Contaminated Media Management Plan

Add/Alter B235 – PANG Base

Portland, Oregon

October 7, 2025

Geotechnical ■ Environmental ■ Special Inspections

Columbia West

Engineering, Inc

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October 7, 2025

Oregon Department of Environmental Quality
Northwest Region
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Attn: Dan Hafley

Re: Contaminated Media Management Plan
Add/Alter B235 – PANG Base
6801 NE Cornfoot Road
Portland, Oregon
CWE Project: GMCon-2-02-1

Columbia West Engineering, Inc. (Columbia West) is pleased to present this Contaminated Media Management Plan (CMMP) for the Portland Air National Guard Building 235 (B235) addition/alteration project located at 6801 NE Cornfoot Road in Portland, Oregon. This CMMP addresses the management of known and potentially contaminated media that could be encountered during construction. This document is intended to be used by the excavation contractor during earthwork activities and should be used in conjunction with any project specifications provided to the contractor by the project developer pertaining to the handling, segregation, management, characterization, reuse, and/or disposal of impacted soil, debris, and/or groundwater at B235.

Sincerely,

Caroline B. Siegel
Environmental Project Manager

Colby R. Hunt, CHMM
Environmental Principal

cc: Kevin Mitchell, Midnight Sun – Glen/Mar JV
Johnny Jeppesen, Midnight Sun – Glen/Mar JV

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Attachments
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ABBREVIATIONS AND ACRONYMS

6:2 FTS	fluorotelomer sulphonic acid 6:2
AOC	area of concern
B235	Building 235
BGS	below ground surface
CFR	Code of Federal Regulations
CFSL	clean fill screening level
CMMP	Contaminated Media Management Plan
CRSA	Columbia River Sand Aquifer
DEQ	Oregon Department of Environmental Quality
DoD	Department of Defense
DoW	Department of War
ECSI	Environmental Cleanup Site Information
EPA	U.S. Environmental Protection Agency
HAZWOPER	Hazardous Waste Operations and Emergency Response
HCP	Hazard Communication Program
HDPE	high-density polyethylene
HSP	Health and Safety Plan
ID	identification
ISM	incremental sampling methodology
LDPE	low-density polyethylene
MCL	maximum contaminant level
mil	milli-inch
NE	not established
ng/L	nanograms per liter
OD	overbank deposits
OSHA	Occupational Safety and Health Administration
PANG	Portland Air National Guard
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDoDA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptanesulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFMPA	perfluoro-3-methoxypropanoic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentanesulfonic acid
RCRA	Resource Conservation and Recovery Act
RSL	regional screening level
SL	screening level

SSL	soil screening level
THQ	toxic hazard quotient
µg/kg	micrograms per kilogram

CONTAMINATED MEDIA MANAGEMENT PLAN
ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON

1.0 INTRODUCTION

This CMMP has been prepared by Columbia West on behalf of Midnight Sun – Glen/Mar JV for the Add/Alter B235 project at the PANG Base located at 6801 NE Cornfoot Road in Portland, Oregon (B235). This document is intended to assist the construction team in field identification and management of known and potentially contaminated media (soil and groundwater) as well and debris that could be encountered at B235 during construction. This CMMP includes field protocols for identification, response actions, communication, removal, segregation, temporary storage or stockpiling, transportation, treatment, and disposal of contaminated media and debris. B235 is shown relative to surrounding physical features on Figure 1.

Acronyms and abbreviations used herein are defined immediately following the Table of Contents.

2.0 B235 DESCRIPTION

B235 is located on the PANG Base adjacent to and south of the Portland International Airport and occupies approximately 245 acres leased from the Port of Portland (owner) by the Oregon Air National Guard (lessee). The PANG Base consists of tax lots 101 and 901 of Multnomah County tax map 1N2E07, tax lots 200 and 301 of tax map 1N2E08, tax lot 201 of tax map 1N2E17B, and tax lot 101 of tax map 1N2E18A. B235 is located on tax lot 301 of tax map 1N2E08.

The PANG Base is listed on DEQ ECSI database (ECSI No. 1372) due to the presence of petroleum hydrocarbons, solvents, metals, and PFAS in soil, groundwater, and/or sediment at various locations throughout the PANG facility. The existing B235 structure is located in an AOC identified as AOC 20, which is a former sanitary landfill where activities involving potential PFAS-containing materials were conducted. Based on information provided by DEQ during a conference call on March 31, 2025, the only contaminant of concern for the Add/Alter B235 project is PFAS.

3.0 PLANNED REDEVELOPMENT

It is our understanding that the proposed development will consist of constructing a 6,500-square-foot, single-story addition to the existing B235 structure, including relocation of underground utilities. The layout of the planned addition is shown on Figures 2 and 3.

4.0 REGULATORY SCREENING LEVELS

The EPA has established SLs for various contaminants, exposure pathways, and receptors to evaluate risk to human health, including for various PFAS compounds. It is our understanding that earthwork related to site redevelopment will generally consist of surface grading, micropile installation, and utility excavation and that future B235 use will remain industrial. Soil and groundwater will be generated during construction. DEQ has not established risk-based concentrations for PFAS. However, the EPA has established SLs for PFAS in soil, including composite worker (industrial) RSLs and residential SSLs for protection of groundwater. While the EPA has established SLs for exposure to tap water and MCLs for drinking water, the EPA has not

established SLs for exposure to groundwater. In addition, the Department of War (DoW, formerly the DoD) has established PFAS soil and tap water SLs for use in preliminary assessments and site inspections.[1] Landfill disposal limits have not been established for PFAS-containing soil.

Previous soil sample analytical results will be compared to the EPA industrial (composite worker) RSLs, EPA residential SSLs for protection of groundwater, and DoW SLs for residential soil. Previous groundwater sample results will be compared to EPA MCLs and DoW SLs for tap water.

5.0 BACKGROUND

The following sections describe the background of B235, including a bibliography of previous reports, a description of B235 development history, a description of subsurface soil and groundwater conditions in the vicinity of B235, and a summary of previous environmental investigations conducted in the vicinity of B235.

5.1 BIBLIOGRAPHY

The section summarizes available information related to the historical development and subsurface conditions at B235. Our knowledge of B235 is based on the following environmental reports:

- DEQ 1998. *Consent Order for Oregon Air National Guard Site at Portland Airport*, dated March 4, 1998.
- Port of Portland 1999. *Re: Oregon Air National Guard – PDX Airport - #1, ECSI #1372; Subject: Voluntary Cleanup Program – Intent to Participate,* dated December 29, 1999.
- Department of the Army Corps of Engineers 2004. *Department of Defense and State Memorandum of Agreement Program*, dated June 30, 2004.
- DEQ 2013. *Portland Air National Guard Base; Status of Sites 1, 2, 3, and 11 Monitoring; ECSI Site No. 1372,* dated April 24, 2013.
- BB&E, Inc. 2016. *Revision 1; Perfluorinated Compounds Preliminary Assessment; Site Visit Report; Portland Air National Guard; Portland, Oregon,* dated April 2016.
- Leidos 2018. *Work Plan for Fiscal Year 2017 Phase III; Regional Site Inspection for Perfluorooctanesulfonate and Perfluorooctanoic Acid at Portland Air National Guard Base; Portland, Oregon,* dated April 2018.
- Leidos 2019. *Site Inspection Report for Perfluorooctane Sulfonate and Perfluorooctantoic Acid at Portland Air National Guard Base, Oregon; 142nd Fighter Wing; Portland Air National Guard Base; Portland, Oregon,* dated January 2019.
- Parsons 2019. *Final Work Plan for the Expanded Site Inspection for Per- and Polyfluoroalkyl Substances (PFAS) at the Portland Air National Guard Base; Portland, Oregon,* dated September 2019.
- DEQ 2020. *Voluntary Cleanup Letter Agreement; Interim Response Action – Jet Fuel Release; Portland Air National Guard Base, Portland, OR; ECSI #1372,* dated October 5, 2020.

[1] Department of Defense 2025. Memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program,* dated January 21, 2025.

- KOMAN Government Solutions, LLC 2021. *Final Technical Memorandum; Interim Response Action – Jet Fuel Release; Portland Air National Guard Base; Portland, Oregon,* dated January 12, 2021.
- Parsons 2021. *Final Expanded Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at the Portland Air National Guard Base; Portland, Oregon,* dated March 2021.
- K & A Engineering 2021. *Geotechnical Engineering Report; Building B250 Seismic Retrofit Project, Building 235 Addition Project; Portland Air National Guard Base; Portland, Oregon*, dated September 27, 2021.
- Brice-AECOM JV. 2021. *Final Historical Records Search Summary Report; Portland Air National Guard Base; Portland, Oregon,* dated October 2021.
- DEQ. 2022. *Voluntary Cleanup Letter Agreements – Portland Air National Guard ECSI# 1372 & Kingsley Field Air National Guard ECSI #816,* dated August 2022.
- Brice-AECOM JV 2022. *Final Work Plan – PFAS Remedial Investigation; Portland Air National Guard Base; Portland, Oregon,* dated October 2022.
- Brice-AECOM JV 2023. *Final PFAS Remedial Investigation; Uniform Federal Policy-Quality Assurance Project Plan; Revision 1; Portland Air National Guard Base; Portland, Oregon,* dated October 2023.

In addition to the above documents, Columbia West reviewed several figures and chemical analytical tables provided by DEQ summarizing soil and groundwater sampling conducted by Brice-AECOM JV at the PANG Base in 2023 and 2024. The analytical results for soil and groundwater samples collected from the vicinity of B235 are compared to the applicable EPA SLs in Tables 1 and 2.

5.2 B235 DEVELOPMENT HISTORY

The Port of Portland has owned the land occupied by the existing PANG Base since 1936, and the Portland International Airport, which is managed by the Port of Portland, began operating as a municipal airport in 1940. At that time, the Air National Guard began operations at the airport. Most of the area currently occupied by the PANG Base was converted to an active U.S. Air Force base in 1950. The Air National Guard resumed control of the base in 1964 and leases the base from the Port of Portland. Base operations included activities that may have contributed to PFAS contamination of soil, groundwater, surface water, and/or sediment, including fire training areas using aqueous film-forming foam (Leidos 2019).

The area currently occupied by B235 was used as a sanitary landfill from 1949 through 1956. Materials landfilled and/or burned in nearby trenches potentially contained PFAS compounds. The current B235 structure was constructed in 1961 and has been used for metal fabrication, welding, and storage through the present.

5.3 SUBSURFACE CONDITIONS

The following sections describe the subsurface soil and groundwater conditions at B235.

5.3.1 Soil

Subsurface conditions encountered during previous investigations throughout the PANG Base consisted of approximately 50 feet of Quaternary-aged terrace alluvium composed of floodplain

and terraced bedded layers and mixtures of silt, clay, and sand commonly referred to as overbank deposits (OD). The OD is underlain by the Columbia River Sand Aquifer (CRSA), which consists of fine- to medium-grained basaltic sand. Beneath the OD and CRSA is the Troutdale Formation, which is between 800 and 900 feet thick and consists of well-sorted, coarse-grained sandstone and conglomerate gravel.

5.3.2 Groundwater

Shallow groundwater was encountered in two cone penetrometer tests (CPT-1 and CPT-2) and a geotechnical boring (B-1) completed adjacent to B235 during a 2021 geotechnical investigation for the project at depths between 9 and 10 feet BGS. In the vicinity of B235, depths to deeper groundwater are between approximately 28 and 41 feet BGS in the deep OD, 48 to 60 feet BGS in the CRSA, and up to 200 feet BGS in the Troutdale Formation. Depth to groundwater and groundwater flow direction vary depending on seasonal influences and precipitation. Groundwater flow direction varies between the various water-bearing units and fluctuates seasonally. Shallow groundwater in the vicinity of B235 generally flows from north to south.

The OD is a source of recharge to both drainage ditches at the PANG Base as well as to the Columbia Slough. Previous investigation results have indicated the presence of PFAS compounds in the OD aquifer, with only minor concentrations of PFAS compounds generally detected in the CRSA. The OD also serves to limit downward migration of contaminants present in the OD to the underlying CRSA. Several groundwater-bearing units beneath the PANG Base are part of a regional aquifer system that serve as the City of Portland's supplemental water supply, including municipal water supply wells screened in the CRSA and the Troutdale Formation.

5.4 PREVIOUS INVESTIGATIONS

The above reports and documents pertain to the PANG Base as a whole. Based on our review, activities at the PANG Base associated with historical use as an air force base have resulted in releases of PFAS compounds to soil, sediment, groundwater, and surface water throughout the PANG Base. DEQ issued a Consent Order for the remedial investigation, risk assessment, and feasibility study at the PANG Base in 1998, and the Port of Portland subsequently enrolled in DEQ's Voluntary Cleanup Program in 1999. The 1998 Consent Order was limited to non-PFAS contaminants. Several remedial investigations have been conducted at the PANG Base that have identified 20 AOCs.

B235 is located in AOC 20, a former sanitary landfill where known activities involving potential PFAS-containing materials were conducted. The sanitary landfill was reportedly used to dispose of general shop refuse, paint cans, oil and paint residue, batteries, and broken equipment and parts. Contaminants from up-gradient AOC 3, located north of AOC 20, are known to have migrated south toward AOC 20. AOC 3 is a hangar where known activities involving potential PFAS-containing materials were conducted, including storage and minor releases of aqueious film forming foam.

DEQ provided figures including analytical data summaries for soil and groundwater samples collected in and near AOC 20 as part of ongoing remedial investigations for PFAS across the PANG Base. Specifically, one soil boring (AOC20-01-SB) was advanced adjacent to the planned B235 addition in AOC 20 in November 2023. Two soil samples collected from boring AOC20-01-

SB at depths from 0 feet to 0.5 foot BGS and from 7 to 8 feet BGS were analyzed for PFAS standard 40 list by EPA Method D-E1633. Up to seven PFAS compounds were detected in the two soil samples collected from boring AOC20-01-SB. PFOA, PFOS, PFBA, PFNA, PFHxA, PFHxS, and PFHpA were detected in the soil sample collected from 0 feet to 0.5 foot BGS at concentrations or estimated concentrations of 0.15 µg/kg, 0.47 µg/kg, 0.23 µg/kg, 0.083 µg/kg, 0.097 µg/kg, 0.074 µg/kg, and 0.070 µg/kg, respectively. PFOA, PFOS, PFHxA, PFHxS, and PFHpA were detected in the soil sample collected from 7 to 8 feet BGS at concentrations or estimated concentrations of 0.095 µg/kg, 2.9 µg/kg, 0.30 µg/kg, 0.4 µg/kg, and 0.057 µg/kg, respectively. The detected concentrations of one or more of these PFAS in soil samples collected from AOC 20 were greater than the corresponding EPA industrial RSLs, EPA residential SSLs for protection of groundwater, and/or DoW SLs for residential soil.

A shallow grab groundwater sample collected from boring AOC20-01-SB (AOC020-01-GW) was analyzed for PFAS standard 40 list by EPA Method D-E1633. Ten PFAS were detected in groundwater sample AOC020-01-GW. PFOS, PFOA, PFHxS, 6:2 FTS, PFBS, PFBA, PFHpS, PFHpA, PFHxA, and PFPeS were detected at concentrations of 210 ng/L, 2.9 ng/L, 350 ng/L, 9.3 ng/L, 5.1 ng/L, 1.6 ng/L, 5.9 ng/L, 1.0 ng/L, 11 ng/L, and 5.5 ng/L, respectively. The detected concentrations of one or more of these PFAS were greater than the corresponding EPA MCLs and/or DoW tap water SLs. It does not appear that deep groundwater samples (i.e., groundwater samples from the CRSA or Troutdale Formation) have been collected from AOC 20.

Also in November 2023, two soil borings (AOC04-02-SB and AOC04-03-SB) were advanced in AOC 4, located adjacent west of AOC 20. Boring AOC04-02-SB was advanced approximately 100 feet west of the existing B235 structure. Three soil samples collected from boring AOC04-02-SB at depths of 0 feet to 1 foot, 6.5 to 7 feet, and 9 to 10 feet BGS were analyzed for PFAS standard 40 list by EPA Method D-E1633. Up to 11 PFAS were detected in the soil samples collected from boring AOC04-02-SB. PFOS and PFDoDA were detected in the soil sample collected from 0 feet to 1 foot BGS at concentrations of 0.18 µg/kg and 0.048 µg/kg, respectively. PFBS, PFOA, PFOS, PFHxS, 6:2 FTS, PFHpS, PFHxA, and PFPeS were detected in the soil sample collected from 6.5 to 7 feet BGS at concentrations of 0.052 µg/kg, 0.068 µg/kg, 1.8 µg/kg, 0.36 µg/kg, 1.1 µg/kg, 0.067 µg/kg, 0.078 µg/kg, and 0.056 µg/kg, respectively. PFBS, PFOA, PFOS, PFHxS, 6:2 FTS, PFHpS, PFHpA, PFHxA, PFPeS, and PFPeA were detected in the soil sample collected from 9 to 10 feet BGS at concentrations of 0.061 µg/kg, 0.10 µg/kg, 12 µg/kg, 0.64 µg/kg, 0.35 µg/kg, 0.20 µg/kg, 0.032 µg/kg, 0.096 µg/kg, 0.069 µg/kg, and 0.056 µg/kg, respectively. The detected concentrations of one or more of the PFAS compounds detected in soil samples collected from boring AOC04-02-SB were greater than the corresponding EPA RSLs, EPA residential SSLs for protection of groundwater, and/or DoW SLs for residential soil.

Boring AOC04-03-SB was advanced adjacent to the northwest corner of the existing B235 structure. Three soil samples collected from boring AOC04-03-SB at depths of 0 feet to 1 foot, 1.5 to 2 feet, and 5 to 6 feet BGS were analyzed for PFAS standard 40 list by EPA Method D-E1633. Up to six PFAS were detected in the soil samples collected from boring AOC04-03-SB. 6:2 FTS was detected in the soil sample collected from 0 feet to 1 foot BGS at a concentration of 0.36 mg/kg. PFOS and 6:2 FTS were detected in the soil sample collected from 1.5 to 2 feet BGS at concentrations of 0.055 µg/kg and 0.59 µg/kg, respectively. PFOA, 6:2 FTS, PFHpA, PFHxA, and PFPeA were detected in the soil sample collected from 5 to 6 feet BGS at concentrations of

0.051 µg/kg, 1.7 µg/kg, 0.11 µg/kg, 0.24 µg/kg, and 0.30 µg/kg, respectively. PFAS were not detected at concentrations greater than the corresponding EPA RSLs or DOW SLs for residential soil in the soil samples collected from boring AOC04-03-SB. PFAS were detected at concentrations greater than EPA residential SSLs for protection of groundwater in the soil samples collected from boring AOC-04-03-SB.

While it does not appear that deep groundwater samples have been collected from AOC 20, two deep groundwater monitoring wells (MW-POR11-02D and MW-POR02-03D) are present in the vicinity of AOC 20. A groundwater sample collected from monitoring well MW-POR11-02D in January 2024 contained PFOS, PFOA, PFHxS, and PFMPA at concentrations of 0.69 ng/L, 3.2 ng/L, 0.6 ng/L, and 1.3 ng/L, respectively. During the January 2024 sampling event, PFMPA was detected in a groundwater sample collected from monitoring well MW-POR02-03D at a concentration of 0.57 ng/L. The detected concentrations of PFAS in groundwater samples collected from monitoring wells MW-POR11-02D and MW-POR-02-03D were less than the corresponding EPA MCLs.

Immediatley west of AOC 20, analysis of groundwater sample AOC 04-06 indicated the presence of PFOS, PFOA, and PFHxS at concentrations of 8.6 ng/L, 6.1 ng/L, and 38 ng/L, respectively. Groundwater sample AOC 04-06 was collected from the upper CRSA, and the detected concentrations of PFOS, PFOA, and PFHxS in this groundwater sample represent the highest detected concentrations of PFAS compounds in the CRSA beneath the PANG base.

6.0 CONTAMINANT INFORMATION

The following sections describe the distribution of contaminants at B235 and the maximum contaminant concentrations detected in soil and groundwater samples collected at and near B235. Sample locations and analytical summaries are shown on Figures 4 through 7.

6.1 SOIL

Based on the results of previous subsurface investigations conducted at the PANG Base, soil in the vicinity of B235 contains detectable concentrations of PFAS compounds. The maximum detected concentrations of these contaminants detected in soil samples collected near B235 are as follows:

- 6:2 FTS: 1.7 µg/kg
- PFBS: 0.061 µg/kg
- PFBA: 0.23 µg/kg
- PFDoDA: 0.048 µg/kg
- PFHpS: 0.20 µg/kg
- PFHpA: 0.11 µg/kg
- PFHxS: 0.64 µg/kg
- PFHxA: 0.30 µg/kg
- PFNA: 0.083 µg/kg
- PFOS: 12 µg/kg
- PFOA: 0.15 µg/kg
- PFPeS: 0.069 µg/kg
- PFPeA: 0.30 µg/kg

6.2 GROUNDWATER

Based on the results of previous subsurface investigations conducted at the PANG Base, shallow groundwater in the vicinity of B235 contains detectable concentrations of PFAS compounds. The maximum detected concentrations of these contaminants detected in shallow groundwater samples collected from the OD near B235 are as follows:

- 6:2 FTS: 9.3 ng/L
- PFMPA: 1.3 ng/L
- PFBS: 5.1 ng/L
- PFBA: 1.6 ng/L
- PFHpS: 5.9 ng/L
- PFHpA: 1.0 ng/L
- PFHxS: 350 ng/L
- PFHxA: 11 ng/L
- PFOS: 210 ng/L
- PFOA: 3.2 ng/L
- PFPeS: 5.5 ng/L

The highest detected concentrations of PFAS compounds in groundwater in the CRSA in the vicinity of B235 are as follows:

- PFHxS: 38 ng/L
- PFOS: 8.6 ng/L
- PFOA: 6.1 ng/L

7.0 WORKER SAFETY

Select PFAS compounds were detected in soil samples collected from the vicinity of B235 at concentrations greater than the EPA industrial RSLs, and it is possible that higher concentrations of contaminants may be present in areas not previously explored. All workers who may come into contact with potentially contaminated media (e.g, soil, groundwater, micropile spoils) must be HAZWOPER trained. Depending on the specific roles and responsibilities of each worker, each worker may either be 24-hour or 40-hour HAZWOPER trained. Before beginning earthwork activities, the owner, operator, or contractor must prepare and implement a site-specific HCP. The HCP fulfills "worker right to know" requirements (29 CFR 1926.59). If completed by the contractor, a copy of the HCP must be submitted to the owner and/or the lessee before the start of work on the project. During work on the project, the HCP must be posted at B235. The contractor is responsible for notifying subcontractors and/or visitors of pertinent environmental conditions. Subcontractors may either adopt the contractor's HCP or must prepare their own HCP. This document should be used in conjunction with, not in place of, the HCP and the project specifications. Each contractor and subcontractor are responsible for the safety of their employees, including compliance with applicable OSHA regulations and compliance with all specifications in the technical specifications for the project. In addition to implementation of an HCP, the owner, lessee, or contractor should prepare and implement a site-specific HSP in accordance with OSHA requirements to ensure adequate protection for their employees while on site.

