

**DRAFT GEOTECHNICAL DATA REPORT  
GEDDES MARINA PHASE 2 REMEDIATION  
MARYSVILLE, WASHINGTON**

HWA Project No. 2020-011-21

December 3, 2021

Prepared for:

Parametrix, Inc.





December 3, 2021  
HWA Project No. 2020-011-21

Parametrix, Inc.  
719 2nd Avenue, Suite 200  
Seattle, WA 98104

Attention: Benn Burke

**SUBJECT: DRAFT GEOTECHNICAL DATA REPORT  
Geddes Marina Phase 2 Remediation  
Marysville, Washington**

Dear Benn:

Attached is our draft geotechnical data report for the proposed Phase 2 remediation work for the Geddes Marina in Marysville, Washington. This draft geotechnical data report documents the procedures and presents the findings of our geotechnical investigations. The purpose of the geotechnical investigations was to provide information regarding existing subsurface conditions within the proposed project areas.

We appreciate the opportunity to provide geotechnical engineering services on this project. Please call if you have any questions or comments concerning this report, or if we may be of further service.

Sincerely,

**HWA GEO SCIENCES INC.**

JoLyn Gillie, P.E.  
Geotechnical Engineer, Principal

Sean Schlitt, P.E.  
Geotechnical Engineer

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**DRAFT GEOTECHNICAL DATA REPORT  
GEDDES MARINA PHASE 2 REMEDIATION  
MARYSVILLE, WASHINGTON**

**1.0 INTRODUCTION**

**1.1 GENERAL**

This geotechnical data report presents the results of a geotechnical explorations and testing performed by HWA GeoSciences Inc. (HWA) in support of the Phase 2 remediation work at the Geddes Marina Site in Marysville, Washington. The purpose of this study was to evaluate soil and ground water conditions in the vicinity of the project and to provide recommendations regarding design and construction considerations for the proposed design alternatives.

Our work scope included site subsurface explorations, geotechnical laboratory testing of selected representative soil samples, and preparation of this geotechnical data report. Engineering analyses and geotechnical recommendations for the proposed improvements will be provided in a follow up draft geotechnical report.

**1.2 PROJECT DESCRIPTION**

The site for the proposed Geddes Marina Phase 2 Remediation work is located on the property west of the existing Ebey Waterfront Park, that was formerly the Geddes Marina Site, and is shown on [Figure 1](#), the Site Vicinity Map.

The primary focus of the project will be completing the remedial action on the Geddes Marina site that was initiated in 2016. The Phase 2 Remediation involves capping impacted sediment an elevation above the high-water mark (OHWM) with imported clean fill material. A stabilizing layer consisting of a geogrid will be placed on top of the existing sediment to allow for construction of and reduce uneven settling and consolidation of the proposed cap layer. Approximately 5 feet of clean, imported fill and a 1-foot-thick stabilization layer made of a geotextile liner and rock will be used to cap impacted sediments. Additional fill material will be placed to extend the fill to the top of the existing lagoon bank, bringing the final grade above the OHWM.

The City's downtown stormwater conveyance system currently discharges into the former boat basin on the north side of the former boat basin near First Street. The existing City stormwater system that drains into the northern portion of the artificial lagoon created as the former marina boat basin will be diverted upstream of the artificial lagoon by installation of the stormwater conveyance pipe. The new stormwater conveyance pipe will discharge via an energy dissipation structure to a conveyance channel constructed along the western edge of the Geddes Marina site that will flow to Ebby Slough.

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The project also includes installation of large woody material along the shoreline and restoration of a riparian buffer zone as required by City of Marysville code to provide additional habitat opportunities for fish and wildlife.

## **2.0 FIELD INVESTIGATION**

### **2.1 GEOTECHNICAL BORINGS**

For this project, HWA completed a field subsurface investigation which included drilling two (2) exploratory borings, designated BH-1 and BH-2. Exploration locations are provided on [Figure 2](#), the Site and Exploration Plan.

The exploratory borings were advanced on September 8, 2021 by Holocene of Puyallup, Washington, under subcontract to HWA. The exploratory borings were advanced to depths of approximately 61.5 feet below ground surface (bgs) with a track-mounted Diedrich D-50 Turbo drill rig utilizing mud rotary drilling methods. Soil samples were collected within the exploratory borings at 2.5- to 5-foot depth intervals per Standard Penetration Test (SPT) sampling methods, which consisted of using a 2-inch outside diameter, split-spoon sampler driven with a 140-pound auto-hammer. During the test, each sample was obtained by driving the sampler up to 18 inches into the soil with the hammer free-falling 30 inches per stroke. The number of blows required for each 6 inches of penetration was recorded. The standard penetration resistance of the soil was calculated as the number of blows required for the final 12 inches of penetration. If a total of 50 blows was recorded within a single 6-inch interval, the test was terminated, and the blow count was recorded as 50 blows/number of inches of penetration. This resistance provides an indication of the relative density of granular soils and the relative consistency of cohesive soils. At the completion of the boreholes, they were backfilled with bentonite chips per Department of Ecology requirements.

All explorations were advanced under the full-time supervision and observation of an HWA geotechnical engineer. Pertinent information including soil sample depths, stratigraphy, geotechnical engineering characteristics, and ground water occurrence were recorded and used to develop logs of each of the explorations. Soil samples obtained from the explorations were classified in the field and representative portions were placed in plastic bags. The soil samples were then taken to our Bothell, Washington, laboratory for further examination.

A legend of the terms and symbols used on the borehole logs is presented on [Figure A-1](#), and the logs are presented on [Figures A-2 through A-3](#). Laboratory test results and a discussion of laboratory test methodology are presented in [Appendix B](#), and/or displayed on the exploration logs in [Appendix A](#), as appropriate.

The stratigraphic contacts shown on the borehole logs represent the approximate boundaries between soil types. Actual transitions may be more gradual. The ground water conditions

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depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times.

## 2.2 LABORATORY TESTING

Laboratory tests were conducted at HWA's Bothell, Washington laboratory on selected samples from the explorations to characterize relevant engineering and index parameters. The tests included visual classification, natural moisture content determination, Atterberg Limits, one dimensional consolidation testing, and grain size distribution. All tests were conducted in the HWA laboratory in general accordance with appropriate American Society of Testing and Materials (ASTM) standards. Testing is discussed in further detail in [Appendix B](#). The test results are presented in [Appendix B](#), and displayed on the exploration logs in [Appendix A](#), as appropriate.

## 2.3 EXISTING SUBSURFACE EXPLORATIONS

HWA reviewed existing subsurface data from previous soil investigations in the vicinity of the project site. The documents in this review included the following documents:

- Gray & Osborne, Inc., *1<sup>st</sup> and 3<sup>rd</sup> Street Stormwater Retrofit Project Predesign Report*, dated January 2014, G&O report reference 13587, prepared for the City of Marysville. Borings designated BH-1 through BH-3 were explored by PanGEO in 2013.
- Maul Foster Alongi, *Draft Focused Site Assessment Work Plan – Former Geddes Marina Property, Marysville, Washington*, dated October 2014, MFA report reference 0689.01.03, prepared for City of Marysville. Borings designated EB-1 through EB-7 were explored by Associated Earth Sciences, Inc in 2008.
- Maul Foster Alongi, *Focused Site Assessment Report – Former Geddes Marina Property, Marysville, Washington*, dated October 2015, MFA report reference 0689.01.03, prepared for the City of Marysville. Borings designated GM-1 through GM-10 were explored by Holt Services, Inc in 2015.
- Maul Foster Alongi, *Integrated Planning Implementation Strategy – Former Geddes Marina Property, Marysville, Washington*, dated December 2015, MFA report reference 0689.01.03, prepared for the City of Marysville. Cone penetrometer explorations, designated CPT-1 and CPT-2 were explored by Materials Testing and Consulting, Inc. in 2015.

Additionally, HWA conducted multiple studies in the vicinity of the project including:

- *Final Geotechnical Report, Marysville Downtown Stormwater Treatment Project, Marysville, Washington* dated November 12, 2021. The proposed improvements involved constructing several new features, including an underground pump station, a flow splitter, a valve vault, pretreatment units, four engineered biofiltration media treatment vaults, as well as several catch basin structures and associated piping. The

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stormwater treatment facility is planned to be constructed primarily in the northwest corner of the site, with a few structures in the northeast corner of the site.

- *Phase I and Phase II Environmental Site Assessment, City of Marysville, Welco Property, Marysville, Washington* dated May 17, 2016. This work was conducted for the City of Marysville, who intended to purchase the Subject Property and redevelop it as a passive recreational area/park.

Pertinent information including logs from the previous investigations are provided in [Appendix C](#), and contain information regarding soil sample depths, stratigraphy, soil engineering characteristics, and ground water occurrence. The locations of the explorations are provided on [Figure 2](#), the Site and Exploration Plan.

### **3.0 SITE CONDITIONS**

#### **3.1 SITE DESCRIPTION**

The site is located along the northern and eastern banks of Ebey Slough and is bordered by the BNSF railway to the west, 1<sup>st</sup> Street to the north, and SR 529 to the east. The site was originally used for the timber industry in the 1800's and was converted to marina operations in the early 1900's. The site was a historic fueling station at one time and is known to be underlain by historically deposited uncontrolled/undocumented fills placed during past developments, some of which is potentially impacted. Additional information regarding impacted soils is provided by Maul Foster Alongi (2014, 2015).

Based on historical imagery from Google Earth™, the use of the marina underwent several changes over the last few decades. Between the years 2011 and 2014, most of the boat houses and the central dock of the marina were removed. By August 2016, many of the remaining boat houses and all structures on-site were removed, except for the small structure previously located in the northwest corner of the site. Currently, the site is abandoned, and no structures remain; however, in August and September of 2019, a fill embankment was constructed in the northwest corner of the site to preload the proposed treatment facility location. Most of this material will be removed prior to the Phase 2 remediation work.

#### **3.2 GENERAL GEOLOGIC CONDITIONS**

The project site is located within the Puget Lowland. The Puget Lowland has repeatedly been occupied by a portion of the continental glaciers that developed during the ice ages of the Quaternary period. During at least four periods, portions of the ice sheet advanced south from British Columbia into the lowlands of Western Washington. The southern extent of these glacial advances was near Olympia, Washington. Each major advance included numerous local advances and retreats, and each advance and retreat resulted in its own sequence of erosion and deposition of glacial lacustrine, outwash, till, and drift deposits. Between and following these

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glacial advances, sediments from the Olympic and Cascade Mountains accumulated in the Puget Lowland in lakes and valleys.

Geologic information for the project area was obtained from the *Geologic Map of the Marysville Quadrangle, Snohomish County, Washington* (Minard, 1985). Per this map, near-surface deposits in the vicinity of the project consist of alluvial deposits and Marysville Sand derived from the recessional outwash of the receding Vashon glacier. The recessional outwash is described as stratified sand and gravel with minor silt and clay layers. The map further indicates that the recessional outwash is mostly well drained and generally provides stable subgrade soil for construction sites based on static (non-seismic) conditions, however, they are generally loose to medium dense and are susceptible to liquefaction where present below the ground water table.

Since the last glaciation, marine sediments and fine river alluvium (slough deposits) have been deposited over the glacial soils by the Snohomish River. These materials are typically very soft/loose clays and silts or fine sands with occasional peaty organics.

### 3.3 SITE SOIL CONDITIONS

The subsurface conditions observed at the site consisted of a profile of very soft to very loose compressible slough deposits, and/or Marysville sand deposits. Borings in the vicinity of the project also exhibit the presence of undocumented fill at the surface. Brief descriptions of the major soil units observed in our explorations are presented on the following page, in order of deposition, beginning with the most recently deposited. The exploration data provided in [Appendices A, B, and C](#) provide more detail of subsurface conditions observed at specific locations and depths.

- **Fill** – Fill placed to raise grades as part of past development activities at the site was observed in all the previous explorations HWA performed and reviewed. However, fill was not observed along the shore to the west of the artificial lagoon in the boring completed for this phase of work. Fill thicknesses ranged from about 1.5 feet at boring EB-3 to about 12 feet in boring EB-2. Fill generally consisted of loose to medium dense, slightly silty to silty sand, with varying amounts of gravel. Woody debris and construction debris were also encountered in several locations.
- **Silty and Clayey Peat:** Silty and/or clayey peat layers were observed in both borings interbedded with the slough alluvium. Peat was commonly found above or interbedded with very soft to soft clay and silt materials. The peaty layers ranged in thickness from 2.5 feet, in BH-2, up to 7.5 feet, in boring BH-1. Peat was also noted to be observed in other borings in the vicinity with varying thicknesses. These soils were likely deposited in slow moving waters at the edge of the slough and are highly compressible.
- **Slough Alluvium/Tide Flat Deposits** – These deposits were present in both borings. This unit ranged in thickness from 17.5 feet in BH-1 (drilled about 250 feet south of First Street), to 25 feet at BH-2 (drilled about 500 feet south of First Street). While not present in our explorations, two subunits were generally observed. The upper subunit consisted



of about 2.5 to 10 feet of very loose, saturated silty sand and sandy silt (mud-like) deposits with varying amounts of organics. The lower subunit consisted of 3 to 5 feet of very soft, compressible organic silt. These two materials were separate by a thin approximately 6-inch-thick layer of woody debris. While not directly encountered in our borings, this layer may contain wood debris such as old timbers or tree trunks.

Existing data indicate that most of the explorations completed at the Geddes Marina Site encountered alluvial and estuarial deposits similar to the alluvium and tide flat deposits observed in our explorations. Similar to our explorations, existing exploration data indicate that these deposits become thicker the closer the exploration was to the slough.

These deposits appear to be normally consolidated and were most likely deposited by the tidal sequence of the slough as a series of tidal basins. The thicknesses and depths of the compressible soil relative to the proximity to the slough embankment suggests that these tidal deposits are potentially deposited as alluvial terraces.

- **Marysville Sand** – Beneath the compressible soil deposits, Marysville sand deposits were encountered in both of the borings. Soils consistent with Marysville sand were also recorded in several of the MFA probes performed in the northern half of the Geddes Marina Site. We consider the sand encountered in the MFA probes GM-2 through GM-4, and GM-10 to likely be the top of the Marysville sand unit. All the explorations that encountered Marysville sand were also terminated in this unit.

Marysville sand deposits generally consist of loose to dense, silty sand. Although there is a large range of densities within these soils at various depths, the typical Marysville Sand unit is consistent with a medium dense sand. Marysville sand is a recessional outwash soil that was deposited by meltwater emanating from the retreating glacial ice sheet. As a result, it has not been overridden by glaciers and is typically loose to medium dense. Recessional outwash deposits are generally deemed liquefiable where saturated.

### 3.4 GROUND WATER CONDITIONS

Due to the use of mud rotary drilling methods during the explorations, ground water conditions are difficult to determine. However, HWA anticipates ground water conditions to be consistent with the water level observed in the nearby artificial lagoon. Furthermore, ground water was observed during previous exploratory drilling at depths of approximately 5 to 10 feet. In general, ground water conditions should be assumed to be no deeper than the elevation of the water surface in the adjacent slough, which is known to be near the ground surface at the Geddes Marina Site at the peak heights. For construction, shoring design, and resistance to buoyancy, the ground water should be assumed to be at the ground surface. Additionally, given the project corridor's proximity to the Ebey Slough, we would expect that the groundwater levels along the corridor will closely match the tidal fluctuations of the adjacent water body.

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Prospective contractors should be prepared to encounter and manage seasonally varying ground water conditions and significant precipitation events. The volume of ground water may increase where excavations intersect existing utility trenches, as significant ground water flows are likely to occur in the permeable gravel backfill within existing trenches.

#### **4.0 CONDITIONS AND LIMITATIONS**

We have prepared this geotechnical data report for Parametrix, Inc. and the City of Marysville for use in design for this project. The purpose of the geotechnical investigation was to provide information regarding existing subsurface conditions within the proposed project areas in support of the proposed improvements. A limited number of explorations were completed for conceptual design and additional site investigations may be needed to supplement this data for future design phases of this project. Experience has shown that pavement, soil, and ground water conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HWA should be notified for review of the information of this report, and revision of such if necessary.

Within the limitations of scope, schedule and budget, HWA attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology in the area at the time the report was prepared. No warranty, express or implied, is made.

HWA does not practice or consult in the field of safety engineering. We do not direct the contractor's operations and cannot be responsible for the safety of personnel other than our own on the site. As such, the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered unsafe.



We appreciate the opportunity to provide geotechnical services on this project. Should you have any questions or comments, or if we may be of further service, please do not hesitate to call.

Sincerely,

**HWA GEOSCIENCES INC.**

JoLyn Gillie, P.E.  
Geotechnical Engineer, Principal

Sean Schlitt, P.E.  
Geotechnical Engineer

December 3, 2021

HWA Project No. 2020-011-21

## 5.0 REFERENCES

Gray & Osborne, Inc., *1<sup>st</sup> and 3<sup>rd</sup> Street Stormwater Retrofit Project Predesign Report*, dated January 2014, G&O report reference 13587, prepared for the City of Marysville.

HWA GeoSciences Inc, 2021, *Final Geotechnical Report, Marysville Downtown Stormwater Treatment Project, Marysville, Washington*, dated November 12, 2021, HWA report 2019-025, prepared for the City of Marysville.

HWA GeoSciences Inc., 2016, *Phase I and Phase II Environmental Site Assessment, City of Marysville, Welco Property, Marysville, Washington*, dated May 17, 2016, HWA report 2016-023, prepared for the City of Marysville. Maul Foster Alongi, 2014, *Draft Focused Site Assessment Work Plan – Former Geddes Marina Property, Marysville, Washington*, dated October 2014, MFA report reference 0689.01.03, prepared for City of Marysville.

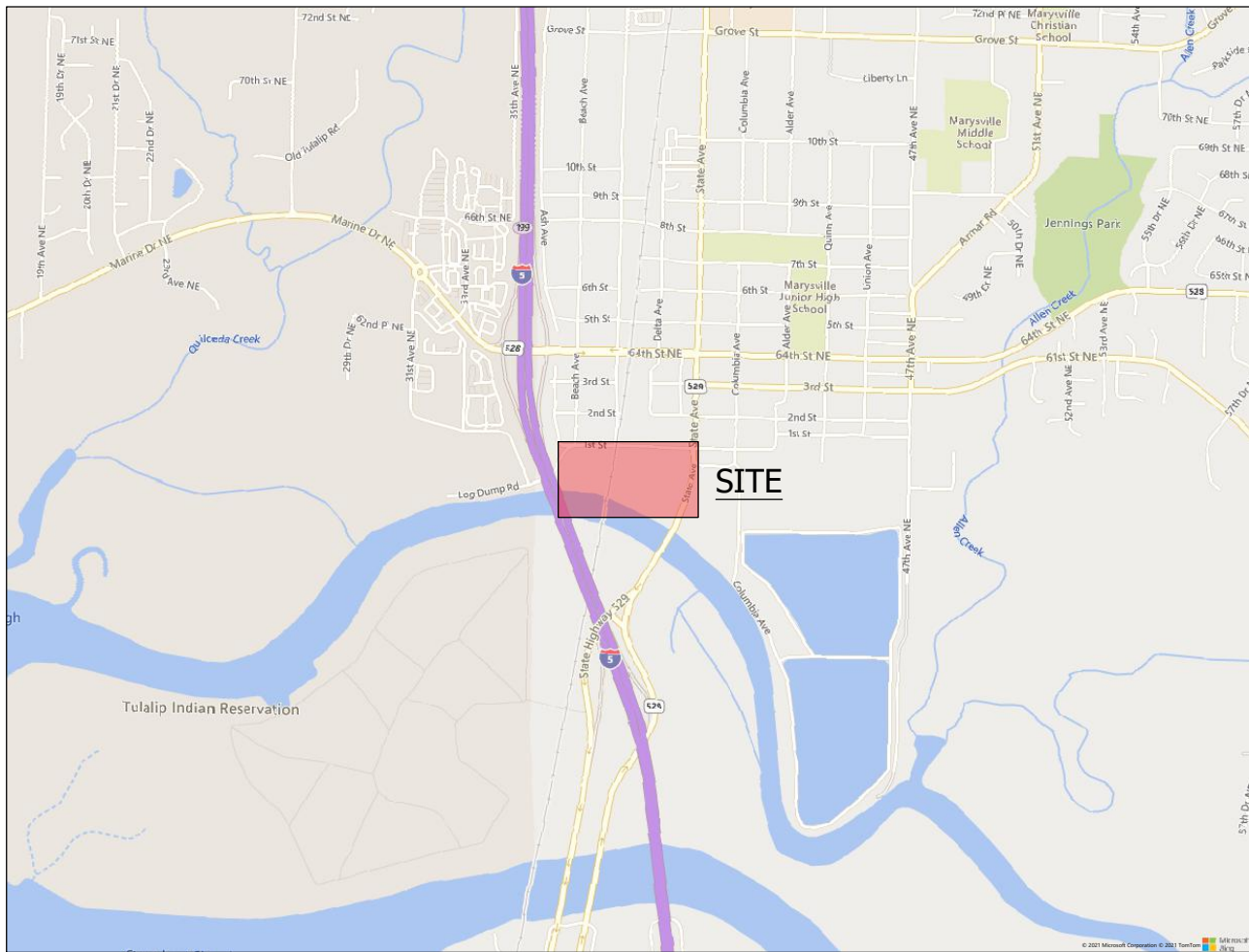
Maul Foster Alongi, 2015, *Focused Site Assessment Report – Former Geddes Marina Property, Marysville, Washington*, dated October 2015, MFA report reference 0689.01.03, prepared for the City of Marysville.

Maul Foster Alongi, 2015, *Integrated Planning Implementation Strategy – Former Geddes Marina Property, Marysville, Washington*, dated December 2015, MFA report reference 0689.01.03, prepared for the City of Marysville.

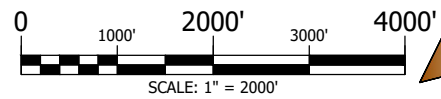
Minard James., 1983, *Geologic Map of the Edmonds East and part of the Edmonds West Quadrangles, Washington*, Washington Department of Natural Resources Division of Geology and Earth Resources, Geologic MapMF-1541, scale 1: 24,000.



**SITE MAP**



**VICINITY MAP**



**SITE AND VICINITY MAP**

**GEDDES MARINA  
PHASE 2 REMEDIATION  
MARYSVILLE, WASHINGTON**

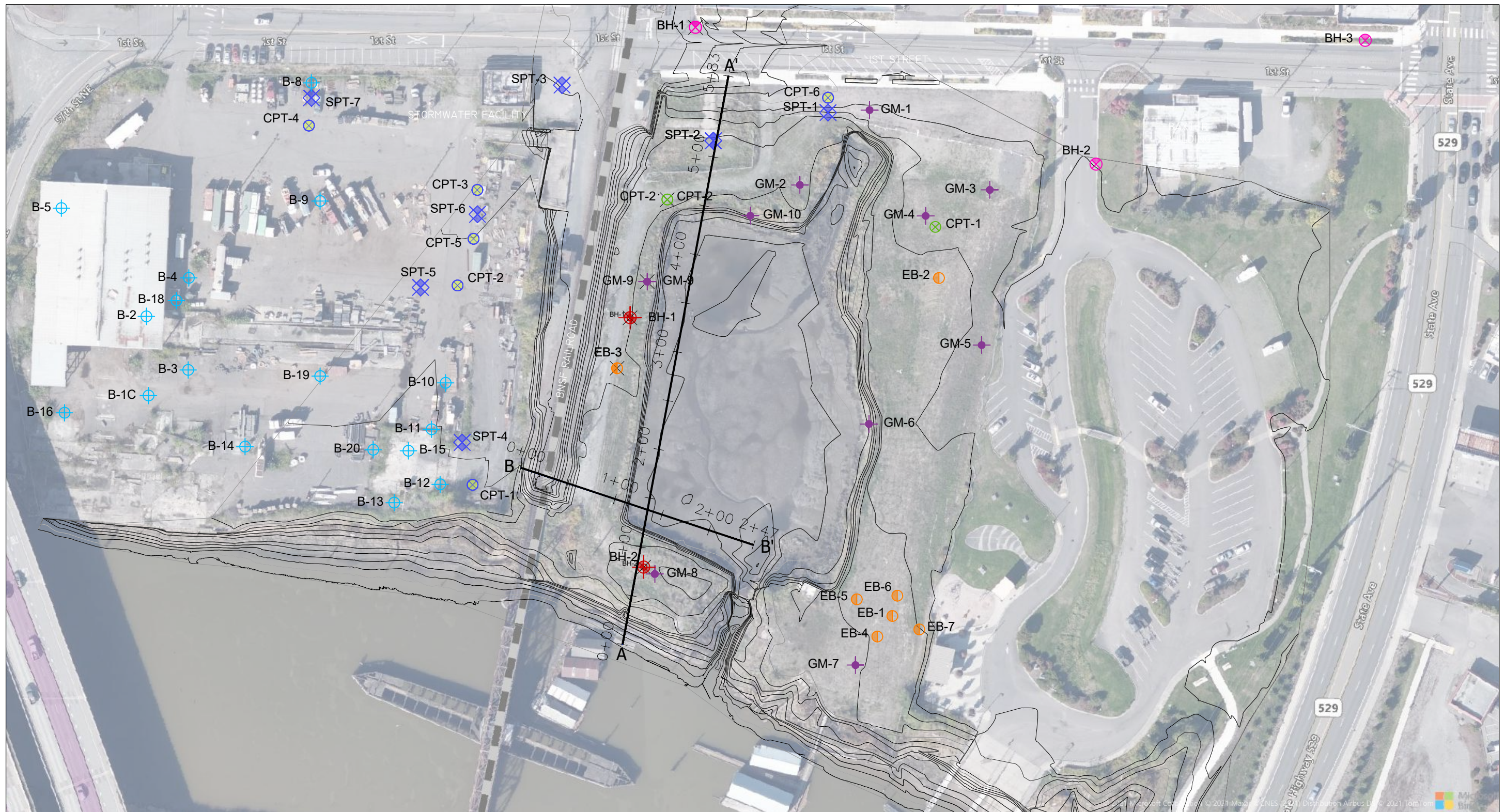
FIGURE NO.:

**1**

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2020-011-21





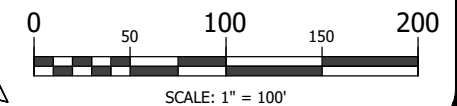
**EXPLORATION LEGEND**

- BH-1 APPROXIMATE LOCATION OF BORINGS (HWA, 2021)
- BH-1 APPROXIMATE LOCATION OF BORINGS (HWA, 2019)
- CPT-1 APPROXIMATE LOCATION OF CPT (HWA, 2019)
- SPT-1 APPROXIMATE LOCATION OF SPT (HWA, 2019)
- B-1C APPROXIMATE LOCATION OF BORINGS (HWA, 2016)
- CPT-1 APPROXIMATE LOCATION OF CPT (Materials Testing Consulting, 2015)

- BH-1 APPROXIMATE LOCATION OF BORINGS (PanGEO, 2013)
- GM-1 APPROXIMATE LOCATION OF BORINGS (Maul Foster & Alongi, 2013)
- EB-3 APPROXIMATE LOCATION OF BORINGS (Associated Earth Sciences, 2008)

**GEDDES MARINA**

Scale: 1" = 100'-0"



**GEDDES MARINA  
PHASE 2 REMEDIATION  
MARYSVILLE, WASHINGTON**

**SITE &  
EXPLORATION PLAN**

DRAWN BY:	FIGURE NO.:
CF	2
CHECK BY:	PROJECT NO.:
SKS	2020-011-21

BASE MAP PROVIDED BY: BING AND SURVEYOR

C:\USERS\CFRY\DESKTOP\2020-011 GEDDES MARINA\2020-011-21 GEDDED MARINA PHASE 2 (LAGOON FILL).DWG <2> Plotted: 9/20/2021 10:27 PM

**APPENDIX A**

**FIELD INVESTIGATION**

DRAFT

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS				
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)		GW Well-graded GRAVEL			
		More than 50% of Coarse Fraction Retained on No. 4 Sieve	Gravel with Fines (appreciable amount of fines)	GP Poorly-graded GRAVEL			
			Sand and Sandy Soils	Clean Sand (little or no fines)	GM Silty GRAVEL		
	50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)		GC Clayey GRAVEL			
				SW Well-graded SAND			
	Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	SM Silty SAND	ML SILT		
50% or More Passing No. 200 Sieve Size				Silt and Clay	Liquid Limit 50% or More	SC Clayey SAND	
						CL Lean CLAY	
Highly Organic Soils		Silt and Clay	Liquid Limit 50% or More	OL Organic SILT/Organic CLAY	OH Organic SILT/Organic CLAY		
				50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More	MH Elastic SILT
							CH Fat CLAY
			PT PEAT				

- TEST SYMBOLS**
- %F Percent Fines
  - AL Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
  - CBR California Bearing Ratio
  - CN Consolidation
  - DD Dry Density (pcf)
  - DS Direct Shear
  - GS Grain Size Distribution
  - K Permeability
  - MD Moisture/Density Relationship (Proctor)
  - MR Resilient Modulus
  - OC Organic Content
  - pH pH of Soils
  - PID Photoionization Device Reading
  - PP Pocket Penetrometer (Approx. Comp. Strength, tsf)
  - Res. Resistivity
  - SG Specific Gravity
  - CD Consolidated Drained Triaxial
  - CU Consolidated Undrained Triaxial
  - UU Unconsolidated Undrained Triaxial
  - TV Torvane (Approx. Shear Strength, tsf)
  - UC Unconfined Compression

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- Non-standard Penetration Test (3.0" OD Split Spoon with Brass Rings)
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- 3-1/4" OD Split Spoon

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

*Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)*

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

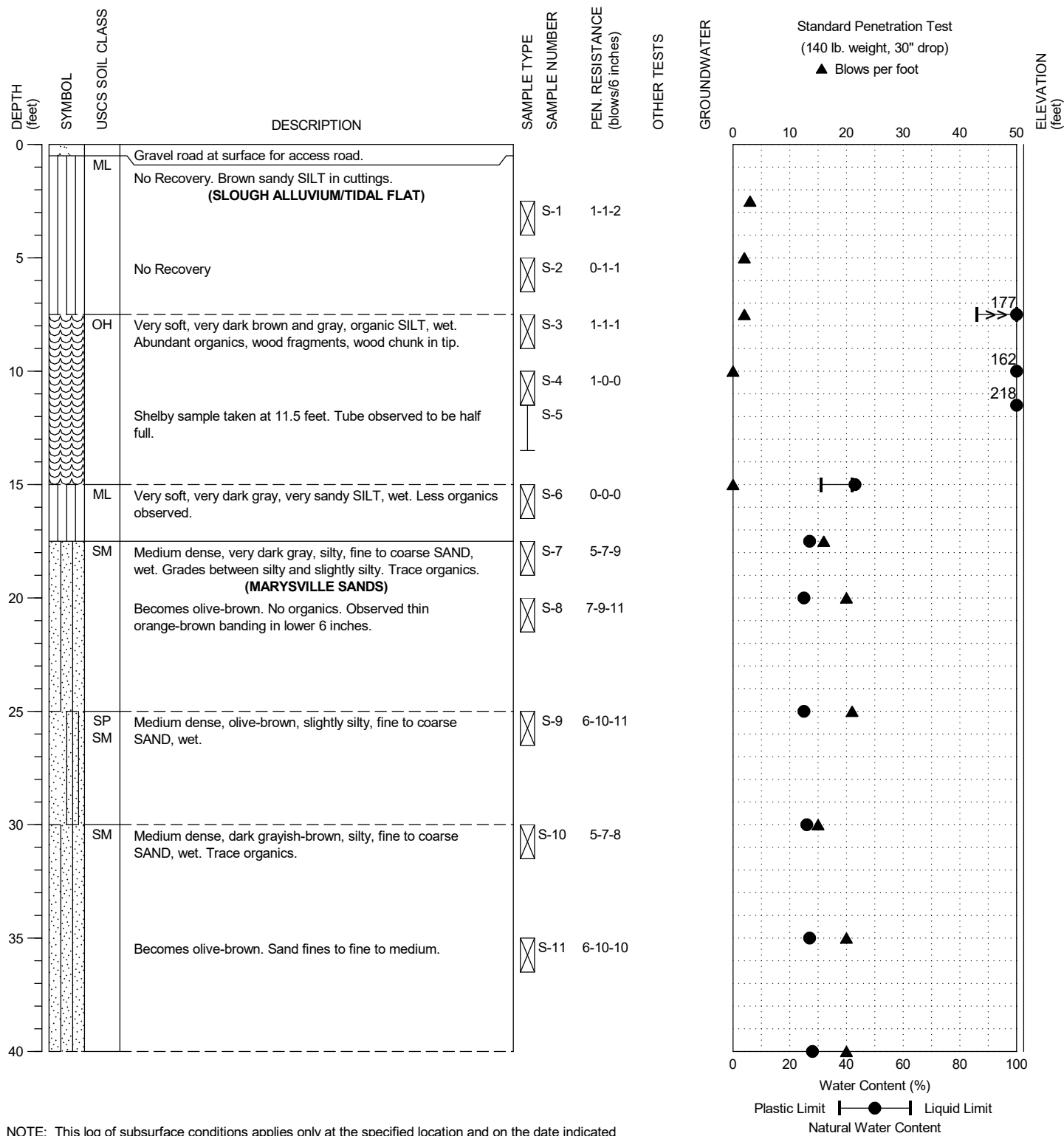


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LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Diedrich D50 Turbo Track Rig, Mud Rotary  
 SAMPLING METHOD: Mud Rotary w/ Automatic Hammer  
 LOCATION: See Figure 2

DATE STARTED: 9/8/2021  
 DATE COMPLETED: 9/8/2021  
 LOGGED BY: SKS



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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BORING:  
 BH-1

PAGE: 1 of 2

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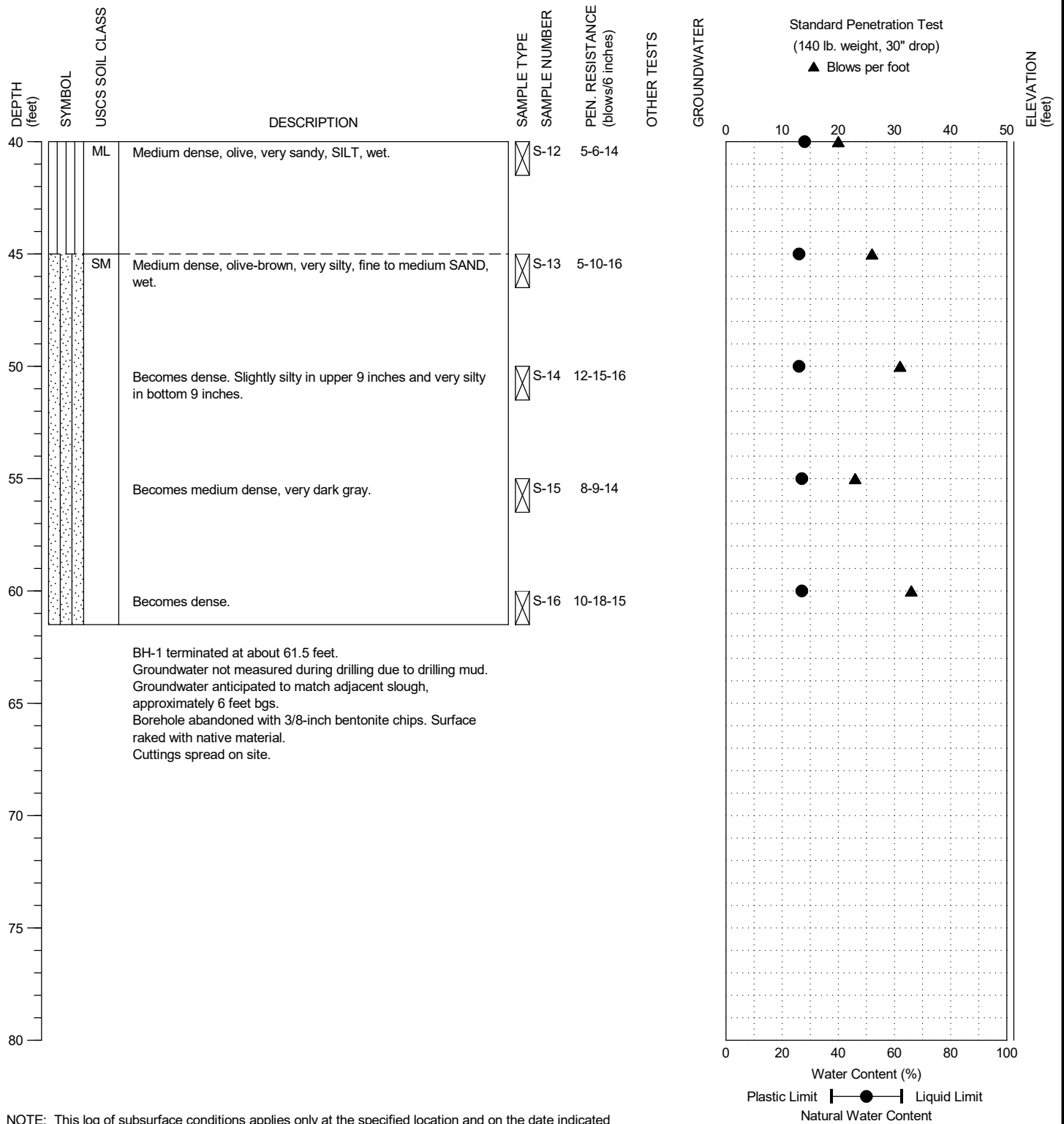
FIGURE:

A-2



DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Diedrich D50 Turbo Track Rig, Mud Rotary  
 SAMPLING METHOD: Mud Rotary w/ Automatic Hammer  
 LOCATION: See Figure 2

DATE STARTED: 9/8/2021  
 DATE COMPLETED: 9/8/2021  
 LOGGED BY: SKS



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Geddes Marina  
 Phase 2 Remediation  
 Marysville, Washington

BORING:  
 BH-1

PAGE: 2 of 2

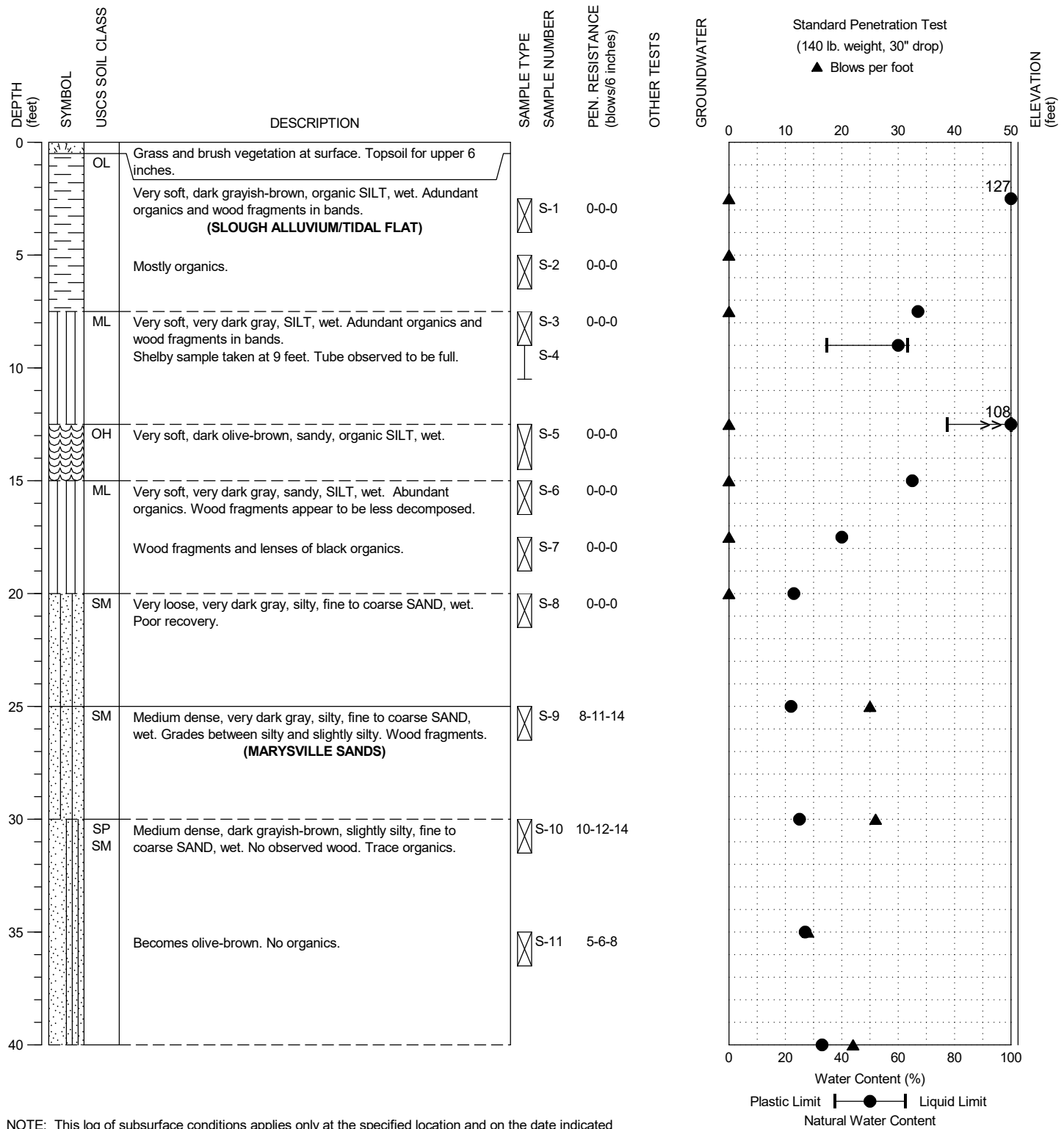
PROJECT NO.: 2020-011-21

FIGURE:

