ARM Group Inc.
Engineers and Scientists

December 10, 2019

Ms. Barbara Brown
Project Coordinator
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Pre-Design Investigation Work Plan (Revision 1)
Parcel B14: Humphrey Impoundment
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown:

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Pre-Design Investigation (PDI) Work Plan for a portion of the Tradepoint Atlantic property (formerly Sparrows Point Terminal, LLC) that has been designated as Area B: Parcel B14 (the Site). Parcel B14 is comprised of 60.3 acres of the approximately 3,100-acre former steel making facility (**Figure 1**). The majority of Parcel B14 is occupied by the Humphrey Impoundment, which is approximately 43 acres in size. The Site is bounded to the west by the Humphrey Creek Waste Water Treatment Plant (HCWWTP) and Emergency Detention Basin (within Parcel B24), to the north by the Billet Building (within Parcel B8) and the New Cold Mill Complex (NCMC; within Parcel A4), and to the east and south by the Tin Mill Canal (TMC; within Parcel B16). The proposed activities presented in this PDI Work Plan are based on the findings and recommendations from the Phase II Investigation Report for Area B: Parcel B14 (Revision 0 dated March 27, 2018) and communications with the Maryland Department of the Environment (MDE) during a project meeting on June 5, 2018 regarding the conceptual response action plan for Parcel B14.

1.0 BACKGROUND

During the Phase II Investigation, 33 soil borings were initially completed across Parcel B14 to provide for the characterization of the materials that had been placed within Humphrey Impoundment during its operation. Several of these soil boring locations exhibited elevated detections of TPH/Oil & Grease and/or had physical evidence of non-aqueous phase liquid (NAPL) in the associated soil cores. Temporary screening piezometers were installed at 14 of these locations (i.e., B14-002-SB, B14-006-SB, B14-007-SB, B14-008-SB, B14-010-SB, B14-011-SB, B14-012-SB, B14-013-SB, B14-015-SB, B14-017-SB, B14-021-SB, B14-022-SB, B14-028-SB, and B14-034-SB) to help delineate the extent and thickness of NAPLs within the impoundment. Due to the detection of NAPLs within many of these piezometers, nine additional temporary screening piezometers (B14-035-PZ through B14-043-PZ) were subsequently installed at strategic locations to further characterize the extent and thickness of NAPLs across the impoundment. Another four temporary piezometers (B14-044-PZ through B14-047-PZ) were installed immediately to the west of the Parcel B14 boundary. Despite the presence of measurable NAPL in a number of the temporary piezometers, NAPL was not detected in any of the permanent monitoring wells surrounding the impoundment, suggesting that the NAPL is contained within the impoundment. The locations of all piezometers and permanent wells are shown on **Figure 2**. Combined soil borings and piezometer construction logs for borings installed during the Phase II Investigation, including the nine additional piezometers installed due to observations of NAPL, are included in **Appendix A**.

Each screening piezometer was gauged for the presence or absence of NAPL with an oil-water interface probe immediately, 48-hours, and 30-days (or more) after installation. Several of the screening piezometers have since been gauged periodically, depending on accessibility, to monitor the accumulation of NAPL within the piezometer casing. The results of the periodic NAPL gauging events are summarized in **Appendix B**, with the maximum accumulated NAPL thickness in each piezometer summarized in **Appendix C**. During the most recent gauging event completed on November 26 and November 27, 2019, several piezometers could not be located due to dense vegetation or were noted to have been destroyed.

The screening-level risk assessment (SLRA) included in the Phase II Investigation Report for Parcel B14 did not indicate any unacceptable risks for future Composite Workers. However, because the current surface elevation of the impoundment is depressed below the perimeter embankment, any future redevelopment of the parcel is anticipated to include the placement of fill across the surface of the impoundment to promote surface water runoff and reduce infiltration.

2.0 PRE-DESIGN INVESTIGATION

2.1 Purpose and Scope

Due to potential concerns associated with the planned fill placement activities, which include embankment stability, potential NAPL migration, and future constructability, supplemental PDI activities are warranted to support the completion of final design details. The planned PDI activities are discussed in the following subsections of this Work Plan and are summarized in **Table 1**.

2.2 Geotechnical Soil Boring Investigation

A supplemental geotechnical soil boring investigation will be completed to support the characterization of surface and subsurface conditions, and to facilitate the collection of samples for laboratory testing. The soil boring investigation will be performed by a drill rig that is suitable for the site conditions and proposed work. This includes the ability to drive split-spoon samples for Standard Penetration Testing (SPT) in accordance with ASTM D1586, reach the targeted depths of 25 to 30 feet, and create a borehole of large enough diameter to support in-field permeability testing. The assessments to be completed as part of the supplemental investigation are discussed in the following subsections.

2.2.1 Geotechnical Assessment of Embankment

Soil borings will be completed at selected locations along the embankment of the impoundment to support the evaluation of its construction and stability. The boring locations, consisting of borings B14-001-PDI, B14-005-PDI, B14-007-PDI, B14-008-PDI, B14-009-PDI, B14-010-PDI, and B14-011-PDI, are shown on **Figure 3**. These locations were selected to assess portions of the embankment that have not previously been investigated under a geotechnical investigation performed along the eastern side of the embankment by Hillis Carnes Engineering Associates (HCEA). The locations of the geotechnical borings completed by HCEA are shown on **Figure 3**, with boring logs included in **Appendix D**. The proposed supplemental locations were also selected to assess portions of the embankment where NAPL migration to adjacent areas is a potential concern. These borings will extend to a depth of approximately 25 to 30 feet below the existing grade with the intention of extending through the embankment materials and at least five feet into the underling native materials. Continuous split-spoon sampling with SPT testing will be conducted from the ground surface to a depth of 15 feet, and then one more split-spoon and SPT test for every five feet thereafter.

During drilling, soils and subsurface lithologies will be logged by the attending scientist or engineer with respect to material type, color, particle size, odors, and any other relevant properties. Representative materials from each boring between a depth of approximately 5 to 15 feet below grade will be collected and subsequently submitted to a geotechnical testing laboratory for sieve analysis (ASTM D422) and Atterberg limits (ASTM D4318).