8.0 PLANNED EARTHWORK

Planned earthwork activities at B235 include surface grading for the footprint of the B235 addition; installation of micropiles; and utility excavations to relocate storm and water lines, construct a stormwater infiltration trench, and install temporary electrical power during construction. A total of approximately 1,362 cubic yards of soil is expected to be generated during site construction. Details regarding the planned excavations are presented below. The locations of planned excavations at B235 are shown on Figure 2. The project earthwork submittal is presented in Appendix A.

8.1 SURFACE GRADING

Topsoil within the building footprint of the B235 addition will be stripped and the building footprint excavated to a depth of up to approximately 2 feet BGS to achieve the correct subbase elevation. A total of approximately 375 cubic yards of soil will be excavated from the footprint of the B235 addition.

8.2 MICROPILES

The foundation for the B235 addition will include micropiles installed along the perimeter of the structure and beneath several planned walls. Thirty-three micropiles will be installed to a depth of 65 feet BGS, through the PFAS-contaminated OD and into the underlying CRSA. The lower OD in this area is generally considered sufficiently fine grained to impede downward migration of contaminants, and penetration of the lower OD during micropile installation could intruduce contaminants to the CRSA, either through "drag-down" during installation or through the creation of preferential groundwater pathways in the subsurface. To minimize the risks of introducing contaminants to the CRSA, the micropile casing will be advanced by injecting water into the casing to loosen soil at the casing tip. The water and soil cuttings will be flushed upward around the casing, reducing the potential for contaminated waste in the OD from migrating downward to the CRSA.

Approximately 35 cubic yards of spoils (soil, groundwater, and injection water) is anticipated to be generated from micropile installation. The micropiles will be installed inside the roughly excavated footing, which will be lined with 6-mil-thick plastic to prevent the micropile spoils from contacting the underlying soil. The micropile spoils will then be transferred to an on-site storage tank using a trash pump or a pneumatic diaphragm pump and characterized for contaminants of concern. The characterization results will be used to develop a waste profile prior to disposal of the micropile spoils at a permitted off-site disposal facility. Any loose spoils adhered to the plastic liner(s) will be collected and placed in the storage tank and the plastic liners disposed of as solid waste at a RCRA Subtitle D landfill. The layout of the micropiles beneath the building footprint and a cross section of a typical micropile are shown on Figure 3. The micropile plan is presented in Appendix B.

8.3 UTILITY EXCAVATIONS

The existing storm sewer, sanitary sewer, gas, and water lines serving B235 will be relocated and extended to serve the B235 addition. Excavations for the demolition of existing storm, sewer, water, and gas lines will generate approximately 380 cubic yards of soil.

Approximately 411 linear feet will be excavated to up to 6 feet BGS for new storm sewer lines, generating approximately 187 cubic yards of soil. Approximately 71 linear feet will be excavated to up to 6 feet BGS for a new stormwater infiltration trench that will be constructed east of the B235 addition, generating approximately 47 cubic yards of soil.

Approximately 215 linear feet will be excavated to up to 6 feet BGS for new sanitary sewer lines, generating approximately 111 cubic yards of soil. Approximately 153 linear feet will be excavated to up to 3 feet BGS for new water lines, generating approximately 80 cubic yards of soil. Approximately 266 linear feet will be excavated to up to 4 feet BGS for new gas lines, generating approximately 137 cubic yards of soil.

A temporary electrical trench will also be excavated south of B235 to depths of up to 5 feet BGS to provide power for construction activities. Approximately 10 cubic yards of soil is anticipated to be excavated for the temporary electrical trench.

9.0 IDENTIFICATION AND MANAGEMENT OF CONTAMINATED SOIL

Based on the results of previous remedial investigations, soil that will be excavated during redevelopment contains PFAS compounds at concentrations greater than EPA industrial RSLs. While DEQ has not established CFSLs for PFAS compounds, DEQ has indicated that soil generated during construction cannot be managed as clean fill. Currently, RCRA disposal limits for PFAS-impacted soil have not been established, and acceptance criteria for PFAS-impacted soil may vary by disposal facility. As soil excavated from B235 cannot be managed as clean fill, field screening and/or segregation of contaminated soil from potential clean fill is not anticipated. This section describes the protocol to properly segregate, manage, characterize, and dispose of contaminated soil and potential debris beneath B235.

9.1 SEGREGATION

B235 is located within AOC 20, an area identified as a former sanitary landfill. Debris may be encountered during earthwork activities. If necessary, based on the requirements of the selected disposal facility, debris may require segregation from soil and other organic debris during excavation activities. The contractor should visually observe soil during excavation activities for evidence of debris. In addition, soil with more than 10 percent organic material may need to be segregated from soil containing little or no organic debris. Segregated material that cannot be direct loaded for transportation and disposal should be temporarily stockpiled in accordance with Section 9.2.4 (Stockpile Management) of this CMMP.

9.2 CONTAMINATED SOIL MANAGEMENT

Based on the results of previous investigations, soil generated from B235 cannot be managed as clean fill and must be either be disposed of offsite at an appropriate disposal facility or reused onsite with DEQ approval.

9.2.1 Off-Site Disposal of Contaminated Soil

Currently, RCRA disposal limits for PFAS-impacted soil have not been established, and acceptance criteria for PFAS-impacted soil may vary by disposal facility. Waste Management currently does not accept waste containing PFAS at their RCRA Subtitle D landfills in Hillsboro and McMinnville, Oregon, but may accept PFAS at their RCRA Subtitle C landfill in Arlington, Oregon.

Waste Connections may accept waste containing PFAS at their RCRA Subtitle D landfill in The Dalles, Oregon (Wasco County Landfill). Waste Connections has reportedly not established acceptance limits for PFAS-impacted soil and evaluates acceptance of PFAS-impacted soil on a case-by-case basis.

It is the responsibility of the excavation contractor to obtain the necessary landfill profiles and permits and accurately describe the waste to the selected landfill before export and off-site disposal. The earthwork contractor will likely need to provide copies of chemical analytical laboratory reports to the selected disposal facility, and it is possible that the selected landfill may require additional data prior to permitting the soil for disposal. Copies of the permit should accompany each load transported to the selected disposal facility.

Disposal facilities often have the following requirements before accepting soil at their facility:

- Contaminated soil will not be received without first completing a soil profile sheet, obtaining a permit (to be completed by the earthwork contractor), have an approval of credit application on file, and have pre-approval from the disposal facility.
- Trucks will be permitted to weigh in as negotiated with the facility.
- Material may be sampled during delivery by the disposal facility. Comparisons may be made between the submitted profile and on-site analysis. Any material's profile that does not compare to delivered material may be rejected.
- Exported soil must not contain any free liquids or foreign material (i.e., rebar, fittings, cans, wood, etc.). Truck loads found with excessive foreign material could result in the load being rejected or screened, sorted, and disposed of by the disposal facility for an additional fee. If rejected, the soil cannot be returned to B235 without DEQ approval.
- Before the export of soil from B235, Midnight Sun – Glen/Mar JV shall be notified and approve of all soil disposal locations regardless of soil quality.

9.2.2 On-Site Reuse of Contaminated Soil

If reuse of excavated soil from B235 is planned in the future (including under the Utilization of Excavated Materials and Shoulder Construction submittal presented in Appendix A), permission from DEQ will be required. Soil reused on site should be free of debris and physical evidence of contamination and must be geotechnically suitable. Additional sampling of excavated soil and a Beneficial Use Determination from DEQ may also be required prior to on-site reuse of contaminated soil. Soil with contaminant concentrations greater than EPA industrial RSLs or DEQ occupational RBCs cannot be reused and must be disposed of at an approved facility.

9.2.3 Loading and Hauling

Material intended for off-site disposal can be loaded directly into trucks for transport to the receiving facility once the appropriate permitting has been completed. All truck loading will occur on site. The contractor must exercise care during loading of the impacted material to help minimize spillage of the material onto the ground surface. All trucks transporting soil from B235 should be covered with tight-fitting covers before leaving B235. Loads may be wetted prior to transport during dry conditions.

In addition, trucks should pass through a decontamination area near the site egress point, which should include a rock pad/apron, a wheel wash station (if necessary), and the following inspections to avoid track off:

- Inspection for loose soil and removal (if soil is present)
- Inspection to confirm liquid is not leaking from the load
- Inspection to confirm that the load is covered

The contractor must use care not to track soil onto roads. Transport tracking tickets may be required, which document the haul to the approved disposal facility for each truck leaving B235.

9.2.4 Stockpile Management

Soil and/or debris generated during excavation that cannot be immediately transported offsite can be temporarily stockpiled in areas designated by representatives of Midnight Sun – Glen/Mar JV. Excavated material that is placed in temporary stockpiles must be well maintained at all times. All stockpiled material must be placed on impermeable plastic sheeting (minimum 6-mil thick) with a berm around the perimeter of the stockpile. The plastic sheeting and berm must be constructed to prevent the runoff of soil and contaminants to surrounding areas. The berm can be constructed with hay bales, dimensional lumber, or other equivalent methods. The bottom plastic sheeting should be lapped over the berm materials and the soil stockpile covered with plastic sheeting to prevent erosion or leaching of contaminants to underlying soil and prevent exposure to precipitation and wind. Plastic sheeting that covers the soil stockpile should be secured using sandbags or equivalent. Any liquids present in a stockpile will be transferred to an on-site storage tank using a trash pump or a pneumatic diaphragm pump and characterized for contaminants of concern. The characterization results will be used to develop a waste profile prior to disposal of the liquids at a permitted off-site disposal facility.

Stockpiles must be clearly designated as to the nature of the stockpiled soil (e.g., contaminated soil versus clean imported fill), either with signage or stakes with different colored flagging. The locations and nature of each on-site stockpile should be discussed during daily work meetings. All stockpiles should be on the B235 construction site, unless an off-site stockpile location is available and DEQ approves the off-site soil stockpile location. Following removal, the stockpile areas should be restored to a pre-stockpile condition. Residual plastic or debris should not be left unattended at B235 and must be properly disposed of following stockpile removal.

9.2.4.1 Stockpile Soil Sampling

If necessary, contaminated stockpiled soil will be sampled using composite soil sampling methods and analyzed for disposal profiling or potential on-site reuse. In general, composite soil sampling frequency will adhere to the following, unless an alternate sampling frequency has been accepted by the soil disposal facility or DEQ:

Stockpile Soil Sampling Frequency

Stockpile Volume (cubic yards)	Number of Composite Soil Samples to Collect
0 – 10	1
11 – 50	2
51 – 100	3

Each composite soil sample will comprise five soil sub-samples collected from a particular area of the soil stockpile. Soil stockpiles greater than 1,000 cubic yards will be sampled at a rate of five composite soil samples for the first 500 cubic yards, plus one composite soil sample for each additional 500 cubic yards.

For any stockpiles greater than 100 cubic yards, ISM sampling will be conducted in accordance with the Interstate Technology Regulatory Council's *Increment Sampling Methodology (ISM) Update guidance*, dated October 2020.

Stockpile soil samples will be collected by hand or the use of hand tools. Decontaminated hand tools should be used to remove the surface layer of soil and then the soil sample will be retrieved with a decontaminated stainless steel scoop or disposable gloves. Chrome-plated tools will not be used.

Soil samples will be collected using the procedure outlined below. Disposable gloves will be worn and changed between samples.

- Remove the top layer of soil to the desired sampling depth using a decontaminated stainless steel hand tool.
- Collect soil samples using a stainless steel trowel or with single-use PFAS-free liners. Five discrete soil samples will be collected per composite sample. Place the discrete soil samples into a new PFAS-free disposable plastic bag.
- Mix the discrete soil samples into one composite soil sample in the PFAS-free plastic bag until thoroughly homogenized.
- Transfer the composite soil sample to labeled, laboratory-provided HDPE sample jars using a decontaminated stainless steel laboratory spoon. Fill the jar completely to minimize headspace.
- Clean the jar rim before tightening the lid, and quickly and adequately seal the sample containers.
- Collect any necessary equipment blanks after sampling equipment has been appropriately decontaminated.
- Collect any necessary field reagent blanks to capture any potential cross-contamination.
- After sample collection, place each sample bottle in two sealed PFAS-free plastic bags and place soil sample bottles in coolers until transported to the laboratory.

- Use a field notebook to record a description of the soil that was sampled, the location of the soil sample, the sample ID, and the time of soil sample collection. Record the sample on the soil sampling field forms and chain-of-custody form. The stockpile soil sample ID will include a prefix identifying the stockpile (SP) number followed by a sequential numeric designation. For example, the third composite soil sample collected from stockpile SP-3 will be identified as "SP3-3."
- Decontaminate the equipment between collection of soil samples. Decontamination will include the following: (1) rinse with PFAS-free water and scrub with a scrub brush until free of large particles, (2) wash with Alconox®, (3) rinse with PFAS-free water, and (4) rinse with PFAS-free water.

Soil stockpile composite samples will be submitted to an analytical laboratory for analysis of the PFAS standard 40 list by EPA Method D-E1633, at a minimum. Additional analytes may be required if debris associated with historical landfilling activities is encountered. During sampling, the following PFAS-specific guidelines will be followed:

- No Teflon®, Gore-Tex™, or Tyvek® will be worn
- No waterproof or water-resistant logbooks, field books, or pens will be used
- No plastic clipboards, binders, spiral-bound notebooks, or other plastic-containing record keeping products will be used
- No waterproof, water-resistant, or stain-resistant clothing or rain gear will be worn
- No cosmetics, moisturizers, creams, or other cleaning or shower products will be worn
- No glass or LDPE sample containers
- No Teflon®-line lids on sample containers
- No Decon 90® decontamination fluid
- No food or drinks other than bottled water or bottled hydration drinks
- No new clothing (i.e., less than six washings)

The chemical analytical results shall be used to evaluate the appropriate off-site disposal and/or on-site reuse location. All soil designated for off-site disposal must be characterized and permitted in accordance with the receiving facility's requirements before transport and disposal.

9.2.5 Contractor Reporting Requirements

The contractor is responsible for keeping a detailed daily record of all soil excavation, stockpiling, export, and disposal. This includes the purpose, origin, destination, and volume of soil that is (1) loaded and hauled to the approved off-site disposal sites, (2) reused on the PANG Base, or (3) transported to temporary soil stockpile locations (within the PANG Base). The contractor is responsible for preparing a daily field report for distribution to representatives of the owner that identifies the number of truckloads of soil transported offsite and daily tonnage for each disposal location. All soil excavation, handling, and disposal activities should be documented in daily field reports by the contractor. Following completion of earthwork, a Construction Completion Report documenting contaminated media excavation, management, and disposal activities and describing micropile installation and any problems encountered must be submitted to DEQ.

10.0 IMPORTED FILL MATERIAL

All fill material imported to B235 should either consist of a manufactured rock product (e.g., ¾-inch-minus crushed rock from a permitted rock quarry) or must be free of contaminants at concentrations exceeding DEQ CFSLs. It is the contractor's responsibility to ensure all imported fill material meets these criteria and provide the owner with the imported origin information and accompanying documentation demonstrating the material meets DEQ CFSLs if not using a manufactured rock product. In addition, if evidence of contamination is observed in imported fill material, the contractor should reject the imported backfill and identify an alternate source. Also, material imported as structural backfill should be evaluated and approved by the geotechnical engineer before it is placed at B235.

11.0 WHEEL WASH

Standard site entry best management practices, including rock pads at the entrances/exits to the construction site and gravel filter berms, should be implemented at B235 in accordance with Section 3.4 of the City of Portland's *Erosion and Sediment Control Manual*, dated October 2022. A wheel wash-down area should be implemented, if deemed necessary, at B235 to ensure that sediment is not tracked offsite during construction. If necessary, wheel washing will be completed on the rock pad or in an approved wheel wash structure, as specified in Section 3.4 of the City of Portland's *Erosion and Sediment Control Manual*, dated October 2022. If necessary, the wheels will be washed before crossing the rock pad to leave B235.

12.0 EROSION AND DUST CONTROL

The disturbance area for the B235 project will be less than 1 acre. Therefore, a 1200-C permit will not be required for the project. The project will be completed under the existing 1200-Z permit for the PANG Base. Exposed soil will become susceptible to erosion by wind and water; therefore, erosion control measures should be planned carefully and in place before excavation and stockpiling begin. Silt fences, hay bales, and/or granular haul roads will be used as required to reduce sediment transport during construction to acceptable levels. If excavations are conducted during dry periods, a water truck will be kept onsite to wet exposed soil to minimize dust generation. Measures to reduce erosion should be implemented in accordance with State of Oregon, City of Portland, and Multnomah County regulations regarding erosion control. In general, erosion control measures must limit sediment transport to less than 1 ton per acre per year, as calculated by the Universal Soil Loss equation.

13.0 GROUNDWATER MANAGEMENT

Dewatering is not anticipated. If dewatering is required during construction, work will stop and a dewatering plan will be prepared for DEQ review and approval. Work will not restart until a DEQ-approved dewatering plan is in place.

14.0 UNFORESEEN CONDITIONS

In the event that undocumented potentially hazardous conditions are encountered that are not addressed in this CMMP (such as underground storage tanks), the excavation contractor shall cease work and notify the appropriate representatives of Midnight Sun – Glen/Mar JV. The excavation contractor will then barricade or otherwise isolate the area and avoid filling the area until authorized to do so by Midnight Sun – Glen/Mar JV, who will determine the appropriate course of action to assess potential unknown conditions encountered during excavation. The

earthwork contractor shall not replace any known or suspected contaminated soil in any excavation area without prior approval by representatives of Midnight Sun – Glen/Mar JV.

15.0 ASSUMPTIONS AND LIMITATIONS

This CMMP has been prepared for DEQ and Midnight Sun – Glen/Mar JV. This CMMP is designed to provide the project team with guidance for the proper handling and management of known or potentially contaminated media present at B235. This document is intended to be used as a general overview document for the use of the excavation contractors and the project team during the earthwork portions of the project. This CMMP is not intended for use by others, and the information contained herein is not applicable to other sites. Reliance by other parties must be approved by Columbia West in accordance with our standard contractual process for third-party reliance. This CMMP is based on interpretations of surface and subsurface conditions based on data from select soil and groundwater samples collected from limited portions of B235. The results of the analyses only indicate the presence or absence of those chemical constituents analyzed in those discrete sample locations. It is always possible that contamination could exist between the widely spaced boring locations. Analytical data from the laboratory samples should only be considered as indicators of site conditions and not a guarantee of the absence of subsurface impact in areas not sampled.

Our services have been executed in accordance with the generally accepted practices in this area at the time this CMMP was prepared. No warranty or other conditions, express or implied, should be understood.

♦ ♦ ♦

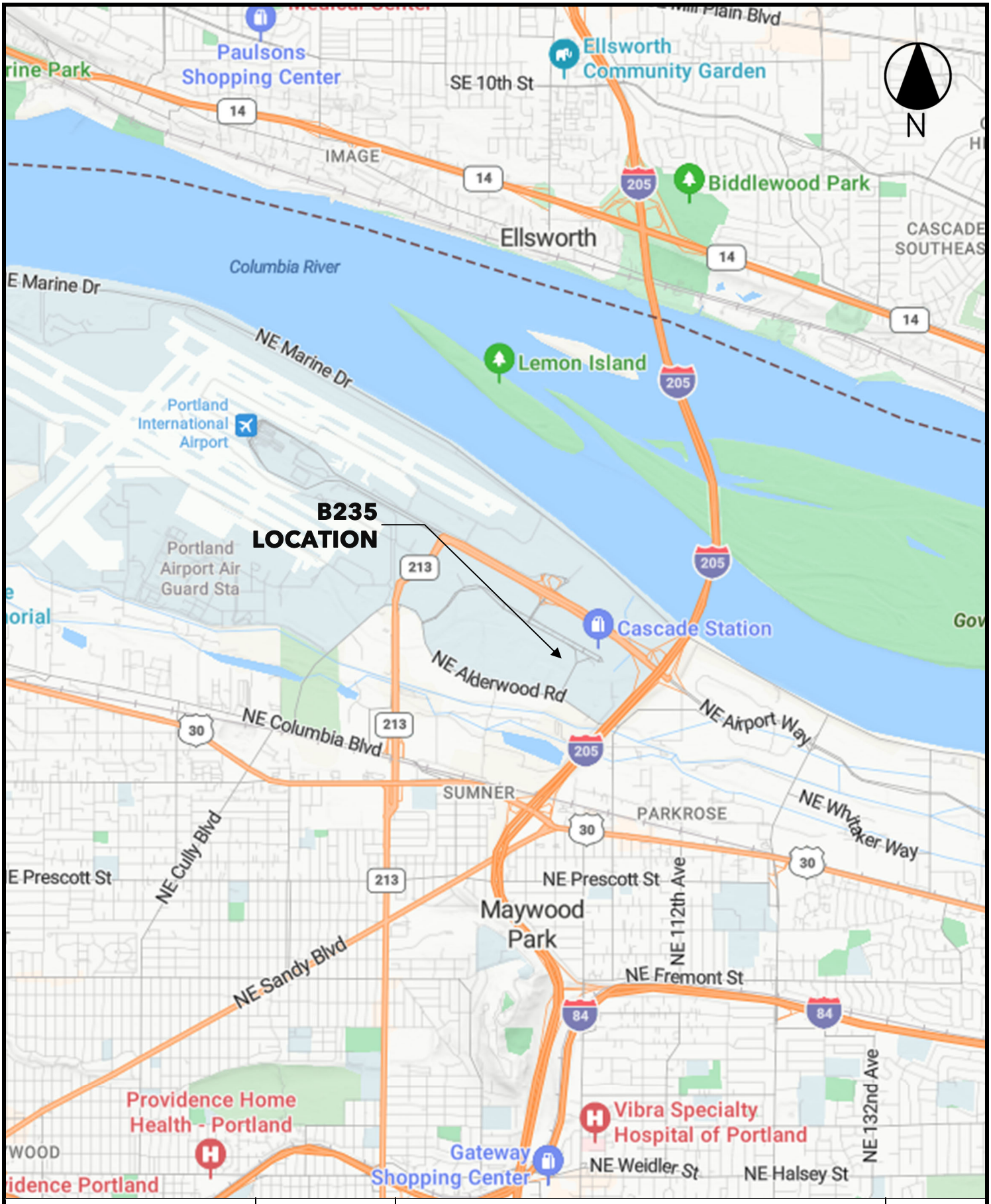
We appreciate the opportunity to work with you on this project. Please contact us if you have any questions regarding this CMMP.