A-2

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Diedrich D50 Turbo Track Rig, Mud Rotary  
 SAMPLING METHOD: Mud Rotary w/ Automatic Hammer  
 LOCATION: See Figure 2

DATE STARTED: 9/8/2021  
 DATE COMPLETED: 9/8/2021  
 LOGGED BY: SKS



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Geddes Marina  
 Phase 2 Remediation  
 Marysville, Washington

BORING:  
 BH-2

PAGE: 1 of 2

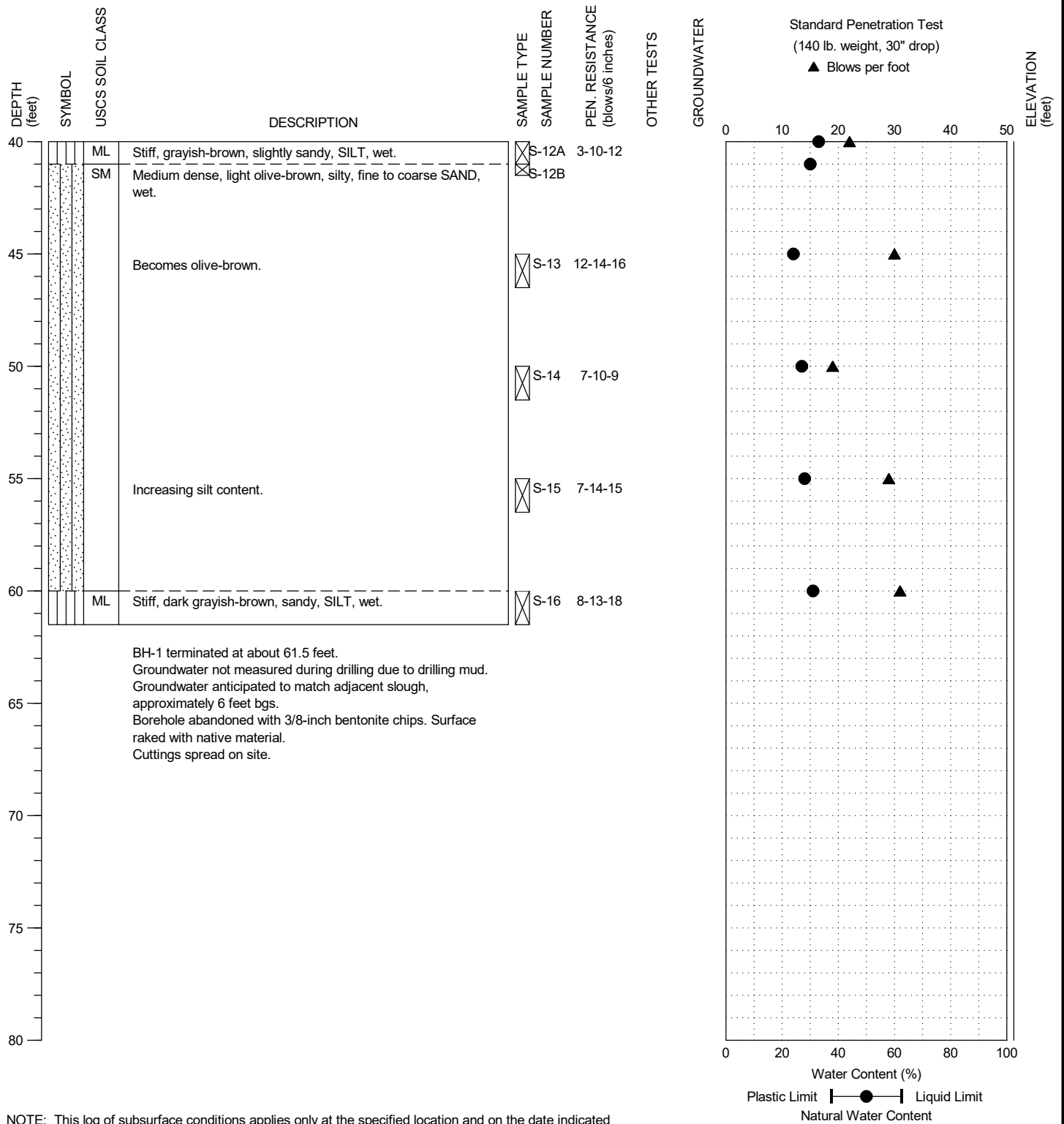
PROJECT NO.: 2020-011-21

FIGURE:

A-3

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Diedrich D50 Turbo Track Rig, Mud Rotary  
 SAMPLING METHOD: Mud Rotary w/ Automatic Hammer  
 LOCATION: See Figure 2

DATE STARTED: 9/8/2021  
 DATE COMPLETED: 9/8/2021  
 LOGGED BY: SKS



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Geddes Marina  
 Phase 2 Remediation  
 Marysville, Washington

BORING:  
 BH-2

PAGE: 2 of 2

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FIGURE:

A-3

# **APPENDIX B**

## **LABORATORY INVESTIGATION**

DRAFT

## APPENDIX B

### LABORATORY TESTING

Representative soil samples obtained from the explorations were returned to HWA's laboratory for further examination and testing. Laboratory tests were conducted on selected soil samples to characterize relevant engineering properties of the on-site materials. A summary of laboratory testing results are provided on the Summary of Material Properties, [Figures B-1 and B-2](#).

**MOISTURE CONTENT OF SOIL:** The moisture content of selected soil samples (percent by dry mass) was determined in general accordance with ASTM D 2216. The results are shown at the sampled intervals on the appropriate summary logs in [Appendix A](#).

**PARTICLE SIZE ANALYSIS OF SOILS:** Selected samples were tested to determine the particle size distribution of material in general accordance with ASTM D 422. The results are summarized on the attached Grain Size Distribution reports ([Figures B-3 through B-7](#)), which also provide information regarding the classification of the samples and the moisture content at the time of testing.

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ATTERBERG LIMITS):** Selected samples were tested using method ASTM D 4318, multi-point method. The results are reported on the attached Liquid Limit, Plastic Limit, and Plasticity Index report, [Figure B-8](#).

**ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL:** The consolidation properties of selected soil samples were measured in general accordance with ASTM D 2435. Saturation was maintained by inundation of the sample throughout the test. The samples were subjected to increasing increments of total stress, the duration of which was selected to exceed the time required for completion of primary consolidation as defined in the Standard, Method B. Unloading of the sample was carried out incrementally. The test results are presented on [Figure B-9 through B-20](#).

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
BH-1,S-3	7.5	9.0	176.7	17.0		164	86	78			61.8	OH	Very dark brown, sandy organic SILT
BH-1,S-4	10.0	11.5	161.8									OH	Very dark brown, organic SILT
BH-1,S-5	11.5	13.5	217.9									OH	Very dark grayish-brown, organic SILT
BH-1,S-6	15.0	16.5	43.0			42	31	11			61.7	ML	Very dark gray, sandy SILT
BH-1,S-7	17.5	19.0	26.8							79.3	20.7	SM	Very dark gray, silty SAND
BH-1,S-8	20.0	21.5	24.9									SM	Dark grayish-brown, silty SAND
BH-1,S-9	25.0	26.5	25.2							93.3	6.7	SP-SM	Olive-brown, poorly graded SAND with silt
BH-1,S-10	30.0	31.5	26.3						0.0	81.5	18.5	SM	Dark grayish-brown, silty SAND
BH-1,S-11	35.0	36.5	27.4									SM	Olive-brown, silty SAND
BH-1,S-12	40.0	41.5	28.1							31.7	68.3	ML	Olive, sandy SILT
BH-1,S-13	45.0	46.5	25.9									SM	Olive-brown, silty SAND
BH-1,S-14	50.0	51.5	26.4									SM	Olive-brown, silty SAND
BH-1,S-15	55.0	56.5	26.8							64.0	36.0	SM	Very dark gray, silty SAND
BH-1,S-16	60.0	61.5	27.4									SM	Very dark gray, silty SAND
BH-2,S-1	2.5	4.0	126.9									OL	Dark grayish-brown, organic SILT
BH-2,S-3	7.5	9.0	66.6	5.5								ML	Very dark gray, SILT with organics
BH-2,S-4	9.0	10.5	60.4			63	35	28				OH	Very dark gray, organic SILT with sand
BH-2,S-5	12.5	14.5	107.7			138	77	61			76.9	OH	Dark olive-brown, organic SILT with sand
BH-2,S-6	15.0	16.5	65.1									ML	Very dark gray, SILT with organics
BH-2,S-7	17.5	19.0	40.1								74.4	ML	Very dark gray, SILT with sand

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.  
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



Geddes Marina  
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SUMMARY OF  
MATERIAL PROPERTIES

PAGE: 1 of 2

PROJECT NO.: 2020-011-21

FIGURE: B-1

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
BH-2,S-8	20.0	21.5	23.4									SM	Very dark gray, silty SAND
BH-2,S-9	25.0	26.5	22.1					0.5	87.3	12.2		SM	Very dark gray, silty SAND
BH-2,S-10	30.0	31.5	25.2									SP-SM	Dark grayish-brown, poorly graded SAND with silt
BH-2,S-11	35.0	36.5	26.7							8.9		SP-SM	Olive-brown, poorly graded SAND with silt
BH-2,S-12A	40.0	41.0	32.6									ML	Grayish-brown, SILT
BH-2,S-12B	41.0	41.5	29.5									SM	Light olive-brown, silty SAND
BH-2,S-13	45.0	46.5	24.4									SM	Olive-brown, silty SAND
BH-2,S-14	50.0	51.5	27.2							25.6		SM	Olive-brown, silty SAND
BH-2,S-15	55.0	56.5	27.7									SM	Dark grayish-brown, silty SAND
BH-2,S-16	60.0	61.5	30.8							51.3		ML	Dark grayish-brown, sandy SILT

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.  
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



Geddes Marina  
Phase 2 Remediation  
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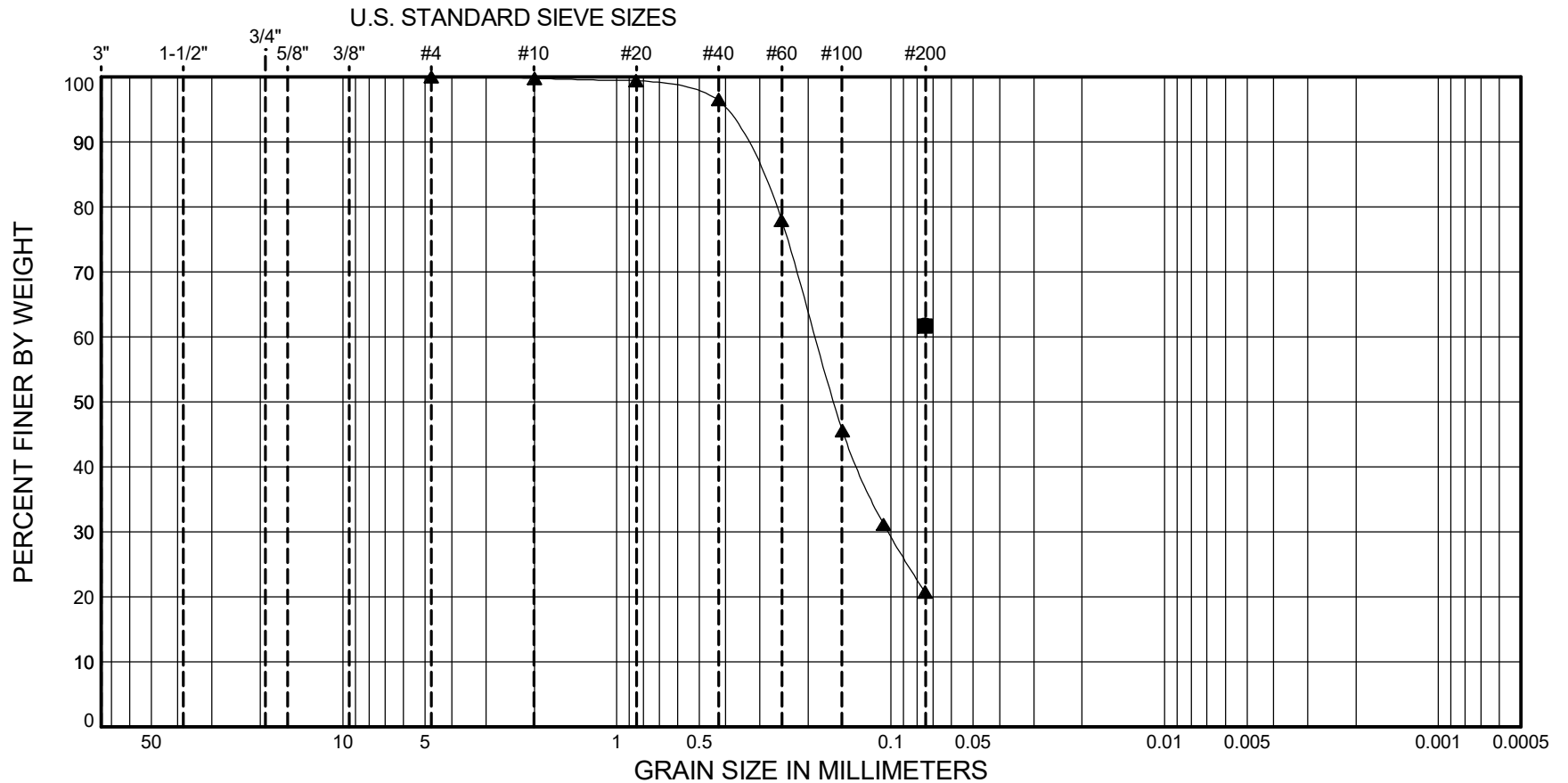
SUMMARY OF  
MATERIAL PROPERTIES

PAGE: 2 of 2

PROJECT NO.: 2020-011-21

FIGURE: B-2

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-1	S-3	7.5 - 9.0	(OH) Very dark brown, sandy organic SILT	177	164	86	78			61.8
■	BH-1	S-6	15.0 - 16.5	(ML) Very dark gray, sandy SILT	43	42	31	11			61.7
▲	BH-1	S-7	17.5 - 19.0	(SM) Very dark gray, silty SAND	27					79.3	20.7



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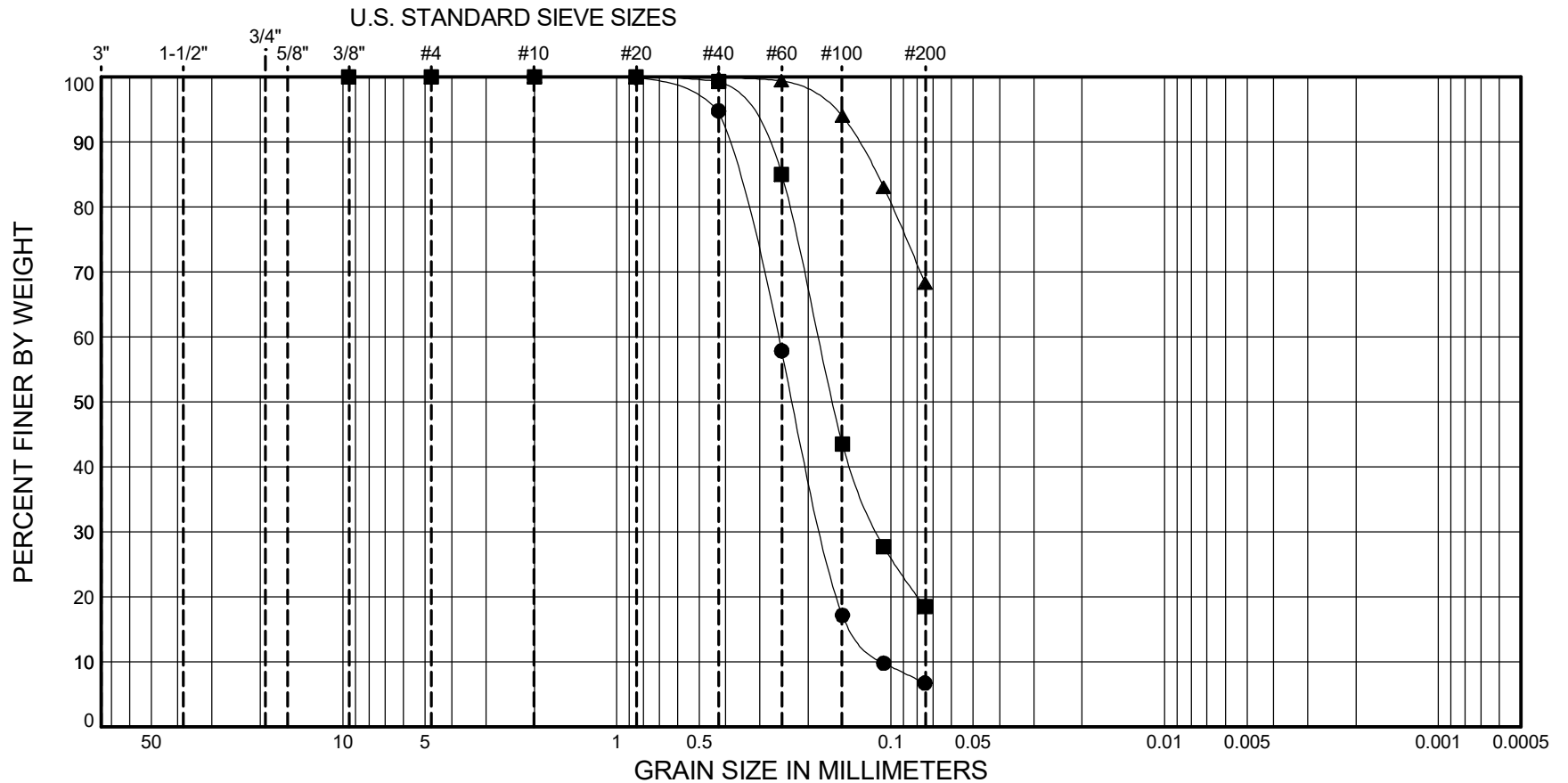
PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2020-011-21

FIGURE: B-3



GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-1	S-9	25.0 - 26.5	(SP-SM) Olive-brown, poorly graded SAND with silt	25					93.3	6.7
■	BH-1	S-10	30.0 - 31.5	(SM) Dark grayish-brown, silty SAND	26				0.0	81.5	18.5
▲	BH-1	S-12	40.0 - 41.5	(ML) Olive, sandy SILT	28					31.7	68.3



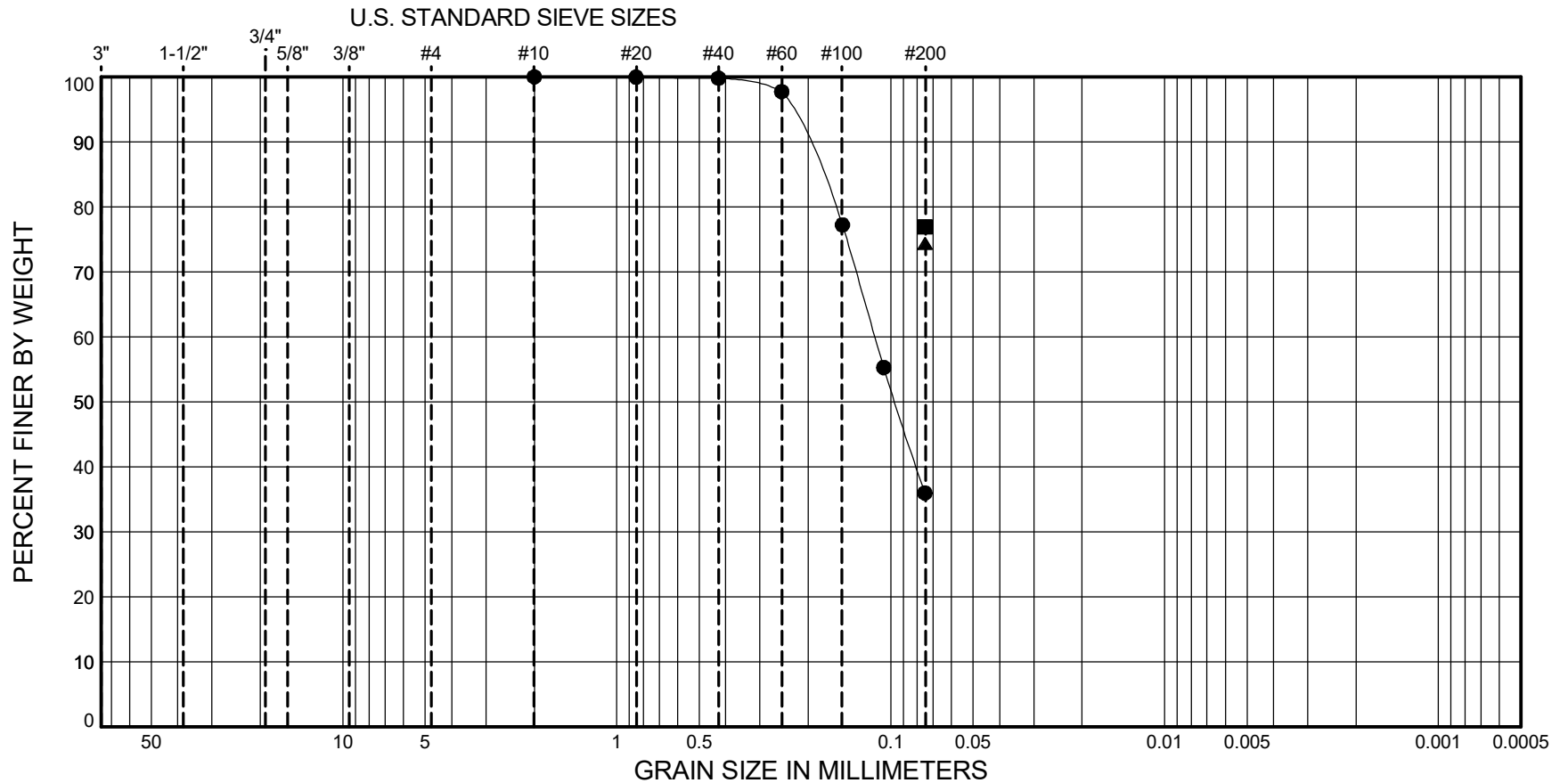
Geddes Marina  
Phase 2 Remediation  
Marysville, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2020-011-21

FIGURE: B-4

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-1	S-15	55.0 - 56.5	(SM) Very dark gray, silty SAND	27					64.0	36.0
■	BH-2	S-5	12.5 - 14.5	(OH) Dark olive-brown, organic SILT with sand	108	138	77	61			76.9
▲	BH-2	S-7	17.5 - 19.0	(ML) Very dark gray, SILT with sand	40						74.4



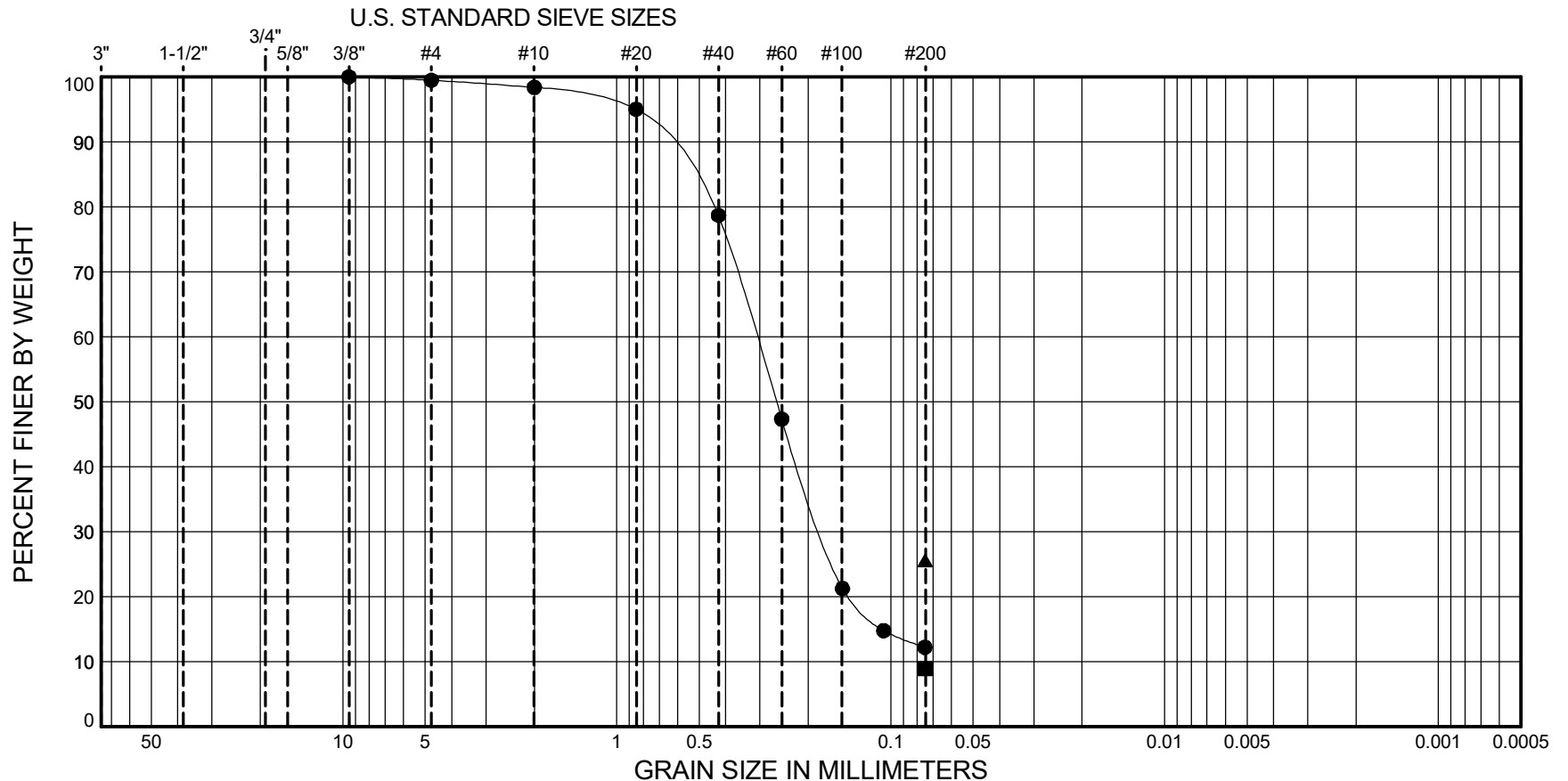
Geddes Marina  
Phase 2 Remediation  
Marysville, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2020-011-21

FIGURE: B-5

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-2	S-9	25.0 - 26.5	(SM) Very dark gray, silty SAND	22				0.5	87.3	12.2
■	BH-2	S-11	35.0 - 36.5	(SP-SM) Olive-brown, poorly graded SAND with silt	27						8.9
▲	BH-2	S-14	50.0 - 51.5	(SM) Olive-brown, silty SAND	27						25.6



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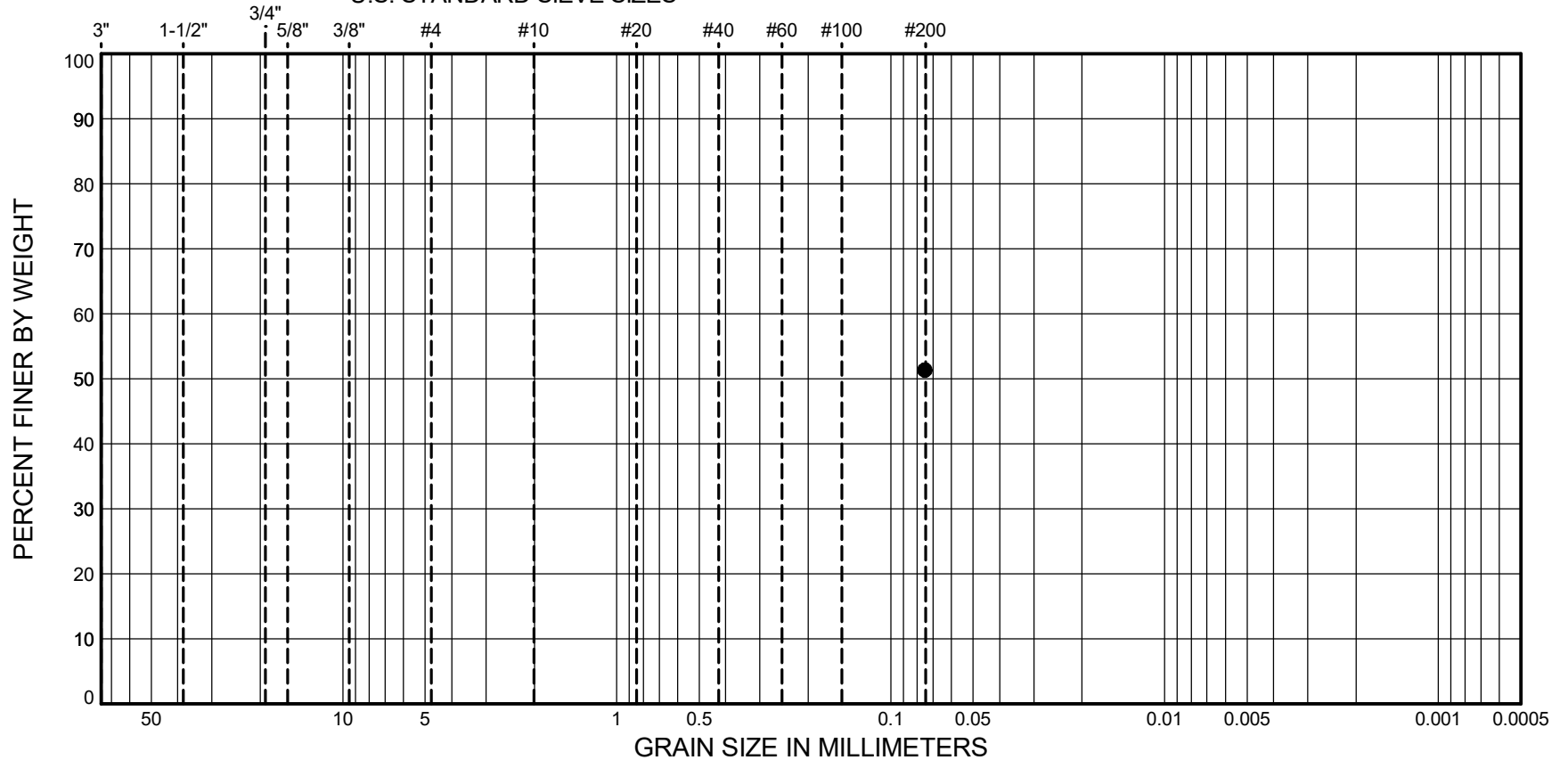
PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2020-011-21

FIGURE: B-6

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

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SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-2	S-16	60.0 - 61.5	(ML) Dark grayish-brown, sandy SILT	31						51.3

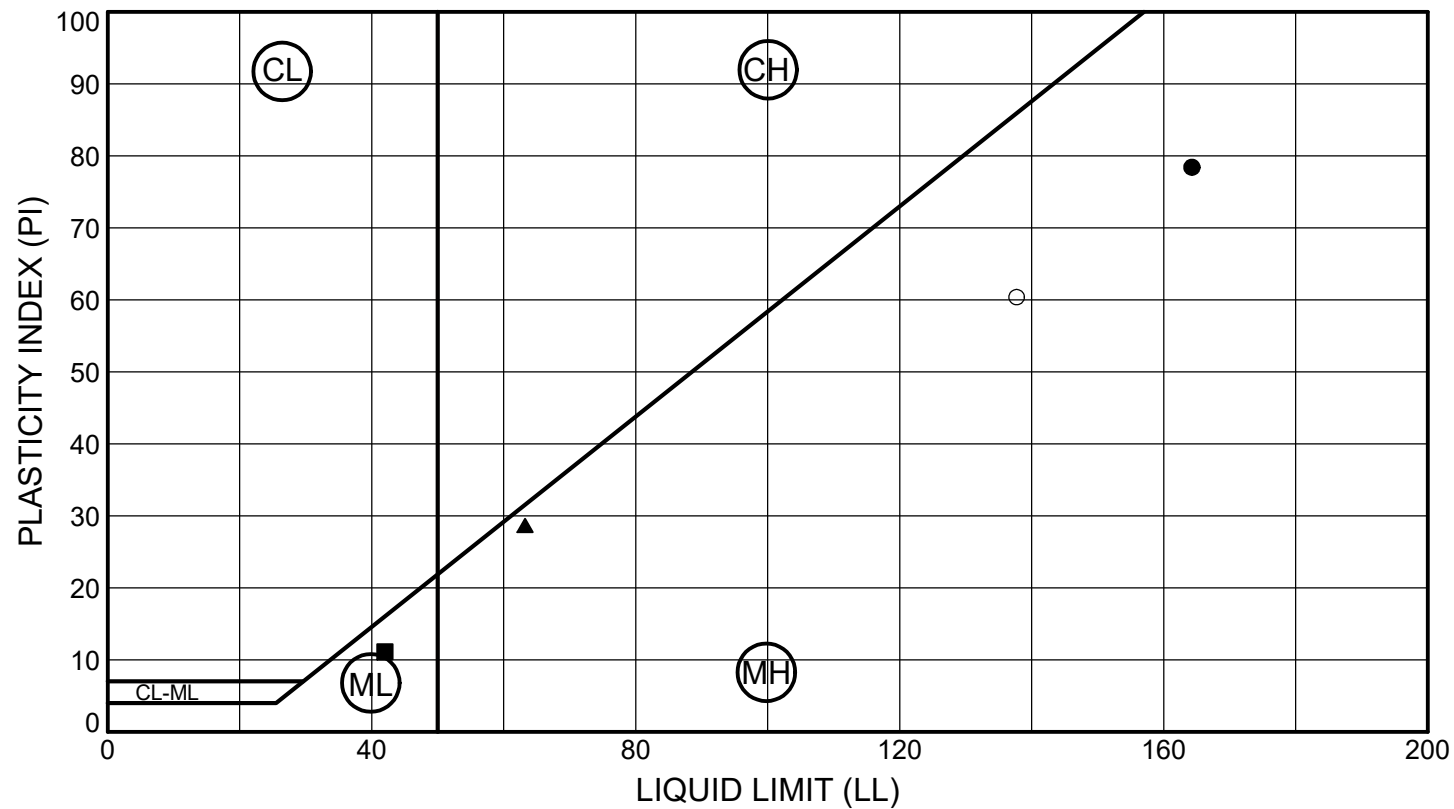


Geddes Marina  
Phase 2 Remediation  
Marysville, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2020-011-21

FIGURE: B-7



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	BH-1	S-3	7.5 - 9.0	(OH) Very dark brown, sandy organic SILT	177	164	86	78	61.8
■	BH-1	S-6	15.0 - 16.5	(ML) Very dark gray, sandy SILT	43	42	31	11	61.7
▲	BH-2	S-4	9.0 - 10.5	(OH) Very dark gray, organic SILT with sand	60	63	35	28	
○	BH-2	S-5	12.5 - 14.5	(OH) Dark olive-brown, organic SILT with sand	108	138	77	61	76.9



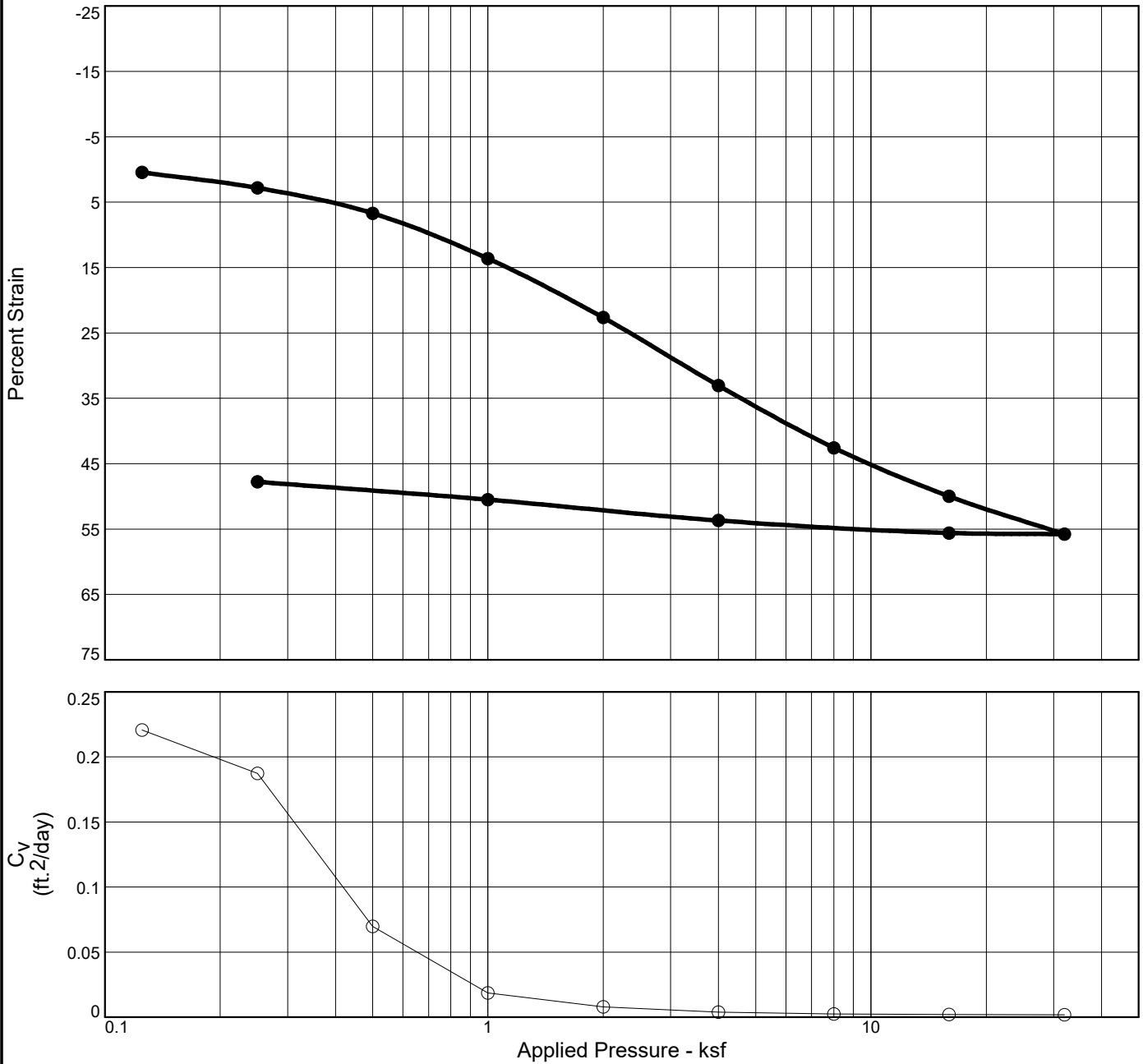
Geddes Marina  
Phase 2 Remediation  
Marysville, Washington

