale Road Beaverton, OR
Completion Date:N/A

#10 Project Name: Thomas Lake Lift Station
Description of Dewatering System: 3, 12" Deep wells to 30'
Owner:Snohomish County — Contact Person:Terry- Glacier
Contaminants Treated: -- — Equipment Used: 250 GPM downwell pumps
System Capacity (gpm): 3 wells, 750 GPM — Dewatering Duration: N/A
Discharge Location and Permit Type: TBD
Project Location: 3915 138th St SE
Completion Date:N/A

#11 Project Name: MAX Redline Extension
Description of Dewatering System: 10, 12" Deep Wells to 30', 120 well points to 21'
Owner: City of Portland — Contact Person: Terry - Glacier
Contaminants Treated: — Equipment Used: 250 gpm downwell pumps and Weir Baker tank, diesel vaccuum pump 6" header
System Capacity (gpm): 750 — Dewatering Duration: N/A
Discharge Location and Permit Type: County Infiltration storm, sewer
Project Location: 7460 NE Airport Way, Portland, OR
Completion Date: N/A

#12 Project Name: Lower Elwha Hotel
Description of Dewatering System: 3, in-situ bedded well pumps in excavation for environmental cleanup of soil and groundwater
Owner: Lower Elwha Klallam Tribe — Contact Person: Mike Chun AEG/ Michael Peters Lower Elwha Klallam Tribe
Contaminants Treated: BTEX, Gx, Dx-EXT, — Equipment Used: bag filter, 2-2K GAC, 3 baker tanks (lead weir)
System Capacity (gpm): 300 GPM — Dewatering Duration: 6 Months, .5 million gallons treated and discharged
Discharge Location and Permit Type: Storm and Sewer, Washington State DOE WQ Permit to waters of state, Industrial Discharge permit through the City of Port Angeles.
Project Location: 101 East Front Street Port Angeles, WA
Completion Date: 2020

#13 Project Name: ACME Fuel
Description of Dewatering System: 3, in-situ bedded well pumps in excavation for environmental cleanup of soil and groundwater
Owner: ACME Fuel — Contact Person: Mike Chun-AEG, Christoph- ACME
Contaminants Treated: BTEX, GX, DX-EXT. — Equipment Used: bag filter, 2-2K GAC, 3 baker tanks (lead weir)
System Capacity (gpm): 300 GPM — Dewatering Duration: 4 Months, .3 million gallons treated and discharged
Discharge Location and Permit Type:Storm and Sewer, Washington State DOE WQ Permit to waters of state, LOTT Discharge permit
Project Location: 303 Thurston Ave NE Olympia, WA
Completion Date: 2020

#14 Project Name: Restover Truck Stop
Description of Dewatering System: 3, in-situ bedded well pumps in excavation for environmental cleanup of soil and groundwater
Owner: The Chehalis Tribe — Contact Person: Mike Chun - AEG, Chris Richardson- Chehalis Tribe
Contaminants Treated: BTEX, Gx, Dx-EXT, — Equipment Used: bag filter, 2-2K GAC, 3 baker tanks (lead weir), Chitosan flocculant
System Capacity (gpm): 300 GPM — Dewatering Duration: 9 Months, 1 Million + gallons treated and discharged
Discharge Location and Permit Type:Storm and Sewer, Washington State DOE WQ Permit to waters of state,City of Tumwater Discharge permit
Project Location: 2729 93rd Ave SW, Olympia, WA
Completion Date: 2019

Lombardini Geological Services LLC

Statement of Qualifications

Environmental Consulting – Innovative Solutions

PO BOX 4301, SPANAWAY, WA 98387
253.334.4782 | WWW.LGS-GEO.COM

Environmental Scenarios:

LGS provides innovative solutions to complex scenarios that arise from unforeseen environmental conditions. Regulation is a large part of environmental work and LGS is equipped to navigate through the statutory requirements. From significant permitting to regulatory statute, LGS has the knowledge base and confidence to get the job done right.

LGS has comprehensive knowledge of geological conditions throughout all of Washington and Oregon. This knowledge allows LGS to create innovative and cost-effective strategies for any project, whether it be an acquisition or a site cleanup.

History:

LGS was founded in 2020. Principal Shawn Lombardini LHG, RG has 18 years of extensive experience in Environmental, Geotechnical, Surface Mining, and Hydrogeological disciplines. This comprehensive understanding of the different facets of geological projects allows LGS to be thorough, efficient, and cost effective. LGS takes pride in being personable and cares about getting the best outcome possible for the client.

LGS appreciates the practice of geology and working in the beautiful northwest.

PO BOX 4301, SPANAWAY, WA 98387
253.334.4782 | WWW.LGS-GEO.COM

Phased Approach:

Phase I: Due diligence -ASTM E 1527-21

LGS approaches each project understanding the sites history. At the beginning of any project, the first step is usually a phase I. This due diligence shows historical uses on and around the property that could potentially impact the project in question. During the phase I review, any condition that presents an environmental risk is referred to as a "recognized environmental condition (REC)". LGS helps with evaluating such risks and can assist the client in understanding the long-term impacts of identified RECs.

Our goal at LGS is to ensure that our clients understand the environmental conditions that exist in order to make an educated decision.

