REPORT OF GEOTECHNICAL ENGINEERING SERVICES

Night & Day Furniture
2205 Robinson Road
Woodland, Washington

For
Night & Day Furniture
October 25, 2021

Project: NDFurniture-1-01

NV5

October 25, 2021

Night & Day Furniture
3115 NE 109th Avenue
Vancouver, WA 98682

Attention: Mike Gallawa

Report of Geotechnical Engineering Services
Night & Day Furniture
2205 Robinson Road
Woodland, Washington
Project: NDFurniture-1-01

NV5 is pleased to present this report of geotechnical engineering services for the proposed development for Night & Day Furniture located at 2205 Robinson Road in Woodland, Washington. Our services were provided in general conformance with our proposal dated September 1, 2021.

We appreciate the opportunity to be of continued service to you. Please call if you have questions regarding this report.

Sincerely,

NV5

Nick Paveglio, P.E.
Principal Engineer

cc: Scott Taylor, SGA Engineering & Design (via email only)
Jason Mattos, SGA Engineering & Design (via email only)
Joe Intermill, SGA Engineering & Design (via email only)
Dennis Wubben, Pro Property Services, LLC (via email only)

JLM:NNP:kt
Attachments
One copy submitted (via email only)
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EXECUTIVE SUMMARY

The following is a summary of our findings and recommendations for use in design and construction of the proposed development. This executive summary is limited to an overview of the project. We recommend that the report be referenced for a thorough description of the subsurface conditions and geotechnical recommendations for the project.

The primary geotechnical considerations for the project are summarized as follows:

- Based on analysis, maximum predicted liquefaction settlement at the site will be 8 inches with differential settlement of up to 4 inches over a distance of 50 feet. A detailed discussion of the liquefaction potential at the development is discussed in the “Geologic Hazards” section.

- Provided the building is metal-framed, Risk Category I/II structure with minimum column spacings of 25 feet, it can be supported on conventional spread footings bearing on firm, undisturbed native soil or on structural fill placed over firm, undisturbed native soil. The owner will have to be willing to accept the risk of building damage as a result of seismic settlement if the building is supported on conventional spread footings.

- Based on correspondence with the design team, at least 4 feet of fill will be required beneath the proposed building pad to meet development grades. Based on analysis, areal fills more than 2 feet thick in combination with the anticipated foundation and floor slab loads are sufficient to exceed typical static settlement tolerances for similar buildings. Accordingly, we recommend construction of structures and all settlement-sensitive improvements not commence until the Fill-Induced Settlement is complete. This will remove the settlement component associated with the fill, and remaining settlement associated with foundations and floor slab loading will be within typical settlement tolerances for similar buildings. Based on experience, the fill settlement period will range between 4 and 10 weeks.

- Due to the presence of potentially liquefiable soil, the seismic site class is F; however, the design parameters for Site Class E can be used to calculate base shear forces per ASCE 7-16, provided the fundamental period of the structure is 0.5 second or less. If liquefaction is mitigated below foundations, the site can be classified as Site Class E. If liquefaction is not mitigated, the footings will be required to be tied together due to the F site class.

- Undocumented fill present in portions of the site should be removed from beneath footings and the footings should be supported on granular pads that extend to native soil. Additional discussions are provided in the “Foundation Support” section. Floor slabs and pavement can be constructed on undocumented fill, provided they are evaluated as described in the “Construction” section and the owner is willing to accept a small risk of poor pavement performance.

- Our explorations encountered an agricultural tilled zone in the upper 4 to 10 inches of soil over a majority of the site from past (and current) agricultural activities. In general, the tilled zone is unconsolidated and will provide poor support for foundations, fills, floor slabs, and pavement. In areas where the tilled zone will not be removed by site cuts, we recommend that the tilled zone be improved by scarifying and re-compacting or by cement amendment as described in the "Design" and "Construction" sections.

- The near-surface fine grained soil is very sensitive to disturbance when at a moisture content that is above optimum. This can result in subgrade damage during construction and significant repair costs. Based on our experience in Woodland, the subgrade soil can be damaged with repeated loading from trucks and equipment, even when cement amended. We recommend the project budget include subgrade protection and the general contractor be prepared for thicker than typical haul roads and staging areas. A discussion of subgrade protection is included in the "Construction" section.

- The sand beneath the ground surface is prone to raveling and caving; excavation sidewalls may not stand vertical and pouring footings neat against excavation sidewalls will likely not be possible.

- Groundwater seepage was observed in a majority of the explorations at depths between 8 and 10 feet BGS. Based on our experience, groundwater could rise to within a few feet of the ground surface during the wet season. The presence of shallow perched groundwater will affect construction of the proposed development. Earthwork contractors should be prepared to dewater excavations at all times of the year, especially during the wet season.

- Based on testing and soil and groundwater conditions, stormwater infiltration systems are not feasible at the site.

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ACRONYMS AND ABBREVIATIONS

AC	asphalt concrete
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
BGS	below ground surface
CPT	cone penetration test
DCP	dynamic cone penetrometer
DSMC	deep soil mix column
ESAL	equivalent single-axle load
FHWA	Federal Highway Administration
g	gravitational acceleration (32.2 feet/second^2)
HMA	hot mix asphalt
H:V	horizontal to vertical
MCE	maximum considered earthquake
OSHA	Occupational Safety and Health Administration
pcf	pounds per cubic foot
pci	pounds per cubic inch
PG	performance grade
psf	pounds per square foot
psi	pounds per square inch
USGS	U.S. Geological Survey
WSS	Washington Standard Specifications for Road, Bridge, and Municipal Construction (2020)

1.0 INTRODUCTION

NV5 is pleased to submit this report of geotechnical engineering services for the proposed development for Night & Day Furniture located at 2205 Robinson Road in Woodland, Washington. The 2.95-acre site is located in the Port of Woodland between Interstate 5 and the Columbia River. The site location relative to surrounding physical features is shown on Figure 1. Acronyms and abbreviations used herein are defined above, immediately following the Table of Contents.

The proposed project will include construction of a metal-framed warehouse facility with a footprint of approximately 50,000 square feet. Associated infrastructure, including loading docks, AC drive aisles and parking areas, stormwater facilities, and underground utilities, will also be required as part of development.

Foundation loads of the proposed building have not been provided at the time of this report. We have assumed loads will be typical for this type of structure, with maximum column and wall loads less than 150 kips and 6 kips per lineal foot, respectively. Based on correspondence with the design team, fills of up to 4 feet may be required to raise the building. Long-term live slab loads within the building are assumed to be generally less than 300 psf.

2.0 PURPOSE AND SCOPE

The purpose of our services was to explore subsurface conditions at the site and provide geotechnical engineering recommendations for use in design and construction of the proposed development. We performed the following scope of our services for the project:

- Reviewed readily available, published geologic data and our in-house files for existing information on subsurface conditions in the site vicinity.
- Explored and evaluated subsurface conditions at the site by completing the following:
  - Excavated nine test pits to depths between 4 and 11 feet BGS.
  - Advanced two CPT probes to a depth of approximately 60.4 feet BGS.
  - Performed two DCP tests for use in pavement design.
  - Performed infiltration testing in two locations at depths of 3 and 4 feet BGS.
- Collected soil samples for laboratory testing and maintained a detailed log of subsurface conditions encountered in the test pits.
- Conducted the following laboratory tests on select soil samples obtained from the test pits:
  - Sixteen moisture content determinations in accordance with ASTM D2216
  - Six particle-size analyses in accordance with ASTM D1140
- Provided recommendations for site preparation, grading and drainage, compaction criteria for both on-site and imported materials, fill type for imported material, and procedures for the use of on-site soil and wet weather earthwork.
- Evaluated groundwater conditions at the site and provided general recommendations for site drainage.
- Provided foundation support recommendations for the proposed building.
- Provided recommendations for design and construction of concrete slab-on-grade structures, including an anticipated value for subgrade modulus.

- Provided seismic design coefficients in accordance with ASCE 7-16.
- Evaluated liquefaction potential at the site.
- Provided general recommendations for liquefaction mitigation.
- Provided general recommendations for the construction of AC pavement for on-site parking areas, including subbase, base course, and AC paving thickness.
- Prepared this report of our explorations, findings, conclusions, and recommendations.

3.0 SITE CONDITIONS

3.1 GEOLOGY

The site is located within the northern portion of the Portland Basin that formed as a structural depression located in the Puget-Willamette Lowland physiographic province. The Portland Basin is a pull-apart depression that resulted from a northwest-trending tectonic dextral shear along fault zones located along the Coast Range to the west and the Cascade Range to the east (Evarts, 2002). The basin is filled with a thick sequence of sedimentary deposits formed by the Columbia River and late Pleistocene Missoula floods that overlie bedrock units.

The near-surface geologic unit is mapped as Quaternary alluvium. The unit consists of silt, fine to medium sand, and gravel that form the floodplains of the Lewis River (Evarts, 2002; Phillips, 1987). Underlying the alluvium are Pleistocene flood deposits (Missoula flood deposits) from the Glacial Lake Missoula outburst floods, which occurred between 13,000 and 15,500 years ago. The unit consists of silt; coarse to fine, horizontally stratified sand; and gravel. The material is made up of quartz and mafic lithic fragments. Water well logs from the Washington State Department of Ecology indicate the alluvium and flood deposits in the site vicinity range up to 150 feet thick locally throughout the area.

Underlying the alluvium and flood deposits is the Pliocene to Pleistocene Epoch (5 million to 1.5 million years before present) Troutdale Formation “lower member,” which consists of laminated silty clay, micaceous sand, poorly consolidated siltstone, and mudstone. The Troutdale Formation has been incised by the Columbia River during late Pleistocene low sea-level stands that occurred as a result of maximum continental glacial periods. The fine-grained unit in the site vicinity is estimated from deep water well logs to range from 50 to 100 feet thick (Evarts, 2002; Gannett and Caldwell, 1998).

The fine-grained unit of the Troutdale Formation is underlain by the Miocene Epoch (20 million to 10 million years before present) Columbia River Basalt Group, which is a series of basalt flows that originated from southeastern Washington and northeastern Oregon. The Columbia River Basalt Group is considered the geologic basement unit for this report.

3.2 SURFACE CONDITIONS

The site is located along Howard Way approximately 1,500 feet north of the intersection with Guild Road. The property is surrounded by industrial properties to the north and west, a mini storage to the east, and undeveloped property to the south. The Columbia River is located approximately 1.8 miles to the west.

The site is currently vacant and generally flat with no significant slopes present. Grass vegetation covers the surface of the site. One large tree is located along the southern boundary of the site.

3.3 SUBSURFACE CONDITIONS

3.3.1 General

Subsurface conditions were explored by excavating nine test pits (TP-1 through TP-9) and advancing two CPT probes (CPT-1 and CPT-2). The test pits were excavated to depths between 4 and 11 feet BGS. The CPT probes were advanced to a depth of approximately 60.4 feet BGS. To supplement the data collected from our explorations at the site, we also reviewed subsurface information from sites in the vicinity.

The locations of all explorations are shown on Figure 2. The test pit logs and laboratory test results are presented in Appendix A. The CPT probe data is presented in Appendix B.

In general, subsurface conditions at the site consist of 5 to 7 feet of alternating layers of sand with varying proportions of silt and silt with varying proportions of sand. Below 5 to 7 feet BGS is sand with variable proportions of silt to depths of approximately 35 feet BGS. The sand is underlain by silt and clay that extends to the maximum depths explored. A detailed description of the site soils are presented in the following sections.

3.3.2 Soil Conditions

3.3.2.1 Fill

Fill was observed in test pits TP-3 and TP-9. The fill consists of silt and extends to depths between 1.5 and 2.3 feet BGS. The fill encountered in test pit TP-3 is on the neighboring site to the north and was not observed to extend into the northern portion of the site as evidenced in test TP-4. Based on our observations, the fill in the southeastern portion of the site appears to likely be compacted. Laboratory testing indicates the moisture content of the fill was approximately 33 percent at the time of the explorations.

3.3.2.2 Topsoil and Tilled Zones

Topsoil and tilled zones were generally encountered in explorations beneath fill and in unfilled portions of the site. The topsoil and tilled zones consist of soft to medium stiff, brown, sandy silt with trace amounts of organics. Topsoil and tilled zone thicknesses range from 4 to 10 inches at the site.

3.3.2.3 Native Soil

Subsurface conditions below the fill and the topsoil and tilled zones consist of alternating layers of fine- to coarse-grained sand with varying proportions of silt and silt with varying proportions of sand to depths between approximately 5 and 7 feet BGS. Below 5 to 7 feet BGS and to depths of approximately 35 feet BGS is sand with varying proportions of silt. Underlying the sand is soft to medium stiff silt and clay to the maximum depths explored of approximately 60.4 feet BGS.

The relative density of the sand layers appears medium dense. Results from laboratory testing indicate the sand layers have fines contents between 5 and 15 percent. The silt layers observed in the test pits are medium stiff to hard and mainly demonstrate no to low plasticity. Based on laboratory testing, the moisture content of the native soil ranged from 18 to 43 percent at the time of the explorations.

3.3.3 Groundwater

Groundwater was observed in a majority of the test pits at the site between depths of 8 and 10 feet BGS. Pore water pressure dissipation testing in the CPT indicated groundwater at approximately 7.5 feet BGS. Based on our experience in the site vicinity, we anticipate the depth of groundwater at the site will vary from near the ground surface to 8 feet BGS during the year.

3.4 DCP TESTING

We performed DCP testing in test pits TP-7 and TP-9 on September 30, 2021. The approximate locations of TP-7 and TP-9 are shown on Figure 2. A summary of the estimated subgrade resilient modulus at each test location is presented in Table 1.

Table 1. DCP Test Results

Exploration	Estimated Resilient Modulus (psi)
TP-7	4,710
TP-9	4,640

3.5 INFILTRATION TESTING

Infiltration testing was conducted in test pits TP-1 and TP-4 at depths of 3 and 4 feet BGS. Infiltration testing in the test pits was conducted using the encased falling head procedure. Results of the field infiltration rate and laboratory testing are summarized in Table 2.

Table 2. Infiltration Test Results

Exploration	Depth (feet BGS)	Material	Observed Infiltration Rate (inches per hour)	Percent Fines[1]
TP-1	4	SILT (ML)	Negligible	100
TP-4	3	SILT (ML)	Negligible	93

1. Percent passing the U.S. Standard No. 200 sieve

3.6 GEOLOGIC HAZARDS

3.6.1 Liquefaction

According to the Alternative Liquefaction Susceptibility Map of Cowlitz County by Palmer et al. (2004), the site is described as having a moderate to high liquefaction susceptibility.

Liquefaction is caused by a rapid increase in pore water pressure that reduces the effective stress between soil particles to near zero. Granular soil, which relies on interparticle friction for strength, is susceptible to liquefaction until the excess pore pressures can dissipate. In general, loose, saturated sand soil with low silt and clay content is the most susceptible to liquefaction. Silty soil with low plasticity is moderately susceptible to liquefaction under relatively higher levels of ground shaking.

Analysis of the CPTs performed at the site using the liquefaction triggering methodology by Boulanger and Idriss (2014) indicate maximum predicted liquefaction settlement is 8 inches if groundwater is assumed to be present at a depth of 2 feet BGS. Based on analysis, seismic differential settlement will be approximately 4 inches over a distance of 50 feet as a result of a design-level seismic event.

According to ASCE 7-16, seismic differential settlement must be less than the values determined in Table 12.12-3 or soil improvements or deep foundations are required to support buildings. Settlement tolerances in Table 12.12-3 are based on the type, column spacing, and risk category of structures. Based on our experience, warehouse- or distribution-type buildings are typically Risk Category I or II. Table 3 shows the maximum tolerable seismic settlement limits for various structure types and column spacing for Risk Category I/II structures. As shown in the table, the allowable seismic settlement increases with column spacing and decreases with multi-story structures. We should be contacted to provide additional information if the structures are Type III or IV.

Table 3. ASCE 7-16 Allowable Seismic Differential Settlement for Risk Category I or II Structures

Structure Type	Column Spacing (feet)						
	20	**25**	**30**	**35**	**40**	**45**	**50**
Other Single-Story Structures	3.6	4.5	5.4	6.3	7.2	8.1	9.0

Assuming a single-story, metal building with column spacings of at least 25 feet (and a Risk Category of I/II) as anticipated, the predicted differential settlement (4 inches) is less than the maximum allowable limit in Table 12.12-3 of ASCE 7-16. Assuming column spacing for the building is greater 25 feet, it can be supported on conventional spread footings, and soil improvements or deep foundations are not required, provided the owner is willing to accept the potential for building damage after a seismic event (damage potential to be provided by project structural engineer).

Per ASCE 7-16 Section 12.13.9, foundation ties will be likely be required for the building because anticipated differential settlement is greater than one-quarter of the tolerances Table 12.12-3 of in ASCE 7-16.

3.6.2 Lateral Spreading

Lateral spreading is a liquefaction-related seismic hazard and occurs on gently sloping or flat sites underlain by liquefiable sediment adjacent to an open face, such as a riverbank. Liquefied soil adjacent to an open face can flow toward the open face, resulting in lateral ground displacement. The nearest open face is the Columbia River, which is located approximately 1.8 miles to the west. In our opinion, the potential for lateral spreading at the site is low.

3.6.3 Fault Rupture

The closest mapped fault to the site is the Portland Hills fault. It is mapped approximately 13 miles to the southwest (Personius, 2017). Since faults are not mapped beneath the site, we conclude that the probability of surface fault rupture beneath the site is low.

4.0 DESIGN

4.1 FILL-INDUCED SETTLEMENT

4.1.1 General

Based on correspondence with the design team, at least 4 feet of fill will be required beneath the proposed building pad to meet development grades. The subsurface soil at the site generally consists of up to 35 feet of sand underlain by soft, moderately to highly compressible clay and silt that is prone to settlement under structural and/or fill loads. Based on analysis, areal fills more than 2 feet thick in combination with the anticipated foundation and floor slab loads are sufficient to exceed typical static settlement tolerances for similar buildings. Accordingly, we recommend construction of structures and all settlement-sensitive improvements not commence until the fill-induced settlement is complete. This will remove the settlement component associated with the fill, and remaining settlement associated with foundations and floor slab loading will be within typical settlement tolerances for similar buildings.

Completion of settlement will vary based on fill thickness; however, settlement will generally be complete within 4 to 10 weeks of placing fill to final grade. Settlement monitoring points should be installed to monitor settlement and determine when it is appropriate to construct settlement-sensitive improvements. Paving is typically completed more than four months after placement of fill, and settlement monitoring likely will not be required in roadways or parking areas.

4.1.2 Settlement Monitoring

Settlement monitoring points can be used to monitor fill-induced settlement associated with the project. The settlement monitoring points can be installed prior to filling and surcharged immediately. Settlement monitoring points should consist of fixed, ridged elements that can be protected from disturbance and can be easily surveyed. We recommend that the location of the settlement monitoring points be determined by NV5 and the contractor. For preliminary planning purposes, we recommend settlement monitoring points be installed at a rate of one per 10,000 square feet of area fill that is greater than 2 feet.

The settlement monitoring points should be surveyed twice weekly. The settlement monitoring points should be monitored using survey equipment with accuracy of 1/100th of a foot and referenced to a stationary datum established at least 500 feet from fill placement. The survey data should be supplied to NV5 within three days of the survey.

4.2 FOUNDATION SUPPORT

4.2.1 Liquefaction Settlement Not Mitigated

As described in the "Geologic Hazards" section, the site is susceptible to up to 8 inches of seismic settlement as a result of liquefaction. Differential seismic settlement over a distance of approximately 50 feet is expected to be 4 inches.

Assuming a single-story, metal-framed building with a Risk Category of I/II and a minimum column spacing of 25 feet, the anticipated seismic differential settlement at the site is less than the allowable limits in Table 12.12-3 of ASCE-7-16 and the building can be supported on conventional spread footings bearing on firm native soil.

Additional over-excavation may be necessary if undocumented fill, loose material, or soft material is present. On-site soil can be used as structural fill. The excavation should extend at least 6 inches beyond the footing perimeter for every foot below subgrade.

All footings should be proportioned for a maximum allowable soil bearing pressure of 2,500 psf. This bearing pressure is a net bearing pressure and applies to the total of dead and long-term live loads and may be increased by one-third when considering seismic or wind loads. The weight of the footing and any overlying backfill can be ignored in calculating footing loads.

We recommend that isolated column and continuous wall footings have minimum widths of 24 and 18 inches, respectively. The bottom of exterior footings should be founded at least 18 inches below the lowest adjacent grade. Interior footings should be founded at least 12 inches below the top of the floor slab. The recommended minimum footing depth is greater than the anticipated frost depth.

We anticipate static post-construction settlement for spread footings prepared in accordance with our recommendations will be less than 1 inch with differential settlement of 0.5 inch between similarly loaded footings. These values only account for static conditions and do not include liquefaction-induced settlement.

4.2.2 Liquefaction Settlement Mitigated

If the predicted seismic differential settlement exceeds the tolerances in Table 12.12-3 of ASCE 7-16 or the owner wishes to reduce the potential for damage to the structure after a seismic event, ground improvement such as stone columns or DSMCs are successful at mitigating liquefaction settlement beneath foundation elements. These ground improvements are typically designed and constructed by specialty contractors. The specialty contractor should be provided with this report to design the ground improvement system.

