ADDENDUM NO.1

CITY OF PENDLETON
WWTRRF 2025 Improvements – Operational Buildings
Issued: July 16, 2026
Bid Opening Date: August 6, 2026, 2:00 pm

TO ALL PLANHOLDERS:

This Addendum provides the following clarifications/corrections to the Bid Documents and Contract for the above-referenced Project. **All bidders shall acknowledge receipt and acceptance of this Addendum by completing the spaces, signing where indicated below and submitting it with the Proposal. Bids submitted without signing for the Addendum may be considered informal.**

The following clarifications are provided based on questions received and must be added/considered when completing your submittal:

- Technical Specifications, Volume 2, Appendix A
    - ADD the attached geotechnical study by Shannon & Wilson to Appendix A

CITY OF PENDLETON

____
Jeff Brown
Public Works Director
500 SW Dorion Avenue
Pendleton, OR 97801

BIDDER'S ACKNOWLEDGMENT:

____
Company Name (please print)

____
Bidder's Name (please print)

____
Signature

____
Title

____
Address

____
City, State

SHANNON & WILSON

July 9, 2026

Curtis Butterfield, PE
Keller Associates, Inc.
1060 Jadwin Avenue, Suite 375
Richland, Washington 99352

RE: PENDLETON WWTRRF NEW ADMIN AND STORAGE BUILDINGS, PENDLETON, OREGON

Dear Mr. Butterfield:

This letter summarizes our recent subsurface exploration activities, our review of the past geotechnical explorations conducted at the City of Pendleton Wastewater Treatment and Resource Recovery Facility (WWTRRF) site, and our geotechnical design recommendations to support structural and civil design associated with the new administration and storage buildings at the site. The general location of the project is shown in Figure 1, Vicinity Map. Shannon & Wilson is providing these services as a subconsultant to Keller Associates, Inc. (Keller).

A previous version of this letter report was issued on February 24, 2026, based on existing geotechnical explorations outside of the proposed structure footprints. The scope of our study was subsequently expanded to include observation of test pit explorations conducted near and within the proposed structure footprints. This report has been updated to incorporate additional subsurface information and presents revised geotechnical design recommendations. This letter supersedes our letter for "Pendleton WWTRRF New Admin and Storage Buildings", dated February 24, 2026.

PROJECT UNDERSTANDING

Project Description

We understand the project includes the construction of two new single-story, at-grade buildings. The proposed building locations within the WWTRRF site are shown in Figure 2, Site and Exploration Plan. The new administrative building will have a footprint of 40 by 80 feet and will be located north of the east primary clarifier and existing administration building, and east of the secondary clarifiers, in an undeveloped portion of the site.

The new storage building will be located south of the secondary clarifiers and immediately east of the in-plant pump station. An existing facility currently occupies the eastern portion of the planned storage building footprint, which we understand will be demolished prior to construction. The storage building will be a pre-engineered metal building (PEMB) with a footprint of 75 by 40 feet and will include a mezzanine level in the eastern portion of the structure.

Foundation loads were not available at the time this letter report was prepared; however, we assume that loads will be typical for this type of construction, with column loads of less than 75 kips and wall loads of less than 2 kips per lineal foot. We understand that the buildings will be designed in accordance with the 2022 Oregon Structural Specialty Code (OSSC).

Site Description

The proposed improvements are located within the WWTRRF site, where the surface topography is generally flat, with a gentle downward slope to the Umatilla River located to the north and west. The site is developed with asphalt concrete (AC) and gravel pavements, existing buildings and facilities, and a grass lawn. An existing dike separates the plant from the Umatilla River along the northwest portion of the site. Both sites of the proposed administrative building and storage building are relatively flat and surfaced with crushed rock gravel. Exhibits 1 and 2 show the sites at the time of our recent exploration.

Exhibit 1: View east of proposed administration building site.

Exhibit 2: View southwest of proposed storage building site.

Scope of Services

Our services were performed in accordance with the scope described in our Subconsultant Agreement with Keller, fully executed on November 25, 2025. Specifically, our scope includes the following items:

- Review existing geotechnical information for the site;
- Observe five (5) test pits to depths up to 5.5 feet below ground surface (bgs) at the sites of the proposed new buildings;
- Develop and provide foundation design parameters, including allowable bearing capacity, estimated settlement, and lateral resistance;
- Develop and provide seismic design parameters based on an ASCE 7-16 site classification; and
- Develop and provide recommendations for foundation subgrade preparation and backfilling.

Previous Explorations

In 2008, Shannon & Wilson previously supported design of the Phase I upgrade project for the WWTP. On February 28, 2008, Shannon & Wilson conducted 17 test pits, designated as TP-1 through TP-17, which were advanced to depths between 3 to 10 feet bgs. Among these test pits, TP-5, TP-6, and TP-7 are approximately 35 to 60 feet away from the proposed building footprints. Later on August 26, 2008, Shannon and Wilson's subsurface exploration program at the WWTRRF site was expanded to include two additional test pits, TP-1A and TP-18, and 17 air-track rock probes. Geotechnical engineering staff from Shannon & Wilson were present during the subsurface explorations to locate the exploration sites, log the encountered materials, and collect soil samples. Relevant logs of subsurface explorations are included in Attachment B, Nearby Subsurface Exploration Logs.

SUBSURFACE CONDITIONS

Recent Subsurface Explorations

On April 28, 2026, Shannon & Wilson observed five (5) additional test pits, TP-12 through TP-16 near and within the proposed buildings. These test pit locations are shown on Figure 2. The test pits were completed to depths between 2.2 and 5.5 feet bgs. Subsurface conditions encountered in these explorations generally consisted of fill overlying native alluvium consisting of silt deposits and silty gravel to gravel deposits.

Test pit logs of the recent subsurface explorations are included in Attachment A, Recent Subsurface Explorations. Following completion of the test pits, they were immediately backfilled with the excavated materials. The backfill was placed in loose lifts approximately 1 to 2 feet thick and compacted using a hoe-pac compactor.

Fill

In test pits TP-12 through TP-16, gravel fill was encountered in the upper 2 inches. Beneath the gravel fill, fill consisting of Silty Gravel with Sand (GM), Silt to Silt with Sand (ML), and Silty Gravel with Sand to Clayey Gravel with Sand (GM/GC) was encountered to depths between 1.2 to 2 feet bgs. The silt within the fill was observed to have no to low plasticity, with varying amounts of rounded and subangular fine to coarse gravel. In test pit TP-12 between approximate depths of 1.5 to 2 feet bgs, Organic Soil (OL/OH) was encountered. The organic soil demonstrated medium to high plasticity and contained fine to coarse sand and subrounded and angular gravel.

Alluvium

Beneath the fill, alluvium consisting of Silty Gravel with Sand (GM) and Silt to Silt with Sand (ML) was encountered within TP-12 through TP-16 to maximum depth explored in these explorations. The gravel of the alluvium is subrounded to rounded, and trace to few amounts of this gravel were encountered in the Silt to Silt with Sand (ML) layers. Varying proportions of fine to coarse sand are present in the alluvium. The silt and fines of the alluvium were observed to demonstrate non-plastic behavior in the field.

In the previous test pit TP-6, the excavator met refusal into basalt bedrock at an approximate depth of 8.5 feet bgs. Bedrock was encountered in other nearby previous explorations, including at 12 feet bgs in air-track borings A-1 and A-3 and at 4.1 feet in test pit TP-11.

Groundwater

Water levels in the existing treatment operations areas were measured at depths between 4 and 10 feet bgs in the test pits during the subsurface exploration programs on February 28, 2008, and August 26, 2008. The observed and recorded water levels are indicated on the test pits logs included in Attachment B.