2.2.2 Geotechnical Assessment of Sediments/Sludges

Concurrent with the embankment soil boring investigation, additional soil borings will be completed within the interior of the impoundment to characterize the physical properties of the impoundment sediments and sludges. Boring locations are shown on **Figure 3** and consist of borings B14-002-PDI, B14-003-PDI, B14-004-PDI, and B14-006-PDI. These locations were selected to characterize the subsurface materials where NAPL was measured and to evaluate the potential for fluid (i.e., water and NAPL) migration. The selection of these locations was also limited by anticipated accessibility for a drill rig within the interior of the impoundment. These borings will be extended to a depth of approximately 15 to 20 feet below the existing grade, with continuous split-spoon sampling and SPT testing conducted from the ground surface to a depth of 15 feet, and then one more split-spoon and SPT test for every five feet thereafter.

During the drilling, soils and subsurface lithologies will be logged by the attending scientist or engineer with respect to material type, color, particle size, odors, and any other relevant properties. Representative materials from each boring between a depth of approximately 5 to 15 feet below grade will be collected and subsequently submitted to a geotechnical testing laboratory for sieve analysis (ASTM D422) and Atterberg limits (ASTM D4318).

2.2.3 Field Permeability Testing

To further support the evaluation of potential NAPL migration and recoverability, field permeability testing will be conducted at selected locations to help characterize the permeability of the impounded materials. Permeability testing will be conducted at or adjacent to the geotechnical boring locations designated as B14-002-PDI, B14-003-PDI, and B14-006-PDI (**Figure 3**). At each of the permeability test locations, a 2-inch diameter temporary PVC well will be installed such that the bottom of the well will have 10 to 15 feet of slotted well screen, with solid riser pipe up to the ground surface. The total depth of each well will be approximately 15 to 20 feet, with a goal of having 5 to 10 feet of screened interval below the static water level, and 3 to 5 feet of screened interval above the water table. A sand pack will be placed in the annular space around the screened interval and to an elevation of 1 or 2 feet above the screened interval, and the sand pack will be sealed with 1 to 2 feet of hydrated bentonite and then soil fill up to the ground surface to prevent surface water intrusion. The permeability tests will be conducted as falling head and/or rising head ‘slug’ tests, where water is added or removed from the wells and the subsequent rise or drop in water level is recorded over time until the water level largely recovers to its initial condition. Alternatively, or in addition to the slug testing, if a constant rate of water addition or withdrawal can be maintained at a relatively constant water level in the well, the associated flow rate and water level will be recorded (i.e. a constant head test). Following data collection, the resulting field measurements will be used to estimate the saturated permeability at each test location using an appropriate analysis method for the field testing conducted (e.g., Bouwer and Rice, Hvorslev, Dagan, and/or other methods as appropriate for partially penetrated unconfined aquifers). The permeability results will be used to support the evaluation of potential dewatering and settlement rates and the design of a NAPL recovery or control system if warranted.

2.3 NAPL Assessment

Additional testing is planned to support the evaluation of the nature, extent, and potential mobility and recoverability of the observed NAPLs within the impoundment. This additional testing will consist of NAPL bail-down recovery testing, and the collection of NAPL samples for selected physical and chemical property testing as described in the following subsections. Prior to the selection of locations for NAPL bail-down transmissivity testing, an inclusive round of NAPL gauging will be completed on each existing 1-inch diameter piezometer in Parcel B14. Although piezometers B14-044-PZ through B14-047-PZ will be gauged during this event, these four piezometers will not be considered for transmissivity testing as they are located outside the Parcel B14 boundary.

2.3.1 NAPL Bail-Down Transmissivity Testing

NAPL bail-down transmissivity testing will be completed in accordance with the ASTM E2856-13 (Estimation of LNAPL Transmissivity): Bail-down/Slug Testing Field Methods.

NAPL bail-down transmissivity testing will be conducted at selected monitoring well locations to support the assessment of potential NAPL migration and recoverability. If such studies indicate that NAPL migration beyond the impoundment embankment is a potential concern during or following the planned fill placement activities, some type of NAPL monitoring and recovery/control will likely be proposed as part of the Response Action Plan for the parcel.

A NAPL bail-down transmissivity test will be completed at three select locations, which will be selected following the completion of an inclusive round of NAPL gauging for existing 1-inch wells. The three locations with the greatest thickness of product recorded during this gauging event will be selected, but no location with less than 0.25 ft on NAPL will be selected. Based on the gauging data included in **Appendix C**, it is anticipated that all 3 locations will have at least one foot of NAPL thickness present. Once the three locations have been determined, a 2-inch monitoring well will be installed at each location for the purpose of completing the bail-down transmissivity testing. Following installation, the monitoring wells will be developed to ensure the transmissivity values collected from the tests are representative of the impoundment area. Each test consists of a single NAPL removal event in which the accumulated NAPL is removed from the monitoring well, followed by continuous NAPL gauging. The minimum NAPL gauging frequency recommended by ASTM E2856-13 corresponds to a 5% or 0.05 feet change in NAPL thickness, whichever is less, for the first 100 minutes. As stated in ASTM E2856-13, the minimum practical time for measuring the fluid levels with a single interface probe is at 1-minute intervals. After the first 100 minutes, the frequency of NAPL measurements will be dependent on the NAPL recovery rate, and an estimated schedule will be implemented based on a preliminary review of the data from the first 100 minutes of testing. A slow recovery rate is predicted due to the NAPL observed in the on-site piezometers; therefore, the test may take days, weeks, or months to complete. The test is considered complete when the NAPL thickness has stabilized, i.e. when the NAPL thickness reaches a plateau with at least three measurements of LNAPL thickness over a period of at least one quarter of a log cycle when plotted on a semi-log scale. A definition of equilibrium as 3 readings within 10% of each other is proposed.

Prior to starting the bail-down transmissivity test, an oil-water interface probe will be used to gauge the three 2-inch monitoring wells. All gauging data, NAPL thicknesses, and visual product observations (color/viscosity) will be recorded on appropriate field log sheets (**Appendix E**). NAPL will be removed with a peristaltic or Xitech pump until all visible free product has been removed or until only trace levels of NAPL remain in the casing; the recovery of water and impacts on the water level will be minimized to the extent practical. The volume of NAPL that is recovered from each monitoring well will be recorded on the field log, as will the new depth to water and depth to product. The NAPL removal and 0-minute gauging event will start the clock for the bail-down transmissivity test. The data will be recorded in the American Petroleum Institute (API) field worksheets included in the *API LNAPL Transmissivity Workbook: A Tool for Bail-down Test Analysis* dated June 2012 (**Appendix E**). The test will be continued until the NAPL thickness has stabilized as discussed above.