Typically, a higher allowable bearing pressure is permissible when foundations are supported on improved soil; however, the lateral resistance parameters presented above are still applicable for design of shallow foundations supported on ground improvements.

4.2.2.1 Stone Columns

Stone column foundation systems consist of compacted aggregate that densifies and reinforces the soil. These systems are typically designed and constructed by a specialty contractor.

Conventional spread foundations are placed over the completed stone columns. The allowable bearing pressure for shallow foundations supported on ground improved by stone columns is typically 3,000 to 4,000 psf.

4.2.2.2 DSMCs

Soil mixing consists of drilling into the soil using a specialty drill rig that injects cement slurry into the ground. Paddles along the shaft blend the soil and cement slurry together until a relatively uniform column of soil and cement is formed. A mat foundation can be constructed directly on top of the columns, similar to stone columns. The allowable bearing pressure for shallow foundations supported on DSMCs is typically 4,000 to 6,000 psf. DSMCs are typically between 36 and 60 inches in diameter and installed on a regular or semi-regular layout under the spread footings and floor slabs. Spoils generated during installation can be used as on-site fill or hauled off site following approval and environmental profiling, which should be identified in the project's Contaminated Media Management Plan. DSMCs are more rigid than stone columns, can support larger loads, and more efficiently mitigate liquefaction in fine-grained soil.

4.2.2.3 Footings Underlain by Structural Mat

To limit differential settlement due to liquefaction, the building can be supported on a minimum 4-foot-thick, geogrid-reinforced soil mat. The purpose of the mat is to limit liquefaction-induced differential settlement to less than 2 inches.

The top of the mat should be at the elevation of the proposed footing subgrade. The structural fill should consist of crushed rock with less than 12 percent fines by weight compacted as recommended for structural fill. The structural fill should be reinforced at 12-inch intervals starting at the base of the fill using Tensar BX 1200 (or an engineer-approved equivalent) biaxial geogrid. The reinforced fill should extend a minimum of 5 feet beyond the perimeter of building areas.

4.2.3 Resistance to Sliding

Lateral loads on building and retaining wall footings can be resisted by passive earth pressure on the sides of the structure and by friction on the base of footings. Our analysis indicates that the allowable passive earth pressure for footings confined by the on-site soil or planned structural fill is 300 pcf. This value should be reduced to 150 pcf below groundwater levels, which for design should be assumed to be at a depth of 2 feet below the current ground surface grade. Adjacent floor slabs, pavement, or the upper 12-inch depth of adjacent, unpaved areas should not be considered when calculating passive resistance. An allowable coefficient of friction equal to 0.3 can be used for footings supported on native soil or fine-grained fill. If a minimum of 6 inches of gravel is placed at the base of footings, the coefficient of friction can be increased to 0.4.

4.2.4 Subgrade Observation and Preparation

All footing subgrades should be evaluated by a representative of NV5 to confirm suitable bearing conditions. Observations should also confirm that loose or soft material, organic material, unsuitable fill, prior topsoil zones, and softened subgrades (if present) have been removed. Localized deepening of footing excavations may be required to penetrate any deleterious material.

4.3 SEISMIC DESIGN CRITERIA

Areas where liquefaction occurs are considered to have a seismic Site Class of F. ASCE 7-16 Section 20.3.1 requires a site-specific ground motion analysis be performed for structures with a fundamental period (T) greater than 0.5 second that have a seismic Site Class of F. If the fundamental period of the structure is less than 0.5 second, the building can be designed using the pre-liquefaction site class.

We anticipate the structure at the development will have a fundamental period of less than 0.5 second and that seismic design parameters can be determined using the pre-liquefaction Site Class of E, provided exception 3 in ASCE 7-16 Section 11.4.8 is met. If the period of the structure is greater than 0.5 second, a site-specific seismic analysis will be required.

Table 4. Seismic Design Parameters in Accordance with ASCE 7-16

Parameter	Short Period (T_s = 0.2 second)[a]	1 Second Period (T_1 = 1.0 second)[1]
MCE Spectral Acceleration, S	S_s = 0.824 g	S_1 = 0.395 g
Site Class	F[1]	
Site Coefficient, F	F_a = 1.3	F_v = 4.0[2]
Adjusted Spectral Acceleration, S_M	S_{MS} = 1.072 g	S_{M1} = 1.580 g
Design Spectral Response Acceleration Parameters, S_D	S_{DS} = 0.714 g	S_{D1} = 1.053 g

1. Seismic parameters are based on Site Class E with exception 3 per ASCE 7-16 Section 11.4.8.
2. Parameters calculated in accordance with default parameters provided by ASCE 7-16 Section 21.3. It is possible to reduce these values with a site-specific seismic analysis.

4.4 FLOOR SLABS

Satisfactory subgrade support for building floor slabs can be obtained, provided the subgrade is prepared in accordance with the "Fill-Induced Settlement" and "Site Preparation" sections. In areas of undocumented fill, the floor slab subgrade should be improved to a minimum depth of 18 inches as recommended in the "Undocumented Fill" section.

A modulus of reaction of 100 pci can be used for slabs on grade constructed on subgrade prepared as recommended in the "Site Preparation" section. A minimum 6-inch-thick layer of imported granular material should be placed and compacted over the prepared subgrade to assist as a capillary break. The floor slab base rock should be crushed rock or crushed gravel and sand meeting the requirements outlined in the "Structural Fill" section. The imported granular material should be placed in one lift and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557. Floor slab base rock contaminated with excessive fines (greater than 5 percent by dry weight passing the U.S. Standard No. 200 sieve) should be replaced.

Flooring manufacturers often require vapor barriers to protect flooring and flooring adhesives. Many flooring manufacturers will warrant their product only if a vapor barrier is installed according to their recommendations. Selection and design of an appropriate vapor barrier, if needed, should be based on discussions among members of the design team. We can provide additional information to assist you with your decision.

All slab subgrades should be evaluated by the geotechnical engineer to confirm suitable bearing conditions. Observations should also confirm that loose or soft material, organic material, unsuitable fill, prior topsoil zones, and softened subgrades have been removed and replaced with structural fill. In addition, contaminated base rock for the slabs should be removed and replaced before the slab is poured.

4.5 RETAINING STRUCTURES

4.5.1 Assumptions

Our retaining wall design recommendations are based on the following assumptions: (1) the walls consist of conventional, cantilevered retaining walls, (2) the walls are less than 10 feet in height, (3) the backfill is drained, and (4) the backfill has a slope flatter than 4H:1V. Re-evaluation of our recommendations will be required if the retaining wall design criteria for the project varies from these assumptions.

4.5.2 Wall Design Parameters

Unrestrained site walls that retain native soil should be designed to resist an active earth pressure of 35 pcf. For embedded building walls, a superimposed seismic lateral force should be calculated based on a dynamic force of $7.5H^2$ pounds per linear foot of wall (where H is the height of the wall in feet) and applied at 0.6H from the base of the wall.

Where retaining walls are restrained from rotation before being backfilled, an equivalent fluid pressure of 55 pcf should be used for design. If other surcharges (e.g., slopes steeper than 4H:1V, foundations, vehicles, etc.) are located within a horizontal distance from the back of a wall equal to twice the height of the wall, additional pressures may need to be accounted for in the wall design. Our office should be contacted for appropriate wall surcharges based on the actual magnitude and configuration of the applied loads.

The wall footings should be designed in accordance with the guidelines provided in the appropriate portion of the "Foundation Support" section.

4.5.3 Wall Drainage and Backfill

The above design parameters have been provided assuming back-of-wall drains will be installed to prevent buildup of hydrostatic pressures behind all walls. If a drainage system is not installed, our office should be contacted for revised design forces.

Backfill material placed behind the walls and extending a horizontal distance of ½H (where H is the height of the retaining wall) should consist of imported granular fill placed and compacted in conformance with the "Structural Fill" section.

A minimum 6-inch-diameter, perforated collector pipe should be placed at the base of the walls. The pipe should be embedded in a minimum 2-foot-wide zone of angular drain rock that is wrapped in a drainage geotextile fabric and extends up the back of the wall to within 1 foot of the finished grade. The drain rock and drainage geotextile fabric should meet the specifications provided in the "Structural Fill" section. The perforated collector pipes should discharge at an appropriate location away from the base of the wall. The discharge pipe(s) should not be tied directly into stormwater drain systems unless measures are taken to prevent backflow into the wall's drainage system.

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flatwork adjacent to retaining walls be postponed to at least four weeks after backfilling of the wall, unless survey data indicate that settlement is complete sooner.

4.6 PAVEMENT

Pavement should be installed on improved subgrade, structural fill, or cement-amended subgrade prepared in conformance with the "Site Preparation" and "Structural Fill" sections. In areas of undocumented fill, the pavement subgrade should be improved to a minimum depth of 18 inches as recommended in the "Undocumented Fill" section.

4.6.1 Design Values

Our pavement recommendations are based on the following assumptions:

- A resilient modulus value of 4,600 psi for native and structural fill subgrades prepared as indicated in the "Site Preparation" section.
- A pavement design life of 20 years.
- Initial and terminal serviceability indices of 4.2 and 2.5, respectively.
- Reliability of 80 percent and standard deviation of 0.49.
- No growth.
- Pavement subgrade is improved to a minimum depth of 12 inches. The subgrade can be improved by scarifying and re-compacting to structural fill requirements or by replacement with structural fill.

If any of these assumptions are incorrect, our office should be contacted with the appropriate information so that the pavement designs can be revised.

4.6.2 Traffic Loading Assumptions

Based on discussions with the project team, the site will be subject to vehicle traffic and truck traffic. We understand truck traffic will consist of up to 5 FHWA Class 8 semi-trucks and 10 three-axle trucks per day. If any of these assumptions are incorrect, our office should be contacted with the appropriate information so that the pavement designs can be revised.

4.6.3 Recommended AC Pavement Design Sections

Our pavement design recommendations are summarized in Table 5.

Table 5. Recommended Standard Pavement Sections for Scarified and Re-Compacted Subgrade

Pavement Use	Semi-Trucks per Day	ESALs	AC Thickness[1] (inches)	Aggregate Base Thickness[1] (inches)
Automobile Drive Aisles	0	25,000	3.0	8.0
Automobile Parking Areas	0	10,000	2.5	6.0
Heavy Duty (Truck Areas)	Up to 5	90,000	4.0	10.0

1. All thicknesses are intended to be the minimum acceptable values.

Because of the likely presence of moist, fine-grained soil, it may be very difficult or impossible during rainy periods to properly moisture condition and compact the soil subgrade. A potential cost savings is to amend the soil with cement. This will allow for construction of the pavement sections without significant delays caused by aerating the moist soil or without disturbing the sensitive soil subgrade. If this method is chosen, the subgrade should be amended as discussed in the “Structural Fill” section. Our recommended cement-amended subgrade pavement design is shown in Table 6.

Table 6. Minimum Pavement Sections With Cement-Amended Subgrade

Pavement Use	Semi-Trucks per Day	ESALs	AC Thickness[1] (inches)	Aggregate Base Thickness[1] (inches)	Cement-Amended Subgrade[1,2] (inches)
Automobile Drive Aisles	0	25,000	3.0	4.0	12.0
Automobile Parking Areas	0	10,000	2.5	4.0	12
Heavy Duty (Truck Areas)	Up to 5	90,000	4.0	4.0	12.0

1. All thicknesses are intended to be the minimum acceptable values.
2. Minimum 100 psi seven-day unconfined compressive strength.

The material thicknesses shown in Tables 5 and 6 are intended to be minimum acceptable values for the final condition. The aggregate base and cement-amended thicknesses (if installed) do not account for construction traffic, and haul roads and staging areas should be used as described in the “Construction” section. Aggregate base rock contaminated during construction should be replaced with clean crushed rock.

The AC pavement should conform to WSS 9-03.8(6) – HMA Proportions of Materials. AC should consist of ½-inch HMA. The AC binder should be PG 64-22 Performance Grade Asphalt Cement conforming to WSS 9-02.1(4) – Performance Graded Asphalt Binder. The layer thickness should be 2.0 to 3.5 inches. The job mix formula should meet the requirements for non-statistical ½-inch HMA (WSS 5-04 – Hot Mix Asphalt and WSS 9-03.8 – Aggregates for Hot Mix Asphalt) and be compacted to 91 percent of the maximum specific gravity or as required by the local jurisdiction in public right-of-way areas. Aggregate base should be placed in one lift and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557. Aggregate base contaminated with soil during construction should be removed and replaced before paving.

4.7 DRAINAGE

4.7.1 Temporary

During work at the site, the contractor should be made responsible for temporary drainage of surface water as necessary to prevent standing water and/or erosion at the working surface. During rough and finished grading of the site, the contractor should keep all pads and subgrade free of ponding water.

4.7.2 Surface

The ground surface at finished pads should be sloped away from their edges at a minimum 2 percent gradient for a distance of at least 5 feet. Roof drainage from the building should be directed into solid, smooth-walled drainage pipes that carry the collected water to the storm drain system.

4.7.3 Subsurface

Perimeter footing drains should be installed around the building where footings are more than 1 foot below existing grades. Drains should consist of a filter fabric-wrapped, drain rock-filled trench that extends at least 12 inches below the lowest adjacent grade (i.e., slab subgrade elevation). A perforated pipe should be placed at the base to collect water that gathers in the drain rock. The drain rock and filter fabric should meet the specifications outlined in the "Structural Fill" section. Discharge for footing drains should not be tied directly into the stormwater drainage system unless mechanisms are installed to prevent backflow.

4.7.4 Stormwater Infiltration Systems

Based on the depth to groundwater and site-specific testing, infiltration systems are not feasible at the site.

4.8 PERMANENT SLOPES

Permanent cut and fill slopes should not exceed 2H:1V. Access roads and pavement should be located at least 5 feet from the top of cut and fill slopes. The setback should be increased to 10 feet for buildings. The slopes should be planted with appropriate vegetation to provide protection against erosion as soon as possible after grading. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope.

5.0 CONSTRUCTION

5.1 SITE PREPARATION

5.1.1 Grubbing and Stripping

The existing root zones should be stripped and removed from all fill areas. Based on our explorations, the existing root zone will be between 1 inch and 3 inches, although greater stripping depths will be required to remove localized zones of loose or organic soil. Greater stripping depths (approaching 12 inches) are anticipated in areas with thicker vegetation and shrubs. The actual stripping depth should be based on field observations at the time of construction. Stripped material should be transported off site for disposal or used in landscaped areas.

Trees and shrubs should be removed from fill areas. In addition, root balls should be grubbed out to the depth of the roots, which could exceed 3 feet BGS. Depending on the methods used to remove root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. We recommend that soil disturbed during grubbing operations be removed to expose firm, undisturbed subgrade. The resulting excavations should be backfilled with structural fill.

5.1.2 Undocumented Fill

5.1.2.1 General

Up to 1.5 feet of undocumented fill was encountered in the southwestern portion of the site. Based on our test pits, the fill appears to likely have been compacted; however, due to the unknown methods of placement and compaction, reliable strength properties for undocumented fill are difficult to predict.

5.1.2.2 Foundation Areas

If encountered, undocumented fill should be removed from under new building foundations and footings should be supported on granular pads as discussed in the “Foundation Support” section.

5.1.2.3 Floor Slab and Pavement Areas

There is a small risk for poor performance of slab-on-grade structures and pavement established directly over undocumented fill soil. If undocumented fill is present after site grading, removal and replacement of undocumented fill would eliminate most of this risk. Floor slabs and pavement can be constructed on fill, provided a small risk of distress is accepted (minor slab cracking and localized “bird baths” in pavement areas) and they are evaluated as described in the “Subgrade Observation” section. Provided a small amount of settlement is tolerable, we recommend slab and pavement subgrade comprised of undocumented fill be improved to a minimum depth of 18 inches. The subgrade should be improved by scarifying and re-compacting to at least 95 percent of the maximum dry density, as determined by ASTM D1557. As an alternative, the upper 18 inches can be improved by replacing undocumented fill with structural fill.

5.1.2.4 Subgrade Observation

Before fill, slabs, base rock, or pavement is placed, the exposed subgrade should be evaluated by proof rolling. The subgrade should be proof rolled with a fully loaded dump truck or similar heavy, rubber tire construction equipment to identify soft, loose, or unsuitable areas. A member of our geotechnical staff should observe proof rolling to evaluate yielding of the ground surface. During wet weather, subgrade evaluation should be performed by probing with a foundation probe rather than proof rolling. Areas that appear soft or loose should be removed and replaced with structural fill or improved by cement amendment in accordance with subsequent sections of this report.

5.1.3 Topsoil and Tilled Zone

Organic-rich topsoil and agricultural tilled zones up to 10 inches thick were encountered in portions of the site. In structure and pavement areas where site cuts do not remove topsoil and tilled zones, the full depth of topsoil and tilled zones should be removed and replaced with structural fill or scarified and recompacted as structural fill.

As an alternative to full-depth removal/replacement or scarification and re-compaction or during wet periods, tilled zone soil can be amended using cement as described in the “Structural Fill” section. Topsoil and tilled zones are not suitable to support foundations and should be completely removed and replaced with compacted crushed rock if the topsoil and tilled zones are not fully improved.

During the wet season, the tilled zones will likely be wet of optimum moisture content for adequate compaction; therefore, we recommend using cement amendment to stabilize the tilled zones during the wet season.

5.2 CONSTRUCTION CONSIDERATIONS

The fine-grained soil present on this site is easily disturbed. If not carefully executed, site preparation, utility trench work, and roadway excavation can create extensive soft areas and significant repair costs can result. Earthwork planning, regardless of the time of year, should include considerations for minimizing subgrade disturbance.

The base rock thickness for pavement areas is intended to support post-construction design traffic loads; however, it is not intended to support construction traffic. If construction occurs in the wet season, or if the moisture content of the surficial fine-grained soil is more than a couple percentage points above optimum, site stripping and cutting will need to be accomplished using track-mounted equipment, and granular haul roads and staging areas will be necessary for support of construction. The amount of staging and haul road areas, as well as the required thickness of granular material, will vary with the contractor’s sequencing of a project and type/frequency of construction equipment. Based on our experience, between 12 and 18 inches of imported granular material is generally required in staging areas and between 18 and 24 inches in haul road areas. The actual thickness will depend on the contractor’s means and methods and should be the contractor’s responsibility. In addition, a geotextile fabric should be considered to assist in developing a barrier between the subgrade and imported granular material in areas of repeated construction traffic. The imported granular material, stabilization material, and geotextile fabric should meet the specifications in the “Structural Fill” section.

As an alternative to thickened crushed rock sections, haul roads and utility work zones may be constructed using cement-amended subgrades overlain by a crushed rock wearing surface. If this approach is used, the thickness of granular material in staging areas and along haul roads can typically be reduced to between 6 and 9 inches. This recommendation is based on an assumed minimum unconfined compressive strength of 100 psi for subgrade amended to a depth of 12 to 16 inches. The actual thickness of the amended material and imported granular material will depend on the contractor's means and methods and should be the contractor's responsibility. Cement amendment is discussed in the "Structural Fill" section.

5.3 EXCAVATION

5.3.1 General

Groundwater was observed in a majority of the test pits at depths between 8 and 10 feet BGS. Based on our experience in the Woodland area, perched groundwater could be present within a couple feet of the ground surface during the wet season.

Cuts in the near-surface soil should be readily completed with conventional excavation equipment. Temporary shallow excavation sidewalls will be prone to raveling and caving, particularly in sandy soil. Open excavation techniques may be used to excavate trenches with depths between 4 and 8 feet, provided the walls of the excavation are cut at a slope of 1H:1V and groundwater seepage is not present. Excavations should be flattened to 1½H:1V or 2H:1V if excessive sloughing or raveling occurs. If groundwater is present, caving and raveling could occur. In lieu of large and open cuts, approved temporary shoring may be used for excavation support. A wide variety of shoring and dewatering systems are available. Consequently, we recommend that the contractor be responsible for selecting the appropriate shoring and dewatering systems.

If shoring is used, we recommend that the type and design of the shoring system be the responsibility of the contractor, who is in the best position to choose a system that fits the overall plan of operation. All excavations should be made in accordance with applicable OSHA and state regulations.

5.3.2 Dewatering

Dewatering may be required for excavations at the site, particularly during the wet season. If encountered, pumping from a sump located within the trench may be effective in dewatering localized sections of trench. However, this method is unlikely to prove effective in dewatering long sections of trench or large excavations. In addition, the sidewalls of trench excavations will need to be flattened or shored if seepage is encountered.

Where groundwater seepage into shored excavations occurs, we recommend placing at least 1 foot to 2 feet of stabilization material at the base of the excavation. Trench stabilization material should meet the requirements provided in the "Structural Fill" section.

We note that these recommendations are for guidance only. Dewatering of excavations is the sole responsibility of the contractor, as the contractor is in the best position to select these systems based on their means and methods.

5.4 STRUCTURAL FILL

5.4.1 General

Fills should only be placed over subgrade that has been prepared in conformance with the "Site Preparation" section. A variety of material may be used as structural fill at the site. However, all material used as structural fill should be free of organic material or other unsuitable materials and should meet the specifications provided in WSS 9-03 – Aggregates, depending on the application. A brief characterization of some of the acceptable materials and our recommendations for their use as structural fill are provided below.