Phase II: Site Assessment -ASTM E1903-19

LGS is a registered site assessor with the Department of Ecology for the purpose of investigating RECs and known releases of contamination. These RECs and contaminants include petroleum products, toxic chemicals, and metals. LGS provides the client with a scope of work to perform an investigation for the constituents of concern. Phase II Assessments provide data from a subsurface investigation to evaluate the condition of soil, groundwater, and vapors.

LGS provides a variety of remediation strategies depending on the concentration of toxic compounds. Helping our client's meet their goals for the project is our primary goal.

PO BOX 4301, SPANAWAY, WA 98387
253.334.4782 | WWW.LGS-GEO.COM

Phase III: Environmental Cleanup

LGS uses information from the Phase II or other work performed to determine the potential remedial cleanup solutions. If the results of the subsurface investigation show contamination above State cleanup levels, LGS can help. Once the Site is registered with the Department of Ecology (DOE). LGS works with regulators to effectively mitigate the site conditions and come up with an agreed cleanup action plan.

LGS provides services to small residential and to large commercial or industrial sites.

LGS Services:

- Environmental Site Assessments (Phase I, II, III)
- Remedial Investigations/Feasibility Studies (RI/FS)
- Groundwater Monitoring and Reporting
- Vapor Assessments
- Environmental cleanups with excavations or in-situ treatments
- Soil, Groundwater, and Vapor remediation systems
- UST Installation and Decommissioning
- Petroleum Technical Assistance Program (PTAP)
- Heating Oil Technical Assistance Program (HOTAP)
- Voluntary Cleanup Program (VCP)
- Dewatering Assessments and Groundwater Control Plan Design
- Salinity Intrusion Assessments
- Aquifer Drawdown-Step Testing
- Surface Mining resource evaluation and DNR permitting
- Resource Well Variance Design

PO BOX 4301, SPANAWAY, WA 98387
253.334.4782 | WWW.LGS-GEO.COM

SHAWN LOMBARDINI, LHG, RG

Tacoma, WA | 253.334.4782 | shawn@lgs-geo.com

EDUCATION: University of Washington; BA in Earth and Space Science, Seattle WA 2005
Central Washington University; BA in Elementary Education, Ellensburg WA 2009

CERTIFICATIONS & REGISTRATIONS / TECHNICAL TRAINING:
LHG (WA), RG (OR), DOE Registered Site Assessor, AHERA, CESCL, GPR-GSSI, / Environmental Site Assessments, RI/FS, CAP, excavation oversight, 40 Hour Hazwoper, ASTM Soils Lab management, and sixteen years of experience.

EMPLOYMENT:

- **Lombardini Geological Services LLC, Spanaway, WA** **July 13, 2020 - Present**
  Principal Hydrogeologist: Environmental Site Assessments, Business Development, Aquifer dewatering design, Aquifer Drawdown-Step testing design, Surface mining resource evaluation and DNR permitting.
- **Associated Environmental Group, LLC, Olympia, WA** **2014 to 2020**
  Project Hydrogeologist: Contamination delineation for metals, LNAPL, & DNAPL sites. BD, proposals, RI, FS, & remedial designs. Hydrogeologic aquifer assessment for saltwater intrusion, nitrates, drawdown, treatment & extraction. Full jurisdictional permitting, NEPA, SEPA, project management, & oversight of personnel.
- **Washington State Department of Natural Resources, Olympia, WA** **2013 to 2014**
  Environmental Specialist 3: Surface mining reclamation regulator: permit application review, consulting, field inspections of mines, field geology mapping, ArcGIS/GPS waypoint map building, report writing, stormwater capacity assessments of mines, & regional aquifer recharge analysis.
- **Professional Service Industries, Lakewood, WA** **2010 to 2013**
  Project Geologist & ASTM Soils Lab Manager: GPR soil/concrete, subsurface exploration - geotechnical, density testing, field resistivity, seismic refraction, sediment control/BMP inspections, and geotechnical report writing.
- **E3RA, Spanaway, WA** **2006 to 2007**
  Staff Geologist: Proctor, moisture, Atterberg, & sieve analysis. Field density testing, axial loading T-Probe evaluations of footing stability for residential developments.

SKILLS: AQTESOLV, CAD, Word, Excel, Surfer, transit survey, ArcGis, gINT, field mapping, and ENVI.

NOTABLE PROFESSIONAL EXPERIENCE:

- **Groundwater Control Plans 2020:** Winlock Sewer Ext, Rock Creek, 46th Ave Pump Station, and NE 99th sewer.
- **Lower Elwha Klallam Tribe Hotel 2018-2020:** PCS delineation, solar powered extraction trailer, saltwater intrusion and aquifer drawdown study, cleanup of soil & groundwater of seven leaking USTs, groundwater extraction/treatment of .5M gallons discharge to City of Port Angeles, likely NFA 2020.
- **Restover Truck Stop 2014-2016 & 2020:** PCS delineation, excavation, confirmation sampling, pump and treat, chemical oxidation action, NFA with WA State DOE. WQ permit with Ecology and SWPPP implementation. NEPA.
- **DNR 2013-2014:** Management of 250 surface mines in 8 counties. Reporting, inspection, and permitee consulting.
- **Vantage Wind Farm 2010:** Oversight of rock core log/interpretation & load capability of basalt base rock 2010.

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