EXHIBIT 3.06

# REPORT OF GEOTECHNICAL ENGINEERING SERVICES

Panzer Nursey
17980 West Baseline Road
Beaverton, Oregon

For
Stanton Street Building Company, LLC
September 8, 2022

Project:  StantonSt-14-01

REGISTERED PROFESSIONAL ENGINEER
91210PE
OREGON
July 12, 2016
TYLER PIERCE
EXPIRES:  12/31/24

NV5

September 8, 2022

Stanton Street Building Company, LLC
2132 SW Montgomery Drive
Portland, OR 97201

Attention: Pam Verdadero

**Report of Geotechnical Engineering Services**
Panzer Nursery
17980 West Baseline Road
Beaverton, Oregon
Project: StantonSt-14-01

NV5 is pleased to submit this report of geotechnical engineering services for the Panzer Nursery development located at 17980 West Baseline Road in Beaverton, Oregon. Our services for this project were conducted in accordance with our proposal dated June 22, 2022.

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

Sincerely,

NV5

Tyler A. Pierce, P.E.
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
91210PE
OREGON
July 12, 2016
TYLER PIERCE
EXPIRES: 12/31/24

Shawn M. Dimke, P.E., G.E.
Principal Engineer

TAP:SMD:kt
Attachments
One copy submitted
Document ID: StantonSt-14-01-090822-geor.docx

## EXECUTIVE SUMMARY

We understand the proposed development will consist of single-family residences, three- to five-plex townhomes, apartment buildings up to four stories tall, and associated infrastructure. The following provides a summary of pertinent geotechnical considerations for the project. We recommend referencing the report for a thorough description of the subsurface conditions and geotechnical recommendations for the project.

- Undocumented fill was encountered in borings B-2, B-5, B-6, B-7, B-10, and B-11 to depths between 2.5 and 12.5 feet BGS. The fill is primarily located along the western edge and the northwestern corner of the site. The fill along the western edge of the site appears to correlate approximately with the elevation difference between the site and adjacent SW 185th Avenue. Foundations located within the undocumented fill area, roughly the western one-third of the site, should be supported on minimum 2-foot-thick gravel pads or the undocumented fill can be removed and replaced as structural fill. Deeper granular pads may be necessary if soft or deleterious material is encountered.

- The proposed structures can be supported on conventional spread footings founded on firm native soil, structural fill overlying firm native soil, or minimum 2-foot-thick gravel pads overlying undocumented fill.

- We recommend improving the upper 12 inches of subgrade where undocumented fill is observed. The soil can be improved by removal and replacement with crushed rock, cement amendment, or moisture conditioning and re-compaction (only during the dry season).

- Based on soil conditions, liquefaction settlement is not considered a site hazard. The fine-grained soil beneath groundwater will likely experience strain softening during a design-level seismic event, but we estimate settlement observed at the surface will be negligible.

- There are many existing shallow underground utility lines at the site for the nursery operations. We recommend complete removal of the shallow utilities. The resulting disturbed soil should be moisture conditioned and recompacted as structural fill (only during the dry season) or removed and replaced with imported granular material.

- Groundwater was observed at depths between 6.5 and 9.5 feet BGS in most of the borings. In the borings along the western edge of the site, where the undocumented fill is primarily located, groundwater was observed at depths between 12.5 and 22.5 feet BGS. Pore pressure dissipation testing conducted with the CPTs indicates static groundwater between 5.3 and 6 feet BGS.

- The fine-grained soil present at the ground surface is easily disturbed during the wet season or when at a moisture content that is above optimum, such as after demolition of pavement and slabs. If not carefully executed, site earthwork can create soft areas and moderate repair costs can result. Subgrade protection is essential and may include placing 12 to 18 inches of granular material over subgrade for staging and haul road areas or cement amending the subgrade and covering it with a thin layer of crushed rock.

The fine-grained soil present at the ground surface can be sensitive to small changes in moisture content and difficult, if not impossible, to adequately compact during wet weather or when the moisture content of the soil is more than a couple of percent above the optimum required for compaction. Depending on the time of year, significant drying will likely be required before using on-site clayey and fine-grained soil as structural fill. Accordingly, the on-site fine-grained soil can typically only be placed as structural fill during the dry summer months.

- Due to shallow groundwater, very low tested infiltration rates, and undocumented fill in the western portion of the site stormwater, infiltration is not considered feasible as the primary means for managing stormwater from the site. We recommend infiltration systems, if used, have a redundant overflow system.

- Foundation drains are recommended around the perimeter of the proposed buildings due to relatively shallow perched groundwater conditions observed at the site.

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AC | asphalt concrete |
| ACP | asphalt concrete pavement |
| 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 |
| DEQ | Oregon Department of Environmental Quality |
| g | gravitational acceleration (32.2 feet/second$^2$) |
| H:V | horizontal to vertical |
| MCE | maximum considered earthquake |
| ODOT | Oregon Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| OSSC | 2021 Oregon Standard Specifications for Construction |
| PCC | portland cement concrete |
| pcf | pounds per cubic foot |
| pci | pounds per cubic inch |
| PG | performance grade |
| psi | pounds per square inch |
| psf | pounds per square foot |
| PVC | polyvinyl chloride |
| SOSSC | State of Oregon Structural Specialty Code |
| SPT | standard penetration test |
| µm | micrometer |

## 1.0 INTRODUCTION

NV5 is pleased to submit this report of geotechnical engineering services for the Panzer Nursery development located at 17980 West Baseline Road in Beaverton, Oregon. 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.

Based on a preliminary layout provided, we understand the project will consist of single-family residences; three- to five-plex townhomes; and apartment buildings up to four stories tall, some of which may be mixed-use units with commercial space on the ground floor. Structural loads were unavailable at the time this report was prepared; however, we have assumed maximum column loads may range up to 200 kips and perimeter footing loads for walls may range up to 5 kips per lineal foot. Floor slab loads are expected to be less than 100 psf. The site is relatively level; as such, we anticipate cuts and fills will be less than a couple feet each, with the exception of foundation and utilities excavations.

## 2.0 SCOPE OF SERVICES

The purpose of our services was to explore subsurface conditions at the site and provide geotechnical engineering recommendations for design and construction of the proposed development. Specifically, we completed the following scope of services:

- Reviewed readily available, published geologic data and our in-house files for existing information on subsurface conditions at the site.
- Coordinated and managed the field explorations, including public utility locates and scheduling subcontractors and NV5 staff.
- Completed the following subsurface explorations and testing at the site:
  - Drilled 14 borings to depths between 16.5 and 31.5 feet BGS.
  - Advanced two CPT probes to depths of approximately 55.5 and 56 feet BGS, conducted pore pressure dissipation tests in each CPT, and performed seismic shear wave testing every 3 meters in one CPT.
  - Performed infiltration testing in three borings at depths between of 3 and 5 feet BGS.
  - Performed five DCP tests near proposed new roads.
- Collected disturbed soil samples for laboratory testing and maintained a log of encountered soil and groundwater conditions in the borings.
- Completed the following laboratory testing on select soil samples:
  - Thirty-nine moisture content determinations in general accordance with ASTM D2216
  - Ten particle-size analyses in general accordance with ASTM D1140
  - Four Atterberg limits test in general accordance with ASTM D4318
- Provided recommendations for site preparation, grading and drainage, demolition, stripping depths, fill type for imported material, compaction criteria, trench excavation and backfill, use of on-site soil, and wet/dry weather earthwork.
- Evaluated groundwater conditions at the site and provided general recommendations for dewatering during construction and subsurface drainage.
- Provided recommendations for the use of on-site native fill material to support slabs-on-grade.

- Provided geotechnical engineering recommendations for design and construction of shallow spread foundations, including allowable design bearing pressure and minimum footing depth and width.
- Provided recommendations for preparation of the subgrade for floor slabs.
- Provided design criteria recommendations for conventional retaining structures, including lateral earth pressures, backfill, compaction, and drainage.
- Provided recommendations for AC pavement design and pavement subgrade preparation for on-site access roads for a range of vehicle traffic.
- Provided seismic coefficients in accordance with ASCE 7-16.
- Prepared this geotechnical engineering report that presents our findings, conclusions, and recommendations.

## 3.0 BACKGROUND

At the time of this report, NV5 is currently preparing a Phase I Environmental Site Assessment for the site, which has not yet been issued. However, based on research for the environmental report, we understand prior to being developed with greenhouses and associated buildings for Panzer Nursery, the site was developed with three apparent residences and outbuildings in the northwestern portion of the site. The western half of the site was filled prior to 1990 during the redevelopment of SW 185th Avenue.

## 4.0 SITE CONDITIONS

### *4.1 GEOLOGIC SETTING*

The site is located in the Tualatin Basin of the Puget Sound-Willamette Valley physiographic province, a tectonically active lowland located along the convergent Cascadia margin (Orr and Orr, 1999). The Tualatin Basin is formed by a gentle syncline between the uplifted Coast Ranges to the west, the Chehalem Mountains to the south, and the Tualatin Mountains to the north and east. The Tualatin Mountains have been uplifted along northwesterly oriented faults, including the steeply dipping Portland Hills fault located along the eastern flank of the mountains.

The near-surface geologic unit mapped at the site is the fine-grained facies of the Quaternary flood deposits (Madin, 1990). The unit consists of unconsolidated silt and sand deposited by catastrophic floods associated with the sudden release of waters from glacial Lake Missoula during the late Pleistocene. Many dozens of these Missoula floods occurred between approximately 15,500 and 12,500 years ago (and perhaps during earlier glaciations). Flood waters several hundred feet deep swept out of the Columbia Gorge and over the lowlands of the Portland area. The thickness of the flood deposits in the site vicinity is approximately 30 to 50 feet.

The Hillsboro Formation, aka the Sandy River Mudstone equivalent, underlies the Quaternary flood deposits. The thickness of the unit in the site vicinity is approximately 250 feet (Madin, 1990). The Hillsboro Formation is typically comprised of stiff, gray to brown, silty clay (Madin, 2009).

Basement rocks underlying the Sandy River Mudstone equivalent in the site vicinity consist of the Miocene Columbia River Basalts, emplaced approximately 17 million to 6 million years ago in the Portland area (Madin, 1990). The Columbia River Basalts are exposed in the Tualatin Basin in the highlands surrounding the valley and in a group of mountains south of the site, which include Cooper Mountain and Bull Mountain. The Columbia River Basalts consist of thick flows of basalt erupted from fissures in eastern Oregon, Washington, and western Idaho that traveled down the ancient Columbia River Gorge to fill the lowland areas around Portland.

## *4.2 SURFACE CONDITIONS*

The approximately 28-acre site is bound by West Baseline Road and SW Stepping Stone Drive to the north, SW 185th Avenue to the west, residential structures to the south, and SW 179th Avenue and residential structures to the east. The western half of the site generally ranges in elevation between approximately 190 and 194 feet based on Google Earth, excluding the fill slope along the western edge and northwest corner of the site. The eastern half of the site slopes down gently from a high elevation of approximately 204 feet at the southeast corner toward the northwest. The fill slope along the west edge and northwest corner of the site ranges up to approximately 14 feet tall and is approximately 2.5H:1V or flatter. The slope transitions into an Ultrablock retaining wall at the corner of the intersection of SW 185th with SW Stepping Stone Drive. The site is currently occupied by Panzer Nursery consisting of associated greenhouses, an office space, warehouses, chemical mixing/dosing buildings, a shop, a 316,000-gallon storage tank, and several other structures. A residential home with a pool, garage, and surrounding landscaping with trees is located in the south-central portion of the site. The driveway areas between the buildings are surfaced with PCC and gravel. A small parking lot and entrance driveway in the northeastern portion of the site is surface with AC.

## *4.3 SUBSURFACE CONDITIONS*

### 4.3.1 General

We explored subsurface conditions at the site by drilling 14 borings (B-1 through B-14) to depths between 16.5 and 31.5 feet BGS and advancing 2 CPT probes (CPT-1 and CPT-2) to depths of approximately 55.5 and 56 feet BGS. Figure 2 shows the approximate exploration locations. A description of the boring explorations and laboratory testing program, the boring logs, and the results of laboratory testing are presented in Appendix A. A description of the CPT program and the results of the CPT probes are presented in Appendix B.

### 4.3.2 Surficial Material

All the borings were surfaced with either AC, crushed rock, or soil. The AC was observed in borings B-1, B-13, and B-14 and ranges between 2.5 and 7 inches thick and is underlain by 8 to 13 inches of aggregate base. The remaining borings were surfaced with either crushed rock or soil. When crushed rock was encountered at the surface, it ranges between 3 and 15 inches thick.

### 4.3.3 Undocumented Fill

Undocumented fill was encountered to depths between 2.5 and 12.5 feet BGS in borings B-2, B-5, B-6, B-7, B-10, and B-11. The fill along the western edge of the site (B-5 through B-7) extends approximately 4 to 12.5 feet BGS, which corresponds to the height of the adjacent slope leading to SW 185th Avenue. The undocumented fill generally consists of medium stiff to very stiff silt. A soft zone was encountered at 5 feet BGS and trace woody debris was encountered at 10 feet BGS in B-7. Trace amounts of organics (rootlets) and debris (asphalt and concrete cuttings) were also encountered at various locations and depths in the fill. Laboratory testing indicates that the moisture content of the undocumented fill ranged from 26 and 37 percent at the time of our explorations.

#### 4.3.4 Silt and Clay

Beneath the fill or surficial materials, soil conditions generally consist of fine-grained silt and clay with variable sand content to the depths explored. The silt and clay range from soft to very stiff but is generally medium stiff. The CPT probes indicate the fine-grained soil extends to the maximum depth explored with thin interbeds of sandy silt throughout. Results of an Atterberg limits test indicate the silt and clay exhibit low plasticity. Laboratory testing indicates that the moisture content of the silt and clay ranged from 29 to 45 percent at the time of our explorations.

#### 4.3.4 Groundwater

Groundwater was observed at depths between 6.5 and 9.5 feet BGS in most of the borings. The groundwater was observed at deeper depths, between 12.5 and 22.5 feet BGS, along the western edge of the site where fill was encountered. Considering the results of our explorations and observations, we expect perched groundwater at shallow depths at the site during the wet season. Pore pressure dissipation testing in the CPT probes indicated groundwater is between 5.3 and 6 feet BGS. The depth to groundwater may fluctuate in response to seasonal changes, changes in surface topography, and other factors not observed during our explorations.

### *4.4 SEISMIC HAZARDS*

#### 4.4.1 Liquefaction and Cyclic Softening

Liquefaction is a phenomenon caused by a rapid increase in pore water pressure that reduces the effective stress between soil particles to near zero. The excessive buildup of pore water pressure results in the sudden loss of shear strength in a soil. Granular soil, which relies on interparticle friction for strength, is susceptible to liquefaction until the excess pore pressures can dissipate. Sand boils and flows observed at the ground surface after an earthquake are the result of excess pore pressures dissipating upwards, carrying soil particles with the draining water. In general, loose, saturated sand soil with low silt and clay content is the most susceptible to liquefaction. Low plasticity, sandy silt may be moderately susceptible to liquefaction under relatively high levels of ground shaking. Non-plastic and low plasticity, fine-grained material may be subject to cyclic softening from an increase in pore water pressure and a reduction in strength during seismic shaking; however, the relatively poor drainage characteristics of silt deposits inhibit the occurrence of a rapid decrease in volume.

We performed liquefaction analysis using the CPT results in accordance with Boulanger and Idriss (2014) employing the depth weighting methods from Cetin et al. (2009). Our laboratory testing results and analyses indicate zones of low plasticity, predominantly fine-grained soil have moderate potential for strain softening during a design-level seismic event. Based on the results of our laboratory testing and CPT results, zones of the underlying silt and clay are susceptible to strain softening but the potential for liquefaction and associated settlement is low.

### 4.4.2 Lateral Spreading

Lateral spreading is a liquefaction-related seismic hazard. Areas subject to lateral spreading are typically gently sloping or flat sites underlain by liquefiable sediment adjacent to an open face, such as a riverbank. Based on the soil encountered at the site, lateral spreading is not considered a hazard at the site.

## *4.5 INFILTRATION TESTING*

Infiltration testing was performed in three borings (B-5, B-6, and B-10). The infiltration testing was completed at depths between 3 and 5 feet BGS. The infiltration testing procedures are described in Appendix A, and the results of the infiltration and laboratory testing are summarized in Table 1.

**Table 1. Infiltration and Laboratory Testing Summary**

| Location | Depth (feet BGS) | Observed Infiltration Rate[1] (inches per hour) | Fines Content[2] (percent) | Soil Type at Test Depth |
|---|---|---|---|---|
| B-5 | 4 | 0.3 | 89 | SILT, minor sand, trace gravel |
| B-6 | 5 | 1.2 | 92 | FILL - SILT, minor sand, trace gravel and organics |
| B-10 | 3 | 0.5 | 86 | CLAY, minor sand and gravel |

1. In-situ infiltration rate observed in the field
2. Fines content – material passing the U.S. Standard No. 200 sieve

## *4.6 DCP TESTING*

We conducted DCP testing in general accordance with ASTM D6951 to estimate the resilient modulus of the subgrade in borings B-1, B-3, B-4, B-8, and B-12. We used least squares regression to determine the slopes of the DCP curves and the equation from the ODOT Pavement Design Guide using a correction factor of $C_f$ = 0.35 for estimating the subgrade resilient moduli (ODOT, 2019). Our estimates of subgrade resilient modulus at each test location are presented in Table 2.

**Table 2. DCP Test Results**

| Exploration | Estimated Subgrade Resilient Modulus (psi) |
|---|---|
| B-1 | 3,470 |
| B-3 | 4,340 |
| B-4 | 4,290 |
| B-8 | 3,690 |
| B-12 | 5,940 |

## 5.0 DESIGN RECOMMENDATIONS

### *5.1 GENERAL*

The following sections provide our design recommendations for the proposed development. All site preparation and structural fill should be prepared as recommended in the "Construction Recommendations" section.

### *5.2 SHALLOW FOUNDATIONS*

#### 5.2.1 General

Based on the assumed foundation loads, the proposed development can be supported by shallow foundations established on firm native soil, structural fill overlying firm native soil, or minimum 2-foot-thick granular pads overlying existing fill.

Footings located within the undocumented fill area, presumably approximately the western one-third of the site, should be supported on minimum 2-foot-thick gravel pads underlain by firm undocumented fill or the undocumented fill can be removed and replaced as structural fill. If loose or soft material, organic material, unsuitable fill, or prior topsoil zones are encountered for footing subgrades, over-excavation for granular pads or thicker granular pads may be necessary. Granular pads should extend 6 inches beyond the margins of the footings for every foot excavated below the footing's base grade. The granular pads should consist of imported granular material, as defined in the "Structural Fill" section. The imported granular material should be compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557, or until well keyed, as determined by one of our geotechnical staff. We recommend that a member of our geotechnical staff observe the prepared footing subgrade.

#### 5.2.2 Dimensions and Capacities

Shallow footings should be proportioned for a maximum allowable soil bearing pressure of 2,000 psf. This bearing pressure is a net bearing pressure and applies to the total of dead and long-term live loads and can be increased by one-half when considering seismic or wind loads. The weight of the footing and overlying backfill can be ignored in calculating footing loads. Isolated spread footings and continuous spread footings should be at least 18 and 12 inches wide, 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/ground surface.

#### 5.2.3 Settlement

Based on our experience with similar soil, total static post-construction settlement should be less than 1 inch, with differential settlement of approximately one-half the total over a 50-foot span.

#### 5.2.4 Resistance to Sliding

Lateral loads on footings can be resisted by passive earth pressure on the sides of the structure and by friction on the base of the footings. We recommend a friction coefficient of 0.45 for computing the friction capacity of building foundations that bear on granular pads or 0.30 for foundations bearing on native soil. Our analysis indicates that the available passive earth pressure for footings confined by structural fill or footings constructed in direct contact with the undisturbed native soil or structural fill is 350 pcf. Typically, the movement required to develop the available passive resistance may be relatively large; therefore, we recommend using a reduced passive pressure of 250 pcf equivalent fluid pressure. Adjacent floor slabs, pavement, or the upper 12-inch depth of adjacent, unpaved areas should not be considered when calculating passive resistance. In addition, in order to rely on the recommended passive resistance, the groundwater level must be below the base of the footing and a minimum of 5 feet of horizontal clearance must exist between the face of the footings and any adjacent downslopes.

## *5.3 FLOOR SLABS*

A subgrade modulus of 150 pci can be used to design the floor slabs on subgrade prepared as described below. A minimum 6-inch-thick layer of base rock should be placed and compacted over the prepared subgrade to assist as a capillary break. The 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 should be replaced if it becomes contaminated with excessive fines (greater than 5 percent by dry weight passing the U.S. Standard No. 200 sieve). Vapor barriers are often required by flooring manufacturers 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.

## *5.4 RETAINING STRUCTURES*

### 5.4.1 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 8 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.

### 5.4.2 Wall Design Parameters

Retaining structures free to rotate slightly around the base should be designed for active earth pressures using an equivalent fluid unit pressure of 35 pcf. If retaining walls are restrained against rotation during backfilling, they should be designed for an at-rest earth pressure of 55 pcf. For embedded building walls, a superimposed seismic lateral force should be calculated based on a dynamic force of $7H^2$ pounds per lineal foot of wall, where H is the height of the wall in feet, and applied at 0.6H from the base of the wall. 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 “Shallow Foundations” section.

### 5.4.3 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. The 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 retaining wall select backfill 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 specifications provided in the "Materials" 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 at least four weeks after backfilling of the wall, unless survey data indicates that settlement is complete prior to that time.

## *5.5 SEISMIC DESIGN CRITERIA*

The soil profile is consistent with Site Class D in accordance with the 2019 SOSSC, which refers to ASCE 7-16. The values presented in Table 3 can be used to compute design levels of ground shaking.

**Table 3. Seismic Design Parameters***

| Parameter | Short Period ($T_s$) | 1 Second Period ($T_1$) |
|---|---|---|
| MCE Spectral Acceleration, S | $S_s = 0.891$ g | $S_1 = 0.415$ g |
| Site Class | D | |
| Site Coefficient, F | $F_a = 1.144$ | $F_v = 1.885$ |
| Adjusted Spectral Acceleration, $S_M$ | $S_{MS} = 1.019$ g | $S_{M1} = 0.782$ g |
| Design Spectral Response Acceleration Parameters, $S_D$ | $S_{DS} = 0.679$ g | $S_{D1} = 0.522$ g |

* The above parameters can be used provided the seismic response coefficient ($C_s$) is determined according to the exception in ASCE 7-16 Section 11.4.8 or else a site-specific response analysis will be required.

### *5.6 PAVEMENT*

New pavement should be constructed on competent subgrade or new engineered fill prepared in conformance with the “Site Preparation” and “Structural Fill” sections. We do not have specific information on the frequency and type of vehicles expected at the site. Based on our experience with similar projects, we anticipate that traffic will consist mainly of passenger vehicles and occasional two-axle trucks, such as delivery trucks or garbage trucks. We have assumed that all roads are private. Design for city or county roads may require thicker pavement sections than those provided in this report.

Our pavement recommendations are based on the following assumptions:

- A resilient modulus of 20,000 psi was estimated for the aggregate base.
- A resilient modulus of 4,000 psi for subgrades prepared as recommended in this report.
- Initial and terminal serviceability indices of 4.2 and 2.5, respectively.
- Reliability of 75 percent and standard deviation of 0.45.
- Structural coefficients of 0.42 and 0.14 for the AC and aggregate base, respectively.
- The design life of the pavement is 20 years.
- Zero growth over the design life.
- Trucks will have two axles.

If any of these assumptions vary from project design values, our office should be contacted with the appropriate information so that the pavement designs can be revised. Our pavement design recommendations and assumed traffic scenarios are summarized in Table 4. The design team should select the most appropriate design traffic level. The recommended pavement sections are capable of supporting an occasional 75,000-pound fire truck.

**Table 4. Pavement Section Thickness**

| **Traffic Levels** | | **Pavement Section Thicknesses on On-Site Subgrade[1] (inches)** | | **Pavement Section Thicknesses on Cement-Amended Subgrade[1,2] (inches)** | |
|---|---|---|---|---|---|
| **Cars/Day** | **Trucks/Day** | **AC** | **Base Rock** | **AC** | **Base Rock** |
| 200 | 0 | 2.5 | 7.0 | 2.5 | 4.0 |
| 400 | 5 | 3.0 | 8.0 | 3.0 | 4.0 |
| 400 | 10 | 3.0 | 10.0 | 3.0 | 4.0 |

1. All thicknesses are intended to be the minimum acceptable values.
2. Compressive strength of cement-amended soil should be at least 100 psi.

The AC, aggregate base, and cement amendment should meet the requirements outlined in the “Materials” section. Our pavement design assumes construction will be completed during an extended period of dry weather. Wet weather construction could require an increased thickness of aggregate base.

Construction traffic should be limited to non-structural portions of the site or haul roads. Construction traffic should not be allowed on new pavement. If construction traffic is to be allowed on newly constructed road sections, an allowance for this additional traffic will need to be made in the design pavement section.

## *5.7 DRAINAGE CONSIDERATIONS*

### 5.7.1 Temporary

During earthwork 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.

### 5.7.2 Site Drainage

We recommend that all roof drains be connected to a tightline leading to storm drain facilities. Pavement surfaces and open space areas should be sloped such that surface water runoff is collected and routed to suitable discharge points. We also recommend that ground surfaces adjacent to the buildings be sloped away from the buildings to facilitate drainage away from the buildings. Trapped planter areas should not be created adjacent to pavement and structures without providing means for positive drainage (e.g., swales or catch basins).