5.4.2 On-Site Soil

The soil at the site that will likely be excavated and subsequently used as structural fill consists of a mixture of fill and native soil consisting of sand and silt. Laboratory testing indicates that the moisture content of the silt and sand is significantly greater than the anticipated optimum moisture content required for adequate compaction, and extensive moisture conditioning will be needed to use the material as structural fill. We recommend using imported granular material for structural fill or cement-amended soil if the on-site material cannot be properly moisture conditioned.

When used as structural fill, the on-site soil should be placed in lifts with a maximum uncompacted thickness of 8 inches. The soil should be compacted to not less than 92 percent of the maximum dry density, as determined by ASTM D1557.

5.4.3 Imported Granular Material

Imported granular material used during periods of wet weather, for building pad subgrades, and for staging areas should be pit- or quarry-run rock, crushed rock, or crushed gravel and sand and should meet the specifications provided in WSS 9-03.9(1) – Ballast, WSS 9-03.14(1) – Gravel Borrow, or WSS 9-03.14(2) – Select Borrow. The imported granular material should be fairly well graded between coarse and fine material, should have less than 5 percent by dry weight passing the U.S. Standard No. 200 sieve, and should have a minimum of two mechanically fractured faces.

Imported granular material should be placed in lifts with a maximum uncompacted thickness of 8 to 12 inches and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557. During the wet season or when wet subgrade conditions exist, the initial lift should be approximately 18 inches in uncompacted thickness and should be compacted with a smooth-drum roller without using vibratory action.

Where imported granular material is placed over wet or soft soil subgrades, we recommend a geotextile be placed as a barrier between the subgrade and imported granular material. Depending on site conditions, the geotextile should meet the specifications provided in WSS 9-33.2(1) – Geotextile Properties (Table 3) for soil separation or stabilization. The geotextile should be installed in conformance with WSS 2-12 – Construction Geosynthetic.

5.4.4 Trench Backfill

Trench backfill placed beneath, adjacent to, and for at least 2 feet above utility lines (i.e., the pipe zone) should consist of well-graded, granular material with a maximum particle size of

1½ inches and less than 7 percent by dry weight passing the U.S. Standard No. 200 sieve and should meet the specifications provided in WSS 9-03.12(3) – Gravel Backfill for Pipe Zone Bedding. The pipe zone backfill should be compacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557, or as required by the pipe manufacturer or local building department.

Within roadway alignments or beneath proposed or future building pads, the remainder of the trench backfill should consist of well-graded, granular material with a maximum particle size of 2½ inches and less than 7 percent by dry weight passing the U.S. Standard No. 200 sieve and should meet the specifications provided in WSS 9-03.19 – Bank Run Gravel for Trench Backfill. This material should be compacted to at least 92 percent of the maximum dry density, as determined by ASTM D1557, or as required by the pipe manufacturer or local building department. The upper 2 feet of the trench backfill should be compacted to at least 95 percent of the maximum dry density, as determined by ASTM D1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill material that is free of organic material and material over 6 inches in size and meets the specifications provided in WSS 9-03.14(3) – Common Borrow and WSS 9-03.15 – Native Material for Trench Backfill. This general trench backfill should be compacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557, or as required by the pipe manufacturer or local building department.

5.4.5 Stabilization Material

Stabilization material used to create haul roads for construction traffic or at the base of unstable trench subgrade should consist of pit- or quarry-run rock or crushed rock. The material should have a maximum particle size of 6 inches and less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, should have at least two mechanically fractured faces, and should be free of organic material and other deleterious material. Material meeting the specifications provided in WSS 9-27.3(6) – Stone is generally acceptable for use. Stabilization material should be placed in lifts between 12 and 18 inches thick and compacted to a firm condition with a smooth-drum roller without using vibratory action.

5.4.6 Drain Rock

Backfill for subsurface drains should consist of drain rock meeting the specifications provided in WSS 9-03.9(1) – Ballast or WSS 9-03.12(4) – Gravel Backfill for Drains and should have at least two angular faces. The drain rock should be wrapped in a geotextile separation fabric meeting the specifications provided in this section.

5.4.7 Building Slab Base and Pavement Aggregate

Imported granular material placed beneath floor slabs and pavement (if necessary) should be clean crushed rock or crushed gravel and sand that is fairly well graded between coarse and fine. The granular material should contain no deleterious material, should have a maximum particle size of 1½ inches, should meet the specifications provided in WSS 9-03.9(3) – Crushed Surfacing and WSS 9-03.10 – Aggregate for Gravel Base, should have less than 5 percent by dry weight passing the U.S. Standard No. 200 sieve, and should have a minimum of two mechanically fractured faces. The imported granular material should be placed in one lift and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557.

5.4.8 Geotextile Separation Fabric

A geotextile separation fabric will be required at the interface of the existing soil and imported granular material beneath the proposed walls. In addition, geotextile fabric may be required where soft subgrade is encountered. The separation fabric should meet the specifications provided in WSS 9-33.2(1) – Geotextile Properties (Table 3) for soil separation. The geotextile should be installed in conformance with the specifications provided in WSS 2-12 – Construction Geosynthetic.

5.4.9 Soil Amendment with Cement

5.4.9.1 General

As an alternative to the use of imported granular material or as an alternative to scarification and compaction during wet periods, an experienced contractor may be able to amend the on-site fine-grained soil with portland cement to obtain suitable support properties. It is generally less costly to amend on-site soil than to remove and replace soft soil with granular material. Based on the moisture contents, soil types, and processing speed, cement amendment would be more suitable at this site than lime amendment. The amount of cement used during amendment should be based on an assumed soil dry unit weight of 100 pcf.

5.4.9.2 Subbase Stabilization

Specific recommendations based on exposed site conditions for soil amendment can be provided if necessary. However, for preliminary design purposes, we recommend a target strength for cement-amended subgrade for building and pavement subbase (below aggregate base) soil of 100 psi. The amount of cement used to achieve this target generally varies with moisture content and soil type. It is difficult to predict the field performance of soil to cement amendment due to variability in soil response, and we recommend laboratory testing to confirm expectations. Generally, 6 percent cement by weight of dry soil can be used when the soil moisture content does not exceed approximately 20 percent. If the soil moisture content ranges between 25 and 35 percent, 7 to 9 percent by weight of dry soil is recommended. The amount of cement added to the soil may need to be adjusted based on field observations and performance. Moreover, depending on the time of year and moisture content levels during amendment, water may need to be applied during tilling to appropriately condition the soil moisture content.

For building and pavement subbase, we recommend assuming a minimum cement ratio of 6 percent (by dry weight). If the soil moistures are in excess of 30 percent, a cement ratio of 7 to 8 percent will likely be needed. Due to the higher organic content and moisture, we recommend using a cement ratio of 8 percent when stabilizing topsoil (tilled) zone material for building and pavement subbase and anticipate that the cement will need to be applied in two 4 percent applications followed by multiple tilling passes with each application. Each 4 percent application should be completed in the same day, with the second application started one hour to two hours after the first application is completed.

We recommend cement-spreading equipment be equipped with balloon tires to reduce rutting and disturbance of the fine-grained soil. A static sheepsfoot or segmented pad roller with a minimum static weight of 40,000 pounds should be used for initial compaction of the fine-grained soil. A smooth-drum roller with a minimum applied linear force of 700 pounds per inch should be used for final compaction. The amended soil should be compacted to at least 92 percent of the achievable dry density at the moisture content of the material, as defined in ASTM D1557.

A minimum curing time of four days is required between amendment and construction traffic access. Construction traffic should not be allowed on unprotected, cement-amended subgrade. To protect the cement-amended surfaces from abrasion or damage, the finished surface should be covered with 4 to 6 inches of imported granular material.

Amendment depths for building/pavement, haul roads, and staging areas are typically approximately 12, 16, and 12 inches, respectively. The crushed rock typically becomes contaminated with soil during construction. Contaminated base rock should be removed and replaced with clean rock in pavement areas. The actual thickness of the amended material and imported granular material for haul roads and staging areas will depend on the anticipated traffic as well as the contractor's means and methods and should be the contractor's responsibility.

Cement amendment should not be attempted when the air temperature is below 40 degrees Fahrenheit or during moderate to heavy precipitation. Cement should not be placed when the ground surface is saturated or standing water exists.

5.4.9.3 Cement-Amended Structural Fill

On-site soil that would not otherwise be suitable for structural fill may be amended and placed as fill over a subgrade prepared in conformance with the "Site Preparation" section. The cement ratio for general cement-amended fill can generally be reduced by 1 percent (by dry weight). Typically, a minimum curing time of four days is required between amendment and construction traffic access. Consecutive lifts of fill may be amended immediately after the previous lift has been amended and compacted (e.g., the four-day wait period does not apply). However, where the final lift of fill is a building or roadway subgrade, the four-day wait period is in effect for the final lift of cement-amended soil.

5.4.9.4 Other Considerations

Portland cement -amended soil is hard and has low permeability. This soil does not drain well and it is not suitable for planting. Future planted areas should not be cement amended, if practical, or accommodations should be made for drainage and planting. Moreover, cement amending soil within building areas must be done carefully to avoid trapping water under floor slabs. We should be contacted if this approach is considered. Cement amendment should not be used if runoff during construction cannot be directed away from adjacent wetlands (if any).

5.4.9.5 Specification Recommendations

We recommend that the following comments be included in the specifications for the project:

- In general, cement amendment is not recommended during cold weather (temperatures less than 40 degrees Fahrenheit) or during rainfall.
- Mixing Equipment
  - Use a pulverizer/mixer capable of uniformly mixing the cement into the soil to the design depth. Blade mixing will not be allowed.
  - Pulverize the soil-cement mixture such that 100 percent by dry weight passes a 1-inch sieve and a minimum of 70 percent passes a No. 4 sieve, exclusive of gravel or stone retained on these sieves. If water is required, the pulverizer should be equipped to inject water to a tolerance of ¼ gallon per square foot of surface area.
  - Use machinery that will not disturb the subgrade, such as a pulverizer/mixer vehicle with low-pressure “balloon” tires. If subgrade is disturbed, the tilling/amendment depth shall extend the full depth of the disturbance.
  - Multiple “passes” of the tiller will likely be required to adequately blend the cement and soil mixture.
- Spreading Equipment
  - Use a spreader capable of distributing the cement uniformly on the ground to within 5 percent variance of the specified application rate.
  - Use machinery that will not disturb the subgrade, such as a spreader vehicle with low-pressure “balloon” tires. If subgrade is disturbed, the tilling/amendment depth shall extend the full depth of the disturbance.
- Compaction Equipment
  - Use a static, sheepsfoot or segmented pad roller with a minimum static weight of 40,000 pounds for initial compaction of fine-grained soil (silt and clay) or an alternate approved by the geotechnical engineer.

5.5 EROSION CONTROL

Earthwork is feasible during the rainy season, provided proper erosion control procedures are implemented and the “Construction Considerations” and “Structural Fill” sections are followed. The site soil is susceptible to erosion; therefore, erosion control measures should be carefully planned and in place before construction begins. Surface water runoff should be collected and directed away from slopes to prevent water from running down the slope face. Erosion control measures (such as straw bales, sediment fences, and temporary detention and settling basins) should be used in accordance with local and state ordinances.

6.0 OBSERVATION OF CONSTRUCTION

Satisfactory pavement, earthwork, and foundation performance depends to a large degree on the quality of construction. Sufficient observation of the contractor’s activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. NV5 should be retained to observe subgrade preparation, fill placement, foundation excavations, drainage system installation, and pavement placement and to review laboratory compaction and field moisture-density information.

Subsurface conditions observed during construction should be compared to those encountered during the subsurface explorations. Recognition of changed conditions requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

7.0 LIMITATIONS

We have prepared this report for use by Night & Day Furniture and members of the design team for the proposed project. The data and report can be used for bidding or estimating purposes, but our report, conclusions, and interpretations should not be construed as warranty of the subsurface conditions and are not applicable to other sites.

Exploration observations indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect soil strata or water level variations that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, re-evaluation will be necessary.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor’s methods, techniques, sequences, or procedures, except as specifically described in this report for consideration in design.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty, express or implied, should be understood.

◆ ◆ ◆

We appreciate the opportunity to be of continued service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

NV5

Jordan L. Melby, P.E. (Oregon)
Senior Project Engineer

Nick Paveglio, P.E.
Principal Engineer

NICHOLAS N. PAVEGLIO
STATE OF WASHINGTON
45872
REGISTERED
PROFESSIONAL ENGINEER

Signed 10/25/2021

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FIGURES

VICINITY MAP BASED ON AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH PRO®

NDFURNITURE-1-01	**VICINITY MAP**	
OCTOBER 2021	NIGHT & DAY FURNITURE WOODLAND, WA	**FIGURE 1**

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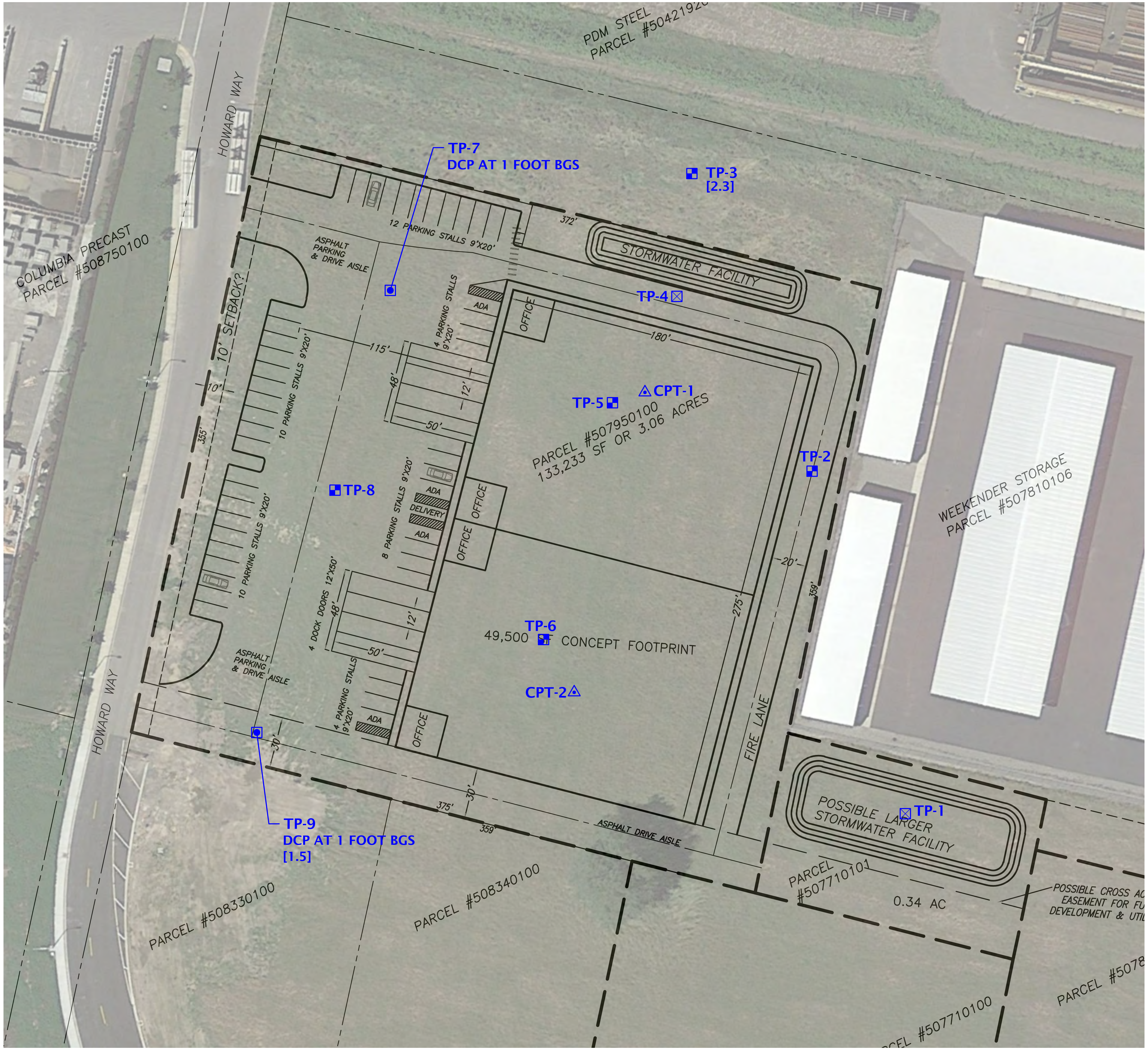
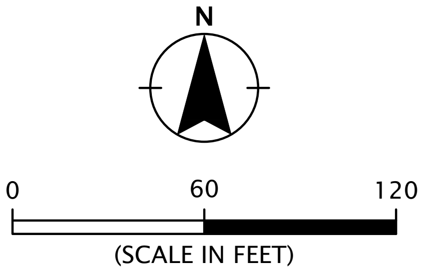
File Name: \\losrv1\files\Jobs\M-R\NDFurniture\NDFurniture-1\NDFurniture-1-01\Figures\CAD\NDFurniture-1-01-VM01.dwg | Layout: FIGURE 1



LEGEND:

▣	TEST PIT
☒	TEST PIT WITH INFILTRATION TEST
◉	TEST PIT WITH DCP TEST
[2.3]	DEPTH OF UNDOCUMENTED FILL (FEET BGS)
△	CPT



NOTES:

1. SITE PLAN BASED ON IMAGE OF SHEET 1 PRE-APPLICATION SITE PLAN (UNDATED) PREPARED BY SGA ENGINEERING & DESIGN.
2. AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH PRO OCTOBER 6, 2021.

FIGURE 2

SITE PLAN

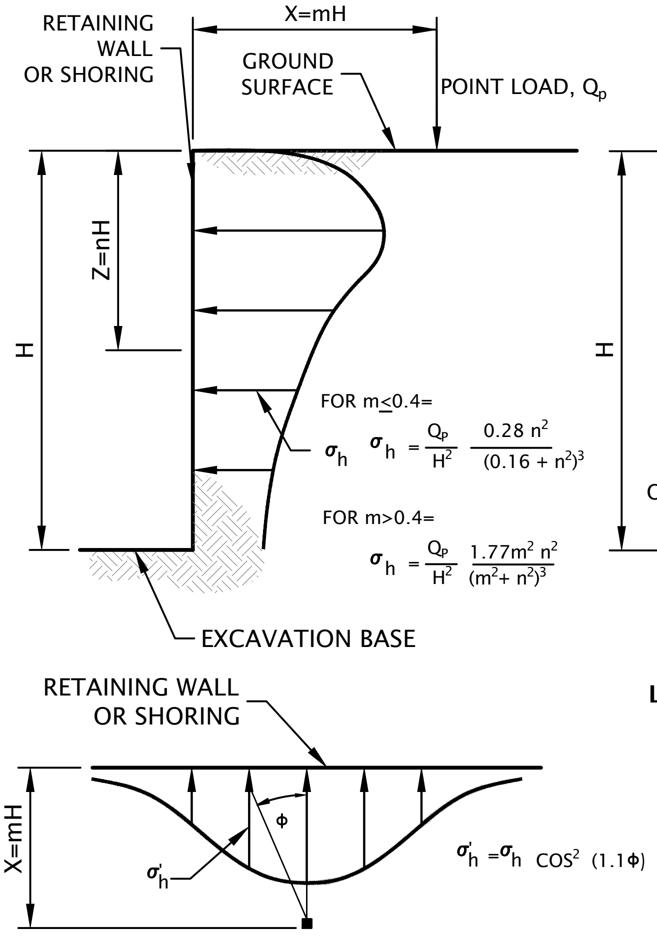
NIGHT & DAY FURNITURE
WOODLAND, WA

NDFURNITURE-1-01

OCTOBER 2021

NV5

Printed By: mmiller | Print Date: 10/22/2021 8:05:35 AM
File Name: \\losrv1\Files\Jobs\M-R\NDFurniture\NDFurniture-1-01\Figures\CAD\NDFurniture-1-01-SP01.dwg | Layout: FIGURE 2