Groundwater was not encountered within the depths explored in our recent explorations. Groundwater levels should be expected to vary with changes in topography and precipitation. The water levels at the site may be influenced by the water levels in the nearby Umatilla River and McKay Creek.

GEOLOGIC AND SEISMIC HAZARD EVALUATION

Seismic Design Parameters

We understand that the proposed improvements will be designed in accordance with the 2022 OSSC, which references ASCE 7-16 for seismic site classification. As noted in the subsurface conditions section, basalt bedrock was encountered at relatively shallow depths of approximately 4.1 to 12 feet bgs in some of the test pit locations. Review of nearby well logs indicates that the basalt formation extends to depths greater than 100 feet in the vicinity of the site. Based on these subsurface conditions, we recommend assigning a Site Class C. The code-based seismic design parameters corresponding to Site Class C are provided in Exhibit 3 below.

Exhibit 3: Recommended ASCE 7-16 Seismic Design Parameters

Seismic Parameters	Symbol	Value
Site Class	-	C
Mapped MCE PGA	PGA	0.162g
PGA Site Coefficient	F_{PGA}	1.238
Peak Ground Acceleration Corrected for Site Effects	PGA_M	0.200g
Mapped Short Period Spectral Acceleration	S_S	0.361g
Mapped 1-Second Spectral Acceleration	S_1	0.136g
Short Period Site Coefficient	F_a	1.3
1-Second Period Site Coefficient	F_v	1.5
Adjusted MCER Spectral Response Acceleration for Short Periods	S_{MS}	0.469g
Adjusted Spectral Response Acceleration at 1-Second Period	S_{M1}	0.204
Short Period Design Spectral Acceleration	S_{DS}	0.313g
1-Second Period Design Spectral Acceleration	S_{D1}	0.136g

NOTES:

1 g = gravity acceleration; N/A = Not applicable; PGA= Peak Ground Acceleration.

Liquefaction and Lateral Spreading

Soil liquefaction is a phenomenon in which excess pore water pressure within loose to medium-dense, saturated granular soils increases during seismic shaking to levels approaching the initial effective stress. Soils most susceptible to liquefaction typically include sands and low-plasticity silts. This increase in pore pressure reduces the soil's shear strength and can result in ground deformation such as lateral spreading, slope instability, and settlement.

The behavior of soil under seismic loading is the primary factor influencing its liquefaction potential. Based on our review, the saturated soils beneath the proposed building area consist of medium-dense to dense gravelly alluvium, which is generally not considered susceptible to liquefaction. Accordingly, we consider the likelihood of liquefaction at the site to be low. Because lateral spreading is contingent upon liquefaction occurring, the potential for lateral spreading is also considered low.

Fault Surface Rupture

The nearest mapped fault to the site is part of the Hite Fault Zone, located approximately 9.5 miles east of the site. This fault is classified as a Class A fault, indicating it is potentially active. The estimated slip rate for the fault is less than 0.2 mm/year. Based on this information, we conclude that the likelihood of surface fault rupture impacting the site is low.

FOUNDATION DESIGN RECOMMENDATIONS

Based on our understanding of the subsurface conditions at the site and the assumed foundation loads, column loads up to 75 kips and wall loads up to 2 kips per lineal foot, we consider it geotechnically feasible to support the proposed administrative and storage buildings on shallow foundations underlain by a minimum 12-inch-thick granular pads established over firm, undisturbed native subgrade. Due to frost depth, the foundations should be embedded a minimum of 24 inches from the lowest adjacent grade.

We note that recent test pits were excavated within the building footprints and subsequently backfilled with on-site materials compacted using a hoe-pac in lifts. To minimize potential settlement risks, we recommend that the building pad be proof rolled, as discussed in the Subgrade Preparation section of this letter report.

Where test pit locations are known to fall within the influence zone of the foundations (i.e., within a 1H:1V downward projection from the edge of the foundation), we recommend that the materials within this zone be removed and replaced with granular pad material. The replacement material should be compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557.

Granular Pads

The granular pads should consist of ¾-inch minus crushed rock meeting the requirements of Section 2630.10 of the 2024 Oregon Standard Specifications for Construction and should be compacted to at least 95 percent of the maximum dry density, as determined by ASTM D1557. The crushed rock should contain no more than five percent by dry weight of material passing the No. 200 sieve. The crushed rock should horizontally extend a minimum of 6 inches beyond the edges of the footings.

Undocumented Fill

In our recent explorations performed near and within the proposed building footprints, undocumented fill of varying composition was encountered to depths up to 1.8 feet bgs. Undocumented fill was encountered at greater depths in other areas of the site during our 2008 subsurface exploration.

Based on the minimum foundation embedment depth of 24 inches and construction of a minimum 12-inch-thick granular pad, we anticipate that most, if not all, of the undocumented fill will be removed during construction in the new building location. However, because reliable strength and settlement characteristics cannot be assigned to undocumented fill, additional over-excavation may be required where deeper fill is encountered. Accordingly, we recommend that the project budget includes a contingency for over-excavation.

Where undocumented fill extends below the bottom of the granular pad, we recommend over-excavating to a minimum depth of 2 feet below the pad and replacing it with ¾-inch minus crushed rock meeting the requirements of Section 2630.10 of the 2024 Oregon Standard Specifications for Construction. The crushed rock should be placed in loose lifts not exceeding 8 inches in thickness and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. The crushed rock should extend horizontally beyond the footing edges at a rate of 6 inches for every 1 foot of crushed-rock thickness below the foundation, resulting in crushed rock being present within a 1H:2V projection beneath the footing.

We recommend that a qualified representative of the Owner observe the subgrade prior to placement of crushed rock to determine if further over-excavation of material is needed if deleterious materials are present.

Allowable Bearing Capacity

Provided these recommendations are followed, we recommend that foundations be sized based on a net allowable bearing capacity of 2,500 pounds per square foot (psf). The footings should have minimum widths of 18 and 12 inches for spread and wall footings, respectively.

Foundation Settlement

Foundations designed according to the recommended allowable bearing capacity should experience total settlement of less than 1 inch, with differential settlement of less than ½ inch over a distance of 30 feet.

Foundation Lateral Resistance

Lateral resistance to wind and earthquake loading can be achieved through frictional resistance between the base of foundation elements and the supporting crushed rock. Based on the soils encountered, a friction factor of 0.4 may be used for design.

Passive earth pressures may also be considered for lateral resistance; however, we do not anticipate that passive resistance will be feasible because the upper 24 inches of adjacent soil should be disregarded due to potential disturbance from frost penetration. If footings are embedded deeper than 24 inches, we recommend using a reduced, or partial, passive pressure equal to approximately 50 percent of the full passive resistance. For sliding and overturning evaluations, a passive resistance of 150H psf (triangular distribution) may be used, where H is the height of the foundation element engaged within the passive zone.

CONSTRUCTION CONSIDERATIONS

Subgrade Preparation

Organic material and topsoil should be stripped and removed from all structural areas and replaced with crushed rock compacted as fill. We recommend that soil disturbed during clearing and grubbing operations be removed and replaced with crushed rock structural fill. All subgrades should be neatly trimmed and carefully prepared. Any organic, deleterious, loose, or softened material should be removed from the excavation prior to placing crushed rock. Given the minimum footing depth and the incorporation of a minimum 12-inch-thick granular pads beneath foundations, we anticipate that the topsoil will be removed during subgrade preparation.

Due to several recent test pits excavated within the building footprints and subsequently backfilled with on-site material, we recommend performing a proof roll over each building footprint following subgrade preparation. The proof roll should be conducted using a loaded dump truck or water truck with axle loads ranging from approximately 10 to 20 kips. This process will help identify any soft, loose, or yielding areas. Any deficient areas identified during proof rolling should be over-excavated to an approximate depth of 2 feet, or as necessary to achieve adequate subgrade stability.