LIQUID LIMIT, PLASTIC LIMIT AND  
PLASTICITY INDEX OF SOILS  
METHOD ASTM D4318

PROJECT NO.: 2020-011-21

FIGURE: B-8

# CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation 114.2 %	Moisture 217.9 %	24.7			2.65	OH		5.059

### MATERIAL DESCRIPTION

Very dark grayish brown, organic SILT

**Project No.** 2020-011      **Client:** Parametrix  
**Project:** Geddes Marina  
Phase 2 Remediation  
**Source of Sample:** BH-1      **Depth:** 11.5'-13.5'      **Sample Number:** S-5

**Remarks:**  
Specific gravity assumed



**Figure B-9**

**Tested By:** GB

**Checked By:** SEG

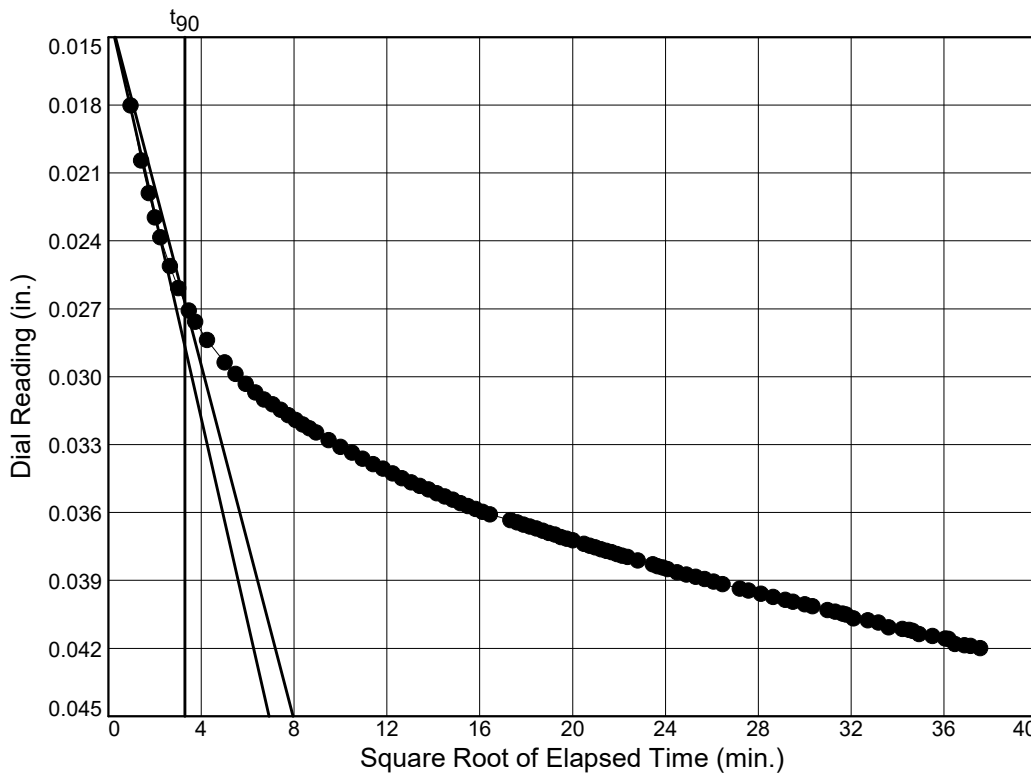
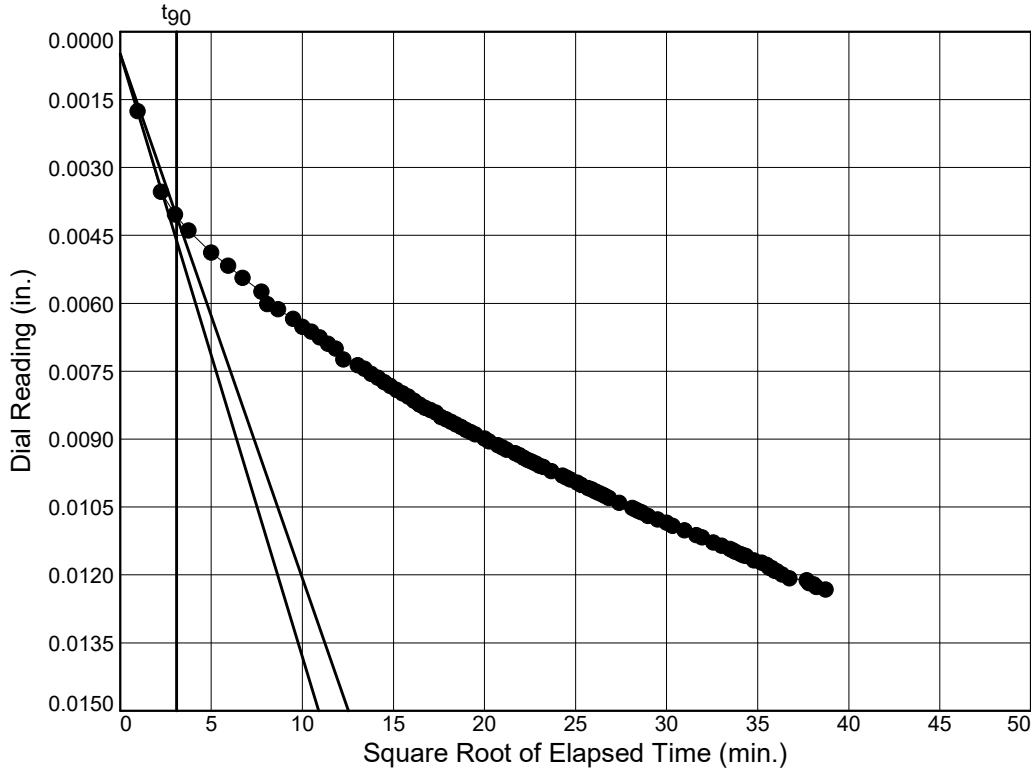
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-1

Depth: 11.5'-13.5'

Sample Number: S-5



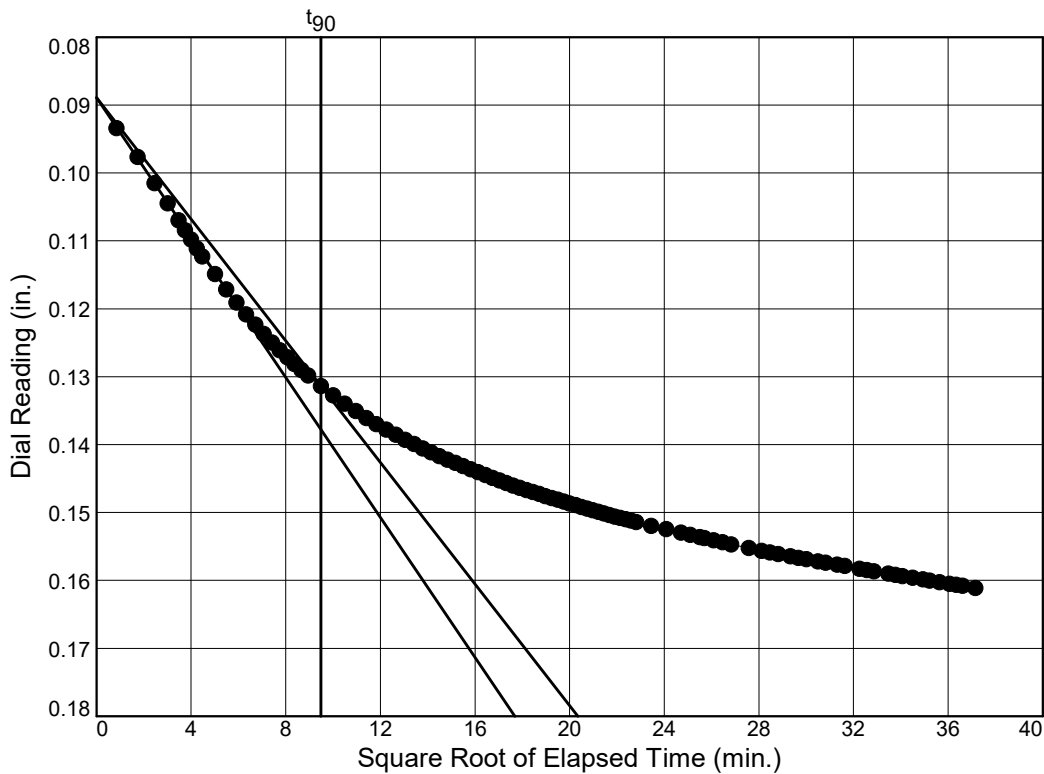
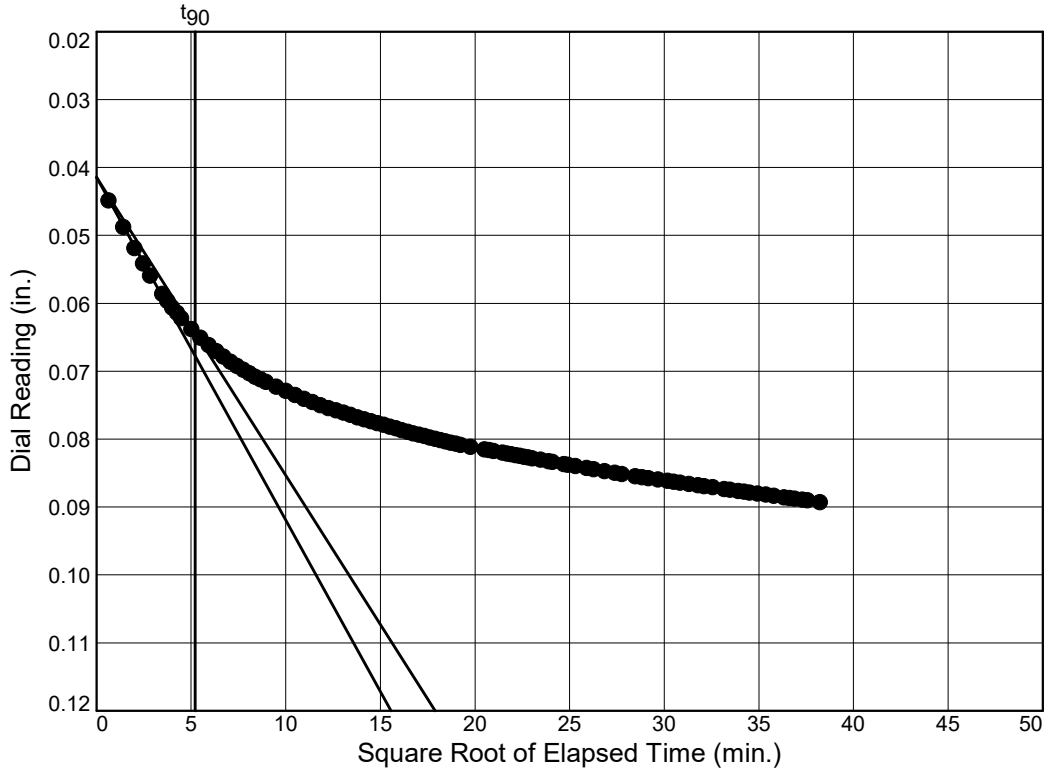
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-1

Depth: 11.5'-13.5'

Sample Number: S-5





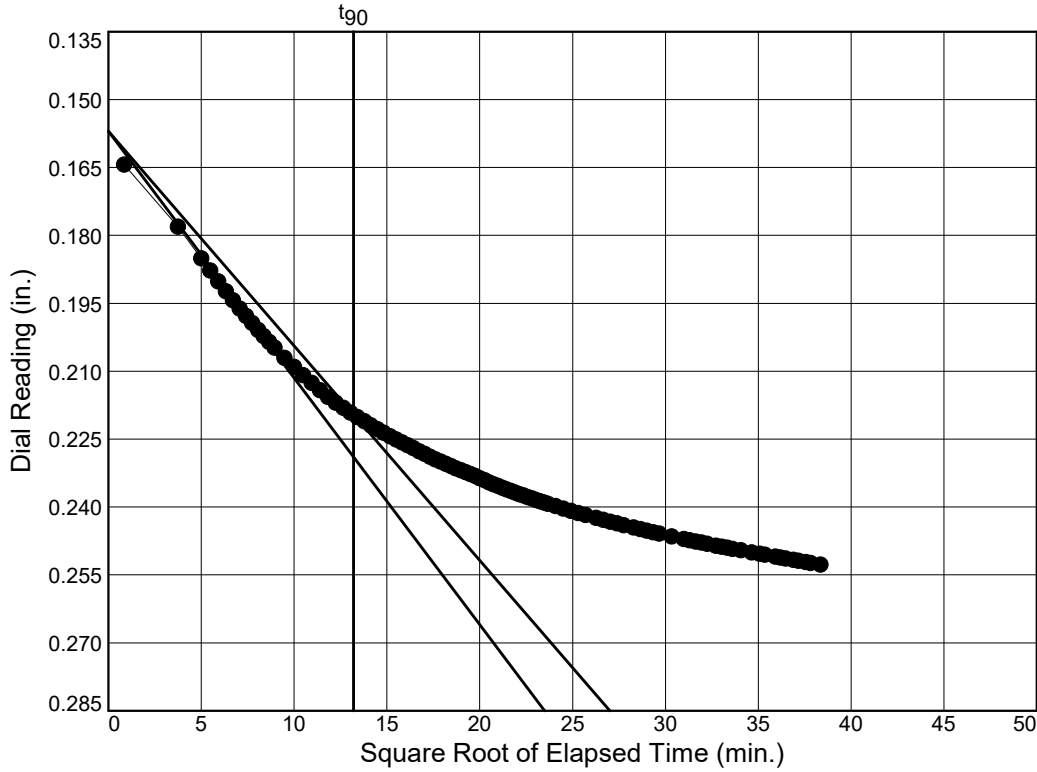
# Dial Reading vs. Time

Project No.: 2020-011  
Project: Geddes Marina

Source of Sample: BH-1

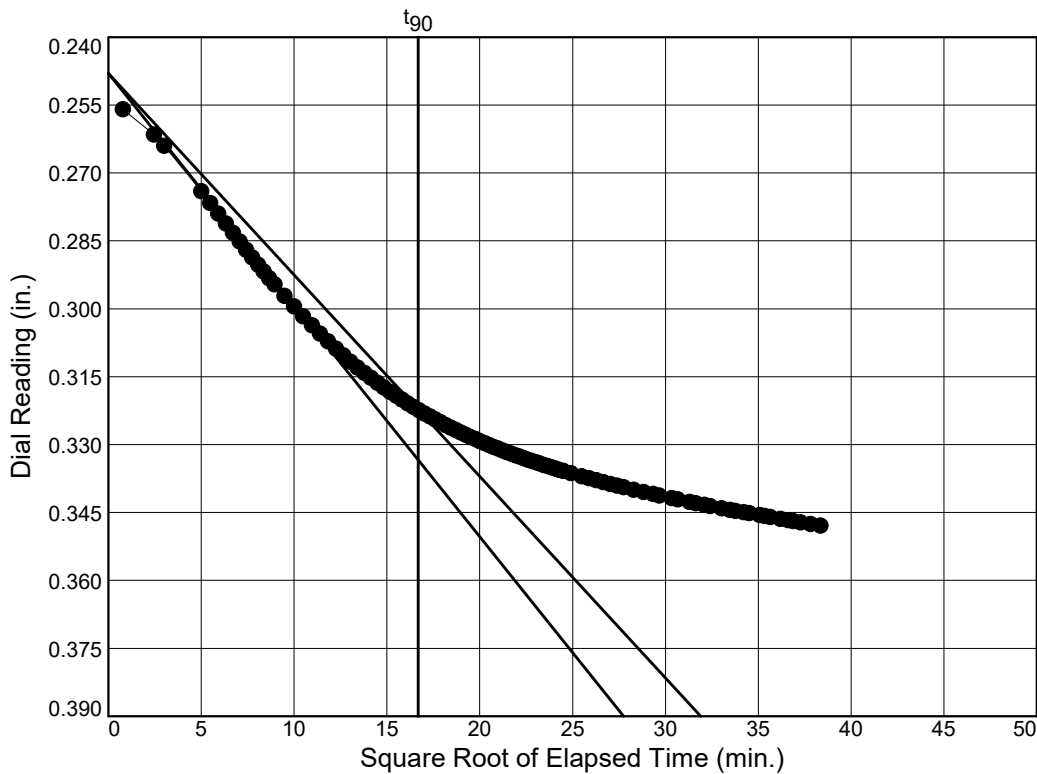
Depth: 11.5'-13.5'

Sample Number: S-5



Load No.= 5  
Load=2.00 ksf  
 $D_0 = 0.1570$   
 $D_{90} = 0.2196$   
 $D_{100} = 0.2265$   
 $T_{90} = 174.29$  min.

$C_v @ T_{90}$   
0.008 ft.<sup>2</sup>/day



Load No.= 6  
Load=4.00 ksf  
 $D_0 = 0.2480$   
 $D_{90} = 0.3223$   
 $D_{100} = 0.3306$   
 $T_{90} = 278.59$  min.

$C_v @ T_{90}$   
0.004 ft.<sup>2</sup>/day

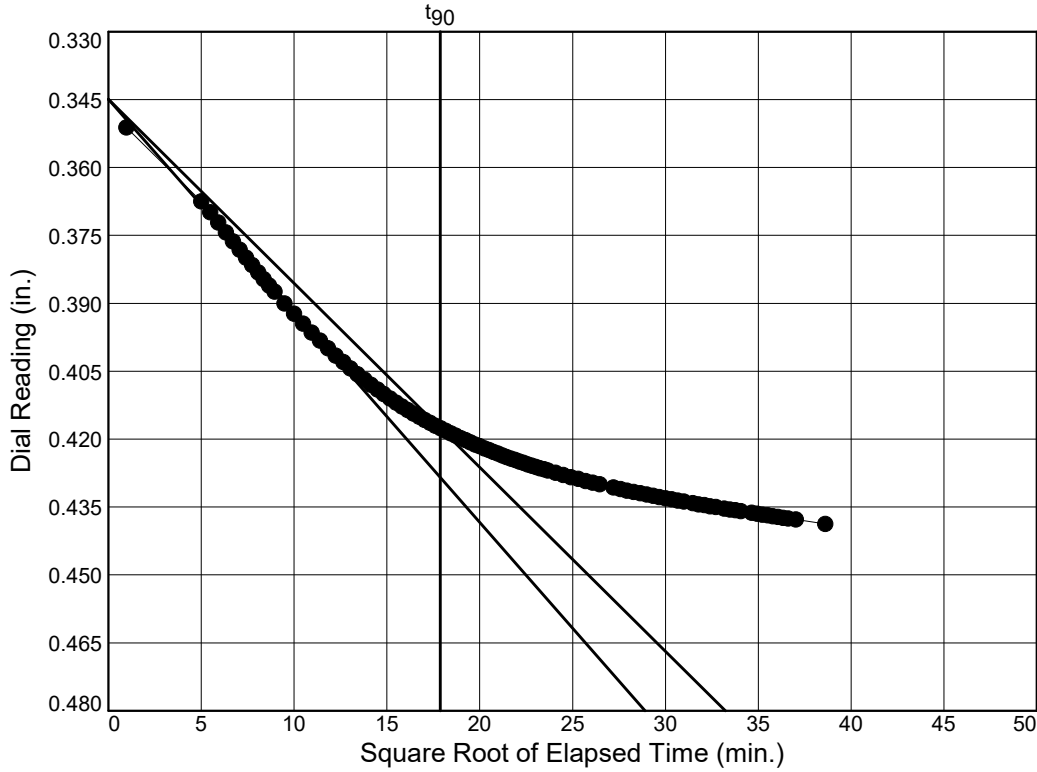
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-1

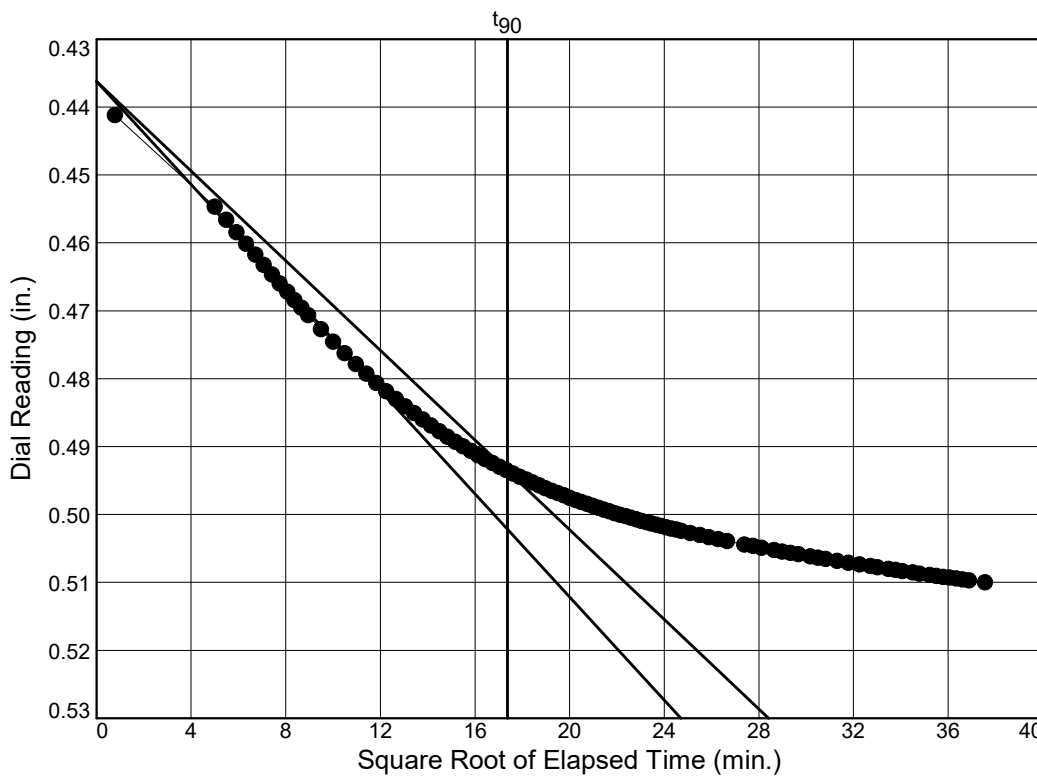
Depth: 11.5'-13.5'

Sample Number: S-5



Load No.= 7  
 Load=8.00 ksf  
 $D_0 = 0.3450$   
 $D_{90} = 0.4176$   
 $D_{100} = 0.4257$   
 $T_{90} = 319.37 \text{ min.}$

$C_v @ T_{90}$   
 0.003 ft.<sup>2</sup>/day



Load No.= 8  
 Load=16.00 ksf  
 $D_0 = 0.4362$   
 $D_{90} = 0.4935$   
 $D_{100} = 0.4999$   
 $T_{90} = 301.60 \text{ min.}$

$C_v @ T_{90}$   
 0.002 ft.<sup>2</sup>/day

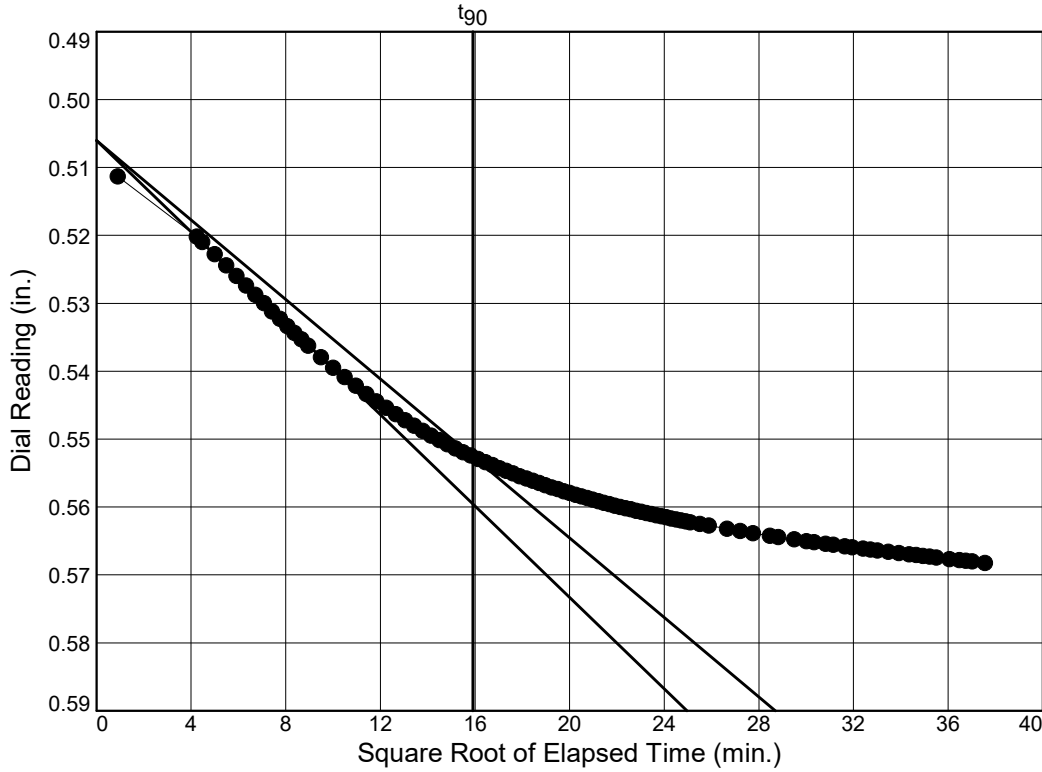
# Dial Reading vs. Time

Project No.: 2020-011  
Project: Geddes Marina

Source of Sample: BH-1

Depth: 11.5'-13.5'

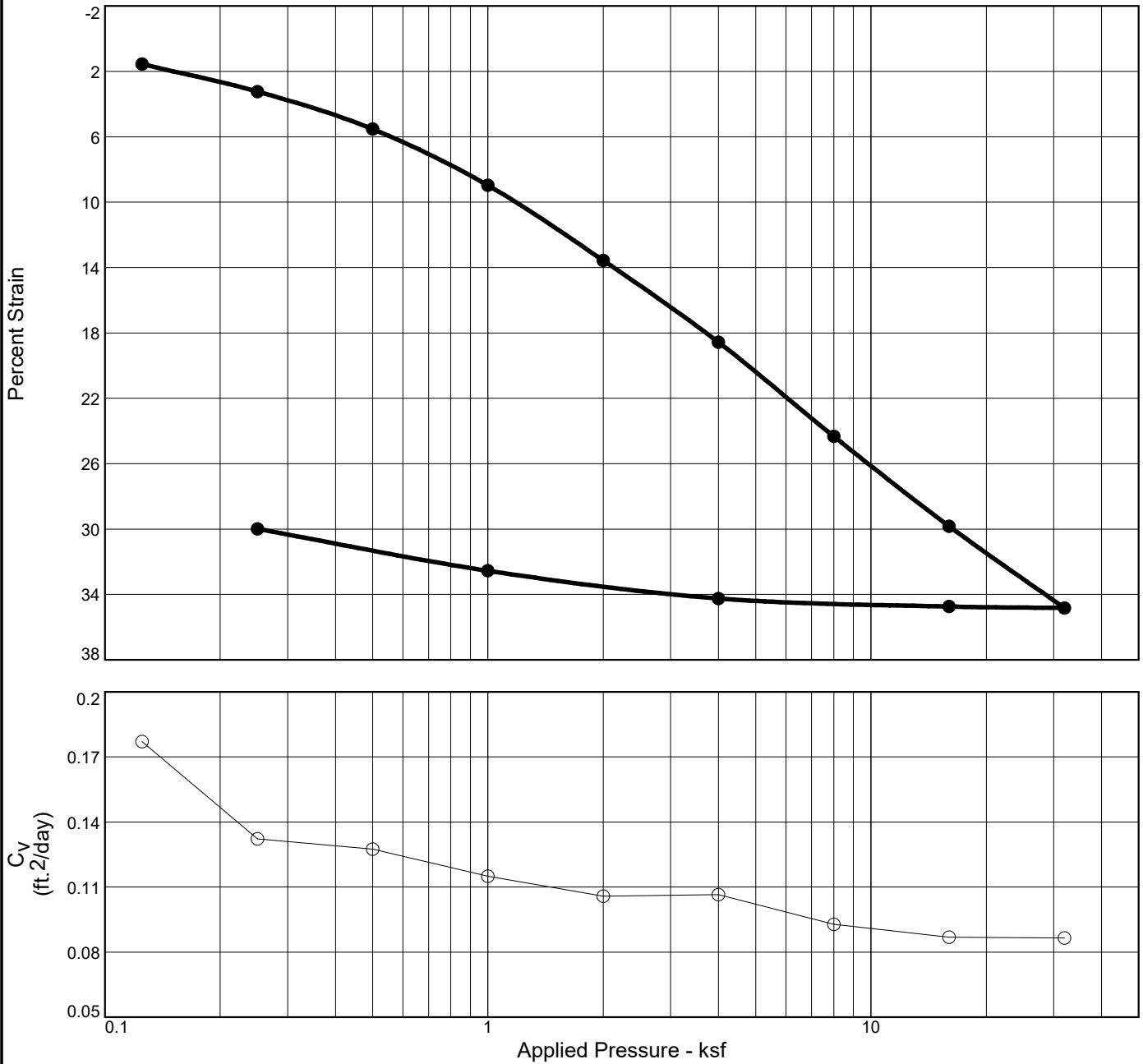
Sample Number: S-5



Load No.= 9  
Load=32.00 ksf  
 $D_0 = 0.5060$   
 $D_{90} = 0.5526$   
 $D_{100} = 0.5577$   
 $T_{90} = 253.05$  min.

$C_v @ T_{90}$   
0.002 ft.<sup>2</sup>/day

# CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation								
96.4 %	60.4 %	62.2	63	28	2.65	OH		1.661

### MATERIAL DESCRIPTION

Very dark gray, organic SILT with sand

**Project No.** 2020-011      **Client:** Parametrix  
**Project:** Geddes Marina  
Phase 2 Remediation  
**Source of Sample:** BH-2      **Depth:** 9'-11'      **Sample Number:** S-4

**Remarks:**  
Specific gravity assumed



**Figure B-10**

**Tested By:** GB

**Checked By:** SEG

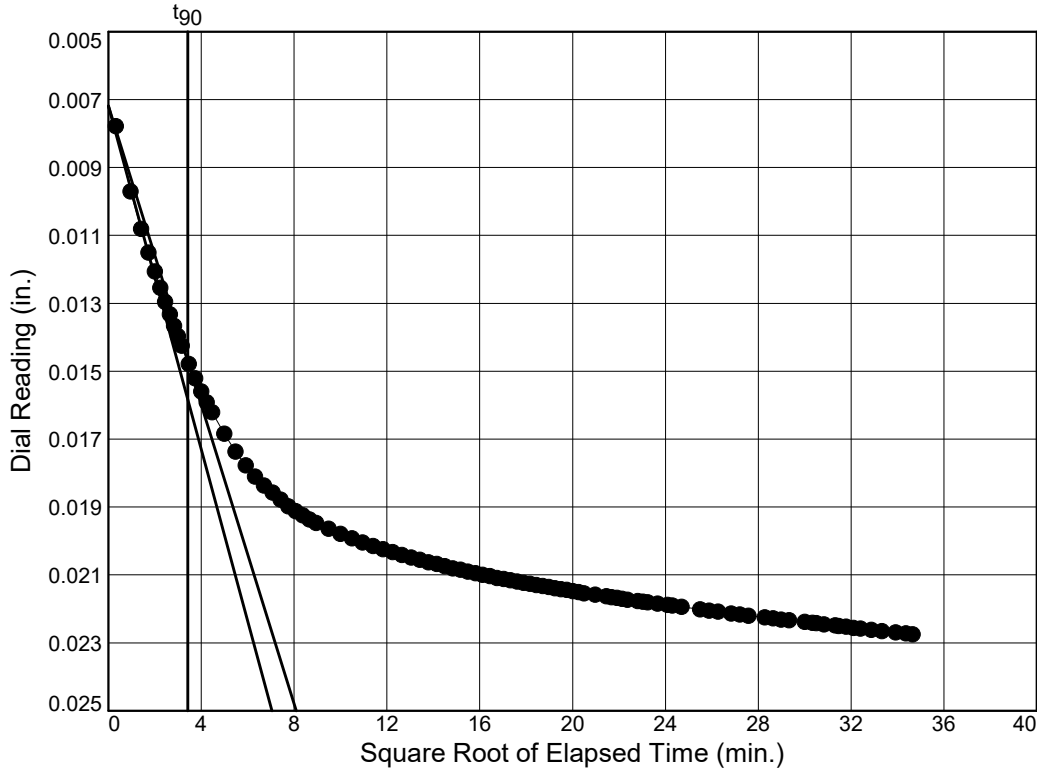
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-2

Depth: 9'-11'

Sample Number: S-4



Load No.= 1

Load=0.13 ksf

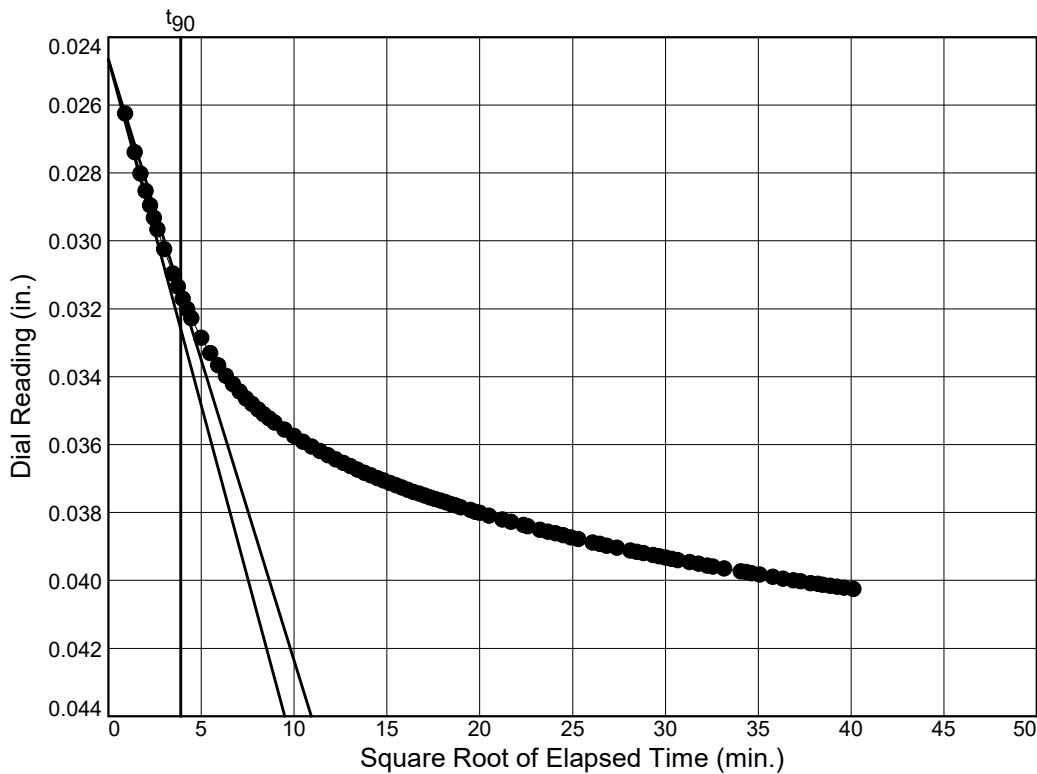
$D_0 = 0.0072$

$D_{90} = 0.0147$

$D_{100} = 0.0155$

$T_{90} = 11.70 \text{ min.}$

$C_v @ T_{90}$   
 0.177 ft.<sup>2</sup>/day



Load No.= 2

Load=0.25 ksf

$D_0 = 0.0247$

$D_{90} = 0.0315$

$D_{100} = 0.0323$

$T_{90} = 15.14 \text{ min.}$

$C_v @ T_{90}$   
 0.132 ft.<sup>2</sup>/day

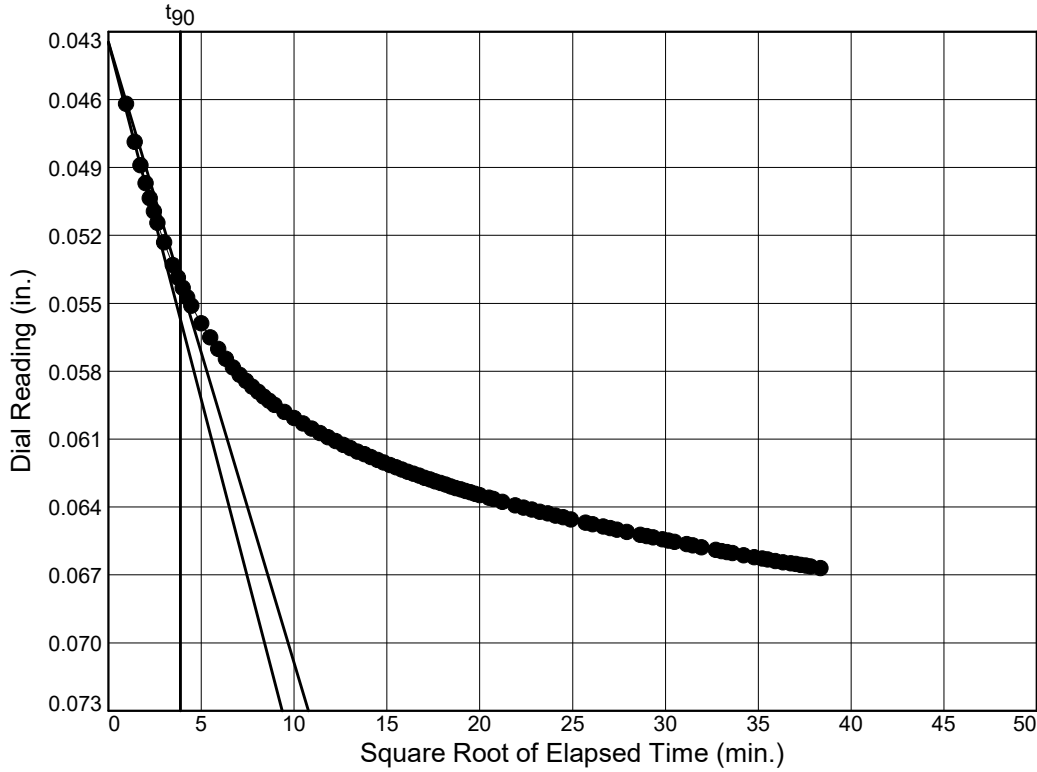
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-2

Depth: 9'-11'