FOR m≤0.4=

$$\sigma_h = \frac{Q_P}{H^2}\ \frac{0.28\ n^2}{(0.16 + n^2)^3}$$

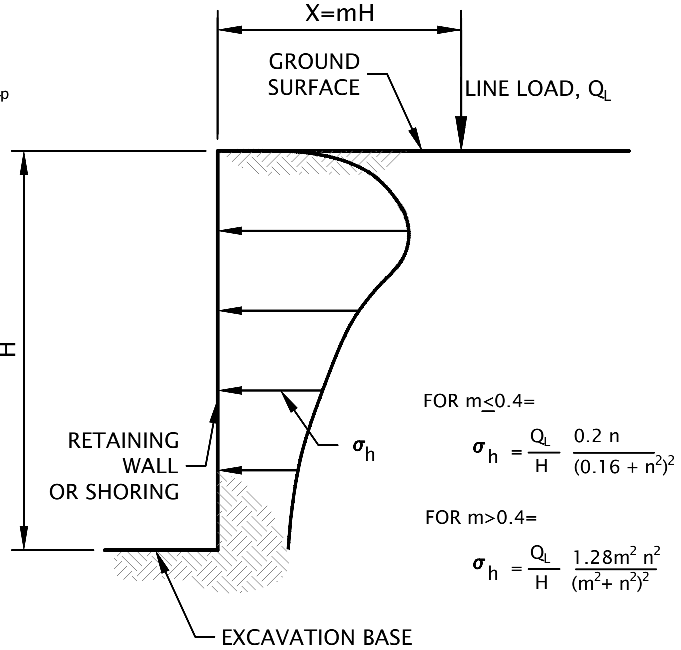
FOR m>0.4=

$$\sigma_h = \frac{Q_P}{H^2}\ \frac{1.77 m^2\ n^2}{(m^2 + n^2)^3}$$

$$\sigma'_h = \sigma_h\ \text{COS}^2\ (1.1\phi)$$

DISTRIBUTION OF HORIZONTAL PRESSURES

VERTICAL POINT LOAD



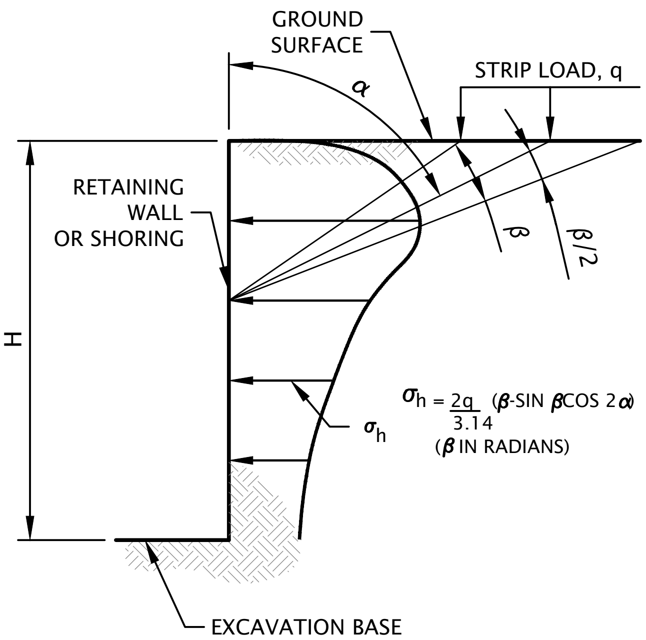
FOR m≤0.4=

$$\sigma_h = \frac{Q_L}{H}\ \frac{0.2\ n}{(0.16 + n^2)^2}$$

FOR m>0.4=

$$\sigma_h = \frac{Q_L}{H}\ \frac{1.28 m^2\ n^2}{(m^2 + n^2)^2}$$

LINE LOAD PARALLEL TO WALL



$$\sigma_h = \frac{2q}{3.14}\ (\beta\text{-SIN }\beta\text{COS }2\alpha)$$

(β IN RADIANS)

STRIP LOAD PARALLEL TO WALL

NOT TO SCALE

NOTES:

1. FIGURE SHOULD BE USED IN CONJUNCTION WITH REPORT TEXT.
2. THESE GUIDELINES APPLY TO RIGID WALLS WITH POISSON'S RATIO ASSUMED TO BE 0.5 FOR BACKFILL MATERIALS.
3. LATERAL PRESSURES FROM ANY COMBINATION OF ABOVE LOADS MAY BE DETERMINED BY THE PRINCIPLE OF SUPERPOSITION.

NV5	NDFURNITURE-1-01	**SURCHARGE-INDUCED LATERAL EARTH PRESSURES**
	OCTOBER 2021	NIGHT & DAY FURNITURE WOODLAND, WA
		FIGURE 3

APPENDIX A

APPENDIX A

FIELD EXPLORATIONS

GENERAL

Subsurface conditions were explored by excavating nine test pits (TP-1 through TP-9) to depths between 4 and 11 feet BGS and advancing two CPT probes (CPT-1 and CPT-2) to a depth of approximately 60.4 feet BGS. The test pits were excavated by Western States Soil Conservation, Inc. of Hubbard, Oregon, and the CPTs were performed by Oregon Geotechnical Explorations of Kaiser, Oregon. The tests pits were excavated under the supervision of NV5 personnel. The exploration logs for test pits are presented in this appendix. The CPT logs are presented in Appendix B.

The approximate locations of the explorations are shown on Figure 2. The locations were determined in the field by pacing or measuring from existing site features. This information should be considered accurate only to the degree implied by the methods used.

SOIL SAMPLING

Representative samples of the soil observed in the test pits were collected from the walls or base of the test pits using the excavator bucket. Sampling intervals are shown on the exploration logs.

SOIL CLASSIFICATION

The soil samples were classified in the field in accordance with the “Exploration Key” (Table A-1) and “Soil Classification System” (Table A-2), which are presented in this appendix. The exploration logs indicate the depths at which the soil characteristics change, although the change could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

LABORATORY TESTING

We visually examined soil samples collected from the explorations to confirm field classifications. We also performed the following laboratory testing to evaluate the engineering properties of the soil.

MOISTURE CONTENT

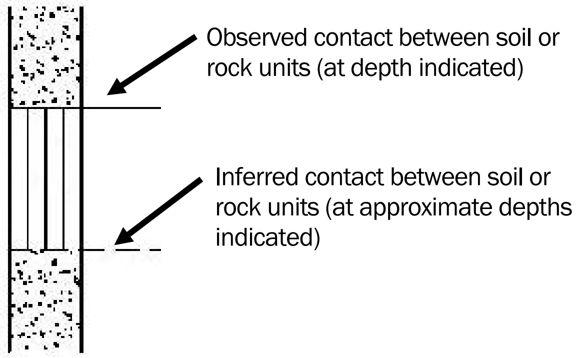
We tested the natural moisture content of select soil samples in general accordance with ASTM D2216. The test results are presented in this appendix.

PARTICLE-SIZE ANALYSIS

Particle-size analysis was completed on select soil samples in general accordance with ASTM D1140. The test results are presented in this appendix.

SYMBOL	SAMPLING DESCRIPTION
▯	Location of sample collected in general accordance with ASTM D1586 using Standard Penetration Test (SPT) with recovery
▮	Location of sample collected using thin-wall Shelby tube or Geoprobe® sampler in general accordance with ASTM D1587 with recovery
▤	Location of sample collected using Dames & Moore sampler and 300-pound hammer or pushed with recovery
▥	Location of sample collected using Dames & Moore sampler and 140-pound hammer or pushed with recovery
◩	Location of sample collected using 3-inch-outside diameter California split-spoon sampler and 140-pound hammer with recovery
⊠	Location of grab sample
▒	Rock coring interval
▽	Water level during drilling
▼	Water level taken on date shown

Graphic Log of Soil and Rock Types



Observed contact between soil or rock units (at depth indicated)

Inferred contact between soil or rock units (at approximate depths indicated)

GEOTECHNICAL TESTING EXPLANATIONS

ATT	Atterberg Limits	P	Pushed Sample
CBR	California Bearing Ratio	PP	Pocket Penetrometer
CON	Consolidation	P200	Percent Passing U.S. Standard No. 200 Sieve
DD	Dry Density		
DS	Direct Shear	RES	Resilient Modulus
HYD	Hydrometer Gradation	SIEV	Sieve Gradation
MC	Moisture Content	TOR	Torvane
MD	Moisture-Density Relationship	UC	Unconfined Compressive Strength
NP	Non-Plastic	VS	Vane Shear
OC	Organic Content	kPa	Kilopascal

ENVIRONMENTAL TESTING EXPLANATIONS

CA	Sample Submitted for Chemical Analysis	ND	Not Detected
P	Pushed Sample	NS	No Visible Sheen
PID	Photoionization Detector Headspace Analysis	SS	Slight Sheen
		MS	Moderate Sheen
ppm	Parts per Million	HS	Heavy Sheen

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EXPLORATION KEY

TABLE A-1

RELATIVE DENSITY - COARSE-GRAINED SOIL

Relative Density	Standard Penetration Test (SPT) Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)
Very loose	0 – 4	0 – 11	0 – 4
Loose	4 – 10	11 – 26	4 – 10
Medium dense	10 – 30	26 – 74	10 – 30
Dense	30 – 50	74 – 120	30 – 47
Very dense	More than 50	More than 120	More than 47

CONSISTENCY - FINE-GRAINED SOIL

Consistency	Standard Penetration Test (SPT) Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)	Unconfined Compressive Strength (tsf)
Very soft	Less than 2	Less than 3	Less than 2	Less than 0.25
Soft	2 – 4	3 – 6	2 – 5	0.25 – 0.50
Medium stiff	4 – 8	6 – 12	5 – 9	0.50 – 1.0
Stiff	8 – 15	12 – 25	9 – 19	1.0 – 2.0
Very stiff	15 – 30	25 – 65	19 – 31	2.0 – 4.0
Hard	More than 30	More than 65	More than 31	More than 4.0

PRIMARY SOIL DIVISIONS			GROUP SYMBOL	GROUP NAME
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 (< 5% fines)	GW or GP	GRAVEL
		GRAVEL WITH FINES (≥ 5% and ≤ 12% fines)	GW-GM or GP-GM	GRAVEL with silt
			GW-GC or GP-GC	GRAVEL with clay
		GRAVEL WITH FINES (> 12% fines)	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND (50% or more of coarse fraction passing No. 4 sieve)	CLEAN SAND (<5% fines)	SW or SP	SAND
		SAND WITH FINES (≥ 5% and ≤ 12% fines)	SW-SM or SP-SM	SAND with silt
			SW-SC or SP-SC	SAND with clay
		SAND WITH FINES (> 12% fines)	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOIL (50% or more passing No. 200 sieve)	SILT AND CLAY	Liquid limit less than 50	ML	SILT
			CL	CLAY
			CL-ML	silty CLAY
			OL	ORGANIC SILT or ORGANIC CLAY
		Liquid limit 50 or greater	MH	SILT
			CH	CLAY
			OH	ORGANIC SILT or ORGANIC CLAY
HIGHLY ORGANIC SOIL			PT	PEAT

MOISTURE CLASSIFICATION

Term	Field Test
dry	very low moisture, dry to touch
moist	damp, without visible moisture
wet	visible free water, usually saturated

ADDITIONAL CONSTITUENTS

Secondary granular components or other materials such as organics, man-made debris, etc.

Percent	Silt and Clay In:		Percent	Sand and Gravel In:	
	Fine-Grained Soil	Coarse-Grained Soil		Fine-Grained Soil	Coarse-Grained Soil
< 5	trace	trace	< 5	trace	trace
5 – 12	minor	with	5 – 15	minor	minor
> 12	some	silty/clayey	15 – 30	with	with
			> 30	sandy/gravelly	Indicate %

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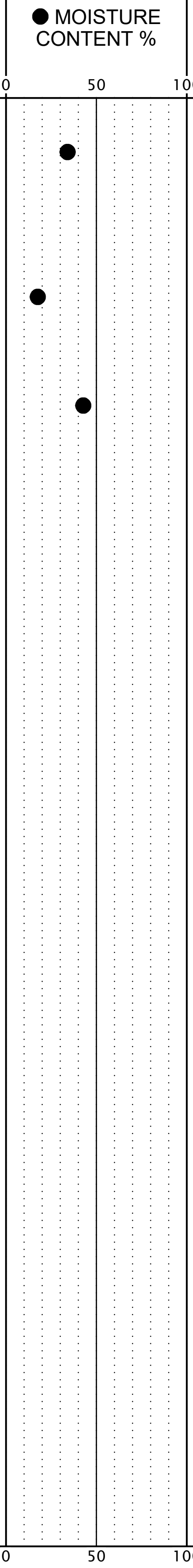
SOIL CLASSIFICATION SYSTEM

TABLE A-2

MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	COMMENTS
Stiff to very stiff, dark brown SILT with sand (ML), trace organics; moist (8- to 10-inch-thick tilled zone, 2- to 3-inch-thick root zone).		PP	☒	PP = 2.0 tsf
Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	2.0		☒	
Stiff, light brown with orange mottled SILT (ML), trace organics; moist. trace debris (burnt wood) at 4.0 feet	3.3	P200 PP	☒ ☒	Infiltration test at 4.0 feet. P200 = 100% PP = 3.0 tsf
Medium dense, gray with orange mottled, silty SAND (SM); moist, sand is fine, stratified bedding (light gray to dark gray, approximately 2 to 4 centimeters thick).	6.0		☒	Severe caving observed at 6.0 feet.
gray at 9.0 feet				
wet at 10.0 feet			☒	Moderate to rapid groundwater seepage observed at 10.0 feet.
Exploration completed at a depth of 11.0 feet.	11.0			Surface elevation was not measured at the time of exploration.

DEPTH FEET: 0.0, 2.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0

GRAPHIC LOG



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LOGGED BY: H. Herinckx

COMPLETED: 09/30/21

EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-1

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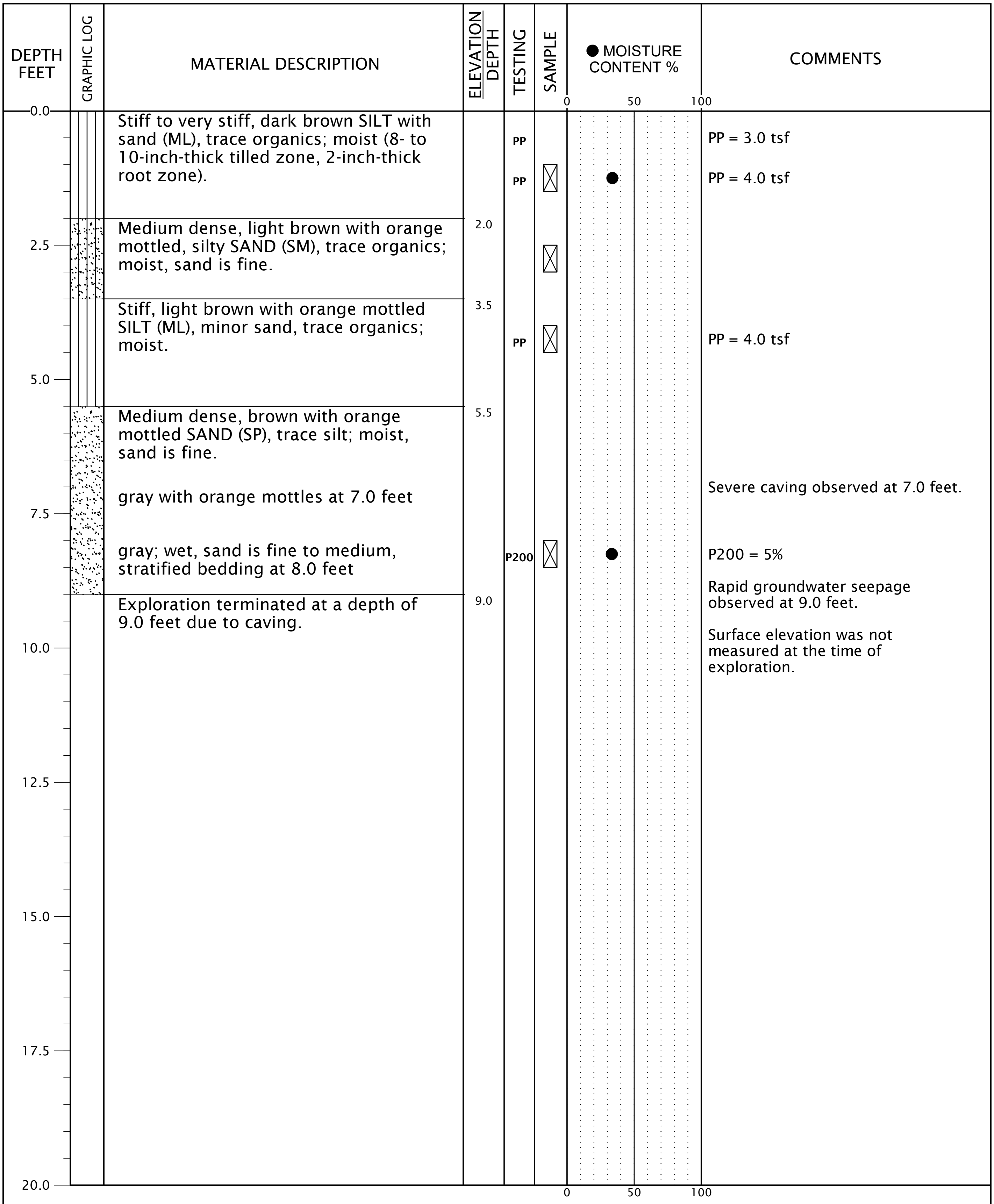
FIGURE A-1



DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	● MOISTURE CONTENT %	COMMENTS
0.0	Stiff to very stiff, dark brown SILT with sand (ML), trace organics; moist (8- to 10-inch-thick tilled zone, 2-inch-thick root zone).		PP PP	☒	●	PP = 3.0 tsf PP = 4.0 tsf
2.5	Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	2.0		☒		
	Stiff, light brown with orange mottled SILT (ML), minor sand, trace organics; moist.	3.5	PP	☒		PP = 4.0 tsf
5.0						
	Medium dense, brown with orange mottled SAND (SP), trace silt; moist, sand is fine.	5.5				
7.5	gray with orange mottles at 7.0 feet					Severe caving observed at 7.0 feet.
	gray; wet, sand is fine to medium, stratified bedding at 8.0 feet		P200	☒	●	P200 = 5%
	Exploration terminated at a depth of 9.0 feet due to caving.	9.0				Rapid groundwater seepage observed at 9.0 feet. Surface elevation was not measured at the time of exploration.
10.0						
12.5						
15.0						
17.5						
20.0						

EXCAVATED BY: Western States Soil Conservation, Inc.

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EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-2

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WOODLAND, WA

FIGURE A-2

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	● MOISTURE CONTENT % 0 50 100	COMMENTS
0.0		Very stiff, dark brown SILT with sand (ML), minor gravel, trace organics; moist (8-inch-thick tilled zone, 2-inch-thick root zone) - **FILL**.		PP	☒		PP = 4.5 tsf
		without gravel at 1.5 feet					
		trace debris (plastic) at 2.0 feet		PP			PP = 4.5 tsf
2.5		Stiff, dark brown with orange mottled SILT (ML), minor to with sand; moist.	2.3	PP	☒		PP = 3.0 tsf
		Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	3.0		☒		
5.0		Stiff, light brown with orange mottled SILT (ML), trace sand; moist.	4.0		☒		
7.5		Medium dense, brown with orange mottled, silty SAND (SM); moist, sand is fine, stratified bedding.	7.0		☒		Severe caving observed at 8.0 feet.
		gray; wet, sand is fine to medium at 9.0 feet					Rapid groundwater seepage observed at 9.0 feet.
10.0		Exploration terminated at a depth of 9.0 feet due to caving.	9.0		☒		Surface elevation was not measured at the time of exploration.
12.5							
15.0							
17.5							
20.0						0 50 100	

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EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-3

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WOODLAND, WA

FIGURE A-3

TEST PIT LOG - NV5 - 1 PER PAGE NDFURNITURE-1-01-TP1_9.GPJ GDI_NV5.GDT PRINT DATE: 10/21/21:SN:KT

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	COMMENTS
0.0	Stiff to very stiff, dark brown SILT with sand (ML), trace organics; moist (10-inch-thick tilled zone, 2-inch-thick root zone).		PP		PP = 2.5 tsf
2.5	Medium dense, light brown, silty SAND (SM), trace organics; moist, sand is fine.	2.0			
	Stiff, light brown with orange mottled SILT (ML), minor sand, trace organics; moist.	3.0	P200 PP	☒	Infiltration test at 3.0 feet. P200 = 93% PP = 3.5 tsf
5.0	Exploration completed at a depth of 4.0 feet.	4.0			No groundwater seepage observed to the depth explored. No caving observed to the depth explored. Surface elevation was not measured at the time of exploration.