The API worksheets are designed to calculate NAPL transmissivity with three different models: Bouwer and Rice (1976), Cooper and Jacob (1946), and Cooper, Bredehoeft and Papadopulos (1967). Following the completion of the transmissivity tests, the model that best fits the data will be utilized for the transmissivity value. Final transmissivity values will then be compared to guideline reference values to help make conclusions regarding NAPL recoverability and the need for any NAPL recovery or control measures as part of the Response Action Plan.

2.3.2 NAPL Laboratory Testing

As part of the NAPL assessment, and in conjunction with the bail-down transmissivity testing, a sample of the NAPL recovered from each of the monitoring wells will be placed into laboratory-supplied bottleware and submitted to Pace Analytical Services, Inc. (PACE) for density and viscosity testing. The results of this testing will support the evaluation of potential NAPL mobility and recoverability and potential treatment or disposal requirements for any recovered NAPL.

2.5 Additional Provisions

All field protocols will be conducted in accordance with the Standard Operating Procedures (SOPs) and requirements given in the property-wide Quality Assurance Project Plan (QAPP). The investigation will also be conducted under the property-wide Health and Safety Plan (HASP). Any NAPL or water removed from the piezometers and temporary wells will be containerized and subsequently disposed of at an appropriate and permitted disposal facility. The selected disposal facility will be approved by the MDE prior to shipment. Any waste generated during the PDI activities will be placed in designated drums and will be managed in bulk with waste from other investigations and will be appropriately characterized prior to disposal.

3.0 CLOSING

If you have any questions, or if we can provide any additional information at this time, please do not hesitate to contact ARM Group Inc. at 410-290-7775.

Respectfully submitted,
ARM Group Inc.

Stewart Kabis, G.I.T.
Project Geologist

T. Neil Peters, P.E.
Senior Vice President

Attachments:

Figures
- Figure 1 – Site Location Map
- Figure 2 – Piezometer and Well Locations
- Figure 3 – Geotechnical Boring Locations

Tables
- Table 1 – Parcel B14: Pre-Design Investigation Summary

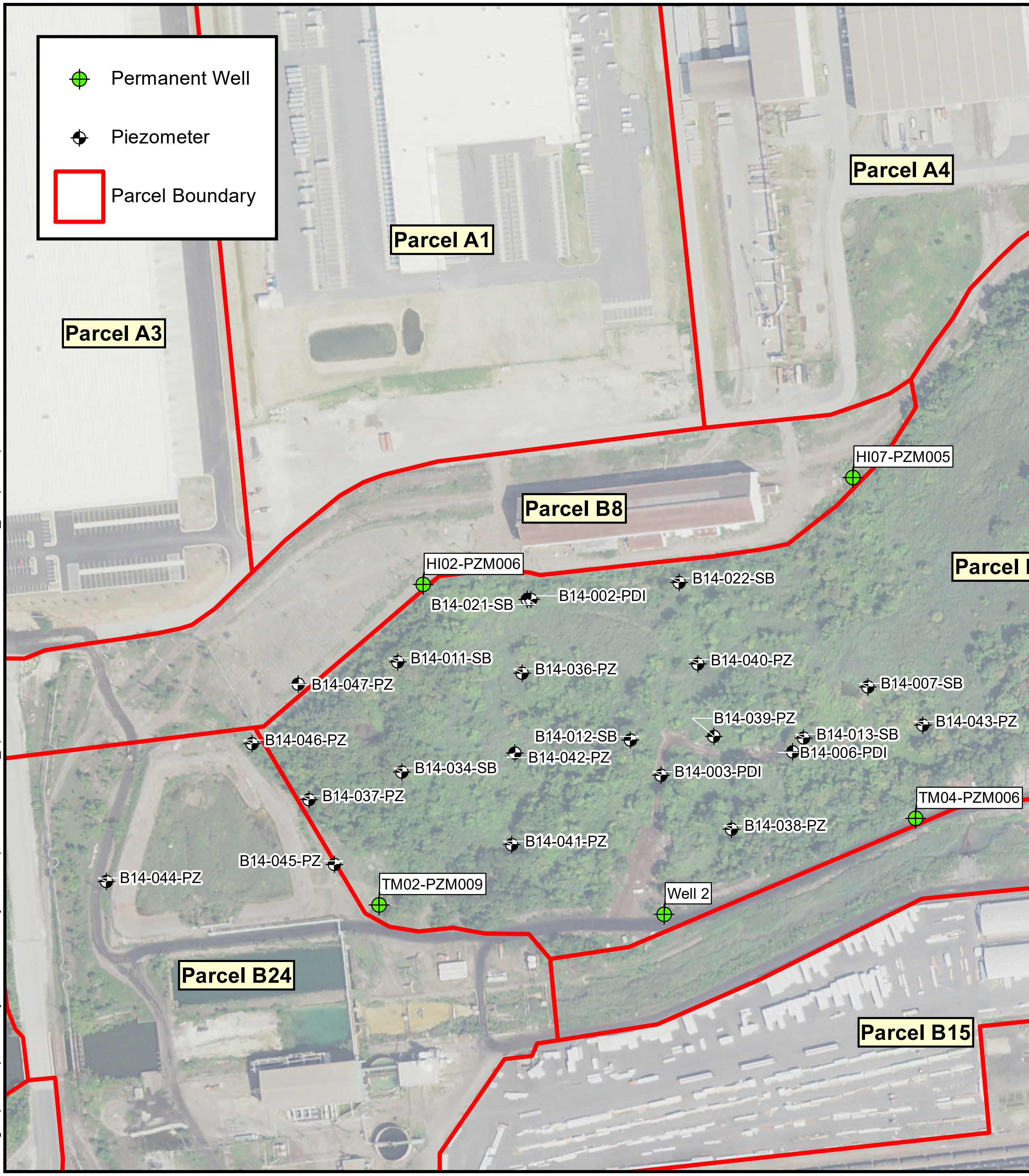
Appendices
- Appendix A – Soil Boring and Piezometer Construction Logs
- Appendix B – NAPL Gauging Summary Tables
- Appendix C – Maximum NAPL Thickness Data
- Appendix D – HCEA Geotechnical Boring Logs
- Appendix E – Field Forms