Backfill for subgrade stabilization should consist of crushed rock meeting the requirements of Section 2630.10 of the 2024 Oregon Standard Specifications for Construction. The crushed rock should be placed in loose lifts not exceeding 8 inches in thickness and compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D1557.

Temporary Slopes

The Earthwork Contractor is responsible for maintaining the safety of all temporary excavations and must be familiar with applicable local, state, and federal safety regulations, including current OSHA Excavation and Trench Safety Standards. Site safety, including construction means, methods, and sequencing, is solely the Contractor's responsibility. The

Contractor must also continuously monitor excavation conditions and provide any necessary shoring to safeguard personnel, adjacent improvements, and existing facilities such as buried pipelines near the excavation areas. For planning purposes, we recommend assuming temporary excavation slopes no steeper than 1.5 Horizontal to 1 Vertical (1.5H:1V).

LIMITATIONS

The analyses, conclusions, recommendations, and conceptual construction information contained in this report are based on site conditions as they existed at the time of our previous subsurface exploration and further assume that the explorations are representative of the subsurface conditions throughout the site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the explorations. If subsurface conditions different from those encountered in the explorations are encountered or appear to be present during construction, we should be advised at once so that we can review these conditions and reconsider our recommendations, where necessary. If there is a substantial lapse of time between the submission of this report and the start of construction at the site, or if conditions have changed because of natural forces or construction operations at or adjacent to the site, we recommend that we review our report to determine the applicability of the conclusions and recommendations.

Within the limitations of scope, schedule, and budget, the analyses, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no other warranty, either express or implied. These conclusions and recommendations were based on our understanding of the project as described in this report and the site conditions as observed at the time of our explorations.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples from test borings. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

This report was prepared for the exclusive use of Keller and the City of Pendleton. This report is interpretive with data included, and if provided to the Contractors, it should be for their information only and not as a basis of bidding. Our report's interpretations and conclusions should not be construed as a warranty of the subsurface conditions included in this report.

The scope of our present work did not include environmental assessments or evaluations regarding the presence or absence of wetlands, or hazardous or toxic substances in the soil, surface water, groundwater, or air, on or below or around this site, or for the evaluation or disposal of contaminated soils or groundwater should any be encountered.

Shannon & Wilson has prepared and included the attached "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of our reports.

CLOSING

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

REGISTERED PROFESSIONAL ENGINEER
86997PE
OREGON
SEPT 12, 2017
JORDAN LUKE MELBY
EXPIRES: 12-31-26

Jordan Melby, PE
Senior Engineer

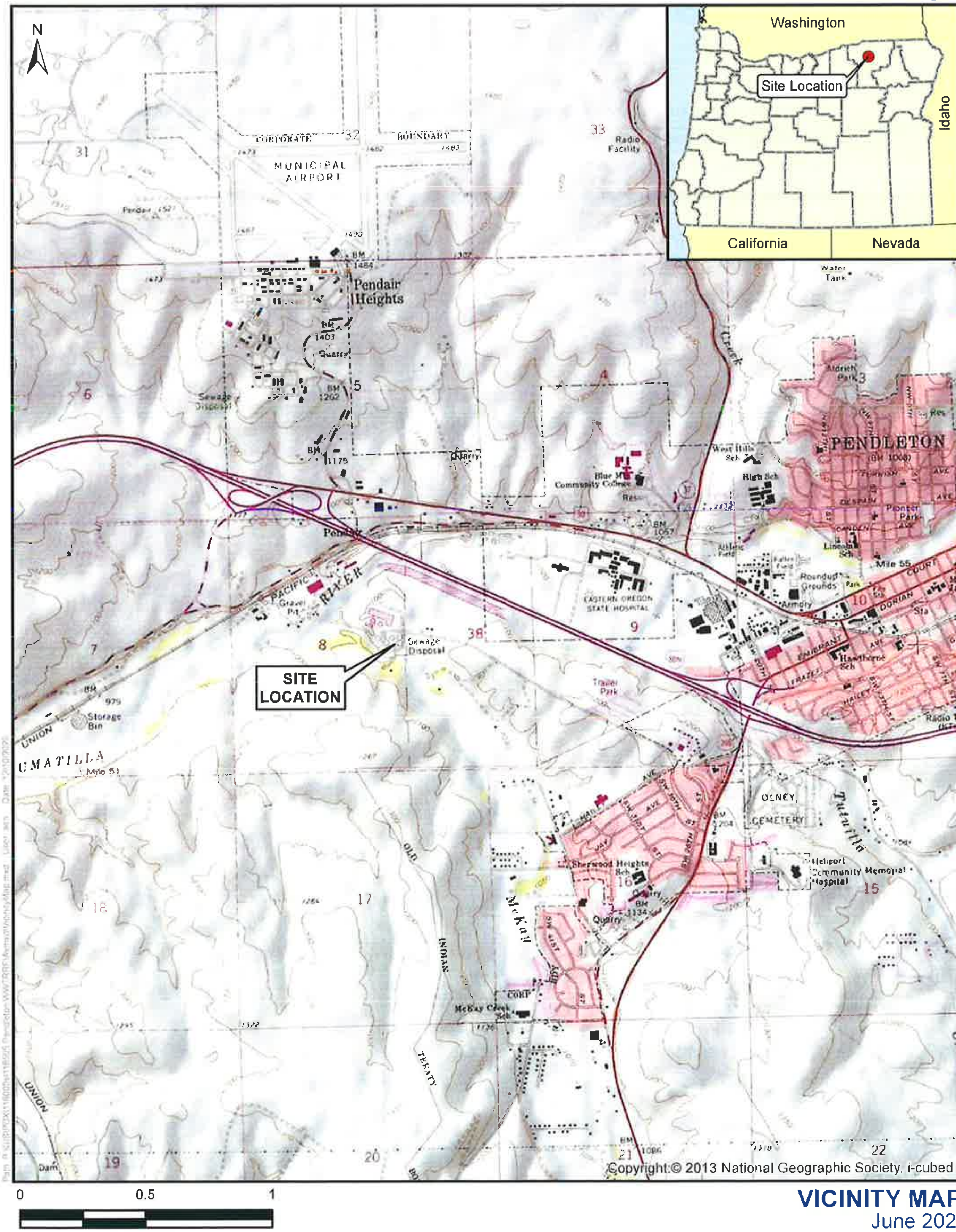
JLM/lxr:mmb

Enc. Figure 1 – Vicinity Map
Figure 2 – Site and Exploration Plan
Attachment A – Recent Subsurface Explorations
Attachment B – Nearby Subsurface Exploration Logs
Important Information About Your Geotechnical/Environmental Report