7.5

10.0

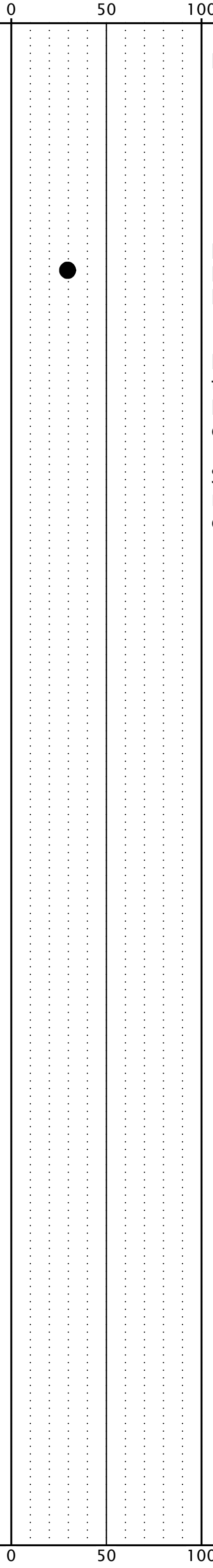
12.5

15.0

17.5

20.0

● MOISTURE CONTENT %



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EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-4

NIGHT & DAY FURNITURE
WOODLAND, WA

FIGURE A-4

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	● MOISTURE CONTENT % (0 50 100)	COMMENTS
0.0		Stiff, dark brown SILT (ML), minor to with sand, trace organics; moist (8-inch-thick tilled zone, 2-inch-thick root zone).		PP			PP = 1.75 tsf
		stiff to very stiff at 1.3 feet		PP	☒	●	PP = 2.0 tsf
				PP	☒		PP = 1.5 tsf
2.5		Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	2.5				
		Stiff, light brown with orange mottled SILT (ML), trace sand and organics; moist.	3.0	PP	☒		PP = 4.5 tsf
5.0		Medium dense, brown with orange mottled SAND with silt (SP-SM); moist, sand is fine.	5.0				
		gray with orange mottles at 7.0 feet					Severe caving observed at 7.0 feet.
7.5		wet, sand is fine to medium, stratified bedding at 8.0 feet		P200	☒	●	Moderate to rapid groundwater seepage observed at 8.0 feet. P200 = 8%
		Exploration terminated at a depth of 9.0 feet due to caving.	9.0				Surface elevation was not measured at the time of exploration.
10.0							
12.5							
15.0							
17.5							
20.0							

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COMPLETED: 09/30/21

EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-5

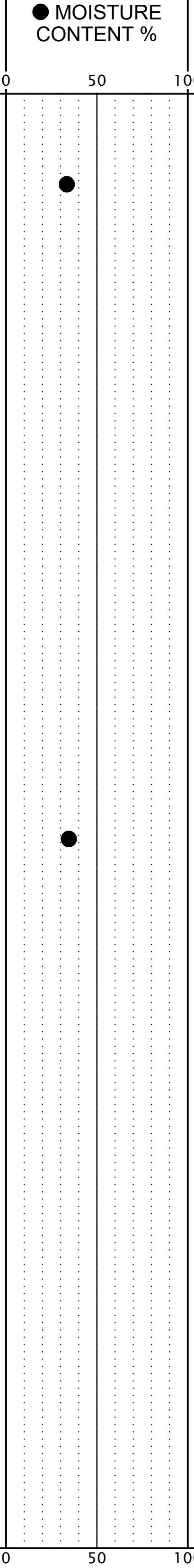
NIGHT & DAY FURNITURE
WOODLAND, WA

FIGURE A-5

TEST PIT LOG - NV5 - 1 PER PAGE NDFURNITURE-1-01-TP1_9.GPJ GDI_NV5.GDT PRINT DATE: 10/21/21:SN:KT

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	COMMENTS
0.0	Stiff to very stiff, dark brown SILT (ML), minor to with sand, trace organics; moist (8-inch-thick tilled zone, 2-inch-thick root zone).		PP 	☒	PP = 2.75 tsf
1.5	Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	1.5		☒	
3.5	Stiff to very stiff, light brown with orange mottled SILT (ML), trace sand and organics; moist.	3.5	PP	☒	PP = 3.5 tsf
5.5	Medium dense, brown with orange mottled, silty SAND (SM); moist, sand is fine. gray with orange mottles at 6.5 feet sand is fine to medium, stratified bedding at 8.0 feet wet at 9.0 feet	5.5		☒	Severe caving observed at 9.0 feet.
10.0	Exploration terminated at a depth of 10.0 feet due to caving.	10.0	P200	☒	Rapid groundwater seepage observed at 10.0 feet. P200 = 15% Surface elevation was not measured at the time of exploration.

Depth scale: 0.0, 2.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0



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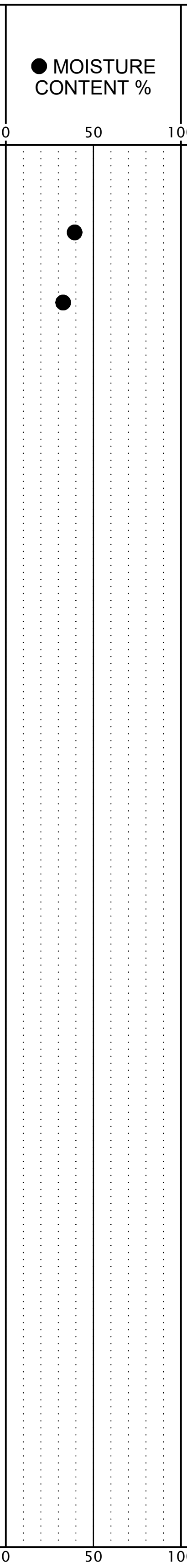
TEST PIT TP-6

NIGHT & DAY FURNITURE
WOODLAND, WA

FIGURE A-6

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	COMMENTS
0.0	Stiff to very stiff, dark brown SILT (ML), minor to with sand, trace organics; moist (8-inch-thick tilled zone, 2-inch-thick root zone).		PP	☒	DCP test at 1.0 foot. PP = 2.75 tsf
	Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	1.5		☒	
2.5					
	Stiff, light brown with orange mottled SILT (ML), trace sand and organics; moist. brown with orange mottles, minor to with sand at 4.0 feet	3.0	PP	☒	PP = 2.5 tsf
5.0	Medium dense, brown with orange mottled, silty SAND (SM); moist, sand is fine. gray with orange mottles; stratified bedding at 6.5 feet	5.0			
7.5					Severe caving observed at 8.0 feet.
	Exploration terminated at a depth of 9.0 feet due to caving.	9.0			Moderate to rapid groundwater seepage observed at 9.0 feet. Surface elevation was not measured at the time of exploration.
10.0					
12.5					
15.0					
17.5					
20.0					



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TEST PIT TP-7

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WOODLAND, WA

FIGURE A-7

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	● MOISTURE CONTENT % (0 50 100)	COMMENTS
0.0	Stiff to very stiff, dark brown SILT (ML), minor to with sand, trace organics; moist (6- to 8-inch-thick tilled zone, 2-inch-thick root zone).		PP	☒	●	PP = 2.0 tsf
2.5	Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	2.0				
	Stiff to hard, light brown SILT (ML), trace sand and organics; moist.	3.0	PP	☒		PP = 4.0 tsf
	brown with orange mottles at 4.5 feet					
5.0	Medium dense, brown with orange mottled, silty SAND (SM); moist, sand is fine.	5.0				
	gray with orange mottles at 7.0 feet					
7.5	gray; wet, sand is fine to medium, stratified bedding at 8.0 feet	8.0				Slow to moderate groundwater seepage observed at 8.0 feet.
	Exploration completed at a depth of 8.0 feet.			☒		No caving observed to the depth explored. Surface elevation was not measured at the time of exploration.
10.0						
12.5						
15.0						
17.5						
20.0						

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TEST PIT TP-8

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WOODLAND, WA

FIGURE A-8

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	● MOISTURE CONTENT % (0 50 100)	COMMENTS
0.0	Stiff to very stiff, dark brown SILT with sand (ML), trace organics; moist (4- to 6-inch-thick tilled zone, 0- to 1-inch-thick root zone) - **FILL**. trace debris (scrap metal) at 1.0 foot	1.5	PP	☒	●	DCP test at 1.0 foot. PP = 4.5 tsf
	Stiff, dark brown SILT with sand (ML), trace organics; moist.	2.5		☒	●	
2.5	Medium dense, light brown with orange mottled, silty SAND (SM), trace organics; moist, sand is fine.	3.5				
	Stiff, light brown with orange mottled SILT (ML), trace sand and organics; moist. brown with orange mottles at 4.5 feet	5.0	PP	☒		PP = 4.0 tsf
5.0	Medium dense, brown with orange mottled, silty SAND (SM); moist, sand is fine.			☒		
7.5	gray at 8.0 feet					
	wet, sand is fine to medium, stratified bedding at 9.0 feet					Moderate caving observed at 9.0 feet.
10.0		11.0	P200	☒	●	Slow groundwater seepage observed at 10.0 feet. P200 = 13%
	Exploration completed at a depth of 11.0 feet.					Surface elevation was not measured at the time of exploration.
12.5						
15.0						
17.5						
20.0						

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EXCAVATION METHOD: mini excavator (see document text)

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TEST PIT TP-9

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WOODLAND, WA

FIGURE A-9

SAMPLE INFORMATION			MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
TP-1	0.5		34							
TP-1	2.5		18							
TP-1	4.0		43				100			
TP-2	1.0		34							
TP-2	8.0		33				5			
TP-4	3.0		30				93			
TP-5	1.0		39							
TP-5	8.0		39				8			
TP-6	1.0		33							
TP-6	10.0		35				15			
TP-7	1.0		39							
TP-7	2.0		33							
TP-8	1.0		37							
TP-9	1.0		33							
TP-9	2.0		45							
TP-9	10.0		37				13			

NV5

NDFURNITURE-1-01

OCTOBER 2021

SUMMARY OF LABORATORY DATA

NIGHT & DAY FURNITURE
WOODLAND, WA

FIGURE A-10

APPENDIX B

APPENDIX B

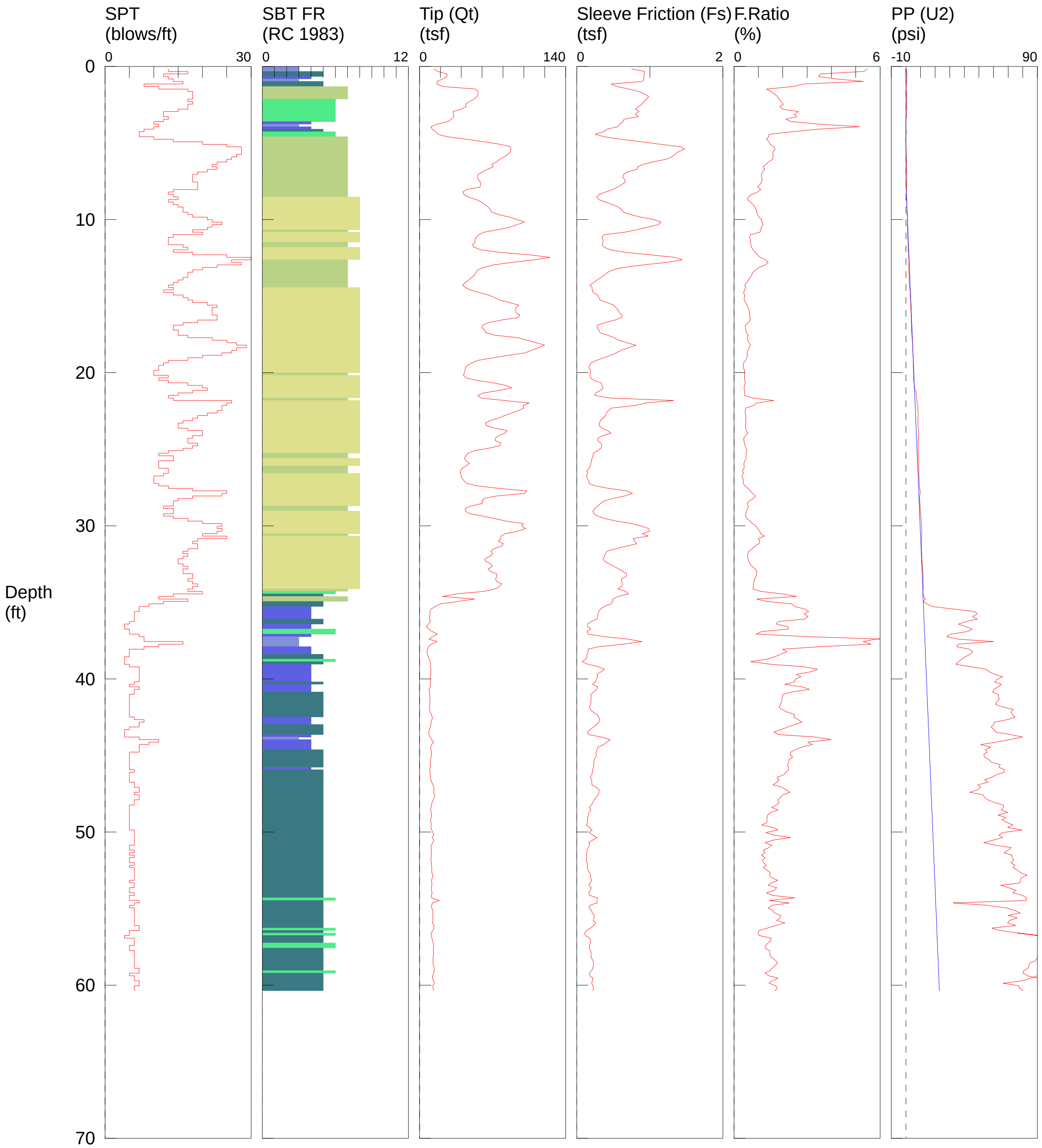
CONE PENETRATION TESTING

Our subsurface exploration program included two CPT probes (CPT-1 and CPT-2) advanced to a depth of approximately 60.4 feet BGS. Figure 2 shows the locations of the CPTs relative to existing site features. The CPTs were performed in general accordance with ASTM D5778 by Oregon Geotechnical Explorations of Keizer, Oregon. The CPT results are presented in this appendix.

The CPT is an in situ test that characterizes subsurface stratigraphy. The testing includes advancing a 35.6-millimeter-diameter cone equipped with a load cell and a friction sleeve through the soil profile. The cone is advanced at a rate of approximately 2 centimeters per second. Tip resistance, sleeve friction, and pore pressure are typically recorded at 0.1-meter intervals.

NV5 / CPT-1 / 1623 Howard Way Woodland

OPERATOR: OGE DMM
CONE ID: DDG1296
HOLE NUMBER: CPT-1
TEST DATE: 9/24/2021 9:34:17 AM
TOTAL DEPTH: 60.367 ft

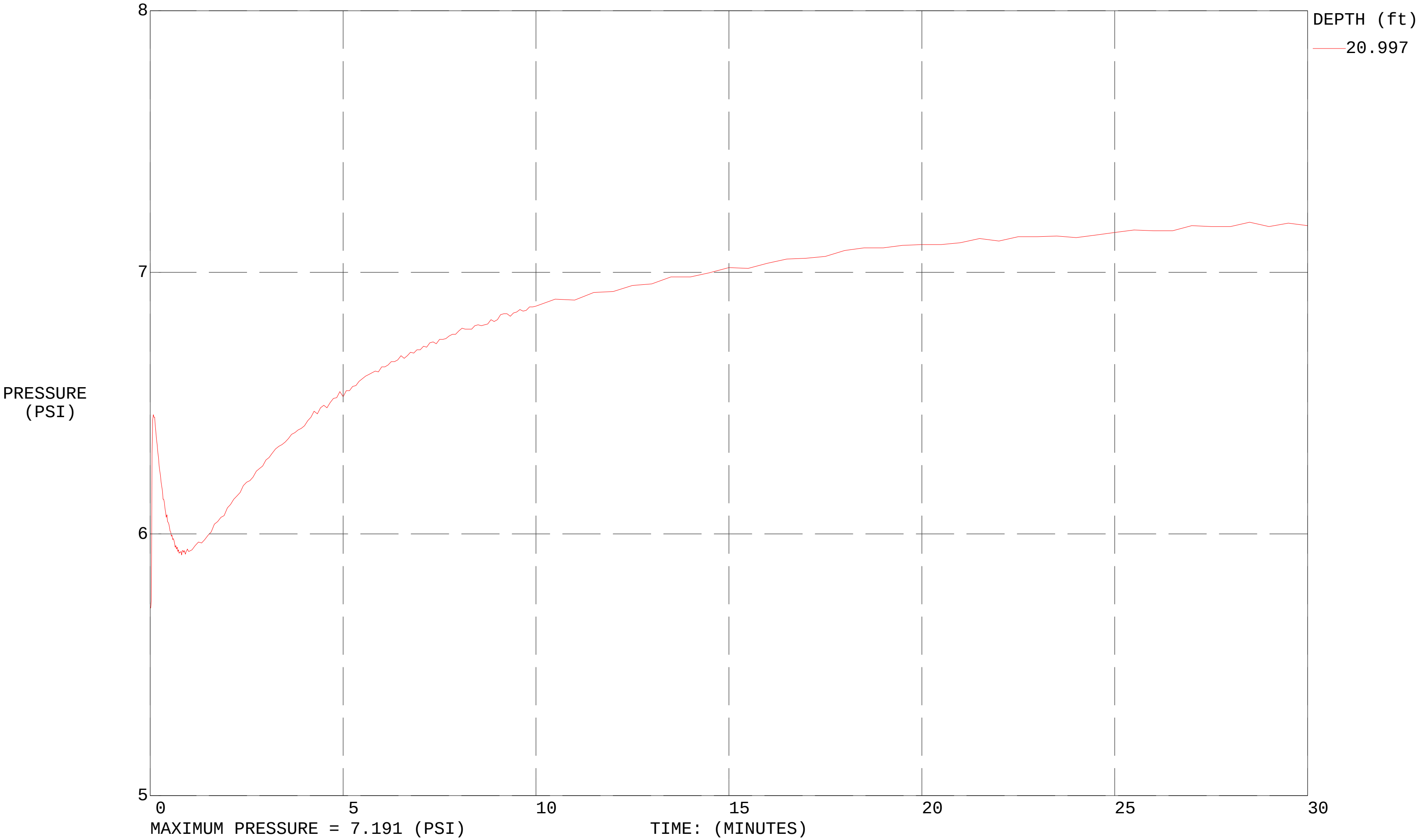


■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

COMMENT: NV5 / CPT-1 / 1623 Howard Way Woodland

TEST DATE: 9/24/2021 9:34:17 AM



MAXIMUM PRESSURE = 7.191 (PSI)

HYDROSTATIC PRESSURE = 5.85 (PSI), WATER TABLE: 7.50 ft

NV5 / CPT-1 / 1623 Howard Way Woodland

OPERATOR: OGE DMM
CONE ID: DDG1296
HOLE NUMBER: CPT-1
TEST DATE: 9/24/2021 9:34:17 AM
TOTAL DEPTH: 60.367 ft

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
0.164	13.70	0.7494	5.469	0.307	13	3	clay
0.328	17.40	0.9259	5.323	0.484	17	3	clay
0.492	26.04	0.9215	3.539	0.768	12	5	clayey silt to silty clay
0.656	26.44	0.9168	3.467	0.709	13	5	clayey silt to silty clay
0.820	21.93	0.9217	4.203	0.608	14	4	silty clay to clay
0.984	16.83	0.8945	5.314	0.464	16	3	clay
1.148	16.41	0.4723	2.878	0.461	8	5	clayey silt to silty clay
1.312	22.51	0.5462	2.426	0.363	11	5	clayey silt to silty clay
1.476	53.55	0.7142	1.334	0.190	17	7	silty sand to sandy silt
1.640	55.97	0.8481	1.515	0.337	18	7	silty sand to sandy silt
1.804	56.08	0.9283	1.655	0.425	18	7	silty sand to sandy silt
1.969	54.98	0.9853	1.792	0.461	18	7	silty sand to sandy silt
2.133	52.24	0.9564	1.831	0.448	17	7	silty sand to sandy silt
2.297	47.80	0.9187	1.922	0.451	18	6	sandy silt to clayey silt
2.461	44.07	0.8931	2.026	0.458	17	6	sandy silt to clayey silt
2.625	44.71	0.8428	1.885	0.497	17	6	sandy silt to clayey silt
2.789	39.92	0.7986	2.001	0.500	15	6	sandy silt to clayey silt
2.953	32.23	0.8505	2.639	0.356	12	6	sandy silt to clayey silt
3.117	32.36	0.7989	2.468	0.382	12	6	sandy silt to clayey silt
3.281	32.75	0.8424	2.572	0.389	13	6	sandy silt to clayey silt
3.445	30.36	0.6458	2.127	0.134	12	6	sandy silt to clayey silt
3.609	26.97	0.6315	2.342	0.010	10	6	sandy silt to clayey silt
3.773	16.62	0.5867	3.530	-0.186	11	4	silty clay to clay
3.937	10.90	0.5633	5.167	-0.245	10	3	clay
4.101	12.04	0.4142	3.440	-0.042	8	4	silty clay to clay
4.265	15.35	0.3684	2.400	0.356	7	5	clayey silt to silty clay
4.429	17.47	0.2499	1.431	0.023	7	6	sandy silt to clayey silt
4.593	26.16	0.3720	1.422	-0.111	10	6	sandy silt to clayey silt
4.757	45.02	0.5986	1.329	-0.301	14	7	silty sand to sandy silt
4.921	62.07	0.8855	1.427	-0.212	20	7	silty sand to sandy silt
5.085	77.57	1.1534	1.487	-0.042	25	7	silty sand to sandy silt
5.249	87.05	1.4232	1.635	0.085	28	7	silty sand to sandy silt
5.413	87.65	1.4735	1.681	0.209	28	7	silty sand to sandy silt
5.577	87.08	1.3853	1.591	0.271	28	7	silty sand to sandy silt
5.741	84.62	1.3455	1.590	0.301	27	7	silty sand to sandy silt
5.906	80.95	1.3024	1.609	0.314	26	7	silty sand to sandy silt
6.070	76.92	1.2183	1.584	0.330	25	7	silty sand to sandy silt
6.234	73.41	1.0382	1.414	0.396	23	7	silty sand to sandy silt
6.398	69.17	0.9042	1.307	0.366	22	7	silty sand to sandy silt
6.562	70.50	0.8336	1.182	0.386	23	7	silty sand to sandy silt
6.726	64.91	0.8190	1.262	0.451	21	7	silty sand to sandy silt
6.890	59.91	0.6906	1.153	0.497	19	7	silty sand to sandy silt
7.054	56.24	0.6376	1.134	0.500	18	7	silty sand to sandy silt
7.218	55.44	0.6274	1.132	0.513	18	7	silty sand to sandy silt