FIGURES

Tradepoint Atlantic
Area A and Area B Parcels
June 21, 2018

Figure
1

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
Area A: Project 150298M
Area B: Project 150300M
Development: Project 160443M



Parcel B14 Wells and Piezometers (NAPL Gauging Locations)

November 27, 2019

Figure 2

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Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 180589M

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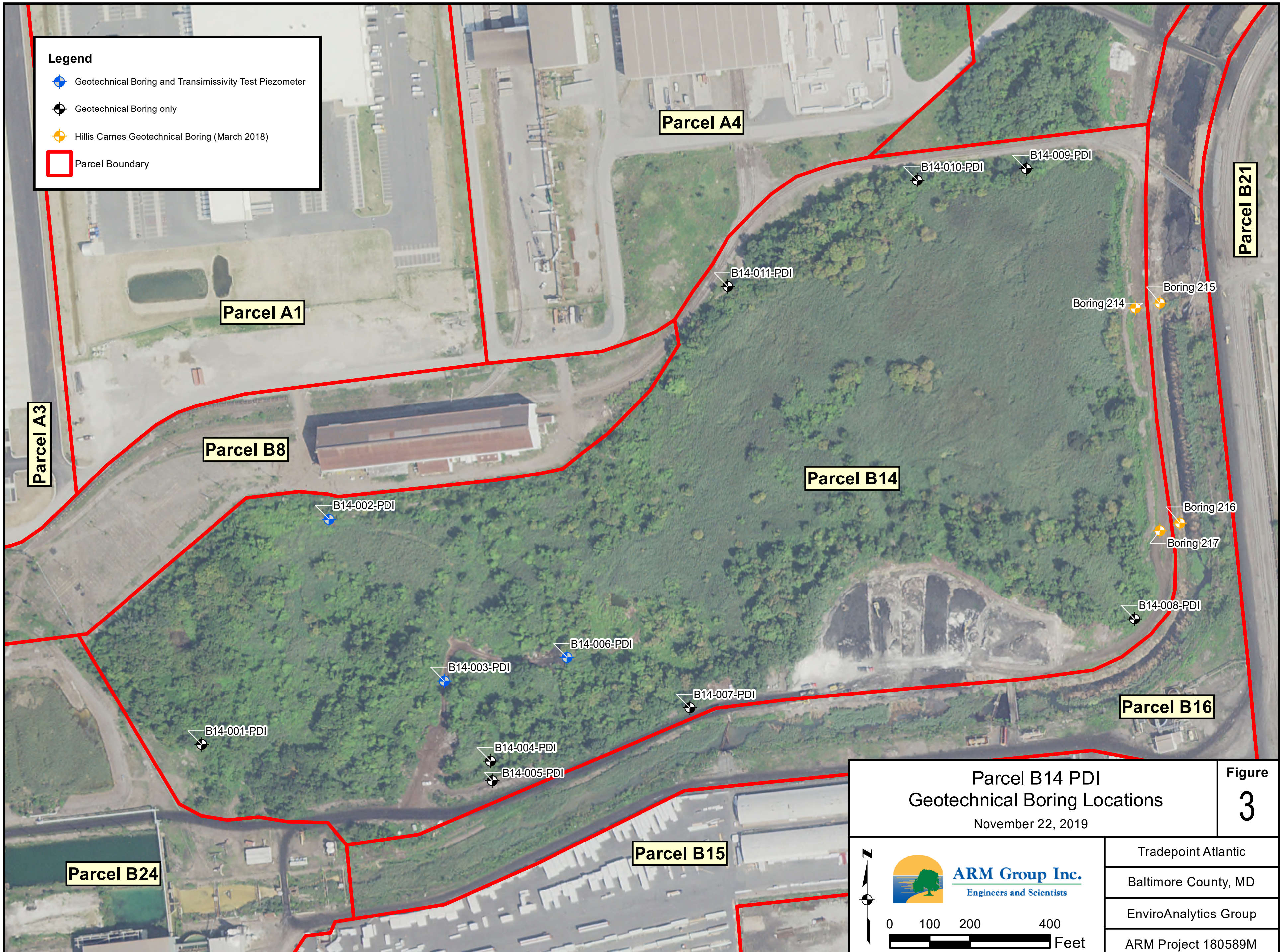

Parcel B14 PDI
Geotechnical Boring Locations
November 22, 2019

Figure 3

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 180589M

\\armgroup.lcl\CorpData\Projects\EnviroAnalytics Group\180589M EAG B14 Humphrey Impoundment\GIS\Parcel B14 PDI (8.5x11).mxd

TABLES

Table 1
Parcel B14: Pre-Design Investigation Summary
Former Sparrows Point Steel Mill
Sparrows Point, Maryland