Sincerely,

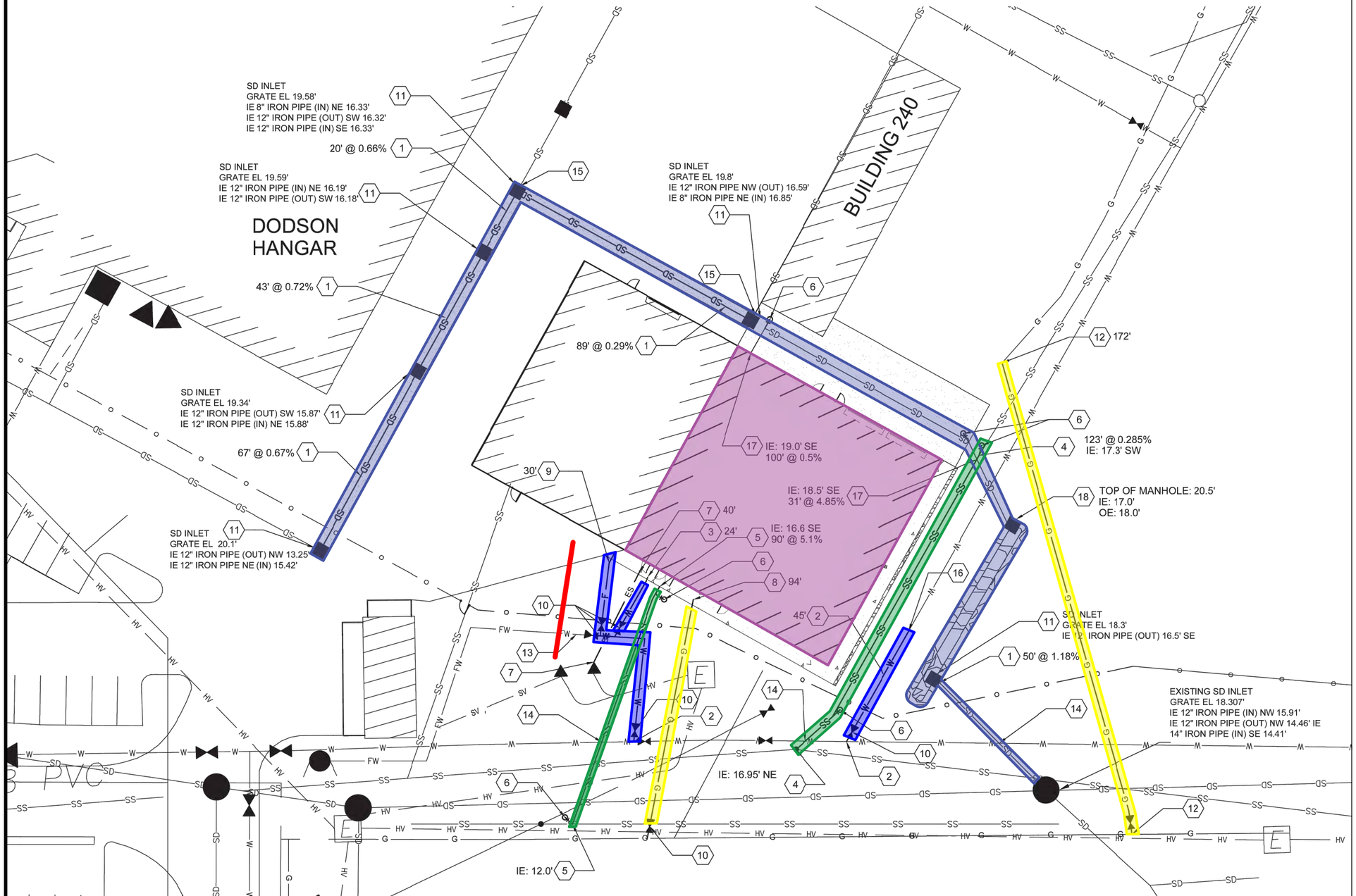
Caroline B. Siegel
Environmental Project Manager

Colby R. Hunt, CHMM
Environmental Principal

FIGURES



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	PROJECT NO.: GMCON-2-02-1 OCTOBER 2025	VICINITY MAP ADD/ALTER B235 – PANG BASE PORTLAND, OREGON	FIGURE 1



LEGEND

- SURFACE GRADING EXCAVATION - 2 FEET BGS (375 CUBIC YARDS OF SOIL)
- TEMPORARY POWER TRENCH LINE - 5 FEET BGS (10 CUBIC YARDS OF SOIL)
- STORM SEWER LINES AND INFILTRATION TRENCH - 6 FEET BGS (234 CUBIC YARDS OF SOIL)
- WATER LINES - 3 FEET BGS (80 CUBIC YARDS OF SOIL)
- SANITARY SEWER LINES - 6 FEET BGS (111 CUBIC YARDS OF SOIL)
- GAS LINES - 4 FEET BGS (137 CUBIC YARDS OF SOIL)

N

0 9 18 27 36 45 90

NOTES:
1. SITE PLAN SOURCED FROM CH2M HILL - JDR JV PLAN SET PROVIDED BY MIDNIGHT SUN - GLEN/MAR JV.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

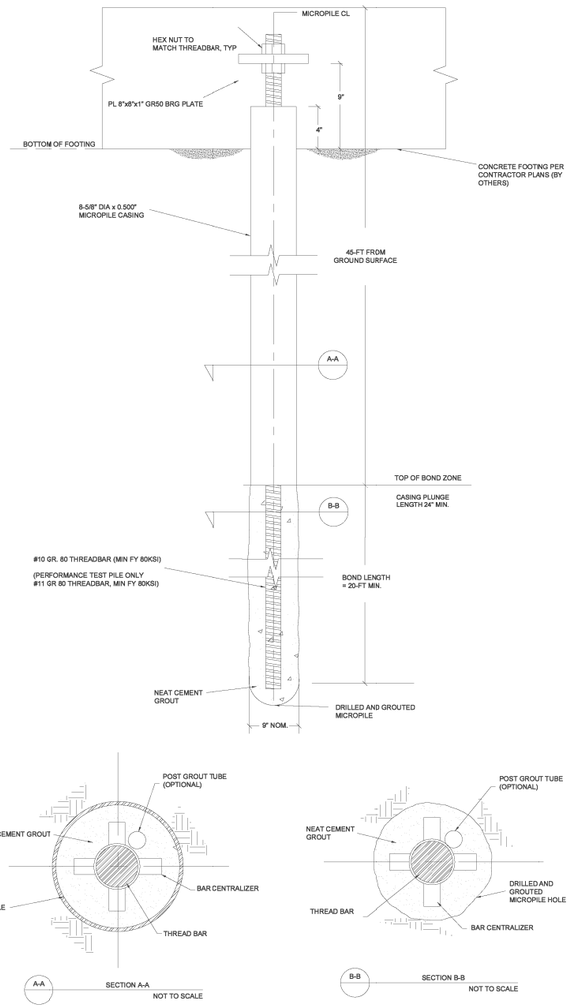
ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON
6801 NE CORNFOOT ROAD

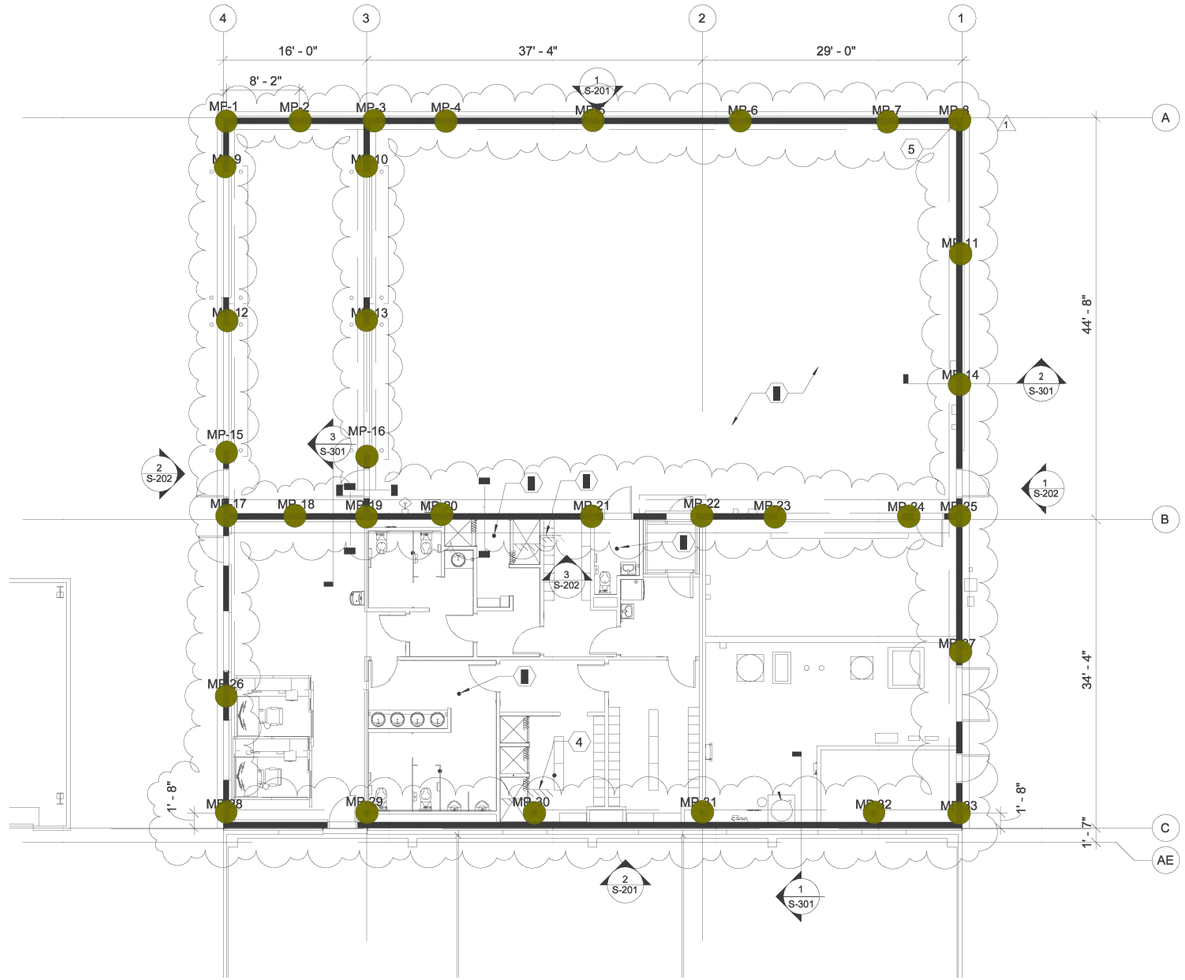
SITE PLAN - EXCAVATION AREAS

PROJECT NO.: GMCON-2-02-1

OCTOBER 2025

FIGURE 2





LEGEND

MICROPILE

N

0 4 8 12 16 20 40

NOTES:
1. SITE PLAN SOURCED FROM CH2M HILL - JDR JV PLAN SET PROVIDED BY MIDNIGHT SUN - GLEN/MAR JV.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

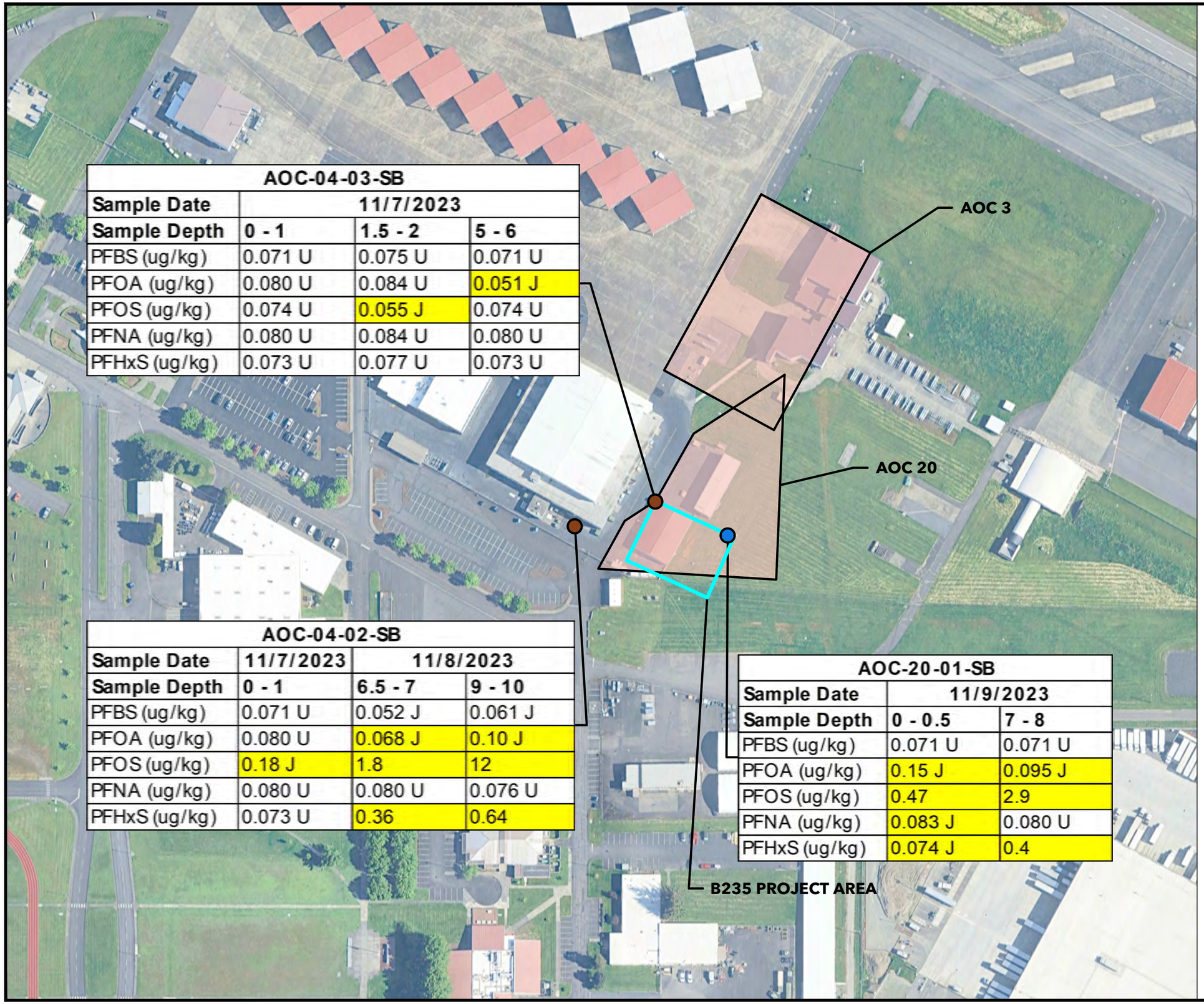
ADD/ALTER BUILDING B235 - PANG BASE
PORTLAND, OREGON
6801 NE CORNFOOT ROAD

SITE PLAN - MICROPILE LOCATIONS

PROJECT NO.: GMCON-2-02-1

OCTOBER 2025

FIGURE 3



AOC-04-03-SB			
Sample Date	**11/7/2023**		
Sample Depth	**0 - 1**	**1.5 - 2**	**5 - 6**
PFBS (ug/kg)	0.071 U	0.075 U	0.071 U
PFOA (ug/kg)	0.080 U	0.084 U	0.051 J
PFOS (ug/kg)	0.074 U	0.055 J	0.074 U
PFNA (ug/kg)	0.080 U	0.084 U	0.080 U
PFHxS (ug/kg)	0.073 U	0.077 U	0.073 U

AOC-04-02-SB			
Sample Date	**11/7/2023**	**11/8/2023**	
Sample Depth	**0 - 1**	**6.5 - 7**	**9 - 10**
PFBS (ug/kg)	0.071 U	0.052 J	0.061 J
PFOA (ug/kg)	0.080 U	0.068 J	0.10 J
PFOS (ug/kg)	0.18 J	1.8	12
PFNA (ug/kg)	0.080 U	0.080 U	0.076 U
PFHxS (ug/kg)	0.073 U	0.36	0.64

AOC-20-01-SB		
Sample Date	**11/9/2023**	
Sample Depth	**0 - 0.5**	**7 - 8**
PFBS (ug/kg)	0.071 U	0.071 U
PFOA (ug/kg)	0.15 J	0.095 J
PFOS (ug/kg)	0.47	2.9
PFNA (ug/kg)	0.083 J	0.080 U
PFHxS (ug/kg)	0.074 J	0.4

LEGEND

- AREA OF CONCERN (AOC)
- SOIL SAMPLE LOCATION - GROUNDWATER MONITORING WELL
- SOIL SAMPLE LOCATION - SOIL BORING

J = ESTIMATED CONCENTRATION

U = NOT DETECTED

YELLOW HIGHLIGHT INDICATES DETECTED CONCENTRATION ABOVE ONE OR MORE SLs

2023 RESULTS ARE FROM SAMPLING CONDUCTED BY BRICE-AECOM JV

N

0 40 80 120 160 200 400

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

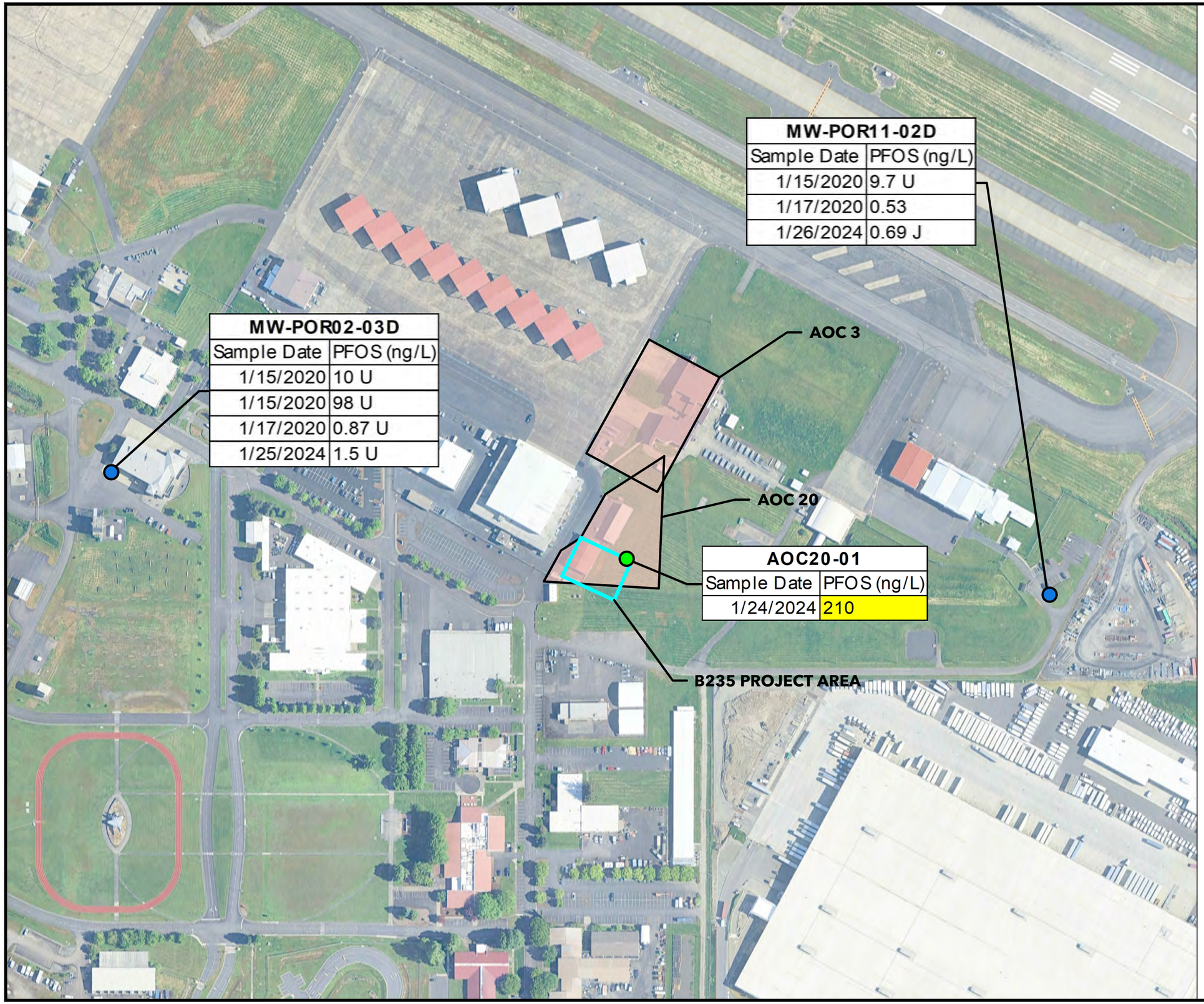
ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON

SITE PLAN - B235 SOIL SAMPLE RESULTS

PROJECT NO.: GMCON-2-02-1

OCTOBER 2025

FIGURE 4



LEGEND

- AREA OF CONCERN (AOC)
- GROUNDWATER SAMPLE LOCATION - SHALLOW MONITORING WELL
- GROUNDWATER SAMPLE LOCATION - DEEP MONITORING WELL