Sample Number: S-4



Load No.= 3

Load=0.50 ksf

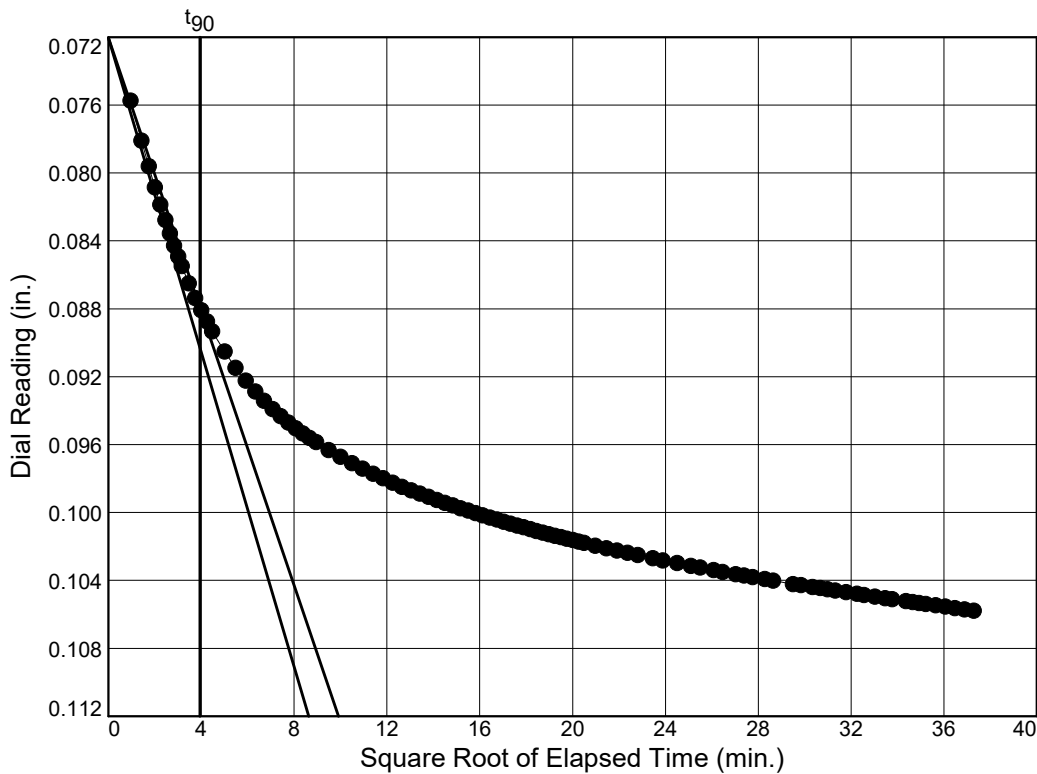
$D_0 = 0.0435$

$D_{90} = 0.0541$

$D_{100} = 0.0553$

$T_{90} = 15.03 \text{ min.}$

$C_v @ T_{90}$   
 0.127 ft.<sup>2</sup>/day



Load No.= 4

Load=1.00 ksf

$D_0 = 0.0720$

$D_{90} = 0.0879$

$D_{100} = 0.0897$

$T_{90} = 15.57 \text{ min.}$

$C_v @ T_{90}$   
 0.115 ft.<sup>2</sup>/day

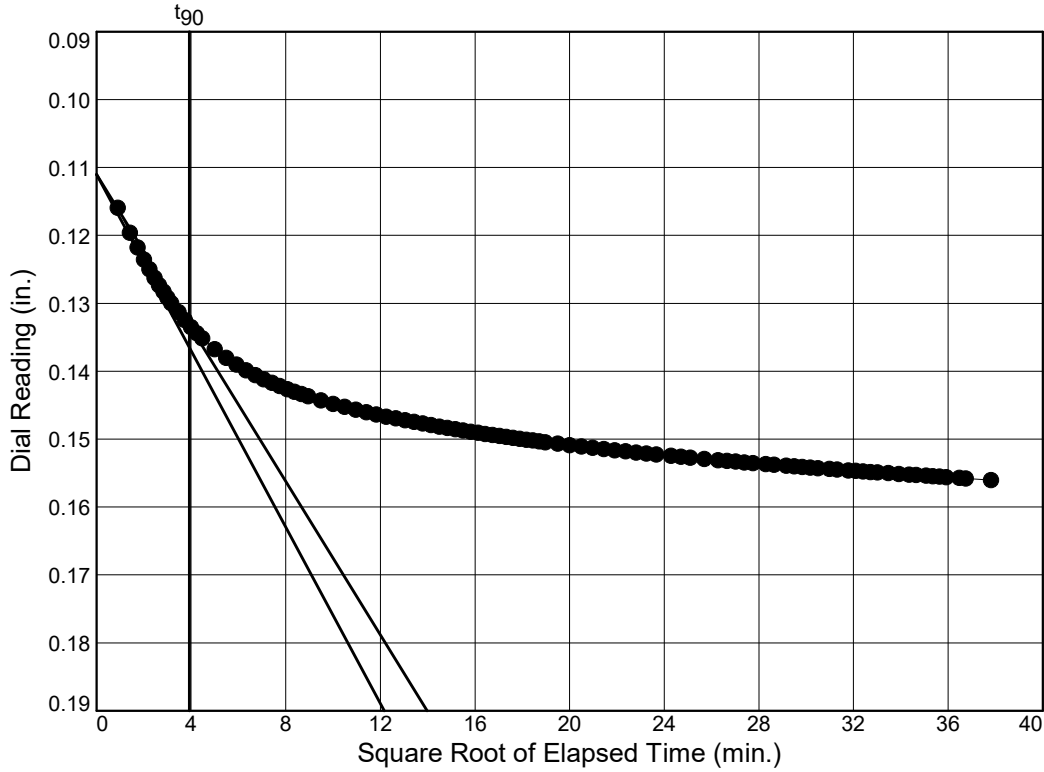
# Dial Reading vs. Time

Project No.: 2020-011  
Project: Geddes Marina

Source of Sample: BH-2

Depth: 9'-11'

Sample Number: S-4



Load No.= 5

Load=2.00 ksf

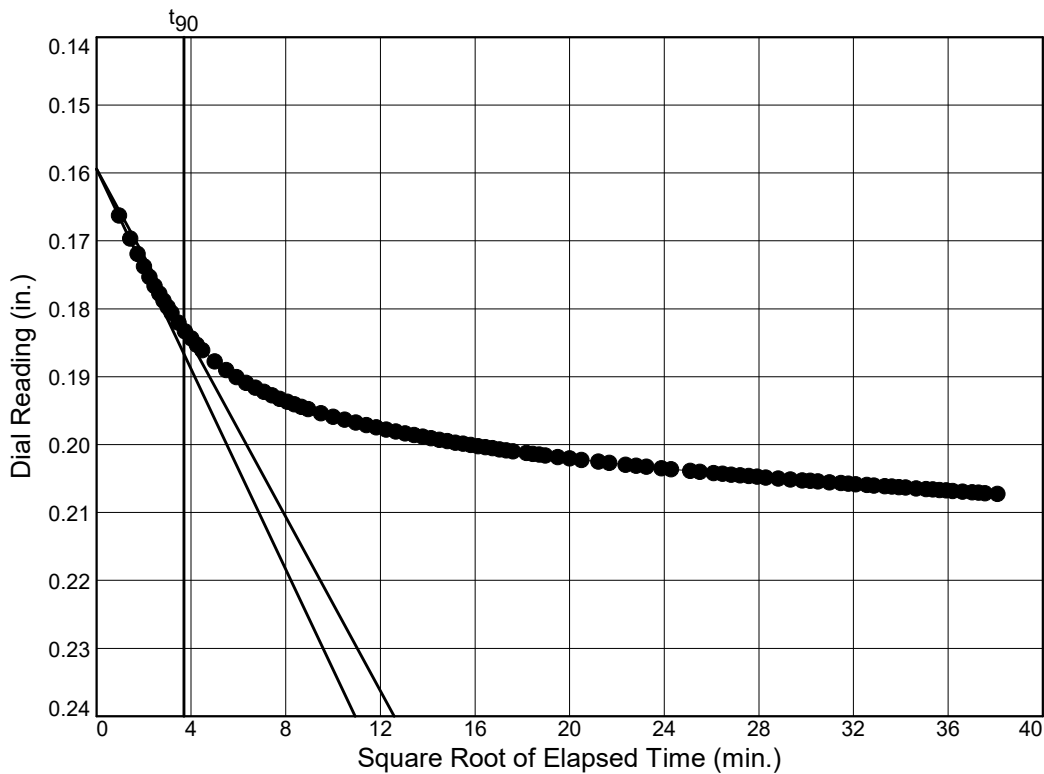
$D_0 = 0.1110$

$D_{90} = 0.1332$

$D_{100} = 0.1357$

$T_{90} = 15.40$  min.

$C_v @ T_{90}$   
0.106 ft.<sup>2</sup>/day



Load No.= 6

Load=4.00 ksf

$D_0 = 0.1594$

$D_{90} = 0.1831$

$D_{100} = 0.1857$

$T_{90} = 13.62$  min.

$C_v @ T_{90}$   
0.107 ft.<sup>2</sup>/day

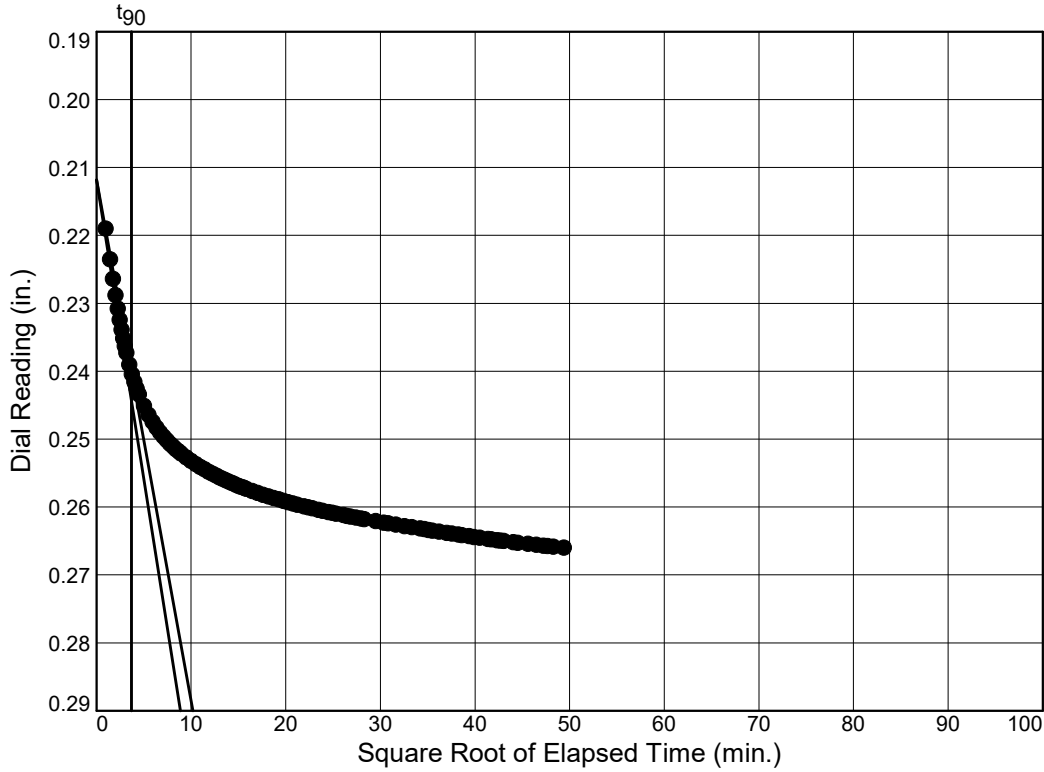
# Dial Reading vs. Time

Project No.: 2020-011  
 Project: Geddes Marina

Source of Sample: BH-2

Depth: 9'-11'

Sample Number: S-4



Load No.= 7

Load=8.00 ksf

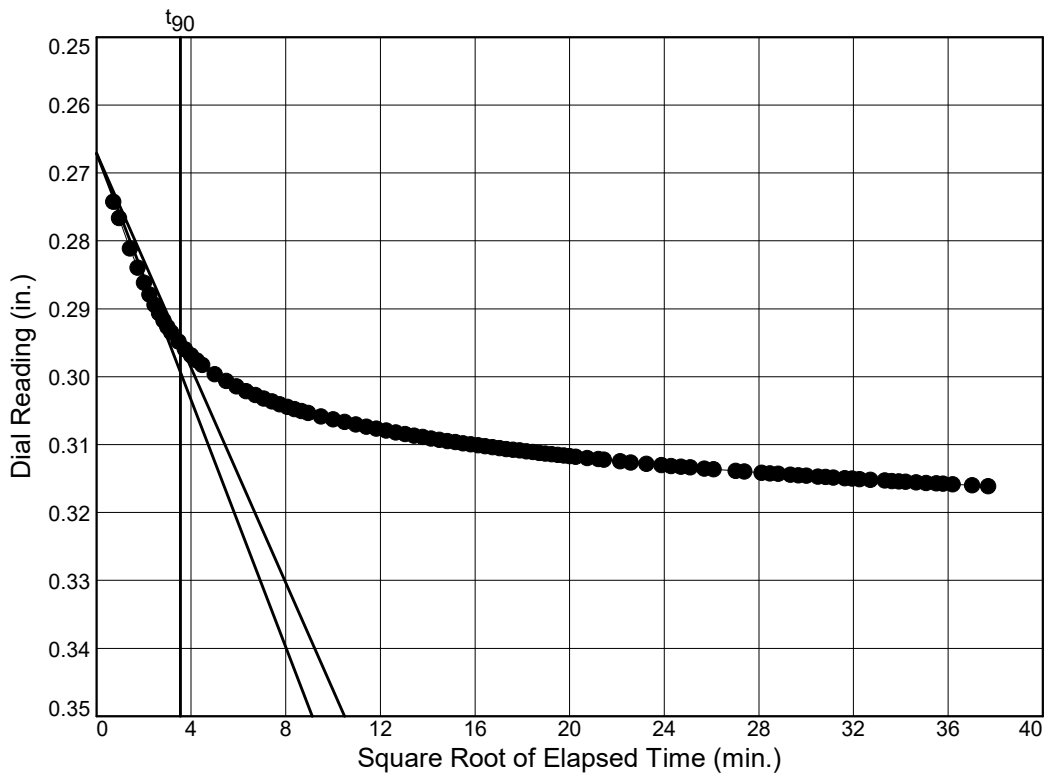
$D_0 = 0.2118$

$D_{90} = 0.2402$

$D_{100} = 0.2433$

$T_{90} = 13.63 \text{ min.}$

$C_v @ T_{90}$   
 0.093 ft.<sup>2</sup>/day



Load No.= 8

Load=16.00 ksf

$D_0 = 0.2671$

$D_{90} = 0.2952$

$D_{100} = 0.2983$

$T_{90} = 12.56 \text{ min.}$

$C_v @ T_{90}$   
 0.087 ft.<sup>2</sup>/day



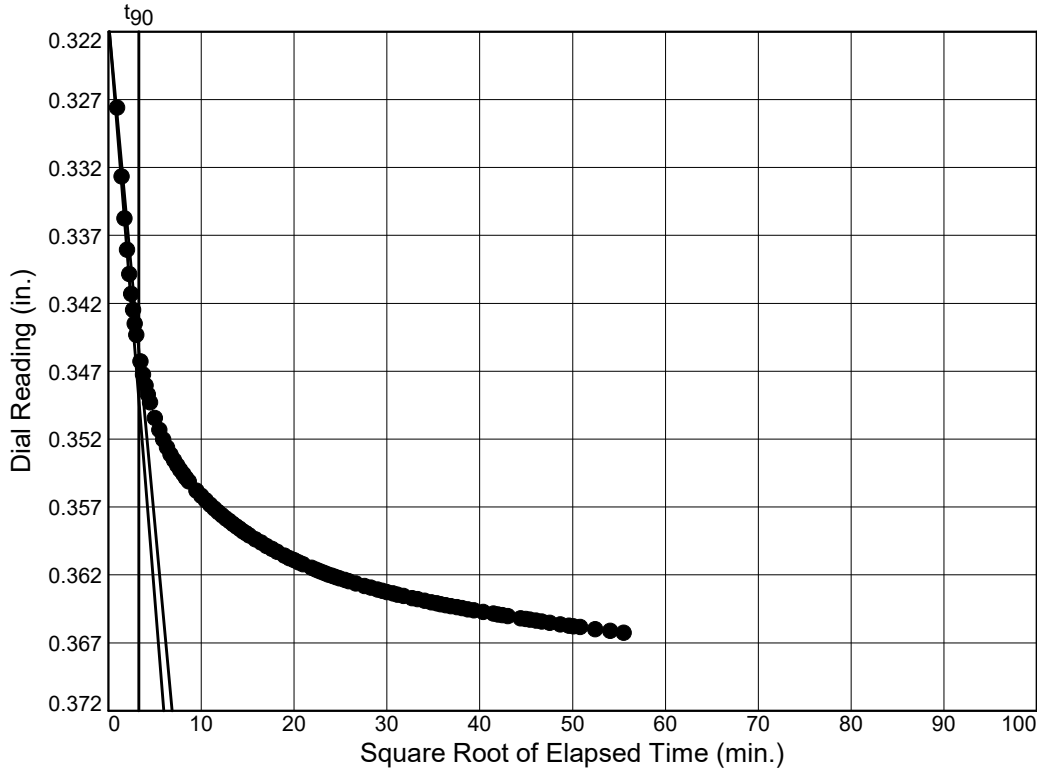
# Dial Reading vs. Time

Project No.: 2020-011  
Project: Geddes Marina

Source of Sample: BH-2

Depth: 9'-11'

Sample Number: S-4



Load No.= 9

Load=32.00 ksf

$D_0 = 0.3211$

$D_{90} = 0.3455$

$D_{100} = 0.3483$

$T_{90} = 10.85 \text{ min.}$

$C_v @ T_{90}$

0.087 ft.<sup>2</sup>/day

## **APPENDIX C**

### **EXPLORATION DATA FROM PREVIOUS STUDIES**

DRAFT

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

TEST SYMBOLS

- %F Percent Fines
- AL Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
- CBR California Bearing Ratio
- CN Consolidation
- DD Dry Density (pcf)
- DS Direct Shear
- GS Grain Size Distribution
- K Permeability
- MD Moisture/Density Relationship (Proctor)
- MR Resilient Modulus
- OC Organic Content
- pH pH of Soils
- PID Photoionization Device Reading
- PP Pocket Penetrometer (Approx. Comp. Strength, tsf)
- Res. Resistivity
- SG Specific Gravity
- CD Consolidated Drained Triaxial
- CU Consolidated Undrained Triaxial
- UU Unconsolidated Undrained Triaxial
- TV Torvane (Approx. Shear Strength, tsf)
- UC Unconfined Compression

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)		GW Well-graded GRAVEL	
		More than 50% of Coarse Fraction Retained on No. 4 Sieve		GP Poorly-graded GRAVEL	
			Gravel with Fines (appreciable amount of fines)		GM Silty GRAVEL
	Sand and Sandy Soils	Clean Sand (little or no fines)		GC Clayey GRAVEL	
		50% or More of Coarse Fraction Passing No. 4 Sieve		SW Well-graded SAND	
			Sand with Fines (appreciable amount of fines)		SP Poorly-graded SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%		SM Silty SAND	
				SC Clayey SAND	
				ML SILT	
	50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More		CL Lean CLAY
					OL Organic SILT/Organic CLAY
					MH Elastic SILT
Highly Organic Soils				CH Fat CLAY	
				OH Organic SILT/Organic CLAY	
				PT PEAT	

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- Non-standard Penetration Test (3.0" OD Split Spoon with Brass Rings)
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- 3-1/4" OD Split Spoon

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

*Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)*

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

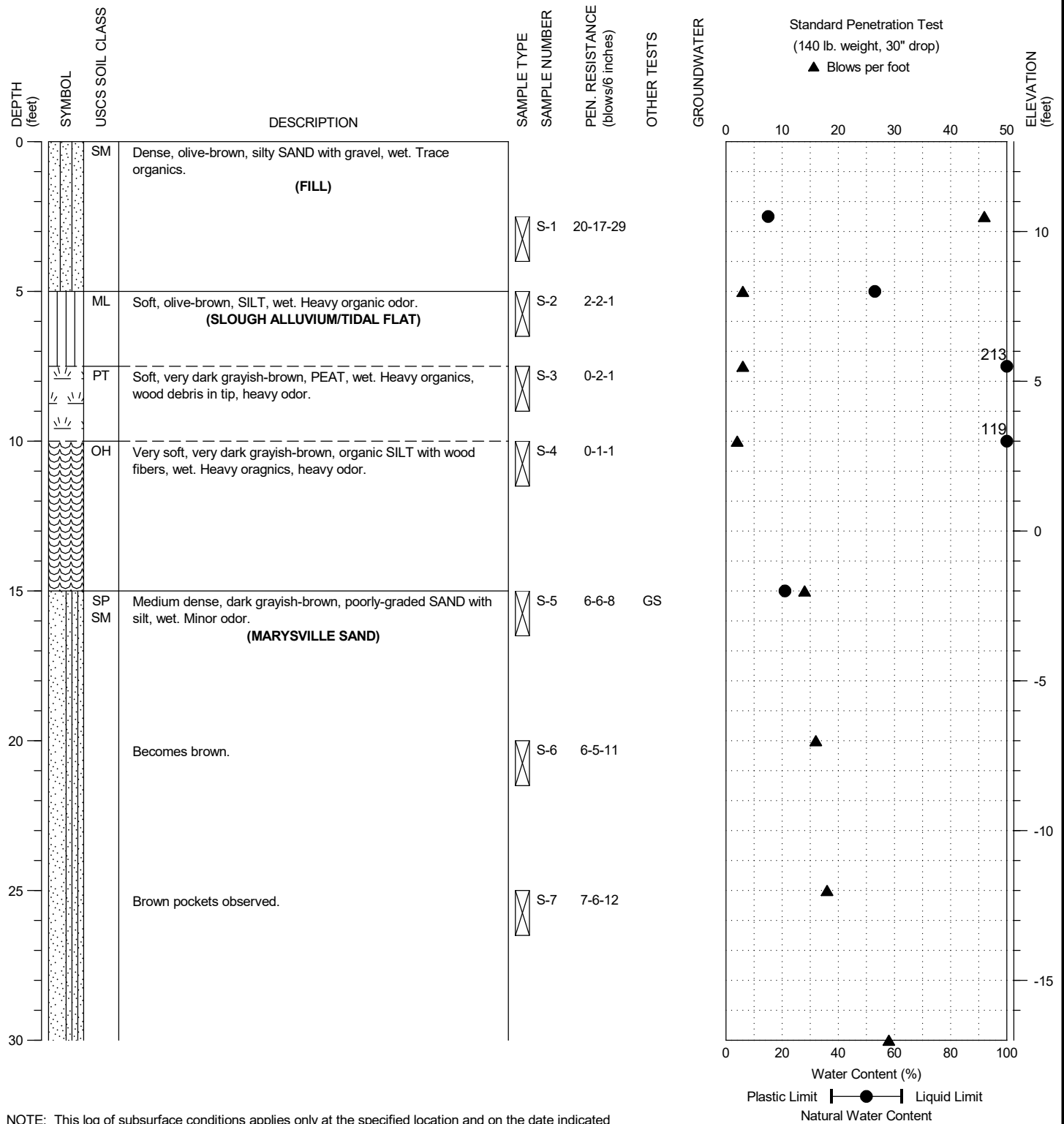


MARYSVILLE DOWNTOWN  
STORMWATER TREATMENT PROJECT  
MARYSVILLE, WASHINGTON

LEGEND OF TERMS AND  
SYMBOLS USED ON  
EXPLORATION LOGS

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: East of Railroad Tracks, Below Pump Station

DATE STARTED: 7/29/2019  
 DATE COMPLETED: 7/29/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 13.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-1

PAGE: 1 of 2

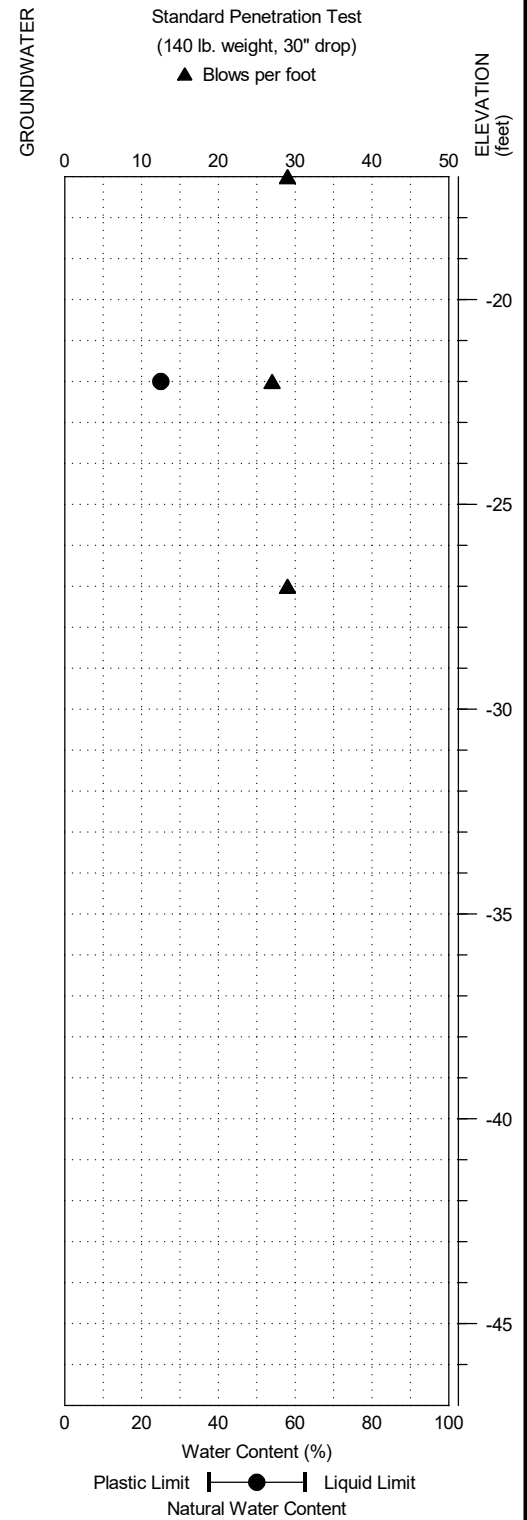
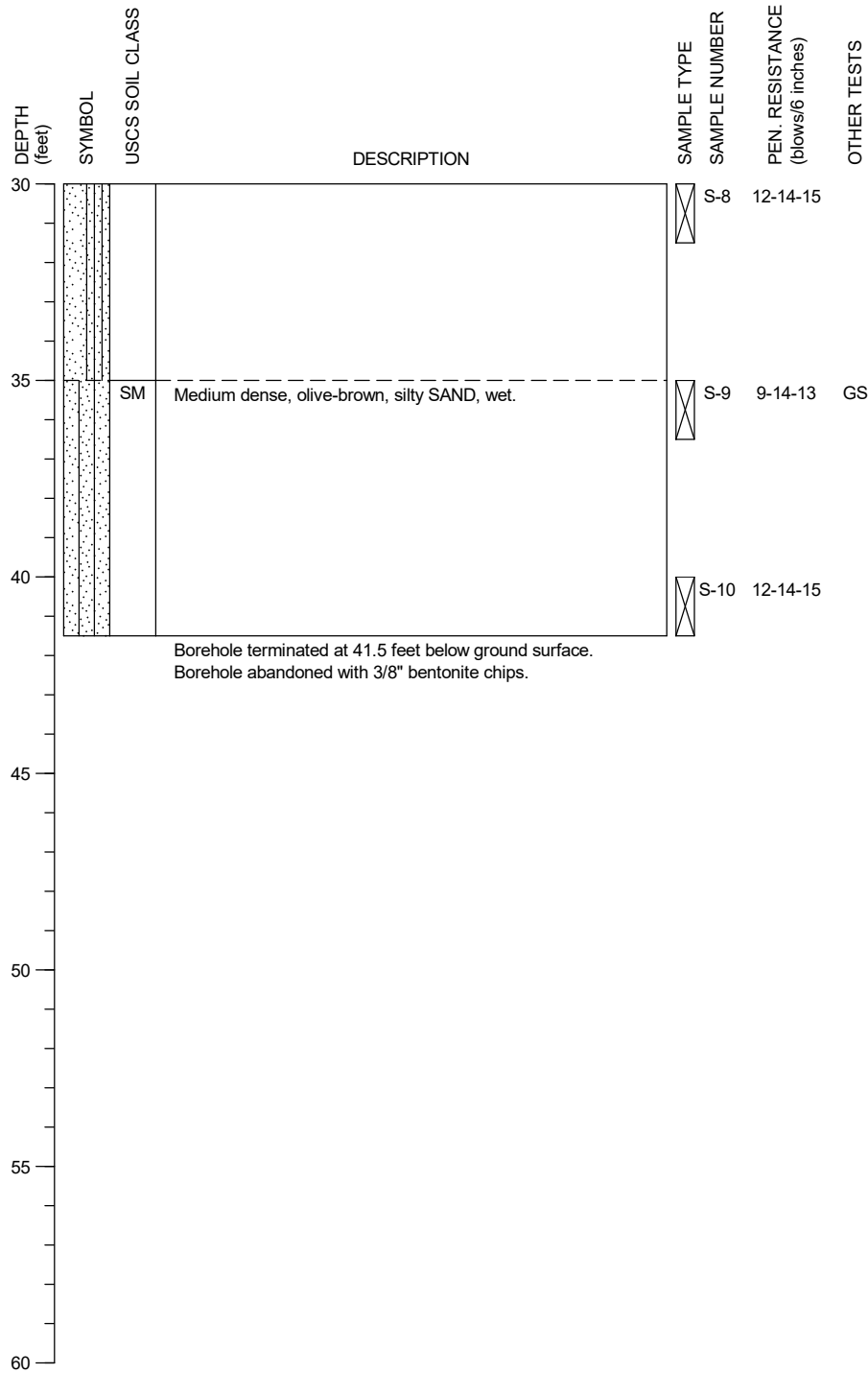
PROJECT NO.: 2019-025-21

FIGURE:

A-2

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: East of Railroad Tracks, Below Pump Station

DATE STARTED: 7/29/2019  
 DATE COMPLETED: 7/29/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 13.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



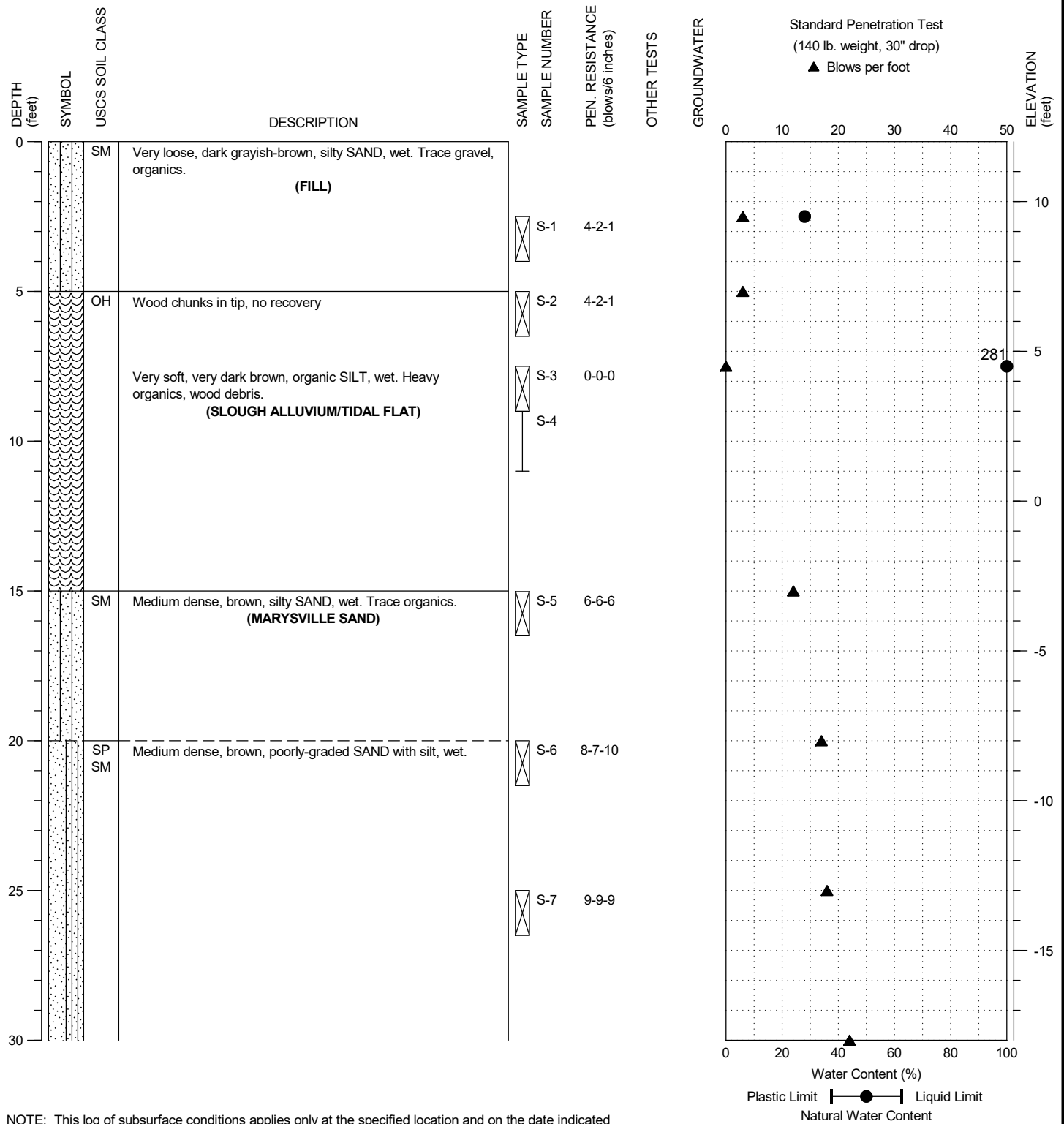
MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-1

PAGE: 2 of 2

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: East of Jacking Pit and Railroad Tracks

DATE STARTED: 7/29/2019  
 DATE COMPLETED: 7/29/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 12.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-2

PAGE: 1 of 2

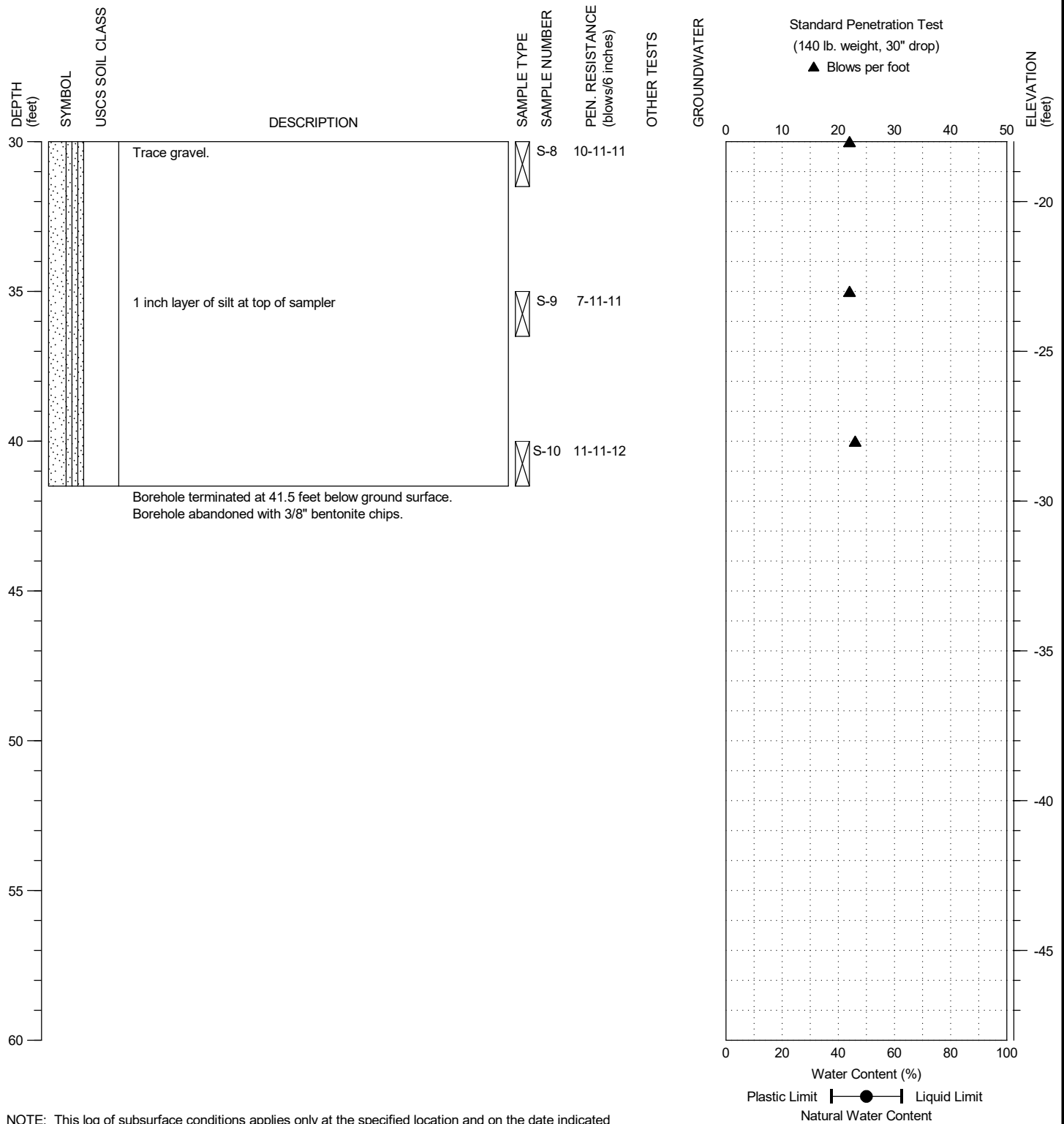
PROJECT NO.: 2019-025-21

FIGURE:

A-3

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: East of Jacking Pit and Railroad Tracks

DATE STARTED: 7/29/2019  
 DATE COMPLETED: 7/29/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 12.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-2

PAGE: 2 of 2

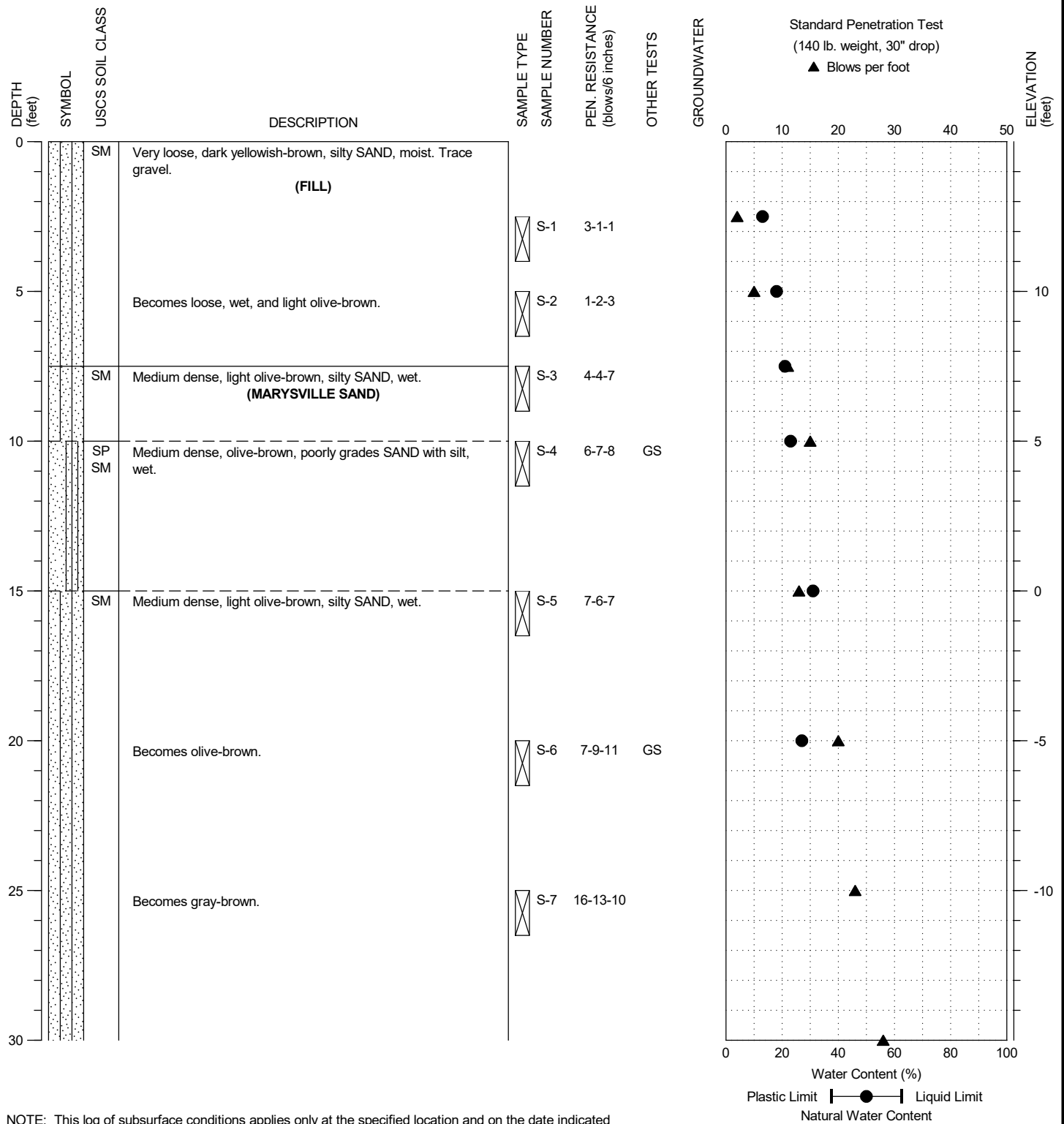
PROJECT NO.: 2019-025-21

FIGURE:

A-3

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: West of Receiving Pit and Railroad Tracks

DATE STARTED: 7/30/2019  
 DATE COMPLETED: 7/30/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 15.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-3

PAGE: 1 of 2

PROJECT NO.: 2019-025-21

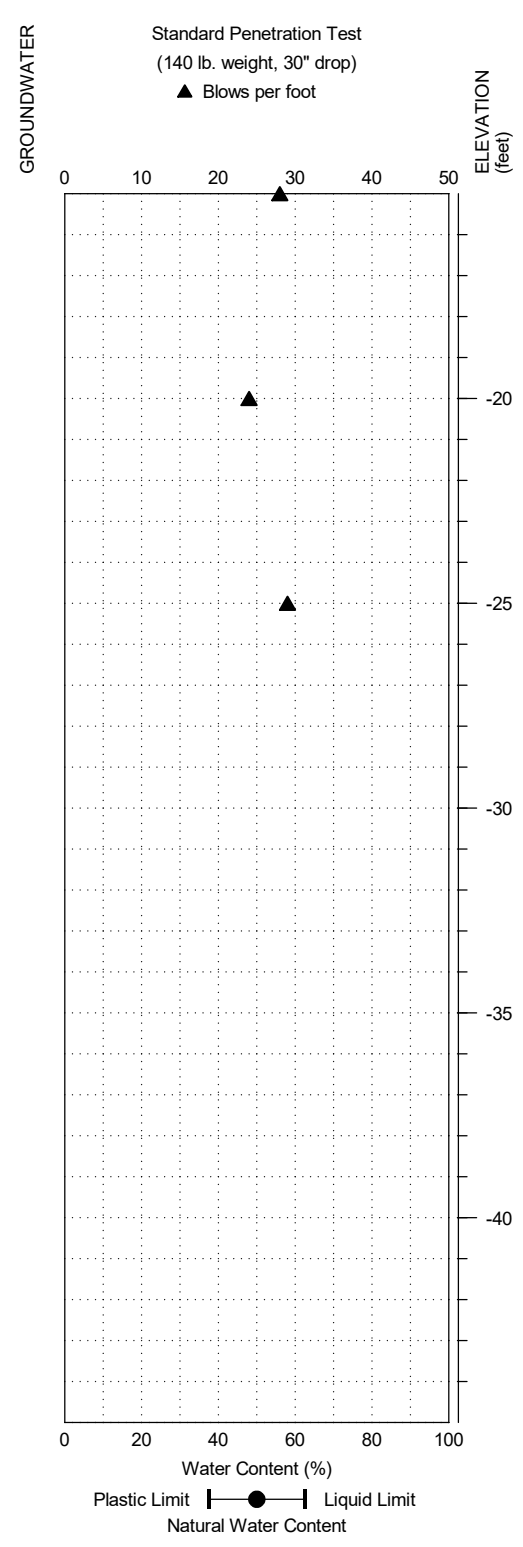
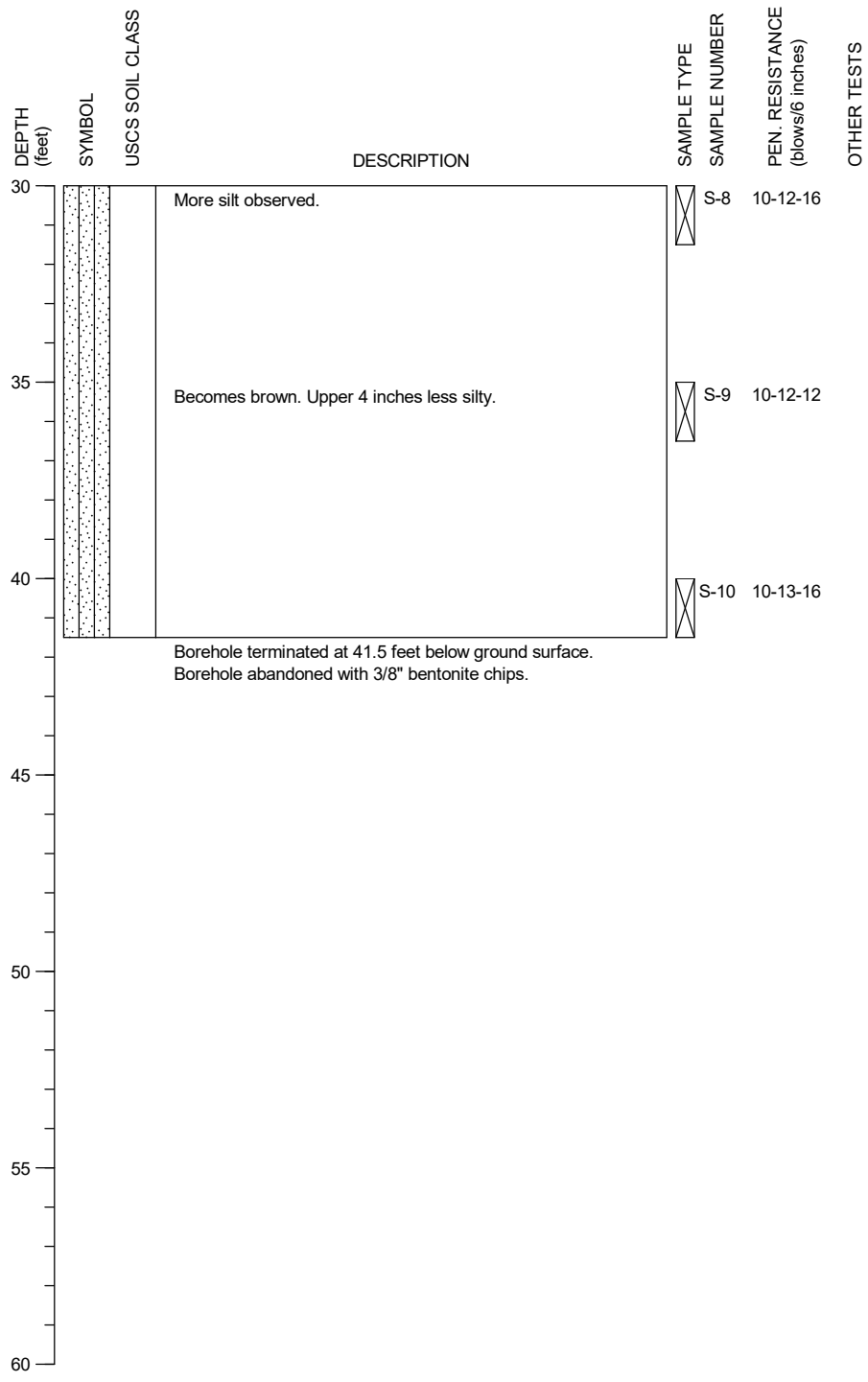
FIGURE:

A-4



DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: Mud Rotary, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: West of Receiving Pit and Railroad Tracks

DATE STARTED: 7/30/2019  
 DATE COMPLETED: 7/30/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 15.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

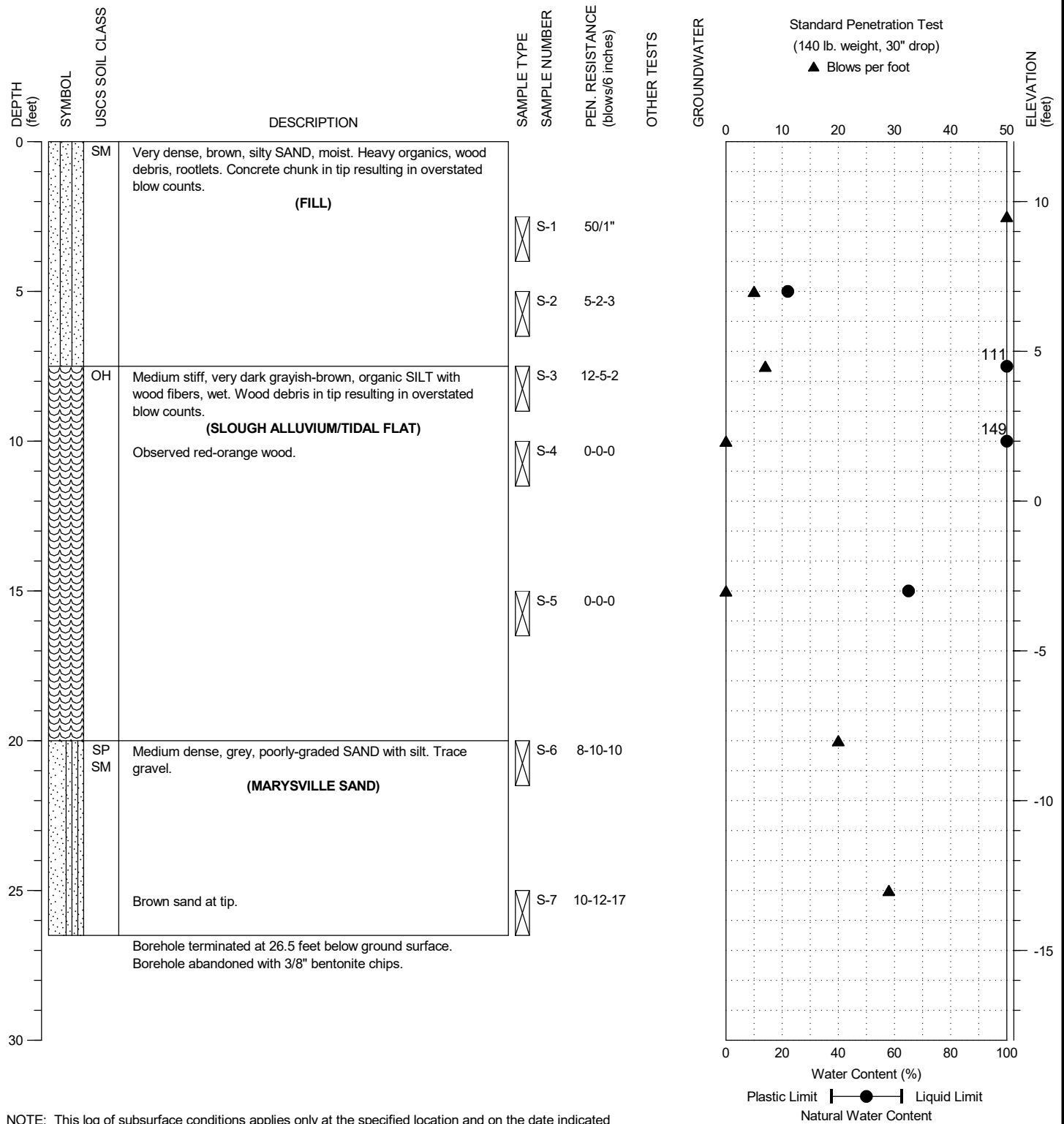


MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-3  
 PAGE: 2 of 2

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: HSA, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: Below tanks, SE corner of lot, West of Railroad Tracks

DATE STARTED: 7/30/2019  
 DATE COMPLETED: 7/30/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 12.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-4

PAGE: 1 of 1

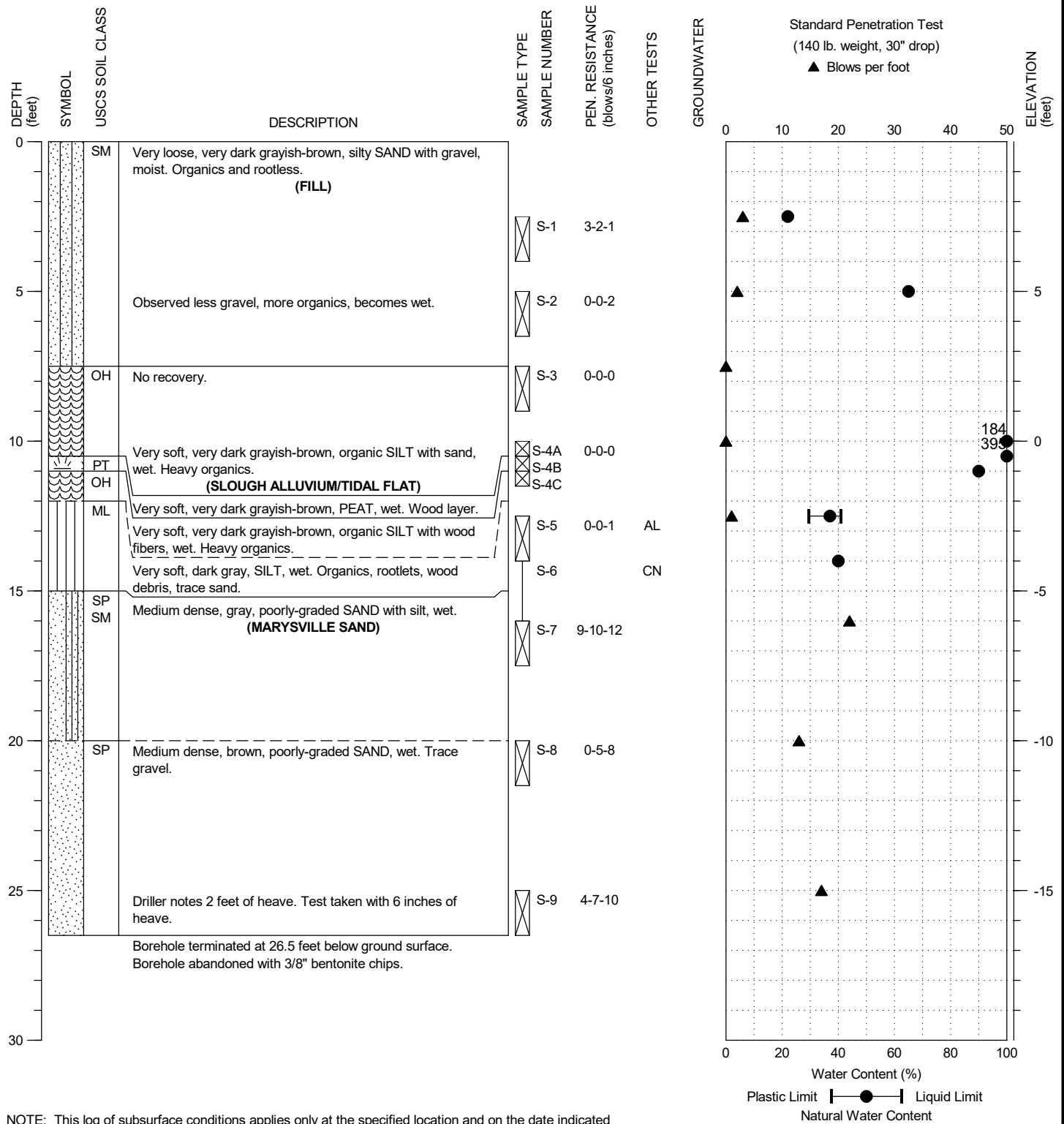
PROJECT NO.: 2019-025-21

FIGURE:

A-5

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: HSA, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: Below tanks, East center of lot, West of Railroad Tracks

DATE STARTED: 7/30/2019  
 DATE COMPLETED: 7/30/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 10.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-5

PAGE: 1 of 1

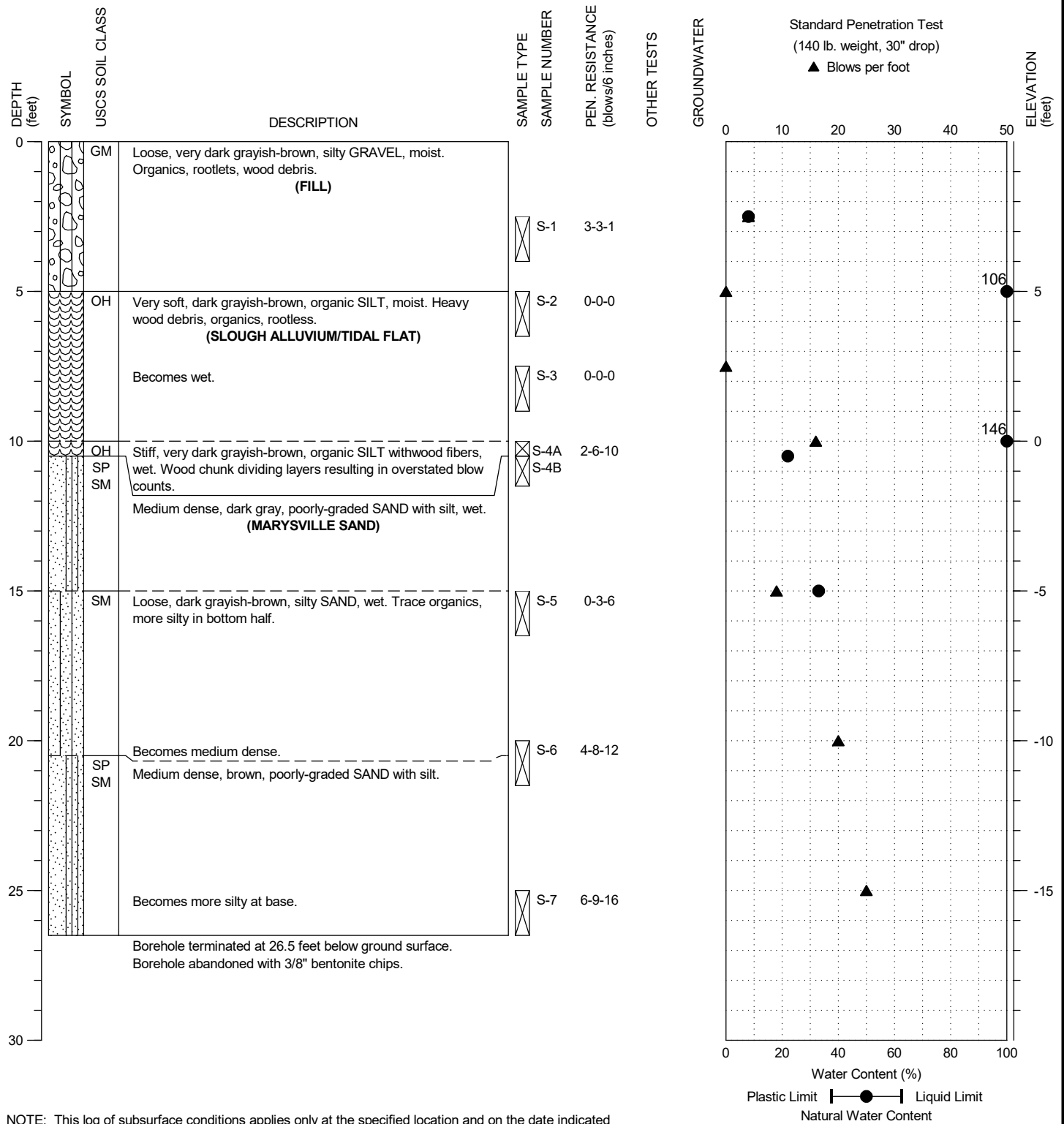
PROJECT NO.: 2019-025-21

FIGURE:

A-6

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: HSA, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: Below tanks, NE of lot, West of Railroad Tracks

DATE STARTED: 7/30/2019  
 DATE COMPLETED: 7/30/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 10.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



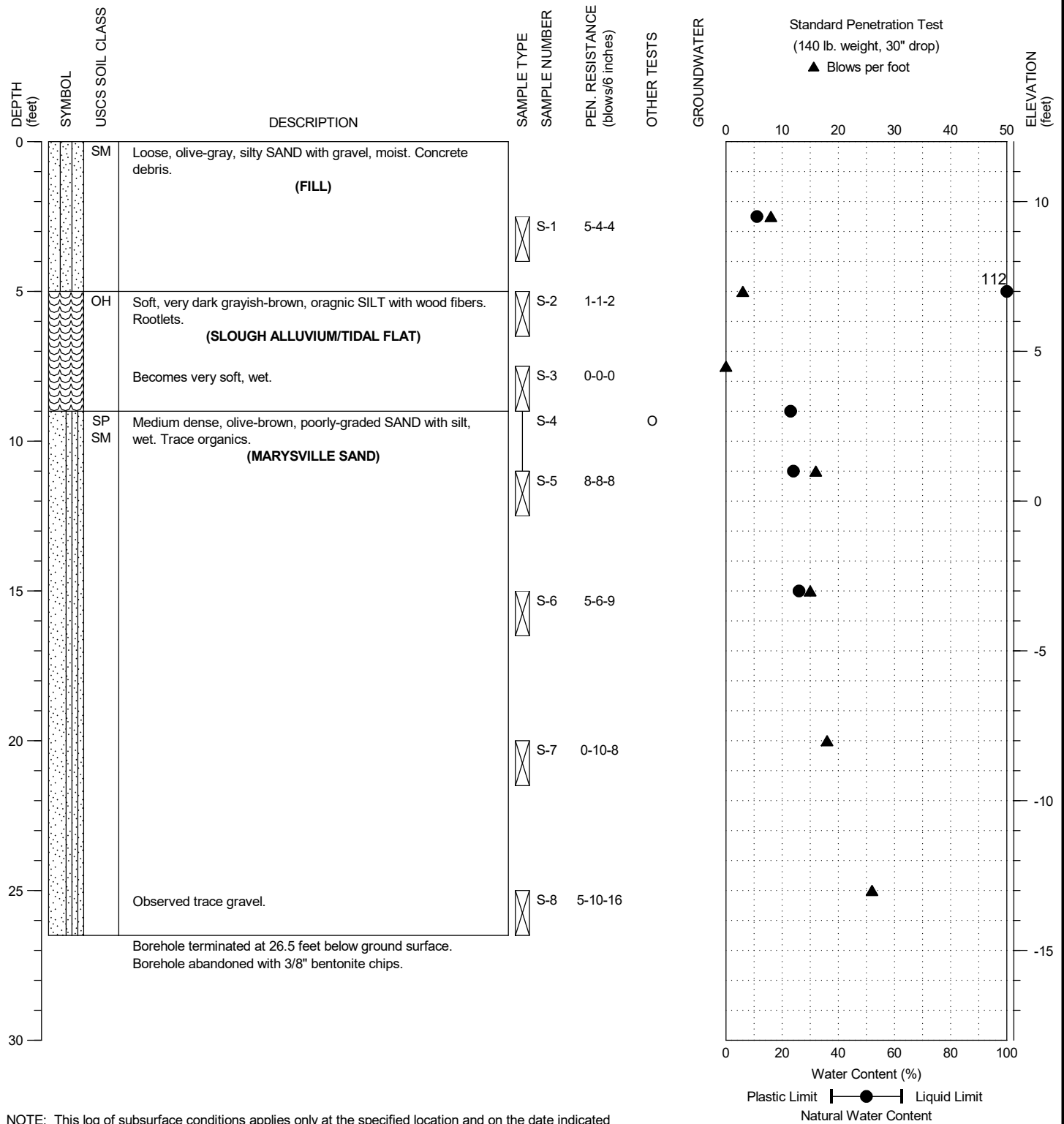
MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

BORING:  
 SPT-6

PAGE: 1 of 1

DRILLING COMPANY: Holocene Drilling  
 DRILLING METHOD: HSA, Truck Rig  
 SAMPLING METHOD: SPT, Automatic Hammer, SS  
 LOCATION: NW of lot, South of 1st Street

DATE STARTED: 7/31/2019  
 DATE COMPLETED: 7/31/2019  
 LOGGED BY: S Schlitt  
 SURFACE ELEVATION: 12.0 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



MARYSVILLE DOWNTOWN  
 STORMWATER TREATMENT PROJECT  
 MARYSVILLE, WASHINGTON

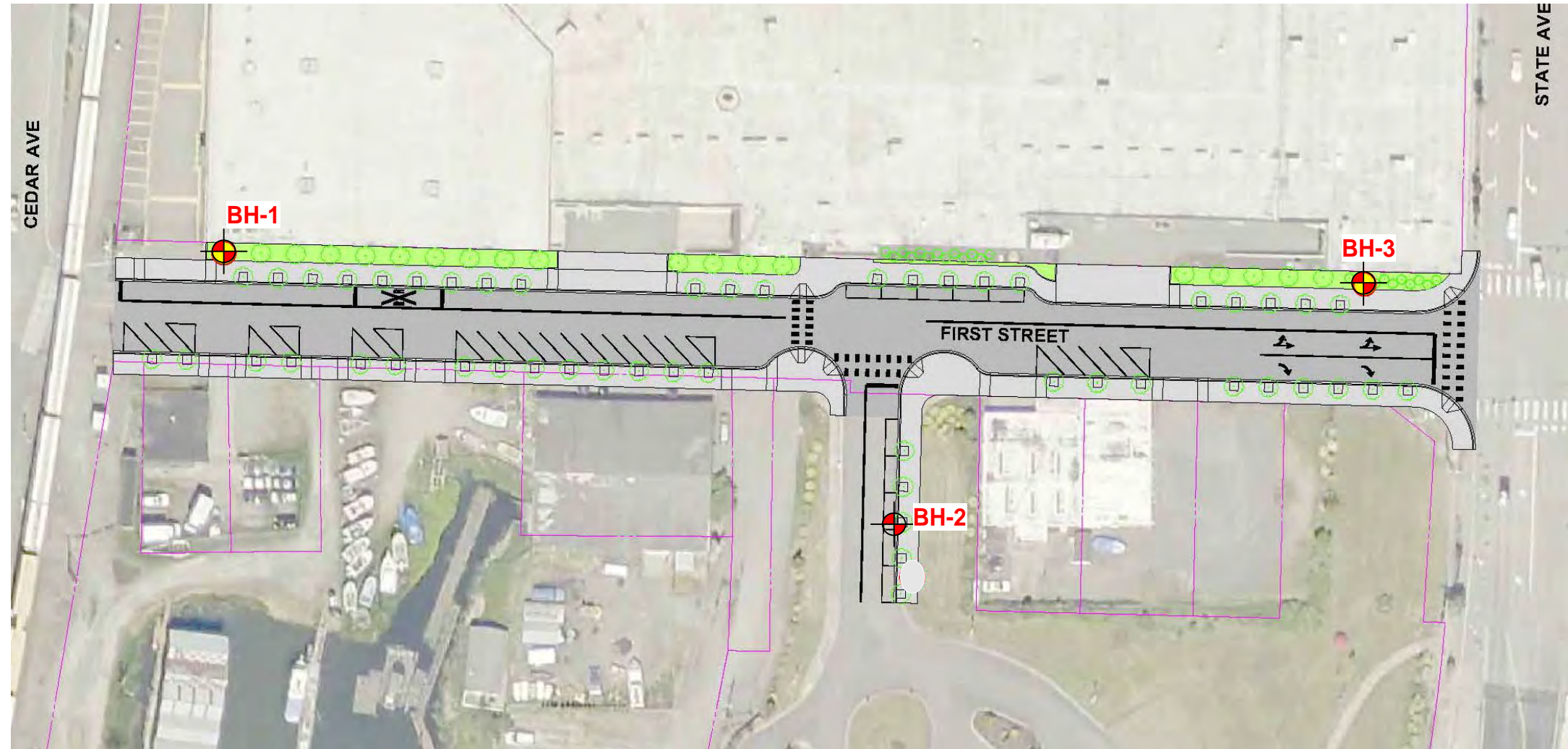
BORING:  
 SPT-7

PAGE: 1 of 1

PROJECT NO.: 2019-025-21

FIGURE:

A-8



Approx. Scale  
1" = 80'

Legend:

 **BH-1** Approx. Borehole Location

Note: Base map modified from Conceptual Plan provided by Gray & Osborne, Inc.



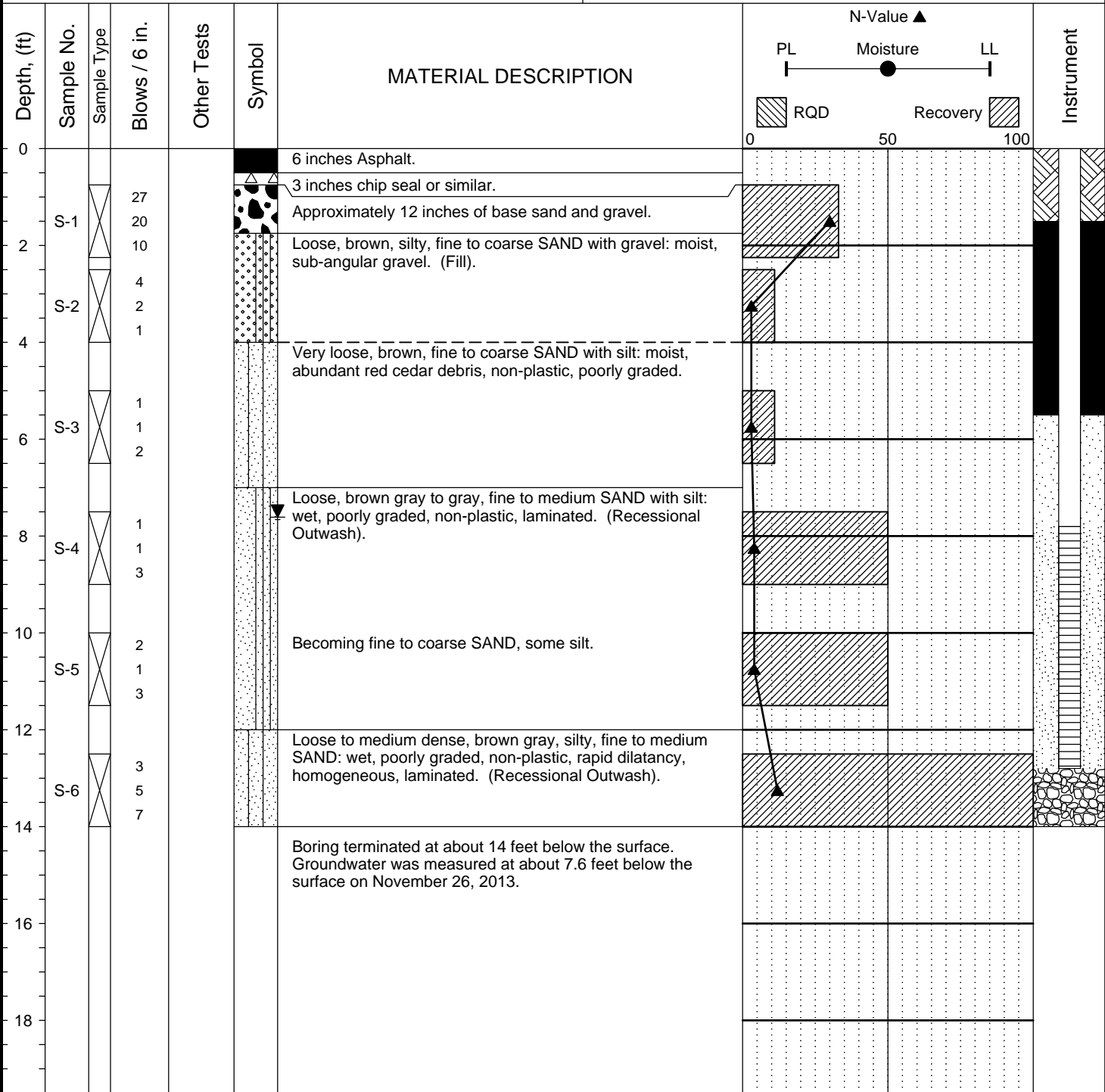
1st & 3rd Street Retrofit  
Marysville, WA

**SITE AND EXPLORATION PLAN**  
**3RD STREET BETWEEN**  
**COLUMBIA AVE AND 47TH AVE NE**

Project No. 13-239

Figure No. 1

Project: 3rd Street Improvements Job Number: 13-239 Location: 1st and 3rd Streets, Marysville, WA Coordinates: Northing: , Easting:	Surface Elevation: Top of Casing Elev.: Drilling Method: HSA Sampling Method: SPT
--	--



Completion Depth: 14.0ft  
 Date Borehole Started: 11/25/13  
 Date Borehole Completed: 11/25/13  
 Logged By: S. Evans  
 Drilling Company: Bore Tec Drilling

Remarks: Groundwater measured in well installation on 11/26/13 at 12:31. Well was then developed by pumping with a down-hole pump until return water was nearly clear, about 5 minutes. Data logger installed in well following development. Logging was programed to begin at 12:00 noon, 11/27/13.

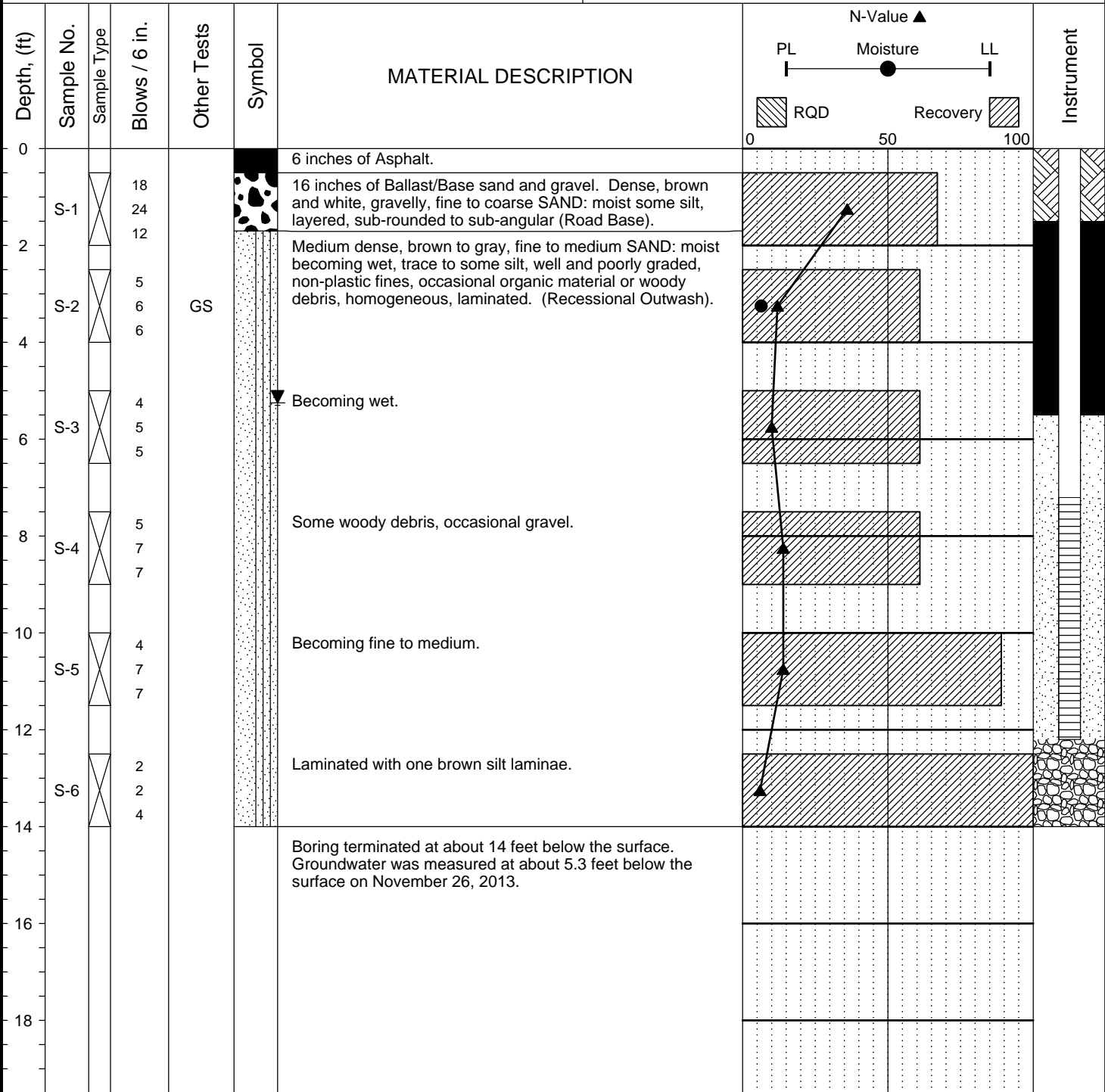


### LOG OF TEST BORING B-1

**Figure A-2**

The stratification lines represent approximate boundaries. The transition may be gradual.