Investigation Activity	Rationale/Purpose	Test Locations(1)	Investigation Description	Testing Parameters/Methods(2)
Geotechnical Assessment of Embankment	Further characterize the strength and integrity of the impoundment embankment where accessible and information is not availale. Collected strength data will support the completion of an embankment slope stability analysis for the planned future fill placement across the impoundment.	B14-001-PDI B14-005-PDI B14-007-PDI B14-008-PDI B14-009-PDI B14-010-PDI B14-011-PDI	Borings completed with geotechnical soil boring rig to total depths of approximately 25 to 30 feet. Continuous split-spoon sampling from ground surface to 15 feet deep, then one split-spoon sample every 5 feet thereafter.	- SPT blow counts for all split spoon samples; and - 1 representative bulk sample from each boring between a depth of 5 and 15 feet for the following laboratory tests: sieve analysis and Atterberg limits.
Geotechnical Assessment of Sediments/Sludges	Further characterize the physical properties of the sediments/sludges within the impoundment to support the analysis of embankment slope stability and potential fluid (i.e., water and NAPL) migration.	B14-002-PDI B14-003-PDI B14-004-PDI B14-006-PDI	Borings completed with geotechnical soil boring rig to total depths of approximately 15 to 20 feet. Continuous split-spoon sampling from ground surface to 15 feet deep, then one split-spoon sample every 5 feet thereafter.	- SPT blow counts for all split spoon samples; and - 1 representative bulk sample from each boring between a depth of 5 and 15 feet for the following laboratory tests: sieve analysis and Atterberg limits.
Field Permeability Testing	Further characterize the permeability of the impounded materials in selected locations to support the evaluation of potential fluid migration and recovery.	B14-002-PDI B14-003-PDI B14-006-PDI	Complete in-field permeability tests (falling and rising head slug tests, or constant rate test) with temporary wells to be installed in or adjacent to the selected geotechnical borings.	Install a temporary 15 to 20-foot deep 2-inch PVC well consisting of approximately 10 to 15 feet of slotted well screen extending at least 5 feet below and 3 feet above the water level, and solid riser pipe to the ground surface. Measure water level response over time following injection and removal of water and analyze per Bouwer & Rice or similar method.
NAPL Recovery Testing	Help determine the recoverability of NAPL identified within the impoundment. This information will support the design of NAPL recovery/control measures, if warranted.	*TBD	Three 2-inch monitoring wells will be installed at selected piezometers. LNAPL will be removed with a peristaltic or Xitech pump in an attempt to minimize any water recovery.	LNAPL transmissivity testing and data evaluation using the bail-down testing method per ASTM E2856-13.
Supplemental NAPL Characterization	Further characterize each distinct NAPL type (based on density, color, viscosity, etc.) to support the evaluation of potential migration, recoverability, and disposal requirements.	Same as above.	Same as above. Excess NAPL to be placed into drum or other container for future recycling or disposal.	Place NAPL sample from each piezometer into laboratory-supplied bottleware and submit for analysis of fluid density (specific gravity) and viscosity.

Notes:
1. SPT = Standard Penetration Test
2. TPD = To Be Determined

APPENDIX A

ARM Group Inc.
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Boring ID: B14-002-SB/PZ

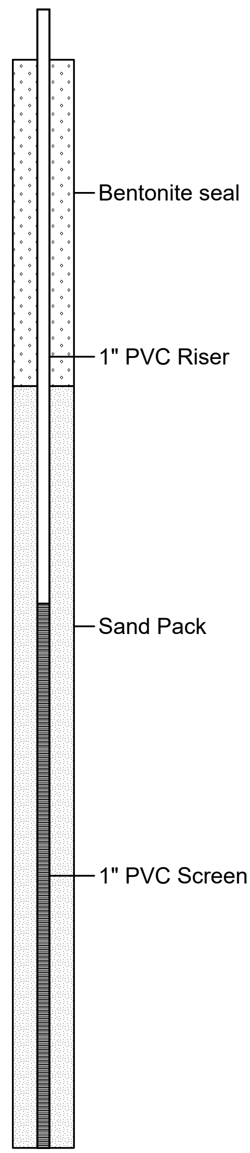
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin; M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Ryan Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/14/17
Piezometer Installation Date	: 9/14/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 570756.78
Easting (US ft)	: 1459350.57
0-Hr DTW	: 11.84' TOC
48-Hr DTW	: 4.45' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	100	0.0	B14-002-SB-1	(0-1') SAND with some SILT and GRAVEL, very fine to medium grained, medium dense, brown, trace moist, non plastic, non cohesive	SW	Groundwater was observed at 1' bgs, thus there was no soil recovery in the sleeve Because soils could not be properly screened, a piezometer was installed to check for the potential presence of NAPL
				(1-10') No Recovery		
5						
10						0-1' bgs interval was completed via hand auger method.
				End of boring		



Boring terminated at 10' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.80'
Riser: 0 - 5' bgs
Screen: 5 - 10' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 10' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

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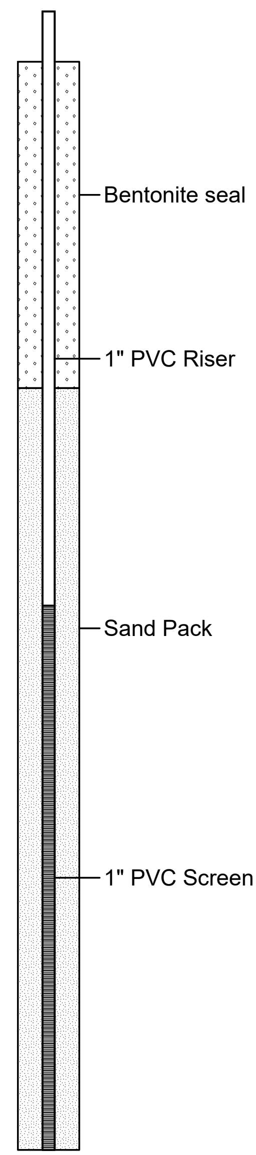
Boring ID: B14-006-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin; M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/13/17
Piezometer Installation Date	: 9/14/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 570478.47
Easting (US ft)	: 1459634.31
0-Hr DTW	: 3.61' TOC
48-Hr DTW	: 4.12' TOC
No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	30	-	B14-006-SB-1	(0-2.5') CLAYEY SAND, medium dense, reddish brown, moist, non plastic, non cohesive	SC	
		-				Moderate organic matter present
		-		(2.5-6') CLAYEY SILT with trace SAND, very soft to soft, black and brown, very moist, low plasticity, cohesive	ML	
		1.0				
		0.1	B14-006-SB-5			
5	50	-				
		-		(6-9.5') GRAVEL with SILT and SAND, loose, black, wet, non plastic, non cohesive	GW-GM	
		0.1				Wet at 7.5' bgs Light product sheen from 7.5-9.5' bgs
		0.4				
		2.5		(9.5-10') CLAY, soft, grayish green with black streaks, very moist, low plasticity, cohesive	CL	
10				End of boring		



Boring terminated at 10' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.95'
Riser: 0 - 5' bgs
Screen: 5 - 10' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 10' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