SHANNON & WILSON

Job Number: 116595

Pendleton WWTRRF Improvements
Pendleton, Oregon



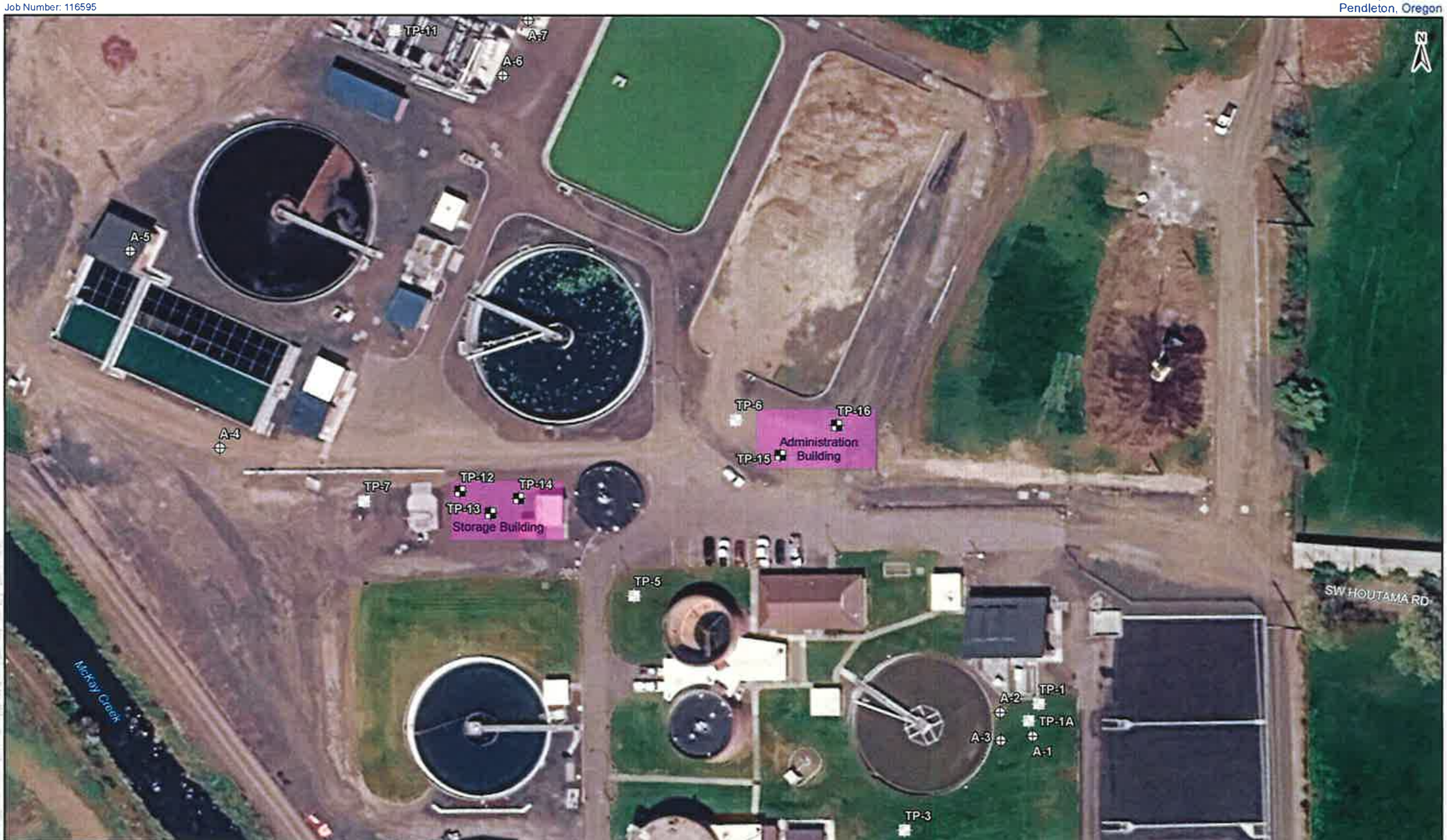
VICINITY MAP

June 2026

FIGURE 1

SHANNON & WILSON
Job Number: 116595

Pendleton WWTRRF Improvements
Pendleton, Oregon



NOTES
1. Aerial imagery obtained through Google Maps Satellite.
2. Approximate proposed building locations provided by Keller Associates, Inc., on November 24, 2025.

LEGEND
A-1 Designation and Approximate Location of Air-Track Probe (Shannon & Wilson, 2008)
TP-1 Designation and Approximate Location of Test Pit (Shannon & Wilson, 2008)
TP-1 Designation and Approximate Location of Test Pit (Shannon & Wilson, 2026)
Approximate Location of Proposed Building

0 60 120
1" = 60'
VERIFY SCALE - BAR IS TWO INCHES ON ORIGINAL FIGURE

SITE AND EXPLORATION PLAN
June 2026
FIGURE 2

ATTACHMENT A: RECENT SUBSURFACE EXPLORATIONS

Attachment A

Recent Subsurface Explorations

CONTENTS

Figures

APPENDIX A: RECENT SUBSURFACE EXPLORATIONS

A.1 GENERAL

The recent subsurface explorations for the Pendleton WWTRRF new administrative and storage buildings included five (5) test pits. This appendix describes the techniques used to perform the explorations, and presents logs of the materials encountered.

A.2 GEOTECHNICAL TEST PITS

The geotechnical test pits were excavated on April 28, 2026, using a Kubota KX161-3 mini excavator equipped with a 2-foot wide-toothed bucket provided and operated by the City of Pendleton. The test pits were excavated to depths between 2.2 to 5.5 feet below the ground surface (bgs). A Shannon & Wilson representative was present during the explorations to locate the test pits, observe the excavation, collect soil samples, and log the materials encountered.

A.2.1 Soil Sampling

Disturbed jar samples were collected of cuttings from the excavator bucket or the spoils pile at select intervals determined in the field by the Shannon & Wilson representative on site. The material was examined, classified, and described in the field, sealed to retain moisture, and returned to our in-house laboratory for additional examination and testing.

A.3 MATERIAL DESCRIPTIONS

Soil samples were described and identified visually in the field, in general accordance with ASTM D2488, the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Consistency, color, relative moisture, degree of plasticity, peculiar odors, and other relevant distinguishing characteristics of the samples were noted.

Once transported to Shannon & Wilson, the field descriptions and identifications were modified where necessary, based on laboratory test results and further review of the samples. The specific terminology used is defined in the Soil Description and Log Key, Figure A1.

A.4 LOGS OF TEST PITS

Summary logs of the test pits are presented in Figures A2 through A6. Material descriptions and interfaces on the log are interpretive, and actual changes may be gradual. The left-hand portion of the test log gives our description, identification, and geotechnical unit designation for the materials encountered, sample locations and designations, and special notes of test pit observations. The right-hand portion presents photographs of the test pits.

A.5 TEST PIT ABANDONMENT

The test pits were backfilled immediately with the excavated materials. The backfill was placed in 1- to 2-foot loose lifts and compacted using a hoe-pac compactor.

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor.*
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND	
Fine	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.)
Medium	#40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.)
Coarse	#10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL	
Fine	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.)
Coarse	3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Inclinometer or Non-perforated Casing
Gravel	Vibrating Wire Piezometer
Perforated or Screened Casing	

PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Pendleton WWTP
Pendleton, Oregon

SOIL DESCRIPTION AND LOG KEY

June 2026 116595

SHANNON & WILSON

FIG. A1
Sheet 1 of 3

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW	Well-Graded Gravel; Well-Graded Gravel with Sand
			GP	Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM	Silty Gravel; Silty Gravel with Sand
			GC	Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW	Well-Graded Sand; Well-Graded Sand with Gravel
			SP	Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM	Silty Sand; Silty Sand with Gravel
			SC	Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat or other highly organic soils (see ASTM D4427)

FILL	Placed by humans, both engineered and nonengineered. May include various soil materials and debris.		The Fill graphic symbol is combined with the soil graphic that best represents the observed material

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the *CL-ML* area of the plasticity chart.
2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.
3. The soil graphics above represent the various USCS identifications (i.e., *GP*, *SM*, etc.) and may be augmented with additional symbology to represent differences within USCS designations. *Sandy Silt (ML)*, for example, may be accompanied by the *ML* soil graphic with sand grains added. Non-USCS materials may be represented by other graphic symbols; see log for descriptions.