### 5.7.3 Foundation Drains

Foundation drains are recommended for the proposed buildings due to the relatively shallow perched groundwater and relatively impervious fine-grained soil at the site. Foundation drains should be constructed at a minimum slope of approximately ½ percent and pumped or drained by gravity to a suitable discharge. The perforated drainpipe should not be tied to a stormwater drainage system without backflow provisions. Foundation drains should consist of 4-inch-diameter, perforated drainpipe embedded in a minimum 2-foot-wide zone of crushed drain rock wrapped in drainage geotextile that extends to within 12 inches of the ground surface. The invert elevation of the drainpipe should be installed at least 18 inches below the elevation of the floor slab. The drain rock and geotextile should meet the requirements specified in the "Materials" section.

## *5.8 INFILTRATION SYSTEMS*

The results of our infiltration testing indicate that the on-site soil has very low infiltration capacity. In addition, groundwater seepage was observed at depths between 6.5 and 9.5 feet BGS in most of the borings and between 12.5 and 22.5 feet BGS in the deep fill area on the west side of the site. Pore pressure dissipation testing in the CPTs indicated static groundwater is between 5.3 and 6 feet BGS. Jurisdictions typically require a minimum separation of 5 feet from the base of infiltration system to the seasonal high groundwater. Infiltration into the undocumented fill soil, which ranges in depth up to approximately 12.5 feet BGS in the western portion of the site, should also not be allowed.

The infiltration rates shown in Table 1 are short-term field rates and factors of safety have not been applied. If infiltration facilities will be used, correction factors should be applied to the measured infiltration rates by the civil engineer to account for soil variations and the potential for long-term clogging due to siltation and buildup of organic material, depending on the proposed length, location, and type of infiltration facility. We recommend a minimum factor of safety of at least 2 be applied to the field infiltration values.

The actual depths and estimated infiltration rates can vary significantly from these values. Based on the shallow depth to groundwater and very low tested infiltration rates, we recommend any infiltration system at the site not be the sole source for stormwater infiltration and facilities have a redundant overflow system. We recommend the installation of stormwater facilities be observed by a qualified geotechnical engineer or representative under their supervision to evaluate if soil conditions are consistent with subsurface conditions encountered during our explorations.

### *5.9 PERMANENT SLOPES*

Permanent cut and fill slopes should not exceed 2H:1V. Fill slopes should be over-built by at least 12 inches and trimmed back to the required slope to maintain a firm face. 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.

## 6.0 CONSTRUCTION RECOMMENDATIONS

### *6.1 SITE PREPARATION*

#### 6.1.1 Demolition

Demolition includes removal of existing structures, surficial material, abandoned utilities, and any subsurface elements from previous on-site structures. Demolished material should be transported off site for disposal. Excavations remaining from site preparation activities should be backfilled with structural fill where below planned site grades. The base of excavations should be excavated to expose firm subgrade before filling. Utility lines abandoned under new structural elements should be completely removed and backfilled with structural fill in accordance with the recommendations in the “Structural Fill” section. Soft soil encountered in utility line excavations should be removed and replaced with structural fill. Concrete debris, AC pavement, and base rock can be used as structural fill, provided it is processed to meet the requirements for recycled material in the “Structural Fill” section.

Old basement/crawl space areas or voids resulting from removal of improvements or loose soil in utility lines should be backfilled with compacted structural fill, as discussed in the “Structural Fill” section. The bottom of such excavations should be excavated to expose a firm subgrade before filling and their sides sloped at a minimum of 1H:1V to allow for more uniform compaction at the edges of the excavations.

#### 6.1.2 Undocumented Fill

Undocumented fill containing trace amounts of deleterious material, including wood debris, roots, and asphalt cuttings, was encountered along the western edge of the site. Fill was also encountered along the northwest corner of the site and in one boring on the southern portion of the site (B-2). In general, the fill consists of medium stiff to stiff silt, with the exception of a soft zone encountered at 5 feet BGS in B-7. The approximate boring locations and associated undocumented fill depths are shown on Figure 2. We recommend footings founded on undocumented fill be supported on gravel pads, as described in the “Shallow Foundations” section. If undocumented fill is encountered beneath building slabs or pavement areas, the fill should be improved in the upper 12 inches, either by removing and replacing with structural fill, scarifying and recompacting, or cement treatment. Alternatively, the undocumented fill can be completely removed and moisture conditioned and replaced in lifts as structural fill.

#### 6.1.3 Subgrade Evaluation

A member of our geotechnical staff should observe the exposed subgrade after stripping, demolition, and site cutting have been completed to determine if there are areas of unsuitable or unstable soil. 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 after subgrade compaction is complete. Proof rolling should be observed by a qualified geotechnical engineer or their representative. Areas that appear to be too wet and soft to support proof rolling equipment should be evaluated by probing and prepared in accordance with the recommendations for wet weather construction presented in the “Construction Considerations” section.

### *6.2 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.

If construction occurs during or extends into the wet season or if the moisture content of the surficial soil is more than a couple percentage points above optimum, site stripping and cutting may need to be accomplished using track-mounted equipment. Likewise, the use of granular haul roads and staging areas will be necessary for support of construction traffic during the rainy season or when the moisture content of the surficial soil is more than a few percentage points above optimum. The base rock thickness for pavement areas is intended to support post-construction design traffic loads. This design base rock thickness may not support construction traffic or pavement construction when the subgrade soil is wet. Accordingly, if construction is planned for periods when the subgrade soil is wet, staging and haul roads with increased thicknesses of base rock will be required. 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 roads areas. Stabilization material may be used as a substitute, provided the top 4 inches of material consists of imported granular material. The actual thickness will depend on the contractor’s means and methods and, accordingly, should be the contractor’s responsibility. In addition, a geotextile fabric should be placed as 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 “Materials” 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, accordingly, should be the contractor's responsibility. Cement amendment is discussed in the "Materials" section.

## *6.3 EXCAVATION*

### 6.3.1 General

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations for pavement, foundations, and utilities. We recommend that excavation be performed by a track-mounted excavator using a smooth-blade bucket.

### 6.3.2 Trench Cuts and Trench Shoring

Trench cuts should stand vertical to a depth of approximately 4 feet, provided groundwater seepage does not occur. Open excavation techniques may be used to excavate trenches with depths between 4 and 10 feet BGS, provided the walls of the excavation are cut at a slope of 1H:1V and groundwater seepage is not present. Sloughing and caving will likely occur if the excavation extends below the groundwater table or if seepage is present. The walls of the trench should be flattened or braced for stability if excessive sloughing occurs and the area dewatered if seepage is encountered.

Excavations should not undermine adjacent utilities, foundations, walkways, streets, or other hardscapes, unless special shoring or underpinned support is provided. Unsupported excavations should not be conducted within a downward and outward projection of a 1H:1V line from 5 feet outside the edge of an adjacent structural feature.

If box shoring is used, it should be understood that box shoring is a safety feature used to protect workers and does not prevent caving. If excavations are left open for extended periods of time, caving of the sidewalls may occur. The presence of caved material will limit the ability to properly backfill and compact the trenches. The contractor should be prepared to fill voids between the box shoring and the sidewalls of the trenches with sand or gravel before caving occurs.

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.

### 6.3.3 Dewatering

We anticipate that a sump located within the trench excavation likely will be sufficient to remove accumulated water, depending on the amount and persistence of water seepage and the length of time the trench is left open. Flow rates for dewatering are likely to vary depending on location, soil type, and the season during which the excavation occurs. Dewatering systems should be capable of adapting to variable flows. If groundwater and fine-grained soil are present in the base of the utility trench excavation, we recommend over-excavating the trench by 12 to 18 inches and placing trench stabilization material in the base.

#### 6.3.4 Safety

All excavations should be made in accordance with applicable OSHA requirements and regulations of the state, county, and local jurisdiction. While this report describes certain approaches to excavation and dewatering, the contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety, and providing shoring (as required) to protect personnel and adjacent structural elements.

### *6.4 MATERIALS*

#### 6.4.1 Structural Fill

##### *6.4.1.1 General*

Structural fill includes fill beneath foundations, slabs, pavement, any other areas intended to support structures, or within the influence zones of structures. Structural fill should be free of organic material and other deleterious material and, in general, should consist of particles no larger than 4 inches in diameter. A brief characterization of some of the acceptable materials and our recommendations for their use as structural fill are provided below.

##### *6.4.1.2 On-Site Soil*

The soil at the site is fine grained and can be used for structural fill, provided it can be adequately moisture conditioned. The site soil is sensitive to small changes in moisture content and is highly susceptible to disturbance when wet. Use of the on-site material as structural fill will not be possible during the wet season, which typically extends from mid-October to early June.

We estimate the optimum moisture content for compaction to be approximately 14 to 18 percent for the on-site soil. Optimum compaction typically occurs within 3 percent of optimum moisture. Typically, the moisture content for the on-site soil will be greater than the anticipated optimum moisture content required for adequate compaction. It is likely that even during the dry season, drying will be required to achieve adequate compaction. We recommend using imported granular material for structural fill 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 6 to 8 inches. The soil should be compacted to not less than 92 percent of the maximum dry density, as determined by ASTM D1557.

##### *6.4.1.3 Imported Granular Material*

Imported granular material used for structural fill should be pit- or quarry-run rock, crushed rock, or crushed gravel and sand. Imported granular material should be fairly well graded between coarse and fine material, should have less than 6 percent by dry weight passing the U.S. Standard No. 200 sieve, and should have at least two mechanically fractured faces. Material with a higher fines content is permissible provided compaction can be achieved.

When used as structural fill, imported granular material should be placed in lifts with a maximum uncompacted thickness of 12 inches and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557.

#### 6.4.1.4 *Stabilization Material*

Stabilization material should consist of pit- or quarry-run rock, crushed rock, or crushed gravel and sand that consists of 4- to 6-inch-minus material. It should have less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve and at least two mechanically fractured faces. The material should be free of organic material and other deleterious material. Stabilization material should be placed in one lift and compacted to a firm condition.

Where the stabilization material is used to stabilize soft subgrade beneath pavement or construction haul roads, a geotextile should be placed as a barrier between the soil subgrade and the imported granular material. The geotextile fabric should meet the specifications provided below for subgrade geotextiles. Geotextile is not required where stabilization material is used at the base of utility trenches.

#### 6.4.1.5 *Trench Backfill*

Trench backfill placed beneath, adjacent to, and for at least 12 inches above utility lines (i.e., the pipe zone) should consist of durable, well-graded granular material with a maximum particle size of 1½ inches, should have less than 10 percent fines by dry weight, and should have at least two mechanically fractured faces. 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, the remainder of the trench backfill up to the subgrade elevation should consist of durable, well-graded granular material with a maximum particle size of 2½ inches, should have less than 10 percent fines by dry weight, and should have at least two mechanically fractured faces. 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 3 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 diameter. 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.

#### 6.4.1.6 *Aggregate Base Rock*

Imported granular material used as base rock for building floor slabs and pavement should consist of ¾- or 1½-inch-minus material. The aggregate should have less than 6 percent by dry weight passing the U.S. Standard No. 200 sieve and should have at least two fractured faces. The aggregate base should be compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D1557.

#### 6.4.1.7 *Retaining Wall Select Backfill*

Backfill material placed behind retaining walls and extending a horizontal distance of ½H, where H is the height of the retaining wall, should consist of imported granular material. We recommend the select granular wall backfill be separated from general fill, native soil, and/or topsoil using a geotextile fabric that meets the specifications provided below for drainage geotextiles.

The wall backfill should be compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D1557. However, backfill located within a horizontal distance of 3 feet from a retaining wall should only be compacted to approximately 90 percent of the maximum dry density, as determined by ASTM D1557. Backfill placed within 3 feet of the wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (such as a jumping jack or vibratory plate compactor). If flatwork (sidewalks or pavement) will be placed atop the wall backfill, we recommend that the upper 2 feet of material be compacted to 95 percent of the maximum dry density, as determined by ASTM D1557.

#### *6.4.1.8 Drain Rock Material*

Drain rock should consist of open-graded, angular, granular material with a maximum particle size of 2 inches. The material should be free of roots, organic material, and other unsuitable material and should have less than 2 percent by dry weight passing the U.S. Standard No. 200 sieve (washed analysis).

#### *6.4.1.9 Recycled Material*

AC, conventional concrete, and oversized rock may be used as fill if they are processed to meet the requirements for their intended use and do not pose an environmental concern. Processing includes crushing and screening, grinding in place, or other methods to meet the requirements for structural fill as described above. The processed material should be fairly well graded and not contain metal, organic material, or other deleterious material. The processed material may be mixed with on-site soil or imported fill to assist in achieving the gradation requirements. Processed recycled fill should have a maximum particle size of 4 inches.

Recycled granular fill material is generally not suitable for the top 4 inches of pavement base rock or floor slab base rock. We also caution that excavation through recycled material that is placed as structural fill may be difficult. In addition, these excavations may also be prone to raveling and caving.

### 6.4.2 Geotextile Fabric

#### *6.4.2.1 Separate Geotextile Fabric*

A separation geotextile fabric can be placed as a barrier between silty subgrade and granular material in staging areas, haul road areas, or in areas of repeated construction traffic. The subgrade geotextile should meet the requirements in OSSC 02320 (Geosynthetics) for subgrade geotextiles and be installed in conformance with OSSC 00350 (Geosynthetic Installation).

#### *6.4.2.2 Drainage Geotextile Fabric*

Drain rock and other granular material used for subsurface drains should be wrapped in a geotextile fabric that meets the specifications provided in OSSC 00350 (Geosynthetic Installation) and OSSC 02320 (Geosynthetics) for drainage geotextiles and installed in conformance with OSSC 00350 (Geosynthetic Installation).

### 6.4.3 AC

The AC should be Level 2, ½-inch, dense ACP as described in OSSC 00744 (Asphalt Concrete Pavement) and compacted to 91 percent of the specific gravity of the mix, as determined by ASTM D2041. The minimum and maximum lift thickness is 2.0 and 3.0 inches, respectively, for ½-inch ACP. Asphalt binder should be performance graded and conform to PG 64-22 or better.

### 6.4.4 Cement Amendment

#### *6.4.4.1 General*

As an alternative to the use of imported granular material for wet weather structural fill, an experienced contractor may be able to amend the on-site soil with portland cement to obtain suitable support properties. Successful use of soil amendment depends on the use of correct mixing techniques, soil moisture content, and amendment quantities.

#### *6.4.4.2 Subbase Stabilization*

Specific recommendations based on exposed site conditions for soil amending 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. Successful use of soil amendment depends on use of correct techniques and equipment, soil moisture content, and the amount of cement added to the soil. The recommended percentage of cement is based on soil moisture contents at the time of placing the structural fill. Based on our experience, 5 percent cement by weight of dry soil is generally satisfactory when the soil moisture content does not exceed approximately 25 percent. If the soil moisture content is in the range of 25 to 35 percent, 6 to 8 percent by weight of dry soil is recommended. It is difficult to accurately predict field performance due to the variability in soil response to cement amendment. 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. The amount of cement used during amendment should be based on an assumed soil dry unit weight of 100 pcf. For preliminary design purposes, we recommend a minimum of 6 percent cement. It is not possible to amend soil during heavy or continuous rainfall. Work should be completed during suitable conditions

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 on the order of 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, accordingly, should be the contractor's responsibility. Cement amendment should not be attempted when 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.

#### *6.4.4.3 Cement-Amended Structural Fill*

On-site silt/clay soil that is not suitable for structural fill due to high moisture content may be amended and placed as fill over a subgrade prepared in conformance with the "Site Preparation" section. Cement-amended fill lift thicknesses should be limited to 12 inches. 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.

#### *6.4.4.4 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). Cement amendment runoff should be collected, monitored, and treated in accordance with DEQ requirements prior to being discharged.

#### *6.4.4.5 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 using low-pressure “balloon” tires on the pulverizer/mixer vehicle. If subgrade is disturbed, the tilling/amendment depth shall extend the full depth of the disturbance.
    - Multiple “passes” of the tiller may 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 using low-pressure “balloon” tires on the spreader vehicle. 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.

### *6.5 EROSION CONTROL*

The site soil is moderately 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.

## 7.0 OBSERVATION OF CONSTRUCTION

Satisfactory foundation and earthwork performance depends to a large degree on 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. Subsurface conditions observed during construction should be compared with those encountered during the subsurface exploration. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect if subsurface conditions change significantly from those anticipated.

We recommend that NV5 be retained to observe earthwork activities, including stripping, proof rolling of the subgrade and repair of soft areas, footing subgrade preparation, final proof rolling of the pavement subgrade and base rock, and AC placement and compaction, and performing laboratory compaction and field moisture-density tests.

## 8.0 LIMITATIONS

We have prepared this report for use by Stanton Street Building Company, LLC and other members of the design and construction 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.

## REFERENCES

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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 site development was conceptual at the time this report was prepared. When the design has been finalized and if there are changes in the site grades, design traffic, or type of construction, the conclusions and recommendations presented may not be applicable. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification.

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 service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

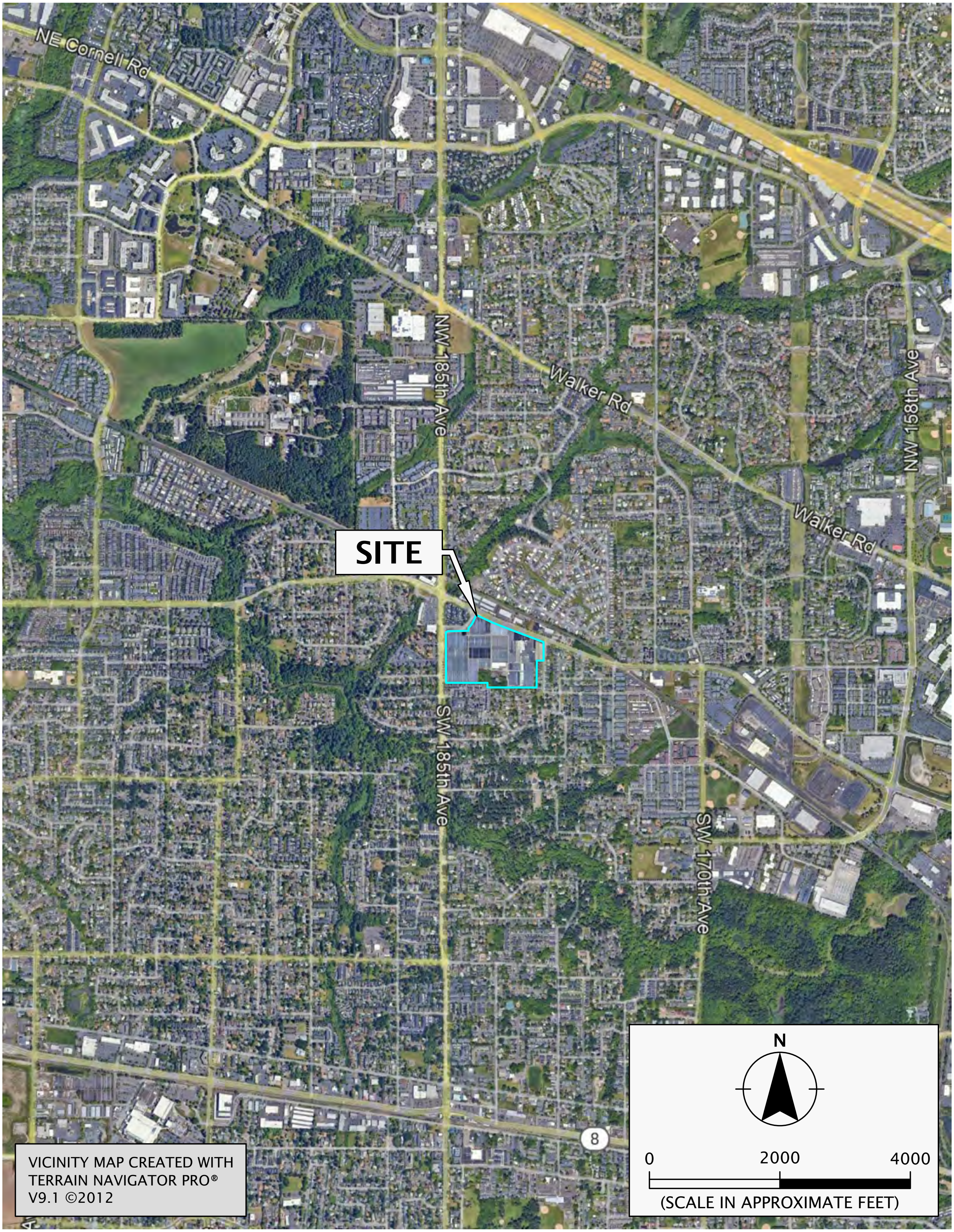
NV5

Tyler A. Pierce, P.E.
Senior Project Engineer

Shawn M. Dimke, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
91210PE
OREGON
July 12, 2016
TYLER PIERCE
EXPIRES: 12/31/24

# FIGURES



VICINITY MAP CREATED WITH
TERRAIN NAVIGATOR PRO®
V9.1 ©2012

| | | | |
|---|---|---|---|
| NV5 | STANTONST-14-01 | **VICINITY MAP** | |
| | SEPTEMBER 2022 | PANZER NURSERY<br>BEAVERTON, OR | **FIGURE 1** |

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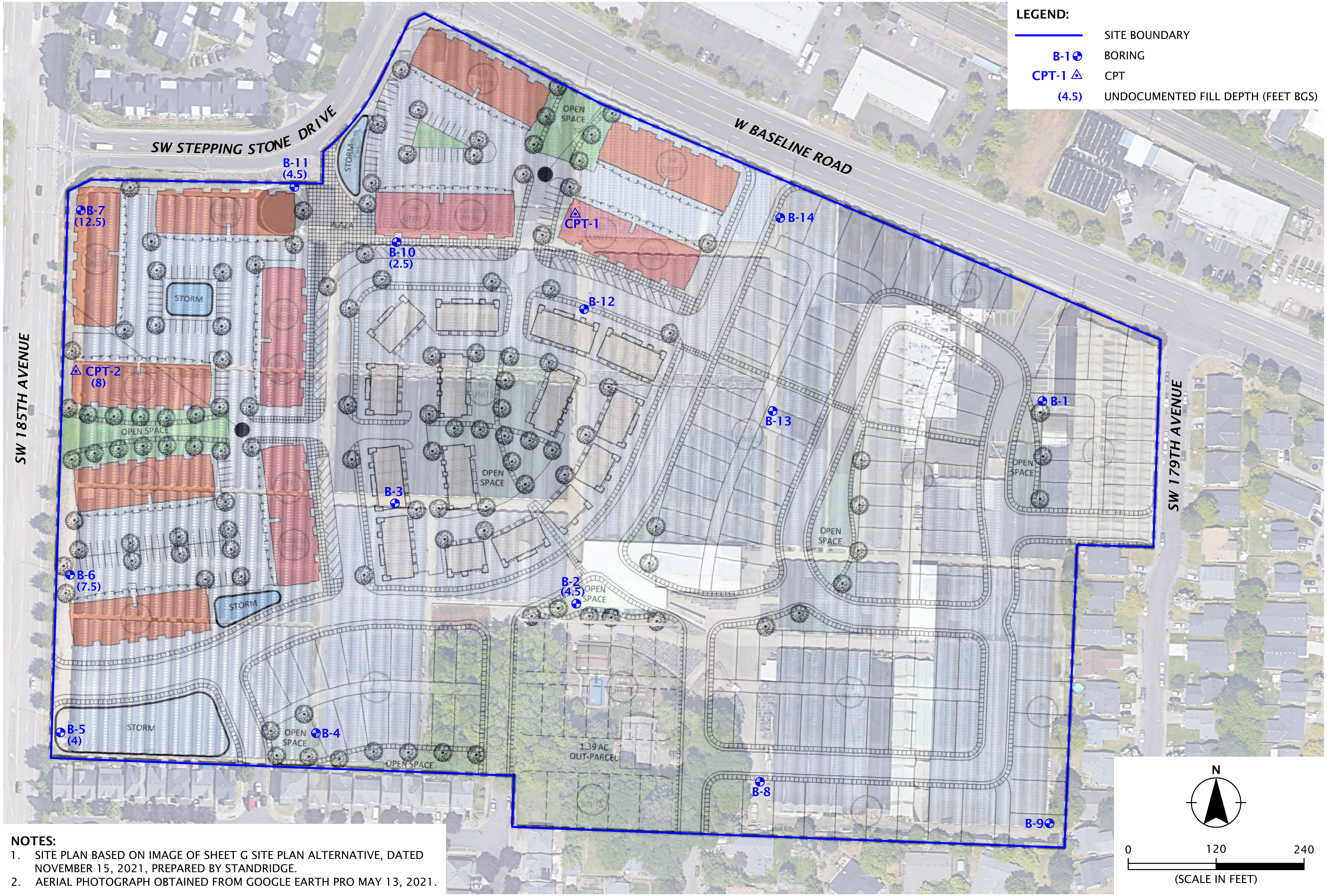

**NOTES:**

1. SITE PLAN BASED ON IMAGE OF SHEET G SITE PLAN ALTERNATIVE, DATED NOVEMBER 15, 2021, PREPARED BY STANDRIDGE.
2. AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH PRO MAY 13, 2021.

FIGURE 2

SITE PLAN

PANZER NURSERY
BEAVERTON, OR

STANTONST-14-01

SEPTEMBER 2022

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# APPENDIX A

# APPENDIX A

## FIELD EXPLORATIONS

### *GENERAL*

We explored subsurface conditions at the site by drilling 14 borings (B-1 through B-14) to depths between 16.5 and 31.5 feet BGS and advancing 2 CPT probes (CPT-1 and CPT-2) to depths of approximately 55.5 and 56 feet BGS at the locations shown on Figure 2. The borings were drilled by Dan J. Fischer Excavating, Inc. of Forest Grove, Oregon, on August 1 and 2, 2022, using a trailer-mounted drill rig and solid-stem auger drilling methods. The borings were completed under the supervision of NV5 personnel. The exploration logs are presented in this appendix. A description of the CPTs and the CPT results are presented in Appendix B.

The locations of the explorations were determined in the field by pacing from existing site features. This information should be considered accurate to the degree implied by the method used.