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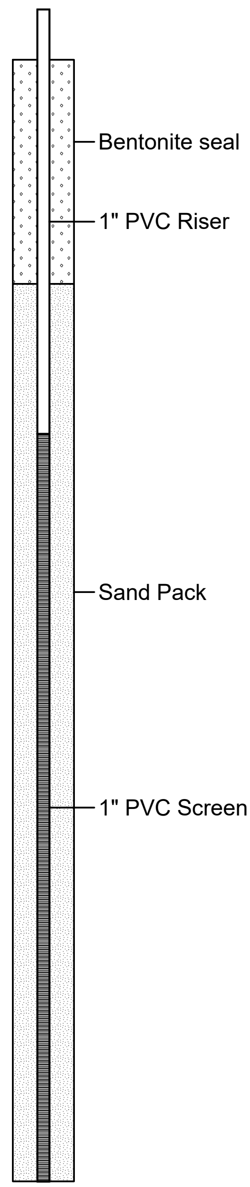
Boring ID: B14-007-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/7/17
Piezometer Installation Date	: 11/16/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569875.57
Easting (US ft)	: 1458505.37
0-Hr DTW	: 5.84' TOC
48-Hr DTW	: 5.90' TOC
No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	30	-	B14-007-SB-1	(0-1') ORGANIC SILT, brown, wet	OL	Piezometer installed after receipt of soil boring analytical results
		-		(1-5') SILTY CLAY, soft with some firm lenses, black, very moist, low plasticity, cohesive	OL	
		-				
		-				
		0.0				
5	20	-		(5-15') CLAY, soft to very soft, dark gray with black staining, very moist, low plasticity, cohesive	CL	Odor present in black stained soil
		-				
		47.7	B14-007-SB-8			No groundwater encountered
		-				
		11.0	B14-007-SB-10			
10	20	-				
		-				
		-				
		3.0				
		7.4				
15				End of boring		



Boring terminated at 15' bgs due to rig stuck.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.70'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: granular (30-50 mesh)]

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Boring ID: B14-008-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

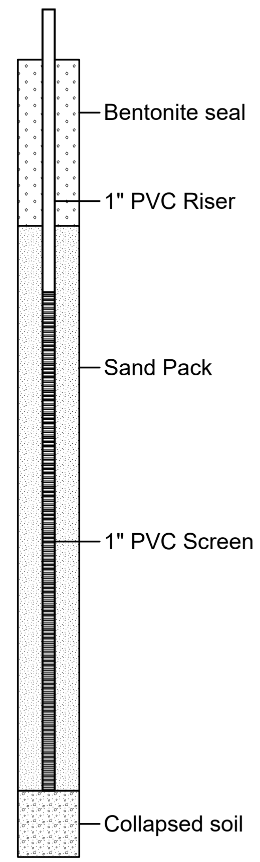
Soil Boring Installation Date	: 9/12/17
Piezometer Installation Date	: 11/15/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569996.32
Easting (US ft)	: 1459083.74
0-Hr DTW	: 6.85' TOC
48-Hr DTW	: 3.48' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval
0-1		-	B14-008-SB-1
1-2		-	
2-3	50	0.0	
3-4		0.1	
4-5		0.0	
5-6		0.5	
6-7		2.3	
7-8	100	4.0	
8-9		12.0	B14-008-SB-9
9-10		3.1	B14-008-SB-10
10-11		-	
11-12		-	
12-13	60	0.5	
13-14		2.6	
14-15		1.7	
15-16		-	
16-17		-	
17-18	50	-	
18-19		0.0	
19-20		0.7	
20-21		-	
21-22		-	
22-23	60	-	
23-24		-	
24-25		-	
25-26		-	
26-27		-	
27-28	60	-	
28-29		-	
29-30		-	
30-31		-	
31-32		-	
32-33	60	-	
33-34		-	
34-35		-	

DESCRIPTION	USCS
(0-0.6') ORGANIC SILT, soft, reddish brown, moist, non plastic, non cohesive	OL
(0.6-24') SILTY CLAY with SAND grading to CLAY with intermittent black and wet CLAYEY SAND lenses, firm to very firm, reddish brown and very dark gray, moist to very moist, low plasticity, cohesive	CL
(24-35') CLAY, firm, light greenish gray, moist, low plasticity, low cohesion	CL

End of boring



REMARKS

Piezometer installed after receipt of soil boring analytical results

Moderate waste-like odor in CLAYEY SAND lenses

No water encountered

No shallow water bearing zones present.

Boring terminated at 35' bgs due to attempt to install shallow piezometer.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.50'
Riser: 0 - 7' bgs
Screen: 7 - 22' bgs [Slot Size: 0.010"]
Sand Pack: 5 - 22' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 5' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-010-SB/PZ

(page 1 of 1)

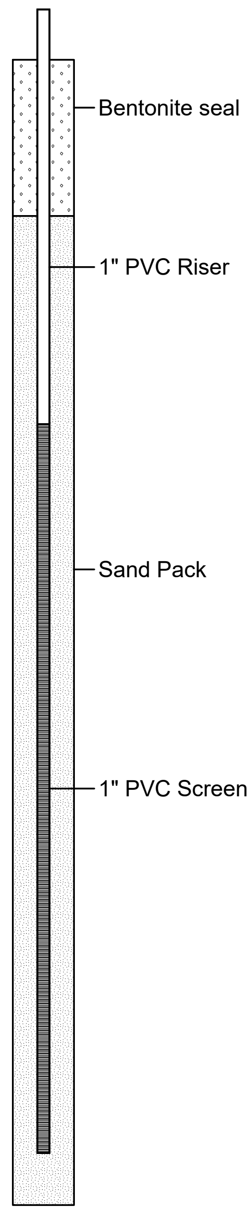
Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin; M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Ryan Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/13/17
Piezometer Installation Date	: 9/13/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 570027.32
Easting (US ft)	: 1459753.99
0-Hr DTW	: 11.02' TOC
48-Hr DTW	: 11.14' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-1.5	68	-	B14-010-SB-1	(0-1.5') SILTY SAND, loose, brown, dry, non plastic, non cohesive	SM	Trace organic matter present
1.5-5.5	68	1.0, 1.0, 4.1, 0.6, -	B14-010-SB-5	(1.5-5.5') SLAG GRAVEL, fine to coarse, with SAND, medium dense to dense, gray and grayish brown, dry, non plasticity, non cohesive; with CLAY from 3.5-4' bgs	GW	Trace large metallic SLAG
5.5-9.5	60	0.9, 28.0, 1.3, -		(5.5-9.5') BRICK and SLAG GRAVEL with SILT, reddish brown, dry then wet at 7' bgs, non plastic, non cohesive	GW-GM	Wet at 7' bgs
9.5-20	60 / 40 / 50	-, -, -, -, -, -, -, -, -, -, -		(9.5-20') SLAG GRAVEL with some SILT, black, wet, non plastic, non cohesive	GP	Moderate sheen, no odor (9.5-20' bgs)
20-22	0			(20-22') No recovery		