MCL FOR PFOS = 4 ng/L

J = ESTIMATED CONCENTRATION

U = NOT DETECTED

YELLOW HIGHLIGHT INDICATES DETECTED CONCENTRATION ABOVE ONE OR MORE SLs

2020 RESULTS ARE FROM SAMPLING CONDUCTED BY PARSONS

2024 RESULTS ARE FROM SAMPLING CONDUCTED BY BRICE-AECOM JV

N

0 60 120 180 240 300 600

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

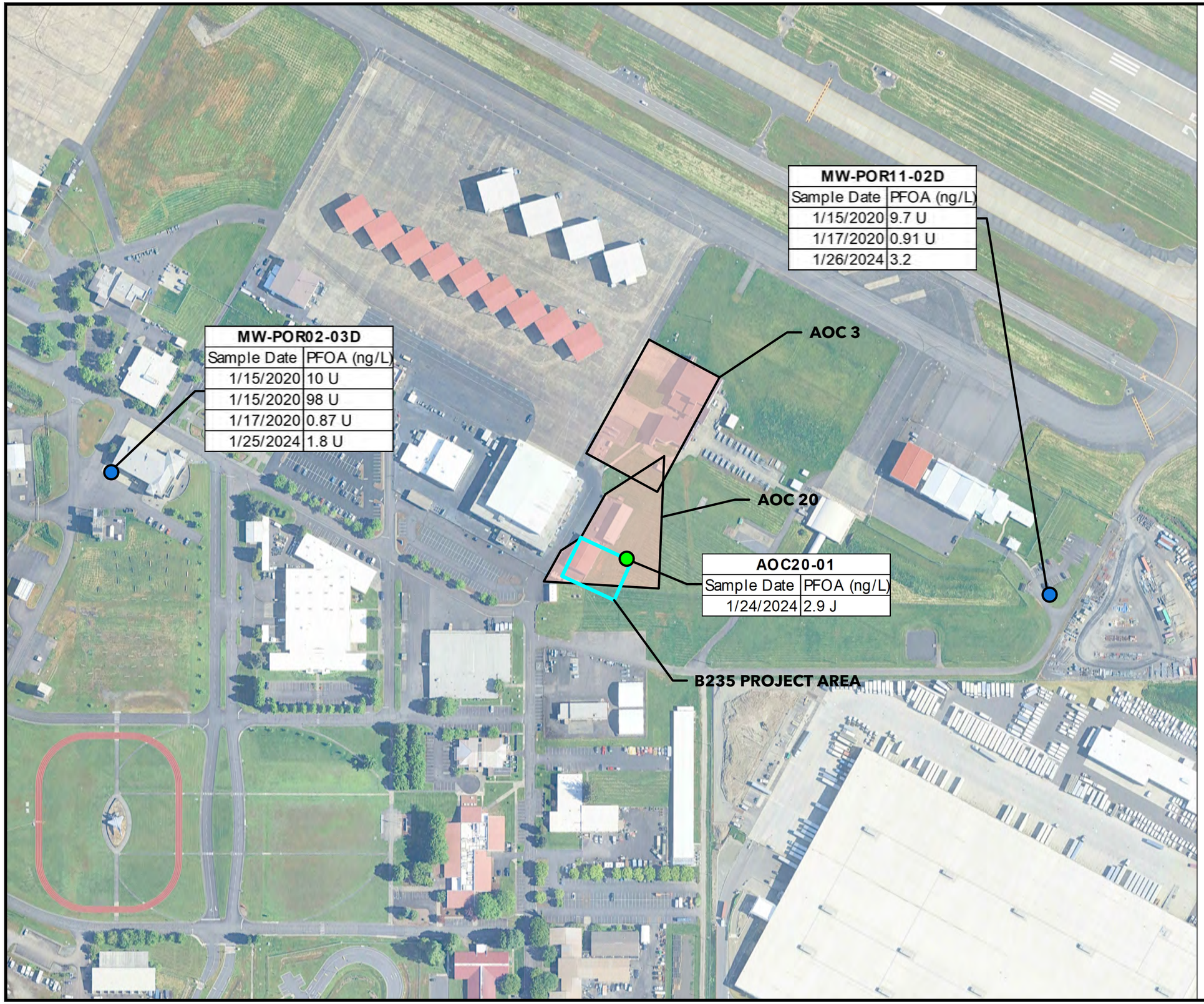
ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON

SITE PLAN - B235 PFOS GROUNDWATER SAMPLE RESULTS

PROJECT NO.: GMCON-2-02-1

OCTOPBER 2025

FIGURE 5



LEGEND

- AREA OF CONCERN (AOC)
- GROUNDWATER SAMPLE LOCATION - SHALLOW MONITORING WELL
- GROUNDWATER SAMPLE LOCATION - DEEP MONITORING WELL

MCL FOR PFOA = 4 ng/L

J = ESTIMATED CONCENTRATION

U = NOT DETECTED

2020 RESULTS ARE FROM SAMPLING CONDUCTED BY PARSONS

2024 RESULTS ARE FROM SAMPLING CONDUCTED BY BRICE-AECOM JV

N

0 60 120 180 240 300 600

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

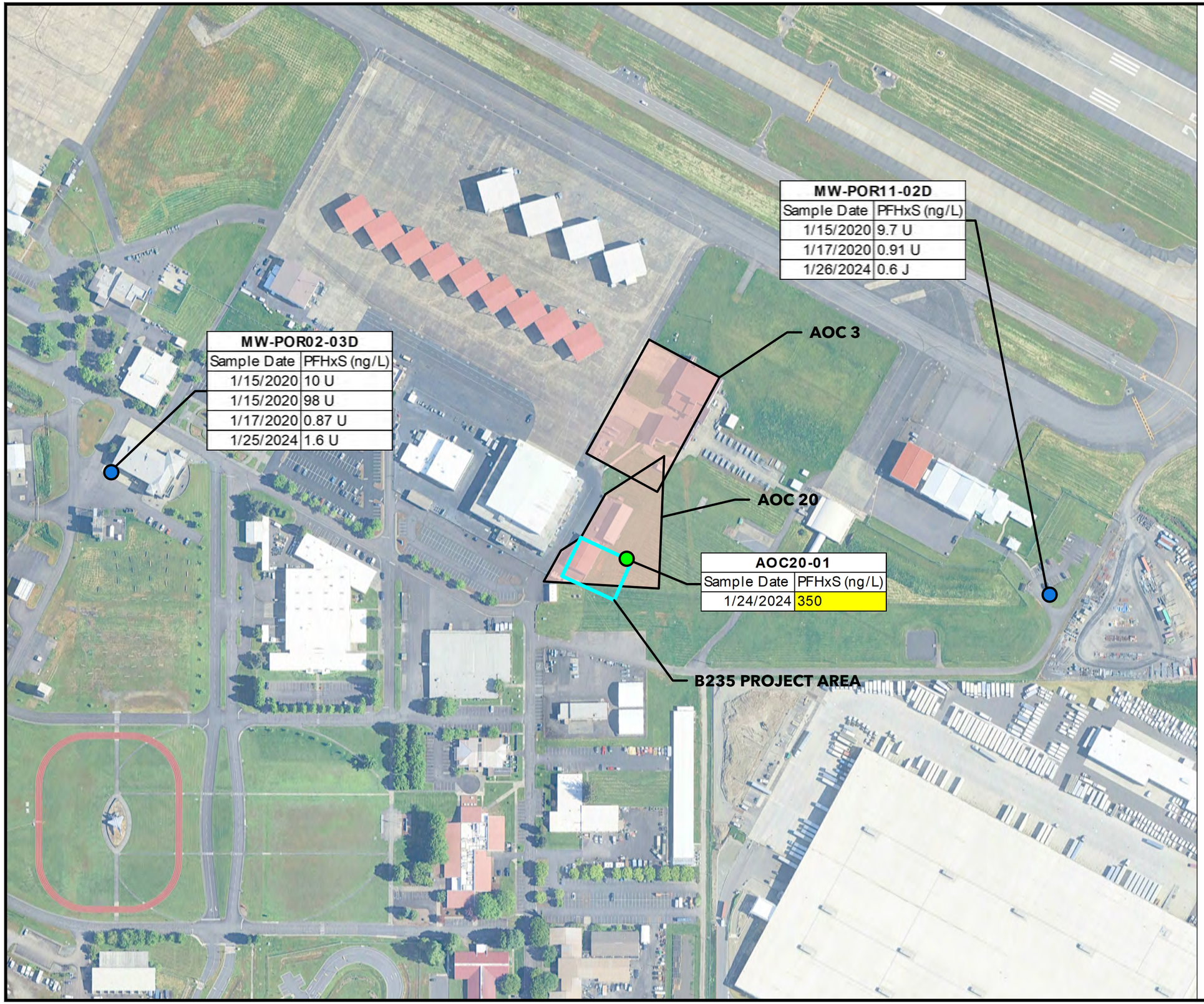
ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON

SITE PLAN - B235 PFOA GROUNDWATER SAMPLE RESULTS

PROJECT NO.: GMCON-2-02-1

OCTOBER 2025

FIGURE 6



LEGEND

- AREA OF CONCERN (AOC)
- GROUNDWATER SAMPLE LOCATION - SHALLOW MONITORING WELL
- GROUNDWATER SAMPLE LOCATION - DEEP MONITORING WELL

MCL FOR PFHxS = 10 ng/L

J = ESTIMATED CONCENTRATION

U = NOT DETECTED

YELLOW HIGHLIGHT INDICATES DETECTED CONCENTRATION ABOVE ONE OR MORE SLs

2020 RESULTS ARE FROM SAMPLING CONDUCTED BY PARSONS

2024 RESULTS ARE FROM SAMPLING CONDUCTED BY BRICE-AECOM JV

N

0 60 120 180 240 300 600

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

ADD/ALTER B235 - PANG BASE
PORTLAND, OREGON

SITE PLAN - B235 PFHXS GROUNDWATER SAMPLE RESULTS

PROJECT NO.: GMCON-2-02-1

OCTOBER 2025

FIGURE 7

TABLES

TABLE 1
Summary of Soil Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Depth (feet BGS)	Sample Date	PFAS EPA Method D-E1633 (µg/kg)									
			11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUds)	2-(N-Ethylperfluorooctanesulfonamido) acetic acid (NEtFOSAA)	2-(N-Methylperfluorooctanesulfonamido) acetic acid (NMeFOSAA)	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)	3-Perfluoroheptyl propanoic acid (7:3 FTCA)	3-Perfluoropropyl propanoic acid (3:3 FTCA)	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl PF3ONS)	Fluorotelomer sulphonic acid 4:2 (4:2 FTS)	Fluorotelomer sulphonic acid 6:2 (6:2 FTS)
AOC04-02-SB-00-01	0 - 1	11/07/23	0.76 U	0.16 U	0.080 U	4.0 U	4.0 U	0.80 U	0.76 U	0.75 U	0.30 U	0.61 U
AOC04-02-SB-06.5-7	6.5 - 7	11/08/23	0.77 U	0.16 U	0.080 U	4.1 U	4.2 U	0.80 U	0.77 U	0.75 U	0.30 U	**1.1**
AOC04-02-SB-9-10	9 - 10	11/08/23	0.71 U	0.15 U	0.076 U	3.8 U	3.8 U	0.75 U	0.71 U	0.7 U	0.28 U	**0.35 J**
AOC04-03-SB-00-01	0 - 1	11/07/23	0.76 U	0.16 U	0.080 U	4.0 U	4.0 U	0.80 U	0.76 U	0.75 U	0.30 U	**0.36 J**
AOC04-03-SB-1.5-02	1.5 - 2	11/07/23	0.79 U	0.17 U	0.084 U	4.2 U	4.2 U	0.80 U	0.79 U	0.75 U	0.32 U	**0.59 J**
AOC04-03-SB-05-06	5 - 6	11/07/23	0.75 U	0.16 U	0.080 U	4.0 U	4.0 U	0.79 U	0.75 U	0.74 U	0.30 U	**1.7**
AOC20-01-SB-0-0.5	0 - 0.5	11/09/23	0.77 U	0.16 U	0.080 U	4.0 U	4.0 U	0.80 U	0.77 U	0.75 U	0.30 U	0.62 U
AOC20-01-SB-7-8	7 - 8	11/09/23	0.75 U	0.16 U	0.080 U	3.9 U	3.9 U	0.79 U	0.75 U	0.74 U	0.30 U	0.6 U
EPA Screening Levels[1]												
Composite Worker (THQ = 0.1)			NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Residential Soil to Groundwater[2]			NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Department of War Screening Levels[3]												
Residential Soil			NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE 1
Summary of Soil Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Depth (feet BGS)	Sample Date	PFAS EPA Method D-E1633 (µg/kg)									
			Fluorotelomer sulphonic acid 8:2 (8:2 FTS)	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N-Ethyl perfluorooctanesulfonamide (NEtFOSA)	N-Ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	N-Methylperfluorooctanesulfonamidoethanol (NMeFOSE)	N-Methylperfluorooctanesulfonamide (NMeFOSA)	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	Perfluoro-3-methoxypropanoic acid (PFMPA)	Perfluoro-4-methoxybutanoic acid (PFMBA)
AOC04-02-SB-00-01	0 - 1	11/07/23	0.31 U	0.80 U	0.080 U	0.80 U	0.80 U	0.040 U	0.80 U	0.28 U	0.32 U	0.32 U
AOC04-02-SB-06.5-7	6.5 - 7	11/08/23	0.31 U	0.80 U	0.080 U	0.80 U	0.80 U	0.040 U	0.80 U	0.28 U	0.32 U	0.32 U
AOC04-02-SB-9-10	9 - 10	11/08/23	0.29 U	0.75 U	0.076 U	0.76 U	0.76 U	0.038 U	0.75 U	0.27 U	0.3 U	0.30 U
AOC04-03-SB-00-01	0 - 1	11/07/23	0.31 U	0.80 U	0.080 U	0.80 U	0.80 U	0.040 U	0.80 U	0.28 U	0.32 U	0.32 U
AOC04-03-SB-1.5-02	1.5 - 2	11/07/23	0.32 U	0.80 U	0.084 U	0.84 U	0.84 U	0.042 U	0.80 U	0.30 U	0.34 U	0.34 U
AOC04-03-SB-05-06	5 - 6	11/07/23	0.30 U	0.79 U	0.080 U	0.80 U	0.80 U	0.040 U	0.79 U	0.28 U	0.32 U	0.32 U
AOC20-01-SB-0-0.5	0 - 0.5	11/09/23	0.31 U	0.80 U	0.080 U	0.80 U	0.80 U	0.040 U	0.80 U	0.28 U	0.32 U	0.32 U
AOC20-01-SB-7-8	7 - 8	11/09/23	0.30 U	0.79 U	0.080 U	0.80 U	0.80 U	0.040 U	0.79 U	0.28 U	0.31 U	0.31 U
EPA Screening Levels[1]												
Composite Worker (THQ = 0.1)			NE	350	NE	NE	NE	NE	NE	NE	NE	NE
Residential Soil to Groundwater[2]			NE	0.0015	NE	NE	NE	NE	NE	NE	NE	NE
Department of War Screening Levels[3]												
Residential Soil			NE	23	NE	NE	NE	NE	NE	NE	NE	NE

TABLE 1
Summary of Soil Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Depth (feet BGS)	Sample Date	PFAS EPA Method D-E1633 (µg/kg)									
			Perfluorobutanesulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanesulfonic acid (PFDoS)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanesulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)
AOC04-02-SB-00-01	0 - 1	11/07/23	0.071 U	0.32 U	0.077 U	0.080 U	0.078 U	**0.048 J**	0.076 U	0.080 U	0.073 U	0.080 U
AOC04-02-SB-06.5-7	6.5 - 7	11/08/23	**0.052 J**	0.32 U	0.077 U	0.080 U	0.078 U	0.08 U	**0.067 J**	0.080 U	**0.36**	**0.078 J**
AOC04-02-SB-9-10	9 - 10	11/08/23	**0.061 J**	0.30 U	0.073 U	0.076 U	0.074 U	0.076 U	**0.20**	**0.032 J**	**0.64**	**0.096 J**
AOC04-03-SB-00-01	0 - 1	11/07/23	0.071 U	0.32 U	0.077 U	0.080 U	0.078 U	0.08 U	0.076 U	0.080 U	0.073 U	0.080 U
AOC04-03-SB-1.5-02	1.5 - 2	11/07/23	0.075 U	0.34 U	0.081 U	0.084 U	0.081 U	0.084 U	0.080 U	0.084 U	0.077 U	0.084 U
AOC04-03-SB-05-06	5 - 6	11/07/23	0.071 U	0.32 U	0.077 U	0.080 U	0.078 U	0.08 U	0.076 U	**0.11 J**	0.073 U	**0.24**
AOC20-01-SB-0-0.5	0 - 0.5	11/09/23	0.071 U	**0.23 J**	0.077 U	0.080 U	0.078 U	0.08 U	0.076 U	**0.070 J**	**0.074 J**	**0.097 J**
AOC20-01-SB-7-8	7 - 8	11/09/23	0.071 U	0.32 U	0.077 U	0.080 U	0.078 U	0.08 U	0.076 U	**0.057 J**	**0.4**	**0.30**
EPA Screening Levels[1]												
Composite Worker (THQ = 0.1)			25,000	120,000	NE	0.00016	NE	4,100	NE	NE	1,600	41,000
Residential Soil to Groundwater[2]			0.30	0.65	NE	0.0000081	NE	17	NE	NE	0.017	0.24
Department of War Screening Levels[3]												
Residential Soil			1,900	7,800	NE	0.06	NE	NE	NE	NE	130	3,200

TABLE 1
Summary of Soil Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Depth (feet BGS)	Sample Date	PFAS EPA Method D-E1633 (µg/kg)									
			Perfluorononanesulfonic acid (PFNS)	Perfluorononanoic acid (PFNA)	Perfluorooctanesulfonamide (PFOSA)	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Perfluoropentanesulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTetDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUDA)
AOC04-02-SB-00-01	0 - 1	11/07/23	0.077 U	0.080 U	0.040 U	**0.18 J**	0.080 U	0.075 U	0.16 U	0.080 U	0.080 U	0.080 U
AOC04-02-SB-06.5-7	6.5 - 7	11/08/23	0.077 U	0.080 U	0.040 U	**1.8**	**0.068 J**	**0.056 J**	0.16 U	0.080 U	0.080 U	0.080 U
AOC04-02-SB-9-10	9 - 10	11/08/23	0.073 U	0.076 U	0.038 U	**12**	**0.10 J**	**0.069 J**	**0.056 J**	0.076 U	0.076 U	0.076 U
AOC04-03-SB-00-01	0 - 1	11/07/23	0.077 U	0.080 U	0.040 U	0.074 U	0.080 U	0.075 U	0.16 U	0.080 U	0.080 U	0.080 U
AOC04-03-SB-1.5-02	1.5 - 2	11/07/23	0.081 U	0.084 U	0.042 U	**0.055 J**	0.084 U	0.079 U	0.17 U	0.084 U	0.084 U	0.084 U
AOC04-03-SB-05-06	5 - 6	11/07/23	0.077 U	0.080 U	0.040 U	0.074 U	**0.051 J**	0.075 U	**0.30 J**	0.080 U	0.080 U	0.080 U
AOC20-01-SB-0-0.5	0 - 0.5	11/09/23	0.077 U	**0.083 J**	0.040 U	**0.47**	**0.15 J**	0.075 U	0.16 U	0.080 U	0.080 U	0.080 U
AOC20-01-SB-7-8	7 - 8	11/09/23	0.077 U	0.080 U	0.040 U	**2.9**	**0.095 J**	0.075 U	0.16 U	0.080 U	0.080 U	0.080 U
EPA Screening Levels[1]												
Composite Worker (THQ = 0.1)			NE	250	NE	8.2	0.078	NE	NE	82,000	NE	25,000
Residential Soil to Groundwater[2]			NE	0.025	NE	0.0015	0.00004	NE	NE	940	NE	4.5
Department of War Screening Levels[3]												
Residential Soil			NE	19	0.63	NE	0.070	NE	NE	NE	NE	NE

Notes:
1. EPA Regional Screening Levels dated November 2024
2. Risk-Based Soil Screening Level for Protection of Groundwater
3. DoW Screening Levels for PFAS for Use in DoD Preliminary Assessments/Site Inspections dated November 2024
NE: not established
THQ: toxic hazard quotient
U: Not detected. Reporting or detection limit shown.
Bolding indicates analyte detection.
Shading indicates analyte detection at a concentration greater than one or more SLs.
Samples collected by Brice-AECOM JV.