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
7.382	56.28	0.6518	1.158	0.543	18	7	silty sand to sandy silt
7.546	58.30	0.6608	1.133	0.582	19	7	silty sand to sandy silt
7.710	58.34	0.6190	1.061	0.579	19	7	silty sand to sandy silt
7.874	58.03	0.5613	0.967	0.510	19	7	silty sand to sandy silt
8.038	44.70	0.4889	1.094	0.445	14	7	silty sand to sandy silt
8.202	41.45	0.3964	0.957	0.379	13	7	silty sand to sandy silt
8.366	42.60	0.3036	0.713	0.379	14	7	silty sand to sandy silt
8.530	46.74	0.2716	0.581	0.409	15	7	silty sand to sandy silt
8.694	54.42	0.3002	0.552	0.454	13	8	sand to silty sand
8.858	59.28	0.3971	0.670	0.566	14	8	sand to silty sand
9.022	62.30	0.4842	0.777	0.615	15	8	sand to silty sand
9.186	65.79	0.5639	0.857	0.657	16	8	sand to silty sand
9.350	67.77	0.6134	0.905	0.713	16	8	sand to silty sand
9.514	69.17	0.6382	0.923	0.706	17	8	sand to silty sand
9.678	75.74	0.7328	0.967	0.762	18	8	sand to silty sand
9.843	86.30	0.8755	1.014	0.941	21	8	sand to silty sand
10.007	93.84	1.0632	1.133	1.105	22	8	sand to silty sand
10.171	100.56	1.1519	1.145	1.079	24	8	sand to silty sand
10.335	93.43	1.1146	1.193	1.154	22	8	sand to silty sand
10.499	86.41	0.9615	1.113	1.111	21	8	sand to silty sand
10.663	74.61	0.8220	1.102	1.121	18	8	sand to silty sand
10.827	61.61	0.6561	1.065	1.121	20	7	silty sand to sandy silt
10.991	56.55	0.3771	0.667	1.098	14	8	sand to silty sand
11.155	54.31	0.3430	0.631	1.111	13	8	sand to silty sand
11.319	53.03	0.3571	0.673	1.350	13	8	sand to silty sand
11.483	53.07	0.3570	0.673	1.399	13	8	sand to silty sand
11.647	50.72	0.3467	0.683	1.406	16	7	silty sand to sandy silt
11.811	52.27	0.3765	0.720	1.442	17	7	silty sand to sandy silt
11.975	58.91	0.4586	0.778	1.514	14	8	sand to silty sand
12.139	75.95	0.6547	0.862	1.638	18	8	sand to silty sand
12.303	104.74	1.0018	0.956	1.831	25	8	sand to silty sand
12.467	125.22	1.3414	1.071	1.896	30	8	sand to silty sand
12.631	110.34	1.4419	1.307	2.010	26	8	sand to silty sand
12.795	88.62	1.2399	1.399	2.027	28	7	silty sand to sandy silt
12.959	70.74	0.9093	1.285	1.968	23	7	silty sand to sandy silt
13.123	61.71	0.6341	1.027	1.929	20	7	silty sand to sandy silt
13.287	55.81	0.4956	0.888	1.971	18	7	silty sand to sandy silt
13.451	53.95	0.4196	0.778	2.033	17	7	silty sand to sandy silt
13.615	52.67	0.3799	0.721	2.108	17	7	silty sand to sandy silt
13.780	49.96	0.3307	0.662	2.177	16	7	silty sand to sandy silt
13.944	47.20	0.2794	0.592	2.207	15	7	silty sand to sandy silt
14.108	44.13	0.2351	0.533	2.216	14	7	silty sand to sandy silt
14.272	41.19	0.1801	0.437	2.256	13	7	silty sand to sandy silt
14.436	43.67	0.2091	0.479	2.393	14	7	silty sand to sandy silt
14.600	48.35	0.2093	0.433	2.818	12	8	sand to silty sand
14.764	56.83	0.2229	0.392	2.847	14	8	sand to silty sand
14.928	66.17	0.2858	0.432	2.955	16	8	sand to silty sand
15.092	71.94	0.3019	0.420	3.014	17	8	sand to silty sand
15.256	76.63	0.3161	0.413	3.155	18	8	sand to silty sand
15.420	86.19	0.4142	0.481	3.217	21	8	sand to silty sand
15.584	94.88	0.5010	0.528	3.308	23	8	sand to silty sand
15.748	92.54	0.5339	0.577	3.360	22	8	sand to silty sand
15.912	91.88	0.5665	0.617	3.436	22	8	sand to silty sand

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
16.076	92.55	0.5843	0.631	3.521	22	8	sand to silty sand
16.240	96.08	0.6194	0.645	3.602	23	8	sand to silty sand
16.404	94.16	0.6117	0.650	3.655	23	8	sand to silty sand
16.568	78.33	0.5243	0.669	3.678	19	8	sand to silty sand
16.732	65.88	0.3764	0.571	3.674	16	8	sand to silty sand
16.896	60.23	0.2806	0.466	3.687	14	8	sand to silty sand
17.060	59.60	0.2749	0.461	3.802	14	8	sand to silty sand
17.224	62.36	0.3007	0.482	3.906	15	8	sand to silty sand
17.388	63.27	0.3172	0.501	3.982	15	8	sand to silty sand
17.552	72.37	0.4219	0.583	4.044	17	8	sand to silty sand
17.717	93.97	0.5098	0.542	4.237	22	8	sand to silty sand
17.881	102.70	0.5756	0.560	4.364	25	8	sand to silty sand
18.045	112.29	0.6888	0.613	4.433	27	8	sand to silty sand
18.209	119.76	0.8083	0.675	4.619	29	8	sand to silty sand
18.373	113.87	0.7027	0.617	4.671	27	8	sand to silty sand
18.537	107.23	0.6046	0.564	4.570	26	8	sand to silty sand
18.701	101.14	0.5383	0.532	4.609	24	8	sand to silty sand
18.865	85.22	0.4615	0.542	4.894	20	8	sand to silty sand
19.029	70.72	0.3749	0.530	4.952	17	8	sand to silty sand
19.193	55.71	0.2670	0.479	4.920	13	8	sand to silty sand
19.357	50.14	0.1963	0.392	4.939	12	8	sand to silty sand
19.521	45.93	0.1729	0.377	4.992	11	8	sand to silty sand
19.685	43.89	0.1664	0.379	5.057	11	8	sand to silty sand
19.849	43.56	0.1870	0.429	5.119	10	8	sand to silty sand
20.013	42.77	0.1832	0.428	5.139	10	8	sand to silty sand
20.177	41.94	0.1789	0.426	5.227	13	7	silty sand to sandy silt
20.341	44.70	0.1900	0.425	5.289	11	8	sand to silty sand
20.505	54.67	0.2342	0.428	5.374	13	8	sand to silty sand
20.669	70.76	0.3321	0.469	5.489	17	8	sand to silty sand
20.833	82.88	0.3437	0.415	5.652	20	8	sand to silty sand
20.997	88.29	0.3611	0.409	5.711	21	8	sand to silty sand
21.161	75.94	0.3225	0.425	6.871	18	8	sand to silty sand
21.325	61.18	0.2587	0.423	6.927	15	8	sand to silty sand
21.490	55.77	0.2426	0.435	7.045	13	8	sand to silty sand
21.654	58.94	0.4586	0.778	7.182	14	8	sand to silty sand
21.818	81.36	1.3215	1.624	7.476	26	7	silty sand to sandy silt
21.982	104.79	0.9434	0.900	7.744	25	8	sand to silty sand
22.146	99.07	0.8030	0.811	8.202	24	8	sand to silty sand
22.310	99.87	0.4678	0.468	8.064	24	8	sand to silty sand
22.474	94.48	0.4333	0.459	8.179	23	8	sand to silty sand
22.638	88.33	0.4001	0.453	8.274	21	8	sand to silty sand
22.802	81.44	0.3954	0.486	8.297	19	8	sand to silty sand
22.966	75.54	0.3599	0.476	8.179	18	8	sand to silty sand
23.130	67.83	0.3215	0.474	8.169	16	8	sand to silty sand
23.294	62.98	0.3080	0.489	8.215	15	8	sand to silty sand
23.458	64.13	0.3052	0.476	8.244	15	8	sand to silty sand
23.622	72.28	0.3421	0.473	8.401	17	8	sand to silty sand
23.786	83.89	0.4226	0.504	8.525	20	8	sand to silty sand
23.950	82.18	0.4669	0.568	8.558	20	8	sand to silty sand
24.114	75.25	0.3477	0.462	8.617	18	8	sand to silty sand
24.278	72.73	0.2867	0.394	8.493	17	8	sand to silty sand
24.442	72.56	0.2889	0.398	8.339	17	8	sand to silty sand
24.606	78.02	0.3326	0.426	8.362	19	8	sand to silty sand

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
24.770	76.39	0.3431	0.449	8.424	18	8	sand to silty sand
24.934	66.10	0.3284	0.497	8.434	16	8	sand to silty sand
25.098	52.79	0.2819	0.534	8.424	13	8	sand to silty sand
25.262	46.50	0.2262	0.486	8.450	11	8	sand to silty sand
25.427	44.48	0.2198	0.494	8.486	14	7	silty sand to sandy silt
25.591	42.92	0.2085	0.486	8.548	14	7	silty sand to sandy silt
25.755	44.31	0.1974	0.446	8.614	11	8	sand to silty sand
25.919	47.75	0.1907	0.399	8.656	11	8	sand to silty sand
26.083	44.75	0.1836	0.410	8.731	11	8	sand to silty sand
26.247	40.78	0.1687	0.414	8.777	13	7	silty sand to sandy silt
26.411	39.16	0.1357	0.347	8.748	13	7	silty sand to sandy silt
26.575	38.97	0.1483	0.381	8.849	12	7	silty sand to sandy silt
26.739	39.86	0.1316	0.330	8.950	10	8	sand to silty sand
26.903	40.44	0.1433	0.354	9.048	10	8	sand to silty sand
27.067	42.67	0.1644	0.385	9.075	10	8	sand to silty sand
27.231	45.26	0.1687	0.373	9.114	11	8	sand to silty sand
27.395	55.60	0.2506	0.451	9.303	13	8	sand to silty sand
27.559	76.41	0.4401	0.576	9.437	18	8	sand to silty sand
27.723	102.87	0.6790	0.660	9.709	25	8	sand to silty sand
27.887	100.62	0.7609	0.756	9.728	24	8	sand to silty sand
28.051	73.58	0.6512	0.885	9.477	18	8	sand to silty sand
28.215	61.78	0.4973	0.805	9.336	15	8	sand to silty sand
28.379	60.07	0.3700	0.616	9.460	14	8	sand to silty sand
28.543	60.09	0.3248	0.541	9.585	14	8	sand to silty sand
28.707	49.38	0.2839	0.575	9.689	12	8	sand to silty sand
28.871	43.77	0.2464	0.563	9.741	14	7	silty sand to sandy silt
29.035	43.86	0.2207	0.503	9.830	14	7	silty sand to sandy silt
29.199	48.15	0.2324	0.483	9.938	12	8	sand to silty sand
29.364	60.28	0.2837	0.471	10.130	14	8	sand to silty sand
29.528	71.43	0.3752	0.525	10.317	17	8	sand to silty sand
29.692	82.64	0.5443	0.659	10.480	20	8	sand to silty sand
29.856	99.37	0.7497	0.754	10.709	24	8	sand to silty sand
30.020	97.88	0.8827	0.902	10.804	23	8	sand to silty sand
30.184	101.57	0.9827	0.967	10.706	24	8	sand to silty sand
30.348	94.32	0.9985	1.059	10.938	23	8	sand to silty sand
30.512	82.27	0.8968	1.090	10.676	20	8	sand to silty sand
30.676	78.00	0.9737	1.248	10.618	25	7	silty sand to sandy silt
30.840	77.90	0.7702	0.989	10.830	19	8	sand to silty sand
31.004	75.39	0.7932	1.052	10.402	18	8	sand to silty sand
31.168	80.21	0.8170	1.019	10.774	19	8	sand to silty sand
31.332	78.54	0.6773	0.862	10.680	19	8	sand to silty sand
31.496	71.33	0.5310	0.744	10.631	17	8	sand to silty sand
31.660	68.24	0.4104	0.601	10.627	16	8	sand to silty sand
31.824	70.15	0.3934	0.561	10.850	17	8	sand to silty sand
31.988	67.58	0.3770	0.558	10.908	16	8	sand to silty sand
32.152	62.57	0.3583	0.573	10.961	15	8	sand to silty sand
32.316	63.10	0.3786	0.600	11.059	15	8	sand to silty sand
32.480	68.58	0.4408	0.643	11.206	16	8	sand to silty sand
32.644	69.63	0.5070	0.728	11.418	17	8	sand to silty sand
32.808	65.95	0.5719	0.867	11.458	16	8	sand to silty sand
32.972	67.65	0.6299	0.931	11.516	16	8	sand to silty sand
33.136	73.77	0.6803	0.922	11.706	18	8	sand to silty sand
33.301	74.18	0.6797	0.916	11.732	18	8	sand to silty sand

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
33.465	72.92	0.6107	0.838	11.745	17	8	sand to silty sand
33.629	73.64	0.6117	0.831	11.804	18	8	sand to silty sand
33.793	78.59	0.6239	0.794	11.752	19	8	sand to silty sand
33.957	76.71	0.6135	0.800	11.912	18	8	sand to silty sand
34.121	72.48	0.5593	0.772	11.801	17	8	sand to silty sand
34.285	61.93	0.6723	1.086	11.729	20	7	silty sand to sandy silt
34.449	35.34	0.7060	1.998	11.745	14	6	sandy silt to clayey silt
34.613	22.13	0.5646	2.552	12.151	11	5	clayey silt to silty clay
34.777	52.46	0.4927	0.939	13.216	17	7	silty sand to sandy silt
34.941	37.00	0.4933	1.333	11.726	12	7	silty sand to sandy silt
35.105	19.65	0.4644	2.364	14.416	9	5	clayey silt to silty clay
35.269	14.97	0.3722	2.487	18.247	7	5	clayey silt to silty clay
35.433	11.15	0.3237	2.902	31.983	7	4	silty clay to clay
35.597	9.78	0.2997	3.066	46.994	6	4	silty clay to clay
35.761	10.01	0.2885	2.881	48.913	6	4	silty clay to clay
35.925	9.31	0.2832	3.041	45.612	6	4	silty clay to clay
36.089	9.57	0.2768	2.893	48.740	6	4	silty clay to clay
36.253	10.52	0.1917	1.823	41.561	5	5	clayey silt to silty clay
36.417	8.52	0.1480	1.737	35.958	4	5	clayey silt to silty clay
36.581	6.65	0.1470	2.212	40.623	4	4	silty clay to clay
36.745	8.45	0.1889	2.235	45.399	5	4	silty clay to clay
36.909	12.16	0.1371	1.127	42.222	5	6	sandy silt to clayey silt
37.073	17.01	0.1550	0.911	30.548	7	6	sandy silt to clayey silt
37.238	12.28	0.3798	3.092	27.963	8	4	silty clay to clay
37.402	8.86	0.6992	7.888	35.468	8	3	clay
37.566	16.72	0.8866	5.303	59.943	16	3	clay
37.730	11.22	0.6318	5.630	35.599	11	3	clay
37.894	8.47	0.3010	3.552	34.896	8	3	clay
38.058	7.72	0.1538	1.991	43.222	5	4	silty clay to clay
38.222	7.16	0.1552	2.167	45.791	5	4	silty clay to clay
38.386	7.25	0.1385	1.909	43.889	5	4	silty clay to clay
38.550	8.44	0.1401	1.661	40.777	4	5	clayey silt to silty clay
38.714	8.85	0.1207	1.363	38.214	4	5	clayey silt to silty clay
38.878	10.38	0.0715	0.688	35.890	4	6	sandy silt to clayey silt
39.042	10.17	0.1534	1.509	34.092	5	5	clayey silt to silty clay
39.206	10.24	0.2970	2.900	44.507	7	4	silty clay to clay
39.370	11.09	0.3792	3.418	54.892	7	4	silty clay to clay
39.534	10.50	0.3294	3.137	57.200	7	4	silty clay to clay
39.698	10.81	0.2768	2.560	60.829	7	4	silty clay to clay
39.862	10.33	0.2834	2.745	66.160	7	4	silty clay to clay
40.026	10.62	0.2661	2.506	62.286	7	4	silty clay to clay
40.190	10.17	0.2534	2.491	60.600	6	4	silty clay to clay
40.354	10.35	0.2157	2.084	65.242	5	5	clayey silt to silty clay
40.518	10.22	0.2869	2.806	62.904	7	4	silty clay to clay
40.682	8.75	0.2711	3.098	60.355	6	4	silty clay to clay
40.846	9.55	0.2268	2.375	59.220	6	4	silty clay to clay
41.011	9.64	0.1934	2.005	63.421	5	5	clayey silt to silty clay
41.175	9.83	0.1943	1.978	63.368	5	5	clayey silt to silty clay
41.339	9.89	0.1939	1.960	63.901	5	5	clayey silt to silty clay
41.503	10.00	0.1949	1.949	61.963	5	5	clayey silt to silty clay
41.667	9.73	0.1852	1.904	61.391	5	5	clayey silt to silty clay
41.831	9.48	0.1756	1.852	66.320	5	5	clayey silt to silty clay
41.995	9.44	0.1846	1.955	73.525	5	5	clayey silt to silty clay