End of boring

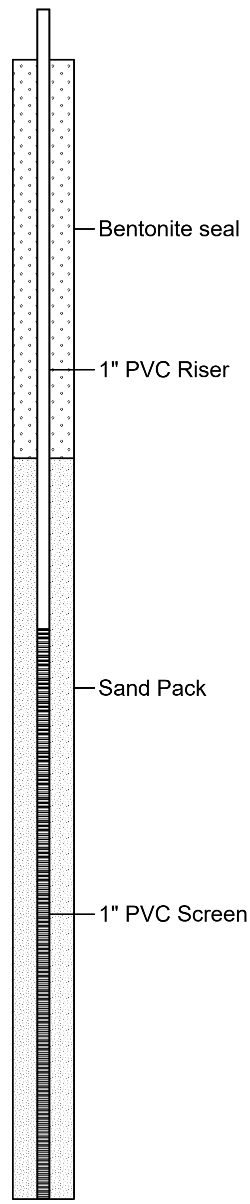


Boring terminated at 22' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.52'
Riser: 0 - 7' bgs
Screen: 7 - 21' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 22' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc. Engineers and Scientists		
Boring ID: B14-011-SB/PZ (page 1 of 1)	Client : EnviroAnalytics Group ARM Project No. : 150300M-17-3 Project Description : Sparrows Point - Parcel B14 Site Location : Sparrows Point, MD ARM Representative : M. Replogle, E.I.T. Checked by : M. Replogle, E.I.T. Drilling Company : Allied Drilling Co. Driller : Mike Garvine Drilling Equipment : Geoprobe 7822DT	Soil Boring Installation Date : 9/7/17 Piezometer Installation Date : 9/7/17 Casing/Riser/Screen Type : PVC Borehole Diameter : 2.25" Riser/Screen Diameter : 1" Northing (US ft) : 569792.54 Easting (US ft) : 1457396.68 0-Hr DTW : 5.10' TOC 48-Hr DTW : 5.65' TOC No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	60	-	B14-011-SB-1	(0-3') ORGANIC SILT, soft, reddish brown, moist, non plastic, non cohesive	ML	
		0.5				
		0.0				
		0.1		(3-4') ORGANIC SILTY SAND, loose, reddish brown, moist, non plastic, non cohesive	SM	
		0.1	B14-011-SB-5	(4-15') CLAY with some SAND from 4-7' bgs, dense grading to soft, gray then black from 14-15' bgs, moist, low plasticity, cohesive	CL	
5	100	0.0				
		0.0				
		0.0				
		0.2				
		0.3	B14-011-SB-10			
10	100	0.0				
		0.0				
		0.0				
		0.5				
		1.5				
15	100	-		(15-17') SILTY CLAY, very soft, brownish black, wet, low plasticity, cohesive	CL	Wet at 15' bgs Oily black water present from 15-17' bgs
		-				
		-		(17-20') CLAY, dense to soft, gray, moist, low plasticity, cohesive	CL	Petroleum-like odor in black water
		-				
		-				
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 1.00'
Riser: 0 - 10' bgs
Screen: 10 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 7 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0- 7' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-012-SB/PZ

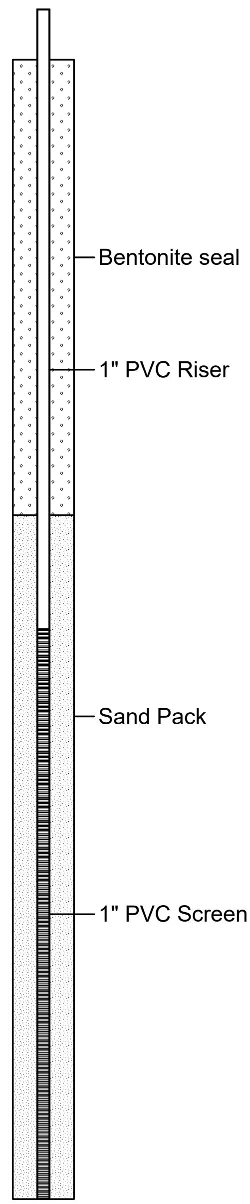
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin; M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/6/17
Piezometer Installation Date	: 9/15/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569615.62
Easting (US ft)	: 1457923.32
0-Hr DTW	: 9.26' TOC
48-Hr DTW	: 9.16' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	82	-	B14-012-SB-1	(0-1.1') ORGANIC SILT, soft, dark brown, moist to dry, non plastic, non cohesive	OL	Piezometer installed after receipt of soil boring analytical results
		0.0		(1.1-2') SANDY CLAY, dense, dark brownish red, dry, low plasticity, cohesive	CL	
		0.0		(2-2.7') SAND, fine grained, with CLAY, dense, dark reddish brown, dry, non plastic, non cohesive	SP	
		0.0		(2.7-9') SILTY CLAY, dense grading to soft, brownish red with trace dark grayish brown, dry then very moist at 6' bgs, low plasticity, cohesive	CL	
		0.0				
5	80	-				
		0.2				
		1.8				
		53.6	B14-012-SB-9			
		215.2	B14-012-SB-10	(9-10') SILTY CLAY, firm, dark brownish gray, very moist, low plasticity, cohesive	CL	Sludge-like odor 8-15' bgs
10	60	-				
		-		(11.5-17') SAND, fine to medium grained, medium dense, gray, wet, non plastic, non cohesive	SW	Wet at 11.5' bgs
		-				
		22.8				
		14.2				
15	20	-				
		-				
		-		(17-20') SILTY CLAY, soft, black, very moist, low plasticity, cohesive	CL	
		-				
		25.5				
20				End of boring		