### *SOIL SAMPLING*

Samples were collected from the borings using a 1½-inch-inside diameter split-spoon (SPT) sampler in general accordance with ASTM D1586. The split-spoon samplers were driven into the soil with a 140-pound hammer free-falling 30 inches. The samplers were driven a total distance of 18 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the boring logs, unless otherwise noted. Sampling methods and intervals are shown on the exploration logs.

The hammer used to conduct the SPTs was lifted using a rope and cathead system. The hammer was raised using two wraps of the rope around the cathead to conduct the SPTs.

### *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 actually could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

### *INFILTRATION TESTING*

Infiltration testing was conducted in borings B-5, B-6, and B-10 at depths between 3 and 5 feet BGS. The underlying soil was saturated by allowing the water to infiltrate into the subsurface. The infiltration rate was measured under low-head conditions after saturated conditions had been achieved. Infiltration testing was completed using the encased falling head test method. Infiltration testing was completed by pouring water into 6-inch PVC pipe embedded at least 12 inches and measuring the drop in water with respect to time. Testing was completed until consistent rates were achieved.

## LABORATORY TESTING

### *CLASSIFICATION*

The soil samples were classified in the laboratory to confirm field classifications. The laboratory classifications are shown on the exploration logs if those classifications differed from the field classifications.

### *MOISTURE CONTENT*

We determined the natural moisture content of select soil samples in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to the dry weight of soil in a test sample expressed as a percentage. The test results are presented in this appendix.

### *PARTICLE-SIZE ANALYSIS*

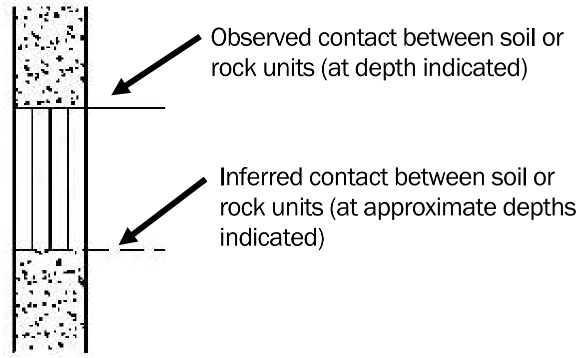
Particle-size analysis was completed on select soil samples in general accordance with ASTM D1140 (percent passing the U.S. Standard No. 200 sieve). This test determines the fraction of the soil particles in a sample that are finer than 75 µm expressed as percentage of its dry weight. The test results are presented in this appendix.

### *ATTERBERG LIMITS*

The plastic limit and liquid limit (Atterberg limits) of select soil samples were determined in general accordance with ASTM D4318. The Atterberg limits and the plasticity index were completed to aid in the classification of the soil and evaluation of liquefaction susceptibility. The plastic limit is defined as the moisture content (in percent) where the soil becomes brittle. The liquid limit is defined as the moisture content where the soil begins to act similar to a liquid. The plasticity index is the difference between the liquid and plastic limits. 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



## 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 |

## 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<br>(more than 50% retained on No. 200 sieve) | GRAVEL<br>(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<br>(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<br>(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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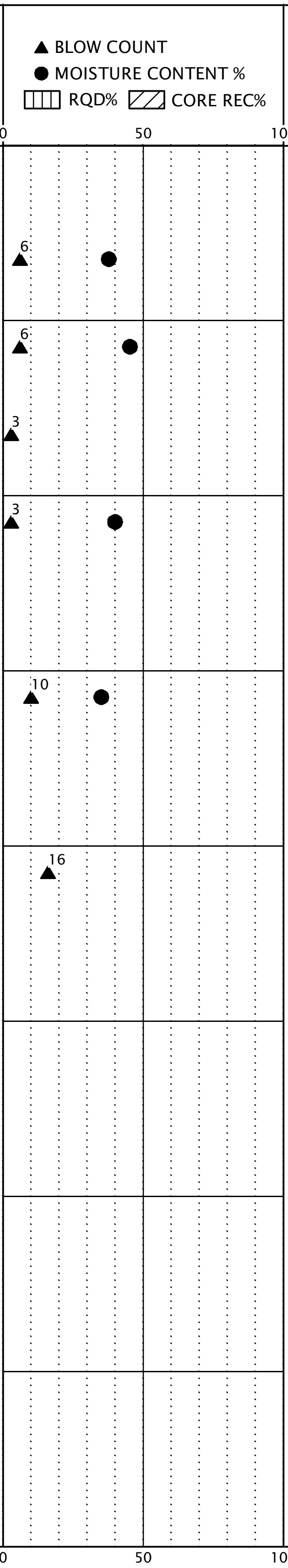
**SOIL CLASSIFICATION SYSTEM**

**TABLE A-2**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | INSTALLATION AND COMMENTS |
|---|---|---|---|---|
| 0 | ASPHALT CONCRETE (3.0 inches). | 0.3 | | |
| | AGGREGATE BASE (9.0 inches). | 1.0 | | |
| | Medium stiff, gray with brown mottled CLAY (CL), minor sand; moist, sand is fine. | | ATT<br>PP | DCP test at 1.3 feet.<br>PP = 0.5 tsf<br>LL = 47%<br>PL = 25% |
| 5 | gray at 5.0 feet | | PP | PP = 0.5 tsf |
| | | | | ▽ 6.5 feet, during drilling |
| | Soft, light brown SILT (ML), minor sand; moist to wet, sand is fine. | 7.0 | PP | PP = 0.25 tsf |
| 10 | brown with gray mottles; wet at 10.0 feet | | PP | PP = 0.25 tsf |
| 15 | stiff at 15.0 feet | | P200<br>PP | P200 = 95%<br>PP = 0.75 tsf |
| 20 | very stiff at 20.0 feet | | PP | PP = 1.75 tsf |
| | Exploration completed at a depth of 21.5 feet.<br>SPT completed using two wraps with a cathead. | 21.5 | | Surface elevation was not measured at the time of exploration. |
| 25 | | | | |
| 30 | | | | |
| 35 | | | | |
| 40 | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

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STANTONST-14-01

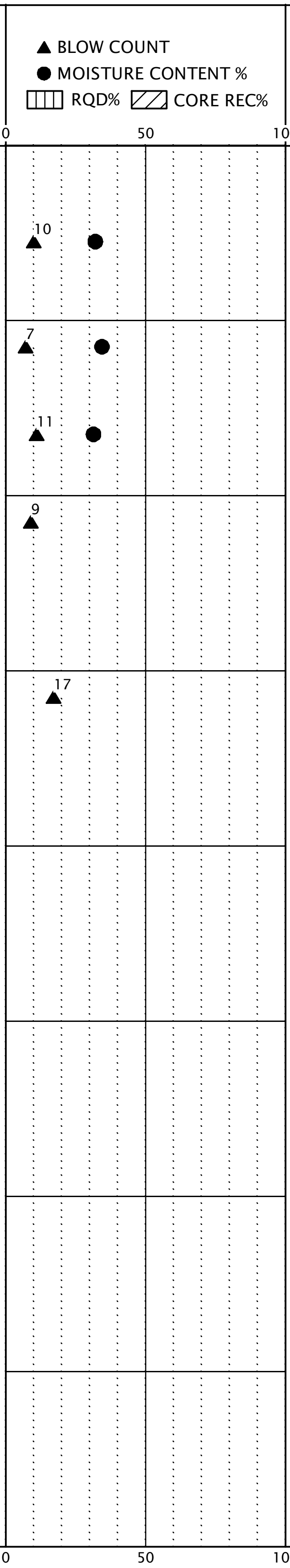
SEPTEMBER 2022

**BORING B-1**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-1**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | CRUSHED ROCK (15.0 inches) - **FILL**. | | | | |
| | Stiff, dark gray CLAY (CL), minor sand, trace organics (rootlets); moist, sand is fine - **FILL**. | 1.3 | P200<br>PP | ▮ | P200 = 93%<br>PP = 1.5 tsf |
| 5 | Medium stiff, light brown with gray mottled SILT with sand (ML); moist, sand is fine. | 4.5 | PP | ▮ | PP = 1.0 tsf |
| | stiff at 7.5 feet | | PP | ▮ | PP = 1.25 tsf |
| 10 | trace gravel at 10.0 feet | | | ▮ | ▽ 9.5 feet, during drilling |
| 15 | very stiff at 15.0 feet | | | ▮ | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | |
| 35 | | | | | |
| 40 | | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 6 inches

NV5

STANTONST-14-01

SEPTEMBER 2022

## BORING B-2

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-2**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT | ● MOISTURE CONTENT % | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0 | CRUSHED ROCK (6.0 inches) - **FILL**. | 0.5 | | | | | DCP test at 0.5 foot. |
| | Medium stiff to stiff, brown CLAY (CL), minor sand; moist, sand is fine. | | PP | ▮ | 8 | ● | PP = 1.0 tsf |
| 5 | | | PP | ▮ | 5 | | PP = 0.5 tsf |
| | | | | | | | ▽ 6.5 feet, during drilling |
| | Soft, brown SILT with sand (ML); moist to wet, sand is fine. | 7.0 | PP | ▮ | 3 | ● | PP = 0.25 tsf |
| 10 | medium stiff at 10.0 feet | | PP | ▮ | 6 | | PP = 0.75 tsf |
| 15 | soft at 15.0 feet | | | ▮ | 3 | | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | | | Surface elevation was not measured at the time of exploration. |

▲ BLOW COUNT ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (scale 0 – 50 – 100)

DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

NV5

STANTONST-14-01

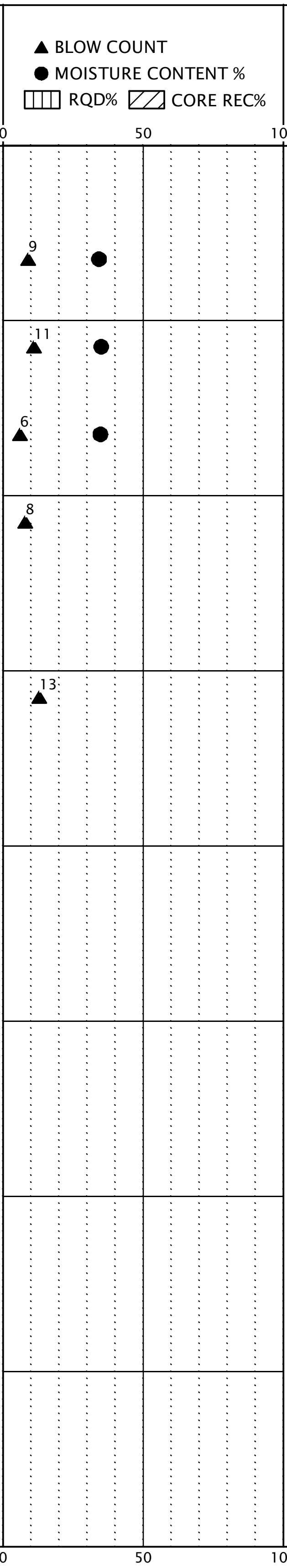
SEPTEMBER 2022

**BORING B-3**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-3**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | BLOW COUNT | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | CRUSHED ROCK (4.0 inches) - **FILL**. | 0.3 | | | |
| | Stiff, gray SILT (ML), minor sand; moist, sand is fine. | | | | DCP test at 0.5 foot. |
| | | | PP | 9 | PP = 1.5 tsf |
| 5 | | | ATT | 11 | LL = 40%<br>PL = 26% |
| | medium stiff, light brown at 7.5 feet | | | 6 | ∇ 8.5 feet, during drilling |
| 10 | medium stiff to stiff at 10.0 feet | | | 8 | |
| 15 | stiff, sandy; wet at 15.0 feet | | | 13 | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |



DRILLED BY: Dan J. Fischer Excavating, Inc.

LOGGED BY: L. Gose

COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)

BORING BIT DIAMETER: 3 inches

STANTONST-14-01

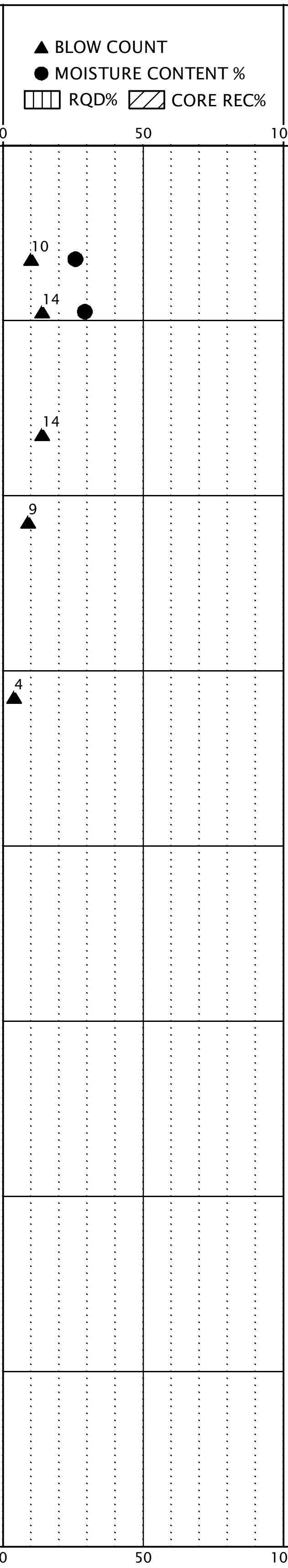
SEPTEMBER 2022

## BORING B-4

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-4**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | Stiff, brown SILT with sand and cobbles (ML), trace gravel and debris; moist, cobbles are approximately 10%, debris is asphalt concrete cuttings - **FILL**. | | | ▮ | |
| 5 | Stiff, brown SILT (ML), minor sand, trace gravel; moist. | 4.0 | **P200** | ▮ | Infiltration test at 4.0 feet.<br>P200 = 89% |
| | | | | ▮ | |
| 10 | without gravel at 10.0 feet | | | ▮ | ∇ 12.5 feet, during drilling |
| 15 | medium stiff, with sand; wet at 15.0 feet | | | ▮ | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | |
| 35 | | | | | |
| 40 | | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

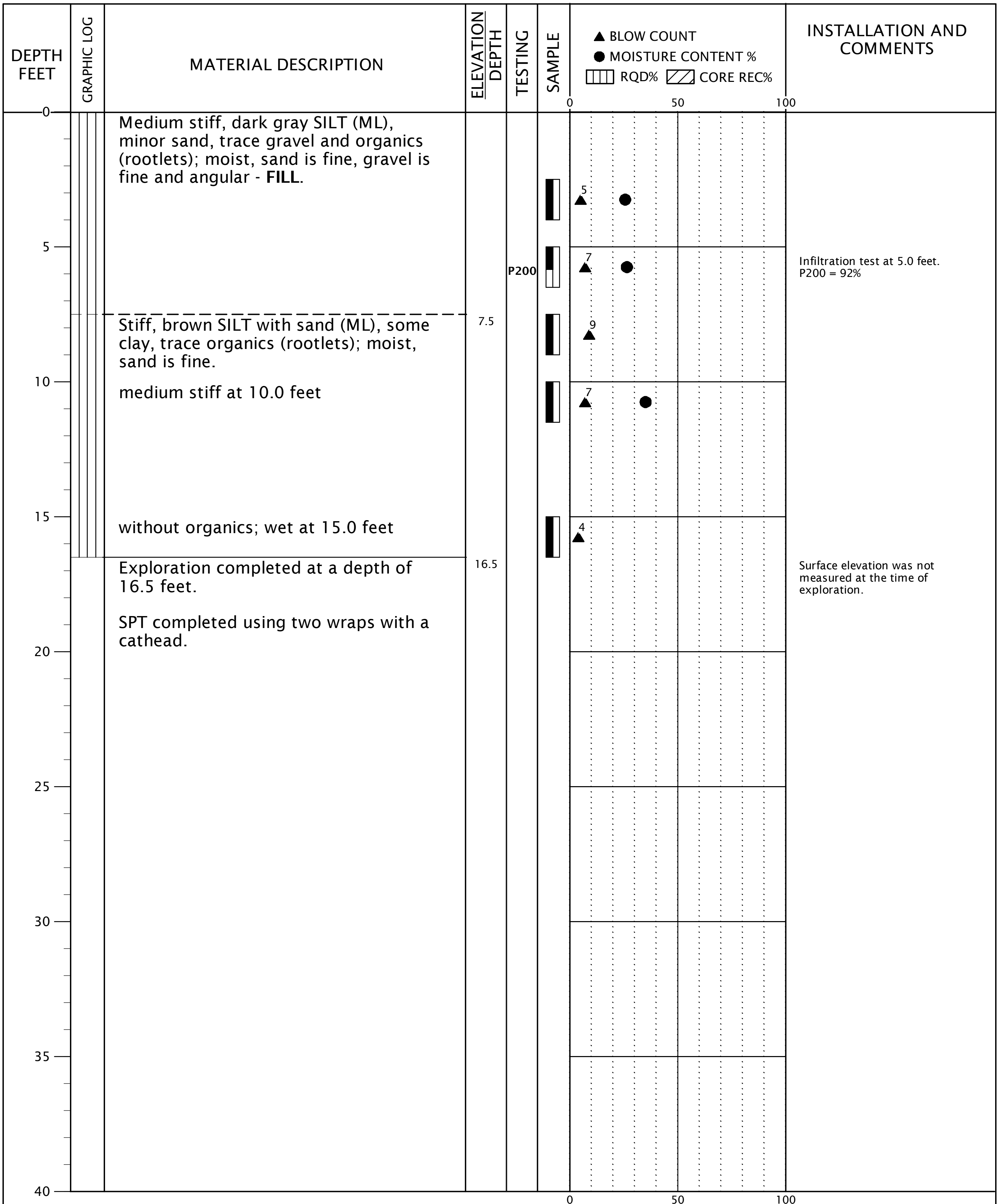
STANTONST-14-01

SEPTEMBER 2022

**BORING B-5**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-5**



| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | BLOW COUNT | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | Medium stiff, dark gray SILT (ML), minor sand, trace gravel and organics (rootlets); moist, sand is fine, gravel is fine and angular - **FILL**. | | | 5 | |
| 5 | | | P200 | 7 | Infiltration test at 5.0 feet.<br>P200 = 92% |
| 7.5 | Stiff, brown SILT with sand (ML), some clay, trace organics (rootlets); moist, sand is fine. | 7.5 | | 9 | |
| 10 | medium stiff at 10.0 feet | | | 7 | |
| 15 | without organics; wet at 15.0 feet | | | 4 | |
| 16.5 | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |

DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/01

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches and 6 inches

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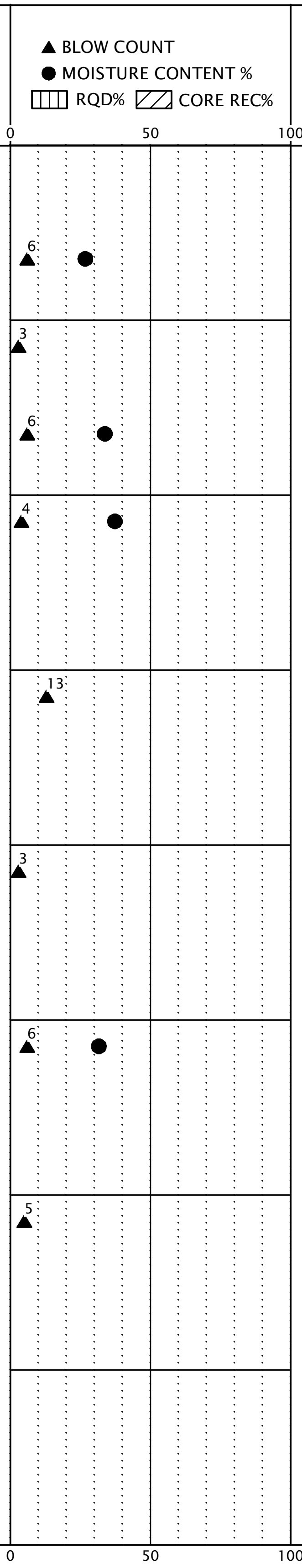
SEPTEMBER 2022

**BORING B-6**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-6**



| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | BLOW COUNT | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | Medium stiff, gray CLAY (CL), minor sand; moist, sand is fine - **FILL**. | | | | |
| | | | PP | 6 | PP = 0.75 tsf |
| 5 | soft at 5.0 feet | | PP | 3 | PP = 0.75 tsf |
| | medium stiff, with sand, trace gravel; gravel is fine and subangular at 7.5 feet | | | 6 | |
| 10 | trace organics (woody debris) at 10.0 feet | | PP | 4 | PP = 0.5 tsf |
| | Stiff, dark gray SILT (ML), trace sand; moist, sand is fine. | 12.5 | | | |
| 15 | | | | 13 | |
| 20 | soft, light brown, minor sand; wet at 20.0 feet | | PP | 3 | PP = 0.25 tsf |
| | | | | | ▽ 22.0 feet, during drilling |
| 25 | medium stiff at 25.0 feet | | P200 | 6 | P200 = 95% |
| 30 | | | | 5 | |
| | Exploration completed at a depth of 31.5 feet.<br>SPT completed using two wraps with a cathead. | 31.5 | | | Surface elevation was not measured at the time of exploration. |
| 35 | | | | | |
| 40 | | | | | |

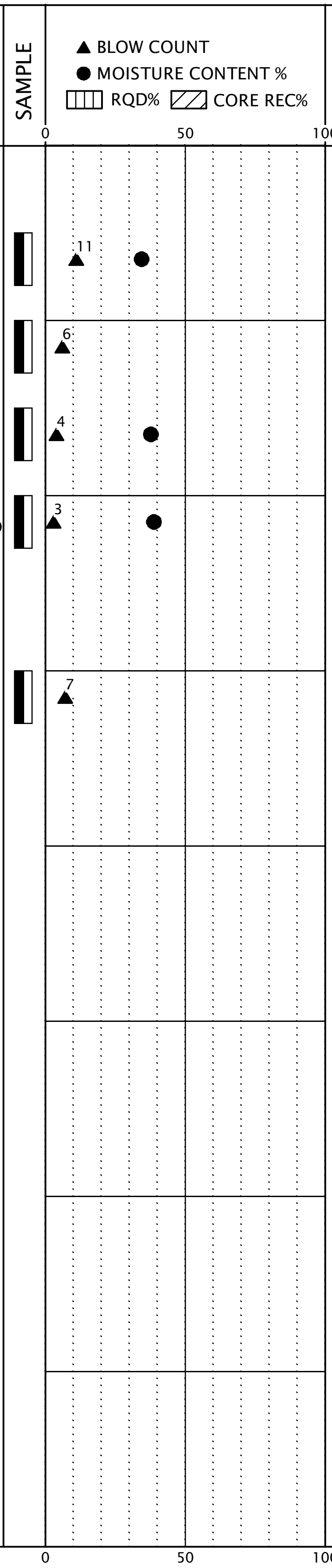
DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/01/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

| | | | |
|---|---|---|---|
| NV5 | STANTONST-14-01 | **BORING B-7** | |
| | SEPTEMBER 2022 | PANZER NURSERY<br>BEAVERTON, OR | **FIGURE A-7** |

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | INSTALLATION AND COMMENTS |
|---|---|---|---|---|
| 0 | CRUSHED ROCK (3.0 inches) - **FILL**. | | | |
| | Stiff, dark gray-orange SILT (ML), minor sand, trace clay; moist, sand is fine. | 0.3 | | DCP test at 0.5 foot. |
| 5 | medium stiff, dark gray, trace sand at 5.0 feet | | | |
| | soft to medium stiff; moist to wet at 7.5 feet | | | |
| 10 | soft, trace gravel; wet at 10.0 feet | | P200 | P200 = 96% |
| 15 | medium stiff at 15.0 feet | | | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | |
| 25 | | | | |
| 30 | | | | |
| 35 | | | | |
| 40 | | | | |

⊻ 7.5 feet, during drilling



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

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STANTONST-14-01

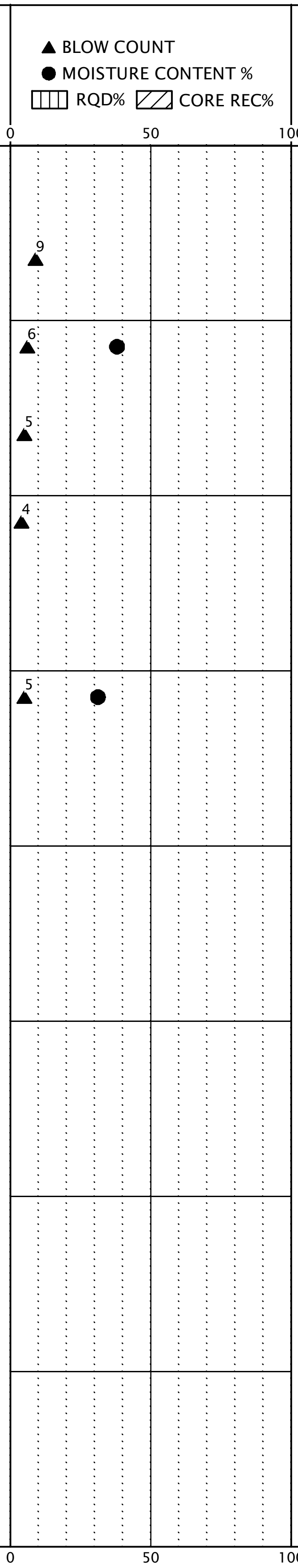
SEPTEMBER 2022

**BORING B-8**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-8**

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0 | | CRUSHED ROCK (4.0 inches) - **FILL**. | 0.3 | | | | |
| | | Stiff, brown SILT (ML), minor sand; moist, sand is fine. | | | ◧ | 9 | |
| 5 | | medium stiff; moist to wet at 5.0 feet | | | ◧ | 6 | |
| | | wet at 7.5 feet | | | ◧ | 5 | |
| 10 | | soft to medium stiff at 10.0 feet | | | ◧ | 4 | |
| | | | | | | | ▽ 12.5 feet, during drilling |
| 15 | | medium stiff at 15.0 feet | | P200 | ◧ | 5 | P200 = 91% |
| | | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | | | | |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