TABLE 2
Summary of Groundwater Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Date	PFAS EPA Method D-E1633 (ng/L)									
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUds)	2-(N-Ethylperfluorooctanesulfonamido) acetic acid (NEtFOSAA)	2-(N-Methylperfluorooctanesulfonamido) acetic acid (NMeFOSAA)	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)	3-Perfluoroheptyl propanoic acid (7:3 FTCA)	3-Perfluoropropyl propanoic acid (3:3 FTCA)	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl PF3ONS)	Fluorotelomer sulphonic acid 4:2 (4:2 FTS)	Fluorotelomer sulphonic acid 6:2 (6:2 FTS)
AOC020-01-GW	01/24/24	3.2 U	1.1 U	1.1 U	14 U	14 U	2.7 U	3.2 U	3 U	2.1 U	**9.3**
MW-POR02-03D-GW	01/25/24	5.0 U	1.8 U	1.8 U	22.0 U	22.0 U	4.4 U	5.0 U	4.8 U	3.3 U	10.0 U
MW-POR11-02D-GW	01/26/24	4.1 U	1.4 U	1.4 U	18.0 U	18.0 U	3.6 U	4.1 U	4.0 U	2.7 U	8.4 U
EPA Screening Levels[1]											
Drinking Water MCL		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Department of War Screening Levels[2]											
Tap Water		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE 2
Summary of Groundwater Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Date	PFAS EPA Method D-E1633 (ng/L)									
		Fluorotelomer sulphonic acid 8:2 (8:2 FTS)	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N-Ethyl perfluorooctanesulfonamide (NEtFOSA)	N-Ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	N-Methylperfluorooctanesulfonamidoethanol (NMeFOSE)	N-Methylperfluorooctanesulfonamide (NMeFOSA)	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	Perfluoro-3-methoxypropanoic acid (PFMPA)	Perfluoro-4-methoxybutanoic acid (PFMBA)
AOC020-01-GW	01/24/24	2.1 U	3.3 U	0.56 U	2.8 U	2.8 U	1.1 U	1.8 U	1.5 U	0.86 U	1.8 U
MW-POR02-03D-GW	01/25/24	3.3 U	5.2 U	0.88 U	4.4 U	4.4 U	1.8 U	2.8 U	2.4 U	**0.57 J**	2.8 U
MW-POR11-02D-GW	01/26/24	2.7 U	4.3 U	0.72 U	3.6 U	3.6 U	1.4 U	2.3 U	2 U	**1.3 J**	2.3 U
EPA Screening Levels[1]											
Drinking Water MCL		NE	10	NE	NE	NE	NE	NE	NE	NE	NE
Department of War Screening Levels[2]											
Tap Water		NE	1.5	NE	NE	NE	NE	NE	NE	NE	NE

TABLE 2
Summary of Groundwater Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Date	PFAS EPA Method D-E1633 (ng/L)									
		Perfluorobutanesulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanesulfonic acid (PFDoS)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanesulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)
AOC020-01-GW	01/24/24	**5.1**	**1.6** J	0.55 U	0.56 U	0.55 U	0.56 U	**5.9**	**1.0** J	**350**	**11**
MW-POR02-03D-GW	01/25/24	0.77 U	3.5 U	0.86 U	0.88 U	0.86 U	0.88 U	0.84 U	1.8 U	1.6 U	0.88 U
MW-POR11-02D-GW	01/26/24	0.63 U	2.9 U	0.7 U	0.72 U	0.7 U	0.72 U	0.68 U	1.4 U	**0.6** J	0.72 U
EPA Screening Levels[1]											
Drinking Water MCL		NE	NE	NE	NE	NE	NE	NE	NE	10	NE
Department of War Screening Levels[2]											
Tap Water		600	1,800	NE	NE	NE	NE	NE	NE	10	990

TABLE 2
Summary of Groundwater Sample Chemical Analytical Results
PFAS
Add/Alter B235 - PANG Base
6801 NE Cornfoot Road
Portland, Oregon

Sample ID	Sample Date	PFAS EPA Method D-E1633 (ng/L)									
		Perfluorononanesulfonic acid (PFNS)	Perfluorononanoic acid (PFNA)	Perfluorooctanesulfonamide (PFOSA)	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Perfluoropentanesulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTetDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUDA)
AOC020-01-GW	01/24/24	0.53 U	0.56 U	0.56 U	**210**	**2.9 J**	**5.5**	0.54 U	1.1 U	0.56 U	1.1 U
MW-POR02-03D-GW	01/25/24	0.84 U	0.88 U	0.88 U	1.5 U	1.8 U	1.7 U	0.86 U	1.8 U	0.88 U	1.8 U
MW-POR11-02D-GW	01/26/24	0.68 U	0.72 U	0.72 U	**0.69 J**	**3.2**	1.4 U	0.72 U	1.4 U	0.72 U	1.4 U
EPA Screening Levels[1]											
Drinking Water MCL		NE	10	NE	4	4	NE	NE	940	NE	NE
Department of War Screening Levels[2]											
Tap Water		NE	5.9	NE	4.0	4.0	NE	NE	NE	NE	NE

Notes:
1. EPA Screening Levels dated November 2024
2. DoW Screening Levels for PFAS for Use in DoD Preliminary Assessments/Site Inspections dated November 2024
J: The identification of the analyte is acceptable; the reported value is an estimate.
NE: not established
U: Not detected. Reporting or detection limit shown.
Shading indicates analyte detection at a concentration greater than one or more SLs.
Samples collected by Brice-AECOM JV.

APPENDIX A

MATERIAL APPROVAL SUBMITTAL

(See Instructions on Reverse)

Form Approved
OMB No 9000-0062
Expires May 31, 2005

TO: *(Contracting Officer)*	**FROM:** *(Contractor)*	DATE *(YYYYMMDD)*
Andrew Dowling, MSgt, OR ANG	Midnight Sun-Glen/Mar JV	2024/08/27
CONTRACT NUMBER W50S8Y24C0001	SUBMISSION NUMBER 31 00 00 - 1 Earthwork	SUBMITTAL ☑ NEW ☐ RESUBMITTAL
PREVIOUS SUBMISSION NUMBER	PROJECT NUMBER TQKD209-002	

TO BE COMPLETED BY CONTRACTOR			**FOR GOVERNMENT USE ONLY**			
ITEM NO.	SPECIFICATION SECTION/ PARA NO./DRAWING NO.	DESCRIPTION OF MATERIAL *(Include Type, Model Number, Catalog Number, Mfg., etc.)*	AP-PROVED	DISAP-PROVED	SEE REVERSE	INITIAL
1	31 00 00 / 3.5	Shoring (G)				
2	" / 1.4.3	De-watering work plan (G)				
3	" / 3.8, 3.14	Utilization of excavated materials (G)				
4	" / 3.9	Buried tape and detection wire (information)				
5	" / 3.10	Backfill and bedding materials (information)				

BY COMPLETING THIS FORM, THE UNDERSIGNED CONTRACTOR CERTIFIES THAT THE MATERIAL COMPLIES WITH ALL SPECIFICATIONS OF SUBJECT CONTRACT.

DATE *(YYYYMMDD)*	TYPE OR PRINT NAME AND TITLE	SIGNATURE
2024/08/27	Kevin R. Mitchell, Construction Manager	Kevin R. Mitchell

FOR GOVERNMENT USE ONLY

TO: *(Base Civil Engineering Officer)*

For Evaluation and Action

DATE *(YYYYMMDD)*	TYPE OR PRINT NAME AND GRADE	SIGNATURE

TO: *(AF Contracting Office)*

RECOMMEND ☐ APPROVAL ☐ DISAPPROVAL AS INDICATED ABOVE AND SUBJECT TO ANY APPLICABLE COMMENTS ON THE REVERSE

DATE *(YYYYMMDD)*	TYPE OR PRINT NAME AND GRADE	SIGNATURE

TO: *(Contractor)*

☐ APPROVED ☐ DISAPROVED AS INDICATED ABOVE AND SUBJECT TO ANY APPLICABLE COMMENTS ON THE REVERSE SIDE. REQUEST RESUBMITTAL ON DISAPPROVED ITEMS WITHIN _____ DAYS OF DATE SHOWN BELOW.

DATE *(YYYYMMDD)*	TYPE OR PRINT NAME AND GRADE	SIGNATURE

COMMENTS

(Number to correspond with applicable Item Number on reverse)

INSTRUCTIONS TO CONTRACTORS

1. The term "material" is defined as articles, supplies, raw materials, equipment, parts, components, and end items that are to be incorporated into the work required by the contract.

2. This form is to be used by contractors for submitting Shop Drawings, Equipment Data, Manufacturer's Literature and Certificates and samples of Materials to the Government for approval in accordance with the provisions of this contract. Unless otherwise specified, it is to be prepared in 4 copies, signed, and provided to the contracting officer with appropriate attachments.

3. Item(s) to be approved will be clearly tabbed or identified. Data pertaining to item(s) to be approved will be clearly identified or tabbed, particularly where documents are voluminous, in order to properly evaluate the materials or articles to be incorporated in the work. Each attachment will be numbered to correspond with the item number shown on the face of this form.

4. Requests submitted shall be numbered consecutively, by contract, in the space entitled "Submission No.". This number, in addition to the Contract No., will be used to identify each Material Approval Submittal. Resubmissions will be indicated in the appropriate block and the insertion of previous submission number and data in addition to a new submission number. A single submission should be used for all work of a section of the specifications, but in NO instance should the submission include work for more than one (1) contract. Submittals requiring priority handling will be submitted by separate submittal using the form and so marked across the face of the form.

5. This Material Approval Submittal is not valid unless it is signed by the contracting officer. This approval is required as called for by the contracting officer under the terms of this contract.

TABULATED DATA

VERTICAL SHORES

SPEED SHORE®

3330 S. SAM HOUSTON PKWY E. HOUSTON, TEXAS 77047
Phone: 713.943.0750 ■ Toll Free: 800.231.6662 ■ Fax: 713. 943.8483

W A R N I N G

EXCAVATION PROCEDURES MAY BE VERY DANGEROUS

- **A TRAINED *COMPETENT PERSON* SHALL: SUPERVISE ALL EXCAVATION OPERATIONS, ENSURE THAT ALL PERSONNEL ARE WORKING IN SAFE CONDITIONS, AND HAVE THOROUGH KNOWLEDGE OF THIS TABULATED DATA. THE *COMPETENT PERSON* SHALL HAVE THE AUTHORITY TO STOP WORK WHEN IT IS UNSAFE FOR WORKERS TO ENTER AN EXCAVATION.**

- **ALL PERSONNEL SHALL BE TRAINED IN CORRECT EXCAVATION PROCEDURES, PROPER USE OF THE PROTECTIVE SYSTEM AND ALL SAFETY PRECAUTIONS.**

- **EXCAVATIONS AND PROTECTIVE SYSTEMS SHALL BE INSPECTED AT LEAST DAILY AND WHENEVER THERE IS A CHANGE OF SOIL, WATER OR OTHER JOB SITE CONDITIONS.**

- **ALL LIFTING AND PULLING EQUIPMENT, INCLUDING CABLES, SLINGS, CHAINS, SHACKLES AND SAFETY HOOKS SHALL BE EVALUATED FOR SUITABILITY AND CAPACITY, AND SHALL BE INSPECTED FOR DAMAGE OR DEFECTS PRIOR TO USE.**

- **ALL INSTALLATION AND REMOVAL OF SHORING AND SHIELDING SHALL BE FROM ABOVE GROUND ONLY.**

- **DO NOT ALLOW PERSONNEL TO ENTER AN EXCAVATION THAT IS NOT PROPERLY SHORED, SHIELDED OR SLOPED.**

- **PERSONNEL SHALL ALWAYS WORK WITHIN THE SHORING AND SHIELDING. PERSONNEL SHALL NOT STAND ON THE EDGE OF AN UNSHORED EXCAVATION.**

- **ALL PERSONNEL SHALL ENTER AND EXIT EXCAVATIONS ONLY WITHIN SHIELDED OR SHORED AREAS.**

SPEED SHORE'S "MANUFACTURER'S TABULATED DATA" IS A GENERAL SET OF GUIDELINES AND TABLES TO ASSIST THE ***COMPETENT PERSON*** IN SELECTING A SAFETY SYSTEM AND THE PROPER SHORING OR SHIELDING EQUIPMENT. THE ***COMPETENT PERSON*** HAS SOLE RESPONSIBILITY FOR JOB SITE SAFETY AND THE PROPER SELECTION **AND INSTALLATION AND REMOVAL OF THE SHORING OR SHIELDING EQUIPMENT.**

THIS TABULATED DATA IS NOT INTENDED TO BE USED AS A JOB SPECIFIC EXCAVATION SAFETY PLAN, BUT SHALL BE USED BY THE ***COMPETENT PERSON*** TO SUPPLEMENT HIS TRAINING, HIS EXPERIENCE AND HIS KNOWLEDGE OF THE JOB CONDITIONS AND SOIL TYPE.

SPEED SHORE® CORPORATION

SPEED SHORE
TABULATED DATA

1.0 SCOPE

1.1 Speed Shore's Tabulated Data complies with the O.S.H.A. standards as stated in the Code of Federal Regulations 29, Part 1926, Subpart P - Excavations, Section 1926.652(c)(2). This data shall only be used by the contractor's ***competent person*** in the selection of Speed Shore Vertical Shores. The ***competent person*** shall be experienced and knowledgeable in trenching and excavation procedures, soil identification and in the use of Speed Shore Vertical Shores.

1.2 All personnel involved in the installation, removal and use of Vertical Shores shall be trained in their use and advised of appropriate safety procedures.

1.3 Table VS-1, VS-2 and VS-3 is based upon requirements stated in CFR 29, Part 1926 and applicable portions of CFR 29, Part 1910. The ***competent person*** shall know and understand the requirements of those parts before using this data.

1.4 Whenever there is a variance between this Tabulated Data and CFR 29, Part 1926, Subpart P - Excavations, this Tabulated Data shall take precedence. Whenever a topic or subject is not contained in this Tabulated Data, the ***competent person*** shall refer to CFR 29, Part 1926, Subpart P - Excavations.

1.5 This data refers to the Code of Federal Regulations, 29, Parts 1910 and 1926. In states that have their own state O.S.H.A. refer to similar regulations in the current construction rules published by the state office of Occupational Health and Safety.

1.6 Tables VS-1, VS-2 and VS-3 shall be used only in excavations with soil conditions as noted. Table VS-1, VS-2 and VS-3 are for depths to 25 feet. For other soil and excavation conditions and depths, site-specific engineered designs are required. Contact Speed Shore Corporation for assistance

1.7 This Tabulated Data is applicable for standard products manufactured exclusively by Speed Shore and may only be used with Speed Shore manufactured products. Any modification or repair of Speed Shore products not specifically authorized by Speed Shore Corporation voids this data.

2.0 DEFINITIONS (RE: CFR 29, Part 1926.32 Definitions) - RESTATED FOR EMPHASIS

2.1 1926.32 (f) "competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees; and who has authorization to take prompt corrective measures to eliminate them.

2.2 1926.32 (p) "Shall" means mandatory.

2.3 1926.32 (q) “Should” means recommended.

3.0 SOIL CLASSIFICATIONS

3.1 In order to use the data presented in Tables VS-1, VS-2 and VS-3 the soil type, or types, in which the excavation is cut shall first be determined by the ***competent person*** according to the O.S.H.A. soil classifications as set forth in CFR 29, Part 1926, Subpart P, Appendix A.

3.2 Table VS-3 is also for use in Type C-60 soil (see 3.3 for definition).

3.3 Type C-60 soil is a moist, cohesive soil or a moist dense granular soil, which does not fit into Type A or Type B classifications, and is not flowing or submerged. This material can be cut with near vertical sidewalls and will stand unsupported long enough to allow the Vertical Shores to be properly installed. The ***competent person*** must monitor the excavation for signs of deterioration of the soil as indicated by, but not limited to, freely seeping water or flowing soil entering the excavation around or below the sheeting. An alternate design for less stable Type C soil will be required where there is evidence of deterioration.

SPEED SHORE CORPORATION

4.0 PRESENTATION OF INFORMATION

4.1 Information is presented in tabular form in Tables VS-1, VS-2 and VS-3. Each table presents the maximum vertical and horizontal spacing that may be used with Vertical Shores for indicated soil types. Table VS-1 is for O.S.H.A. Type A Soil, Table VS-2 for O.S.H.A. Type B Soil and Table VS-3 is for Vertical Shore use in Type C-60 soil (see 3.3 for definition).

4.2 Tables VS-1, VS-2 and VS-3 are not considered adequate when loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by 3 feet of soil surcharge. The term "adjacent" as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

4.3 Using the appropriate table, the ***competent person*** selects the horizontal spacing of the vertical shores and the sheeting required, if any. The selection is based on the depth and width of the trench in varying soil conditions. In these tables, the vertical spacing of the cylinders is held constant at a maximum of 4 feet on center. The horizontal spacing of the hydraulic cylinders is the same as the horizontal spacing of the vertical rails.

5.0 BASIS AND LIMITATIONS OF THE DATA

5.1 Sheeting is used only to prevent local raveling or sloughing of the trench face between the Vertical Shores. Sheeting shall be one of the following or an approved equal.

5.1.1 Aluminum: Speed Shore's Aluminum Sheeting

5.1.2 Steel: 0.5 inch or thicker Steel Plate

5.1.3 Plywood:

3/4 inch Finn Form
3/4 inch Omni Form
3/4 inch Combi Exterior Plywood
3/4 inch Plyform American Plywood Association, Plyform, B - B, Class I Exterior
3/4 inch HDO American Plywood Association, High Density Overlay, Exterior
3/4 inch 14 Ply Artic White Birch
1 1/8 inch CDX
Two sheets of 3/4 inch thick CDX Plywood.

5.2 When sheeting is used, it shall extend to the top the excavation and to within 2 feet of the bottom of the excavation; except in Table VS-3 for excavation depths 0 - 25 feet, where the sheeting shall extend to the bottom of the excavation. If there is an indication of a possible loss of soil from behind or below the support system, sheeting must extend to the bottom of the excavation.

5.3 All spacings indicated are measured from center to center of the members.

5.4 The center line of the top hydraulic cylinder shall be a minimum of 12 inches and a maximum of 24 inches below the top of the excavation.

5.5 The center line of the bottom hydraulic cylinder shall be a maximum of 4 feet above the bottom of the excavation.

5.6 In excavations 6 feet deep or less, only 1 hydraulic cylinder (Single Shore) is required in each vertical plane. The cylinder shall be no more than 4 feet above the bottom of the excavation, and no more than 2 feet below the top of the excavation. In excavations 6 feet to 10 feet deep there shall be a minimum of 2 hydraulic cylinders in each vertical plane. The horizontal spacing shall be as shown in the tables.

5.7 The vertical rails directly behind each hydraulic cylinder pad must bear on firm soil or a solid and stable filler to distribute the cylinder load to the face of the excavation. Do not butt rails back to back across an excavation.

5.8 Two single shores may be substituted for a vertical shore.

5.9 The aluminum rails are designed to be used vertically, however they may be orientated horizontally or diagonally if all other provisions of this data are satisfied.

5.10 The maximum vertical spacing between center lines of hydraulic cylinders shall be 4 feet.

5.11 The faces of the excavation must be cut near vertical and straight

5.12 There shall be a minimum of 3 consecutive shores in a row, at the horizontal spacing indicated (or less), to form a shoring system. In trenches over 12 feet deep, and whenever possible, a minimum of 4 shores should be used. For excavations that are too short to place 3 or 4 shores at the required spacing, the shores shall be placed at the required spacing from end to end of the excavation with a minimum of 2 shores. There shall be a shore within 2 feet of each end of the excavation

5.13 The ends of trenches shall be shored or sloped in accordance with Appendix B of CFR 29, Part 1926 Subpart P Excavations.

5.14 No vertical or lateral loads shall be applied to the cylinders.

5.15 Water flowing into an excavation, from either above or below ground, will cause a decrease in the stability of the soil. Therefore, the ***competent person*** shall take action to prevent water from entering the excavation and remove any water that accumulates in the excavation. Closer monitoring of the soil is required under wet conditions, particularly in less cohesive (weaker) soil conditions. A small amount of water, or flowing conditions, may downgrade the soil classification to a less stable classification. A large amount of water, or flowing conditions, may downgrade all soils to O.S.H.A. Type C. Speed Shore shoring and shielding systems may be used safely in wet conditions when the excavation is monitored by the ***competent person***. Example: When repairing a leak in utility lines, it is often difficult or even impossible, to keep water out of the excavation.

5.16 If shores are installed on the seam between 2 adjacent sheets of plywood, each plywood sheet shall bear a minimum of 4 inches on each vertical rail.

5.17 Tables VS-l, VS-2 and VS-3 shall be used only for selecting the spacing and excavation depths for Single Shores, Vertical Shores and Multi-Shores. Normally, a Single Shore has 1 hydraulic cylinder, a Vertica1 Shore has 2 hydraulic cylinders and Multi-Shores have 3 or more hydraulic cylinders. All three types may be used and may be mixed if the provisions of this Tabulated Data are followed.

6.0 INSPECTION

6.1 The ***competent person*** must evaluate the soils to assure the rated capacity of the Vertical Shores is not exceeded by the lateral pressure of the soil. Soils shall be evaluated in accordance with Part 3.0.

6.2 The ***competent person*** shall monitor all phases of the assembly, installation and use of this product to evaluate and eliminate methods, which could endanger employees utilizing this product.

6.3 Daily inspections of the Vertical Shores and accessories must be performed by the ***competent person*** and deficiencies corrected.

6.4 Inspections shall be conducted as necessary for hazards associated with water accumulation, changing soil conditions, or changing site weather conditions.

7.0 EXAMPLE TO ILLUSTRATE THE USE OF TABLES VS-1, VS-2 and VS-3:

Problem: Design a trench safety system using Speed Shore Vertical Shores for an excavation 8 feet deep and 4 feet wide in O.S.H.A. Type B soil.

Study tables: Select Table VS-2 for Type B soil. Look in the column "Depth of Excavation" on line 0 to 15 feet. Next, read across and find under "Hydraulic Cylinders", "Maximum Horizontal Spacing" at 8 feet and "Maximum Vertical Spacing" at 4 feet. Next, locate the hydraulic cylinder size under "Width of Excavation", 0 to 8 feet": 2 inch diameter. Finally, under "Sheeting", Notes 2 and 3 apply.

Conclusion: Install Speed Shore Vertical Shores with 2 inch diameter cylinders at 8 feet intervals with or without plywood sheeting, depending upon the ***competent person's*** judgment of the raveling or sloughing of the excavation face. (See Notes 2 and 3).

TABLE VS-1 TYPE "A" SOIL

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing *(FEET)*	Maximum Vertical Spacing (Note 6) *FEET*	Width of Excavation *FEET*			
			0 to 8	8 to 12	12 to 15	
0 to 15	8	4	2" dia.	2" dia.	2" dia. (Note 1)	(Note 2)
0 to 25	8	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 2)

TABLE VS-2 TYPE "B" SOIL

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing *(FEET)*	Maximum Vertical Spacing (Note 6) *FEET*	Width of Excavation *FEET*			
			0 to 8	8 to 12	12 to 15	
0 to 10	8	4	2" dia.	2" dia.	2" dia. (Note 1)	(Note 2)
0 to 20	6	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 2)
0 to 25	5	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 7)

TABLE VS-3 TYPE "C-60" SOIL (See 3.3 for definition of C-60 Soil)

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 4)
	Maximum Horizontal Spacing *(FEET)*	Maximum Vertical Spacing (Note 6) *FEET*	Width of Excavation *FEET*			
			0 to 8	8 to 12	12 to 15	
0 to 10	6 (Note 5)	4	2" dia	2" dia	2" dia. (Note 1)	(Note 2)
0 to 20	4	4	2" dia	2" dia. (Note 1)	2" dia. (Note 1)	(Note 7)
0 to 25	4	4	2" dia	2" dia. (Note 1)	N/A	(Note 7)

NOTES TO TABLES VS-1, VS-2 and VS-3

1. Two inch diameter cylinders shall have a structural steel tube oversleeve 3.5 x 3.5 x 0.1875 inches extension (installed over the aluminum oversleeve extension) or a steel tube oversleeve 3 x 3 x 0.1875 inch extension (installed without the aluminum oversleeve) that extends the full retracted length of the cylinder. CAUTION: In either case, the aluminum load transfer plug and the aluminum innersleeve shall be used or a steel load transfer plug shall be welded securely in place inside the steel oversleeve to transfer the load through the steel oversleeve to the socket pad. Other Speed Shore approved oversleeves may be used.