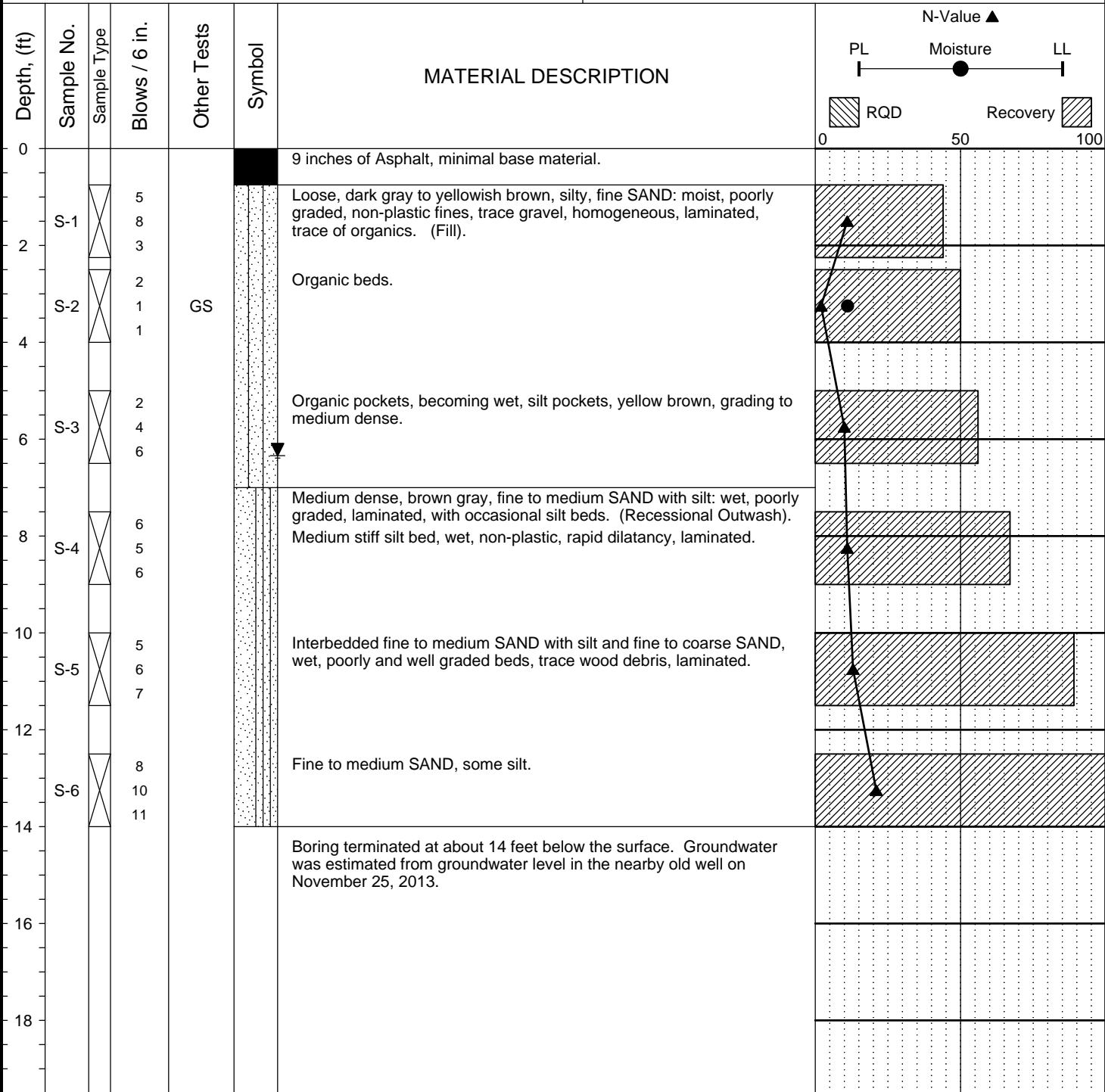
Project: 3rd Street Improvements Job Number: 13-239 Location: 1st and 3rd Streets, Marysville, WA Coordinates: Northing: , Easting:	Surface Elevation: Top of Casing Elev.: Drilling Method: HSA Sampling Method: SPT
--	--



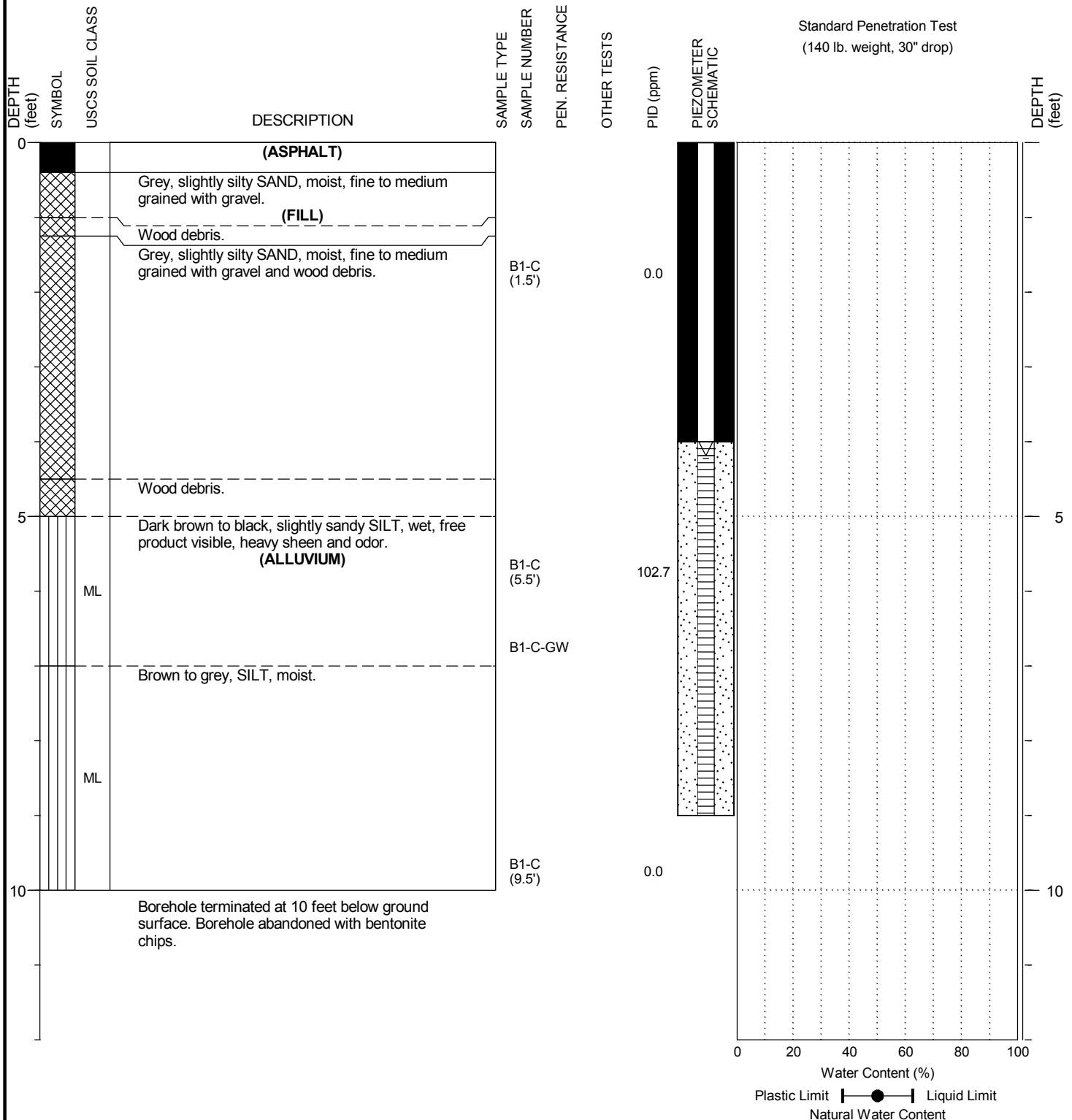
Completion Depth: 14.0ft Date Borehole Started: 11/25/13 Date Borehole Completed: 11/25/13 Logged By: S. Evans Drilling Company: Bore Tec Drilling	Remarks: Groundwater measured in well installation on 11/26/13 at 12:52. Well was then developed by pumping with a down-hole pump until return water was nearly clear, about 5 minutes. Data logger and barometric pressure logger installed in well following development. Logging was programed to begin at 12:00 noon, 11/27/13.
--	---



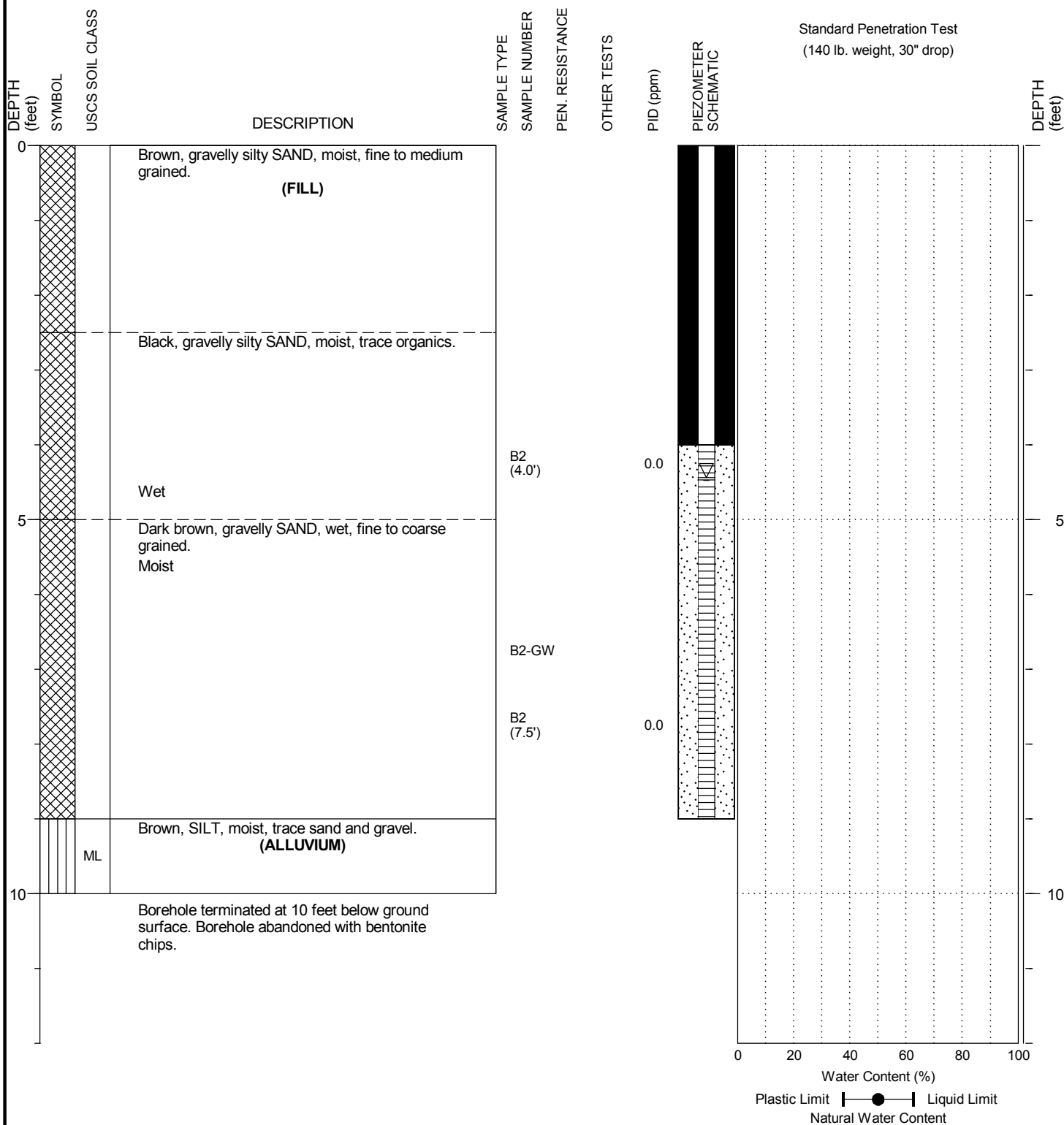
Project: 3rd Street Improvements	Surface Elevation:
Job Number: 13-239	Top of Casing Elev.:
Location: 1st and 3rd Streets, Marysville, WA	Drilling Method: HSA
Coordinates: Northing: , Easting:	Sampling Method: SPT



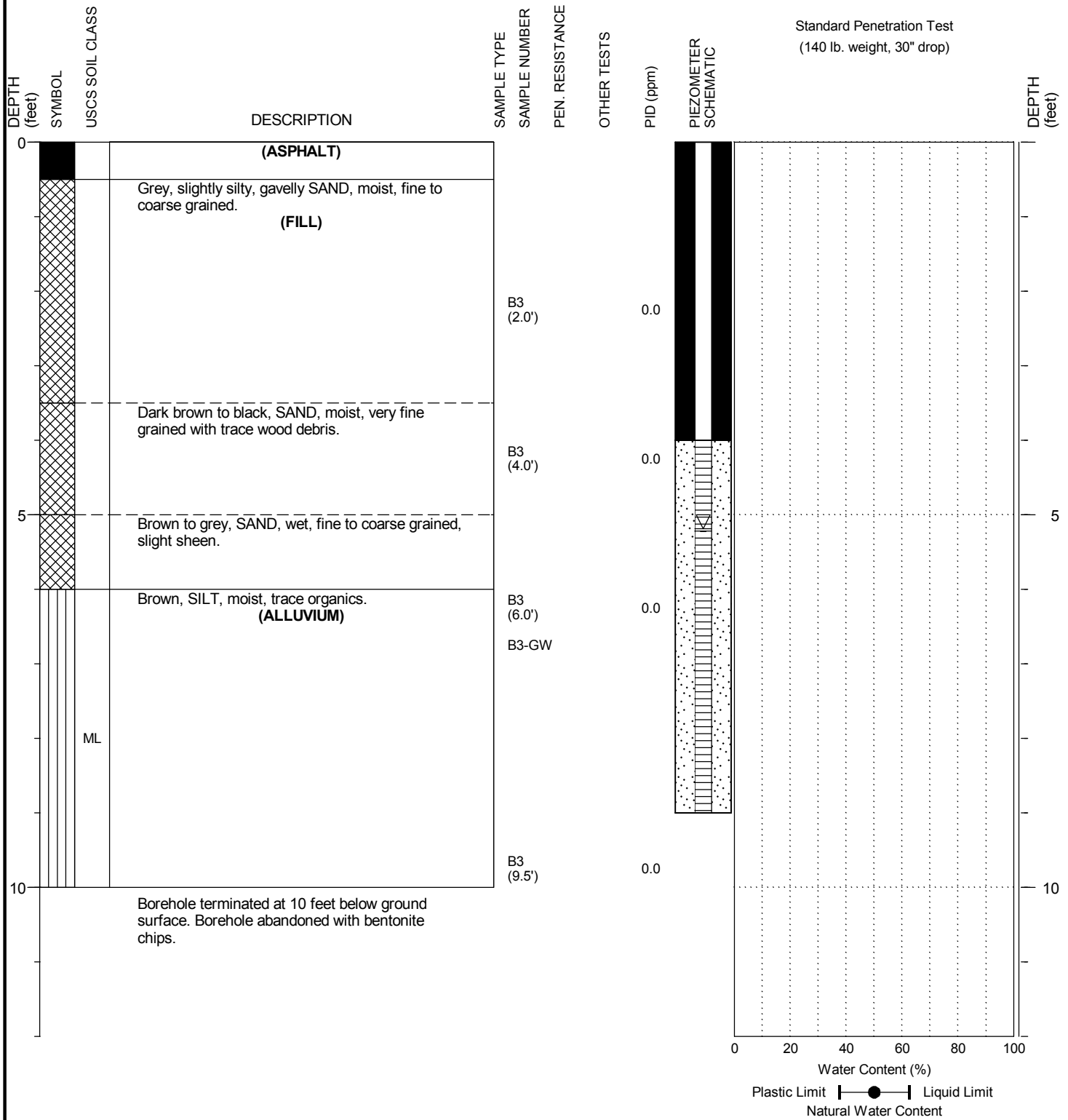
Completion Depth: 14.0ft	Remarks: Groundwater level measured in old monitoring well located 24 feet east of B-3 on 11/25/13.
Date Borehole Started: 11/25/13	
Date Borehole Completed: 11/25/13	
Logged By: S. Evans	
Drilling Company: Bore Tec Drilling	



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



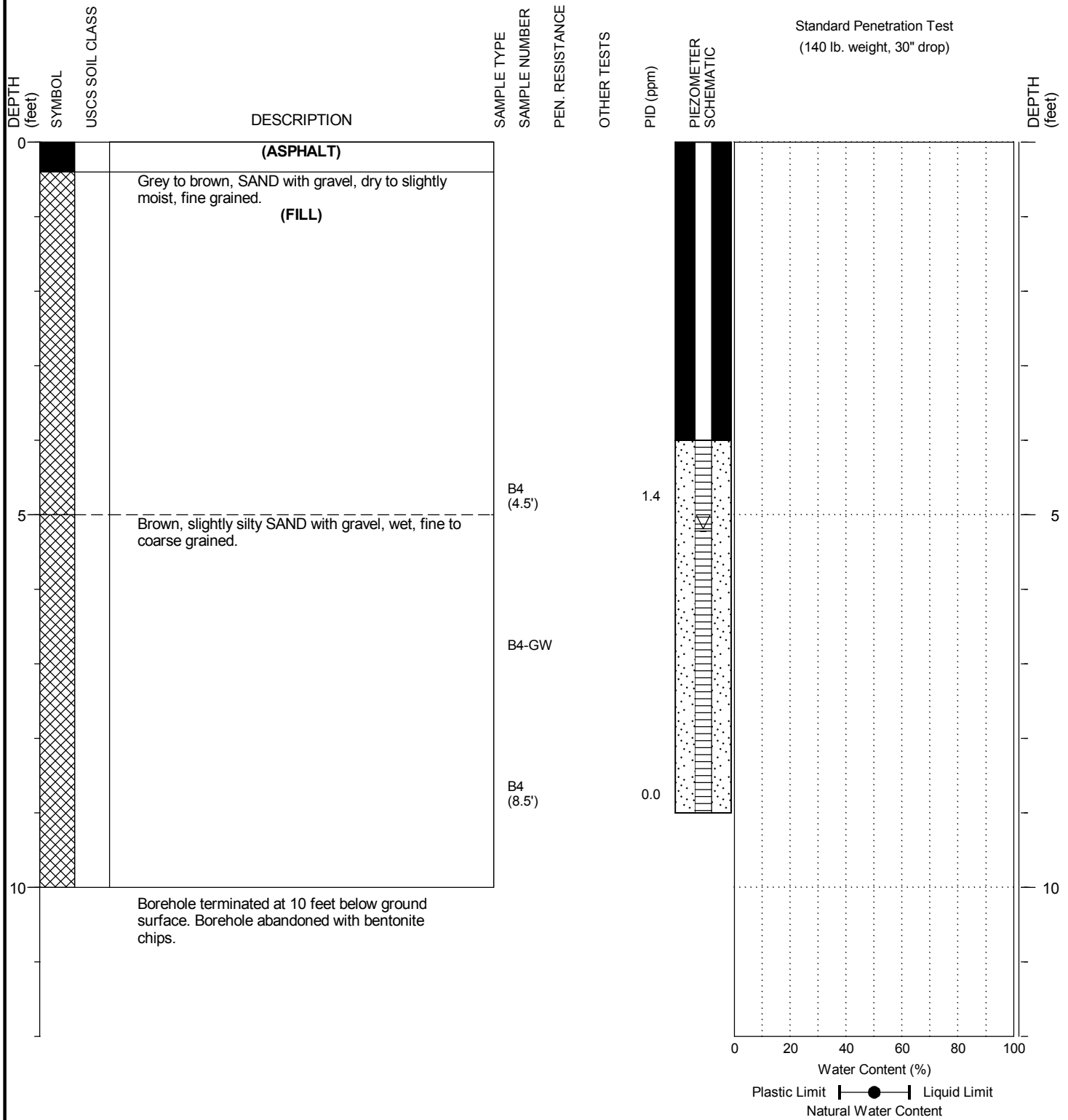
NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former "gas tank"

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B4**

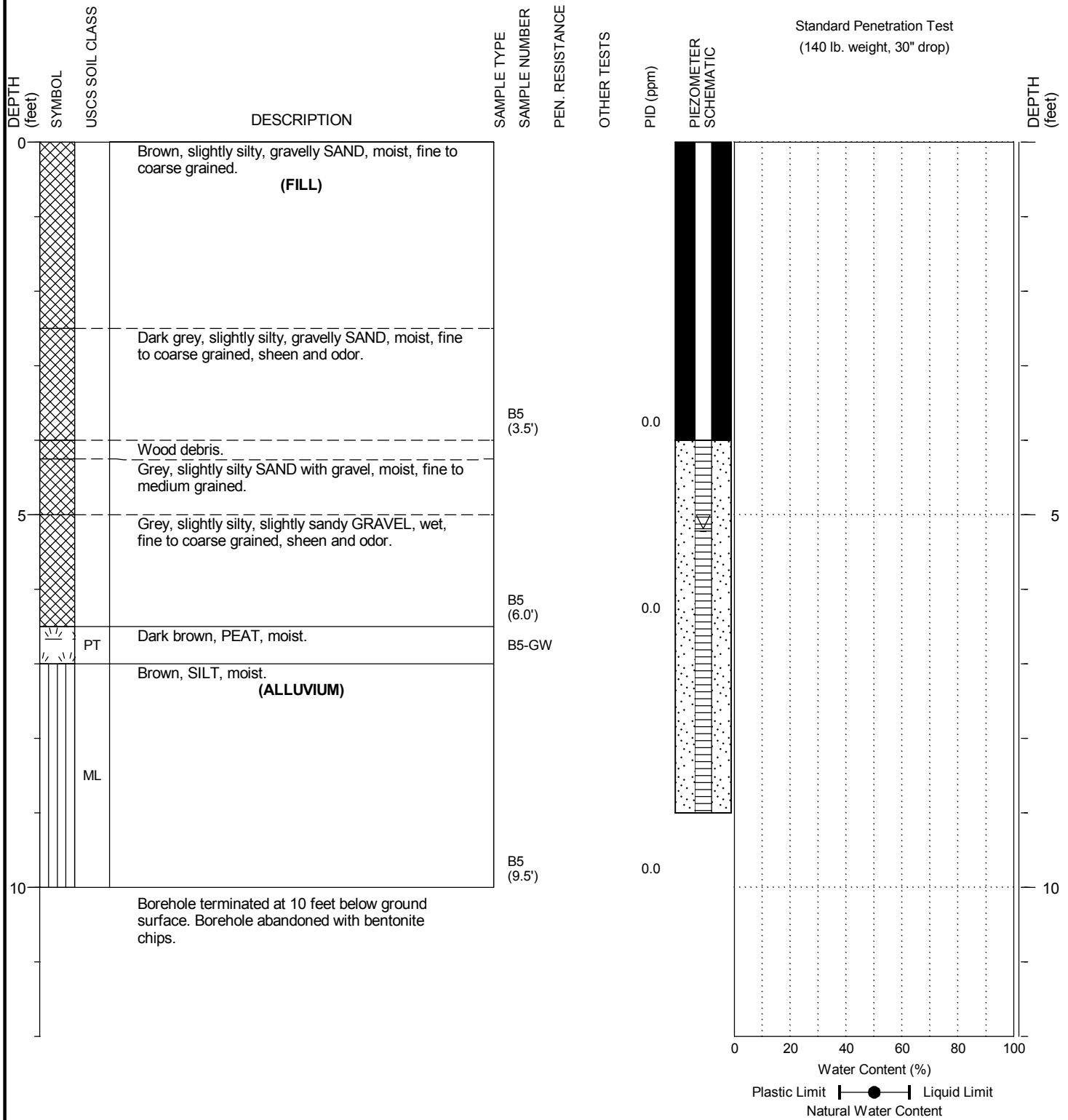
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former fuel storage in small log mill

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



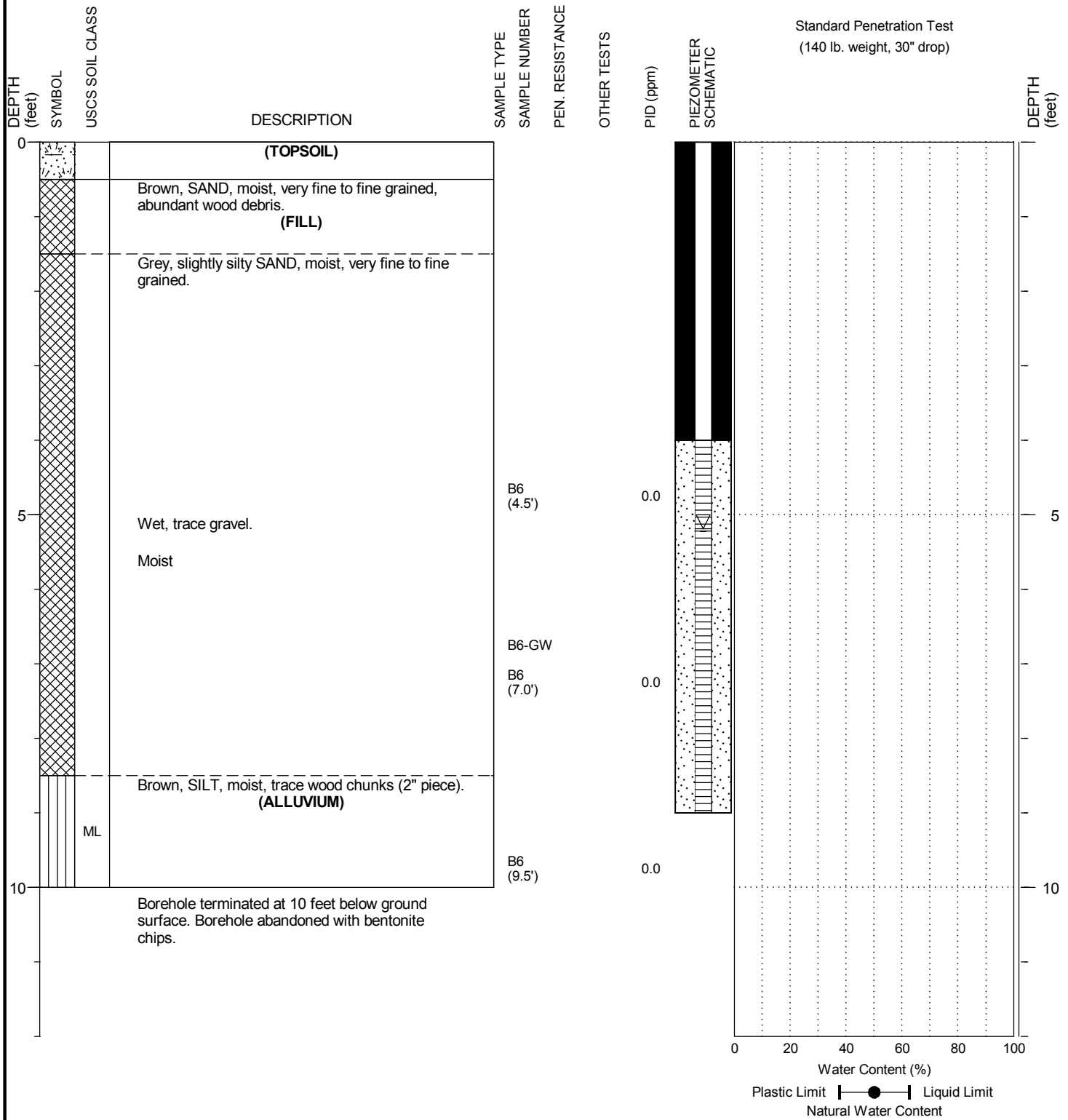
Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B5**

PAGE: 1 of 1

PROJECT NO.: 2016-023

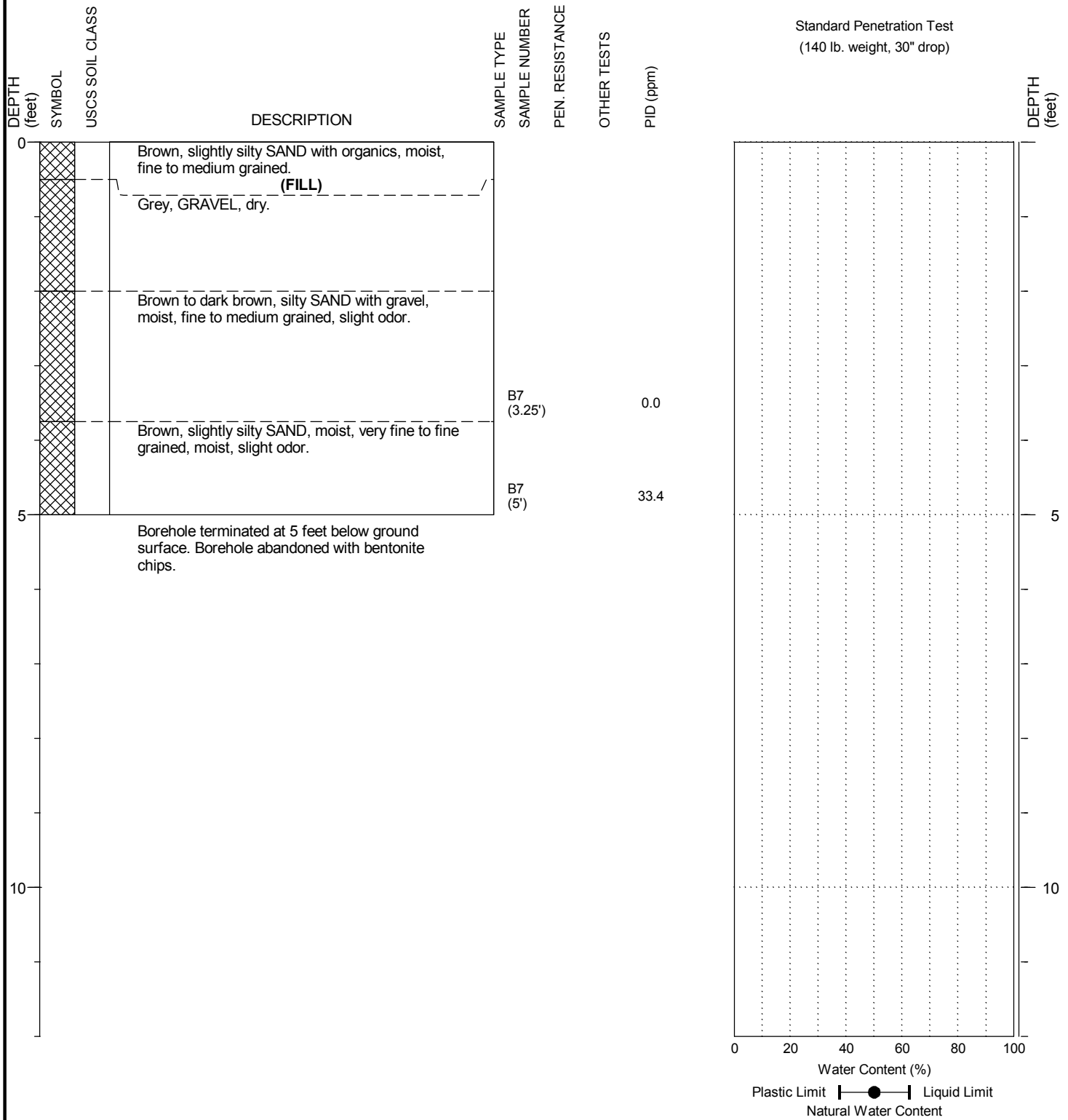
FIGURE:



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: E end of former chemical storage container

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B7**

PAGE: 1 of 1

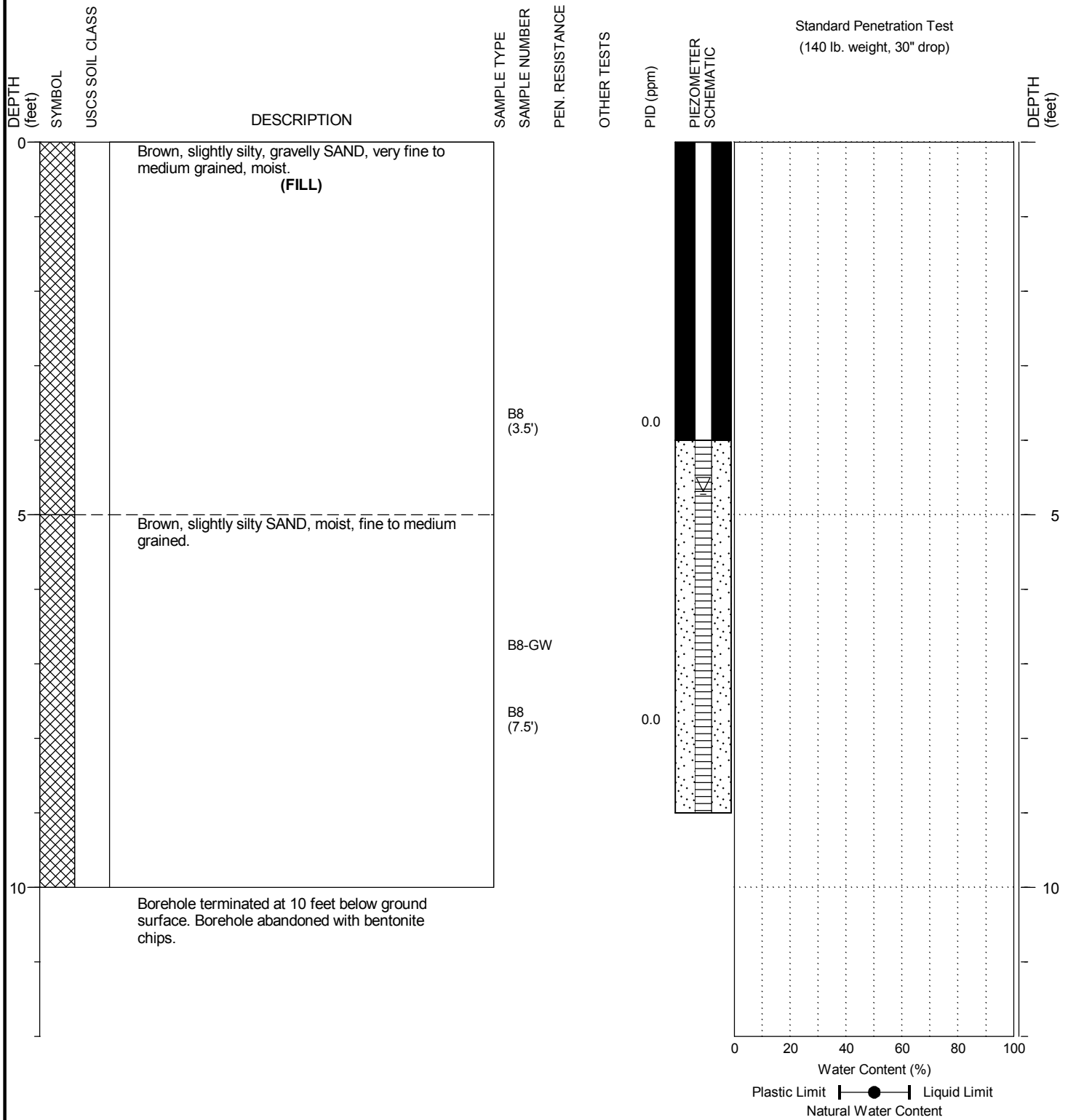
PROJECT NO.: 2016-023

FIGURE:



DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former "Autos" Building

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B8

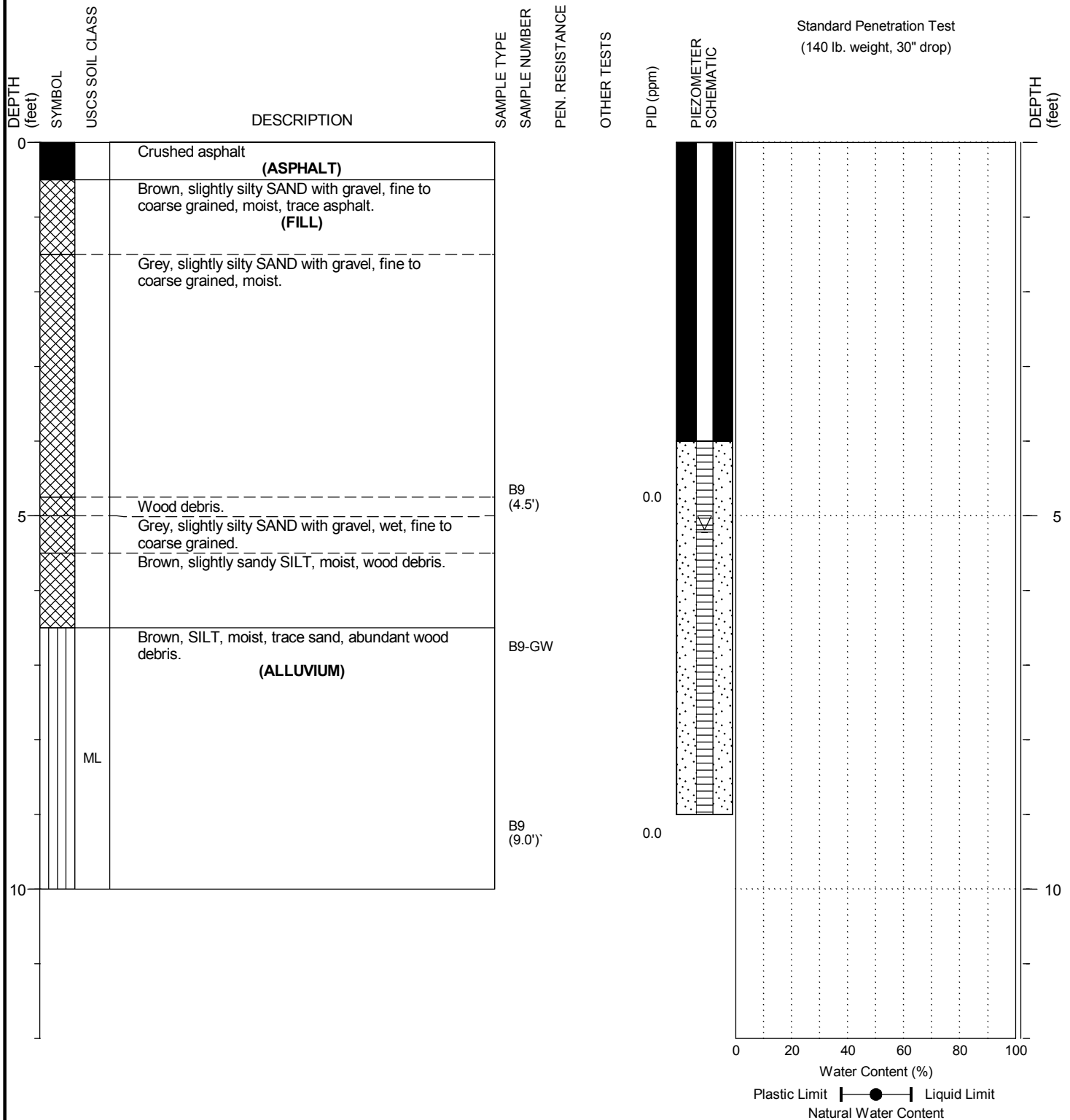
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Log yard/staining observed during Phase I recon

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B9

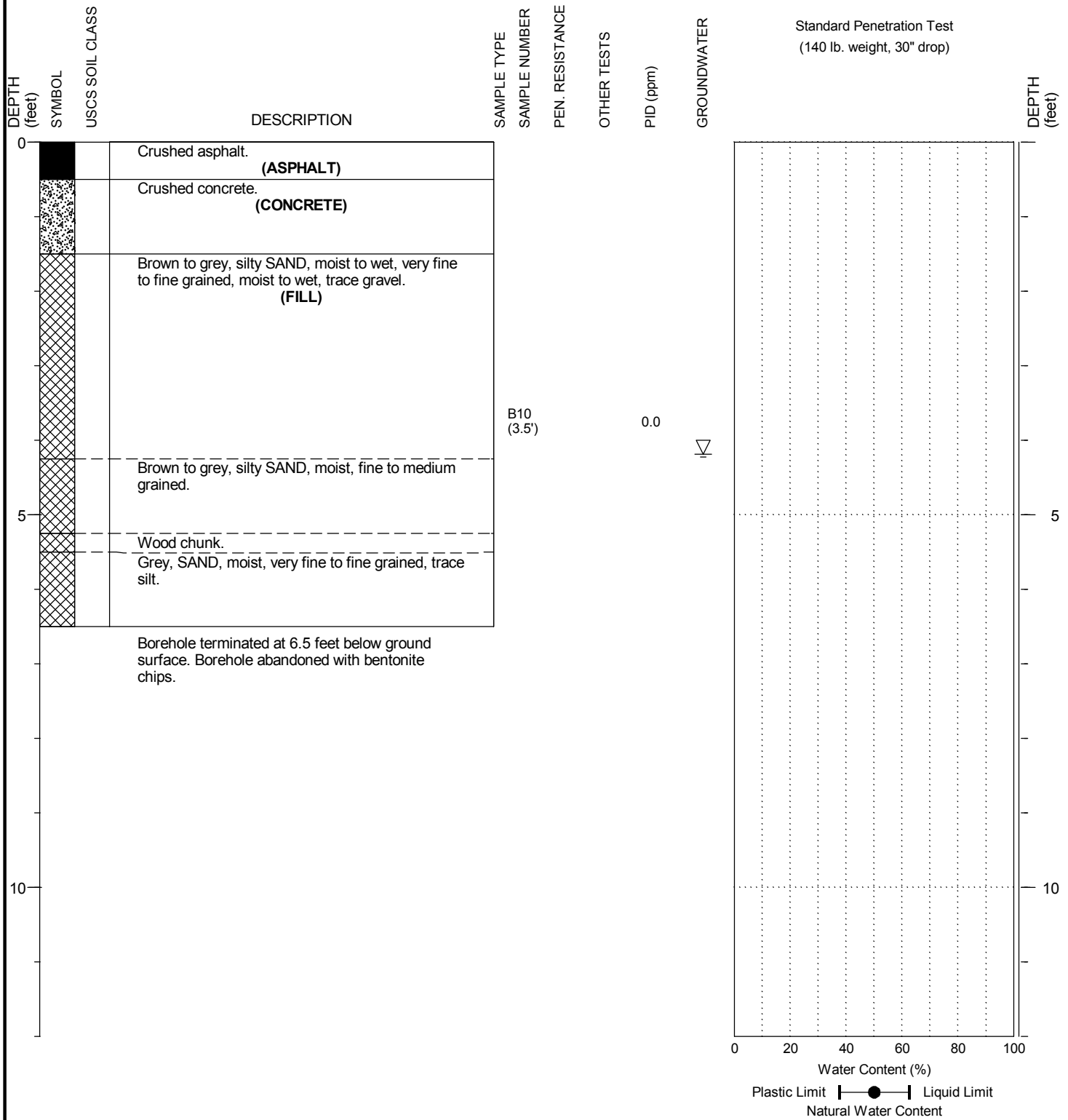
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former drum shed