STANTONST-14-01

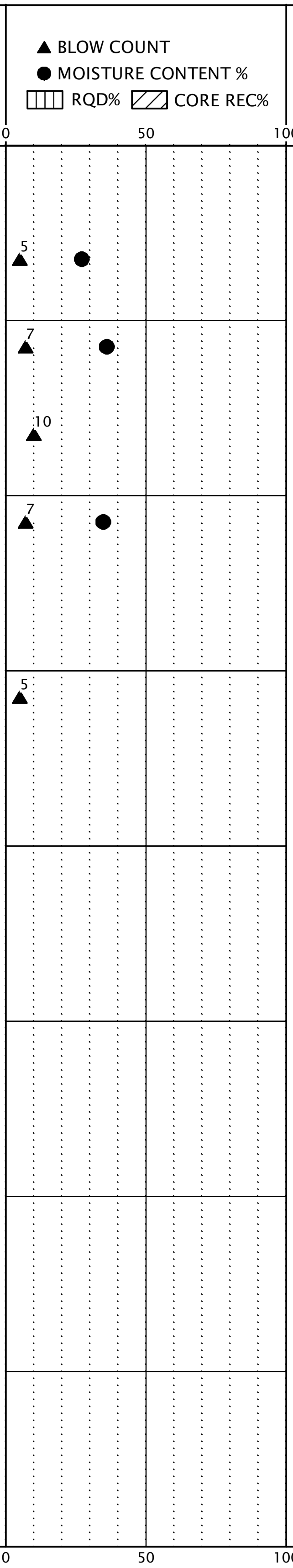
SEPTEMBER 2022

**BORING B-9**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-9**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | INSTALLATION AND COMMENTS |
|---|---|---|---|---|
| 0 | CRUSHED ROCK (6.0 inches) - **FILL**. | 0.5 | | |
| | Medium stiff to stiff, brown SILT (ML), minor clay, trace gravel and debris; moist, debris is asphalt concrete and clay tiles - **FILL**. | 2.5 | | Soil from 0.5 to 2.5 feet classified based on cuttings. |
| | Medium stiff, gray CLAY (CL), minor sand and gravel; moist, sand is fine. | 7.0 | P200 | P200 = 86%<br>Infiltration test at 3.0 feet. |
| 5 | | | | ⊻ 7.5 feet, during drilling |
| | Stiff, brown SILT (ML), minor sand, trace clay; moist, sand is fine. | | | |
| 10 | medium stiff, dark gray at 10.0 feet | | ATT | LL = 34%<br>PL = 24% |
| 15 | light brown; wet at 15.0 feet | 16.5 | | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | |
| 25 | | | | |
| 30 | | | | |
| 35 | | | | |
| 40 | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

NV5

STANTONST-14-01

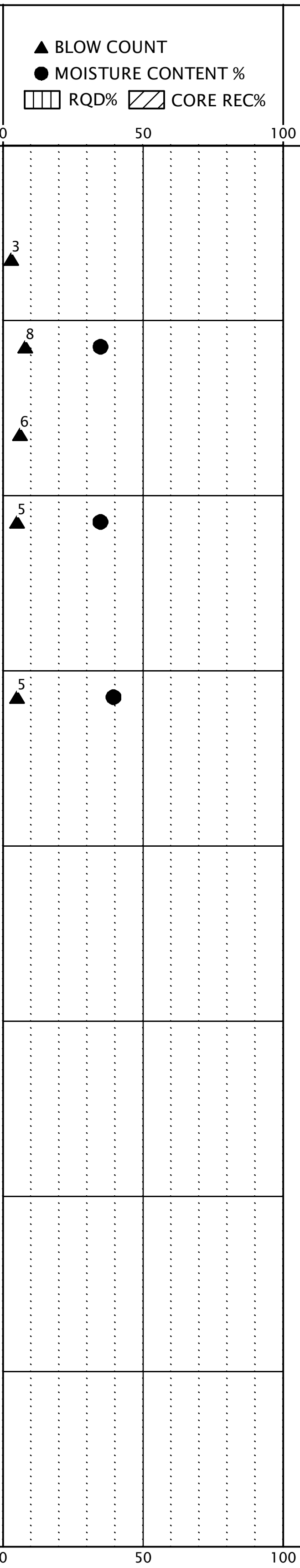
SEPTEMBER 2022

**BORING B-10**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-10**

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|
| 0 | | Soft, dark brown SILT with sand (ML); moist, sand is fine - **FILL**. | | | | |
| 5 | | Medium stiff to stiff, brown with gray mottled SILT (ML), some clay, minor sand; moist. | 4.5 | | | |
| | | medium stiff, without clay at 7.5 feet | | | | ▽ 9.5 feet, during drilling |
| 10 | | moist to wet at 10.0 feet | | P200 | | P200 = 90% |
| 15 | | medium stiff; wet at 15.0 feet | | ATT | | LL = 36%<br>PL = 27% |
| | | Exploration completed at a depth of 16.5 feet.<br><br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | | | |
| 25 | | | | | | |
| 30 | | | | | | |
| 35 | | | | | | |
| 40 | | | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.

LOGGED BY: L. Gose

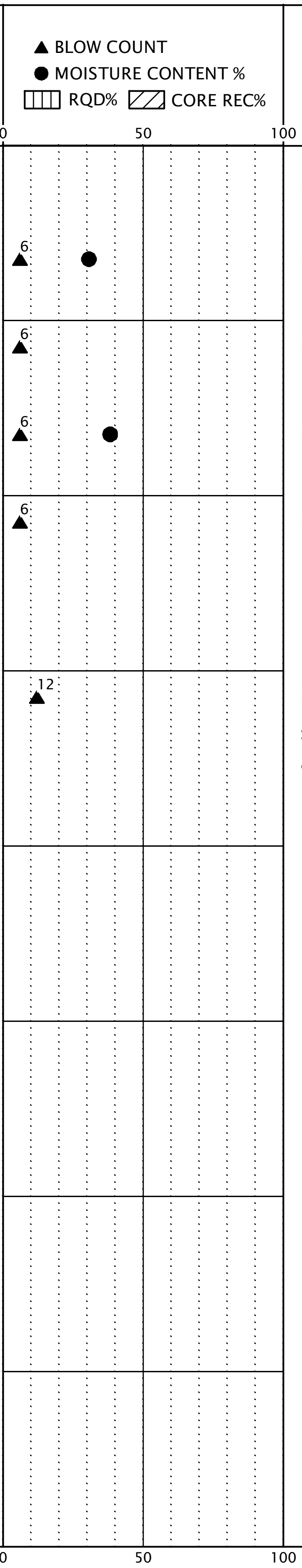
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)

BORING BIT DIAMETER: 3 inches

| | | |
|---|---|---|
| NV5 | STANTONST-14-01 | **BORING B-11** |
| | SEPTEMBER 2022 | PANZER NURSERY<br>BEAVERTON, OR — **FIGURE A-11** |

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | ▲ BLOW COUNT | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|
| 0 | CRUSHED ROCK (12.0 inches) - **FILL**. | | | | |
| | Medium stiff, dark gray with brown mottled CLAY (CL), minor sand and gravel, trace organics (rootlets); moist, sand is fine, gravel is fine. | 1.0 | | | DCP test at 0.5 foot. |
| | | | PP | 6 | PP = 0.75 tsf |
| 5 | | | PP | 6 | PP = 0.75 tsf |
| | Medium stiff, brown-gray with dark brown mottled SILT (ML), minor sand; moist to wet, sand is fine. | 7.0 | PP | 6 | PP = 0.75 tsf<br>▽ 8.5 feet, during drilling |
| 10 | wet at 10.0 feet | | PP | 6 | PP = 0.75 tsf |
| 15 | stiff at 15.0 feet | | PP | 12 | PP = 1.75 tsf |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 | | | Surface elevation was not measured at the time of exploration. |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | |
| 35 | | | | | |
| 40 | | | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

STANTONST-14-01

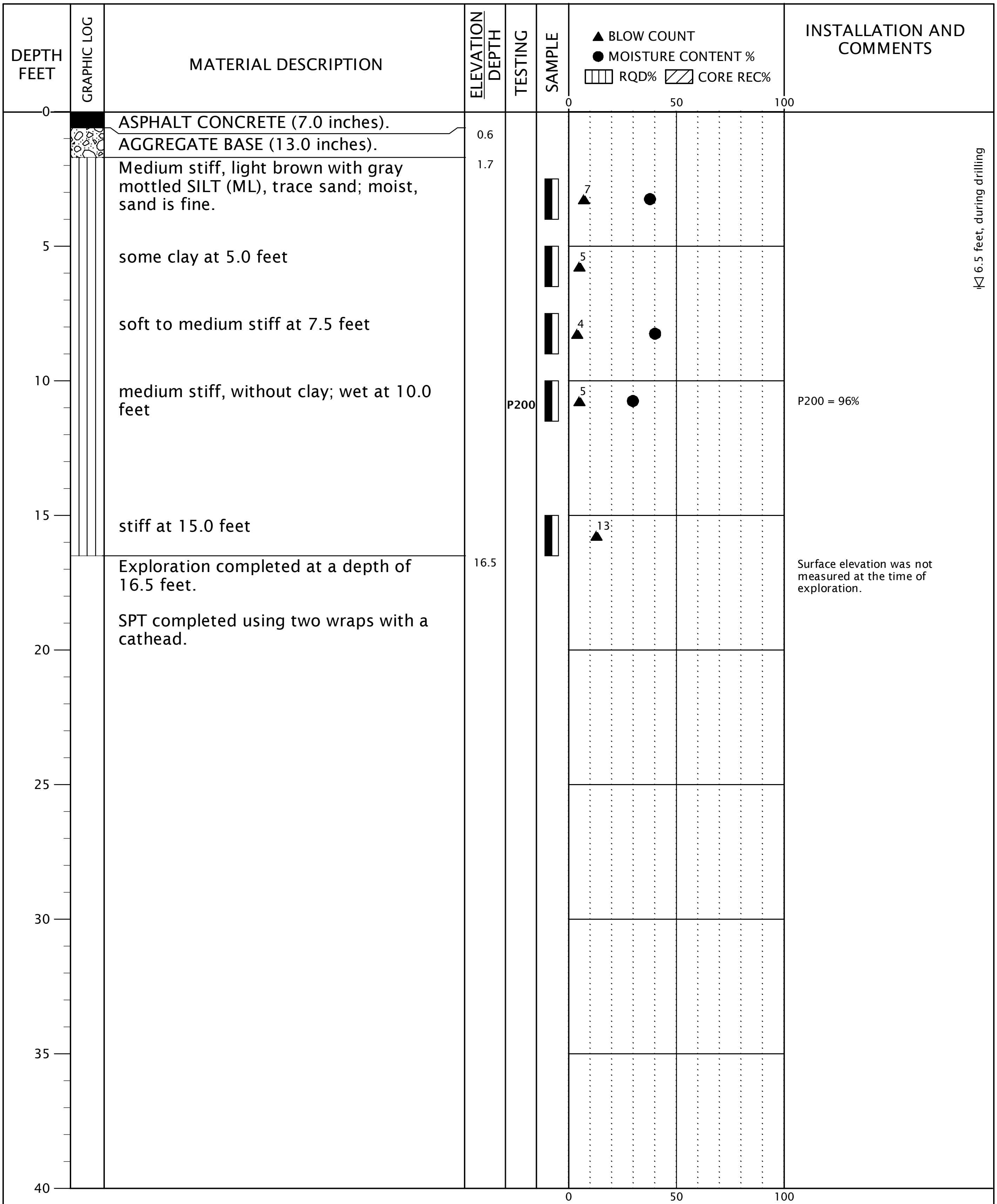
SEPTEMBER 2022

**BORING B-12**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-12**

| MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | INSTALLATION AND COMMENTS |
|---|---|---|---|
| ASPHALT CONCRETE (7.0 inches). | 0.6 | | |
| AGGREGATE BASE (13.0 inches). | 1.7 | | |
| Medium stiff, light brown with gray mottled SILT (ML), trace sand; moist, sand is fine. | | | ▽ 6.5 feet, during drilling |
| some clay at 5.0 feet | | | |
| soft to medium stiff at 7.5 feet | | | |
| medium stiff, without clay; wet at 10.0 feet | | P200 | P200 = 96% |
| stiff at 15.0 feet | 16.5 | | |
| Exploration completed at a depth of 16.5 feet. | | | Surface elevation was not measured at the time of exploration. |
| SPT completed using two wraps with a cathead. | | | |



DRILLED BY: Dan J. Fischer Excavating, Inc.

LOGGED BY: L. Gose

COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)

BORING BIT DIAMETER: 4 inches and 3 inches

NV5

STANTONST-14-01

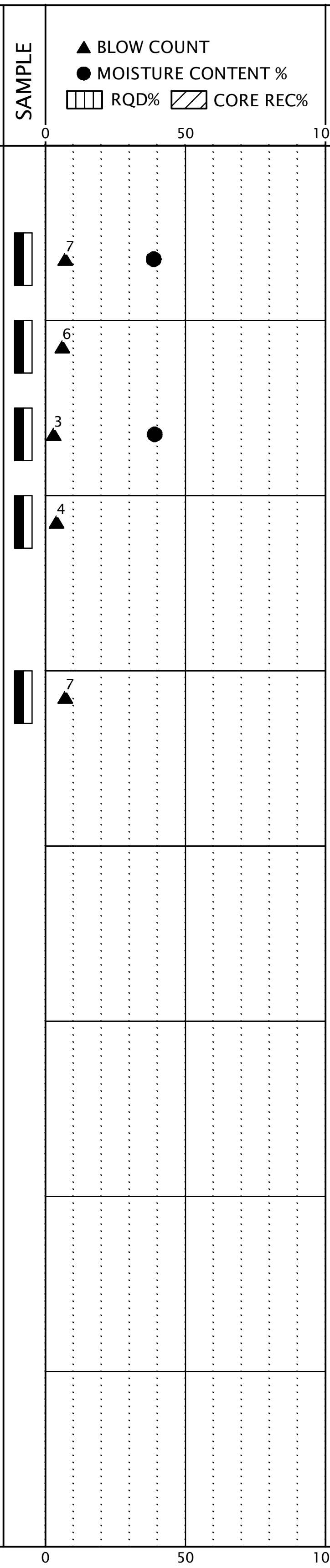
SEPTEMBER 2022

**BORING B-13**

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-13**

| DEPTH FEET | MATERIAL DESCRIPTION | ELEVATION DEPTH |
|---|---|---|
| 0 | ASPHALT CONCRETE (2.5 inches). | 0.2 |
| | AGGREGATE BASE (8.0 inches). | 0.9 |
| | Medium stiff, light brown with dark brown mottled SILT (ML), some clay, minor sand; moist, sand is fine. | |
| 5 | trace clay at 5.0 feet | |
| | soft; moist to wet at 7.5 feet | |
| 10 | soft to medium stiff; wet at 10.0 feet | |
| 15 | medium stiff, some clay at 15.0 feet | |
| | Exploration completed at a depth of 16.5 feet.<br>SPT completed using two wraps with a cathead. | 16.5 |
| 20 | | |
| 25 | | |
| 30 | | |
| 35 | | |
| 40 | | |



INSTALLATION AND COMMENTS

⊻ 7.5 feet, during drilling

Surface elevation was not measured at the time of exploration.

DRILLED BY: Dan J. Fischer Excavating, Inc.
LOGGED BY: L. Gose
COMPLETED: 08/02/22

BORING METHOD: solid-stem auger (see document text)
BORING BIT DIAMETER: 3 inches

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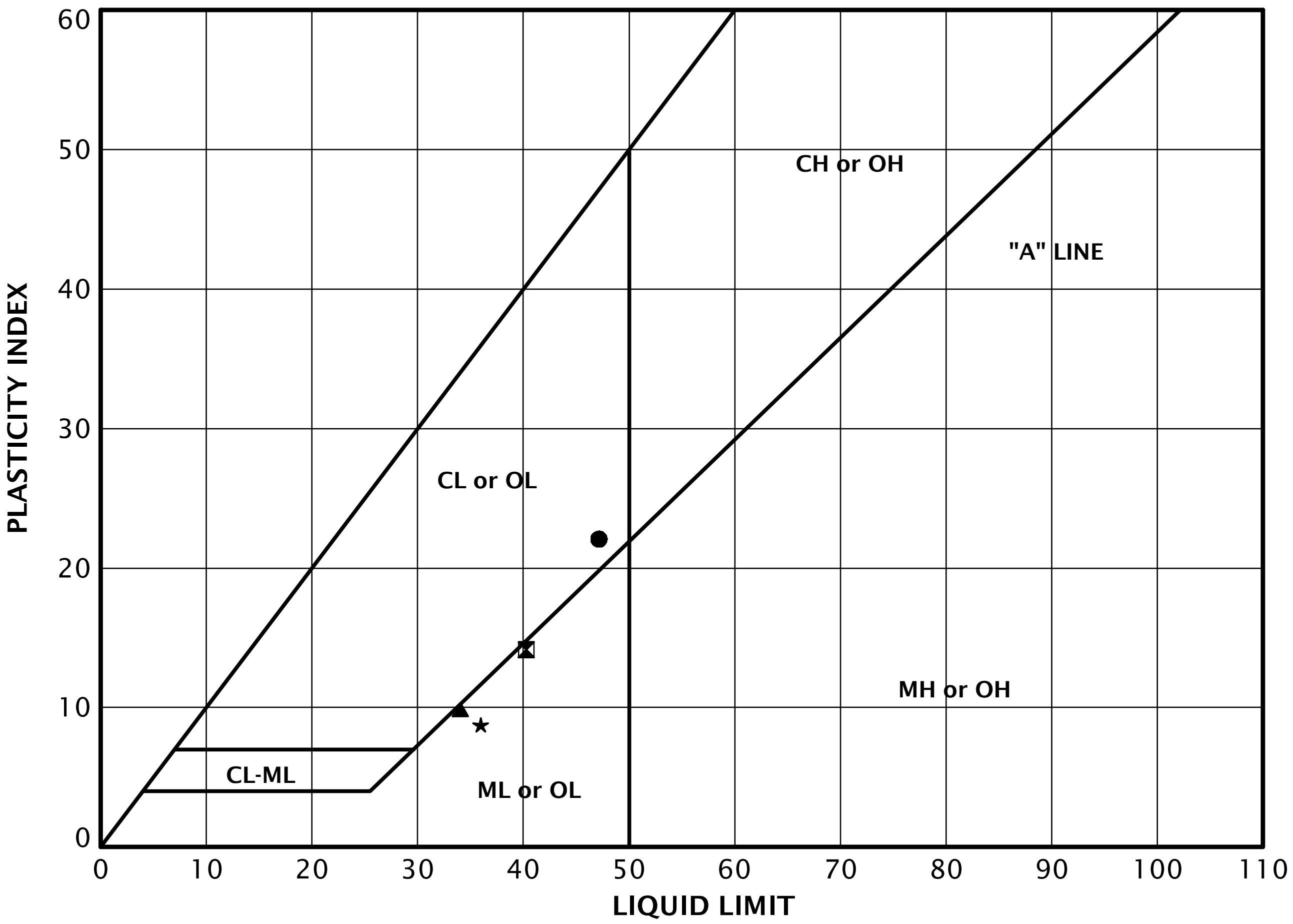
SEPTEMBER 2022

## BORING B-14

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-14**



| KEY | EXPLORATION NUMBER | SAMPLE DEPTH (FEET) | MOISTURE CONTENT (PERCENT) | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|---|---|---|---|---|---|---|
| ● | B-1 | 2.5 | 38 | 47 | 25 | 22 |
| ⊠ | B-4 | 5.0 | 35 | 40 | 26 | 14 |
| ▲ | B-10 | 10.0 | 35 | 34 | 24 | 10 |
| ★ | B-11 | 15.0 | 39 | 36 | 27 | 9 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

_ATTERBERG_LIMITS 7 STANTONST-14-01-B1_14.GPJ GEODESIGN.GDT PRINT DATE: 8/31/22:KT

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STANTONST-14-01

SEPTEMBER 2022

## ATTERBERG LIMITS TEST RESULTS

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-15**

| 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 |
| B-1 | 2.5 | | 38 | | | | | 47 | 25 | 22 |
| B-1 | 5.0 | | 45 | | | | | | | |
| B-1 | 10.0 | | 40 | | | | | | | |
| B-1 | 15.0 | | 35 | | | | 95 | | | |
| B-2 | 2.0 | | 32 | | | | 93 | | | |
| B-2 | 5.0 | | 34 | | | | | | | |
| B-2 | 7.5 | | 31 | | | | | | | |
| B-3 | 2.5 | | 38 | | | | | | | |
| B-3 | 7.5 | | 39 | | | | | | | |
| B-4 | 2.5 | | 34 | | | | | | | |
| B-4 | 5.0 | | 35 | | | | | 40 | 26 | 14 |
| B-4 | 7.5 | | 35 | | | | | | | |
| B-5 | 2.5 | | 26 | | | | | | | |
| B-5 | 4.0 | | 29 | | | | 89 | | | |
| B-6 | 2.5 | | 26 | | | | | | | |
| B-6 | 5.0 | | 26 | | | | 92 | | | |
| B-6 | 10.0 | | 35 | | | | | | | |
| B-7 | 2.5 | | 27 | | | | | | | |
| B-7 | 7.5 | | 34 | | | | | | | |
| B-7 | 10.0 | | 37 | | | | | | | |
| B-7 | 25.0 | | 32 | | | | 95 | | | |
| B-8 | 2.5 | | 34 | | | | | | | |
| B-8 | 7.5 | | 38 | | | | | | | |
| B-8 | 10.0 | | 39 | | | | 96 | | | |
| B-9 | 5.0 | | 38 | | | | | | | |
| B-9 | 15.0 | | 31 | | | | 91 | | | |
| B-10 | 2.5 | | 27 | | | | 86 | | | |

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STANTONST-14-01

SEPTEMBER 2022

## SUMMARY OF LABORATORY DATA

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-16**

| 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 |
| B-10 | 5.0 | | 36 | | | | | | | |
| B-10 | 10.0 | | 35 | | | | | 34 | 24 | 10 |
| B-11 | 5.0 | | 35 | | | | | | | |
| B-11 | 10.0 | | 35 | | | | 90 | | | |
| B-11 | 15.0 | | 39 | | | | | 36 | 27 | 9 |
| B-12 | 2.5 | | 31 | | | | | | | |
| B-12 | 7.5 | | 38 | | | | | | | |
| B-13 | 2.5 | | 38 | | | | | | | |
| B-13 | 7.5 | | 40 | | | | | | | |
| B-13 | 10.0 | | 30 | | | | 96 | | | |
| B-14 | 2.5 | | 39 | | | | | | | |
| B-14 | 7.5 | | 39 | | | | | | | |

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**SUMMARY OF LABORATORY DATA**
(continued)

PANZER NURSERY
BEAVERTON, OR

**FIGURE A-16**

# APPENDIX B

# APPENDIX B

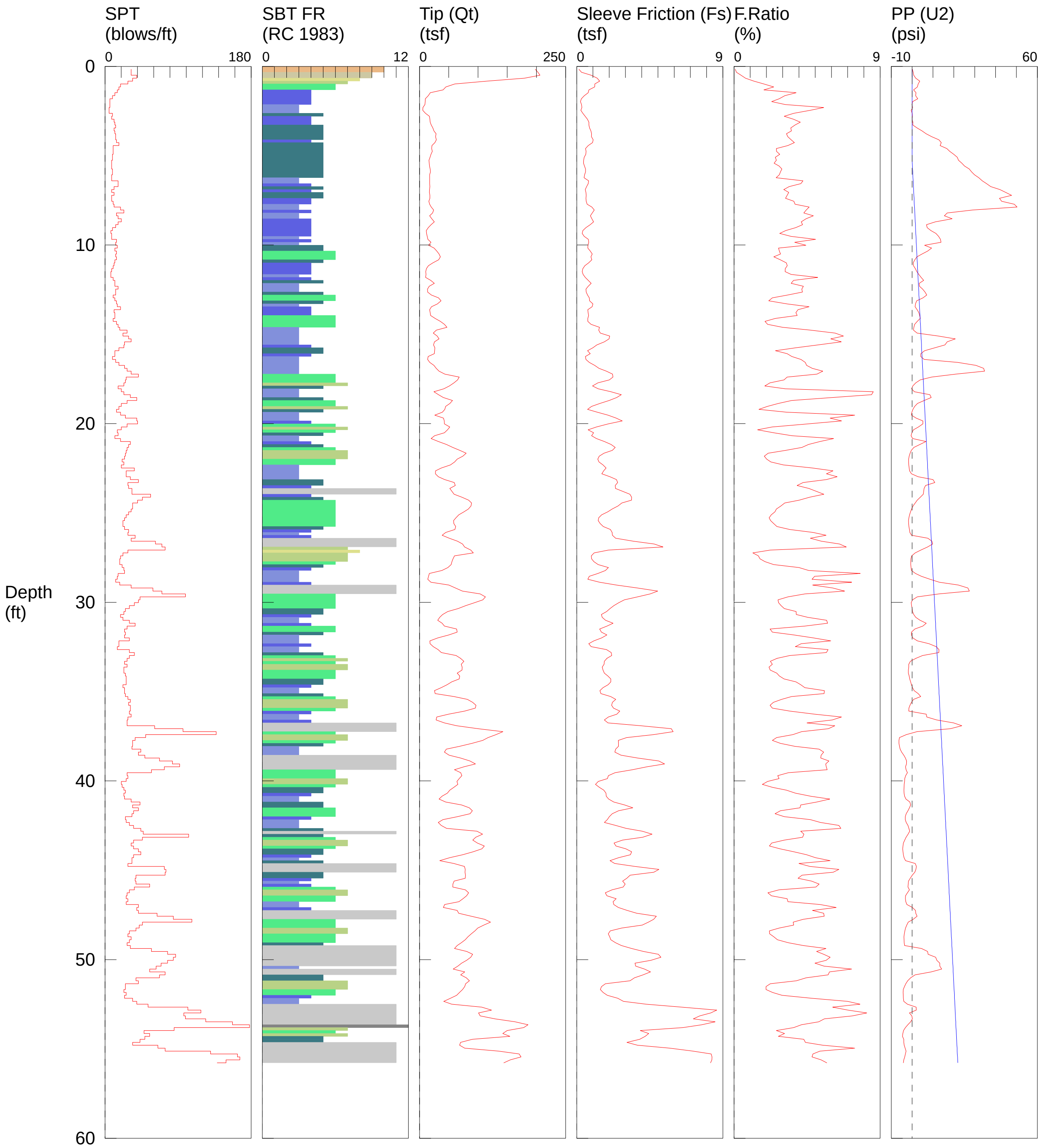
## CONE PENETROMETER TESTING

Our subsurface exploration program included two CPT probes (CPT-1 and CPT-2) to depths of approximately 55.5 and 56 feet BGS. Figure 2 shows the locations of the CPTs relative to proposed site features. The CPTs were performed in general accordance with ASTM D5778 by Oregon Explorations, Inc. on August 2, 2022. The results of the CPTs 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 and 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. At selected depths, the cone advancement was suspended and pore-water dissipation rates measured. Shear wave velocities were also measured at approximately 3-meter intervals in CPT-2.