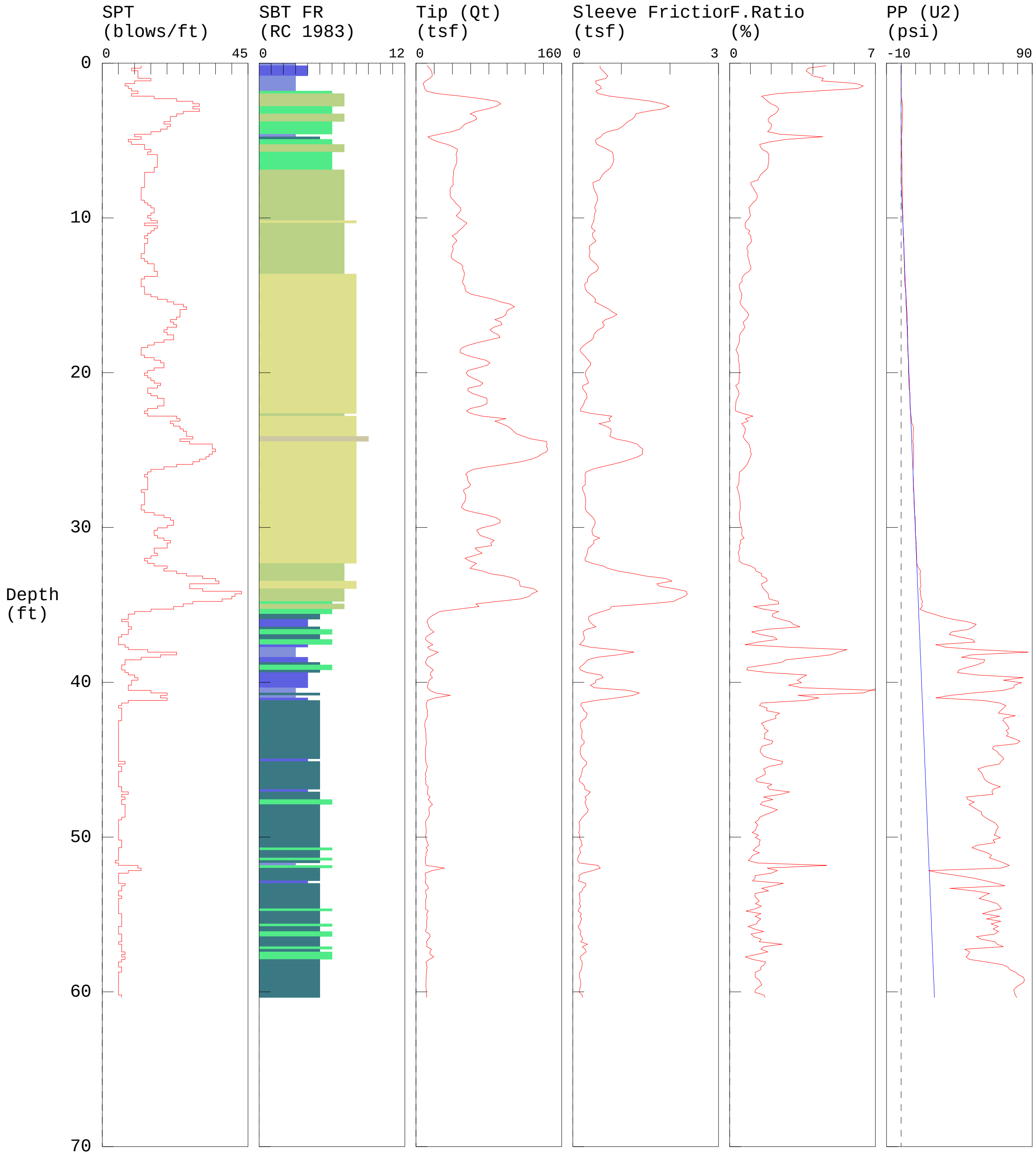
Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
42.159	10.17	0.2213	2.177	71.963	5	5	clayey silt to silty clay
42.323	11.17	0.2782	2.491	72.763	5	5	clayey silt to silty clay
42.487	12.13	0.2967	2.445	74.581	6	5	clayey silt to silty clay
42.651	11.89	0.3126	2.629	69.798	8	4	silty clay to clay
42.815	10.94	0.3043	2.782	60.524	7	4	silty clay to clay
42.979	10.90	0.2729	2.503	60.158	7	4	silty clay to clay
43.143	10.31	0.2274	2.205	58.331	5	5	clayey silt to silty clay
43.307	9.38	0.1806	1.925	60.234	4	5	clayey silt to silty clay
43.471	8.79	0.1433	1.630	61.489	4	5	clayey silt to silty clay
43.635	8.70	0.1618	1.860	71.917	4	5	clayey silt to silty clay
43.799	10.19	0.3409	3.345	79.815	7	4	silty clay to clay
43.963	11.48	0.4575	3.984	71.214	11	3	clay
44.127	13.57	0.4104	3.024	61.911	9	4	silty clay to clay
44.291	11.47	0.3685	3.213	51.201	7	4	silty clay to clay
44.455	10.45	0.2900	2.776	58.030	7	4	silty clay to clay
44.619	11.01	0.2776	2.522	54.346	7	4	silty clay to clay
44.783	11.26	0.2620	2.326	55.696	5	5	clayey silt to silty clay
44.948	11.49	0.2641	2.300	53.297	5	5	clayey silt to silty clay
45.112	10.84	0.2609	2.407	53.889	5	5	clayey silt to silty clay
45.276	10.47	0.2360	2.253	56.932	5	5	clayey silt to silty clay
45.440	10.36	0.2332	2.250	58.517	5	5	clayey silt to silty clay
45.604	10.53	0.2309	2.193	64.447	5	5	clayey silt to silty clay
45.768	10.30	0.2295	2.229	63.793	5	5	clayey silt to silty clay
45.932	9.58	0.2147	2.241	67.540	6	4	silty clay to clay
46.096	9.90	0.2123	2.146	67.242	5	5	clayey silt to silty clay
46.260	10.14	0.2070	2.041	61.976	5	5	clayey silt to silty clay
46.424	10.52	0.1853	1.760	58.583	5	5	clayey silt to silty clay
46.588	10.87	0.2003	1.843	53.895	5	5	clayey silt to silty clay
46.752	11.66	0.2055	1.763	56.157	6	5	clayey silt to silty clay
46.916	12.87	0.2062	1.602	49.440	6	5	clayey silt to silty clay
47.080	13.58	0.2682	1.976	51.015	7	5	clayey silt to silty clay
47.244	14.01	0.3015	2.152	48.828	7	5	clayey silt to silty clay
47.408	13.30	0.3049	2.293	43.614	6	5	clayey silt to silty clay
47.572	14.45	0.2893	2.002	52.777	7	5	clayey silt to silty clay
47.736	13.89	0.2654	1.910	53.911	7	5	clayey silt to silty clay
47.900	13.21	0.2367	1.793	56.272	6	5	clayey silt to silty clay
48.064	11.92	0.2197	1.843	60.407	6	5	clayey silt to silty clay
48.228	11.42	0.2001	1.753	66.605	5	5	clayey silt to silty clay
48.392	11.06	0.1706	1.543	66.726	5	5	clayey silt to silty clay
48.556	10.68	0.1924	1.802	65.166	5	5	clayey silt to silty clay
48.720	10.83	0.1640	1.514	69.727	5	5	clayey silt to silty clay
48.885	11.44	0.1578	1.380	63.182	5	5	clayey silt to silty clay
49.049	11.13	0.1504	1.351	68.210	5	5	clayey silt to silty clay
49.213	10.54	0.1420	1.348	65.680	5	5	clayey silt to silty clay
49.377	10.97	0.1478	1.347	69.158	5	5	clayey silt to silty clay
49.541	11.17	0.1269	1.136	73.313	5	5	clayey silt to silty clay
49.705	10.82	0.1756	1.623	69.573	5	5	clayey silt to silty clay
49.869	11.64	0.2080	1.788	79.475	6	5	clayey silt to silty clay
50.033	12.98	0.1696	1.307	66.536	6	5	clayey silt to silty clay
50.197	13.55	0.2213	1.634	63.659	6	5	clayey silt to silty clay
50.361	12.06	0.2797	2.320	66.098	6	5	clayey silt to silty clay
50.525	13.43	0.2157	1.607	59.982	6	5	clayey silt to silty clay
50.689	12.71	0.1623	1.277	53.300	6	5	clayey silt to silty clay

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
50.853	11.19	0.1736	1.552	60.969	5	5	clayey silt to silty clay
51.017	10.79	0.1548	1.434	72.057	5	5	clayey silt to silty clay
51.181	11.54	0.1380	1.196	70.132	6	5	clayey silt to silty clay
51.345	10.89	0.1394	1.280	67.187	5	5	clayey silt to silty clay
51.509	11.57	0.1301	1.124	72.420	6	5	clayey silt to silty clay
51.673	10.83	0.1381	1.275	72.796	5	5	clayey silt to silty clay
51.837	10.93	0.1277	1.168	73.927	5	5	clayey silt to silty clay
52.001	11.52	0.1396	1.212	71.900	6	5	clayey silt to silty clay
52.165	11.22	0.1481	1.320	74.545	5	5	clayey silt to silty clay
52.329	11.76	0.1413	1.202	73.385	6	5	clayey silt to silty clay
52.493	11.51	0.1553	1.349	76.513	6	5	clayey silt to silty clay
52.657	11.82	0.1759	1.488	78.510	6	5	clayey silt to silty clay
52.822	12.66	0.1850	1.461	82.884	6	5	clayey silt to silty clay
52.986	12.16	0.1865	1.534	78.965	6	5	clayey silt to silty clay
53.150	11.42	0.2049	1.795	78.363	5	5	clayey silt to silty clay
53.314	11.70	0.1796	1.535	78.144	6	5	clayey silt to silty clay
53.478	11.82	0.1648	1.394	64.954	6	5	clayey silt to silty clay
53.642	11.26	0.1972	1.751	70.286	5	5	clayey silt to silty clay
53.806	11.35	0.1844	1.624	75.401	5	5	clayey silt to silty clay
53.970	12.01	0.1603	1.335	73.156	6	5	clayey silt to silty clay
54.134	11.27	0.1749	1.552	79.775	5	5	clayey silt to silty clay
54.298	11.33	0.2821	2.490	82.528	5	5	clayey silt to silty clay
54.462	18.95	0.2759	1.456	82.426	7	6	sandy silt to clayey silt
54.626	12.32	0.2778	2.254	32.376	6	5	clayey silt to silty clay
54.790	11.44	0.1787	1.563	55.637	5	5	clayey silt to silty clay
54.954	11.60	0.1635	1.410	68.556	6	5	clayey silt to silty clay
55.118	12.63	0.2000	1.584	74.388	6	5	clayey silt to silty clay
55.282	12.81	0.2111	1.649	78.226	6	5	clayey silt to silty clay
55.446	12.53	0.2404	1.919	69.982	6	5	clayey silt to silty clay
55.610	12.53	0.2357	1.881	76.173	6	5	clayey silt to silty clay
55.774	12.78	0.2235	1.749	71.031	6	5	clayey silt to silty clay
55.938	12.29	0.2568	2.089	69.583	6	5	clayey silt to silty clay
56.102	13.76	0.2323	1.688	75.271	7	5	clayey silt to silty clay
56.266	13.64	0.1889	1.385	58.880	7	5	clayey silt to silty clay
56.430	12.88	0.1309	1.016	64.362	5	6	sandy silt to clayey silt
56.594	10.85	0.1068	0.984	76.448	5	5	clayey silt to silty clay
56.759	11.35	0.1158	1.020	91.720	4	6	sandy silt to clayey silt
56.923	11.80	0.1786	1.513	94.989	6	5	clayey silt to silty clay
57.087	12.36	0.1875	1.518	92.037	6	5	clayey silt to silty clay
57.251	13.13	0.1829	1.393	92.299	6	5	clayey silt to silty clay
57.415	13.42	0.1738	1.295	96.823	5	6	sandy silt to clayey silt
57.579	13.25	0.1684	1.271	91.919	5	6	sandy silt to clayey silt
57.743	13.05	0.1905	1.460	93.949	6	5	clayey silt to silty clay
57.907	13.38	0.1953	1.460	96.159	6	5	clayey silt to silty clay
58.071	13.19	0.1952	1.481	92.230	6	5	clayey silt to silty clay
58.235	12.91	0.2032	1.574	93.917	6	5	clayey silt to silty clay
58.399	12.77	0.2191	1.716	88.690	6	5	clayey silt to silty clay
58.563	12.84	0.2295	1.787	84.757	6	5	clayey silt to silty clay
58.727	13.37	0.2240	1.675	84.120	6	5	clayey silt to silty clay
58.891	14.09	0.2208	1.566	83.551	7	5	clayey silt to silty clay
59.055	13.88	0.2028	1.462	80.746	7	5	clayey silt to silty clay
59.219	13.52	0.1722	1.273	80.083	5	6	sandy silt to clayey silt
59.383	12.48	0.1784	1.429	83.433	6	5	clayey silt to silty clay

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
59.547	12.26	0.2219	1.810	90.707	6	5	clayey silt to silty clay
59.711	13.65	0.2113	1.549	79.906	7	5	clayey silt to silty clay
59.875	14.22	0.2039	1.434	66.611	7	5	clayey silt to silty clay
60.039	12.66	0.2172	1.715	77.301	6	5	clayey silt to silty clay
60.203	13.00	0.2300	1.769	77.713	6	5	clayey silt to silty clay
60.367	13.10	0.2201	1.680	80.292	6	5	clayey silt to silty clay

NV5 / CPT-2 / 1623 Howard Way Woodland

OPERATOR: OGE DMM
CONE ID: DDG1296
HOLE NUMBER: CPT-2
TEST DATE: 9/24/2021 11:00:26 AM
TOTAL DEPTH: 60.367 ft



🟥 1 sensitive fine gra
▨ 2 organic materia
🟦 3 clay
🟦 4 silty clay to cl
▨ 5 clayey silt to silt
🟩 6 sandy silt to claye
🟩 7 silty sand to sandy
🟨 8 sand to silty sa
▨ 9 sand
🟧 10 gravelly sand to sand
⬜ 11 very stiff fine grained (*)
⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

NV5 / CPT-2 / 1623 Howard Way Woodland

OPERATOR: OGE DMM
CONE ID: DDG1296
HOLE NUMBER: CPT-2
TEST DATE: 9/24/2021 11:00:26 AM
TOTAL DEPTH: 60.367 ft

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
0.164	12.06	0.5598	4.641	0.268	12	3	clay
0.328	14.85	0.5604	3.773	0.150	9	4	silty clay to clay
0.492	16.98	0.6222	3.665	0.167	11	4	silty clay to clay
0.656	17.49	0.6696	3.829	0.121	11	4	silty clay to clay
0.820	17.94	0.7161	3.993	0.141	11	4	silty clay to clay
0.984	15.18	0.6832	4.501	0.101	15	3	clay
1.148	10.67	0.4714	4.418	0.016	10	3	clay
1.312	7.76	0.4731	6.094	-0.049	7	3	clay
1.476	8.78	0.5634	6.416	0.118	8	3	clay
1.640	9.52	0.5863	6.156	0.193	9	3	clay
1.804	11.50	0.4735	4.117	0.163	11	3	clay
1.969	22.94	0.5197	2.265	0.098	9	6	sandy silt to clayey silt
2.133	49.47	0.7616	1.540	0.072	16	7	silty sand to sandy silt
2.297	71.78	1.2023	1.675	0.353	23	7	silty sand to sandy silt
2.461	88.70	1.6176	1.824	0.677	28	7	silty sand to sandy silt
2.625	93.31	1.8525	1.985	0.866	30	7	silty sand to sandy silt
2.789	87.86	1.9830	2.257	0.968	28	7	silty sand to sandy silt
2.953	78.58	1.8558	2.362	1.056	30	6	sandy silt to clayey silt
3.117	66.05	1.5129	2.290	1.026	25	6	sandy silt to clayey silt
3.281	59.36	1.2945	2.181	0.915	23	6	sandy silt to clayey silt
3.445	65.42	1.2767	1.951	1.033	21	7	silty sand to sandy silt
3.609	66.61	1.2288	1.845	1.033	21	7	silty sand to sandy silt
3.773	60.94	1.1306	1.855	0.827	19	7	silty sand to sandy silt
3.937	53.76	1.0773	2.004	0.755	21	6	sandy silt to clayey silt
4.101	51.06	1.0157	1.989	0.716	20	6	sandy silt to clayey silt
4.265	48.03	0.9343	1.945	0.703	18	6	sandy silt to clayey silt
4.429	39.39	0.7159	1.817	0.575	15	6	sandy silt to clayey silt
4.593	25.38	0.6135	2.418	0.412	10	6	sandy silt to clayey silt
4.757	12.84	0.5752	4.482	0.212	12	3	clay
4.921	17.29	0.4766	2.756	0.320	8	5	clayey silt to silty clay
5.085	24.25	0.4661	1.922	0.376	9	6	sandy silt to clayey silt
5.249	34.66	0.4992	1.441	0.350	13	6	sandy silt to clayey silt
5.413	41.29	0.6105	1.479	0.350	13	7	silty sand to sandy silt
5.577	45.68	0.7125	1.560	0.399	15	7	silty sand to sandy silt
5.741	44.87	0.8047	1.794	0.422	14	7	silty sand to sandy silt
5.906	43.91	0.8300	1.890	0.464	17	6	sandy silt to clayey silt
6.070	44.82	0.8330	1.859	0.543	17	6	sandy silt to clayey silt
6.234	44.97	0.8468	1.883	0.552	17	6	sandy silt to clayey silt
6.398	44.54	0.8300	1.864	0.562	17	6	sandy silt to clayey silt
6.562	43.91	0.8114	1.848	0.618	17	6	sandy silt to clayey silt
6.726	42.60	0.7791	1.829	0.624	16	6	sandy silt to clayey silt
6.890	41.57	0.7265	1.748	0.637	16	6	sandy silt to clayey silt
7.054	40.95	0.6578	1.606	0.637	13	7	silty sand to sandy silt
7.218	41.14	0.6102	1.483	0.637	13	7	silty sand to sandy silt

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
7.382	40.78	0.5781	1.418	0.644	13	7	silty sand to sandy silt
7.546	40.67	0.5472	1.345	0.664	13	7	silty sand to sandy silt
7.710	40.70	0.4134	1.016	0.660	13	7	silty sand to sandy silt
7.874	40.79	0.4194	1.028	0.670	13	7	silty sand to sandy silt
8.038	38.00	0.4266	1.123	0.912	12	7	silty sand to sandy silt
8.202	37.35	0.4434	1.187	0.915	12	7	silty sand to sandy silt
8.366	37.64	0.4750	1.262	0.974	12	7	silty sand to sandy silt
8.530	37.27	0.4943	1.326	1.013	12	7	silty sand to sandy silt
8.694	38.38	0.5061	1.319	1.030	12	7	silty sand to sandy silt
8.858	41.05	0.5129	1.250	1.026	13	7	silty sand to sandy silt
9.022	43.44	0.4823	1.110	1.049	14	7	silty sand to sandy silt
9.186	46.01	0.4666	1.014	1.049	15	7	silty sand to sandy silt
9.350	49.01	0.4480	0.914	1.062	16	7	silty sand to sandy silt
9.514	49.25	0.4777	0.970	1.095	16	7	silty sand to sandy silt
9.678	47.20	0.4558	0.966	1.105	15	7	silty sand to sandy silt
9.843	44.11	0.4436	1.006	1.187	14	7	silty sand to sandy silt
10.007	47.21	0.4383	0.928	1.252	15	7	silty sand to sandy silt
10.171	51.79	0.4322	0.835	1.226	17	7	silty sand to sandy silt
10.335	55.81	0.4152	0.744	1.239	13	8	sand to silty sand
10.499	52.87	0.3885	0.735	1.298	17	7	silty sand to sandy silt
10.663	50.36	0.3897	0.774	1.311	16	7	silty sand to sandy silt
10.827	47.15	0.4592	0.974	1.373	15	7	silty sand to sandy silt
10.991	44.86	0.4058	0.904	1.438	14	7	silty sand to sandy silt
11.155	39.81	0.4033	1.013	1.494	13	7	silty sand to sandy silt
11.319	42.63	0.4330	1.016	1.795	14	7	silty sand to sandy silt
11.483	45.06	0.4771	1.059	1.847	14	7	silty sand to sandy silt
11.647	41.84	0.4142	0.990	1.844	13	7	silty sand to sandy silt
11.811	40.01	0.3411	0.853	1.857	13	7	silty sand to sandy silt
11.975	40.78	0.3352	0.822	1.896	13	7	silty sand to sandy silt
12.139	40.31	0.3539	0.878	1.935	13	7	silty sand to sandy silt
12.303	38.96	0.3417	0.877	1.997	12	7	silty sand to sandy silt
12.467	38.51	0.3326	0.864	2.023	12	7	silty sand to sandy silt
12.631	39.56	0.3560	0.900	2.040	13	7	silty sand to sandy silt
12.795	43.74	0.4130	0.944	2.095	14	7	silty sand to sandy silt
12.959	48.91	0.4706	0.962	2.171	16	7	silty sand to sandy silt
13.123	51.46	0.5197	1.010	2.226	16	7	silty sand to sandy silt
13.287	51.15	0.5222	1.021	2.292	16	7	silty sand to sandy silt
13.451	52.55	0.4832	0.920	2.305	17	7	silty sand to sandy silt
13.615	53.25	0.3888	0.730	2.311	17	7	silty sand to sandy silt
13.780	52.65	0.3336	0.634	2.386	13	8	sand to silty sand
13.944	52.10	0.3041	0.584	2.429	12	8	sand to silty sand
14.108	50.95	0.3026	0.594	2.537	12	8	sand to silty sand
14.272	51.88	0.2436	0.469	2.563	12	8	sand to silty sand
14.436	53.87	0.2478	0.460	2.631	13	8	sand to silty sand
14.600	53.87	0.2592	0.481	3.177	13	8	sand to silty sand
14.764	55.39	0.2931	0.529	3.256	13	8	sand to silty sand
14.928	60.63	0.3559	0.587	3.334	15	8	sand to silty sand
15.092	73.04	0.4235	0.580	3.396	17	8	sand to silty sand
15.256	84.89	0.4708	0.555	3.495	20	8	sand to silty sand
15.420	92.65	0.4508	0.487	3.557	22	8	sand to silty sand
15.584	104.01	0.5467	0.526	3.658	25	8	sand to silty sand
15.748	108.18	0.6531	0.604	3.753	26	8	sand to silty sand
15.912	101.80	0.7516	0.738	3.965	24	8	sand to silty sand