2. The bottom of the sheeting shall extend within 2 feet of the bottom of the excavation. If there is an indication of a possible loss of soil from behind or below the support system, sheeting must extend to the bottom of the excavation.

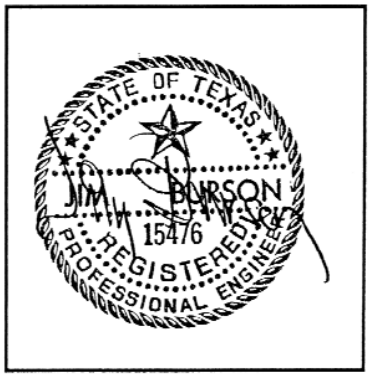
3. Four feet wide sheeting is required at each Vertical Shore if raveling or sloughing of the excavation face appears likely to occur.

4. Four feet wide sheeting shall be used.

5. When 4 feet horizontal spacing is exceeded, the open spaces between the sheeting must be monitored for sloughing and raveling of the excavation face.

6. The bottom hydraulic cylinder shall be a maximum of 4 feet above the bottom of the excavation.

7. Sheeting shall extend to the bottom of the excavation.



SPEED SHORE CORPORATION

EXAMPLES OF TYPICAL INSTALLATION

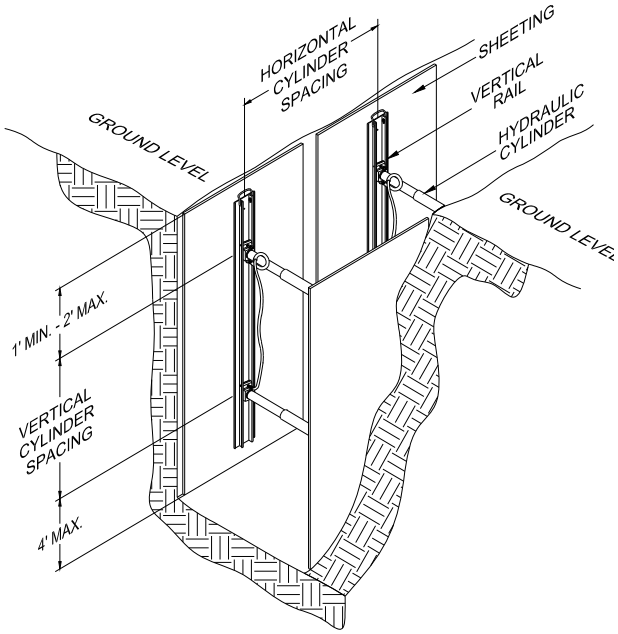


FIG. 1
WITH SHEETING

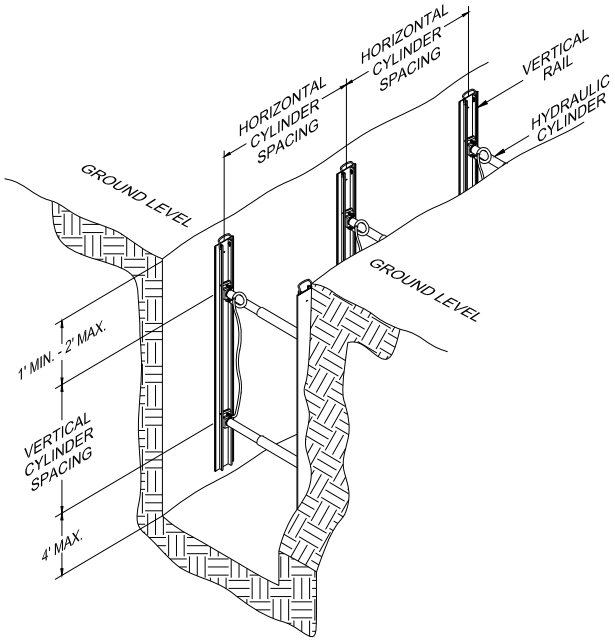


FIG. 2
WITHOUT SHEETING

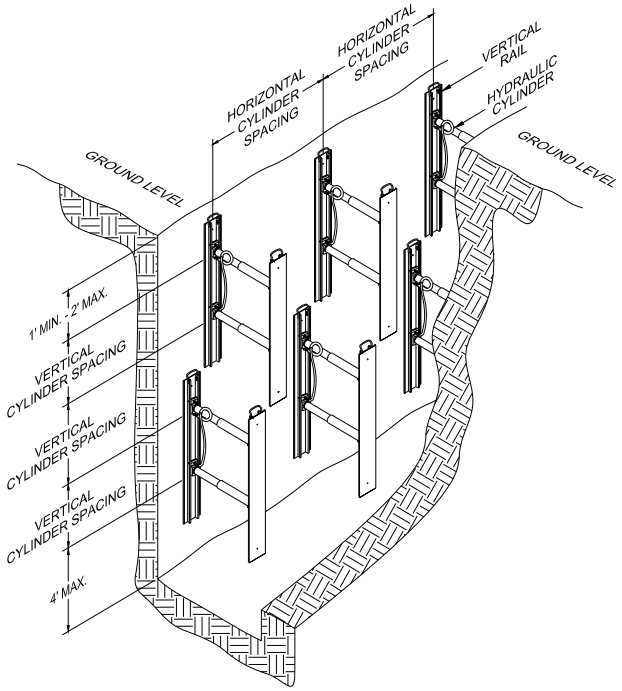


FIG. 3
STACKED

SPEED SHORE CORPORATION

Utilization of Excavated Materials and Shoulder Construction

Assuming the excavated materials are suitable for re-use:

- All excavated materials from trenches to be placed and compacted back in trench lines where applicable, excess material to be hauled off site.

- All excavated materials from grading cuts/fills to be placed and compacted on shoulders of hard/paved surfaces, excess material to be hauled off site.

- All excess excavated material will be hauled off site and disposed of properly.

Any unsuitable excavated materials will be hauled off site and disposed of properly.

3.9 Buried tape and detection wire

Christy's

NOTE: Not all widths are available as standard for the stock color/legend combinations shown. Contact Christy's™ for stock availability of specific products. Non-stock combinations are subject to minimum requirements and plate charges.

Christy's Detectable Marking Tape

Our DETECTABLE marking tape provides for easy buried pipeline detection and below ground identification and warning. The tape can be located below ground with a non-ferrous metal detector when buried at the proper depths. All Christy's tape meets or exceeds the industry standards including the American Public Works Association (APWA) color code.

TAPE MUST BE BURIED FLAT FOR MAXIMUM DETECTABILITY AND LINE PROTECTION. CONSULT YOUR SPECIFIC LOCATOR MANUFACTURER FOR BURIAL LIMITATIONS.

Tape Width	Tape Bury Depth
2"	6" - 9"
3"	6" - 12"
6"	6" - 18"
12" or wider	6" - 24"

SPECIFICATIONS

- Christy's™ DETECTABLE marking tape consists of a 4.5 mil (0.005") thickness; five-ply composition; ultra-high molecular weight; 100 percent virgin polyethylene; acid,alkaline and corrosion resistant.
- The tape tensile strength is in accordance with ASTM D882-80A and will not be less than 7800 PSI.
- Elongation properties are in accordance with ASTM D882-80A and are less than 150% at break point.
- Tape color & legend combination will be in accordance with APWA or local requirements. The color is _____. The legend reads_____
- Tape is 5 mil overall thickness, with a .35 mil solid aluminum foil core. A .8 mil clear film, reverse printed with a repeating warning message is laminated to aluminum foll with a 3.75 mil clear film backing.
- Tape width shall be _____. (For best results we recommend a tape width at least ¾ of the diameter of the pipeline being protected. A 4" diameter line would use 3" or wider tape for optimum protection). Standard widths are 2", 3", 6", & 12".
- Tape lettering shall be 1" tall on 2" detectable tape and 1.5" tall on 3"- 12" tape.

SPECIAL AND CUSTOM LEGENDS

Christy's™ offers a full range of non-standard tapes, including specialty applications such as Telemetry, Irrigation and additional water line wording. All standard combinations listed are available in at least one color/width combination. We offer specific agency legends, designations or color combinations. Custom legends can include the use of specific wording, insignias and phone numbers. Call for special pricing.

T. Christy Enterprises, Inc.
655 E. Ball Rd. • Anaheim, CA 92805
Tel: (714) 507-3300 • Fax: (714) 507-3310
www.TChristy.com • 800-BLU-GLUE

FEBUARY 2021 LIT-4031

Christy's

DETECTABLE & NON-DETECTABLE MARKING TAPE

NOTE: Not all widths are available as standard for the stock color/legend combinations shown. Contact Christy's™ for stock availability of specific products. Non-stock combinations are subject to minimum requirements and plate charges.

How To Order Marking Tapes

STANDARD COLOR/LEGEND COMBINATIONS

TA.XX.XX.XXXXX Example: TA.DT.2.PRW is 2" Detectable Purple Reclaimed Water.

Type of Tape	Width of Tape	Colors	Legend Code	
DT - Detectable	2 - 2"	B - Blue	E - Electric	PW - Potable Water
ND - Non-Detectable	3 - 3"	P - Purple	F - Fire	RAW - Raw Water
	6 - 6"	Y - Yellow	FM - Force main	RW - Reclaimed Water
	12 - 12"	G - Green	FO - Fiber Optic	S -Sewer
		R - Red	G - Gas	STDR - Storm Drain
		O - Orange	IRR - Irrigation	TEL - Telephone
			NPW - Non-Potable Water Service	W - Water

STANDARD COLOR/LEGEND COMBINATIONS

Color	Legend Code	Printed Text on Tape
Blue	BIRR	"Caution Irrigation Line Buried Below"
Blue	BNPW	"Caution Non-Potable Water Line Buried Below"
Blue	BPW	"Caution Potable Water Line Buried Below"
Blue	BRJ	"Caution Restrained Joint Buried Below"
Blue	BRW	"Caution Raw Water Buried Below"
Blue	BW	"Caution Water Line Buried Below"
Brown	BRFM	"Caution Force Main Buried Below"
Green	GFM	"Caution Force Main Buried Below"
Green	GIRR	"Caution Irrigation Line Buried Below"
Green	GNPW	"Caution Non-Potable Line Buried Below"
Green	GPW	"Caution Potable Line Buried Below"
Green	GRAW	"Caution Raw Water Line Buried Below"
Green	GS	"Caution Sewer Line Buried Below "
Green	GSTDR	"Caution Storm Drain Buried Below"
Orange	OFO	"Caution Fiber Optic Line Buried Below"
Orange	OTEL	"Caution Telephone Line Buried Below"
Purple	PIRR	"Caution Irrigation Line Buried Below"
Purple	PRW	"Caution Recycled/Reclaimed Water Line Buried Below"
Purple	PNPW	"Caution Non-Potable Line Buried Below"
Red	RE	"Caution Electric Line Buried Below"
Red	RF	"Caution Fire Line Buried Below"
Yellow	YE	"Caution Electric Line Buried Below"
Yellow	YG	"Caution Gas Line Buried Below"
Yellow	YPL	"Caution Pipeline Buried Below"

T. Christy Enterprises, Inc.
655 E. Ball Rd. • Anaheim, CA 92805
Tel: (714) 507-3300 • Fax: (714) 507-3310
www.TChristy.com • 800-BLU-GLUE

HD Fowler Company Submittal - WI12GRN500 83010

This one page submittal covers the Green and Blue 12GA wire needed for this project.

UF/TWU IRRIGATION WIRE-R7001D

Made in USA | RoHS Compliant | UL

DESCRIPTION:
Regency's single conductor UF/TWU Irrigation Wire is manufactured for the purpose of direct burial power wire applications in accordance with Article 339 of the National Electric Code NFPA-70.
Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3 and B-8. Gauge sizes 18 thru 8 are solid conductors. Sizes 6 thru 4/0 are stranded conductors.
The insulation is a high quality polyvinylchloride (PVC) for systems applications of up to 600 volts and conductor temperatures up to 60 C.
The UF/TWU Irrigation Wire is constructed in accordance with Underwriters Laboratories, Inc. standard 493 and 83, as well as CSA 22.2 No. 75.

APPLICATION:
Suitable for use as power and control wire for irrigation systems.

CONSTRUCTION:
CONDUCTOR: Soft drawn bare copper (ASTM Spec. B-3 and B-8).
Solid (18 awg to 8 awg)
Stranded (6 awg to 4/0 awg)
INSULATION: Polyvinylchloride (PVC)
TEMPERATURE: 60° C
VOLTAGE: 600 volts

Conductor Size	Insulation Thickness	Colors
14	.060	1-12
12	.060	1-12
10	.060	1-9, 11
8	.080	1-8
6	.080	1-5
4	.080	1, 2, 3, 5
2	.080	1, 2, 3, 5

AVAILABLE COLORS: 1-Black, 2-White, 3-Red, 4-Blue, 5-Green, 6-Yellow, 8-Orange, 9-Gray, 10-Pink, 11-Purple, 12-Tan.

Material must be able to pass the following tests without showing signs of degradation:
COLD BEND: The insulation shall not show any cracks when sample is bent around a 3X mandrel after being subjected to –25 C for four (4) hours.

ELECTRICAL: AC test voltage, 60 seconds at 5000 volts.

SUNLIGHT RESISTANCE TEST: Samples conditioned for 300 hours of carbon-arc or xenon-arc exposure.

regencywire
regencywire.com
1500 West Malone / Sikeston, MO 63801
800.876.3020 / F: 800.333.5676

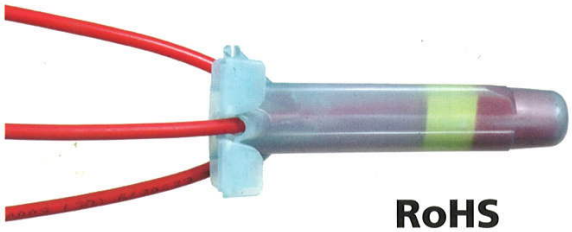
HD Fowler Company Submittal
Sec. 5: Ln 17
Vendor: 80420

This two page submittal covers the wire connectors needed for this job.

P.O. Box 368, Union, NJ 07083-0368, 908-687-7810, 800-327-2443, Fax: 908-687-2722

Paige® spec P7364D

3M™ Direct Bury Splice Kit DBR/Y



RoHS

1.0 SCOPE:

1.1 The 3M™ Direct Bury Splice Kit DBR/Y is used to electrically connect two or more pre-stripped copper wires and moisture seal the connection for direct burial. It includes the 3M R/Y+ Electrical Spring Connector and a high impact, UV-resistant polypropylene tube pre-filled with moisture-resistant gel. It is ideal for splicing wires and cables in irrigation and Low Voltage Lighting systems. For residential, commercial, golf, and other green industry applications.

2.0 PACKAGING DETAILS:

Paige Part Number		270670	270671
3M Part Number		DBR/Y Bulk	DBR/Y Kit
Description		Bulk pack of 100 each gel-filled tubes and twist-on connectors.	25 Kits in a plastic bag. 2 gel-filled tubes and 2 twist-on connectors per bag.
Case Data	Weight	5.1 lbs 2,3 Kg	3.5 lbs 1,6 Kg
	Dimensions	14.25 x 7.625 x 7.5 inches 36 x 19 x 19 cm	13 x 7.6 x 6 inches 33 x 19 x 15 cm
Pallet Data	Quantities	75 cases 7,500 tubes	133 cases 6,650 tubes (3,325 kits-of-2)
	Weights	402 lbs 183 Kg	485 lbs 221 Kg
	Dimensions	48 x 42 x 43 inches 122 x 107 x 109 cm	48 x 42 x 47.5 inches 122 x 107 x 121 cm
	Volume	50.2 ft^3 1,42 m^3	55.4 ft^3 1,57 m^3

3.0 FEATURES:

3.1 ***Reduces inventory and SKUs:***
Designed to replaces the following 3M connectors: DBY, DBR, DBY-6, DBR-6, DBY-Kit, DBR-Kit, DBY-6-Kit, DBR-6-Kit. Reduces the SKUs from 8 to 2 (DBR/Y and DBR/Y Kit.)

3.2 ***Rated for 600 volts:***
One connector for most connections required in irrigation (conventional and decoder types) and landscape lighting systems.

3.3 ***Bulk or Kits-of-two connectors:***
Each waterproof connector includes the R/Y+ twist-on connector (wire nut*), and a gel-filled tube

3.4 ***Water Resistant & Rain Tight:***
The DBR/Y may be installed above or below ground, inside a "valve box" or buried next to a valve-in-head sprinkler or light fixture.

3.5 ***Sunlight resistant:***
Connector can be used above or below ground level.

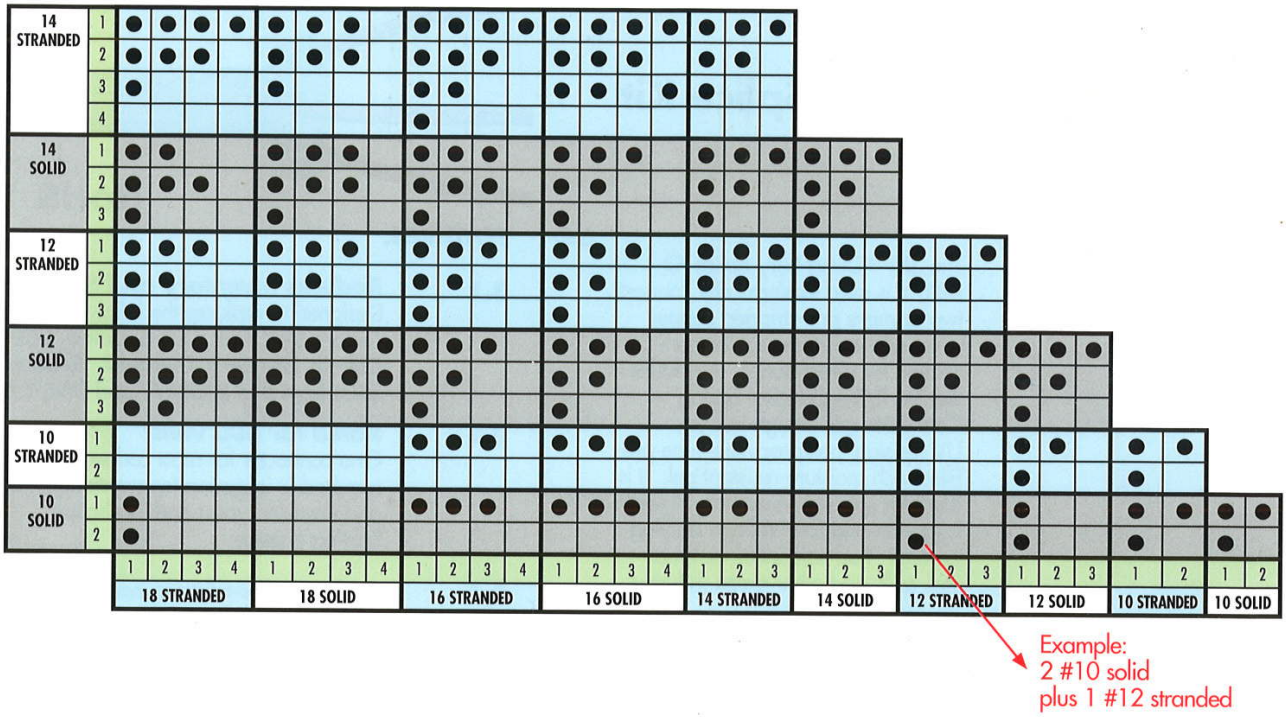
3.6 ***Strain relief:***
The gel-filled tube includes a lid that compresses the wire insulation when closed. This applies a pressure, known as "strain relief" that keeps the connection inside the tube when the wires are pulled-upon. The connector tube includes channels for three sets of wires.

3.7 ***Operating temperature:***
-40°F to 221°F (-40°C to 105°C)

3.8 ***Made in the USA by the 3M Company:***
Unquestioned quality by a name you can trust!

3.9 *The R/Y+ connector has an aggressive quick-bite:*

It makes a fast and reliable mechanical connection over a wide temperature range. The R/Y+ connector locks in place when inserted into the gel-filled tube. It accepts a multitude of direct burial copper wire combinations, as listed in the Table below. Listed for USA and IEC Publications. Certified for Canada. CE passport to European Union countries.



UL LISTED 314R

Metric Wire Combination			
Cross section capacity	2,0 mm² through 16,0 mm²		
Conductor combinations	Quantity	Size	Type
	5 - 7	0,5 mm²	sol/str.
	3 - 7	0,75 mm²	sol/str.
	2 - 8	1,0 mm²	sol/str.
	2 - 7	1,5 mm²	sol/str.
	2 - 5	2,5 mm²	sol/str.
	2 - 4	4,0 mm²	sol/str.
	2	6,0 mm²	sol/str.
* Only AWG wire size combinations are UL LISTED or CSA Certified.			

Paige® irrigation

Paige landscapelighting

1/11/10

* "Wire nut" is a registered trade mark of Ideal Industries, Inc.