# NV5 / CPT-1 / Panzer Nursery / Beaverton

OPERATOR: OGE BAK
CONE ID: DDG1532
HOLE NUMBER: CPT-1
TEST DATE: 8/2/2022 9:13:35 AM
TOTAL DEPTH: 55.774 ft

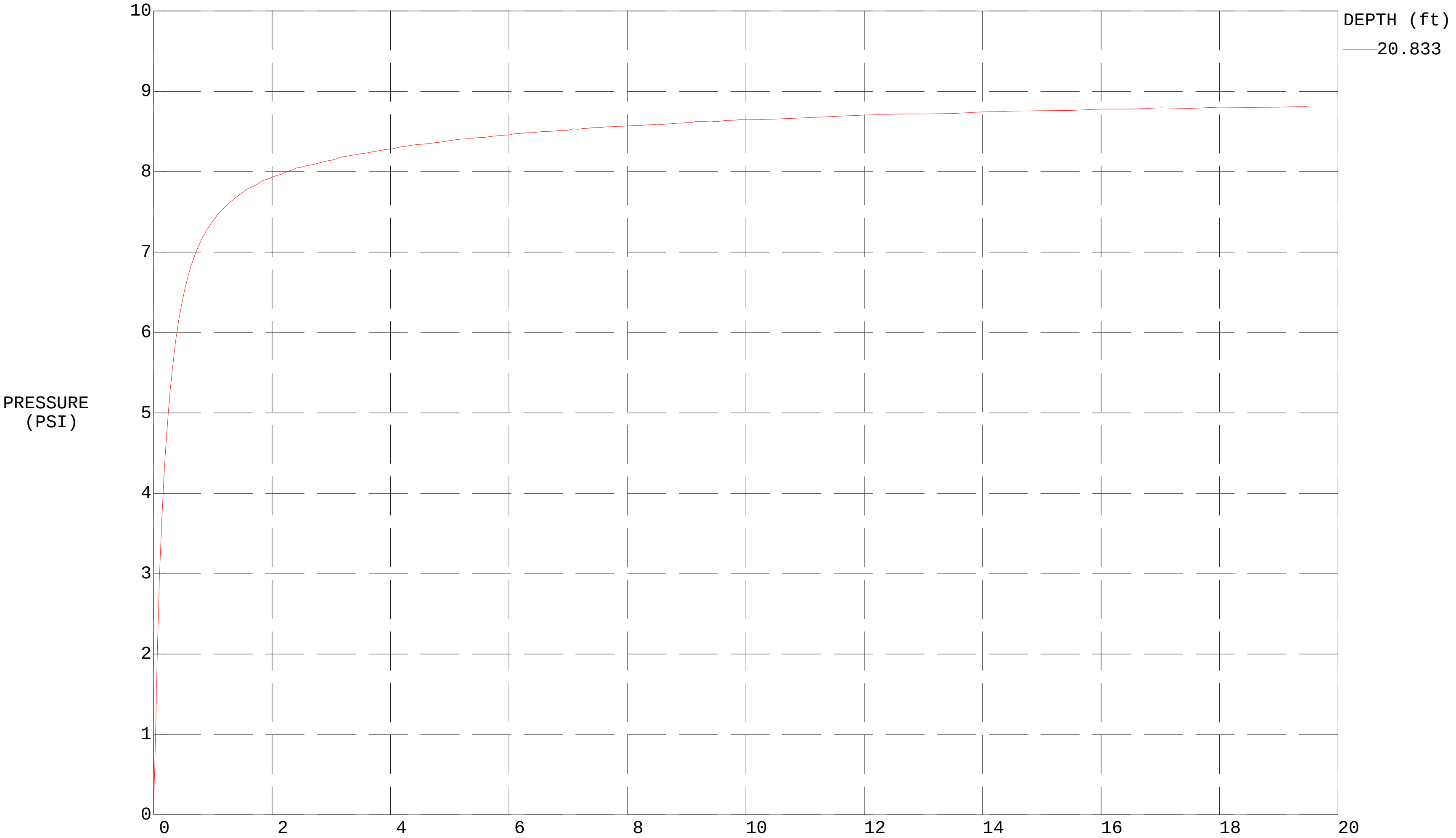


🟥 1 sensitive fine grained
▨ 2 organic material
▨ 3 clay
▨ 4 silty clay to clay
▨ 5 clayey silt to silty clay
🟩 6 sandy silt to clayey silt
▨ 7 silty sand to sandy silt
▨ 8 sand to silty sand
▨ 9 sand
▨ 10 gravelly sand to sand
▨ 11 very stiff fine grained (*)
▨ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

# COMMENT: NV5 / CPT-1 / Panzer Nursery / Beaverton

TEST DATE: 8/2/2022 9:13:35 AM



MAXIMUM PRESSURE = 8.813 (PSI) TIME: (MINUTES)

HYDROSTATIC PRESSURE = 6.733 (PSI), WATER TABLE: 5.30 ft

# NV5 / CPT-1 / Panzer Nursery / Beaverton

OPERATOR: OGE BAK
CONE ID: DDG1532
HOLE NUMBER: CPT-1
TEST DATE: 8/2/2022 9:13:35 AM
TOTAL DEPTH: 55.774 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 | 198.00 | 0.1328 | 0.067 | 0.117 | 32 | 10 | gravelly sand to sand |
| 0.328 | 202.64 | 0.2875 | 0.142 | 0.446 | 32 | 10 | gravelly sand to sand |
| 0.492 | 206.17 | 0.8865 | 0.430 | 0.718 | 39 | 9 | sand |
| 0.656 | 179.61 | 1.2550 | 0.699 | 1.711 | 34 | 9 | sand |
| 0.820 | 115.01 | 1.4048 | 1.221 | 3.634 | 28 | 8 | sand to silty sand |
| 0.984 | 60.29 | 1.1066 | 1.835 | 2.835 | 19 | 7 | silty sand to sandy silt |
| 1.148 | 45.02 | 1.0970 | 2.437 | 2.432 | 17 | 6 | sandy silt to clayey silt |
| 1.312 | 40.29 | 0.7408 | 1.839 | 0.670 | 15 | 6 | sandy silt to clayey silt |
| 1.476 | 18.24 | 0.6972 | 3.823 | 1.821 | 12 | 4 | silty clay to clay |
| 1.640 | 14.85 | 0.4640 | 3.125 | 1.631 | 9 | 4 | silty clay to clay |
| 1.804 | 9.85 | 0.2736 | 2.778 | 2.654 | 6 | 4 | silty clay to clay |
| 1.969 | 9.56 | 0.2219 | 2.321 | 0.203 | 6 | 4 | silty clay to clay |
| 2.133 | 9.04 | 0.2851 | 3.155 | -0.190 | 6 | 4 | silty clay to clay |
| 2.297 | 5.63 | 0.3110 | 5.520 | 0.219 | 5 | 3 | clay |
| 2.461 | 5.34 | 0.2500 | 4.684 | -0.515 | 5 | 3 | clay |
| 2.625 | 9.90 | 0.3644 | 3.680 | -0.043 | 9 | 3 | clay |
| 2.789 | 16.64 | 0.5137 | 3.088 | 0.099 | 8 | 5 | clayey silt to silty clay |
| 2.953 | 17.65 | 0.6455 | 3.658 | -0.117 | 11 | 4 | silty clay to clay |
| 3.117 | 18.10 | 0.7389 | 4.082 | 0.344 | 12 | 4 | silty clay to clay |
| 3.281 | 19.90 | 0.7476 | 3.756 | 0.248 | 13 | 4 | silty clay to clay |
| 3.445 | 22.61 | 0.7893 | 3.492 | 2.341 | 11 | 5 | clayey silt to silty clay |
| 3.609 | 24.53 | 0.8669 | 3.534 | 4.718 | 12 | 5 | clayey silt to silty clay |
| 3.773 | 28.12 | 0.9069 | 3.225 | 6.648 | 13 | 5 | clayey silt to silty clay |
| 3.937 | 27.21 | 0.8996 | 3.306 | 9.403 | 13 | 5 | clayey silt to silty clay |
| 4.101 | 28.57 | 1.0045 | 3.516 | 12.762 | 14 | 5 | clayey silt to silty clay |
| 4.265 | 25.98 | 0.9643 | 3.712 | 13.918 | 17 | 4 | silty clay to clay |
| 4.429 | 21.05 | 0.6967 | 3.309 | 13.374 | 10 | 5 | clayey silt to silty clay |
| 4.593 | 20.68 | 0.5379 | 2.601 | 16.577 | 10 | 5 | clayey silt to silty clay |
| 4.757 | 21.71 | 0.5674 | 2.614 | 18.014 | 10 | 5 | clayey silt to silty clay |
| 4.921 | 19.52 | 0.5491 | 2.812 | 19.909 | 9 | 5 | clayey silt to silty clay |
| 5.085 | 17.78 | 0.4519 | 2.542 | 21.626 | 9 | 5 | clayey silt to silty clay |
| 5.249 | 16.17 | 0.4225 | 2.612 | 22.195 | 8 | 5 | clayey silt to silty clay |
| 5.413 | 16.49 | 0.4058 | 2.461 | 23.770 | 8 | 5 | clayey silt to silty clay |
| 5.577 | 16.86 | 0.4665 | 2.768 | 25.060 | 8 | 5 | clayey silt to silty clay |
| 5.741 | 18.11 | 0.5333 | 2.945 | 27.313 | 9 | 5 | clayey silt to silty clay |
| 5.906 | 18.53 | 0.5287 | 2.853 | 28.490 | 9 | 5 | clayey silt to silty clay |
| 6.070 | 17.20 | 0.4796 | 2.789 | 29.839 | 8 | 5 | clayey silt to silty clay |
| 6.234 | 17.16 | 0.4444 | 2.590 | 31.935 | 8 | 5 | clayey silt to silty clay |
| 6.398 | 17.12 | 0.7261 | 4.241 | 33.603 | 16 | 3 | clay |
| 6.562 | 17.15 | 0.7056 | 4.113 | 35.643 | 16 | 3 | clay |
| 6.726 | 17.60 | 0.5975 | 3.395 | 37.629 | 11 | 4 | silty clay to clay |
| 6.890 | 16.82 | 0.5159 | 3.067 | 42.037 | 8 | 5 | clayey silt to silty clay |
| 7.054 | 16.59 | 0.5592 | 3.370 | 44.809 | 11 | 4 | silty clay to clay |
| 7.218 | 17.70 | 0.5780 | 3.265 | 47.612 | 8 | 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 |
|---|---|---|---|---|---|---|---|
| 7.382 | 17.66 | 0.5591 | 3.167 | 41.816 | 8 | 5 | clayey silt to silty clay |
| 7.546 | 15.74 | 0.5807 | 3.688 | 42.868 | 10 | 4 | silty clay to clay |
| 7.710 | 16.99 | 0.6380 | 3.755 | 48.888 | 11 | 4 | silty clay to clay |
| 7.874 | 20.03 | 0.9269 | 4.627 | 50.277 | 19 | 3 | clay |
| 8.038 | 24.15 | 1.0738 | 4.447 | 28.966 | 23 | 3 | clay |
| 8.202 | 22.19 | 0.9532 | 4.296 | 16.799 | 14 | 4 | silty clay to clay |
| 8.366 | 17.10 | 0.8345 | 4.879 | 15.400 | 16 | 3 | clay |
| 8.530 | 20.85 | 0.9251 | 4.437 | 19.156 | 20 | 3 | clay |
| 8.694 | 25.09 | 1.0381 | 4.137 | 11.109 | 16 | 4 | silty clay to clay |
| 8.858 | 19.71 | 0.8311 | 4.216 | 6.835 | 13 | 4 | silty clay to clay |
| 9.022 | 14.76 | 0.5601 | 3.795 | 7.190 | 9 | 4 | silty clay to clay |
| 9.186 | 11.55 | 0.3669 | 3.177 | 8.963 | 7 | 4 | silty clay to clay |
| 9.350 | 11.86 | 0.3335 | 2.813 | 11.384 | 8 | 4 | silty clay to clay |
| 9.514 | 12.98 | 0.4547 | 3.503 | 12.650 | 8 | 4 | silty clay to clay |
| 9.678 | 14.14 | 0.7100 | 5.021 | 13.560 | 14 | 3 | clay |
| 9.843 | 19.60 | 0.7312 | 3.731 | 13.827 | 13 | 4 | silty clay to clay |
| 10.007 | 15.38 | 0.6817 | 4.433 | 5.930 | 15 | 3 | clay |
| 10.171 | 24.78 | 0.6788 | 2.739 | 9.286 | 12 | 5 | clayey silt to silty clay |
| 10.335 | 29.42 | 0.8202 | 2.788 | 7.454 | 14 | 5 | clayey silt to silty clay |
| 10.499 | 33.39 | 0.9558 | 2.863 | 4.686 | 13 | 6 | sandy silt to clayey silt |
| 10.663 | 35.41 | 0.8686 | 2.453 | 2.293 | 14 | 6 | sandy silt to clayey silt |
| 10.827 | 32.60 | 0.9263 | 2.842 | 1.244 | 12 | 6 | sandy silt to clayey silt |
| 10.991 | 22.56 | 0.7257 | 3.216 | 0.467 | 11 | 5 | clayey silt to silty clay |
| 11.155 | 15.10 | 0.4953 | 3.279 | 0.651 | 10 | 4 | silty clay to clay |
| 11.319 | 11.76 | 0.3710 | 3.154 | 1.466 | 8 | 4 | silty clay to clay |
| 11.483 | 10.64 | 0.3339 | 3.138 | 2.256 | 7 | 4 | silty clay to clay |
| 11.647 | 10.91 | 0.3842 | 3.523 | 3.177 | 7 | 4 | silty clay to clay |
| 11.811 | 10.09 | 0.5198 | 5.151 | 4.283 | 10 | 3 | clay |
| 11.975 | 19.06 | 0.6986 | 3.665 | 5.537 | 12 | 4 | silty clay to clay |
| 12.139 | 25.23 | 0.8855 | 3.510 | 3.375 | 12 | 5 | clayey silt to silty clay |
| 12.303 | 16.55 | 0.7072 | 4.273 | 3.498 | 16 | 3 | clay |
| 12.467 | 13.45 | 0.5606 | 4.167 | 4.995 | 13 | 3 | clay |
| 12.631 | 13.57 | 0.5713 | 4.211 | 6.133 | 13 | 3 | clay |
| 12.795 | 20.08 | 0.6623 | 3.298 | 6.968 | 10 | 5 | clayey silt to silty clay |
| 12.959 | 32.48 | 0.7648 | 2.354 | 5.206 | 12 | 6 | sandy silt to clayey silt |
| 13.123 | 36.76 | 0.7835 | 2.131 | 2.109 | 14 | 6 | sandy silt to clayey silt |
| 13.287 | 30.39 | 0.9907 | 3.260 | 1.546 | 15 | 5 | clayey silt to silty clay |
| 13.451 | 20.29 | 0.9364 | 4.615 | 1.386 | 19 | 3 | clay |
| 13.615 | 17.26 | 0.6798 | 3.938 | 2.368 | 11 | 4 | silty clay to clay |
| 13.780 | 18.05 | 0.6870 | 3.806 | 3.172 | 12 | 4 | silty clay to clay |
| 13.944 | 18.71 | 0.7270 | 3.885 | 3.591 | 12 | 4 | silty clay to clay |
| 14.108 | 26.69 | 0.6777 | 2.539 | 3.869 | 10 | 6 | sandy silt to clayey silt |
| 14.272 | 35.71 | 0.6773 | 1.897 | 2.408 | 14 | 6 | sandy silt to clayey silt |
| 14.436 | 42.49 | 0.8792 | 2.069 | 1.191 | 16 | 6 | sandy silt to clayey silt |
| 14.600 | 46.68 | 1.3937 | 2.985 | 0.764 | 18 | 6 | sandy silt to clayey silt |
| 14.764 | 28.58 | 1.3459 | 4.710 | 0.649 | 27 | 3 | clay |
| 14.928 | 23.32 | 1.4526 | 6.228 | 2.320 | 22 | 3 | clay |
| 15.092 | 30.10 | 2.0286 | 6.739 | 12.586 | 29 | 3 | clay |
| 15.256 | 33.32 | 1.9861 | 5.961 | 20.649 | 32 | 3 | clay |
| 15.420 | 25.56 | 1.6883 | 6.605 | 16.799 | 24 | 3 | clay |
| 15.584 | 23.75 | 1.2259 | 5.162 | 15.651 | 23 | 3 | clay |
| 15.748 | 26.06 | 0.9953 | 3.819 | 10.941 | 17 | 4 | silty clay to clay |
| 15.912 | 25.78 | 0.6566 | 2.547 | 5.930 | 12 | 5 | clayey silt to silty clay |

| Depth<br>ft | Tip (Qt)<br>(tsf) | Sleeve Friction (Fs)<br>(tsf) | F.Ratio<br>(%) | PP (U2)<br>(psi) | SPT<br>(blows/ft) | Zone | Soil Behavior Type<br>UBC-1983 |
|---|---|---|---|---|---|---|---|
| 16.076 | 25.22 | 0.8244 | 3.269 | 4.130 | 12 | 5 | clayey silt to silty clay |
| 16.240 | 14.65 | 0.5222 | 3.564 | 4.077 | 9 | 4 | silty clay to clay |
| 16.404 | 13.63 | 0.5612 | 4.117 | 5.799 | 13 | 3 | clay |
| 16.568 | 17.51 | 0.7672 | 4.382 | 21.826 | 17 | 3 | clay |
| 16.732 | 24.63 | 1.1000 | 4.466 | 30.549 | 24 | 3 | clay |
| 16.896 | 28.41 | 1.3698 | 4.821 | 34.239 | 27 | 3 | clay |
| 17.060 | 33.28 | 1.8179 | 5.463 | 34.647 | 32 | 3 | clay |
| 17.224 | 43.09 | 2.2008 | 5.107 | 20.935 | 41 | 3 | clay |
| 17.388 | 67.91 | 2.2234 | 3.274 | 9.302 | 26 | 6 | sandy silt to clayey silt |
| 17.552 | 65.07 | 2.0030 | 3.078 | 3.826 | 25 | 6 | sandy silt to clayey silt |
| 17.717 | 58.81 | 1.3008 | 2.212 | 1.685 | 23 | 6 | sandy silt to clayey silt |
| 17.881 | 51.03 | 0.9649 | 1.891 | 0.310 | 16 | 7 | silty sand to sandy silt |
| 18.045 | 41.58 | 1.3087 | 3.148 | -0.259 | 20 | 5 | clayey silt to silty clay |
| 18.209 | 24.45 | 2.0967 | 8.577 | 1.071 | 23 | 3 | clay |
| 18.373 | 32.37 | 2.7413 | 8.467 | 8.448 | 31 | 3 | clay |
| 18.537 | 40.61 | 2.4567 | 6.050 | 9.104 | 39 | 3 | clay |
| 18.701 | 56.17 | 1.9937 | 3.549 | 5.759 | 27 | 5 | clayey silt to silty clay |
| 18.865 | 52.01 | 1.4216 | 2.734 | 2.536 | 20 | 6 | sandy silt to clayey silt |
| 19.029 | 44.46 | 0.9103 | 2.048 | 1.143 | 17 | 6 | sandy silt to clayey silt |
| 19.193 | 43.23 | 0.6581 | 1.522 | 0.360 | 14 | 7 | silty sand to sandy silt |
| 19.357 | 39.02 | 1.2573 | 3.222 | -0.158 | 19 | 5 | clayey silt to silty clay |
| 19.521 | 25.83 | 1.9201 | 7.433 | -0.336 | 25 | 3 | clay |
| 19.685 | 40.92 | 2.4234 | 5.922 | 1.909 | 39 | 3 | clay |
| 19.849 | 42.25 | 2.7974 | 6.620 | 5.070 | 40 | 3 | clay |
| 20.013 | 42.46 | 1.9305 | 4.547 | 5.094 | 27 | 4 | silty clay to clay |
| 20.177 | 51.55 | 1.2050 | 2.338 | 2.998 | 20 | 6 | sandy silt to clayey silt |
| 20.341 | 47.71 | 0.6923 | 1.451 | 0.643 | 15 | 7 | silty sand to sandy silt |
| 20.505 | 42.45 | 1.0339 | 2.435 | -0.174 | 16 | 6 | sandy silt to clayey silt |
| 20.669 | 25.60 | 0.9131 | 3.567 | -0.547 | 12 | 5 | clayey silt to silty clay |
| 20.833 | 19.74 | 1.2111 | 6.136 | 0.206 | 19 | 3 | clay |
| 20.997 | 32.10 | 1.6990 | 5.293 | 6.608 | 31 | 3 | clay |
| 21.161 | 46.04 | 2.1093 | 4.581 | 3.668 | 29 | 4 | silty clay to clay |
| 21.325 | 56.79 | 2.3698 | 4.173 | 0.785 | 27 | 5 | clayey silt to silty clay |
| 21.490 | 68.82 | 2.1811 | 3.169 | -0.467 | 26 | 6 | sandy silt to clayey silt |
| 21.654 | 79.69 | 1.6723 | 2.098 | -0.988 | 25 | 7 | silty sand to sandy silt |
| 21.818 | 74.03 | 1.3791 | 1.863 | -1.460 | 24 | 7 | silty sand to sandy silt |
| 21.982 | 64.36 | 1.2922 | 2.008 | -1.733 | 21 | 7 | silty sand to sandy silt |
| 22.146 | 60.05 | 1.3585 | 2.262 | -1.735 | 23 | 6 | sandy silt to clayey silt |
| 22.310 | 52.98 | 1.6100 | 3.039 | -1.661 | 20 | 6 | sandy silt to clayey silt |
| 22.474 | 37.24 | 1.8002 | 4.834 | -1.455 | 36 | 3 | clay |
| 22.638 | 27.14 | 1.6543 | 6.095 | -1.239 | 26 | 3 | clay |
| 22.802 | 27.06 | 1.5408 | 5.693 | -0.328 | 26 | 3 | clay |
| 22.966 | 32.16 | 2.0429 | 6.352 | 2.867 | 31 | 3 | clay |
| 23.130 | 42.96 | 2.4425 | 5.686 | 9.953 | 41 | 3 | clay |
| 23.294 | 59.18 | 2.5147 | 4.249 | 10.853 | 28 | 5 | clayey silt to silty clay |
| 23.458 | 61.10 | 2.3695 | 3.878 | 6.373 | 29 | 5 | clayey silt to silty clay |
| 23.622 | 51.60 | 2.3781 | 4.608 | 5.695 | 33 | 4 | silty clay to clay |
| 23.950 | 58.99 | 3.2616 | 5.529 | 5.300 | 56 | 11 | very stiff fine grained (*) |
| 24.114 | 72.54 | 3.3779 | 4.657 | 3.898 | 46 | 4 | silty clay to clay |
| 24.278 | 83.95 | 3.3698 | 4.014 | 2.398 | 40 | 5 | clayey silt to silty clay |
| 24.442 | 89.00 | 2.7746 | 3.118 | 1.458 | 34 | 6 | sandy silt to clayey silt |
| 24.606 | 87.97 | 2.5376 | 2.885 | 0.425 | 34 | 6 | sandy silt to clayey silt |
| 24.770 | 83.40 | 2.1773 | 2.611 | -0.259 | 32 | 6 | sandy silt to clayey silt |

| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 24.934 | 75.96 | 1.9063 | 2.510 | -0.836 | 29 | 6 | sandy silt to clayey silt |
| 25.098 | 67.04 | 1.5339 | 2.288 | -1.255 | 26 | 6 | sandy silt to clayey silt |
| 25.262 | 62.34 | 1.3476 | 2.162 | -1.586 | 24 | 6 | sandy silt to clayey silt |
| 25.427 | 58.18 | 1.3109 | 2.253 | -1.800 | 22 | 6 | sandy silt to clayey silt |
| 25.591 | 58.62 | 1.4333 | 2.445 | -1.735 | 22 | 6 | sandy silt to clayey silt |
| 25.755 | 61.80 | 1.6281 | 2.634 | -1.581 | 24 | 6 | sandy silt to clayey silt |
| 25.919 | 60.47 | 2.0698 | 3.423 | -1.364 | 29 | 5 | clayey silt to silty clay |
| 26.083 | 44.61 | 2.1721 | 4.869 | -1.151 | 28 | 4 | silty clay to clay |
| 26.247 | 38.59 | 2.1908 | 5.677 | -0.296 | 37 | 3 | clay |
| 26.411 | 50.75 | 2.3861 | 4.702 | 7.494 | 32 | 4 | silty clay to clay |
| 26.575 | 64.73 | 3.4747 | 5.368 | 9.417 | 62 | 11 | very stiff fine grained (*) |
| 26.739 | 73.40 | 4.7707 | 6.499 | 9.812 | 70 | 11 | very stiff fine grained (*) |
| 26.903 | 76.82 | 5.3089 | 6.911 | 7.350 | 74 | 11 | very stiff fine grained (*) |
| 27.067 | 87.64 | 1.9556 | 2.231 | 4.192 | 28 | 7 | silty sand to sandy silt |
| 27.231 | 92.00 | 1.0643 | 1.157 | 1.442 | 22 | 8 | sand to silty sand |
| 27.395 | 59.63 | 0.8913 | 1.495 | -0.224 | 19 | 7 | silty sand to sandy silt |
| 27.559 | 57.09 | 0.9094 | 1.593 | -0.579 | 18 | 7 | silty sand to sandy silt |
| 27.723 | 55.49 | 1.0520 | 1.896 | -0.721 | 18 | 7 | silty sand to sandy silt |
| 27.887 | 53.84 | 1.3119 | 2.437 | -0.678 | 21 | 6 | sandy silt to clayey silt |
| 28.051 | 48.52 | 1.9402 | 3.999 | -0.542 | 23 | 5 | clayey silt to silty clay |
| 28.215 | 38.21 | 1.7599 | 4.605 | -0.398 | 24 | 4 | silty clay to clay |
| 28.379 | 16.70 | 1.2978 | 7.770 | 1.597 | 16 | 3 | clay |
| 28.543 | 15.38 | 0.7637 | 4.966 | 4.395 | 15 | 3 | clay |
| 28.707 | 14.08 | 0.6752 | 4.797 | 8.512 | 13 | 3 | clay |
| 28.871 | 19.25 | 1.3934 | 7.237 | 12.992 | 18 | 3 | clay |
| 29.035 | 50.09 | 2.4262 | 4.843 | 22.109 | 32 | 4 | silty clay to clay |
| 29.199 | 61.34 | 3.7350 | 6.089 | 26.643 | 59 | 11 | very stiff fine grained (*) |
| 29.364 | 73.22 | 4.9830 | 6.806 | 27.406 | 70 | 11 | very stiff fine grained (*) |
| 29.528 | 103.66 | 4.5206 | 4.361 | 12.735 | 99 | 11 | very stiff fine grained (*) |
| 29.692 | 112.53 | 3.7384 | 3.322 | 2.376 | 43 | 6 | sandy silt to clayey silt |
| 29.856 | 108.26 | 2.9297 | 2.706 | 0.131 | 41 | 6 | sandy silt to clayey silt |
| 30.020 | 94.31 | 2.5858 | 2.742 | -0.478 | 36 | 6 | sandy silt to clayey silt |
| 30.184 | 78.93 | 2.2829 | 2.892 | -0.291 | 30 | 6 | sandy silt to clayey silt |
| 30.348 | 66.03 | 2.0397 | 3.089 | -0.029 | 25 | 6 | sandy silt to clayey silt |
| 30.512 | 48.06 | 1.8380 | 3.825 | 0.125 | 23 | 5 | clayey silt to silty clay |
| 30.676 | 39.49 | 1.5117 | 3.828 | 0.716 | 19 | 5 | clayey silt to silty clay |
| 30.840 | 34.46 | 1.5625 | 4.535 | 1.690 | 22 | 4 | silty clay to clay |
| 31.004 | 30.93 | 1.7639 | 5.702 | 3.738 | 30 | 3 | clay |
| 31.168 | 38.63 | 2.2260 | 5.763 | 6.749 | 37 | 3 | clay |
| 31.332 | 42.64 | 1.8628 | 4.368 | 5.078 | 27 | 4 | silty clay to clay |
| 31.496 | 63.44 | 1.4078 | 2.219 | 1.287 | 24 | 6 | sandy silt to clayey silt |
| 31.660 | 64.43 | 1.5143 | 2.350 | -0.320 | 25 | 6 | sandy silt to clayey silt |
| 31.824 | 50.12 | 1.8470 | 3.685 | -0.334 | 24 | 5 | clayey silt to silty clay |
| 31.988 | 31.30 | 1.5290 | 4.886 | 0.230 | 30 | 3 | clay |
| 32.152 | 17.68 | 1.0522 | 5.953 | 2.456 | 17 | 3 | clay |
| 32.316 | 17.74 | 0.7342 | 4.137 | 7.972 | 17 | 3 | clay |
| 32.480 | 23.41 | 0.8841 | 3.777 | 11.454 | 15 | 4 | silty clay to clay |
| 32.644 | 31.55 | 1.8290 | 5.796 | 12.813 | 30 | 3 | clay |
| 32.808 | 37.26 | 2.1192 | 5.688 | 12.767 | 36 | 3 | clay |
| 32.972 | 62.52 | 2.1444 | 3.430 | 4.971 | 30 | 5 | clayey silt to silty clay |
| 33.136 | 70.01 | 1.8513 | 2.644 | 1.733 | 27 | 6 | sandy silt to clayey silt |
| 33.301 | 75.79 | 1.6892 | 2.229 | -0.881 | 24 | 7 | silty sand to sandy silt |
| 33.465 | 71.07 | 1.6782 | 2.361 | -1.666 | 27 | 6 | sandy silt to clayey silt |

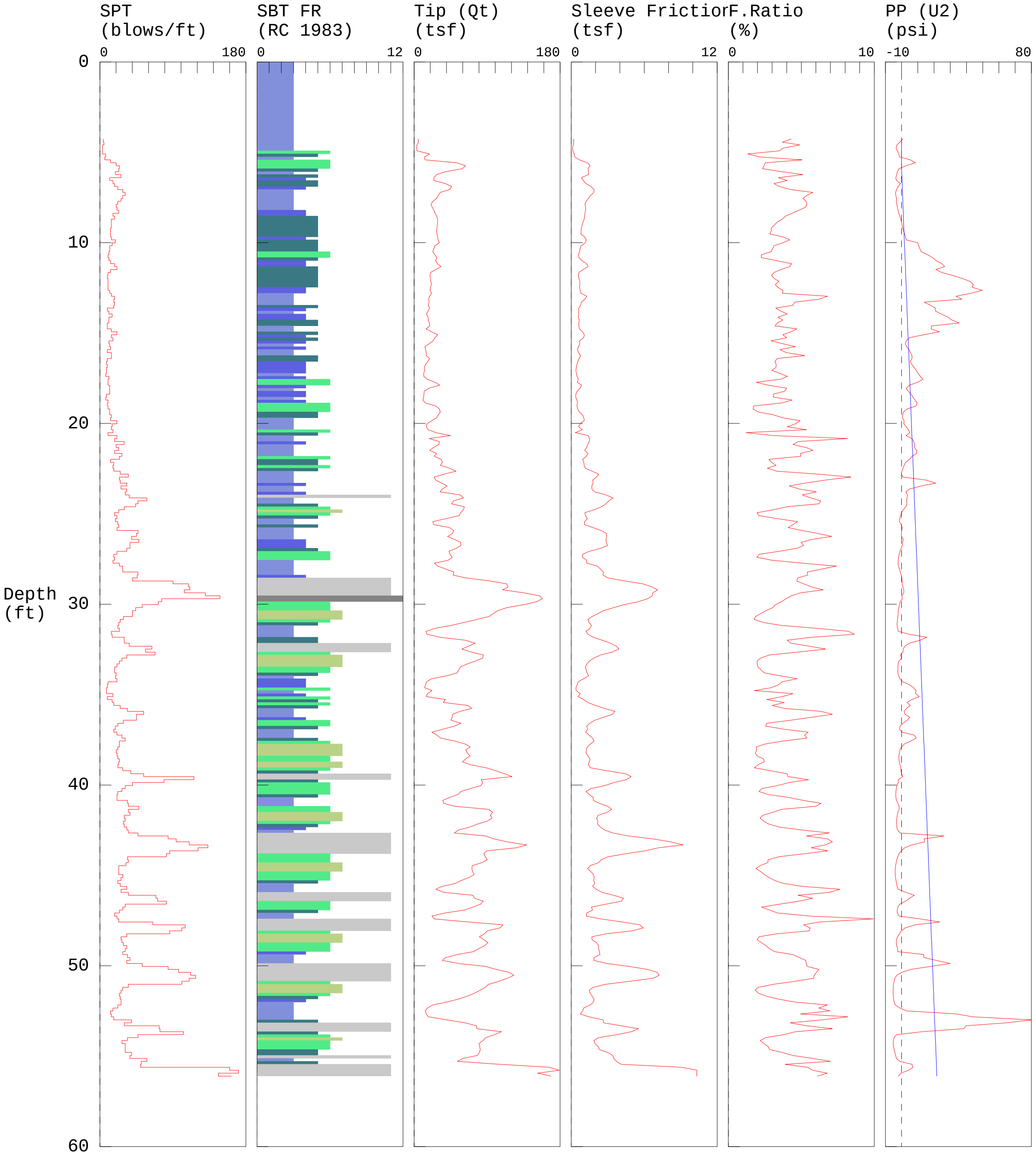
| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 33.629 | 72.79 | 1.5603 | 2.144 | -1.621 | 23 | 7 | silty sand to sandy silt |
| 33.793 | 72.68 | 1.6133 | 2.220 | -1.842 | 23 | 7 | silty sand to sandy silt |
| 33.957 | 64.46 | 1.6956 | 2.631 | -1.829 | 25 | 6 | sandy silt to clayey silt |
| 34.121 | 68.55 | 1.9123 | 2.790 | -1.482 | 26 | 6 | sandy silt to clayey silt |
| 34.285 | 67.90 | 2.0911 | 3.080 | -1.185 | 26 | 6 | sandy silt to clayey silt |
| 34.449 | 54.86 | 2.0925 | 3.814 | -0.790 | 26 | 5 | clayey silt to silty clay |
| 34.613 | 46.94 | 1.9283 | 4.108 | -0.395 | 22 | 5 | clayey silt to silty clay |
| 34.777 | 36.94 | 1.6099 | 4.359 | 0.142 | 24 | 4 | silty clay to clay |
| 34.941 | 25.51 | 1.4184 | 5.560 | 0.910 | 24 | 3 | clay |
| 35.105 | 26.60 | 1.4764 | 5.551 | 2.878 | 25 | 3 | clay |
| 35.269 | 58.94 | 2.0869 | 3.541 | 4.045 | 28 | 5 | clayey silt to silty clay |
| 35.433 | 81.78 | 2.3952 | 2.929 | 0.686 | 31 | 6 | sandy silt to clayey silt |
| 35.597 | 90.64 | 2.1941 | 2.421 | -0.398 | 29 | 7 | silty sand to sandy silt |
| 35.761 | 96.50 | 2.1392 | 2.217 | -1.103 | 31 | 7 | silty sand to sandy silt |
| 35.925 | 95.56 | 2.2565 | 2.361 | -1.594 | 31 | 7 | silty sand to sandy silt |
| 36.089 | 77.31 | 2.6447 | 3.421 | -1.682 | 30 | 6 | sandy silt to clayey silt |
| 36.253 | 49.69 | 2.4610 | 4.952 | 6.736 | 32 | 4 | silty clay to clay |
| 36.417 | 29.37 | 1.9417 | 6.612 | 6.942 | 28 | 3 | clay |
| 36.581 | 28.09 | 1.7000 | 6.052 | 11.753 | 27 | 3 | clay |
| 36.745 | 42.63 | 1.9163 | 4.495 | 19.835 | 27 | 4 | silty clay to clay |
| 36.909 | 63.42 | 3.9409 | 6.214 | 23.842 | 61 | 11 | very stiff fine grained (*) |
| 37.073 | 100.09 | 5.8152 | 5.810 | 18.307 | 96 | 11 | very stiff fine grained (*) |
| 37.238 | 142.59 | 5.9388 | 4.165 | 2.315 | 137 | 11 | very stiff fine grained (*) |
| 37.402 | 130.75 | 4.7352 | 3.622 | -2.787 | 50 | 6 | sandy silt to clayey silt |
| 37.566 | 117.35 | 3.0738 | 2.619 | -6.103 | 37 | 7 | silty sand to sandy silt |
| 37.730 | 108.05 | 2.5520 | 2.362 | -6.336 | 34 | 7 | silty sand to sandy silt |
| 37.894 | 89.72 | 2.5610 | 2.854 | -6.349 | 34 | 6 | sandy silt to clayey silt |
| 38.058 | 68.41 | 2.5604 | 3.743 | -6.074 | 33 | 5 | clayey silt to silty clay |
| 38.222 | 45.55 | 2.3863 | 5.239 | -5.754 | 44 | 3 | clay |
| 38.386 | 42.36 | 2.3382 | 5.520 | -5.038 | 41 | 3 | clay |
| 38.550 | 50.68 | 2.7171 | 5.361 | -4.066 | 49 | 3 | clay |
| 38.714 | 70.14 | 3.7420 | 5.335 | -3.215 | 67 | 11 | very stiff fine grained (*) |
| 38.878 | 86.29 | 5.0428 | 5.844 | -2.707 | 83 | 11 | very stiff fine grained (*) |
| 39.042 | 95.70 | 5.4049 | 5.648 | -2.737 | 92 | 11 | very stiff fine grained (*) |
| 39.206 | 76.19 | 4.3287 | 5.682 | -3.199 | 73 | 11 | very stiff fine grained (*) |
| 39.370 | 59.68 | 3.4231 | 5.736 | -2.950 | 57 | 11 | very stiff fine grained (*) |
| 39.534 | 70.38 | 2.3549 | 3.346 | -2.307 | 27 | 6 | sandy silt to clayey silt |
| 39.698 | 72.46 | 1.9466 | 2.686 | -3.126 | 28 | 6 | sandy silt to clayey silt |
| 39.862 | 67.72 | 1.8810 | 2.777 | -3.562 | 26 | 6 | sandy silt to clayey silt |
| 40.026 | 63.83 | 1.3210 | 2.070 | -3.676 | 20 | 7 | silty sand to sandy silt |
| 40.190 | 65.57 | 1.1450 | 1.746 | -3.805 | 21 | 7 | silty sand to sandy silt |
| 40.354 | 58.74 | 1.3893 | 2.365 | -3.946 | 23 | 6 | sandy silt to clayey silt |
| 40.518 | 51.62 | 1.6644 | 3.225 | -3.989 | 25 | 5 | clayey silt to silty clay |
| 40.682 | 47.47 | 1.7923 | 3.776 | -3.871 | 23 | 5 | clayey silt to silty clay |
| 40.846 | 38.28 | 1.8055 | 4.716 | -3.650 | 24 | 4 | silty clay to clay |
| 41.011 | 33.26 | 1.9597 | 5.892 | -3.044 | 32 | 3 | clay |
| 41.175 | 44.48 | 2.2700 | 5.103 | -1.145 | 43 | 3 | clay |
| 41.339 | 71.82 | 2.9486 | 4.106 | -0.769 | 34 | 5 | clayey silt to silty clay |
| 41.503 | 84.91 | 3.4499 | 4.063 | -1.359 | 41 | 5 | clayey silt to silty clay |
| 41.667 | 90.22 | 2.5768 | 2.856 | -2.050 | 35 | 6 | sandy silt to clayey silt |
| 41.831 | 86.45 | 2.1796 | 2.521 | -2.854 | 33 | 6 | sandy silt to clayey silt |
| 41.995 | 64.82 | 2.0033 | 3.091 | -3.348 | 25 | 6 | sandy silt to clayey silt |
| 42.159 | 39.97 | 1.8792 | 4.702 | -3.335 | 26 | 4 | silty clay to clay |

| Depth<br>ft | Tip (Qt)<br>(tsf) | Sleeve Friction (Fs)<br>(tsf) | F.Ratio<br>(%) | PP (U2)<br>(psi) | SPT<br>(blows/ft) | Zone | Soil Behavior Type<br>UBC-1983 |
|---|---|---|---|---|---|---|---|
| 42.323 | 31.77 | 1.6912 | 5.323 | -2.851 | 30 | 3 | clay |
| 42.487 | 36.99 | 2.3860 | 6.451 | -2.050 | 35 | 3 | clay |
| 42.651 | 46.14 | 3.0348 | 6.578 | -1.591 | 44 | 3 | clay |
| 42.815 | 98.24 | 4.0331 | 4.105 | -1.199 | 47 | 5 | clayey silt to silty clay |
| 42.979 | 107.75 | 4.6388 | 4.305 | -1.960 | 103 | 11 | very stiff fine grained (*) |
| 43.143 | 96.08 | 4.0573 | 4.223 | -2.932 | 46 | 5 | clayey silt to silty clay |
| 43.307 | 90.98 | 2.8206 | 3.100 | -3.631 | 35 | 6 | sandy silt to clayey silt |
| 43.471 | 98.98 | 2.2887 | 2.312 | -4.176 | 32 | 7 | silty sand to sandy silt |
| 43.635 | 110.81 | 2.4120 | 2.177 | -4.440 | 35 | 7 | silty sand to sandy silt |
| 43.799 | 106.67 | 3.0163 | 2.828 | -4.517 | 41 | 6 | sandy silt to clayey silt |
| 43.963 | 91.71 | 3.3783 | 3.684 | -4.421 | 44 | 5 | clayey silt to silty clay |
| 44.127 | 73.77 | 3.3014 | 4.475 | -4.210 | 35 | 5 | clayey silt to silty clay |
| 44.291 | 51.37 | 2.5765 | 5.016 | -3.893 | 33 | 4 | silty clay to clay |
| 44.455 | 34.49 | 2.0427 | 5.922 | -3.196 | 33 | 3 | clay |
| 44.619 | 58.42 | 2.3355 | 3.998 | 1.415 | 28 | 5 | clayey silt to silty clay |
| 44.783 | 76.67 | 3.5834 | 4.674 | 2.000 | 73 | 11 | very stiff fine grained (*) |
| 44.948 | 78.30 | 5.0572 | 6.459 | 1.770 | 75 | 11 | very stiff fine grained (*) |
| 45.112 | 77.63 | 4.7422 | 6.109 | 1.242 | 74 | 11 | very stiff fine grained (*) |
| 45.276 | 78.51 | 3.2876 | 4.187 | 0.019 | 38 | 5 | clayey silt to silty clay |
| 45.440 | 78.17 | 3.0790 | 3.939 | -0.905 | 37 | 5 | clayey silt to silty clay |
| 45.604 | 59.12 | 2.8248 | 4.778 | -1.783 | 38 | 4 | silty clay to clay |
| 45.768 | 56.99 | 2.9838 | 5.236 | -1.890 | 55 | 3 | clay |
| 45.932 | 56.72 | 2.8561 | 5.035 | -2.056 | 36 | 4 | silty clay to clay |
| 46.096 | 78.43 | 2.1662 | 2.762 | -1.359 | 30 | 6 | sandy silt to clayey silt |
| 46.260 | 83.85 | 1.7497 | 2.087 | -2.341 | 27 | 7 | silty sand to sandy silt |
| 46.424 | 80.54 | 1.8500 | 2.297 | -3.156 | 26 | 7 | silty sand to sandy silt |
| 46.588 | 74.26 | 2.4241 | 3.264 | -3.305 | 28 | 6 | sandy silt to clayey silt |
| 46.752 | 67.25 | 2.2324 | 3.320 | -3.081 | 26 | 6 | sandy silt to clayey silt |
| 46.916 | 42.97 | 2.2791 | 5.303 | -2.528 | 41 | 3 | clay |
| 47.080 | 40.55 | 2.5511 | 6.291 | 0.115 | 39 | 3 | clay |
| 47.244 | 64.34 | 3.1080 | 4.830 | 1.519 | 41 | 4 | silty clay to clay |
| 47.408 | 66.83 | 3.6906 | 5.522 | 1.685 | 64 | 11 | very stiff fine grained (*) |
| 47.572 | 88.15 | 4.8994 | 5.558 | 2.336 | 84 | 11 | very stiff fine grained (*) |
| 47.736 | 111.23 | 4.7347 | 4.257 | 0.489 | 107 | 11 | very stiff fine grained (*) |
| 47.900 | 121.28 | 4.4075 | 3.634 | -1.898 | 46 | 6 | sandy silt to clayey silt |
| 48.064 | 109.89 | 4.0340 | 3.671 | -2.614 | 42 | 6 | sandy silt to clayey silt |
| 48.228 | 99.45 | 2.7640 | 2.779 | -3.175 | 38 | 6 | sandy silt to clayey silt |
| 48.392 | 94.65 | 2.0583 | 2.175 | -3.500 | 30 | 7 | silty sand to sandy silt |
| 48.556 | 88.60 | 1.9356 | 2.185 | -3.797 | 28 | 7 | silty sand to sandy silt |
| 48.720 | 82.57 | 2.0240 | 2.451 | -3.962 | 32 | 6 | sandy silt to clayey silt |
| 48.885 | 78.30 | 2.0908 | 2.670 | -3.933 | 30 | 6 | sandy silt to clayey silt |
| 49.049 | 71.42 | 2.3816 | 3.335 | -3.837 | 27 | 6 | sandy silt to clayey silt |
| 49.213 | 64.46 | 2.7480 | 4.263 | -3.679 | 31 | 5 | clayey silt to silty clay |
| 49.377 | 59.56 | 3.3717 | 5.662 | 4.443 | 57 | 11 | very stiff fine grained (*) |
| 49.541 | 80.73 | 4.1032 | 5.082 | 7.372 | 77 | 11 | very stiff fine grained (*) |
| 49.705 | 90.95 | 5.0236 | 5.523 | 7.617 | 87 | 11 | very stiff fine grained (*) |
| 49.869 | 87.62 | 5.1857 | 5.918 | 11.264 | 84 | 11 | very stiff fine grained (*) |
| 50.033 | 80.56 | 4.5629 | 5.664 | 11.772 | 77 | 11 | very stiff fine grained (*) |
| 50.197 | 71.83 | 3.5796 | 4.984 | 13.224 | 69 | 11 | very stiff fine grained (*) |
| 50.361 | 65.51 | 3.6247 | 5.533 | 13.237 | 63 | 11 | very stiff fine grained (*) |
| 50.525 | 57.47 | 4.1666 | 7.250 | 14.097 | 55 | 3 | clay |
| 50.689 | 77.20 | 4.5363 | 5.876 | 9.128 | 74 | 11 | very stiff fine grained (*) |
| 50.853 | 70.45 | 4.0771 | 5.787 | 1.396 | 67 | 11 | very stiff fine grained (*) |

| Depth<br>ft | Tip (Qt)<br>(tsf) | Sleeve Friction (Fs)<br>(tsf) | F.Ratio<br>(%) | PP (U2)<br>(psi) | SPT<br>(blows/ft) | Zone | Soil Behavior Type<br>UBC-1983 |
|---|---|---|---|---|---|---|---|
| 51.017 | 79.94 | 3.5483 | 4.439 | -0.756 | 38 | 5 | clayey silt to silty clay |
| 51.181 | 85.39 | 3.2780 | 3.839 | -2.152 | 41 | 5 | clayey silt to silty clay |
| 51.345 | 78.76 | 1.7606 | 2.235 | -3.094 | 25 | 7 | silty sand to sandy silt |
| 51.509 | 77.32 | 1.5199 | 1.966 | -3.716 | 25 | 7 | silty sand to sandy silt |
| 51.673 | 73.51 | 1.4473 | 1.969 | -4.307 | 23 | 7 | silty sand to sandy silt |
| 51.837 | 68.33 | 1.6219 | 2.374 | -4.352 | 26 | 6 | sandy silt to clayey silt |
| 52.001 | 63.55 | 1.8763 | 2.953 | -4.315 | 24 | 6 | sandy silt to clayey silt |
| 52.165 | 52.77 | 2.5239 | 4.783 | -4.184 | 34 | 4 | silty clay to clay |
| 52.329 | 41.12 | 2.8741 | 6.989 | -4.016 | 39 | 3 | clay |
| 52.493 | 54.91 | 4.2616 | 7.761 | -2.312 | 53 | 3 | clay |
| 52.657 | 106.48 | 6.4695 | 6.076 | 1.914 | 102 | 11 | very stiff fine grained (*) |
| 52.822 | 122.93 | 8.6226 | 7.014 | 1.954 | 118 | 11 | very stiff fine grained (*) |
| 52.986 | 100.92 | 8.2514 | 8.176 | -1.364 | 97 | 11 | very stiff fine grained (*) |
| 53.150 | 103.81 | 7.5747 | 7.296 | -0.163 | 99 | 11 | very stiff fine grained (*) |
| 53.314 | 128.99 | 7.1756 | 5.563 | 0.117 | 124 | 11 | very stiff fine grained (*) |
| 53.478 | 163.56 | 8.5172 | 5.207 | -0.790 | 157 | 11 | very stiff fine grained (*) |
| 53.642 | 185.54 | 7.7027 | 4.151 | -2.107 | 178 | 11 | very stiff fine grained (*) |
| 53.806 | 178.08 | 6.5353 | 3.670 | -3.260 | 85 | 12 | sand to clayey sand (*) |
| 53.970 | 149.96 | 3.9056 | 2.604 | -4.157 | 48 | 7 | silty sand to sandy silt |
| 54.134 | 142.35 | 4.4312 | 3.113 | -4.477 | 55 | 6 | sandy silt to clayey silt |
| 54.298 | 154.51 | 4.2076 | 2.723 | -4.696 | 49 | 7 | silty sand to sandy silt |
| 54.462 | 90.23 | 3.8726 | 4.292 | -4.053 | 43 | 5 | clayey silt to silty clay |
| 54.626 | 70.16 | 3.0831 | 4.395 | -4.026 | 34 | 5 | clayey silt to silty clay |
| 54.790 | 68.38 | 3.7334 | 5.460 | -3.805 | 65 | 11 | very stiff fine grained (*) |
| 54.954 | 77.21 | 5.7384 | 7.432 | -3.372 | 74 | 11 | very stiff fine grained (*) |
| 55.118 | 135.39 | 7.1620 | 5.290 | -2.937 | 130 | 11 | very stiff fine grained (*) |
| 55.282 | 170.39 | 8.2758 | 4.857 | -3.233 | 163 | 11 | very stiff fine grained (*) |
| 55.446 | 173.62 | 8.3303 | 4.798 | -3.599 | 166 | 11 | very stiff fine grained (*) |
| 55.610 | 155.22 | 8.3221 | 5.362 | -4.045 | 149 | 11 | very stiff fine grained (*) |
| 55.774 | 144.21 | 8.2321 | 5.708 | -4.178 | 138 | 11 | very stiff fine grained (*) |