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B10

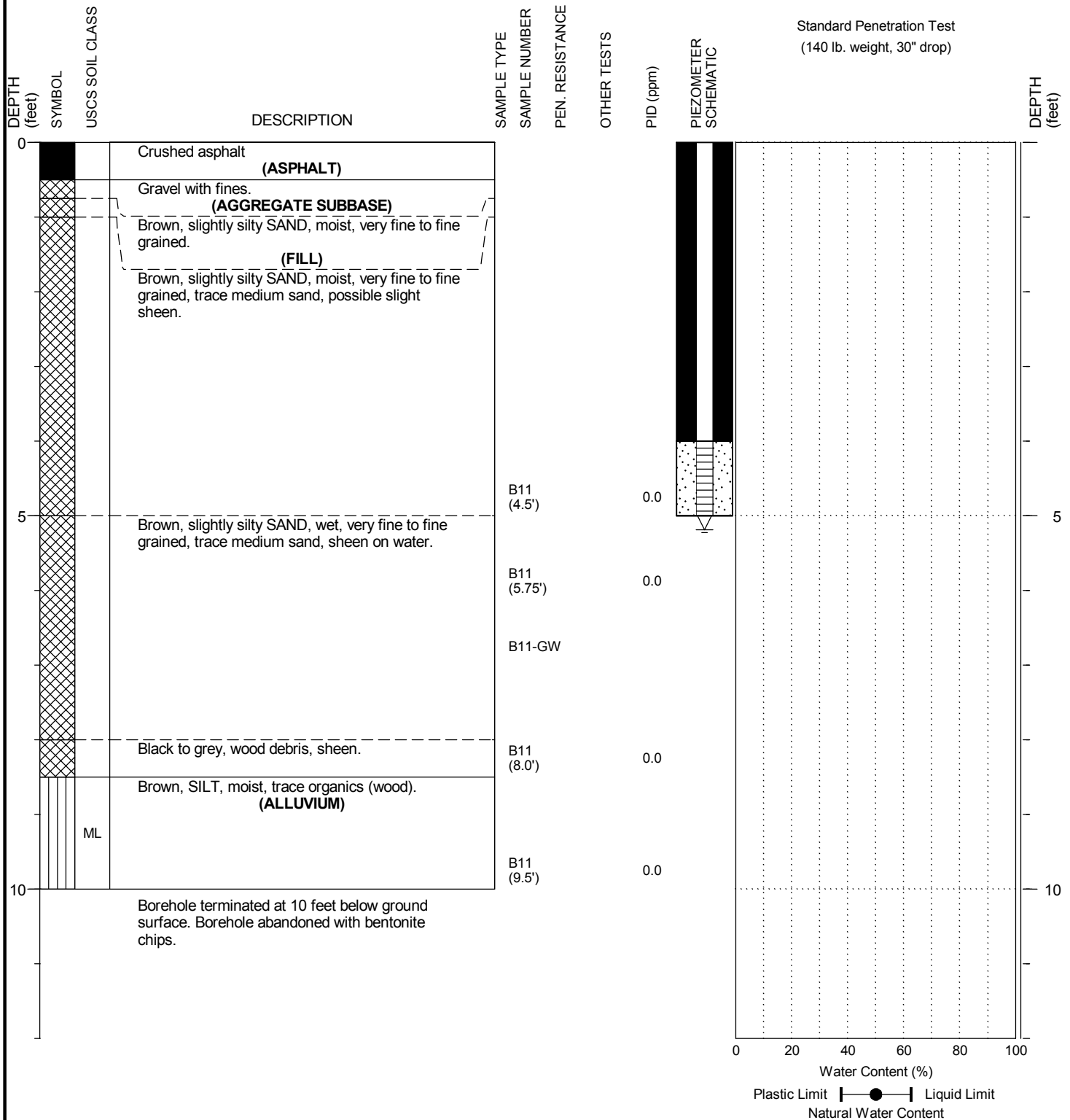
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: NE corner of maintenance shop (former waste oil location)

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 BII

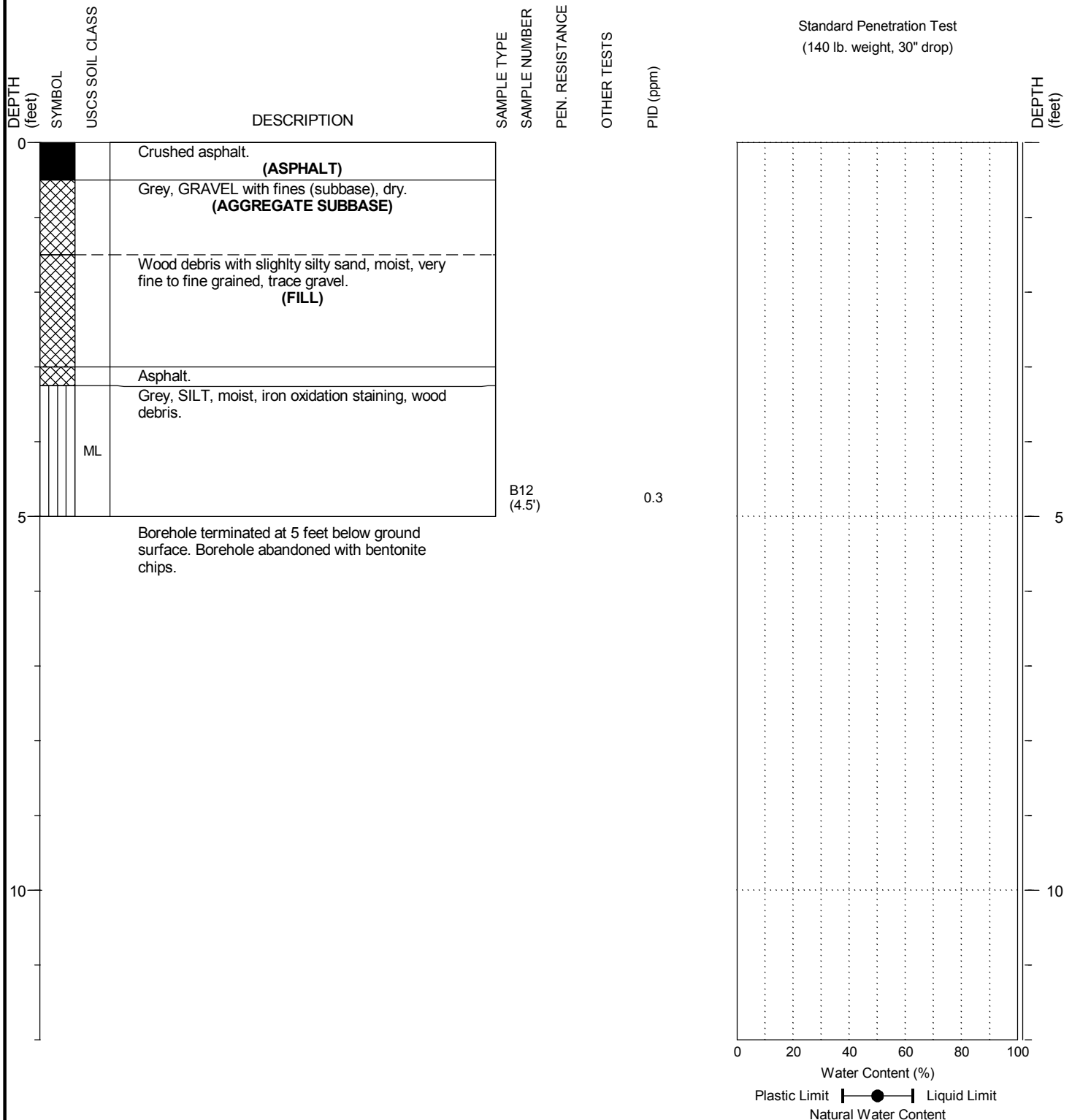
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Vehicle wash area

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B12

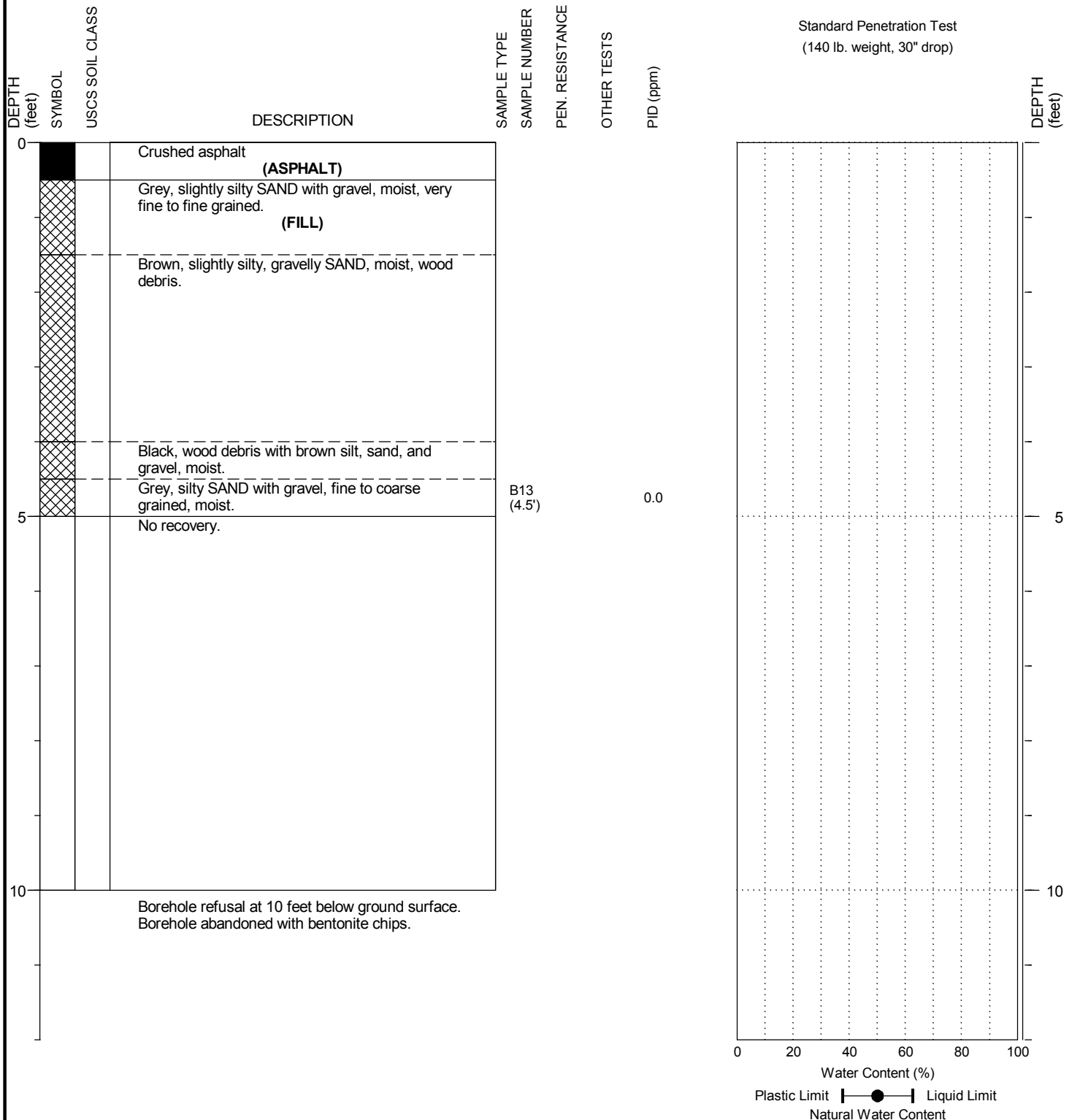
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: South of abandoned storm water treatment equipment

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B13**

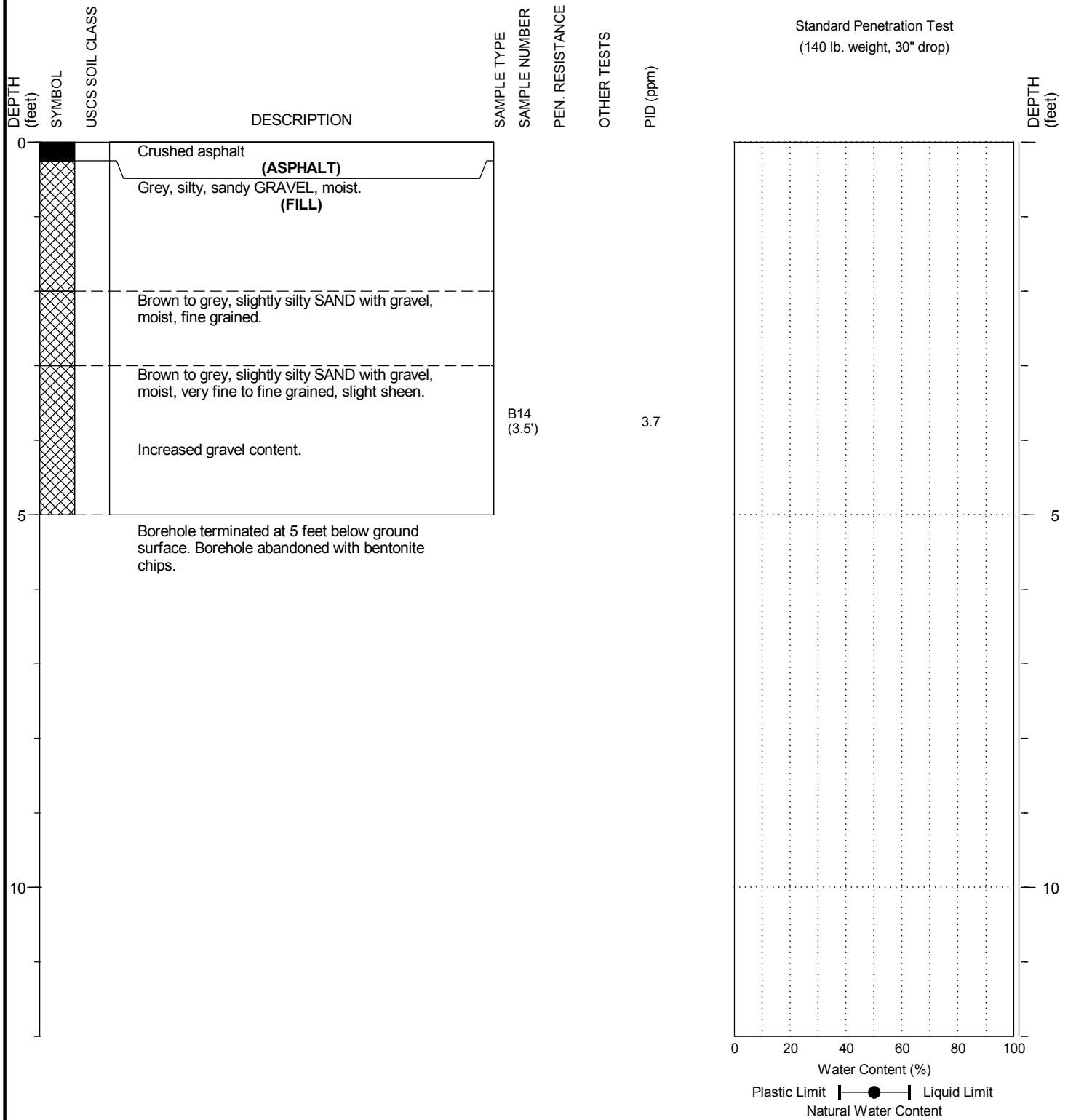
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former "waste storage" area

DATE STARTED: 4/4/2016  
 DATE COMPLETED: 4/4/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B14**

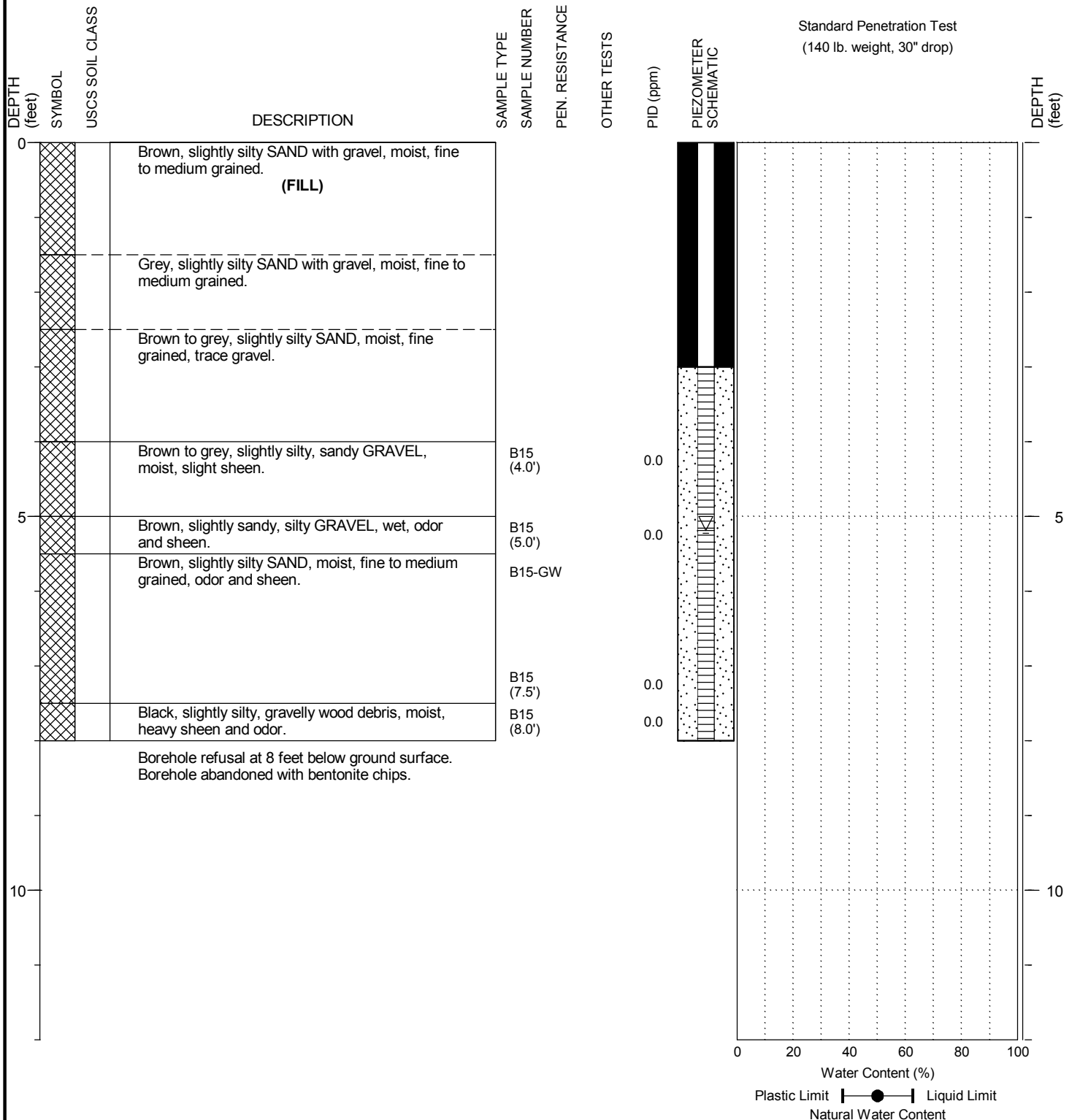
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Interior of maintenance shop

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B15

PAGE: 1 of 1

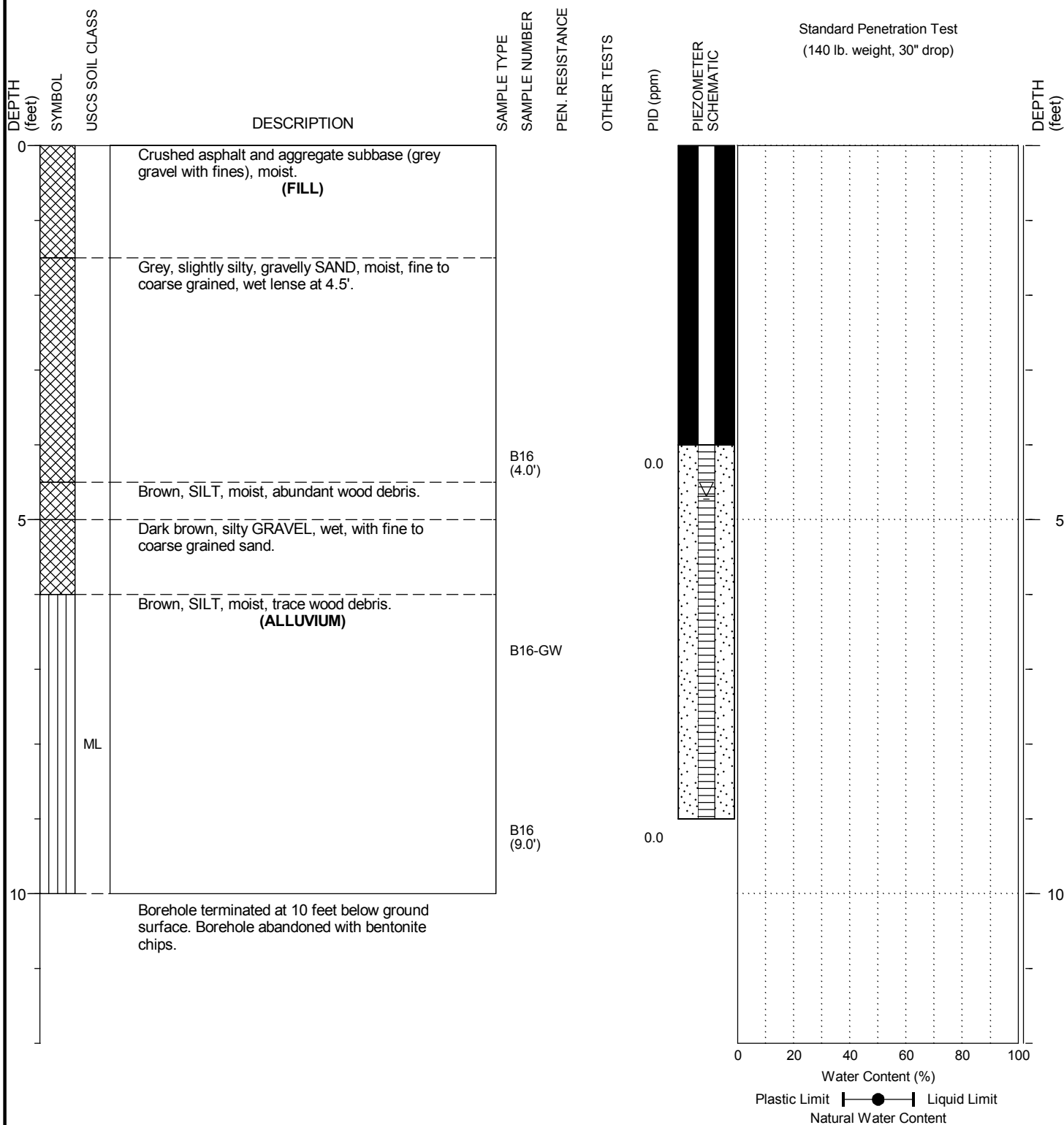
PROJECT NO.: 2016-023

FIGURE:



DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: SW corner of Subject Property

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B16

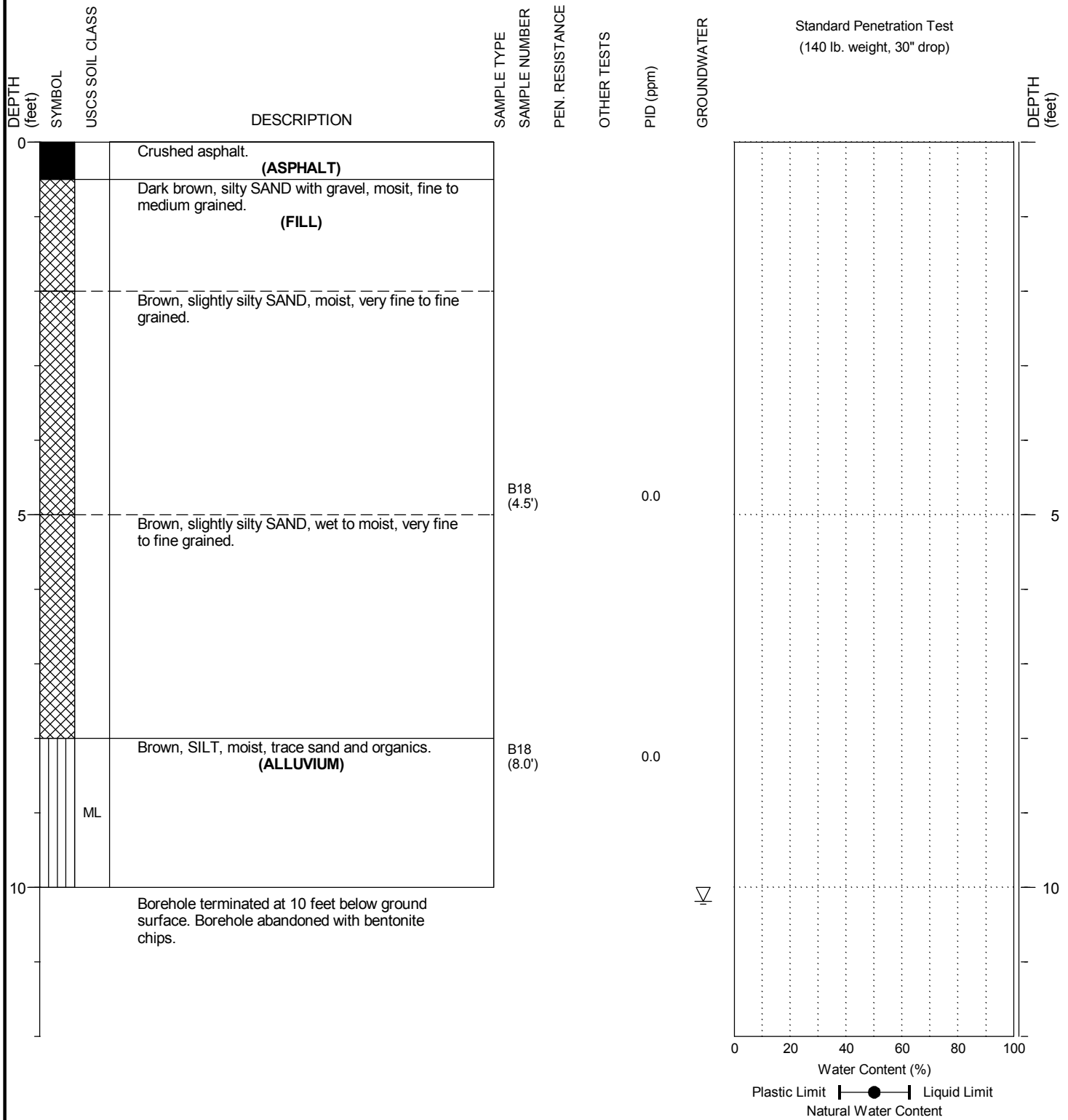
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Suspect patch, E of log mill

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
**B18**

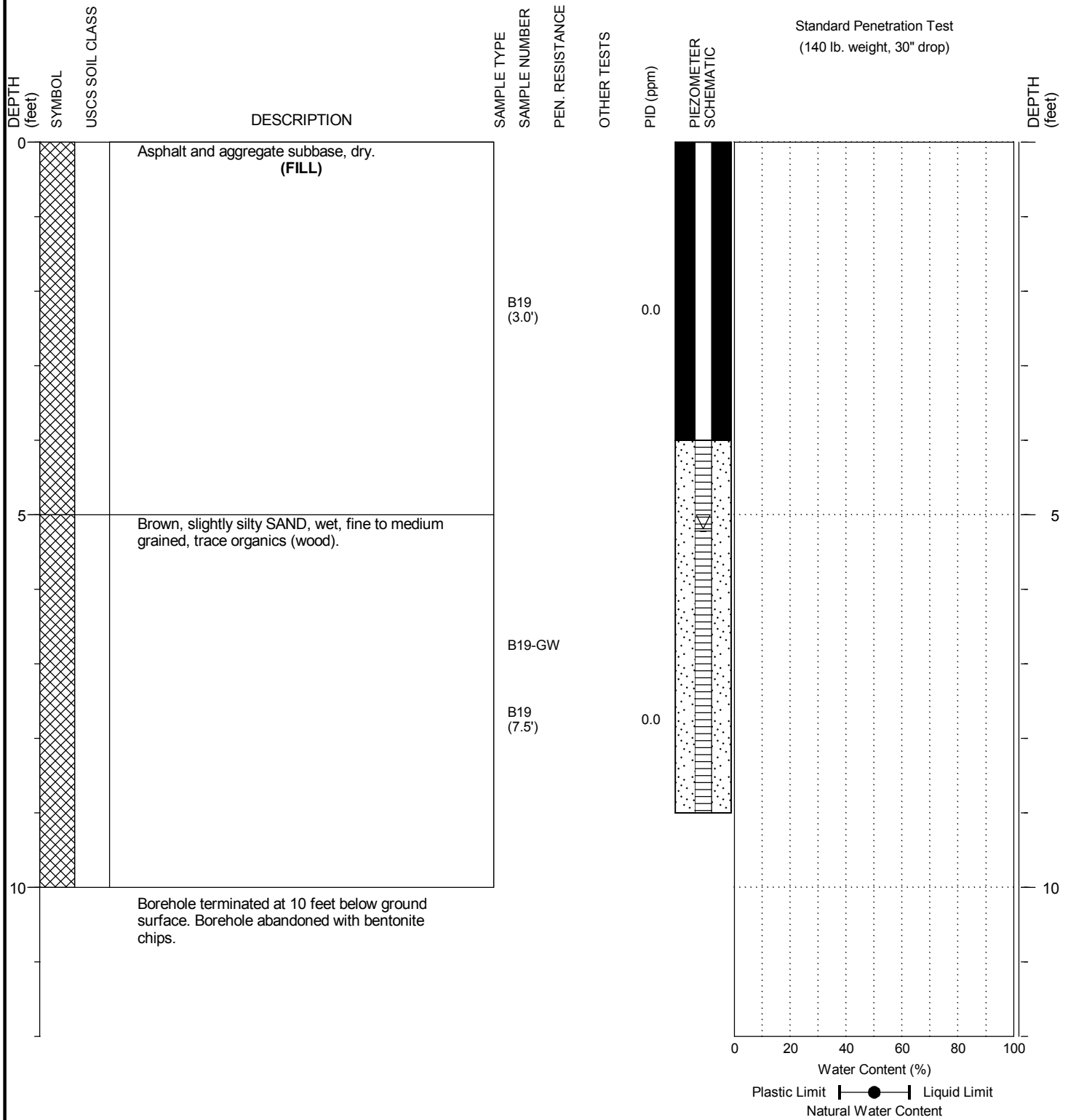
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: S end of logging yard

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 BI9

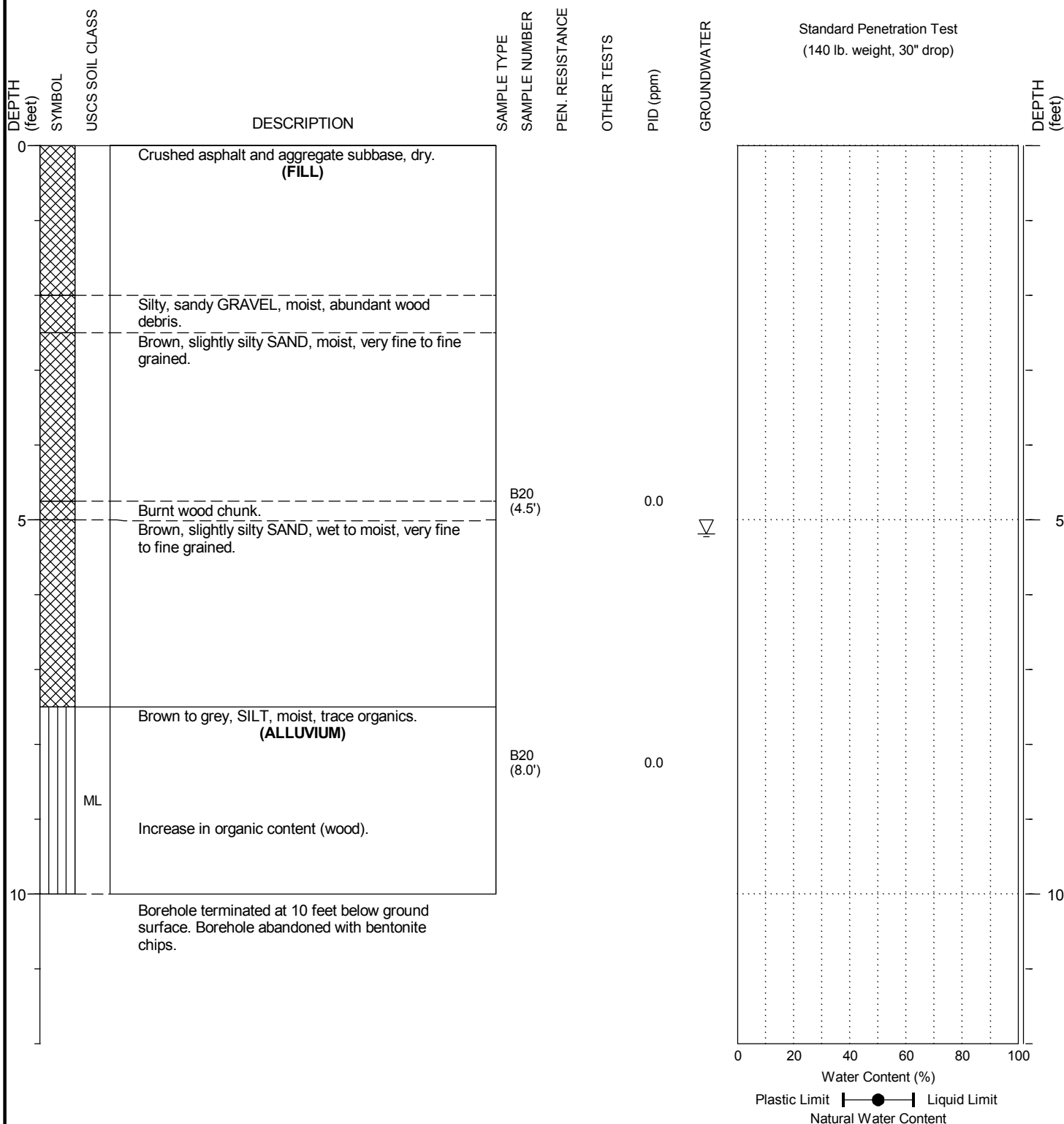
PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

DRILLING COMPANY: Cascade Drilling, Inc.  
 DRILLING METHOD: Direct Push  
 SAMPLING METHOD: Split Spoon  
 LOCATION: Former diesel AST

DATE STARTED: 4/5/2016  
 DATE COMPLETED: 4/5/2016  
 LOGGED BY: N. Kapise



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Welco Property Phase II  
 City of Marysville  
 Marysville, WA

BORING:  
 B20

PAGE: 1 of 1

PROJECT NO.: 2016-023

FIGURE:

				Terms Describing Relative Density and Consistency			
				Density	SPT <sup>(2)</sup> blows/foot	Test Symbols	
Coarse-Grained Soils - More than 50% (1) Retained on No. 200 Sieve	Gravels - More than 50% (1) of Coarse Fraction Retained on No. 4 Sieve	≤ 5% Fines (5)	GW	Well-graded gravel and gravel with sand, little to no fines	Very Loose	0 to 4	G = Grain Size M = Moisture Content A = Atterberg Limits C = Chemical DD = Dry Density K = Permeability
			GP	Poorly-graded gravel and gravel with sand, little to no fines	Loose	4 to 10	
			GM	Silty gravel and silty gravel with sand	Medium Dense	10 to 30	
	Sands - 50% (1) or More of Coarse Fraction Passes No. 4 Sieve	≥ 15% Fines (5)	GC	Clayey gravel and clayey gravel with sand	Dense	30 to 50	
			SW	Well-graded sand and sand with gravel, little to no fines	Very Dense	> 50	
			SP	Poorly-graded sand and sand with gravel, little to no fines	Consistency		
Fine-Grained Soils - 50% (1) or More Passes No. 200 Sieve	Sands and Clays Liquid Limit Less than 50	≤ 5% Fines (5)	SM	Silty sand and silty sand with gravel	Very Soft	0 to 2	
			SC	Clayey sand and clayey sand with gravel	Soft	2 to 4	
			ML	Silt, sandy silt, gravelly silt, silt with sand or gravel	Medium Stiff	4 to 8	
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay	Stiff	8 to 15	
Fine-Grained Soils - 50% (1) or More Passes No. 200 Sieve	Sils and Clays Liquid Limit 50 or More	≥ 15% Fines (5)	OL	Organic clay or silt of low plasticity	Very Stiff	15 to 30	
			MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt	Hard	> 30	
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel	(3) Estimated Percentage		Moisture Content
			OH	Organic clay or silt of medium to high plasticity	Component		Dry - Absence of moisture, dusty, dry to the touch
			PT	Peat, muck and other highly organic soils	Percentage by Weight		Slightly Moist - Perceptible moisture
				Trace < 5		Moist - Damp but no visible water	
				Few 5 to 10		Very Moist - Water visible but not free draining	
				Little 15 to 25		Wet - Visible free water, usually from below water table	
				With			
				- Non-primary coarse constituents: ≥ 15%			
				- Fines content between 5% and 15%			
				Bulk sample			
				Grab Sample			
				Portion not recovered			
				(1) Percentage by dry weight		(4) Depth of ground water	
				(2) (SPT) Standard Penetration Test (ASTM D-1586)		▽ ATD = At time of drilling	
				(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)		▽ Static water level (date)	
						(5) Combined USCS symbols used for fines between 5% and 15%	

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.



# LOG OF EXPLORATION BORING NO. EB-1

Depth (ft)	
	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p><b>DESCRIPTION</b></p>
1	Asphalt
2	Fill
3	Medium dense, moist, light gray, non-stratified, sandy fine to coarse, subrounded and subangular gravel, few silt (SM).
4	Fill
5	Loose, moist to wet, light gray to dark gray, non-stratified fine to coarse SAND, little silt, trace fine subrounded gravel (SW).
6	Woody Debris/Log
7	Fill
8	Loose, saturated, brown, silty fine to medium SAND and crushed SHELLS, trace disseminated organics (SM).
9	Fill/Lacustrine Deposit?
10	Very soft to soft, saturated, light olive-gray and light brown, interlayered organic rich silty CLAY, trace fine sand, PEAT, and WOODY MATERIAL (OL/CL/PT).
11	
12	
13	Loose, saturated, non-stratified, fine to coarse SAND, trace silt, trace organics (SW).
14	PEAT (PT).
15	
16	Estuarine/Alluvial Deposit
17	Loose, saturated, light gray, non-stratified, fine to medium SAND, few grading down to trace silt (SM/SW).
18	
19	
20	Bottom of exploration boring at depth 16 feet Ground water at approximately 5' below the surface. Soil sample (EB-1, 5') taken at approximately 5' below the surface. Water sample (EB-1, W) taken from approximately 5' below the surface.