3.10 Backfill and bedding materials

Jerry L. Storedahl, Owner

J.L. Storedahl & SONS

Office: (360) 636-2420
FAX: (360) 577-3906

2233 Talley Way · Kelso, Washington 98626

ROCK PRODUCTS, GRADING & EXCAVATING

For Base Course, Place Under Slab and Trench Backfill

SIEVE ANALYSIS

SAMPLE # 1 **DATE** 1/22/24 **TIME** 10:00

MATERIAL: 1 ¼"-0 Base Course **WEIGHT** 46.44 lbs **PIT:** MTQ

Sieve Size	Weight Retained	Weight Passing	Percentage Passing	Parameter (Specs)
2 ½"				
2"				
1 ¾"				
1 ½"		46.44	100	100%
1 ¼"		46.12	99.3	99-100%
• 1"		40.74	87.7	80-100%
7/8"				
¾"				
• 5/8"		25.91	55.8	50-80%
½"				
• 3/8"				
¼"				
• #4		14.40	31.0	25-45%
• #10				
• #40		5.36	11.5	3-18%
#80				
• #200		2.82	6.1	0-7.5%
PAN				

Fracture	S.E.
¾"	
5/8"	
½"	
3/8"	
¼"	
#40	

NOTES

S.E. 69 100% Fracture

Tested by Jason Storedahl

Jerry L. Storedahl, Owner

J.L. Storedahl & SONS

Office: (360) 636-2420
FAX: (360) 577-3906

2233 Talley Way · Kelso, Washington 98626

ROCK PRODUCTS, GRADING & EXCAVATING

For Top Course

SIEVE ANALYSIS

SAMPLE # 1 **DATE** 1/8/24 **TIME** 9:00

MATERIAL: 3/4"-0 Top Course **WEIGHT** 35.20 lbs **PIT:** MTQ

	Sieve Size	Weight Retained	Weight Passing	Percentage Passing	Parameter (Specs)
	2 ½"				
	2"				
	1 ¾"				
	1 ½"				
	1 ¼"				
	1"				
	7/8"				
•	¾"		35.20	100	99-100%
	5/8"				
•	½"		30.54	86.8	80-100%
•	3/8"				
•	¼"				
•	#4		17.76	50.5	46-66%
•	#10				
•	#40		6.69	19.0	8-24%
	#80				
•	#200		3.42	9.7	0-10%
	PAN				

Fracture	S.E.
¾"	
5/8"	
½"	
3/8"	
¼"	
#40	

NOTES

SE= 52 100% Fracture

Tested by Jason Storedahl

Jerry L. Storedahl, Owner

J.L. Storedahl & SONS

Office: (360) 636-2420
FAX: (360) 577-3906

2233 Talley Way • Kelso, Washington 98626

ROCK PRODUCTS, GRADING & EXCAVATING

For Bedding and Cover of Gas Line

SAND GRADATION

SAMPLE #: 1 **DATE** 1/9/24 **TIME** 9:00

MATERIAL Fill Sand **SAMPLE WT.** 14.95 **SAMPLE FROM** Owl Creek

Screen Size	Weight Retained	Total Wt. Retained	% Retained	Weight Passing	Total % Passing	Specs
2"						
1-1/2"						
1-1/4"						
1"						
3/4"						
1/2"				14.95	100	
3/8"				14.95	100	
1/4"				14.95	100	
4				14.78	98.9	
6						
8				14.64	97.9	
16				14.60	97.7	
30				14.23	95.2	
Total						
50				11.99	80.2	
80				11.91	79.7	
100				5.45	36.5	
200				.78	5.2	
PAN						

Tested By Jason Storedahl

Jerry L. Storedahl, Owner

J.L. Storedahl & SONS

Office: (360) 636-2420
FAX: (360) 577-3906

2233 Talley Way · Kelso, Washington 98626

ROCK PRODUCTS, GRADING & EXCAVATING

For Rip Rap Pads

SIEVE ANALYSIS

SAMPLE # 1 **DATE** 1/5/24 **TIME** 1:00

MATERIAL: 3"-0 **WEIGHT** 24.68 **lbs** **PIT:** MTQ

Sieve Size	Weight Retained	Weight Passing	Percentage Passing	Parameter (Specs)
2 ½"		24.68	100	
2"				
1 ¾"				
1 ½"		19.34	78.4	
1 ¼"				
1"		13.22	53.6	
7/8"				
¾"		11.34	45.9	
5/8"				
½"				
3/8"		6.68	27.1	
¼"				
#4		4.96	20.1	
#10				
#40		2.95	12.0	
#80				
#200		1.52	6.2	
PAN				

Fracture	S.E.
¾"	
5/8"	
½"	
3/8"	
¼"	
#40	

NOTES

S.E. 51 100% Fracture

Tested by Jason Storedahl

KNIFE RIVER

For Pipe Encasement - 2 Sack Slurry

Date: 04/30/2024
Customer: SLATECO
Project: PANG-B235

Knife River (KR) is pleased to submit the attached concrete mix design(s) for the above referenced project. The mix design(s) selected for use are based on the project specifications provided to KR at the time of review. Because these specifications may not have been complete at the time the mix was selected, the purchaser and reviewing parties are responsible for determining the proposed concrete mix design(s) meet all the project specifications and are acceptable for the use stated on this submittal.

All sales of materials are subject to KR's Standard Terms and Conditions. A copy of all approved mix designs must be provided to KR prior to start of production of these mixes. It is the purchaser's responsibility when ordering concrete to provide the approved mix design ID for the application to be placed and to verify prior to placement that the delivered mix meets the order placed.

KR warrants the concrete will meet project specifications only when sampled at point of discharge of the concrete delivery truck and tested and evaluated per all applicable ASTM, ACI and/or AASHTO standards. KR is not responsible for the pumping, placement, or handling of concrete after its discharge from the truck chute. Purchaser is solely responsible for and assumes all liability when concrete is not placed within concrete mix design tolerances for slump, air content and any other specialty limits as per approved mix design. Concrete must be field tested by certified ACI Concrete Field-Testing Technician Grade 1 personnel with all other tests performed in an accredited lab.

Approval of these mix designs carries the inclusion of KR on the distribution list of all concrete tests performed.

Please contact us immediately if there are any questions, additional information needed, or if any changes to the submittal are required.

Sincerely,

Brandon Benfield
971-245-0402
brandon.benfield@kniferiver.com
Attachments: Mix design use table
Mix design(s) Submittal(s) w/ supporting documents

KNIFE RIVER

Date: 04/30/2024
Customer: SLATECO
Project: PANG-B235

The following mix design(s) has/have been included with this submittal for your review:

Mix	Use	Slump	Air	W/CM	Specified Strength
24C1LAW0H9 CDF / CLSM DOSE WITH MASTERCELL 25	Pipe Encasement	8 +/- 2	16 +/- 6	1.46	100 psi @ 28 Days

Any plant specialty product(s) (e.g. fibers, ice, hot water, color, accelerators, specialty admixtures) added to the mix design(s) will require the purchaser to specify type and/or quantity at the time the order is placed. Any purchaser added product(s) on the jobsite null and voids KR's warranty of compliance and frees KR of all liabilities associated to altered concrete.

12222 NW MARINA WAY * PORTLAND, OREGON 97231 * 503-944-3500 * FAX 503-944-3599
OREGON CCB # 2101 WASHINGTON LICENSE # KNIFERC909DN

KNIFE RIVER

Concrete Mix Submittal

Metro Ready Mix
Dispatch: 503-944-3550

Submittal Information

Submittal Name	PANG-B235
Date Submitted	04/30/2024
Customer	SLATECO
Project Name	PANG-B235
USE	Pipe Encasement

Mix Information

Mix ID	24C1LAW0H9
Mix Name	CDF / CLSM DOSE WITH MASTERCELL 25
Compressive Strength (f'c)	100 psi @ 28 Days
Aggregate Nominal Size	#4 (4.75mm)

Mix Properties

Slump	8 +/- 2	**Sack Content**	2.13 94 lb/sack	**Total Mass**	3180 lb
Air	16 +/- 6	**Total Water**	35.00 gal	**Total Volume**	27.00 ft3
W/CM Ratio	1.46	**Water/Sack**	16.43 gal	**Unit Weight**	117.79 lb/ft3

Group	Material Description	Specific Gravity	Mass	Volume
Cement	Portland Type I/II - ASTM C150	3.15	200	1.018
Aggregate	Fine Aggregate - ASTM C-33	2.62	2688	16.443
Water	NonPotable Water	1	292	4.679
Air				4.860

*SSD Weights and Sp Gr's
**Admixture dosage rate will be adjusted according to manufacturer's recommendations to accommodate varying field conditions.
***This is a design w/cm ration and production w/cm ratio may vary as recognized by industry standards such as ASTM C94

COMMENTS:

Submitted By: Brandon Benfield

Designed By: R. Craig

CCT: 43823

KNIFE RIVER

Concrete Mix Evaluation Report

ACI 318 Required Average Strength

Mix ID	24C1LAW0H9	Number Of Tests	2
Mix Name	CDF / CLSM DOSE WITH MASTERCELL 25	Average Strength	110 psi
Design Strength (f'c)	100 psi @ 28 Days	St Dev	0 psi
Required Strength (f'cr)	1100 psi @ 28 Days	St Dev (Modified)	0 psi

Test Date	Mix	Lab	Temp (Concrete) (°F)	Slump (in)	Air Content (%)	Unit Weight (lb/ft3)	Comp Strength (7-Day) (psi)	Acceptance Strength (28-Day) (psi)	Moving Average (psi)
06/16/2022	24C1LAW0H9	CARLSON TESTING	60	8.5			50	110	
07/27/2022	24C1LAW0H9		73	9	9.2	121.4		110	
		Average	66.5	8.75	9.2	121.4	50	110	
		Minimum	60.0	8.50	9.2	121.4	50	110	
		Maximum	73.0	9.00	9.2	121.4	50	110	
		Standard Deviation	9.19	0.354				0	

KNIFE RIVER

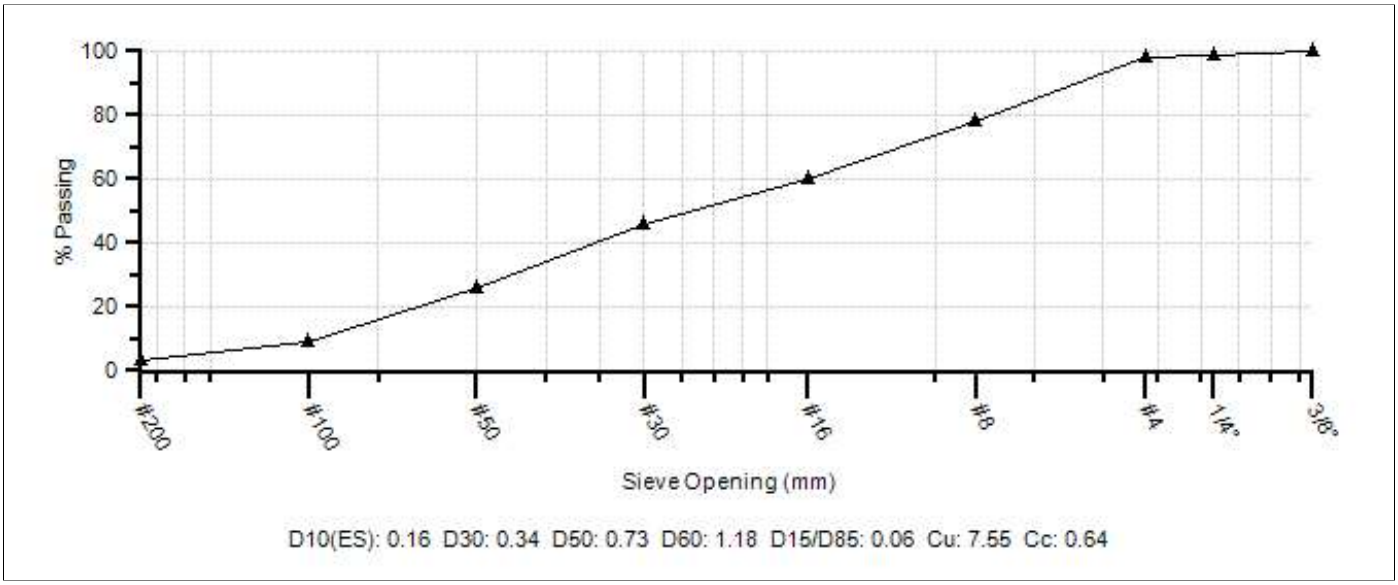
Combined Aggregate Blend Report

Mix ID	24C1LAW0H9	Nominal Max Size	#4 (4.75mm)
Mix Name	CDF / CLSM DOSE WITH MASTERCELL 25	Aggregate Volume	16.4
Design Strength (f'c)	100 psi @ 28 Days	Coarse Aggregate %	0.0
Specification		Fine Aggregate %	100.0

% Passing Gradations

Aggregate Type	Fine
% Contribution	100

Sieve/Test	Spec	Result	PCC Sand
3/8" (9.5mm)		100.0	100
1/4" (6.3mm)		99.0	99
#4 (4.75mm)		98.0	98
#8 (2.36mm)		78.0	78
#16 (1.18mm)		60.0	60
#30 (.6mm)		46.0	46
#50 (.3mm)		26.0	26
#100 (.15mm)		9.0	9
#200 (75µm)		3.00	3.0
Pan		0.00	0.0



D10(ES): 0.16 D30: 0.34 D50: 0.73 D60: 1.18 D15/D85: 0.06 Cu: 7.55 Cc: 0.64

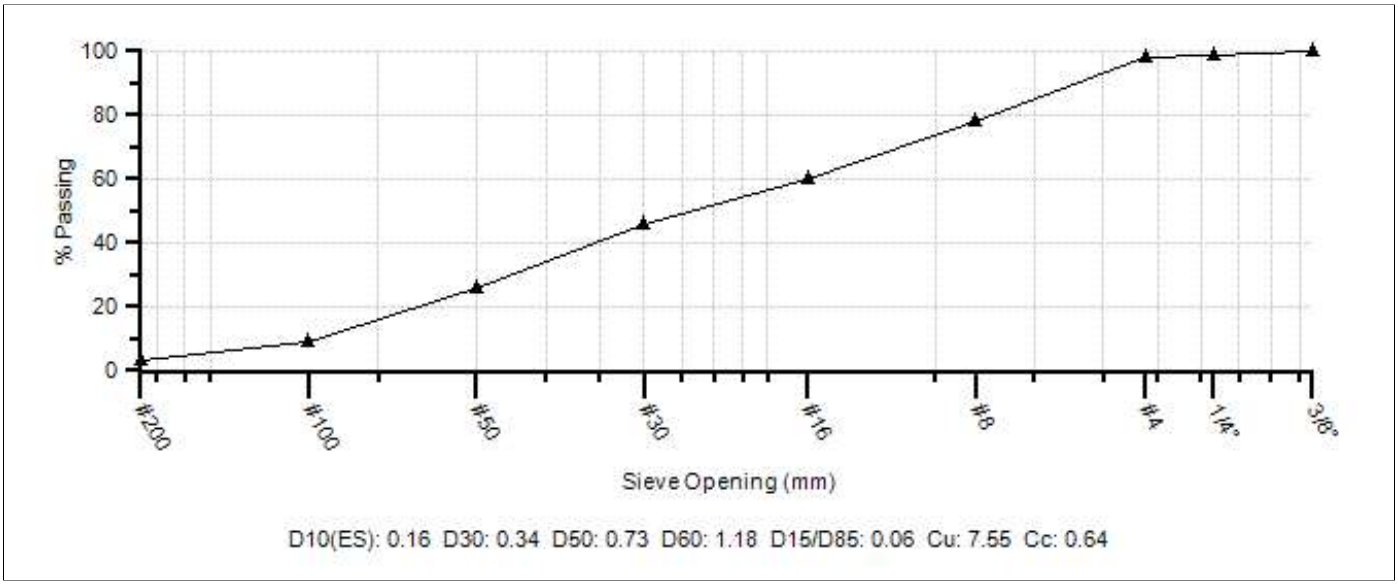
KNIFE RIVER

Fine Aggregate Blend Report

Mix ID	24C1LAW0H9
Mix Name	CDF / CLSM DOSE WITH MASTERCELL 25
Design Strength (f'c)	100 psi @ 28 Days
Specification	
FM	2.83

	% Passing Gradations
Aggregate Type	Fine
% Contribution	100

Sieve/Test	Spec	Result	PCC Sand
3/8" (9.5mm)		100.0	100
1/4" (6.3mm)		99.0	99
#4 (4.75mm)		98.0	98
#8 (2.36mm)		78.0	78
#16 (1.18mm)		60.0	60
#30 (.6mm)		46.0	46
#50 (.3mm)		26.0	26
#100 (.15mm)		9.0	9
#200 (75µm)		3.00	3.0
Pan		0.00	0.0



D10(ES): 0.16 D30: 0.34 D50: 0.73 D60: 1.18 D15/D85: 0.06 Cu: 7.55 Cc: 0.64

KNIFE RIVER

Individual Retained Aggregate Blend Report

Mix ID 24C1LAW0H9

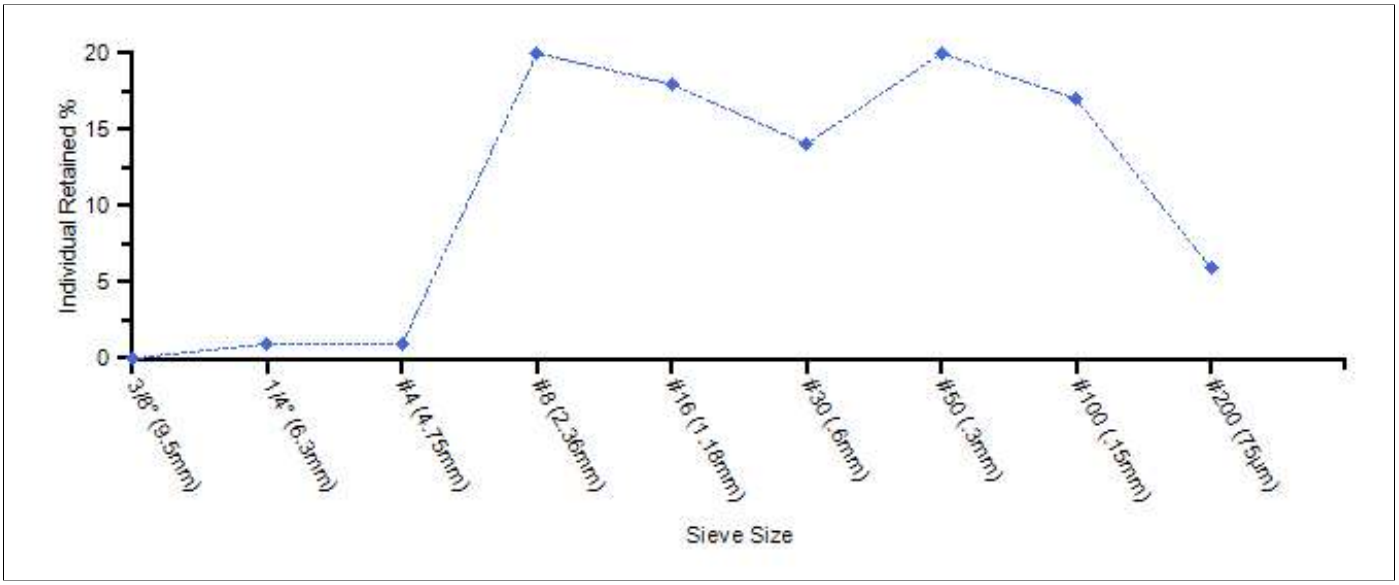
Mix Name CDF / CLSM DOSE WITH MASTERCELL 25

Design Strength (f'c) 100 psi @ 28 Days

% Individual Retained Gradations

Aggregate Type	Fine
% Contribution	100.0

Sieve/Test	Spec	Result	PCC Sand
3/8" (9.5mm)		0.00	0.0
1/4" (6.3mm)		1.00	1.0
#4 (4.75mm)		1.00	1.0
#8 (2.36mm)		20.00	20.0
#16 (1.18mm)		18.00	18.0
#30 (.6mm)		14.00	14.0
#50 (.3mm)		20.00	20.0
#100 (.15mm)		17.00	17.0
#200 (75µm)		6.000	6.00
Pan		3.000	3.00



Manufacturer's Certification

Report Date: 4/12/2023

We hereby certify that CalPortland Type I/II Cement meets the standard requirements of ASTM C150 and AASHTO M85 specification for Type I and Type II cements. Reported are the average chemical and physical data for the lot.

Lot #: 23-098

Type I / II Cement

Source: SsangYong, So. Korea

	ASTM C150 and AASHTO M85 Requirements		Analysis	Limestone
Chemical Properties	**Type I**	**Type II**	**Results**	**Analysis**
Silicon dioxide (SiO_2), %	---	---	**20.0**	**7.1**
Aluminum oxide (Al_2O_3), max, %	---	6.0	**4.7**	**2.9**
Ferric oxide (Fe_2O_3), max, %	---	6.0	**3.1**	**1.3**
Calcium oxide (CaO), %	---	---	**62.5**	**47.0**
Magnesium oxide (MgO), max, %	6.0	6.0	**4.0**	**3.3**
Sulfur trioxide (SO_3), max, %	3.0	3.0	**2.7**	**0.1**
Loss on ignition (LOI), max, %	3.5	3.5	**1.6**	
Insoluble residue (IR), max, %	1.5	1.5	**0.5**	**Base**
Alkalies ($Na_2O+0.658*K_2O$), %	---	---	**0.54**	**Cement**
Tricalcium silicate (C_3S), %	---	---	**55**	**57**
Dicalcium silicate (C_2S), %	---	---	**15**	**15**
Tricalcium aluminate (C_3A), max, %	---	8	**7**	**7**
Tetracalcium aluminoferrite (C_4AF), %	---	---	**9**	**10**
CO_2, %	---	---	**1.2**	
Limestone addition, max, %	5.0	5.0	**3.1**	
$CaCO_3$ in Limestone, min, %	70	70	**85**	
Physical Properties				
Air content of mortar, max, volume %	12	12	**8**	
Blaine Fineness, min, m^2/kg	260	260	**415**	
Autoclave expansion, max, %	0.80	0.80	**0.11**	
Compressive Strength, min				
1 Day, psi	---	---	**1930**	
3 Day, MPa	12.0	10.0	**24.2**	
3 Day, psi	1740	1450	**3520**	
7 Day, MPa	19.0	17.0	**34.3**	
7 Day, psi	2760	2470	**4970**	
28 Day (from previous lot), MPa	---	---	**45.7**	
28 Day (from previous lot), psi	---	---	**6630**	
Vicat Setting Time, min-max, minutes	45 - 375	45 - 375	**143**	

Apparatus and methods used in this laboratory have been checked by the Cement and Concrete Reference Laboratory of the National Institute of Standards and Technology. A copy of the report detailing their findings is available upon request. Major oxides are analyzed in accordance with ASTM C114.