# NV5 / CPT-2 / Panzer Nursery / Beaverton

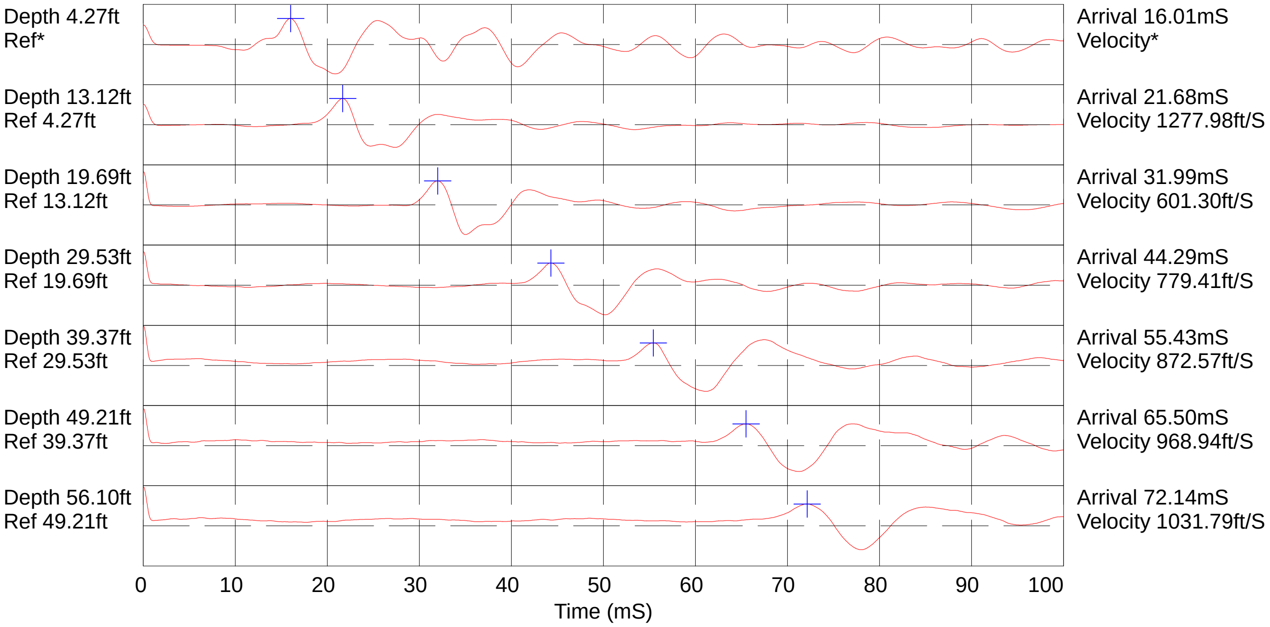
OPERATOR: OGE BAK
CONE ID: DDG1532
HOLE NUMBER: CPT-2
TEST DATE: 8/2/2022 11:04:23 AM
TOTAL DEPTH: 56.102 ft



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | 1 | sensitive fine gra | ■ | 4 | silty clay to cl | ■ | 7 | silty sand to sandy | ■ | 10 | gravelly sand to sand |
| ■ | 2 | organic materia | ■ | 5 | clayey silt to silt | ■ | 8 | sand to silty sa | ■ | 11 | very stiff fine grained (*) |
| ■ | 3 | clay | ■ | 6 | sandy silt to claye | ■ | 9 | sand | ■ | 12 | sand to clayey sand (*) |

*SBT/SPT CORRELATION: UBC-1983

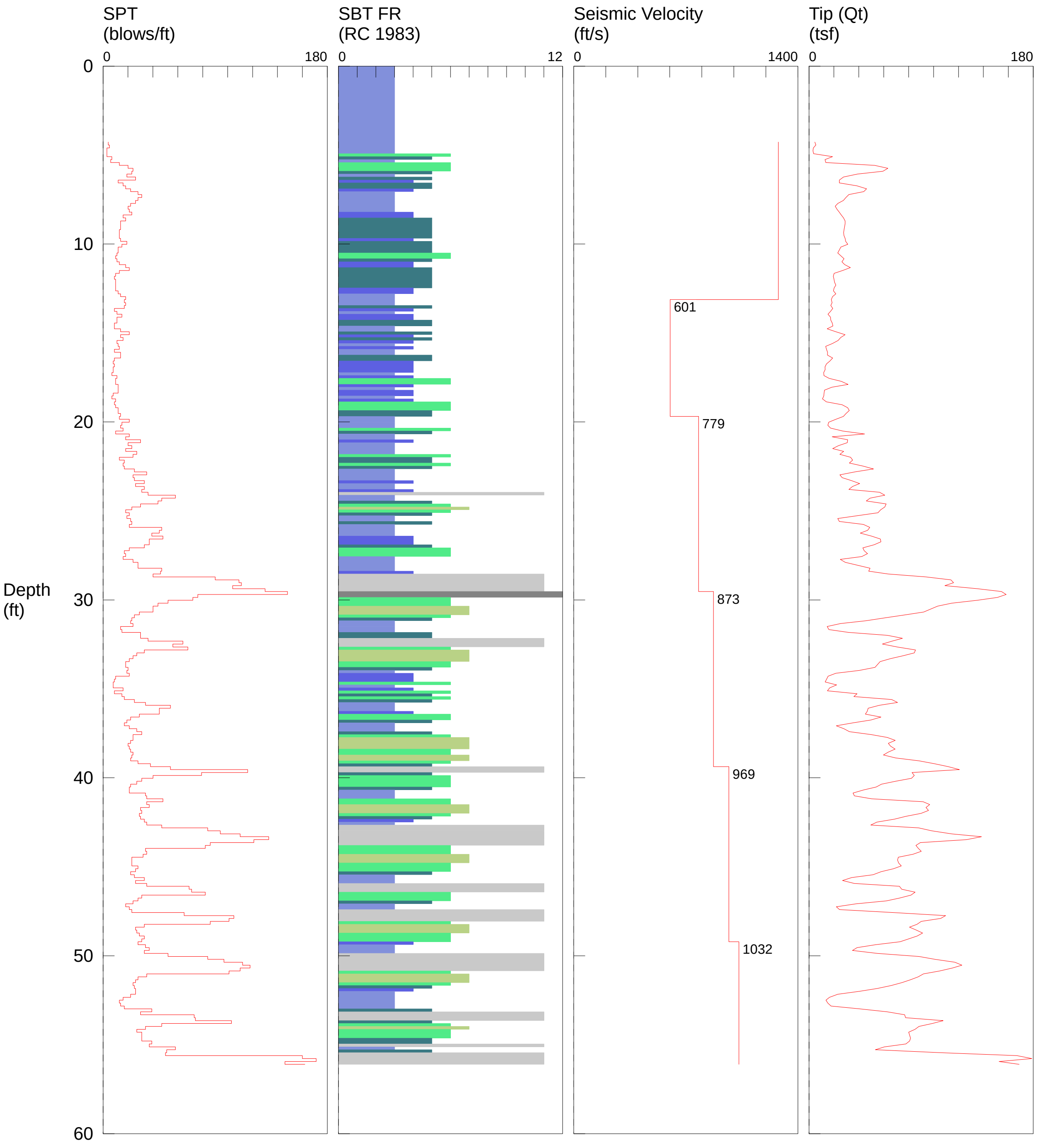
COMMENT: NV5 / CPT-2 / Panzer Nursery / Beaverton



Hammer to Rod String Distance (ft): 5.58
* = Not Determined

# NV5 / CPT-2 / Panzer Nursery / Beaverton

OPERATOR: OGE BAK
CONE ID: DDG1532
HOLE NUMBER: CPT-2
TEST DATE: 8/2/2022 11:04:23 AM
TOTAL DEPTH: 56.102 ft

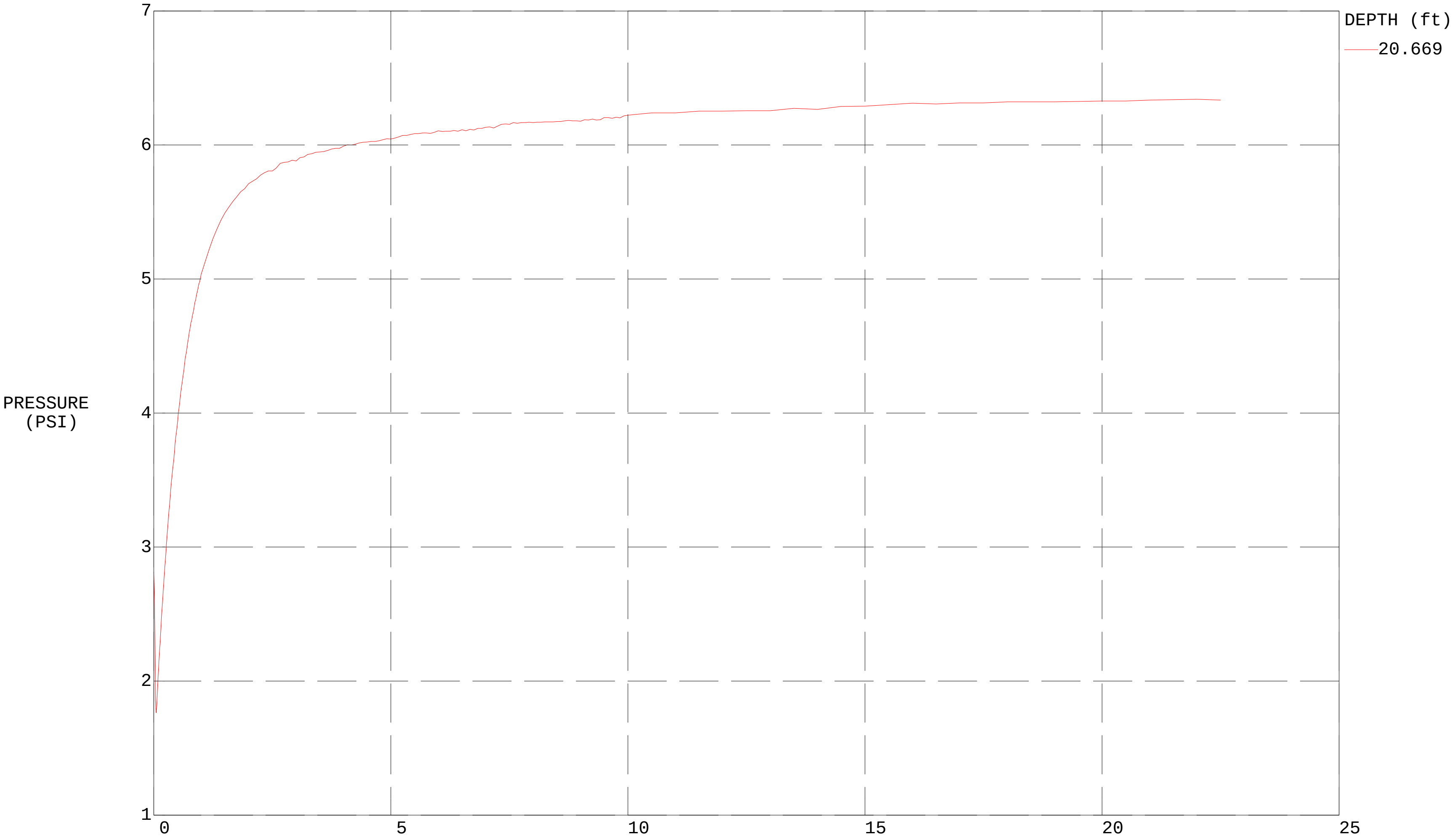


🟥 1 sensitive fine grained
🟥 2 organic material
🟦 3 clay
🟦 4 silty clay to clay
🟦 5 clayey silt to silty clay
🟩 6 sandy silt to clayey silt
🟩 7 silty sand to sandy silt
🟨 8 sand to silty sand
🟫 9 sand
🟧 10 gravelly sand to sand
⬜ 11 very stiff fine grained (*)
⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

# COMMENT: NV5 / CPT-2 / Panzer Nursery / Beaverton

TEST DATE: 8/2/2022 11:04:23 AM



MAXIMUM PRESSURE = 6.341 (PSI)

HYDROSTATIC PRESSURE = 6.349 (PSI), WATER TABLE: 6.02 ft

# NV5 / CPT-2 / Panzer Nursery / Beaverton

OPERATOR: OGE BAK
CONE ID: DDG1532
HOLE NUMBER: CPT-2
TEST DATE: 8/2/2022 11:04:23 AM
TOTAL DEPTH: 56.102 ft

| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 4.265 | 4.57 | 0.1964 | 4.295 | 0.563 | 4 | 3 | clay |
| 4.429 | 5.44 | 0.2012 | 3.702 | -1.076 | 5 | 3 | clay |
| 4.593 | 3.39 | 0.1655 | 4.890 | -3.028 | 3 | 3 | clay |
| 4.757 | 3.04 | 0.1144 | 3.766 | -3.522 | 3 | 3 | clay |
| 4.921 | 3.56 | 0.1245 | 3.495 | -2.625 | 3 | 3 | clay |
| 5.085 | 18.72 | 0.2507 | 1.339 | -1.864 | 7 | 6 | sandy silt to clayey silt |
| 5.249 | 12.74 | 0.2698 | 2.118 | -1.391 | 6 | 5 | clayey silt to silty clay |
| 5.413 | 13.37 | 0.6725 | 5.030 | 5.276 | 13 | 3 | clay |
| 5.577 | 52.58 | 1.3301 | 2.529 | 8.434 | 20 | 6 | sandy silt to clayey silt |
| 5.741 | 63.25 | 1.5494 | 2.449 | 2.657 | 24 | 6 | sandy silt to clayey silt |
| 5.906 | 59.34 | 1.3835 | 2.331 | -1.663 | 23 | 6 | sandy silt to clayey silt |
| 6.070 | 38.84 | 1.4174 | 3.649 | -2.718 | 19 | 5 | clayey silt to silty clay |
| 6.234 | 27.59 | 1.4066 | 5.098 | -2.966 | 26 | 3 | clay |
| 6.398 | 24.30 | 0.8321 | 3.424 | -3.647 | 12 | 5 | clayey silt to silty clay |
| 6.562 | 24.32 | 0.9817 | 4.037 | -3.217 | 16 | 4 | silty clay to clay |
| 6.726 | 38.52 | 1.2045 | 3.127 | -0.740 | 18 | 5 | clayey silt to silty clay |
| 6.890 | 46.14 | 1.6079 | 3.485 | -2.205 | 22 | 5 | clayey silt to silty clay |
| 7.054 | 43.85 | 1.8665 | 4.256 | -3.150 | 28 | 4 | silty clay to clay |
| 7.218 | 31.96 | 1.8485 | 5.783 | -3.703 | 31 | 3 | clay |
| 7.382 | 29.64 | 1.5983 | 5.392 | -3.639 | 28 | 3 | clay |
| 7.546 | 27.55 | 1.4063 | 5.104 | -3.201 | 26 | 3 | clay |
| 7.710 | 23.13 | 1.2355 | 5.341 | -3.281 | 22 | 3 | clay |
| 7.874 | 20.87 | 1.1216 | 5.374 | -3.017 | 20 | 3 | clay |
| 8.038 | 22.38 | 1.1803 | 5.274 | -2.691 | 21 | 3 | clay |
| 8.202 | 24.26 | 1.1762 | 4.848 | -2.291 | 23 | 3 | clay |
| 8.366 | 25.77 | 1.1263 | 4.371 | -1.845 | 16 | 4 | silty clay to clay |
| 8.530 | 27.64 | 1.0833 | 3.920 | -1.140 | 18 | 4 | silty clay to clay |
| 8.694 | 28.91 | 1.0670 | 3.691 | -0.625 | 14 | 5 | clayey silt to silty clay |
| 8.858 | 28.90 | 0.9698 | 3.355 | -0.152 | 14 | 5 | clayey silt to silty clay |
| 9.022 | 28.40 | 0.8929 | 3.144 | 0.232 | 14 | 5 | clayey silt to silty clay |
| 9.186 | 28.08 | 0.8244 | 2.936 | 0.710 | 13 | 5 | clayey silt to silty clay |
| 9.350 | 27.70 | 0.8132 | 2.936 | 1.153 | 13 | 5 | clayey silt to silty clay |
| 9.514 | 27.93 | 0.7907 | 2.831 | 1.829 | 13 | 5 | clayey silt to silty clay |
| 9.678 | 28.88 | 1.0836 | 3.752 | 2.395 | 14 | 5 | clayey silt to silty clay |
| 9.843 | 29.37 | 1.2356 | 4.207 | 2.857 | 19 | 4 | silty clay to clay |
| 10.007 | 31.07 | 1.1590 | 3.731 | 9.937 | 15 | 5 | clayey silt to silty clay |
| 10.171 | 25.46 | 0.7956 | 3.125 | 10.447 | 12 | 5 | clayey silt to silty clay |
| 10.499 | 22.98 | 0.6739 | 2.933 | 12.113 | 11 | 5 | clayey silt to silty clay |
| 10.663 | 25.46 | 0.5772 | 2.268 | 15.955 | 10 | 6 | sandy silt to clayey silt |
| 10.827 | 28.12 | 0.6348 | 2.258 | 18.892 | 11 | 6 | sandy silt to clayey silt |
| 10.991 | 26.34 | 0.8698 | 3.302 | 21.220 | 13 | 5 | clayey silt to silty clay |
| 11.155 | 28.63 | 1.2415 | 4.337 | 24.734 | 18 | 4 | silty clay to clay |
| 11.319 | 33.09 | 1.3897 | 4.200 | 26.491 | 21 | 4 | silty clay to clay |
| 11.483 | 26.79 | 0.9634 | 3.596 | 21.063 | 13 | 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 |
|---|---|---|---|---|---|---|---|
| 11.647 | 20.09 | 0.6286 | 3.129 | 24.640 | 10 | 5 | clayey silt to silty clay |
| 11.811 | 19.43 | 0.5758 | 2.963 | 31.478 | 9 | 5 | clayey silt to silty clay |
| 11.975 | 19.98 | 0.6232 | 3.120 | 37.213 | 10 | 5 | clayey silt to silty clay |
| 12.139 | 20.45 | 0.7080 | 3.463 | 42.029 | 10 | 5 | clayey silt to silty clay |
| 12.303 | 21.57 | 0.6949 | 3.221 | 44.176 | 10 | 5 | clayey silt to silty clay |
| 12.467 | 20.06 | 0.6776 | 3.377 | 43.426 | 10 | 5 | clayey silt to silty clay |
| 12.631 | 19.54 | 0.7295 | 3.734 | 49.567 | 12 | 4 | silty clay to clay |
| 12.795 | 21.53 | 0.7978 | 3.705 | 42.523 | 14 | 4 | silty clay to clay |
| 12.959 | 18.87 | 1.2827 | 6.796 | 33.553 | 18 | 3 | clay |
| 13.123 | 17.85 | 1.1102 | 6.221 | 36.997 | 17 | 3 | clay |
| 13.287 | 18.45 | 0.8379 | 4.543 | 13.843 | 18 | 3 | clay |
| 13.451 | 17.45 | 0.7716 | 4.422 | 17.725 | 17 | 3 | clay |
| 13.615 | 19.06 | 0.6183 | 3.243 | 20.710 | 9 | 5 | clayey silt to silty clay |
| 13.780 | 17.11 | 0.6148 | 3.593 | 20.887 | 11 | 4 | silty clay to clay |
| 13.944 | 15.17 | 0.6115 | 4.031 | 24.237 | 15 | 3 | clay |
| 14.108 | 17.14 | 0.5819 | 3.395 | 28.464 | 11 | 4 | silty clay to clay |
| 14.272 | 17.45 | 0.6501 | 3.725 | 30.941 | 11 | 4 | silty clay to clay |
| 14.436 | 18.58 | 0.6259 | 3.369 | 35.454 | 9 | 5 | clayey silt to silty clay |
| 14.600 | 19.15 | 0.6127 | 3.200 | 18.385 | 9 | 5 | clayey silt to silty clay |
| 14.764 | 14.58 | 0.6833 | 4.687 | 18.233 | 14 | 3 | clay |
| 14.928 | 21.42 | 0.9204 | 4.297 | 23.215 | 21 | 3 | clay |
| 15.092 | 28.90 | 1.0781 | 3.731 | 13.422 | 14 | 5 | clayey silt to silty clay |
| 15.256 | 25.41 | 1.0161 | 3.999 | 4.779 | 16 | 4 | silty clay to clay |
| 15.420 | 23.36 | 0.6827 | 2.923 | 2.838 | 11 | 5 | clayey silt to silty clay |
| 15.584 | 18.66 | 0.6919 | 3.708 | 2.269 | 12 | 4 | silty clay to clay |
| 15.748 | 13.28 | 0.6088 | 4.585 | 2.977 | 13 | 3 | clay |
| 15.912 | 13.89 | 0.4909 | 3.534 | 4.424 | 9 | 4 | silty clay to clay |
| 16.076 | 14.81 | 0.5886 | 3.975 | 5.436 | 14 | 3 | clay |
| 16.240 | 14.71 | 0.7717 | 5.245 | 6.330 | 14 | 3 | clay |
| 16.404 | 18.96 | 0.6356 | 3.352 | 6.346 | 9 | 5 | clayey silt to silty clay |
| 16.568 | 16.80 | 0.5354 | 3.186 | 5.324 | 8 | 5 | clayey silt to silty clay |
| 16.732 | 13.93 | 0.4570 | 3.280 | 6.293 | 9 | 4 | silty clay to clay |
| 16.896 | 12.77 | 0.4173 | 3.268 | 7.566 | 8 | 4 | silty clay to clay |
| 17.060 | 12.92 | 0.3848 | 2.978 | 9.030 | 8 | 4 | silty clay to clay |
| 17.224 | 11.71 | 0.4125 | 3.523 | 10.106 | 7 | 4 | silty clay to clay |
| 17.388 | 11.92 | 0.4823 | 4.047 | 11.553 | 11 | 3 | clay |
| 17.552 | 16.15 | 0.5810 | 3.598 | 13.101 | 10 | 4 | silty clay to clay |
| 17.717 | 25.81 | 0.4937 | 1.913 | 9.729 | 10 | 6 | sandy silt to clayey silt |
| 17.881 | 31.30 | 0.8476 | 2.708 | 4.806 | 12 | 6 | sandy silt to clayey silt |
| 18.045 | 18.20 | 0.7272 | 3.995 | 2.809 | 12 | 4 | silty clay to clay |
| 18.209 | 12.36 | 0.4781 | 3.869 | 4.016 | 12 | 3 | clay |
| 18.373 | 11.98 | 0.3700 | 3.089 | 5.698 | 8 | 4 | silty clay to clay |
| 18.537 | 11.75 | 0.3621 | 3.083 | 6.963 | 7 | 4 | silty clay to clay |
| 18.701 | 10.81 | 0.4720 | 4.366 | 8.191 | 10 | 3 | clay |
| 18.865 | 13.84 | 0.5055 | 3.653 | 9.534 | 9 | 4 | silty clay to clay |
| 19.029 | 26.54 | 0.4626 | 1.743 | 8.880 | 10 | 6 | sandy silt to clayey silt |
| 19.193 | 30.95 | 0.5223 | 1.688 | 3.471 | 12 | 6 | sandy silt to clayey silt |
| 19.357 | 32.21 | 0.6588 | 2.045 | 1.185 | 12 | 6 | sandy silt to clayey silt |
| 19.521 | 29.73 | 0.9150 | 3.078 | 0.531 | 14 | 5 | clayey silt to silty clay |
| 19.685 | 27.53 | 1.0310 | 3.744 | 0.403 | 13 | 5 | clayey silt to silty clay |
| 19.849 | 21.66 | 1.0653 | 4.918 | 1.484 | 21 | 3 | clay |
| 20.013 | 15.80 | 0.7253 | 4.590 | 1.335 | 15 | 3 | clay |
| 20.177 | 14.95 | 0.6051 | 4.046 | 2.809 | 14 | 3 | clay |

| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 20.341 | 17.14 | 0.9154 | 5.342 | 4.122 | 16 | 3 | clay |
| 20.505 | 26.98 | 0.3281 | 1.216 | 4.985 | 10 | 6 | sandy silt to clayey silt |
| 20.669 | 44.54 | 1.3877 | 3.116 | 2.731 | 21 | 5 | clayey silt to silty clay |
| 20.833 | 18.53 | 1.5120 | 8.161 | 6.344 | 18 | 3 | clay |
| 20.997 | 30.97 | 1.4859 | 4.798 | 7.278 | 30 | 3 | clay |
| 21.161 | 30.66 | 1.3559 | 4.422 | 8.106 | 20 | 4 | silty clay to clay |
| 21.325 | 23.57 | 1.2588 | 5.341 | 7.833 | 23 | 3 | clay |
| 21.490 | 18.97 | 1.0977 | 5.788 | 9.262 | 18 | 3 | clay |
| 21.654 | 27.72 | 1.3687 | 4.938 | 9.168 | 27 | 3 | clay |
| 21.818 | 24.74 | 1.2290 | 4.967 | 6.389 | 24 | 3 | clay |
| 21.982 | 33.32 | 0.9253 | 2.777 | 4.827 | 13 | 6 | sandy silt to clayey silt |
| 22.146 | 34.97 | 1.0351 | 2.960 | 2.446 | 17 | 5 | clayey silt to silty clay |
| 22.310 | 32.40 | 1.0561 | 3.260 | 1.468 | 16 | 5 | clayey silt to silty clay |
| 22.474 | 43.47 | 1.1633 | 2.676 | 0.828 | 17 | 6 | sandy silt to clayey silt |
| 22.638 | 51.57 | 1.7030 | 3.302 | 0.051 | 25 | 5 | clayey silt to silty clay |
| 22.802 | 36.83 | 2.2633 | 6.145 | -0.192 | 35 | 3 | clay |
| 22.966 | 24.70 | 2.0750 | 8.400 | 0.798 | 24 | 3 | clay |
| 23.130 | 26.56 | 1.7682 | 6.658 | 14.708 | 25 | 3 | clay |
| 23.294 | 34.01 | 1.7900 | 5.264 | 21.071 | 33 | 3 | clay |
| 23.458 | 40.54 | 1.6878 | 4.164 | 12.081 | 26 | 4 | silty clay to clay |
| 23.622 | 34.81 | 1.6916 | 4.860 | 4.846 | 33 | 3 | clay |
| 23.786 | 31.90 | 1.9252 | 6.035 | 2.592 | 31 | 3 | clay |
| 23.950 | 56.63 | 2.8724 | 5.072 | 3.596 | 36 | 4 | silty clay to clay |
| 24.114 | 60.82 | 3.4325 | 5.644 | 3.295 | 58 | 11 | very stiff fine grained (*) |
| 24.278 | 48.91 | 3.0953 | 6.329 | 2.993 | 47 | 3 | clay |
| 24.442 | 45.95 | 2.8477 | 6.197 | 3.150 | 44 | 3 | clay |
| 24.606 | 61.84 | 2.4867 | 4.021 | 2.536 | 30 | 5 | clayey silt to silty clay |
| 24.770 | 60.76 | 1.8963 | 3.121 | 0.993 | 23 | 6 | sandy silt to clayey silt |
| 24.934 | 57.42 | 1.1272 | 1.963 | -0.075 | 18 | 7 | silty sand to sandy silt |
| 25.098 | 55.31 | 1.1565 | 2.091 | -0.732 | 21 | 6 | sandy silt to clayey silt |
| 25.262 | 38.77 | 1.3134 | 3.387 | -1.156 | 19 | 5 | clayey silt to silty clay |
| 25.427 | 22.97 | 1.0892 | 4.743 | -1.303 | 22 | 3 | clay |
| 25.591 | 24.34 | 1.0785 | 4.432 | -0.315 | 23 | 3 | clay |
| 25.755 | 43.50 | 1.7835 | 4.100 | 0.283 | 21 | 5 | clayey silt to silty clay |
| 25.919 | 48.69 | 2.4522 | 5.036 | -0.027 | 47 | 3 | clay |
| 26.083 | 47.06 | 2.8895 | 6.140 | -0.203 | 45 | 3 | clay |
| 26.247 | 41.07 | 2.9097 | 7.085 | -0.136 | 39 | 3 | clay |
| 26.411 | 49.97 | 2.8532 | 5.709 | 0.969 | 48 | 3 | clay |
| 26.575 | 57.26 | 2.8617 | 4.998 | 0.555 | 37 | 4 | silty clay to clay |
| 26.739 | 57.71 | 2.9717 | 5.150 | 0.422 | 37 | 4 | silty clay to clay |
| 26.903 | 52.18 | 2.4602 | 4.715 | -0.318 | 33 | 4 | silty clay to clay |
| 27.067 | 43.12 | 1.4942 | 3.465 | -1.007 | 21 | 5 | clayey silt to silty clay |
| 27.231 | 44.20 | 0.9390 | 2.124 | -1.605 | 17 | 6 | sandy silt to clayey silt |
| 27.395 | 46.94 | 0.9138 | 1.947 | -1.938 | 18 | 6 | sandy silt to clayey silt |
| 27.559 | 42.27 | 1.2481 | 2.953 | -2.200 | 16 | 6 | sandy silt to clayey silt |
| 27.723 | 25.08 | 1.2657 | 5.047 | -2.264 | 24 | 3 | clay |
| 27.887 | 28.98 | 2.1442 | 7.399 | -1.968 | 28 | 3 | clay |
| 28.215 | 49.00 | 2.6482 | 5.404 | -0.940 | 47 | 3 | clay |
| 28.379 | 47.95 | 2.6072 | 5.437 | -0.278 | 46 | 3 | clay |
| 28.543 | 63.33 | 3.0097 | 4.752 | 0.067 | 40 | 4 | silty clay to clay |
| 28.707 | 93.93 | 4.3987 | 4.683 | 0.227 | 90 | 11 | very stiff fine grained (*) |
| 28.871 | 113.85 | 5.8786 | 5.163 | 0.435 | 109 | 11 | very stiff fine grained (*) |
| 29.035 | 116.00 | 6.6301 | 5.715 | 0.673 | 111 | 11 | very stiff fine grained (*) |

| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 29.199 | 109.01 | 7.0831 | 6.498 | 1.351 | 104 | 11 | very stiff fine grained (*) |
| 29.364 | 135.23 | 6.6984 | 4.953 | 1.287 | 130 | 11 | very stiff fine grained (*) |
| 29.528 | 154.45 | 6.6635 | 4.314 | 0.075 | 148 | 11 | very stiff fine grained (*) |
| 29.692 | 158.16 | 6.2707 | 3.965 | 0.427 | 76 | 12 | sand to clayey sand (*) |
| 29.856 | 151.26 | 5.5101 | 3.643 | -0.814 | 72 | 12 | sand to clayey sand (*) |
| 30.020 | 135.33 | 4.3632 | 3.224 | -1.439 | 52 | 6 | sandy silt to clayey silt |
| 30.184 | 114.52 | 3.4973 | 3.054 | -1.797 | 44 | 6 | sandy silt to clayey silt |
| 30.348 | 103.18 | 2.6612 | 2.579 | -2.077 | 40 | 6 | sandy silt to clayey silt |
| 30.676 | 92.05 | 1.7078 | 1.855 | -2.368 | 29 | 7 | silty sand to sandy silt |
| 30.840 | 77.27 | 1.3653 | 1.767 | -2.608 | 25 | 7 | silty sand to sandy silt |
| 31.004 | 61.20 | 1.4609 | 2.387 | -2.854 | 23 | 6 | sandy silt to clayey silt |
| 31.168 | 45.76 | 1.6656 | 3.640 | -2.806 | 22 | 5 | clayey silt to silty clay |
| 31.332 | 25.31 | 1.5495 | 6.122 | -2.560 | 24 | 3 | clay |
| 31.496 | 14.49 | 1.1961 | 8.254 | -2.064 | 14 | 3 | clay |
| 31.660 | 15.92 | 1.3736 | 8.627 | 4.686 | 15 | 3 | clay |
| 31.824 | 31.55 | 1.8042 | 5.718 | 15.549 | 30 | 3 | clay |
| 31.988 | 63.01 | 2.5418 | 4.034 | 11.537 | 30 | 5 | clayey silt to silty clay |
| 32.152 | 74.98 | 3.2104 | 4.282 | 4.683 | 36 | 5 | clayey silt to silty clay |
| 32.316 | 66.77 | 3.7104 | 5.557 | 1.896 | 64 | 11 | very stiff fine grained (*) |
| 32.480 | 58.88 | 3.9173 | 6.653 | 0.956 | 56 | 11 | very stiff fine grained (*) |
| 32.644 | 70.76 | 3.3427 | 4.724 | 0.796 | 68 | 11 | very stiff fine grained (*) |
| 32.808 | 85.43 | 2.4075 | 2.818 | -0.737 | 33 | 6 | sandy silt to clayey silt |
| 32.972 | 84.44 | 1.8581 | 2.201 | 0.045 | 27 | 7 | silty sand to sandy silt |
| 33.136 | 75.65 | 1.4898 | 1.969 | -1.679 | 24 | 7 | silty sand to sandy silt |
| 33.301 | 65.34 | 1.2923 | 1.978 | -2.152 | 21 | 7 | silty sand to sandy silt |
| 33.465 | 57.00 | 1.1515 | 2.020 | -2.344 | 18 | 7 | silty sand to sandy silt |
| 33.793 | 52.93 | 1.2999 | 2.456 | -2.307 | 20 | 6 | sandy silt to clayey silt |
| 33.957 | 40.23 | 1.4193 | 3.528 | -1.826 | 19 | 5 | clayey silt to silty clay |
| 34.121 | 21.56 | 1.0151 | 4.708 | -1.266 | 21 | 3 | clay |
| 34.285 | 15.22 | 0.5591 | 3.673 | 0.643 | 10 | 4 | silty clay to clay |
| 34.449 | 14.06 | 0.4857 | 3.456 | 4.726 | 9 | 4 | silty clay to clay |
| 34.613 | 12.89 | 0.3764 | 2.921 | 7.353 | 8 | 4 | silty clay to clay |
| 34.777 | 22.01 | 0.3955 | 1.797 | 8.856 | 8 | 6 | sandy silt to clayey silt |
| 34.941 | 16.51 | 0.7324 | 4.436 | 8.490 | 16 | 3 | clay |
| 35.105 | 14.76 | 0.5453 | 3.696 | 10.861 | 9 | 4 | silty clay to clay |
| 35.269 | 38.51 | 1.0112 | 2.626 | 6.264 | 15 | 6 | sandy silt to clayey silt |
| 35.433 | 35.90 | 1.3745 | 3.829 | 3.284 | 17 | 5 | clayey silt to silty clay |
| 35.597 | 66.34 | 1.9892 | 2.998 | 5.236 | 25 | 6 | sandy silt to clayey silt |
| 35.761 | 70.98 | 2.7173 | 3.828 | 3.012 | 34 | 5 | clayey silt to silty clay |
| 35.925 | 56.42 | 3.5867 | 6.357 | 1.439 | 54 | 3 | clay |
| 36.089 | 47.50 | 3.3862 | 7.128 | 2.107 | 45 | 3 | clay |
| 36.253 | 46.64 | 2.6240 | 5.626 | 5.081 | 45 | 3 | clay |
| 36.417 | 45.25 | 1.9362 | 4.279 | 3.305 | 29 | 4 | silty clay to clay |
| 36.581 | 57.69 | 1.5162 | 2.628 | 0.667 | 22 | 6 | sandy silt to clayey silt |
| 36.745 | 49.59 | 1.2654 | 2.552 | -1.119 | 19 | 6 | sandy silt to clayey silt |
| 36.909 | 35.32 | 1.3450 | 3.808 | -1.290 | 17 | 5 | clayey silt to silty clay |
| 37.073 | 21.78 | 1.1904 | 5.465 | 0.320 | 21 | 3 | clay |
| 37.238 | 28.04 | 1.4642 | 5.222 | 7.676 | 27 | 3 | clay |
| 37.402 | 32.42 | 1.7476 | 5.390 | 9.043 | 31 | 3 | clay |
| 37.566 | 50.04 | 1.8711 | 3.739 | 5.671 | 24 | 5 | clayey silt to silty clay |
| 37.730 | 62.69 | 1.5863 | 2.530 | 1.695 | 24 | 6 | sandy silt to clayey silt |
| 37.894 | 69.22 | 1.3248 | 1.914 | -0.216 | 22 | 7 | silty sand to sandy silt |
| 38.058 | 63.60 | 1.2343 | 1.941 | -1.119 | 20 | 7 | silty sand to sandy silt |

| Depth<br>ft | Tip (Qt)<br>(tsf) | Sleeve Friction (Fs)<br>(tsf) | F.Ratio<br>(%) | PP (U2)<br>(psi) | SPT<br>(blows/ft) | Zone | Soil Behavior Type<br>UBC-1983 |
|---|---|---|---|---|---|---|---|
| 38.222 | 65.38 | 1.2088 | 1.849 | -1.351 | 21 | 7 | silty sand to sandy silt |
| 38.386 | 69.11 | 1.3697 | 1.982 | -1.687 | 22 | 7 | silty sand to sandy silt |
| 38.550 | 63.47 | 1.5353 | 2.419 | -1.810 | 24 | 6 | sandy silt to clayey silt |
| 38.714 | 59.67 | 1.4648 | 2.455 | -1.541 | 23 | 6 | sandy silt to clayey silt |
| 38.878 | 69.43 | 1.4119 | 2.034 | -1.060 | 22 | 7 | silty sand to sandy silt |
| 39.042 | 88.46 | 1.5679 | 1.773 | -0.635 | 28 | 7 | silty sand to sandy silt |
| 39.206 | 100.46 | 2.8854 | 2.872 | -0.395 | 38 | 6 | sandy silt to clayey silt |
| 39.370 | 111.75 | 4.4956 | 4.023 | -0.125 | 54 | 5 | clayey silt to silty clay |
| 39.534 | 120.69 | 4.9275 | 4.083 | 0.649 | 116 | 11 | very stiff fine grained (*) |
| 39.698 | 82.63 | 4.5351 | 5.488 | -2.037 | 79 | 11 | very stiff fine grained (*) |
| 39.862 | 84.47 | 3.5354 | 4.186 | -2.181 | 40 | 5 | clayey silt to silty clay |
| 40.026 | 82.22 | 2.7539 | 3.350 | -2.902 | 31 | 6 | sandy silt to clayey silt |
| 40.190 | 69.56 | 1.6078 | 2.311 | -3.319 | 27 | 6 | sandy silt to clayey silt |
| 40.354 | 58.02 | 1.2152 | 2.094 | -3.615 | 22 | 6 | sandy silt to clayey silt |
| 40.518 | 53.97 | 1.4663 | 2.717 | -3.636 | 21 | 6 | sandy silt to clayey silt |
| 40.682 | 43.78 | 1.8071 | 4.127 | -3.580 | 21 | 5 | clayey silt to silty clay |
| 40.846 | 35.22 | 1.8044 | 5.123 | -3.199 | 34 | 3 | clay |
| 41.011 | 36.30 | 2.3016 | 6.340 | -2.414 | 35 | 3 | clay |
| 41.175 | 50.17 | 3.0082 | 5.997 | -1.610 | 48 | 3 | clay |
| 41.339 | 91.62 | 3.3208 | 3.625 | -1.613 | 35 | 6 | sandy silt to clayey silt |
| 41.503 | 96.80 | 2.9752 | 3.073 | -2.331 | 37 | 6 | sandy silt to clayey silt |
| 41.667 | 93.90 | 2.2133 | 2.357 | -2.769 | 30 | 7 | silty sand to sandy silt |
| 41.831 | 95.89 | 2.0780 | 2.167 | -3.046 | 31 | 7 | silty sand to sandy silt |
| 41.995 | 89.85 | 2.1744 | 2.420 | -3.140 | 29 | 7 | silty sand to sandy silt |
| 42.159 | 77.73 | 2.1663 | 2.787 | -3.158 | 30 | 6 | sandy silt to clayey silt |
| 42.323 | 68.54 | 2.3954 | 3.495 | -2.993 | 33 | 5 | clayey silt to silty clay |
| 42.487 | 54.47 | 2.7501 | 5.049 | -2.638 | 35 | 4 | silty clay to clay |
| 42.651 | 49.46 | 3.4236 | 6.922 | -0.993 | 47 | 3 | clay |
| 42.815 | 87.94 | 4.7104 | 5.356 | 26.181 | 84 | 11 | very stiff fine grained (*) |
| 42.979 | 98.47 | 6.7084 | 6.813 | 13.779 | 94 | 11 | very stiff fine grained (*) |
| 43.143 | 114.49 | 8.1693 | 7.136 | 14.148 | 110 | 11 | very stiff fine grained (*) |
| 43.307 | 138.45 | 9.1802 | 6.631 | 6.232 | 133 | 11 | very stiff fine grained (*) |
| 43.471 | 126.31 | 7.1797 | 5.684 | 1.890 | 121 | 11 | very stiff fine grained (*) |
| 43.635 | 89.34 | 6.0612 | 6.784 | -0.232 | 86 | 11 | very stiff fine grained (*) |
| 43.799 | 85.82 | 4.5095 | 5.254 | -1.695 | 82 | 11 | very stiff fine grained (*) |
| 43.963 | 87.68 | 3.0356 | 3.462 | -2.427 | 34 | 6 | sandy silt to clayey silt |
| 44.127 | 90.09 | 2.4556 | 2.726 | -3.102 | 35 | 6 | sandy silt to clayey silt |
| 44.291 | 83.34 | 2.2468 | 2.696 | -3.420 | 32 | 6 | sandy silt to clayey silt |
| 44.455 | 71.68 | 1.5611 | 2.178 | -3.687 | 23 | 7 | silty sand to sandy silt |
| 44.619 | 71.08 | 1.3369 | 1.881 | -3.970 | 23 | 7 | silty sand to sandy silt |
| 44.783 | 71.88 | 1.5932 | 2.216 | -4.053 | 23 | 7 | silty sand to sandy silt |
| 44.948 | 73.98 | 1.8101 | 2.447 | -4.016 | 28 | 6 | sandy silt to clayey silt |
| 45.112 | 67.82 | 1.8890 | 2.785 | -3.799 | 26 | 6 | sandy silt to clayey silt |
| 45.276 | 57.86 | 1.8400 | 3.180 | -3.482 | 22 | 6 | sandy silt to clayey silt |
| 45.440 | 51.28 | 1.9202 | 3.744 | -3.148 | 25 | 5 | clayey silt to silty clay |
| 45.604 | 34.22 | 1.7472 | 5.105 | -2.841 | 33 | 3 | clay |
| 45.768 | 26.79 | 2.0492 | 7.649 | -2.128 | 26 | 3 | clay |
| 45.932 | 36.37 | 2.5186 | 6.924 | 2.568 | 35 | 3 | clay |
| 46.096 | 72.48 | 3.4690 | 4.786 | 7.836 | 69 | 11 | very stiff fine grained (*) |
| 46.260 | 74.37 | 4.2895 | 5.768 | 4.854 | 71 | 11 | very stiff fine grained (*) |
| 46.424 | 85.16 | 4.1230 | 4.841 | 2.285 | 82 | 11 | very stiff fine grained (*) |
| 46.588 | 81.85 | 2.8729 | 3.510 | -1.164 | 31 | 6 | sandy silt to clayey silt |
| 46.752 | 72.62 | 1.6543 | 2.278 | -2.422 | 28 | 6 | sandy silt to clayey silt |

| Depth ft | Tip (Qt) (tsf) | Sleeve Friction (Fs) (tsf) | F.Ratio (%) | PP (U2) (psi) | SPT (blows/ft) | Zone | Soil Behavior Type UBC-1983 |
|---|---|---|---|---|---|---|---|
| 46.916 | 62.08 | 1.7513 | 2.821 | -2.785 | 24 | 6 | sandy silt to clayey silt |
| 47.080 | 37.59 | 1.2669 | 3.370 | -2.745 | 18 | 5 | clayey silt to silty clay |
| 47.244 | 21.92 | 1.2294 | 5.607 | -1.583 | 21 | 3 | clay |
| 47.408 | 24.40 | 2.4206 | 9.922 | 11.459 | 23 | 3 | clay |
| 47.572 | 67.43 | 4.1996 | 6.228 | 23.554 | 65 | 11 | very stiff fine grained (*) |
| 47.736 | 109.58 | 5.6407 | 5.147 | 8.215 | 105 | 11 | very stiff fine grained (*) |
| 47.900 | 105.74 | 5.9259 | 5.604 | 2.072 | 101 | 11 | very stiff fine grained (*) |
| 48.064 | 90.11 | 4.9891 | 5.537 | -0.187 | 86 | 11 | very stiff fine grained (*) |
| 48.228 | 86.65 | 2.8594 | 3.300 | -1.442 | 33 | 6 | sandy silt to clayey silt |
| 48.392 | 80.54 | 1.6939 | 2.103 | -2.614 | 26 | 7 | silty sand to sandy silt |
| 48.556 | 86.02 | 1.7038 | 1.981 | -3.249 | 27 | 7 | silty sand to sandy silt |
| 48.720 | 91.13 | 2.0733 | 2.275 | -3.292 | 29 | 7 | silty sand to sandy silt |
| 48.885 | 86.89 | 2.2363 | 2.574 | -3.073 | 33 | 6 | sandy silt to clayey silt |
| 49.049 | 79.85 | 2.2358 | 2.800 | -2.694 | 31 | 6 | sandy silt to clayey silt |
| 49.213 | 73.02 | 2.3172 | 3.173 | -2.315 | 28 | 6 | sandy silt to clayey silt |
| 49.377 | 53.48 | 2.3580 | 4.409 | 13.470 | 34 | 4 | silty clay to clay |
| 49.541 | 38.51 | 1.8715 | 4.860 | 13.718 | 37 | 3 | clay |
| 49.705 | 34.83 | 1.8475 | 5.305 | 21.338 | 33 | 3 | clay |
| 49.869 | 54.70 | 2.9165 | 5.332 | 29.873 | 52 | 3 | clay |
| 50.033 | 88.24 | 4.7669 | 5.402 | 17.752 | 84 | 11 | very stiff fine grained (*) |
| 50.197 | 100.94 | 6.2709 | 6.213 | 5.730 | 97 | 11 | very stiff fine grained (*) |
| 50.361 | 117.08 | 7.0652 | 6.034 | 0.035 | 112 | 11 | very stiff fine grained (*) |
| 50.525 | 122.79 | 7.2349 | 5.892 | -3.065 | 118 | 11 | very stiff fine grained (*) |
| 50.689 | 115.16 | 6.7316 | 5.846 | -4.178 | 110 | 11 | very stiff fine grained (*) |
| 50.853 | 104.97 | 4.8461 | 4.617 | -4.694 | 101 | 11 | very stiff fine grained (*) |
| 51.017 | 91.76 | 2.8263 | 3.080 | -4.998 | 35 | 6 | sandy silt to clayey silt |
| 51.181 | 87.58 | 1.8131 | 2.070 | -5.233 | 28 | 7 | silty sand to sandy silt |
| 51.345 | 81.42 | 1.4930 | 1.834 | -5.308 | 26 | 7 | silty sand to sandy silt |
| 51.509 | 74.61 | 1.5368 | 2.060 | -5.281 | 24 | 7 | silty sand to sandy silt |
| 51.673 | 65.85 | 1.7021 | 2.585 | -5.182 | 25 | 6 | sandy silt to clayey silt |
| 51.837 | 54.67 | 1.8690 | 3.419 | -4.950 | 26 | 5 | clayey silt to silty clay |
| 52.001 | 40.50 | 1.8401 | 4.543 | -4.598 | 26 | 4 | silty clay to clay |
| 52.165 | 22.98 | 1.5572 | 6.776 | -3.965 | 22 | 3 | clay |
| 52.329 | 16.29 | 1.0097 | 6.198 | -1.020 | 16 | 3 | clay |
| 52.493 | 13.56 | 0.9446 | 6.964 | 2.974 | 13 | 3 | clay |
| 52.657 | 14.95 | 0.7392 | 4.943 | 33.814 | 14 | 3 | clay |
| 52.822 | 17.58 | 1.4388 | 8.184 | 43.709 | 17 | 3 | clay |
| 52.986 | 40.63 | 2.6114 | 6.427 | 79.846 | 39 | 3 | clay |
| 53.150 | 62.72 | 2.6668 | 4.252 | 64.419 | 30 | 5 | clayey silt to silty clay |
| 53.314 | 76.74 | 4.1150 | 5.362 | 39.603 | 73 | 11 | very stiff fine grained (*) |
| 53.478 | 77.47 | 5.5122 | 7.115 | 38.236 | 74 | 11 | very stiff fine grained (*) |
| 53.642 | 107.60 | 4.9542 | 4.604 | 12.735 | 103 | 11 | very stiff fine grained (*) |
| 53.806 | 99.08 | 3.7604 | 3.795 | -3.201 | 47 | 5 | clayey silt to silty clay |
| 53.970 | 88.28 | 2.2589 | 2.559 | -4.779 | 34 | 6 | sandy silt to clayey silt |
| 54.134 | 85.07 | 1.8518 | 2.177 | -5.137 | 27 | 7 | silty sand to sandy silt |
| 54.298 | 79.97 | 1.9471 | 2.435 | -5.204 | 31 | 6 | sandy silt to clayey silt |
| 54.462 | 80.76 | 2.1971 | 2.720 | -5.009 | 31 | 6 | sandy silt to clayey silt |
| 54.626 | 81.51 | 2.3028 | 2.825 | -4.662 | 31 | 6 | sandy silt to clayey silt |
| 54.790 | 80.64 | 2.9695 | 3.683 | -4.173 | 39 | 5 | clayey silt to silty clay |
| 54.954 | 77.71 | 3.4152 | 4.395 | -3.708 | 37 | 5 | clayey silt to silty clay |
| 55.118 | 60.40 | 3.4890 | 5.777 | -3.244 | 58 | 11 | very stiff fine grained (*) |
| 55.282 | 53.29 | 3.7222 | 6.984 | -1.217 | 51 | 3 | clay |
| 55.446 | 105.35 | 4.1069 | 3.898 | 6.354 | 50 | 5 | clayey silt to silty clay |

| Depth<br>ft | Tip (Qt)<br>(tsf) | Sleeve Friction (Fs)<br>(tsf) | F.Ratio<br>(%) | PP (U2)<br>(psi) | SPT<br>(blows/ft) | Zone | Soil Behavior Type<br>UBC-1983 |
|---|---|---|---|---|---|---|---|
| 55.610 | 166.95 | 9.0580 | 5.426 | 6.907 | 160 | 11 | very stiff fine grained (*) |
| 55.774 | 178.88 | 10.3317 | 5.776 | 4.250 | 171 | 11 | very stiff fine grained (*) |
| 55.938 | 152.53 | 10.3127 | 6.761 | -0.478 | 146 | 11 | very stiff fine grained (*) |
| 56.102 | 168.71 | 10.3227 | 6.118 | -2.075 | 162 | 11 | very stiff fine grained (*) |

NV5

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