KCTP3 080118A.GPJ October 17, 2008

## Geddes Marina Phase II ESA Marysville, WA

Logged by: JDC

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

8/19/08

# LOG OF EXPLORATION BORING NO. EB-2

Depth (ft)	DESCRIPTION
1	<b>Fill</b> Medium dense, moist, light gray, non-stratified, gravelly fine to coarse SAND, few silt (SM).
2	
3	<b>Fill</b>
4	Very soft to soft, wet to saturated, brown, PEATY ORGANIC MATERIAL.
5	<b>Fill</b> Loose, saturated, brown, non-stratified, silty fine to medium SAND and crushed SHELLS, trace disseminated organics (SM).
6	<b>Fill/Lacustrine Deposit?</b> Soft, saturated, light olive-gray and light brown, interbedded/interlayered organics, silty CLAY and PEATY MATERIAL, scattered small logs (CL/OL/PT).
7	
8	
9	
10	
11	
12	<b>Estuarine Deposit</b>
13	Soft, saturated, light olive-gray, weakly stratified, silty CLAY, few disseminated organics (CL).
14	
15	
16	Bottom of exploration boring at depth 15 feet Ground water at approximately 4' below the surface. Soil sample (EB-2, 3') taken from approximately 3' below the surface. Water sample (EB-2, W) taken from approximately 5' below the surface.
17	
18	
19	
20	

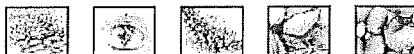
KCTP3 080118A.GPJ October 17, 2008

## Geddes Marina Phase II ESA Marysville, WA

Logged by: JDC

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

8/19/08

# LOG OF EXPLORATION BORING NO. EB-3

Depth (ft)	
	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p><b>DESCRIPTION</b></p>
1	<p><b>Fill</b></p> <p>Medium dense, moist, light gray, non-stratified, sandy fine to coarse subrounded GRAVEL, few silt (GM).</p>
2	<p><b>Fill/Lacustrine Deposit?</b></p> <p>Soft, saturated, light olive-gray and light brown, interbedded/interlayered organics, silty CLAY and PEATY MATERIAL, scattered small logs (CL/OL/PT).</p>
3	
4	
5	
6	
7	
8	
9	
10	<p><b>Estuarine Deposit</b></p>
11	<p>Soft, saturated, light olive-gray, weakly stratified, silty CLAY, few disseminated organics (CL).</p>
12	
13	
14	
15	
16	<p>Bottom of exploration boring at depth 15 feet            Ground water at approximately 5' below the surface. Soil sample (EB-3, 5') taken at approximately 5' below the surface.            Water sample (EB-3, W) taken at approximately 5' below the surface.</p>
17	
18	
19	
20	

## Geddes Marina Phase II ESA Marysville, WA

Logged by: JDC

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

8/19/08



# LOG OF EXPLORATION BORING NO. EB-4

Depth (ft)	DESCRIPTION
1	Fill Loose, damp, gray/black, sandy GRAVEL, some silt (SM).
2	
3	
4	Fill Loose, damp, dark brown, silty SAND, trace gravel and wood debris (slight black staining) (SW).
5	Fill Very soft to soft, saturated, light brown, silty CLAY, PEAT and wood debris (OL/CL/PT).
6	
7	
8	
9	Fill Loose, dark brown, medium to coarse SAND, trace wood debris (SW).
10	
11	
12	
13	Bottom of exploration boring at depth 12 feet Screened from 4' to 7' temp steel well, sampler with peristaltic.
14	
15	
16	
17	
18	
19	
20	

## Geddes Marina Phase II ESA Marysville, WA

Logged by: MSA

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

October 2008

# LOG OF EXPLORATION BORING NO. EB-5

Depth (ft)	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p><b>DESCRIPTION</b></p>
1	<p><b>Fill</b></p> <p>Loose, damp, gray/dark brown, sandy GRAVEL, some silt (SM). Note: Some burnt/charred material in shoe.</p>
2	
3	
4	
5	<p><b>Fill</b></p> <p>Loose, damp, gray/dark brown, sandy GRAVEL, some silt, grades to very soft, gray/brown, PEAT/SILT, with wood debris (PT).</p>
6	
7	
8	<p>Same as above.</p>
9	
10	
11	
12	
13	<p>Bottom of exploration boring at depth 12 feet Screened from 7' to 10' (Raked screen to 4' to 6' after 45 minutes of little water).</p>
14	
15	
16	
17	
18	
19	
20	

## Geddes Marina Phase II ESA Marysville, WA

Logged by: MSA

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

October 2008

# LOG OF EXPLORATION BORING NO. EB-6

Depth (ft)	
	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p><b>DESCRIPTION</b></p>
1	<p style="text-align: center;"><b>Fill</b></p> <p>Loose, damp, gray, sandy GRAVEL, some silt, grades to loose, dark brown, silty CLAY, trace wood debris (SM/OL/CL).</p>
2	
3	
4	
5	<p style="text-align: center;"><b>Fill</b></p> <p>Same as above with 3" gray sand interbed, grades to very loose, damp, brown, PEAT, with silt (OL/CL/PT).</p>
6	
7	
8	-----
	<b>Estuarine/Alluvial Deposit</b>
9	Loose to medium dense, saturated, light gray, fine to medium SAND, trace silt, grades to brown PEAT (SM/SW/PT).
10	
11	
12	
13	Bottom of exploration boring at depth 12 feet
14	
15	
16	
17	
18	
19	
20	

KCTP3 080118A.GPJ October 20, 2008

## Geddes Marina Phase II ESA Marysville, WA

Logged by: MSA

Approved by:

Associated Earth Sciences, Inc.



Project No. KV080118A

October 2008

# LOG OF EXPLORATION BORING NO. EB-7

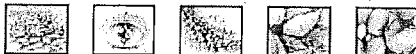
Depth (ft)	<p style="font-size: small;">This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p style="margin-top: 10px;"><b>DESCRIPTION</b></p>
1	<p><b>Fill</b></p> <p>Very loose, damp to wet, gray/brown, sandy GRAVEL, with silt, trace wood debris (SM).</p>
2	
3	
4	
5	<p><b>Fill</b></p> <p>Same as above, grades to very loose, moist to wet, brown, PEAT, with silt (SM/PT).</p>
6	
7	
8	<p><b>Fill</b></p> <p>Very soft, saturated, brown, silty PEAT (PT).</p>
9	
10	
11	
12	
13	Bottom of exploration boring at depth 12 feet
14	
15	
16	
17	
18	
19	
20	

## Geddes Marina Phase II ESA Marysville, WA

Logged by: MSA

Approved by:

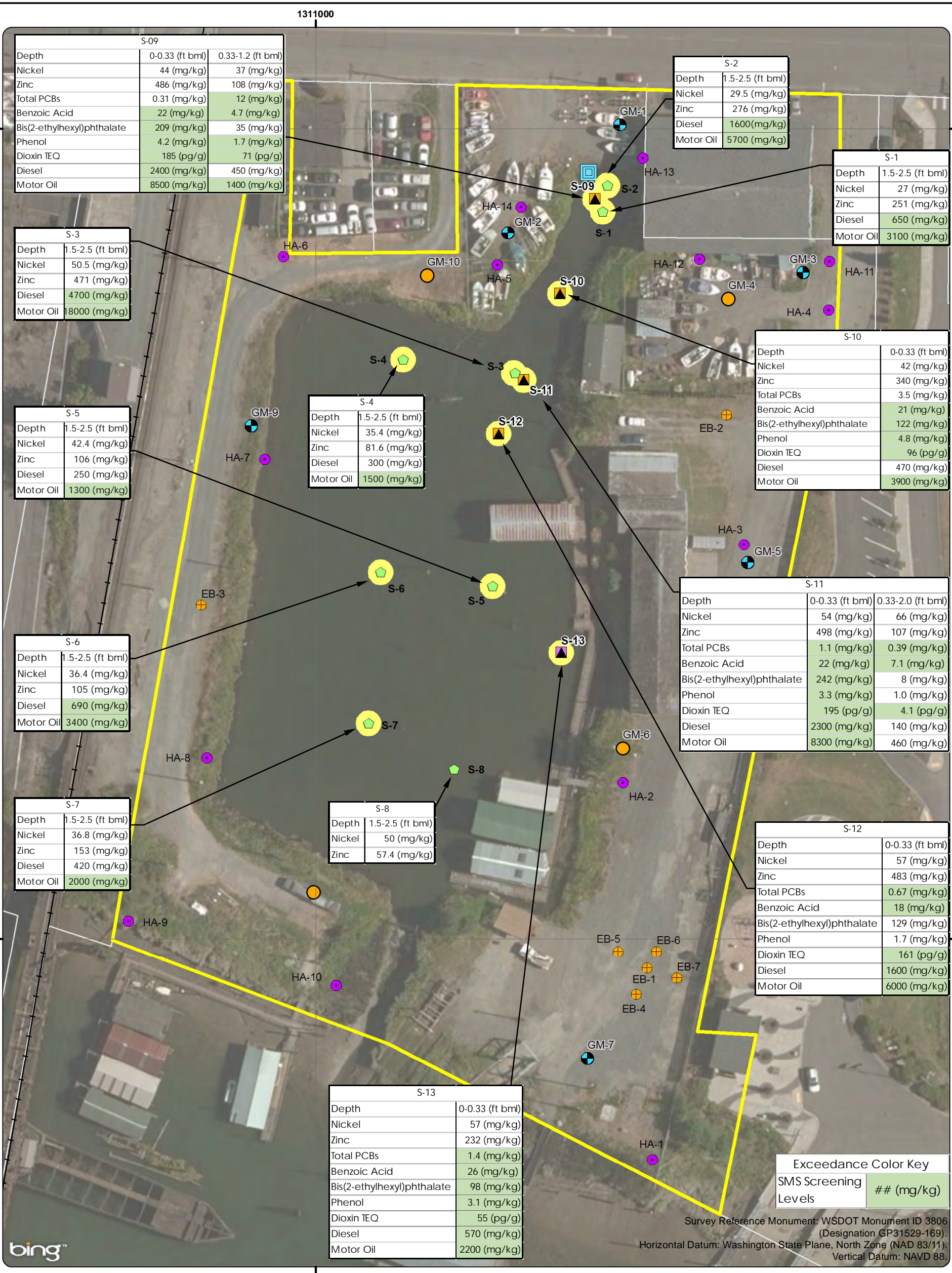
Associated Earth Sciences, Inc.



Project No. KV080118A

October 2008

Path: X:\06889.01\_City of Marysville\ba\03\Projects\Fig8\_SedimentExceedancesGrid.mxd  
 Print Date: 9/23/2015  
 Produced By: miller  
 Approved By: vyan



SMS Screening Levels	## (mg/kg)
----------------------	------------

Survey Reference Monument: WSDOT Monument ID 3806  
 (Designation GP31529-169).  
 Horizontal Datum: Washington State Plane, North Zone (NAD 83/11).  
 Vertical Datum: NAVD 88.

Notes: Monitoring well locations were surveyed by Pacific Geomatic Services, Inc. All other site features are approximate. Soil cleanup levels were developed under MTCA Method A (unrestricted land use). Sediment samples were collected on February 2 and 3, 2015. SMS = Sediment Management Standards. AESI = Associated Earth Sciences, Inc. ft bgs = feet below ground surface. ft bml = feet below mudline. mg/kg = milligrams per kilogram (parts per million). MFA = Maul Foster & Alongi, Inc. MTCA = Model Toxics Control Act. pg/g = picograms per gram (parts per trillion).



This product is for informational purposes and may not have been prepared for, or be suitable for, legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

1311000

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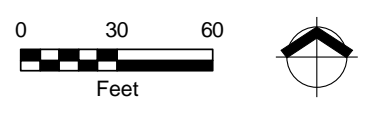
1311000

**Legend**

- Sediment Sample - Previous
- Monitoring Well (MFA, 2015)
- Boring Location (MFA, 2015)
- ▲ Sediment Sample - Tier 1 (MFA, 2015)
- ▲ Sediment Sample - Tier 2 (MFA, 2015)
- Hand Auger Exploration (AESI, 2008)
- Exploration Boring (AESI, 2008)
- MTCA Exceedance
- Stormwater Outfall
- Site Property
- Tax Lots

**Former Geddes Marina Property  
 Marysville, Washington**

**Figure 8  
 Spatial Distribution of Representative Indicator  
 Hazardous Substances in Sediment**



Source: Aerial photograph obtained from Bing Maps/Esri ArcGIS Online; taxlots obtained from Snohomish County.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-1**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/3/15 to 2/3/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method			
1		64	GP	1			0.0 to 1.8 feet: no recovery.
2							1.8 to 3.5 feet: SAND (well graded) (SW); brown; 20% fines; 40% sand, medium to coarse; 40% gravel, coarse, angular; some organic debris; dry. (FILL)
3							
4							3.5 to 3.8 feet: ASPHALT. (FILL)
5		64	GP	2	PID = 1.4 ppm		3.8 to 4.4 feet: GRAVEL (well graded) (GW); brown to gray; 10% fines; 30% sand, medium to coarse; 60% gravel, coarse, angular; wood debris lens at 4.0 to 4.2 feet bgs; damp to moist.
6							4.4 to 5.0 feet: SILT WITH SAND (ML); brown; 65% fines, low to medium plasticity; 30% sand, fine; 5% gravel, fine; damp to moist.
7							5.0 to 6.8 feet: no recovery.
8							6.8 to 7.0 feet: SILT (ML); brown; 70% fines, low plasticity; 30% sand, fine; trace wood debris; damp to moist.
9							7.0 to 7.5 feet: SAND WITH SILT (SW-SM); brown; 10% fines; 70% sand, medium to coarse; 20% gravel, medium, angular; trace woody debris; moist.
10							7.5 to 9.0 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine; trace woody debris; moist.
11		80	GP	3	PID = 0.9 ppm		9.0 to 10.0 feet: WOODY DEBRIS. (FILL)
12							10.0 to 11.0 feet: no recovery.
13							11.0 to 13.3 feet: SILTY SAND (SM); brown; 25% fines, low plasticity; 70% sand, medium to fine; 5% gravel, fine; lens of silt at 11.8 to 12.1 feet bgs; lens of woody debris at 12.8 to 13.0 feet bgs; wet.
14							13.3 to 15.0 feet: WOODY DEBRIS.
15							

**NOTES:** Field duplicate collected (GMDUP-S-12.0).  
 bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

 feet below ground surface.

GBLWC WA\GINTGINTWPROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-2**


Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/3/15 to 2/3/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data				Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number			
1		84	GP	1			0.0 to 0.8 feet: no recovery.	
2							0.8 to 1.2 feet: GRAVEL (poorly graded) (GP); brown to gray; 5% fines; 5% sand; 90% gravel, coarse, angular; dry. (FILL)	
3							1.2 to 1.6 feet: SILT WITH SAND (ML); brown; 85% fines, low plasticity; 15% sand, fine; moist.	
4							1.6 to 1.8 feet: SAND (poorly graded) (SP); brown; 20% fines; 80% sand, fine; moist.	
5							1.8 to 3.2 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine to medium; firm; moist.	
6		90	GP	2	PID = 1.0 ppm		3.2 to 3.5 feet: WOODY DEBRIS.	
7							3.5 to 3.9 feet: SAND (poorly graded) (SP); light brown; 5% fines; 95% sand, fine to medium; trace woody debris; moist.	
8							3.9 to 5.0 feet: SILT WITH SAND (ML); dark brown; 95% fines, low plasticity; 5% fines; very soft; trace woody debris; moist to saturated.	
9							5.0 to 5.5 feet: no recovery.	
10							5.5 to 7.0 feet: SAND WITH SILT (SW-SM); brown; 30% fines, low plasticity; 55% sand, fine to coarse; 15% gravel, fine, angular; very soft; trace woody debris; saturated.	
11							7.0 to 8.5 feet: SILT (ML); brown; 95% fines, low plasticity; 5% sand; trace woody debris; wet.	
12							8.5 to 10.0 feet: WOODY DEBRIS; remnants of burnt wood; wet.	
13		100	GP	3	PID = 1.3 ppm		10.0 to 14.5 feet: SAND (poorly graded) (SP); gray; 5% fines; 90% sand, fine to medium; 5% gravel; trace woody debris; lens of angular, coarse gravel at 11.0 to 11.1 feet bgs; saturated.	
14								
15							14.5 to 15.0 feet: SILT WITH SAND (ML); light brown; 60% fines, low plasticity; 40% sand, fine; firm; saturated.	

**NOTES:** bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

 feet below ground surface.

GBLWC: \\A:\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-3**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method			
1		64	GP	1			0.0 to 1.8 feet: no recovery.
2							1.8 to 2.5 feet: GRAVEL (poorly graded) (GP); gray; 5% fines; 15% sand, fine to medium; 80% gravel, fine to coarse, angular; dry to moist. (FILL)
3							2.5 to 3.0 feet: WOODY DEBRIS; moist. (FILL)
4							3.0 to 3.5 feet: ASPHALT. (FILL)
5		90	GP	2			3.5 to 4.0 feet: TOPSOIL; moist.
6							4.0 to 4.4 feet: WOODY DEBRIS; unweathered. (FILL)
7							4.4 to 5.0 feet: WOODY DEBRIS; weathered. (FILL)
8							5.0 to 5.5 feet: no recovery.
9							5.5 to 9.0 feet: SILT (ML); gray; 100% fines, low plasticity; some woody debris; trace redox features; saturated.
10							9.0 to 10.0 feet: SILT (ML); brown; 100% fines, low plasticity; some woody debris; moist to saturated.
11		100	GP	3			10.0 to 13.4 feet: SILT (ML); brown; 100% fines, low plasticity; trace woody debris; loose; saturated.
12							
13							
14							13.4 to 15.0 feet: SAND (poorly graded) (SP); gray; 10% fines; 90% sand, medium; trace woody debris; saturated.
15							

PID = 1.5 ppm

GM3-S-6.0

GM3-W-9.0

PID = 1.4 ppm

GBLWC WA\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**NOTES:** bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

 feet below ground surface.



**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

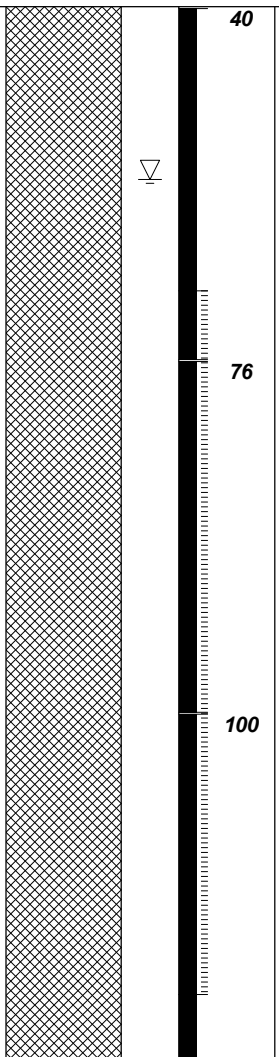
Project Number  
**0689.01.03**

Well Number  
**GM-4**

Sheet  
**1 of 1**


Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/3/15 to 2/3/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data				Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number			
1		40		GP	1			0.0 to 3.0 feet: no recovery.
2								
3								
4				GW				3.0 to 4.6 feet: SAND WITH SILT (SP-SM); gray; 15% fines; 60% sand, medium; 25% gravel, medium; some organic debris; moist. (FILL)
5			76	GP	2			4.6 to 5.0 feet: SILT (ML); gray; 90% fines, low plasticity; 10% sand, fine; some organics; moist to wet. (FILL) 5.0 to 6.2 feet: no recovery.
6								
7								6.2 to 6.6 feet: GRAVEL (poorly graded) (GP); gray; 10% fines; 10% sand, fine; 80% gravel, coarse, angular; trace woody debris; moist. (FILL)
8								6.6 to 8.0 feet: WOODY DEBRIS; moist.
9								8.0 to 10.0 feet: SILT (ML); brown; 95% fines, low plasticity; 5% sand; trace woody debris; moist to saturated.
10								
11			100	GP	3			10.0 to 12.2 feet: WOODY DEBRIS; saturated.
12								
13								12.2 to 15.0 feet: SAND (poorly graded) (SP); light gray; 15% fines; 85% sand, fine to medium; trace woody debris; saturated.
14								
15								

GBLWC WA\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**NOTES:** Temporary screen installed from 4.0 to 14.0 feet bgs. Boring decommissioned with bentonite chips.  
 bgs = below ground surface, GP = geoprobe macrocore liner, GW = groundwater sample, PID = photoionization detector, ppm = parts per million

 feet below ground surface.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-5**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-foot**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description	
		Interval	Percent Recovery	Collection Method				
1		56	GP	1			0.0 to 2.2 feet: no recovery.	
2								
3								
4								
5								
6			0	GP	2			2.2 to 2.8 feet: GRAVEL (well graded) (GW); gray; 5% fines; 25% sand, medium to coarse; 70% gravel, rounded, fine to medium; moist. (FILL)
7								2.8 to 3.4 feet: SAND (poorly graded) (SP); gray; 5% fines; 85% sand, coarse; 10% gravel; moist.
8								3.4 to 3.7 feet: GRAVEL (poorly graded) (GP); gray; 20% sand; 80% gravel, angular, fine to coarse; moist. (FILL)
9								3.7 to 4.1 feet: SAND WITH SILT (SW-SM); gray to brown; 10% fines; 70% sand, medium; 20% gravel, fine to medium; moist. (FILL)
10								4.1 to 5.0 feet: SANDY GRAVEL WITH SILT (GW-GM); 10% fines; 30% sand, coarse; 60% gravel, fine; loose; saturated.
11								5.0 to 12.3 feet: no recovery.
12								
13			54	GP	3			12.3 to 12.6 feet: SAND (poorly graded) (SP); gray; 5% fines; 65% sand, medium; 30% gravel; loose; saturated.
14								12.6 to 12.9 feet: SILT (ML); brown; 100% fines, medium plasticity; trace organic debris; moist.
15								12.9 to 13.3 feet: WOODY DEBRIS; brown; weathered; moist. 13.3 to 15.0 feet: SILT (ML); brown; 100% fines, medium plasticity; trace organic debris; sulfur-like odor; moist to saturated.

PID = 8.3

GM5-S-4.0

GM5-W-9.0

PID = 13.3 ppm

GBLWC WA\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**NOTES:** bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

feet below ground surface.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-6**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
1		80	GP	1				0.0 to 1.0 feet: no recovery.	
2								1.0 to 4.0 feet: SILT (ML); brown; 95% fines, low plasticity; 5% sand; trace organic debris; dry.	
3									
4						PID = 11.4 ppm GM6-S-4.0			4.0 to 4.5 feet: SILT (ML); reddish brown; 100% fines, low plasticity; some woody debris and organics; moist.
5		100	GP	2					4.5 to 14.5 feet: SILT (ML); blue gray; 100% fines, low plasticity; trace woody debris; saturated. Refusal @ 14.5 feet bgs.
6									
7									
8									
9									
10									
11			90	GP	3				
12									
13									
14									
15									14.5 to 15.0 feet: no recovery.

GBLWC WA\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**NOTES:** Temporary screen installed from 8.5 to 13.5 feet bgs. Boring decommissioned with bentonite chips.  
 bgs = below ground surface, GP = geoprobe macrocore liner, GW = groundwater sample, PID = photoionization detector, ppm = parts per million

feet below ground surface.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-7**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-foot**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method			
1		70	GP	1			0.0 to 1.5 feet: no recovery.
2		80	GP	2			1.5 to 2.0 feet: GRAVEL (well graded) (GW); gray; 5% fines; 20% sand; 75% gravel, angular, fine to coarse; moist. (FILL)
3							2.0 to 2.2 feet: WOODY DEBRIS. (FILL)
4							2.2 to 4.5 feet: SAND WITH SILT (poorly graded) (SP-SM); brown; 30% fines; 70% sand, fine to medium; trace woody debris; moist.
5							4.5 to 5.0 feet: SILT (ML); brown to black; 100% fines, medium plasticity; trace woody debris; moist.
6							5.0 to 6.0 feet: no recovery.
7							6.0 to 10.0 feet: SILT (ML); brown to black; 100% fines, medium plasticity; trace woody debris; moist to saturated.
8							
9							
10							
11		90	GP	3			10.0 to 11.0 feet: GRAVEL (poorly graded); gray; 5% fines; 5% sand; 90% gravel, angular, coarse; saturated. (FILL)
12							11.0 to 12.0 feet: SILT WITH SAND (ML); brown; 80% fines, medium plasticity; 20% sand; saturated.
13							12.0 to 15.0 feet: SILT (ML); brown to gray; 100% fines, medium plasticity; trace woody debris; sulfur-like odor; saturated.
14							
15							

PID = 10.5 ppm  
GM7-S-3.0

GM7-W-9.0  
PID = 5.0 ppm

GBLWC WA\GINTGINT\PROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**NOTES:** bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

feet below ground surface.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-8**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description	
		Interval	Percent Recovery	Collection Method				
1		90	GP	1			0.0 to 0.5 feet: no recovery.	
2							0.5 to 1.2 feet: GRAVEL (poorly graded) (GP); gray; 10% sand; 90% gravel, angular, coarse; dry. (FILL)	
3							1.2 to 2.9 feet: SILT (ML); brown; 90% fines, low plasticity; 10% sand, fine; trace organic debris; moist.	
4							2.9 to 3.1 feet: SILT (ML); black; 90% fines, low plasticity; 10% sand, fine; trace organic debris; charcoal remnants; moist.	
5			70	GP GW	2	GM8-S-4.5		3.1 to 5.0 feet: SILTY SAND (SM); yellowish brown; 30% fines; 60% sand, fine to coarse, angular; 10% gravel; trace woody debris; wet.
6								5.0 to 6.5 feet: no recovery.
7								6.5 to 8.0 feet: WOODY DEBRIS; moist. (FILL)
8								8.0 to 10.0 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine; trace woody debris; sulfur-like odor; moist.
9								
10			90	GP	3	PID = 40.7 ppm GM8-W-10.0		10.0 to 10.5 feet: no recovery.
11								10.5 to 11.0 feet: GRAVEL (poorly graded) (GP); gray; 20% fines; 20% sand, 60% gravel, coarse, angular; trace woody debris; moist to saturated.
12								11.0 to 15.0 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine; trace woody debris; saturated.
13								
14								
15								

PID = 14.0 ppm

**NOTES:** Temporary screen installed from 5.0 to 15.0 feet bgs. Boring decommissioned with bentonite chips.  
 bgs = below ground surface, GP = geoprobe macrocore liner, GW = groundwater sample, PID = photoionization detector, ppm = parts per million

feet below ground surface.

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-9**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/2/15 to 2/2/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

Depth (feet, BGS)	Well Details	Sample Data			Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method			
1		80	GP	1			0.0 to 1.0 feet: no recovery.
2							1.0 to 1.2 feet: TOPSOIL; brown; trace organic debris. 1.2 to 2.8 feet: SILT (ML); brown; 95% fines; 5% sand, fine; trace organic debris; redox features; moist.
3							2.8 to 5.0 feet: SILT WITH SAND (ML); gray; 85% fines; 15% sand, fine; trace organic debris; moist.
4							
5		80	GP	2			5.0 to 6.0 feet: no recovery.
6							6.0 to 10.0 feet: SILTY SAND (SM); gray; 30% fines; 70% sand, fine; trace organic debris; damp.
7							
8							
9							
10		80	GP	3			10.0 to 11.0 feet: no recovery.
11							11.0 to 11.7 feet: SILTY SAND (SM); gray; 30% fines; 70% sand, fine; trace organic debris; damp.
12							11.7 to 12.5 feet: SILTY SAND (SM); gray; 30% fines; 70% sand, fine; loose; trace organic debris; damp.
13							12.5 to 13.1 feet: SILTY SAND (SM); gray to brown; 30% fines; 70% sand, fine; loose; wet.
14							13.1 to 14.0 feet: WOODY DEBRIS; unweathered.
15							14.0 to 15.0 feet: SILT WITH SAND (ML); gray; 85% fines; 15% sand, fine; firm, damp.

PID = 13.5 ppm

**NOTES:** bgs = below ground surface, GP = geoprobe macrocore liner, PID = photoionization detector, ppm = parts per million

▽ feet below ground surface.

GBLWC WA\GINTGINTWPROJECTS\0689.01.03\GM-1 THROUGH GM-10.GPJ 5/20/15

**Maul Foster & Alongi, Inc.**

**Geologic Borehole Log/Well Construction**

Project Number  
**0689.01.03**

Well Number  
**GM-10**

Sheet  
**1 of 1**

Project Name **Former Geddes Marina**  
 Project Location **Marysville, Washington**  
 Start/End Date **2/3/15 to 2/3/15**  
 Driller/Equipment **Holt Services, Inc./Geoprobe 7822DT**  
 Geologist/Engineer **M. Murray, C. Wise**  
 Sample Method

TOC Elevation (feet)  
 Surface Elevation (feet)  
 Northing  
 Easting  
 Hole Depth **15.0-feet**  
 Outer Hole Diam **2.0-inch**

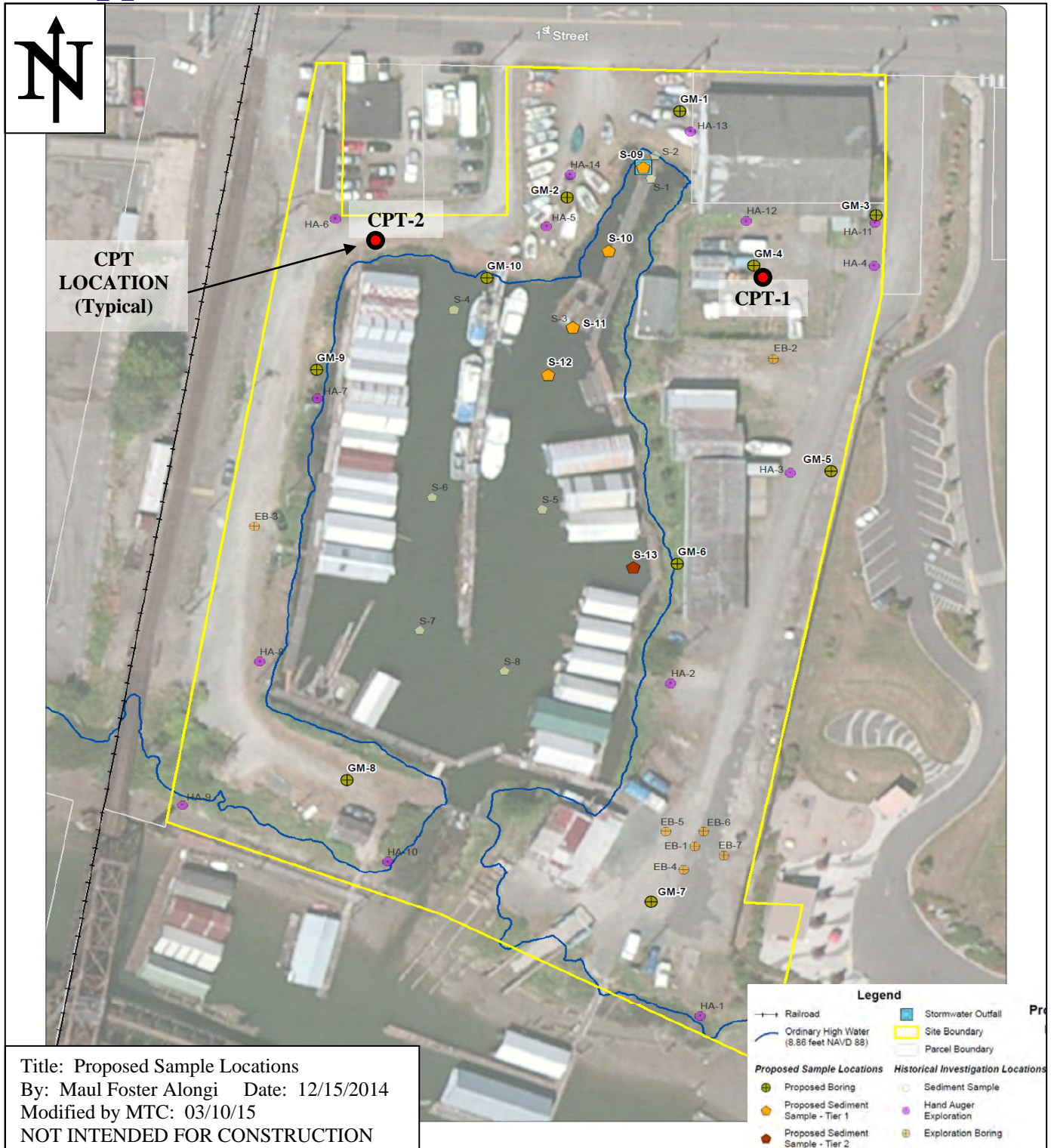
Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
1		70		GP	1			0.0 to 1.5 feet: no recovery.	
2								1.5 to 2.1 feet: GRAVEL (well graded) (GW); brown to gray; 10% fines; 40% sand; medium to fine; 50% gravel, coarse, angular; dry.	
3								2.1 to 4.3 feet: SILT (ML); brown to gray; 95% fines, low plasticity; 5% sand, fine; firm; trace woody debris; moist.	
4				GW		GM10-S-4.0		4.3 to 5.0 feet: WOODY DEBRIS; moist.	
5			80		GP	2	PID = 1.3 ppm		5.0 to 6.0 feet: no recovery.
6									6.0 to 13.0 feet: SILT (ML); gray; 90% fines, low plasticity; 10% sand; very soft; some organic and woody debris; lens of silt without organic debris at 11.0 to 11.1 feet bgs; moist.
7									
8									
9									
10									
11									
12									
13									
14									13.0 to 15.0 feet: SAND (poorly graded) (SP); gray; 5% fines; 90% sand, medium; 5% gravel; lens of silt at 14.4 to 14.5 feet bgs; moist to wet.
15									

PID = 1.0 ppm

**NOTES:** Temporary screen installed from 4.0 to 14.0 feet bgs. Boring decommissioned with bentonite chips.  
 bgs = below ground surface, GP = geoprobe macrocore liner, GW = groundwater sample, PID = photoionization detector, ppm = parts per million

feet below ground surface.

# Appendix B. SITE MAP OF TEST LOCATIONS



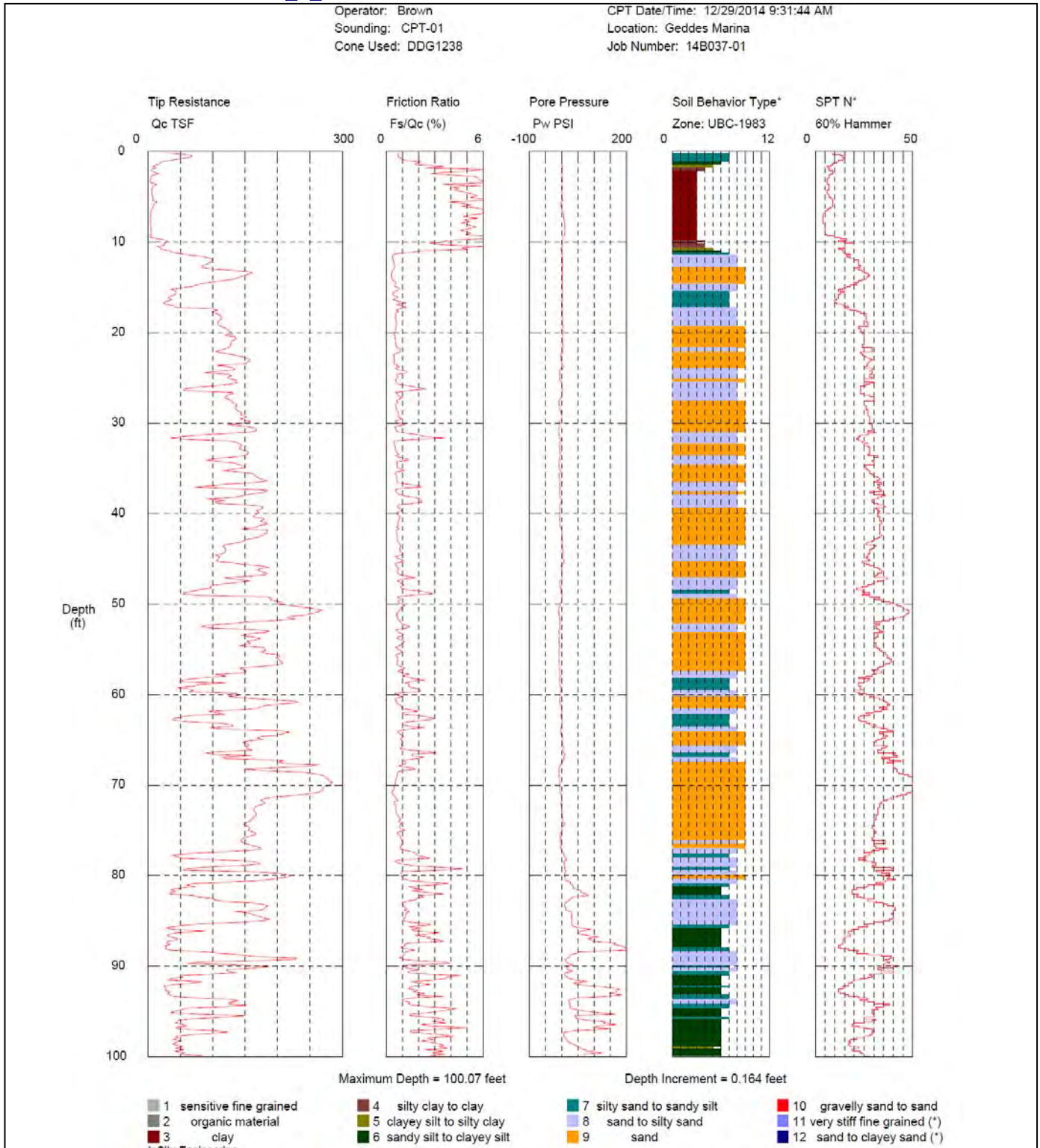
**Materials Testing & Consulting, Inc.**  
 777 Chrysler Drive  
 Burlington, WA 98233

**Proposed Development Map**  
 Geddes Marina Redevelopment  
 1326 First Street  
 Marysville, WA

**FIGURE**  
**2**



# Appendix C. CPT RESULTS



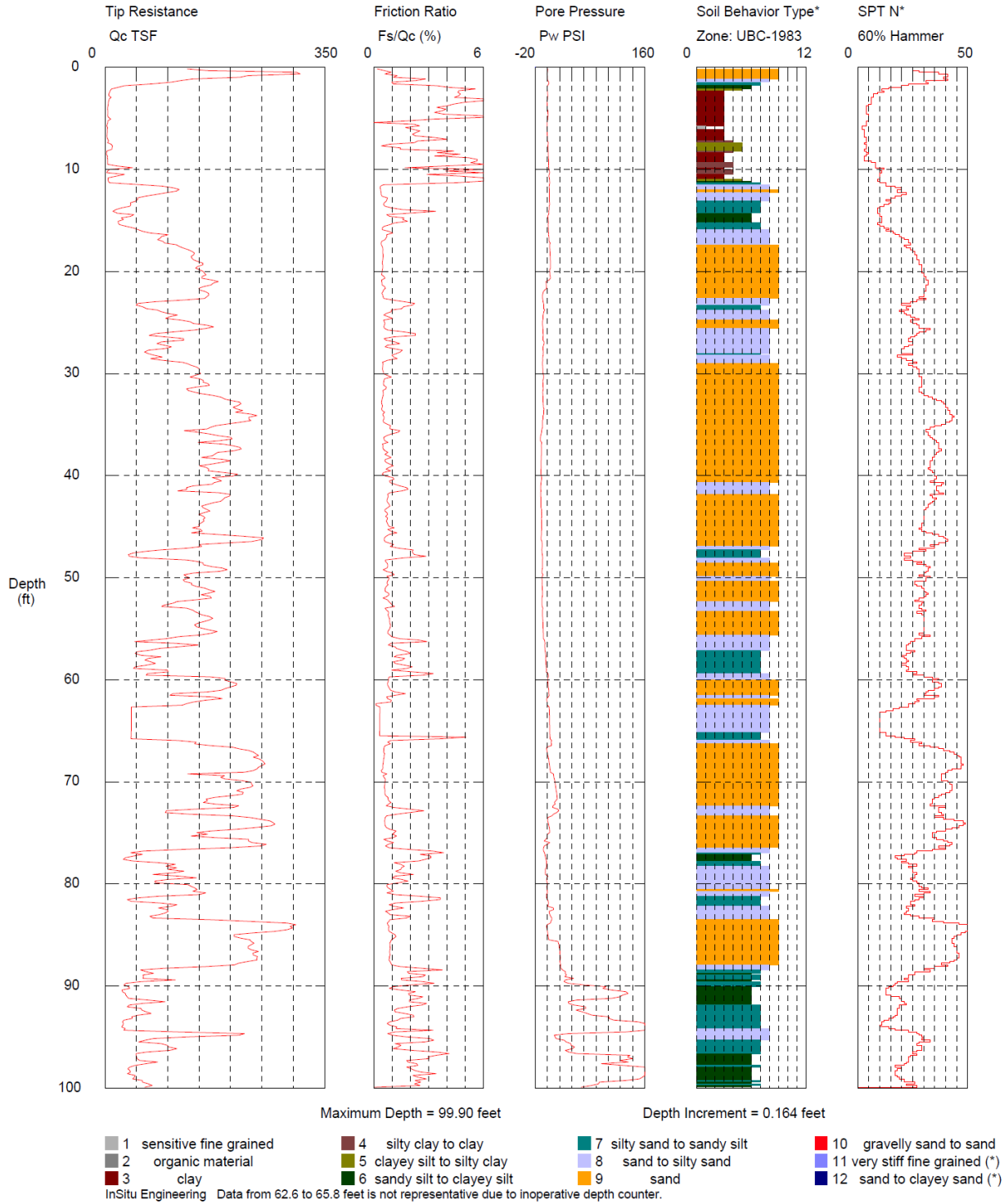
Materials Testing & Consulting, Inc.  
 777 Chrysler Drive  
 Burlington, WA 98233

CPT-1 Log  
 Geddes Marina Redevelopment  
 1326 First Street  
 Marysville, WA

FIGURE  
**3**

Operator: Brown  
 Sounding: CPT-02  
 Cone Used: DDG1238

CPT Date/Time: 12/29/2014 10:51:11 AM  
 Location: Geddes Marina  
 Job Number: 14B037-01



**Materials Testing & Consulting, Inc.**  
 777 Chrysler Drive  
 Burlington, WA 98233

**CPT-2 Log**  
 Geddes Marina Redevelopment  
 1326 First Street  
 Marysville, WA

**FIGURE**  
**4**