Pendleton WWTP
Pendleton, Oregon

SOIL DESCRIPTION AND LOG KEY

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SHANNON & WILSON

FIG. A1
Sheet 2 of 3

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICTY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4%
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10%
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20%
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20%

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.
[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
approx.	Approximate/Approximately
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

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Pendleton, Oregon

SOIL DESCRIPTION AND LOG KEY

June 2026 116595

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FIG. A1
Sheet 3 of 3

Elevation: ~

SOIL PROFILE DESCRIPTION	Depth (ft)	Symbol	Samples	Type	Ground Water	NOTES
Gravel Fill: 2-inches thick	0.2					
Brown, *Silty Gravel with Sand to Clayey Gravel with Sand (GM/GC)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic to low plasticity fines; slight iron oxidation. **FILL**	1.5		S-1	G		
Dark brown, *Organic Soil (OL/OH)*; moist; trace to few fine to coarse, subrounded to rounded gravel; fine to coarse sand; medium to high plasticity; slight iron oxidation.	2.0		S-2	G		
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines. **ALLUVIUM**	3.5		S-3	G		
Brown, *Silt to Silt with Sand (ML)*; moist; trace to few, fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic.	4.3		S-4	G		
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines.	5.5		S-5	G		

TEST PIT PHOTO

NOTES

1. The description in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
2. Refer to Soil Classification and Log Key for explanation of "Symbols" and Definitions.
3. Group symbol is based on visual-manual identification.
4. Where possible, a 1/2-inch-diameter, steel T-bar probe was used to estimate the density of soil.

LEGEND

Seepage

G Grab Sample

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Pendleton, Oregon

LOG OF TEST PIT TP-12

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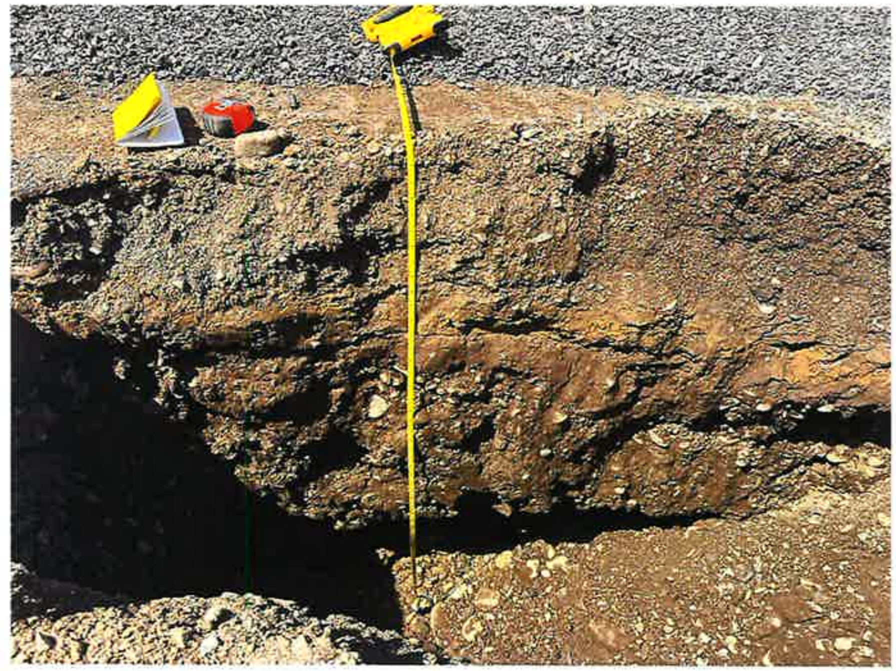
FIG. A2

FIG. A2

REV 2

Elevation: ~ SOIL PROFILE DESCRIPTION	Depth (ft)	Symbol	Samples	Type	Ground Water	NOTES
Gravel Fill: 2-inches thick	0.2					
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subangular to rounded gravel; fine to coarse sand; nonplastic fines. **FILL**	0.8		S-1	G		
	1.2		S-2	G		
Brown, *Silt to Silt with Sand (ML)*; moist; trace fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic.						
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines. **ALLUVIUM**			S-3	G		
Completed: April 28, 2026	4.5					

TEST PIT PHOTO



NOTES

1. The description in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
2. Refer to Soil Classification and Log Key for explanation of "Symbols" and Definitions.
3. Group symbol is based on visual-manual identification.
4. Where possible, a 1/2-inch-diameter, steel T-bar probe was used to estimate the density of soil.

LEGEND

Seepage

G Grab Sample

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Pendleton, Oregon

LOG OF TEST PIT TP-13

June 2026 116595

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FIG. A3

FIG. A3

REV 2

Elevation: ~

SOIL PROFILE DESCRIPTION	Depth (ft)	Symbol	Samples	Type	Ground Water	NOTES
Gravel Fill: 2-inches thick	0.2					
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subangular to rounded gravel; fine to coarse sand; nonplastic to low plasticity fines; trace organics; brick and concrete fragments; metal pieces; slight iron oxidation. **FILL**	1.6		S-1	G		
Brown, *Silt to Silt with Sand (ML)*; moist; trace to few fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic; slight iron oxidation. **ALLUVIUM**	2.3		S-2	G		
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines.	4.0		S-3	G		

Completed: April 28, 2026

TEST PIT PHOTO

NOTES

1. The description in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
2. Refer to Soil Classification and Log Key for explanation of "Symbols" and Definitions.
3. Group symbol is based on visual-manual identification.
4. Where possible, a 1/2-inch-diameter, steel T-bar probe was used to estimate the density of soil.

LEGEND

- Seepage
- G Grab Sample

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FIG. A4

FIG. A4

REV 2

Elevation: ~

SOIL PROFILE DESCRIPTION	Depth (ft)	Symbol	Samples	Type	Ground Water	NOTES
Gravel Fill: 2-inches thick	0.2					
Brown, *Silt to Silt with Sand (ML)*; moist; trace to few, fine to coarse, subangular to rounded gravel; fine sand; nonplastic; trace organics; micaceous. **FILL**	1.3		S-1	G		
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines. **ALLUVIUM**	2.2		S-2	G		

Completed: April 28, 2026

TEST PIT PHOTO

NOTES

1. The description in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
2. Refer to Soil Classification and Log Key for explanation of "Symbols" and Definitions.
3. Group symbol is based on visual-manual identification.
4. Where possible, a 1/2-inch-diameter, steel T-bar probe was used to estimate the density of soil.

LEGEND

- Seepage
- Grab Sample

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LOG OF TEST PIT TP-15

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FIG. A5

REV 2

FIG. A5

Elevation: ~ SOIL PROFILE DESCRIPTION	Depth (ft)	Symbol	Samples	Type	Ground Water	NOTES
Gravel Fill: 2-inches thick	0.2					
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subangular to rounded gravel; fine to coarse sand; nonplastic fines; micaceous. **FILL**	1.2		S-1	G		
Brown, *Silt to Silt with Sand (ML)*; moist; trace to few, fine to coarse, subrounded to rounded gravel; fine to medium sand; nonplastic fines; micaceous.	1.8		S-2	G		
Brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; nonplastic fines. **ALLUVIUM**	3.0		S-3	G		
Completed: April 28, 2026						

TEST PIT PHOTO

NOTES
1. The description in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
2. Refer to Soil Classification and Log Key for explanation of "Symbols" and Definitions.
3. Group symbol is based on visual-manual identification.
4. Where possible, a 1/2-inch-diameter, steel T-bar probe was used to estimate the density of soil.