Dave Germer - Director of Technical Services

APPENDIX B

CONDON · JOHNSON & ASSOCIATES, INC.
CONTRACTORS AND ENGINEERS

31 63 29 Drilled Concrete Piers and Shafts – SD-01 Installation Plan

24055 PANG B235

REV 1

Peter Mercer P.E.
CONDON-JOHNSON & ASSOCIATES, INC. | 1239 NE 92ND AVE, PORTLAND, OR 97220

Table of Contents

Micropile Installation Equipment

Drilling Equipment:

- Klemm 806 or equivalent.

Support Equipment

- Mini Excavator or similar for handling casing
- All Terrain Forklift or similar for moving casing and support equipment
- Grout Plant
- 20,000 or 10,000 Gallon Water Tank
- Diaphragm Pumps
- 3" or 4" Trash Pumps
- Electric or Diesel Monyo Water Pumps

CJA may have to make adjustments to the equipment shown here based on availability and as dictated by site conditions.

See attachment A for drill rig data

Micropile Installation Procedure

All micropiles will be installed as listed in the step-by-step procedure below.

1. Place a center hub and off-set hubs, as necessary, for each micropile to be drilled.

2. With the hydraulic drill rig in place, the micropile casing will advanced by injecting water through the casing. The cutting teeth at the tip of the casing and the water injected into the casing will loosen the soil at the tip of the casing. The water will flush the cuttings up the outside of the micropile casing. Water will constantly injected during drilling, the injected water will cause a constant flow up around the casing, reducing the potential of contaminated water of traveling down the annulus of the casing and contaminating the lower aquifer. The water being ejected at the surface will be pumped from the drill location to settlement swales constructed by others.

3. The drill string will be advanced to the design tip elevation.

4. Once the tip elevation has been reached, the inner rods shall be extracted from the drill-hole (if used).

5. The central #10 GR 80 reinforcing bar shall then be placed into the hole in sections connected with couplers. The bars are to be centered in the casing using plastic centralizers.

6. Once the bar is fully inserted, the hole shall be tremie filled with neat cement grout. In order to ensure full micropile depth, measure the tremie tube while extending it down the hole. At completion of tremie grouting, let grout overflow the top of the casing and visually inspect grout consistency to ensure quality grout has been placed throughout the entire length of the micropile.

7. After the micropile is fully grouted, the casing will be retracted to the top of the design bond zone.

8. Drill will retract the casing 2ft above the bond zone then plunge the casing back down to design elevation. The casing plunge will force grout around the outside of the casing, sealing off the casing annulus in the plunge zone, which will help prevent the movement of contaminates along the casing annulus.

8. After the casing has been plunged, a pressure cap will be installed on the casing and grout will be injected under pressure. The pressure will force additional grout up along the casing annulus, creating a seal. Pressure grouting pressure will be measured by a gauge at the top of the casing. The grout will then be washed out close to the final top of casing elevation.

7. Once the grout has reached the required compressive strength, testing shall be performed. At completion of installation, any testing, and excavation, the top connection plate shall be installed.

Grout Mix Design and Placement Procedure

1. Grout Mix Design: CJA will use a neat cement mix with an approximate .45 w/c- ratio (5 gallons/94lb bags). The mix will consist of Type IL Portland cement and potable water mixed in a grout plant capable of creating a homogenous grout with no clumps.

2. Grout Mix Proportions: 94lb bag Type I/II 5 gallons potable water.

3. Grout Placement Procedure: Grout will be placed using a tremie tube that will be inserted to the bottom of the hole. Grout will be injected through the tremie tube, displacing any water or loose cuttings, and creating a homogenous grout column. Grout will be injected until it overflows the micropile casing. CJA will continue injecting grout until the consistency of the overflowing grout is acceptable.

4. Grout Placement Monitoring Grout: placement will be monitored by the grout plant operator by counting the number of bags pumped through the grout plant. The grout pressure usually ranges from 20-30psi, and will be monitored by a pressure gauge on the grout plant. Prior to grout placement, the theoretical volume of grout will be calculated to determine if grout is flowing out of the hole and into the soil formation. One 94-lb sack of cement yields approximately 1 cu.ft of grout, using this relationship, the grout take will be estimated for each pile.

5. Estimated Grout Curing Time: The estimated curing time for the grout to reach a minimum compressive strength of 4000psi is anticipated to be 7 days.

6. Grout Quality Monitoring: The grout quality will be monitored by the grout plant operator, ensuring that the proper mix ratio is achieved with each batch, and that there are no clumps. If grout samples are requested for strength testing, an independent testing entity will be used.

Load Testing Procedures

Based on the pre-bid Q&A presented in amendment 3, the micropile loads are presented as:

- Compression design load = 56-kips
- Tension Design load = 37-kips
- Lateral Load at top of pile = 10-kips

CJA will perform 1ea performance test in tension on a production micropile 2 x the maximum design load. The center reinforcing bar size may be increased to meet the demand for the tension test. CJA may install production micropiles prior to testing the verification test at our discretion

CJA intends to proof test 2ea production micropiles in tension to 1.5 x the design load.

1. Tension Verification Tests
Testing will occur once the grout strength is a minimum of 4,000 psi (anticipated 3-7 days). Loads will be applied with a single ram and read with a dial pressure gauge. Pile Movement at the top of pile will be measured with 2ea. displacement/dial indicators.

2. Proof Tests
Testing will occur once the grout strength is a minimum of 4,000 psi (anticipated 7days). Loads will be applied with a single ram and read with a dial pressure gauge. Pile Movement at the top of pile working grade will be measured with 2ea. displacement/dial indicators.

Typical testing apparatus will be setup as shown in Attachment B.
Loading schedules and jack calibrations will be submitted prior to testing.

Attachment A: Equipment Data

KR 806-3D

Bohrgerät

Drilling Rig

January 2017

KLEMM
Bohrtechnik

Bohrgerät

Das Bohrgerät KR 806-3D ist die konsequente Weiterentwicklung der KR 806 Baureihe. Mit 147 kW Motorleistung und einem Zweikreis Load-Sensing Hauptpumpensystem ist das Gerät optimal ausgelegt für den Betrieb leistungsintensiver Doppelkopfbohranlagen mit oder ohne Hydraulikhammer.

Die auf dem neuesten Stand befindlichen Doppelkopfbohrsysteme bieten folgende Vorteile:

- gegenläufiger Drehsinn von Außen- zu Innenbohrstrang
- geringe Bohrmittenabweichung
- kontrollierter Bodenentzug
- erschütterungsarmes Bohren

Zur Anpassung an die Bohraufgabe werden verschiedene Doppelkopfbohranlagen empfohlen:

Drehen / Drehen-Schlagen
- KH 16 / KD 1215R
- KH 32 / KD 1011
- KH 16 / KD 1011
- KH 22 / KD 1215R
- KH 32 / KD 1215R

Drehen / Drehen
- KH 13 / KH 9
- KH 32 / KH 13
- KH 16 / KH 9
- KH 27 / KH 9 oder KH 13

Drilling Rig

The drilling rig KR 806-3D is the consequent further development of the KR 806 series. With 147 kW engine power and a two circuit load sensing double pump system the rig is designed for high performance double head units with or without hydraulic drifter.

The double head drilling systems based on the latest standard have the following advantages:

- *Counter rotation of outer casing to inner rod*
- *Minimal deviation*
- *Controlled extraction of soil*
- *Low vibration drilling*

For various drilling operations different double head drilling systems are recommended:

Rotary / Rotary Percussion
- *KH 16 / KD 1215R*
- *KH 32 / KD 1011*
- *KH 16 / KD 1011*
- *KH 22 / KD 1215R*
- *KH 32 / KD 1215R*

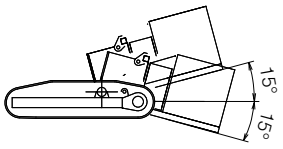
Rotary / Rotary
- *KH 13 / KH 9*
- *KH 32 / KH 13*
- *KH 16 / KH 9*
- *KH 27 / KH 9 or KH 13*

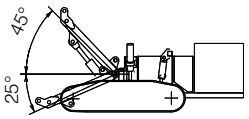
Bohrstellungen

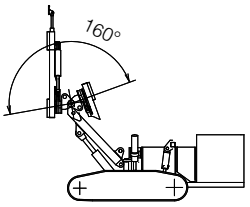
Kinematisch mögliche Schwenkbereiche. Abhängig von der Ausstattung sind Abweichungen hiervon möglich.

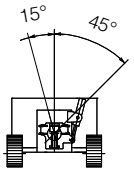
Drilling Positions

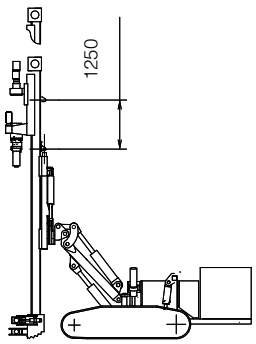
Kinematically possible mast movements. Depending on different configuration deviations are possible.

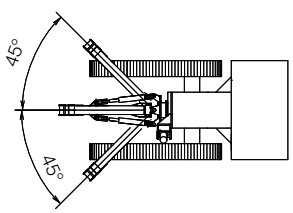


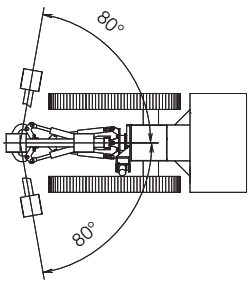


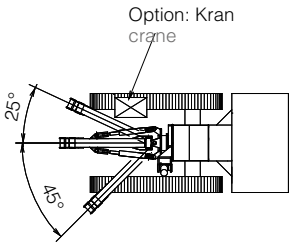













01


02


03


04

01 KR 806-3D mit Magazin MAG 2.1 // *KR 806-3D with magazin MAG 2.1*
02 KR 806-3D mit Krankonsole // *KR 806-3D with console*
03 Dieselmotor // *Diesel engine*
04 Steuerstand // *Control panel*

Eigenschaften

Durch den Aufbau anderer Bohrantriebe (Hydraulikhämmer, Drehantriebe) ist eine Vielzahl weiterer Anwendungen, z.B. Verankerungen, Mikropfahlbohrungen, Hochdruckinjektionen und Bohrungen für Erdwärmesonden abdeckbar. Grundgerät und Bohrlafette sind modular aufgebaut und können somit für verschiedene Bohraufgaben mit einer Reihe von Optionen erweitert werden.

Das Gerät verfügt über eine optimierte kinematische Lafettenanbindung mit einem großen Bereich von Schwenk- und Einrichtmöglichkeiten.

Die Kinematik ermöglicht:
- Bohren 90° zum Fahrwerk nach links und rechts unter bis zu 45° Neigung
- Bohren parallel zum Fahrwerk
- Vertikalbohrungen mit Schwenkmöglichkeit zu beiden Seiten
- Horizontalbohrungen in Fahrtrichtung und quer zum Fahrwerk nach beiden Seiten

Die KR 806-3D erfüllt die aktuell gültigen Abgasnormen. Das Bohrgerät wurde durch eine externe deutsche Prüfstelle (TBG) Baumuster zertifiziert und trägt das Eurotest - Zeichen.

Seit Einführung der Baureihe KR 806 beweisen hunderte weltweit im Einsatz befindliche Geräte die Zuverlässigkeit und die vielfältigen Einsatzmöglichkeiten.

Features

By fitting different drilling units (hydraulic drifter, rotary heads) a variety of other applications are possible, e.g. anchoring, micropiling, jet grouting and geothermal drilling. The modular concept of base rig and drill mast makes it possible to upgrade them with different useful options.

The rig is equipped with an optimised kinematic mast-to-boom link which offers a large range of slewing and mast positioning possibilities.

The kinematic enables:
- *Drilling at 90° in front of the the tracks and with inclinations of up to 45°*
- *Drilling parallel to the tracks*
- *Vertical drilling with tilting function to both sides*
- *Horizontal drilling in direction of travel and across the tracks to both sides*

The KR 806-3D complies with the latest emission standard. The rig was certified by an external German safety organisation (TBG) and has the Eurotest badge.

Since introduction of the KR 806 series hundreds of rigs in operation worldwide give proof of their reliability and very versatile applications.

Technische Daten

Technical Data

Motortyp	***Engine Type***	**DEUTZ TCD 2012 L6 2V**	
zertifiziert nach	*certified*	EEC 97/68 EC Stage 3A, USA EPA/CARB TIER 3	
Leistung	*Rated Output*	kW	147
Dieseltankinhalt	*Fuel Tank Capacity*	l	380
Schallleistungspegel LWA_d	*Sound power level* LWA_d	dB (A)	111
Hydrauliksystem	***Hydraulic System***		
1. Kreislauf	*1st Circuit*	l/min	200 load-sensing
2. Kreislauf	*2nd Circuit*	l/min	200 load-sensing
3. Kreislauf	*3rd Circuit*	l/min	35,0 konstant
4. Kreislauf	*4th Circuit*	l/min	20,0 konstant
5. Kreislauf	*5th Circuit*	l/min	35,0 konstant
Systemdruck max.	*Operating Pressure max.*	bar	320
Hydrauliktankinhalt	*Hydr. Oil Tank Capacity*	l	630
Raupenfahrwerk	***Crawler Base***	**B2**	
Zugkraft max.	*Tractive Force max.*	kN	188
Fahrgeschwindigkeit	*Crawler Speed*	km/h	2,0
3-Steg Bodenplatten	*3-rib Grouser Plates*	mm	400
Bodenfreiheit	*Ground Clearance*	mm	350
Bodendruck	*Ground Pressure*	N/cm^2	7,9
Bohrlafette	***Drill Mast***	**202**	
Gesamtlänge	*Total Length*	mm	6570
Vorschubkraft	*Feed Force*	kN	100
Rückzugkraft	*Retraction Force*	kN	100
Vorschubgeschwindigkeit	*Feed Rate*	m/min	6,0 / 12,0
Rückzuggeschwindigkeit	*Retraction Rate*	m/min	6,0 / 12,0
Vorschub schnell	*Fast Feed Rate*	m/min	26,4
Rückzug schnell	*Fast Retraction Rate*	m/min	52,8
Bohrantriebe	***Drill Heads***		
Drehantriebe	*Rotary Heads*	●	
Hydraulikhämmer	*Hydraulic Drifters*	●	
Doppelkopfbohranlagen	*Double Head Drilling Units*	●	

Technische Änderungen ohne Vorankündigung und Verpflichtung gegenüber früher gelieferten Geräten. Die abgebildeten Geräte können Sonderausstattungen haben. Irrtum und Druckfehler vorbehalten.

Technical specifications are subject to modifications without prior notice and incurring responsibility for machines previously delivered. The shown machines may have optional equipment. Errors and misprints reserved.

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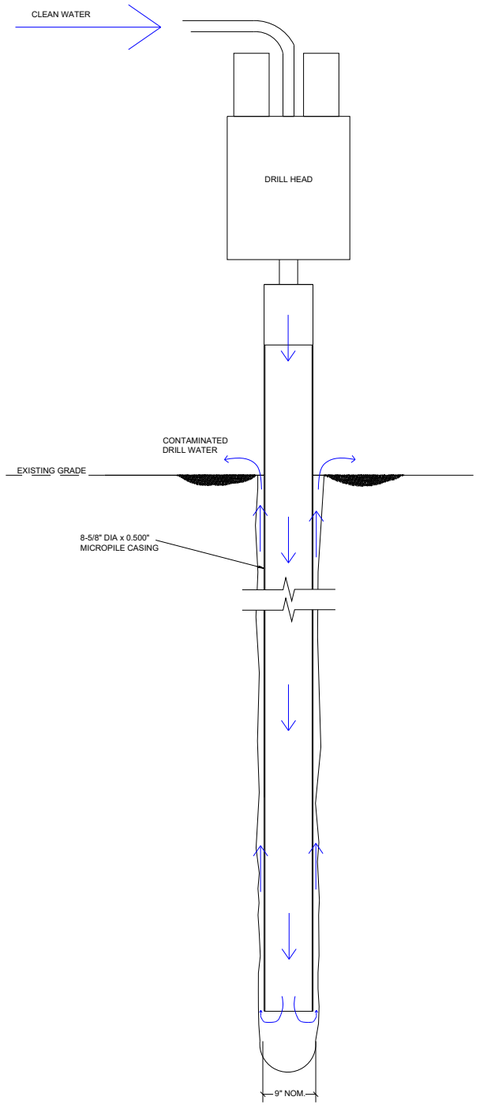
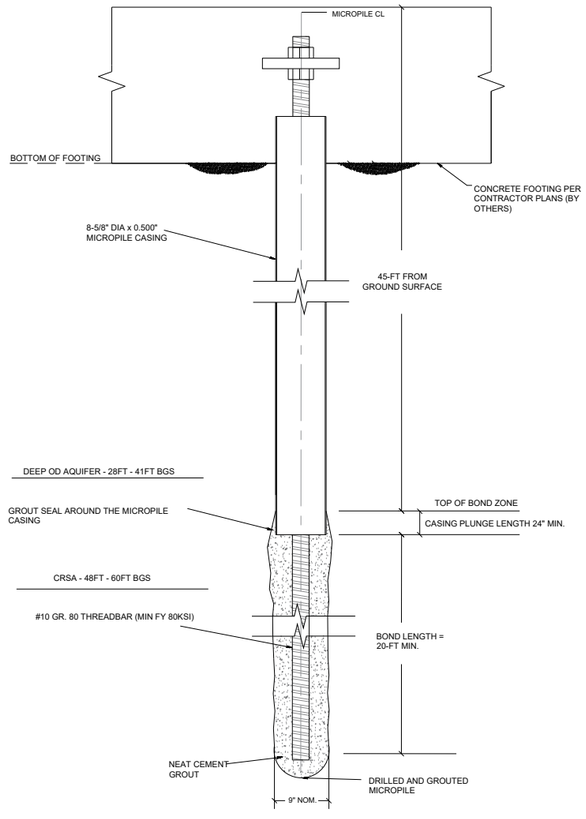
BAUER Group

Attachment B: Typical Micropile Load Test Setup



DESCRIPTION OF DRILLING METHOD:

- WATER WILL BE PUMPED FROM THE STORAGE TANKS TO THE DRILL RIG
- THE WATER WILL BE CONSTANTLY PUMPED THROUGH THE DRILL HEAD DOWN THROUGH THE MICROPILE CASING
- AS THE CASING IS ADVANCED DOWNWARD, THE DRILL WATER WILL FLUSH AWAY SOIL IN FRONT OF THE DRILL CASING.
- THE DRILL WATER WILL CARRY THE SOIL CUTTINGS BACK TO THE SURFACE IN THE ANNULUS BETWEEN THE CASING AND THE SURROUNDING SOIL. A FLOW OF WATER FROM THE TIP OF THE ADVANCING CASING TO THE SURFACE WILL BE MAINTAINED WHILE DRILLING. THE CONSTANT UPWARD FLOW OF WATER WILL REDUCE THE POSSIBILITY OF CONTAMINATES IN THE UPPER SOILS FROM MIGRATING DOWN THE ANNULUS OF THE DRILLED CASING.
- SHALLOW DITCHES DUG WILL DIRECT THE DRILL WATER TO A CONTAINMENT AREA PROVIDED BY GLENMAR FOR ANALYSIS AND PROPER DISPOSAL BY OTHERS.



DESCRIPTION OF GROUTING METHOD:

- AFTER THE MICROPILE CASING HAS BEEN INSTALLED TO DESIGN BOTTOM OF MICROPILE ELEVATION, THE THREADED ROD WILL BE INSTALLED
- THE CASING WILL REMAIN FULL OF WATER AT ALL TIMES BEFORE GROUTING TO ENSURE THAT THERE IS ALWAYS A POSITIVE HEAD PRESSURE INSIDE THE MICROPILE CASING TO REDUCE THE PROBABILITY OF WATER FLOWING DOWN THE CASING ANNULUS
- AFTER THE THREADED ROD IS INSTALLED, A TREMIE PIPE WILL BE PLACED TO THE BOTTOM OF THE MICROPILE AND GROUT WILL BE INJECTED FROM THE BOTTOM OF THE MICROPILE UNTIL GROUT IS SEEN FLOWING FROM THE TOP OF THE CASING.
- ONCE THE INITIAL GROUTING IS COMPLETE, THE MICROPILE CASING WILL BE EXTRACTED FROM THE BONDED ZONE. DURING REMOVAL OF CASING, GROUT WILL BE ADDED AS NEEDED TO MAINTAIN THE CASING FULL OF GROUT
- AFTER ALL THE CASING IS REMOVED FROM THE BOND ZONE, A PRESSURE CAP WILL BE USED TO PRESSURE GROUT THE BOND ZONE WHICH WILL ATTEMPT TO FORCE GROUT UP THE CASING ANNULUS TO SEAL THE CASING ANNULUS FROM ANY WATER MIGRATING FROM THE UPPER ZONES TO THE LOWER AQUIFER.
- FINALLY, THE CASING WILL BE LIFTED 2' UP AND THEN PLUNGED BACK DOWN 2' TO FORM A PLUNGE ZONE. GROUT WILL BE FORCED OUTSIDE THE CASING, SEALING THE CASING ANNULUS.

CONDON · JOHNSON & ASSOCIATES, INC.
CONTRACTORS AND ENGINEERS

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DESIGNED BY:	DRAWN BY:	REVIEWED BY:
	PM	

DRAWING: MICROPILE DRILLING IN CONTAMINATED MATERIAL

No.	DATE	BY	REVISIONS
0	07/10/2025		DRILL PROCEDURE FOR REVIEW

PROJECT: 816001 / PANG 235

LOCATION: PORTLAND, OREGON

SCALE: PLAN VIEW - NTS
DETAIL - NTS

OWNER: PORTLAND AIR NATIONAL GUARD

GENERAL CONTRACTOR: MIDNIGHT SUN - GLENMAR JV

JOB NUMBER: 24055

DATE: 7/10/25

SHEET NUMBER: MP-WTR