Depth	Tip (Qt)	Sleeve Friction (Fs)	F.Ratio	PP (U2)	SPT		Soil Behavior Type
ft	(tsf)	(tsf)	(%)	(psi)	(blows/ft)	Zone	UBC-1983
16.076	99.34	0.8194	0.825	4.034	24	8	sand to silty sand
16.240	98.83	0.9074	0.918	4.109	24	8	sand to silty sand
16.404	95.25	0.8217	0.863	4.161	23	8	sand to silty sand
16.568	86.56	0.6759	0.781	4.220	21	8	sand to silty sand
16.732	93.31	0.6054	0.649	4.103	22	8	sand to silty sand
16.896	94.19	0.6432	0.683	4.276	23	8	sand to silty sand
17.060	85.56	0.6247	0.730	4.472	20	8	sand to silty sand
17.224	81.21	0.5259	0.648	4.387	19	8	sand to silty sand
17.388	84.80	0.4669	0.551	4.390	20	8	sand to silty sand
17.552	90.68	0.4333	0.478	4.459	22	8	sand to silty sand
17.717	92.24	0.4248	0.460	4.547	22	8	sand to silty sand
17.881	81.17	0.3904	0.481	4.501	19	8	sand to silty sand
18.045	68.56	0.3111	0.454	4.492	16	8	sand to silty sand
18.209	58.07	0.2357	0.406	4.452	14	8	sand to silty sand
18.373	51.09	0.1756	0.344	4.478	12	8	sand to silty sand
18.537	48.29	0.1445	0.299	4.521	12	8	sand to silty sand
18.701	48.49	0.1732	0.357	4.655	12	8	sand to silty sand
18.865	55.21	0.2276	0.412	4.743	13	8	sand to silty sand
19.029	64.85	0.2737	0.422	4.848	16	8	sand to silty sand
19.193	76.70	0.3162	0.412	4.959	18	8	sand to silty sand
19.357	81.27	0.3681	0.453	5.037	19	8	sand to silty sand
19.521	78.11	0.3561	0.456	5.041	19	8	sand to silty sand
19.685	68.09	0.3158	0.464	5.047	16	8	sand to silty sand
19.849	57.31	0.2749	0.480	5.037	14	8	sand to silty sand
20.013	55.22	0.2572	0.466	5.060	13	8	sand to silty sand
20.177	56.91	0.2625	0.461	5.136	14	8	sand to silty sand
20.341	61.90	0.2838	0.458	5.211	15	8	sand to silty sand
20.505	68.67	0.3078	0.448	5.312	16	8	sand to silty sand
20.669	73.35	0.3217	0.439	5.371	18	8	sand to silty sand
20.833	70.78	0.2041	0.288	5.381	17	8	sand to silty sand
20.997	57.39	0.1975	0.344	5.430	14	8	sand to silty sand
21.161	56.92	0.2357	0.414	5.786	14	8	sand to silty sand
21.325	61.61	0.2729	0.443	5.914	15	8	sand to silty sand
21.490	69.50	0.2891	0.416	6.018	17	8	sand to silty sand
21.654	77.82	0.2896	0.372	6.129	19	8	sand to silty sand
21.818	77.90	0.2387	0.306	6.142	19	8	sand to silty sand
21.982	78.03	0.2305	0.295	6.123	19	8	sand to silty sand
22.146	72.27	0.2035	0.282	6.084	17	8	sand to silty sand
22.310	59.80	0.1616	0.270	6.188	14	8	sand to silty sand
22.474	55.47	0.1580	0.285	6.489	13	8	sand to silty sand
22.638	60.37	0.3785	0.627	6.541	14	8	sand to silty sand
22.802	72.53	0.8040	1.109	6.812	23	7	silty sand to sandy silt
22.966	98.69	0.7456	0.756	7.169	24	8	sand to silty sand
23.130	86.67	0.7698	0.888	7.090	21	8	sand to silty sand
23.294	93.87	0.5400	0.575	7.515	22	8	sand to silty sand
23.458	100.41	0.6839	0.681	8.313	24	8	sand to silty sand
23.622	104.80	0.7858	0.750	8.499	25	8	sand to silty sand
23.786	107.05	0.7868	0.735	8.323	26	8	sand to silty sand
23.950	110.55	0.7801	0.706	8.218	26	8	sand to silty sand
24.114	117.93	0.7610	0.645	8.231	28	8	sand to silty sand
24.278	126.43	0.8891	0.703	8.297	24	9	sand
24.442	143.14	1.1484	0.802	8.045	27	9	sand
24.606	143.91	1.3252	0.921	8.444	34	8	sand to silty sand

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
24.770	143.21	1.3720	0.958	8.571	34	8	sand to silty sand
24.934	144.69	1.4391	0.995	8.532	35	8	sand to silty sand
25.098	143.51	1.4321	0.998	8.555	34	8	sand to silty sand
25.262	137.60	1.4317	1.040	8.633	33	8	sand to silty sand
25.427	133.59	1.3360	1.000	8.591	32	8	sand to silty sand
25.591	126.59	1.1956	0.945	8.578	30	8	sand to silty sand
25.755	115.12	1.0285	0.893	8.489	28	8	sand to silty sand
25.919	97.54	0.8090	0.829	8.339	23	8	sand to silty sand
26.083	79.16	0.5887	0.744	8.300	19	8	sand to silty sand
26.247	62.67	0.3951	0.630	8.182	15	8	sand to silty sand
26.411	57.02	0.2746	0.482	8.153	14	8	sand to silty sand
26.575	54.42	0.2508	0.461	8.199	13	8	sand to silty sand
26.739	56.81	0.2552	0.449	8.264	14	8	sand to silty sand
26.903	56.86	0.2555	0.449	8.306	14	8	sand to silty sand
27.067	57.58	0.2541	0.441	8.355	14	8	sand to silty sand
27.231	59.96	0.2584	0.431	8.395	14	8	sand to silty sand
27.395	57.90	0.1972	0.341	8.401	14	8	sand to silty sand
27.559	52.16	0.2013	0.386	8.408	12	8	sand to silty sand
27.723	52.67	0.2252	0.428	8.617	13	8	sand to silty sand
27.887	54.30	0.2446	0.450	8.712	13	8	sand to silty sand
28.051	54.71	0.2544	0.465	8.771	13	8	sand to silty sand
28.215	54.25	0.2646	0.488	8.836	13	8	sand to silty sand
28.379	52.90	0.2634	0.498	8.882	13	8	sand to silty sand
28.543	50.98	0.2570	0.504	8.927	12	8	sand to silty sand
28.707	50.11	0.2538	0.506	8.970	12	8	sand to silty sand
28.871	53.65	0.2672	0.498	9.065	13	8	sand to silty sand
29.035	64.81	0.3017	0.466	9.251	16	8	sand to silty sand
29.199	78.33	0.3633	0.464	9.434	19	8	sand to silty sand
29.364	87.75	0.4149	0.473	9.598	21	8	sand to silty sand
29.528	92.35	0.4476	0.485	9.709	22	8	sand to silty sand
29.692	92.10	0.4599	0.499	9.725	22	8	sand to silty sand
29.856	84.54	0.4440	0.525	9.696	20	8	sand to silty sand
30.020	72.19	0.4142	0.574	9.741	17	8	sand to silty sand
30.184	66.69	0.3933	0.590	9.784	16	8	sand to silty sand
30.348	68.43	0.3985	0.582	9.840	16	8	sand to silty sand
30.512	70.61	0.4176	0.591	9.915	17	8	sand to silty sand
30.676	79.29	0.5489	0.692	10.111	19	8	sand to silty sand
30.840	85.78	0.4292	0.500	10.258	21	8	sand to silty sand
31.004	82.11	0.4356	0.531	10.382	20	8	sand to silty sand
31.168	83.01	0.3813	0.459	10.349	20	8	sand to silty sand
31.332	64.93	0.3204	0.493	10.369	16	8	sand to silty sand
31.496	67.62	0.3022	0.447	10.415	16	8	sand to silty sand
31.660	72.51	0.2936	0.405	10.565	17	8	sand to silty sand
31.824	63.13	0.2822	0.447	10.614	15	8	sand to silty sand
31.988	53.74	0.2481	0.462	10.644	13	8	sand to silty sand
32.152	58.57	0.2576	0.440	10.742	14	8	sand to silty sand
32.316	66.44	0.4029	0.606	10.863	16	8	sand to silty sand
32.480	62.53	0.6203	0.992	11.056	20	7	silty sand to sandy silt
32.644	59.24	0.7190	1.214	12.187	19	7	silty sand to sandy silt
32.808	73.43	0.9260	1.261	13.452	23	7	silty sand to sandy silt
32.972	81.08	1.2416	1.531	12.929	26	7	silty sand to sandy silt
33.136	97.66	1.4960	1.532	13.190	31	7	silty sand to sandy silt
33.301	108.14	1.9212	1.777	13.197	35	7	silty sand to sandy silt

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
33.465	113.25	2.0407	1.802	13.246	36	7	silty sand to sandy silt
33.629	113.86	1.7309	1.520	13.412	27	8	sand to silty sand
33.793	114.37	1.7827	1.559	13.582	27	8	sand to silty sand
33.957	129.16	2.0914	1.619	12.795	31	8	sand to silty sand
34.121	133.54	2.3363	1.749	13.367	43	7	silty sand to sandy silt
34.285	127.15	2.3567	1.853	13.233	41	7	silty sand to sandy silt
34.449	124.15	2.3090	1.860	13.602	40	7	silty sand to sandy silt
34.613	114.91	2.1766	1.894	13.769	37	7	silty sand to sandy silt
34.777	88.82	2.0686	2.329	14.684	28	7	silty sand to sandy silt
34.941	65.93	1.5553	2.359	14.122	25	6	sandy silt to clayey silt
35.105	69.05	0.7956	1.152	14.514	22	7	silty sand to sandy silt
35.269	46.68	0.7558	1.619	12.821	15	7	silty sand to sandy silt
35.433	25.88	0.6076	2.348	16.404	10	6	sandy silt to clayey silt
35.597	21.02	0.4327	2.059	22.409	8	6	sandy silt to clayey silt
35.761	16.24	0.3319	2.044	27.802	8	5	clayey silt to silty clay
35.925	13.11	0.3205	2.444	35.517	6	5	clayey silt to silty clay
36.089	12.00	0.3489	2.907	45.549	8	4	silty clay to clay
36.253	13.12	0.4004	3.051	51.499	8	4	silty clay to clay
36.417	14.06	0.4740	3.370	49.534	9	4	silty clay to clay
36.581	15.98	0.2817	1.763	46.233	8	5	clayey silt to silty clay
36.745	19.92	0.2104	1.056	34.785	8	6	sandy silt to clayey silt
36.909	14.79	0.2165	1.464	32.997	6	6	sandy silt to clayey silt
37.073	11.16	0.2373	2.127	40.483	5	5	clayey silt to silty clay
37.238	10.36	0.2356	2.273	48.825	5	5	clayey silt to silty clay
37.402	13.77	0.1876	1.363	50.616	5	6	sandy silt to clayey silt
37.566	18.55	0.1357	0.732	23.729	7	6	sandy silt to clayey silt
37.730	12.80	0.3603	2.814	30.617	8	4	silty clay to clay
37.894	15.03	0.8474	5.638	52.009	14	3	clay
38.058	24.20	1.2590	5.202	87.268	23	3	clay
38.222	19.07	0.9279	4.866	48.544	18	3	clay
38.386	13.05	0.5022	3.849	41.427	12	3	clay
38.550	11.40	0.3079	2.700	57.403	7	4	silty clay to clay
38.714	10.30	0.2570	2.496	56.602	7	4	silty clay to clay
38.878	11.88	0.2033	1.711	51.734	6	5	clayey silt to silty clay
39.042	15.69	0.1357	0.865	45.445	6	6	sandy silt to clayey silt
39.206	18.84	0.1532	0.813	39.610	7	6	sandy silt to clayey silt
39.370	16.06	0.2889	1.799	38.636	8	5	clayey silt to silty clay
39.534	15.71	0.5797	3.691	52.202	10	4	silty clay to clay
39.698	17.99	0.6226	3.460	83.691	11	4	silty clay to clay
39.862	14.54	0.4732	3.255	70.331	9	4	silty clay to clay
40.026	13.62	0.4686	3.441	82.619	9	4	silty clay to clay
40.190	12.74	0.3606	2.830	77.683	8	4	silty clay to clay
40.354	12.71	0.4411	3.471	77.297	8	4	silty clay to clay
40.518	15.51	1.1425	7.368	69.955	15	3	clay
40.682	21.28	1.3680	6.428	49.799	20	3	clay
40.846	37.70	1.2394	3.287	33.958	18	5	clayey silt to silty clay
41.011	21.06	0.9029	4.287	23.811	20	3	clay
41.175	12.67	0.4659	3.679	56.514	8	4	silty clay to clay
41.339	11.55	0.1765	1.528	67.621	6	5	clayey silt to silty clay
41.503	11.21	0.1602	1.429	72.002	5	5	clayey silt to silty clay
41.667	11.51	0.2073	1.801	70.341	6	5	clayey silt to silty clay
41.831	12.71	0.2251	1.771	68.108	6	5	clayey silt to silty clay
41.995	12.24	0.2930	2.395	66.811	6	5	clayey silt to silty clay

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
42.159	12.92	0.2846	2.203	78.334	6	5	clayey silt to silty clay
42.323	11.57	0.2565	2.216	70.675	6	5	clayey silt to silty clay
42.487	10.35	0.1893	1.829	69.808	5	5	clayey silt to silty clay
42.651	9.84	0.1499	1.522	71.904	5	5	clayey silt to silty clay
42.815	9.54	0.1564	1.639	73.159	5	5	clayey silt to silty clay
42.979	10.14	0.1681	1.658	74.055	5	5	clayey silt to silty clay
43.143	10.28	0.1906	1.855	72.080	5	5	clayey silt to silty clay
43.307	10.90	0.1833	1.681	73.666	5	5	clayey silt to silty clay
43.471	10.93	0.1848	1.691	72.387	5	5	clayey silt to silty clay
43.635	10.99	0.1820	1.656	77.611	5	5	clayey silt to silty clay
43.799	11.25	0.2330	2.071	81.668	5	5	clayey silt to silty clay
43.963	11.32	0.2283	2.017	79.556	5	5	clayey silt to silty clay
44.127	10.76	0.1680	1.561	63.499	5	5	clayey silt to silty clay
44.291	10.44	0.1557	1.491	62.774	5	5	clayey silt to silty clay
44.455	10.26	0.1498	1.461	65.774	5	5	clayey silt to silty clay
44.619	10.25	0.1573	1.535	66.915	5	5	clayey silt to silty clay
44.783	10.49	0.1731	1.651	69.060	5	5	clayey silt to silty clay
44.948	10.55	0.2099	1.989	70.544	5	5	clayey silt to silty clay
45.112	10.63	0.2713	2.552	68.661	7	4	silty clay to clay
45.276	11.41	0.2846	2.494	67.363	5	5	clayey silt to silty clay
45.440	12.60	0.2395	1.902	58.128	6	5	clayey silt to silty clay
45.604	11.81	0.1920	1.625	52.689	6	5	clayey silt to silty clay
45.768	11.13	0.1900	1.706	54.245	5	5	clayey silt to silty clay
45.932	10.12	0.1734	1.714	55.709	5	5	clayey silt to silty clay
46.096	10.87	0.1630	1.499	56.402	5	5	clayey silt to silty clay
46.260	10.31	0.1294	1.255	57.220	5	5	clayey silt to silty clay
46.424	10.90	0.1436	1.317	59.158	5	5	clayey silt to silty clay
46.588	10.68	0.2168	2.029	62.839	5	5	clayey silt to silty clay
46.752	13.32	0.2410	1.810	68.115	6	5	clayey silt to silty clay
46.916	12.98	0.2475	1.906	63.133	6	5	clayey silt to silty clay
47.080	12.56	0.3614	2.878	62.313	8	4	silty clay to clay
47.244	12.78	0.3143	2.460	63.074	6	5	clayey silt to silty clay
47.408	15.41	0.2508	1.627	44.922	7	5	clayey silt to silty clay
47.572	13.41	0.2775	2.070	45.667	6	5	clayey silt to silty clay
47.736	15.67	0.2451	1.564	50.237	6	6	sandy silt to clayey silt
47.900	18.02	0.2654	1.472	46.511	7	6	sandy silt to clayey silt
48.064	14.92	0.2834	1.900	49.466	7	5	clayey silt to silty clay
48.228	13.86	0.3161	2.281	52.326	7	5	clayey silt to silty clay
48.392	14.70	0.2999	2.040	55.396	7	5	clayey silt to silty clay
48.556	14.62	0.2493	1.705	55.242	7	5	clayey silt to silty clay
48.720	13.43	0.1945	1.449	57.514	6	5	clayey silt to silty clay
48.885	11.36	0.1577	1.388	60.332	5	5	clayey silt to silty clay
49.049	10.44	0.1273	1.219	63.957	5	5	clayey silt to silty clay
49.213	10.58	0.1438	1.359	65.696	5	5	clayey silt to silty clay
49.377	10.90	0.1393	1.278	66.804	5	5	clayey silt to silty clay
49.541	11.11	0.1392	1.252	65.291	5	5	clayey silt to silty clay
49.705	11.16	0.1202	1.077	65.032	5	5	clayey silt to silty clay
49.869	10.52	0.1444	1.372	63.934	5	5	clayey silt to silty clay
50.033	10.55	0.1304	1.236	68.154	5	5	clayey silt to silty clay
50.197	11.51	0.1685	1.463	63.123	6	5	clayey silt to silty clay
50.361	12.41	0.1756	1.415	64.460	6	5	clayey silt to silty clay
50.525	13.56	0.1927	1.421	52.212	6	5	clayey silt to silty clay
50.689	11.05	0.1384	1.252	48.599	5	5	clayey silt to silty clay

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
50.853	12.92	0.1455	1.126	53.879	5	6	sandy silt to clayey silt
51.017	11.09	0.1578	1.423	59.246	5	5	clayey silt to silty clay
51.181	11.11	0.1208	1.087	61.982	5	5	clayey silt to silty clay
51.345	10.23	0.1046	1.022	60.632	5	5	clayey silt to silty clay
51.509	10.49	0.0935	0.891	65.882	4	6	sandy silt to clayey silt
51.673	10.35	0.1370	1.323	70.514	5	5	clayey silt to silty clay
51.837	11.06	0.5151	4.657	74.244	11	3	clay
52.001	31.26	0.5645	1.806	68.707	12	6	sandy silt to clayey silt
52.165	17.67	0.4052	2.294	18.845	8	5	clayey silt to silty clay
52.329	10.07	0.2009	1.995	27.440	5	5	clayey silt to silty clay
52.493	10.20	0.1250	1.225	38.989	5	5	clayey silt to silty clay
52.657	11.09	0.1348	1.215	49.668	5	5	clayey silt to silty clay
52.822	10.23	0.1123	1.098	57.981	5	5	clayey silt to silty clay
52.986	10.23	0.2635	2.575	65.470	7	4	silty clay to clay
53.150	12.76	0.2679	2.098	71.270	6	5	clayey silt to silty clay
53.314	13.57	0.2081	1.533	33.575	6	5	clayey silt to silty clay
53.478	10.37	0.1939	1.870	50.312	5	5	clayey silt to silty clay
53.642	10.63	0.1294	1.218	60.531	5	5	clayey silt to silty clay
53.806	11.76	0.1423	1.210	56.785	6	5	clayey silt to silty clay
53.970	10.91	0.1415	1.298	53.552	5	5	clayey silt to silty clay
54.134	10.50	0.1494	1.423	60.289	5	5	clayey silt to silty clay
54.298	10.59	0.1311	1.238	65.840	5	5	clayey silt to silty clay
54.462	10.69	0.1626	1.522	67.510	5	5	clayey silt to silty clay
54.626	10.18	0.1269	1.246	68.909	5	5	clayey silt to silty clay
54.790	13.53	0.1068	0.789	61.803	5	6	sandy silt to clayey silt
54.954	11.67	0.1748	1.497	55.968	6	5	clayey silt to silty clay
55.118	11.97	0.1462	1.222	67.729	6	5	clayey silt to silty clay
55.282	12.11	0.1808	1.493	58.485	6	5	clayey silt to silty clay
55.446	11.57	0.1558	1.346	68.465	6	5	clayey silt to silty clay
55.610	11.49	0.1473	1.282	61.786	6	5	clayey silt to silty clay
55.774	11.94	0.1052	0.881	66.601	5	6	sandy silt to clayey silt
55.938	11.13	0.1322	1.188	63.159	5	5	clayey silt to silty clay
56.102	10.39	0.1690	1.626	66.824	5	5	clayey silt to silty clay
56.266	14.78	0.1526	1.032	64.228	6	6	sandy silt to clayey silt
56.430	15.55	0.1799	1.157	51.780	6	6	sandy silt to clayey silt
56.594	13.31	0.2018	1.516	54.827	6	5	clayey silt to silty clay
56.759	11.35	0.1613	1.421	64.300	5	5	clayey silt to silty clay
56.923	12.06	0.3022	2.506	65.984	6	5	clayey silt to silty clay
57.087	11.77	0.1921	1.632	70.116	6	5	clayey silt to silty clay
57.251	16.78	0.2512	1.497	43.595	6	6	sandy silt to clayey silt
57.415	15.07	0.2768	1.836	47.112	7	5	clayey silt to silty clay
57.579	15.55	0.2015	1.296	46.236	6	6	sandy silt to clayey silt
57.743	19.50	0.1462	0.750	44.575	7	6	sandy silt to clayey silt
57.907	14.47	0.1576	1.090	46.932	6	6	sandy silt to clayey silt
58.071	11.09	0.1916	1.727	58.243	5	5	clayey silt to silty clay
58.235	11.45	0.1900	1.660	69.429	5	5	clayey silt to silty clay
58.399	12.19	0.1818	1.492	73.326	6	5	clayey silt to silty clay
58.563	11.73	0.1754	1.495	74.470	6	5	clayey silt to silty clay
58.727	11.43	0.1417	1.239	78.576	5	5	clayey silt to silty clay
58.891	11.22	0.1361	1.214	80.593	5	5	clayey silt to silty clay
59.055	11.16	0.1379	1.236	83.937	5	5	clayey silt to silty clay
59.219	11.03	0.1551	1.406	84.633	5	5	clayey silt to silty clay
59.383	10.95	0.1616	1.475	84.054	5	5	clayey silt to silty clay

Depth ft	Tip (Qt) (tsf)	Sleeve Friction (Fs) (tsf)	F.Ratio (%)	PP (U2) (psi)	SPT (blows/ft)	Zone	Soil Behavior Type UBC-1983
59.547	10.76	0.1658	1.541	81.491	5	5	clayey silt to silty clay
59.711	10.92	0.1490	1.364	78.759	5	5	clayey silt to silty clay
59.875	11.19	0.1378	1.232	77.248	5	5	clayey silt to silty clay
60.039	11.29	0.1368	1.213	77.870	5	5	clayey silt to silty clay
60.203	11.61	0.1900	1.637	78.275	6	5	clayey silt to silty clay
60.367	11.79	0.2001	1.696	79.432	6	5	clayey silt to silty clay

NV5

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