LEGEND
- Seepage
- G Grab Sample

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LOG OF TEST PIT TP-16

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FIG. A6

FIG. A6

REV 2

ATTACHMENT B

NEARBY SUBSURFACE EXPLORATION LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(From ASTM D 2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOIL *(more than 50% retained on No. 200 sieve)*	Gravel *(more than 50% of coarse fraction retained on No. 4 sieve)*	Clean Gravel *(less than 5% fines)*	GW	Well-graded gravel, gravel, gravel/sand mixtures, little or no fines.
			GP	Poorly graded gravel, gravel-sand mixtures, little or no fines
		Gravel with Fines *(more than 10% fines)*	GM	Silty gravel, gravel-sand-silt mixtures
			GC	Clayey gravel, gravel-sand-clay mixtures
	Sand *(50% or more of coarse fraction passes the No. 4 sieve)*	Clean Sand *(less than 5% fines)*	SW	Well-graded sand, gravelly sand, little or no fines
			SP	Poorly graded sand, gravelly sand, little or no fines
		Sand with Fines *(more than 10% fines)*	SM	Silty sand, sand-silt mixtures
			SC	Clayey sand, sand-clay mixtures
FINE-GRAINED SOIL *(50% or more passes the No. 200 sieve)*	Silt and Clay *(liquid limit less than 50)*	Inorganic	ML	Inorganic silt of low to medium plasticity, rock flour, sandy silt, gravelly silt, or clayey silt with slight plasticity
			CL	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay, silty clay
		Organic	OL	Organic silt and organic silty clay of low plasticity
	Silt and Clay *(liquid limit 50 or more)*	Inorganic	MH	Inorganic silt, micaceous or diatomaceous fine sand or silty soils, elastic silt
			CH	Inorganic clay or medium to high plasticity
		Organic	OH	Organic clay of medium to high plasticity, organic silt
HIGHLY-ORGANIC SOIL	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (see ASTM D 4427)

NOTE: No. 4 size = 5 mm; No. 200 size = 0.075 mm

NOTES

1. Dual symbols (symbols separated by a hyphen, i.e., SP-SM, SAND with silt) are used for coarse-grained soils with 10 percent fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

2. Borderline symbols (symbols separated by a slash, i.e., CL/ML and GW/SW) indicate that the soil may fall into one of two possible basic groups.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

SOIL CLASSIFICATION AND LOG KEY

March 2009 | 24-1-03406-002

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FIG. A1

POST 07 BORING CLASS2 3406.GPJ SWNEW.GDT 3/19/09

Total Depth:	*8 ft.*	Northing:	*~ 46 ft.*	Drilling Method:		Hole Diam.:	
Top Elevation:	*1004 ft.*	Easting:	*~ 119 ft.*	Drilling Company:		Rod Type:	
Vert. Datum:		Station:	~	Drill Rig Equipment:		Hammer Type:	
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop:
Crushed Gravel (GW); angular to subangular gravel; moist. **FILL**	*1003.3* 0.7					
Medium stiff brown SILT (ML) trace of gravel; no to low plasticity, rounded to subrounded gravel; moist. **ALLUVIUM**	*1001.5* 2.5					
Medium dense to dense brown sandy GRAVEL (GW) trace of silt; rounded to subrounded, fine to coarse sand and gravel, occasional rounded cobbles; moist to wet.					5	
Water observed at 8.0 feet.	*996.0* 8.0			▽		
Bottom of Test Pit 8.0 feet on 02-28-2008.					10	

Penetration resistance scale: 0, 20, 40, 60

LEGEND

* Sample Not Recovered

▽ Ground Water Level

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP- 1

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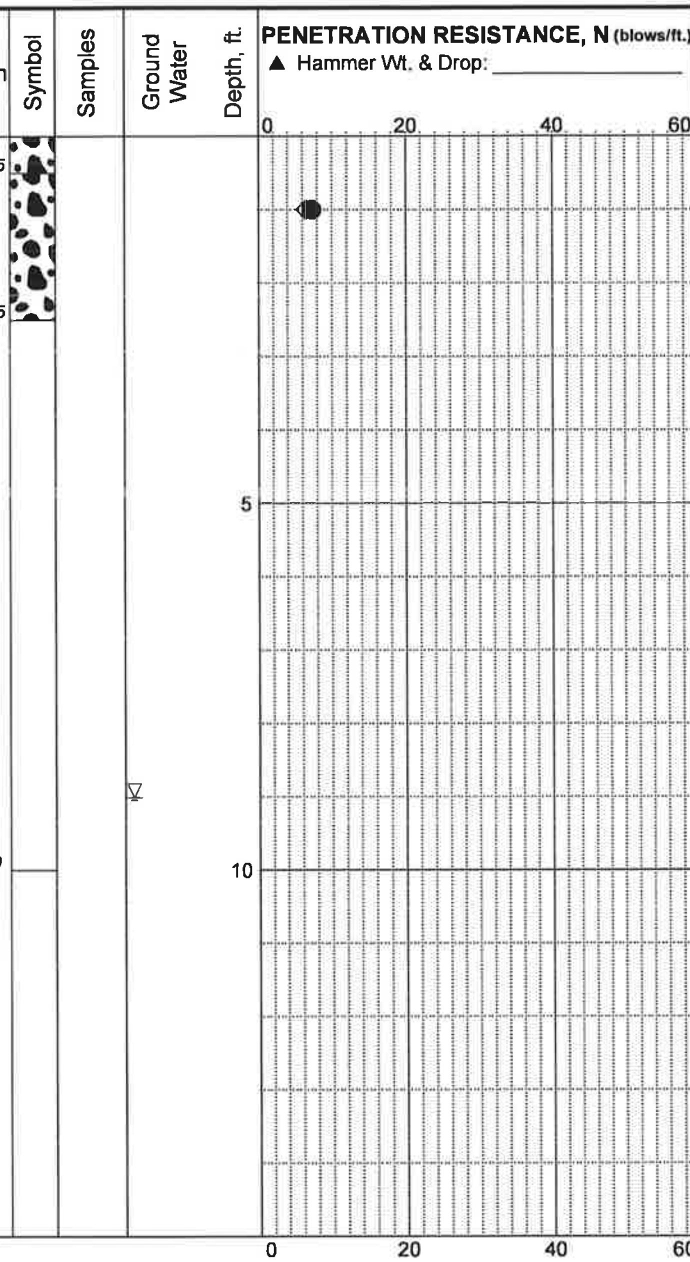
FIG. A2

Total Depth:	10 ft.	Northing:	~	Drilling Method:		Hole Diam.:	
Top Elevation:	1004 ft.	Easting:	~	Drilling Company:		Rod Type:	
Vert. Datum:		Station:	~	Drill Rig Equipment:		Hammer Type:	
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. / Depth (ft.)
Crushed Gravel **FILL**	1003.5 / 0.5
Medium stiff brown SILT (ML) trace of gravel; no to low plasticity, rounded to subrounded gravel; moist. **ALLUVIUM**	1001.5 / 2.5
Medium dense to dense brown sandy GRAVEL (GW) trace of silt; rounded to subrounded, fine to coarse sand and gravel, occasional rounded cobbles; moist to wet.	994.0 / 10.0
Bottom of Test Pit 10.0 feet completed on 8-24-08	



LEGEND

* Sample Not Recovered

∇ Ground Water Level

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP-1A

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FIG. A3

MASTER LOG E 3406.GPJ SHAN WIL.GDT 3/19/09 Log: Rev: Typ:

Total Depth:	10 ft.	Northing:	~ 46 ft.	Drilling Method:		Hole Diam.:	
Top Elevation:	1003.8 ft.	Easting:	~ 119 ft.	Drilling Company:		Rod Type:	
Vert. Datum:		Station:	~	Drill Rig Equipment:		Hammer Type:	
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop:
Topsoil.	1002.8 1.0					
Medium dense to dense brown to gray-brown sandy GRAVEL (GW) trace of silt; rounded to subrounded fine to coarse gravel, fine to coarse sand, occasional rounded to subrounded cobbles; moist. **ALLUVIUM**	1000.3 3.5					
Medium stiff to stiff brown SILT (ML); no to low plasticity, silt seam from 3.5 to 4.1 feet; moist.	999.7 4.1					
Medium dense to dense brown sandy GRAVEL(GW-GM) with silt and cobbles; rounded to subrounded fine to coarse gravel, fine to coarse sand, no to low plasticity silt, rounded to subrounded occasional cobbles <2%; moist.					5	
Water observed at 9.5 feet.	993.8 10.0			∇	10	
Bottom of Test Pit 10.0 feet on 02-28-2008.						

Penetration resistance scale: 0, 20, 40, 60

LEGEND

* Sample Not Recovered

∇ Ground Water Level

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP- 3

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FIG. A5

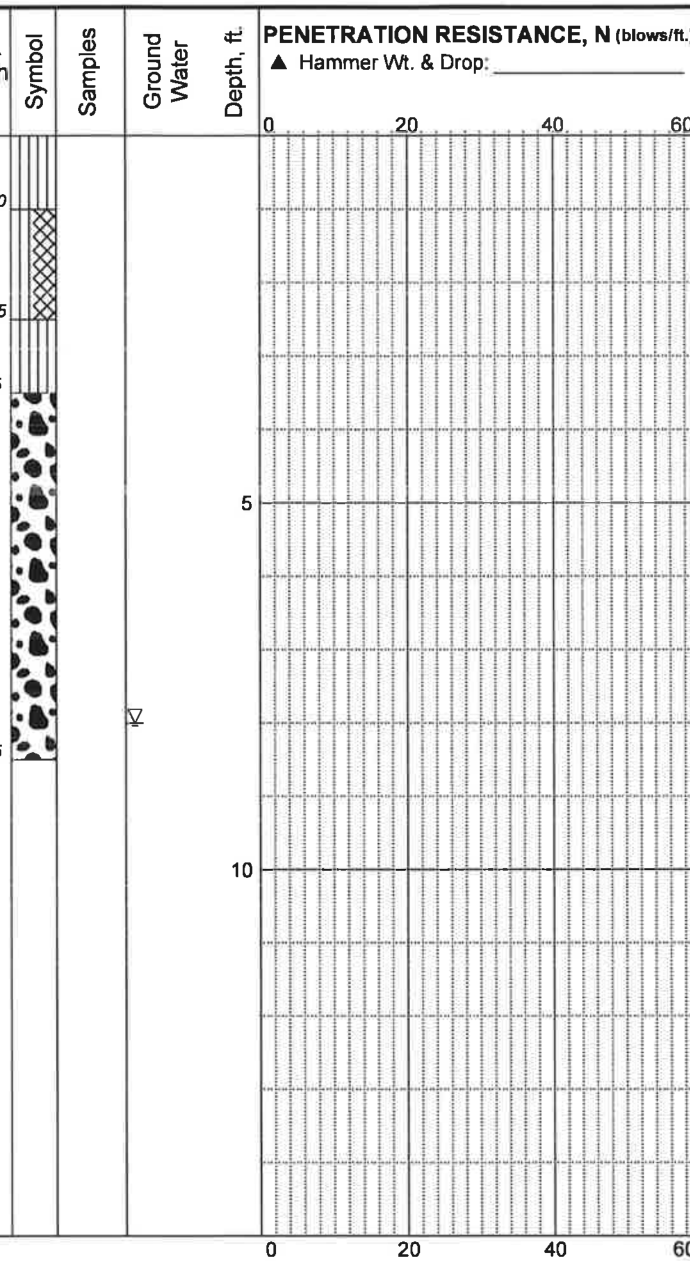
MASTER_LOG_E 3406.GPJ SHAN_WIL.GDT 3/19/09 Log: Rev: Typ:

Total Depth:	8.5 ft.	Northing:	~ 46 ft.	Drilling Method:	Hole Diam.:
Top Elevation:	1003 ft.	Easting:	~ 119 ft.	Drilling Company:	Rod Type:
Vert. Datum:		Station:	~	Drill Rig Equipment:	Hammer Type:
Horiz. Datum:		Offset:	~	Other Comments:	

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. Depth (ft.)
Topsoil.	1002.0 / 1.0
Soft brown SILT (ML) with gravel trace of sand; no to low plasticity, rounded to subangular fine to coarse gravel, fine to medium sand; moist. **FILL**	1000.5 / 2.5
Medium stiff to stiff dark Brown SILT (ML); no to low plasticity; moist. **ALLUVIUM**	999.5 / 3.5
Medium dense to dense brown sandy GRAVEL (GW) trace of silt; rounded to subrounded fine to coarse gravel, fine to coarse sand, occasional rounded to subrounded cobbles; moist. Water observed at 8.0 feet.	994.5 / 8.5
Bottom of Test Pit. 8.5 feet on 02-28-2008.	



LEGEND

* Sample Not Recovered

∇ Ground Water Level

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP- 5

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FIG. A7

Total Depth:	8.5 ft.	Northing:	~ 46 ft.	Drilling Method:	
Top Elevation:	1005 ft.	Easting:	~ 119 ft.	Drilling Company:	
Vert. Datum:		Station:	~	Drill Rig Equipment:	
Horiz. Datum:		Offset:	~	Other Comments:	

Hole Diam.:	
Rod Type:	
Hammer Type:	

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. Depth (ft.)
Crushed GRAVEL (GW-GM) with silt, angular to subangular gravel; moist. **FILL**	1004.5 / 0.5
Medium stiff to stiff brown SILT (ML) trace of sand; no to low plasticity; moist. **ALLUVIUM**	1003.5 / 1.5
Medium dense to dense brown to gray sandy GRAVEL (GW-GM) with silt; rounded to subrounded fine to coarse gravel, fine to medium sand, no plasticity, occasional rounded cobbles; moist. Water observed at 8.0 feet.	996.5 / 8.5
Hard excavating (possible bedrock)	

Bottom of Test Pit - REFUSAL
8.5 feet on 02-28-2008.

Symbol | Samples | Ground Water | Depth, ft.: 5, 10

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop:

0 20 40 60

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered

▽ Ground Water Level

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP- 6

March 2009 24-1-03406-002

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FIG. A8

MASTER LOG E 3406.GPJ SHAN WIL.GDT 3/19/09 Log: Rev: Typ:

Total Depth:	11 ft.	Northing:	~ 46 ft.	Drilling Method:	
Top Elevation:	1001 ft.	Easting:	~ 119 ft.	Drilling Company:	
Vert. Datum:		Station:	~	Drill Rig Equipment:	
Horiz. Datum:		Offset:	~	Other Comments:	

Hole Diam.:
Rod Type:
Hammer Type:

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.
Soft to medium stiff brown SILT (ML) with gravel trace of sand; no to low plasticity, rounded to subangular fine to coarse gravel; moist. **FILL**	994.5 6.5				5
Medium stiff to stiff dark brown SILT (ML); no to low plasticity; moist. **ALLUVIUM**	991.5 9.5			⊻	
Medium dense to dense gray sandy GRAVEL (GW) trace of silt; rounded to subrounded fine to coarse gravel, fine to coarse sand, occasional rounded to subrounded cobbles; wet. Water observed at 9.5 feet.	990.0 11.0				10
Bottom of Test Pit. 11.0 feet on 02-28-2008.					

PENETRATION RESISTANCE, N (blows/ft.)
▲ Hammer Wt. & Drop:

0 20 40 60

LEGEND

* Sample Not Recovered
⊻ Ground Water Level

Plastic Limit ├──●──┤ Liquid Limit
Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

LOG OF TEST PIT TP- 7

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FIG. A9

Total Depth: 4.1 ft.	Northing: ~ 46 ft.	Drilling Method:		Hole Diam.:	
Top Elevation: 996.5 ft.	Easting: ~ 119 ft.	Drilling Company:		Rod Type:	
Vert. Datum:	Station: ~	Drill Rig Equipment:		Hammer Type:	
Horiz. Datum:	Offset: ~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. Depth (ft.)
Concrete.	996.3 / 0.3
Crushed Gravel (GW); angular to subangular gravel; moist. **FILL**	995.7 / 0.8
	995.0 / 1.5
Medium stiff to stiff dark brown to black SILT (ML) with gravel trace of sand; no to low plasticity, rounded to subrounded fine to medium gravel, fine to medium sand; moist. **ALLUVIUM**	
Medium dense to dense brown to gray sandy GRAVEL (GW-GM) with silt; rounded to subrounded fine to coarse gravel, fine to coarse sand, no plasticity silt, occasional rounded to subrounded cobbles, some reddish-brown oxidation stained zones; moist. Water observed at 3.5 feet.	992.4 / 4.1
Hard excavating (Bedrock)	

Bottom of Test Pit - REFUSAL
4.1 feet on 02-28-2008.

Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)
▲ Hammer Wt. & Drop:

Depth, ft.: 5, 10
N: 0, 20, 40, 60

LEGEND

• Sample Not Recovered

∇ Ground Water Level

Plastic Limit ├──●──┤ Liquid Limit
Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. UCS: Unconfined Compressive Strength, PSI: Pounds per Square Inch.

Pendleton Wastewater Treatment Plant Outfall
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LOG OF TEST PIT TP-11

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FIG. A13

MASTER LOG E 3406.GPJ SHAN WIL.GDT 3/19/09 Log: Rev: Typ:

Photo 1: Test Pit TP1- Silty Gravel to Gravel Deposit

Photo 2: Groundwater Seepage in Test Pit TP3

Pendleton Wastewater Treatment Plant, Pendleton, Oregon	
TEST PIT PHOTOS **Photos 1 and 2**	
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SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. A21**

Photo 3: Ground Water Seepage in Test Pit TP5

Photo 4: Groundwater Seepage and Gravel Deposits Cave-In in TP8

Pendleton Wastewater Treatment Plant,
Pendleton, Oregon

TEST PIT PHOTOS
Photos 3 and 4

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FIG. A22

Air Track Logs

Probe A1 — Approx. Elevation 1004 ft

Depth (ft)	Unit Description
0-12.0	Overburden
12.0-14.0	Bedrock (fractured)
14.0-	Sound Rock

Probe A2 — Approx. Elevation 1003 ft

Depth (ft)	Unit Description
0.0-10.0	Overburden
10.0-	Bedrock

Probe A3 — Approx. Elevation 1003 ft

Depth (ft)	Unit Description
0 .0-12.0	Overburden
12.0 – 16.0	Fractured rock
16.0 -	Sound rock

Probe A4 — Approx. Elevation 999 ft

Depth (ft)	Unit Description
0.0-9.0	Overburden
9.0-	Bedrock

Probe A5 — Approx. Elevation 999 ft

Depth (ft)	Unit Description
0.0-7.0	Overburden
7.0-	Bedrock

Probe A6 — Approx. Elevation 996.5 ft

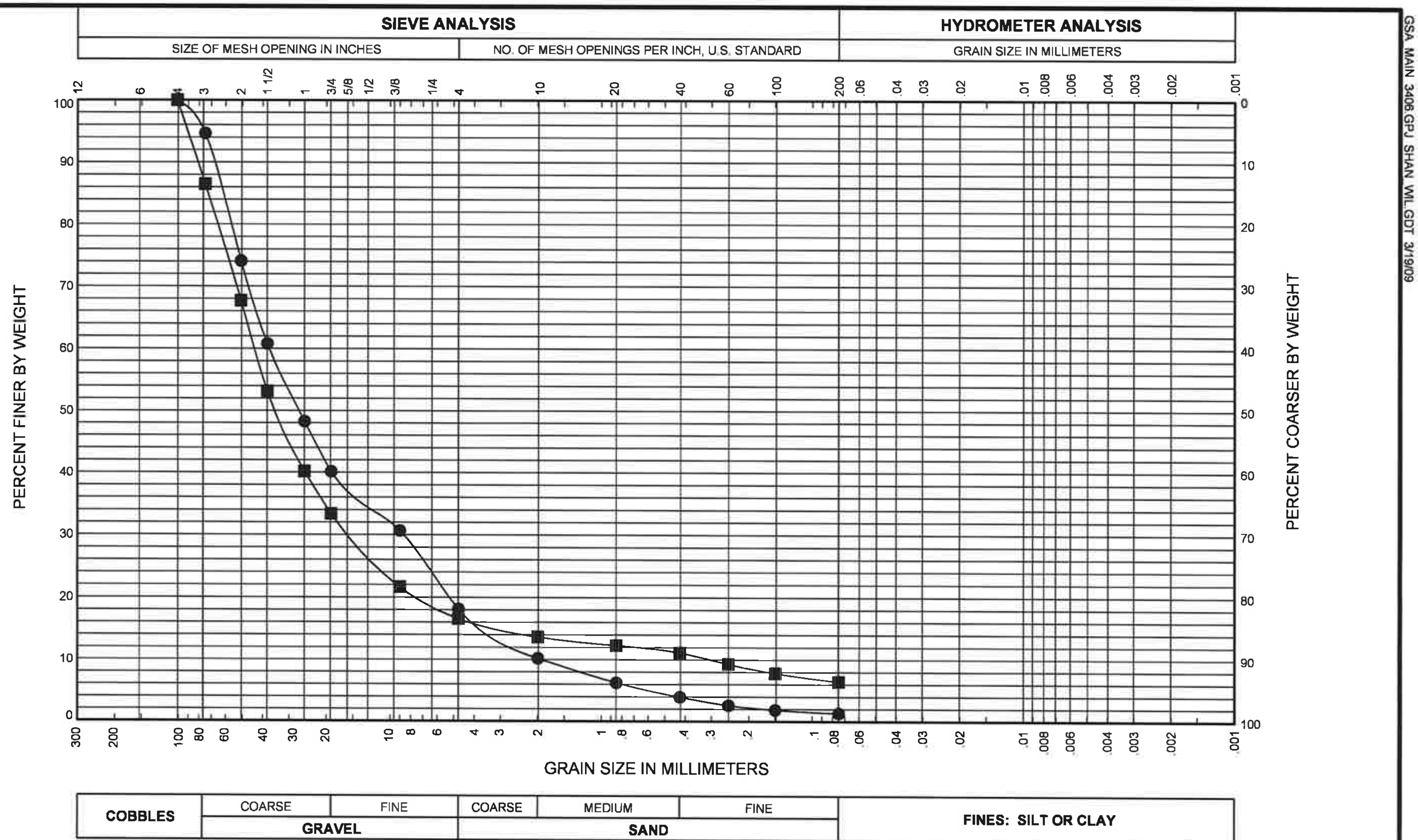
Depth (ft)	Unit Description
0.0-5.0	Overburden
5.0-	Bedrock

Probe A7 — Approx. Elevation 996.5 ft

Depth (ft)	Unit Description
0.0-5.0	Overburden
5.0-	Bedrock

Probe A8 — Approx. Elevation 996.5 ft

Depth (ft)	Unit Description
0.0-3.0	Overburden
3.0-	Bedrock



BORING AND SAMPLE NO.	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● TP-18,	1.0	GW	Brown GRAVEL with sand	76.5	16.8	1.3	4.7	
■ TP-1A,	1.0	GM	Brown GRAVEL, trace silt	69.9	10.1	6.5	7.3	

Pendleton Wastewater Treatment Plant Outfall
Pendleton, Oregon

GRAIN SIZE DISTRIBUTION

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FIG. B-1

Kennedy Jenks

FIG. B-1

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the Geoprofessional Business Association (https://www.geoprofessional.org)