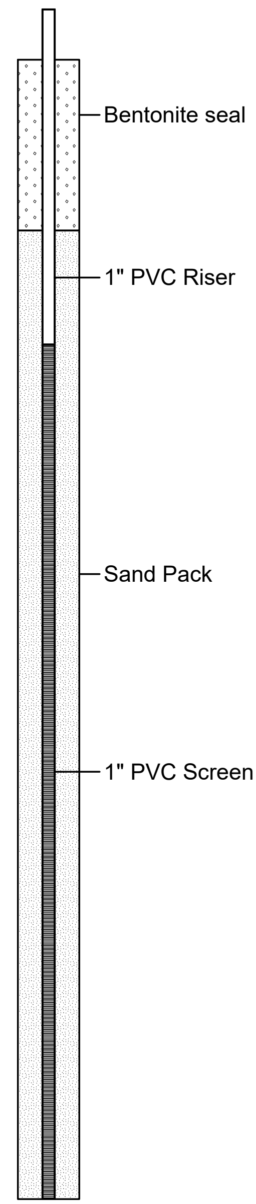


Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.05'
Riser: 0 - 10' bgs
Screen: 10 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 8 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 8' bgs [Grain Size: 3/8" chips]

ARM Group Inc. Engineers and Scientists	Client: EnviroAnalytics Group	Soil Boring Installation Date: 9/7/17
Boring ID: B14-013-SB/PZ	ARM Project No.: 150300M-17-3	Piezometer Installation Date: 11/21/17
(page 1 of 1)	Project Description: Sparrows Point - Parcel B14	Casing/Riser/Screen Type: PVC
	Site Location: Sparrows Point, MD	Borehole Diameter: 2.25"
	ARM Representative: M. Replogle, E.I.T.; L. Perrin	Riser/Screen Diameter: 1"
	Checked by: M. Replogle, E.I.T.	Northing (US ft): 569629.46
	Drilling Company: Allied Drilling Co.	Easting (US ft): 1458273.70
	Driller: Mike Garvine	0-Hr DTW: 7.60' TOC
	Drilling Equipment: Geoprobe 7822DT	48-Hr DTW: 8.01' TOC
		No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	B14-013-SB-1	(0-1') ORGANIC SILT, loose, brown, dry, non plastic, non cohesive	OL	Piezometer installed after receipt of soil boring analytical results
		1.0		(1-3') CLAYEY SILT with GRAVEL, firm, dark reddish grayish brown, moist, low plasticity	ML	
	70	0.2				
		0.3		(3-8') SILTY CLAY with trace GRAVEL, firm to soft, dark reddish grayish brown, moist to very moist, low plasticity, cohesive	CL	Clay breaks on flat planes into cubes
		0.0				
5		1.5				
		2.1				
	100	10.6				
		28.7	B14-013-SB-9	(8-10') CLAY, medium firm, dark gray, moist, medium plasticity, cohesive	CL	
		18.8	B14-013-SB-10			
10		-		(10-16.5') CLAY with some SAND, medium soft, dark grayish black, very moist, medium plasticity, cohesive	CL	
		-				
	60	3.3				
		2.3				
		0.8				
15		-				
		-		(16.5-17') SILTY SAND, loose, black wet, non plastic, non cohesive	SM	Wet at 16' bgs Black oily water present
	70	1.9		(16.8-18') CLAY, soft, black, wet, low plasticity, cohesive	CL	
		1.7		(18-18.5') SAND, loose, black, wet, non plastic, non cohesive (18.5-20') CLAY, soft, black, wet, medium plasticity, cohesive	SP CL	Petroleum-like odor in black water
		2.0				
20				End of boring		



Boring terminated at 20' bgs due to water.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.90'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-015-SB/PZ

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/12/17
Piezometer Installation Date	: 9/12/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569735.70
Easting (US ft)	: 1458868.76
0-Hr DTW	: 14.18' TOC
48-Hr DTW	: 14.06' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

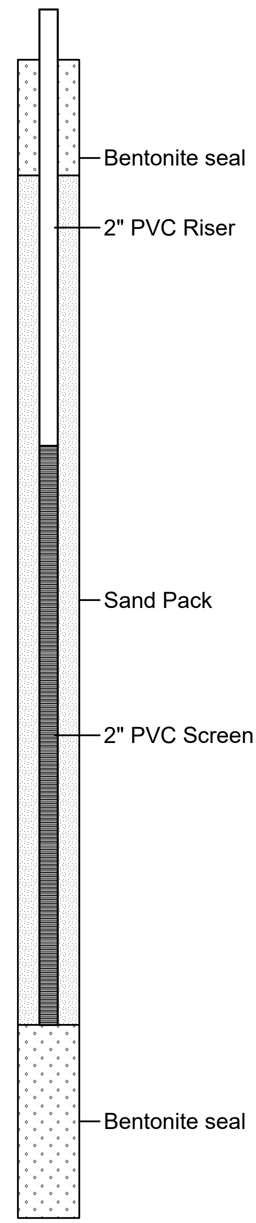
Depth (ft.)	% Recovery
0-5	62
5-10	72
10-15	20
15-20	4
20-25	40
25-30	60

Depth (ft.)	PID Reading (PPM)
0-1	-
1-2	-
2-3	0.0
3-4	0.0
4-5	0.0
5-6	-
6-7	0.0
7-8	0.0
8-9	0.7
9-10	0.0
10-11	-
11-12	-
12-13	-
13-14	-
14-15	0.0
15-16	-
16-17	-
17-18	-
18-19	-
19-20	-
20-21	-
21-22	-
22-23	-
23-24	-
24-25	-
25-26	-
26-27	-
27-28	-
28-29	-
29-30	-

Depth (ft.)	Sample No/Interval
0-1	B14-015-SB-1
4-5	B14-015-SB-5
9-10	B14-015-SB-10

DESCRIPTION	USCS
(0-1.5') SLAG GRAVEL, fine, loose, reddish brown, moist, non plastic, non cohesive	GP
(1.5-8') CLAY with SILT, firm to very firm, reddish brown, moist, low plasticity, cohesive	CL
(8-14.5') CLAYEY SAND with large BRICK COBBLES, medium dense, reddish brown with yellow and gray, moist, non plastic, non cohesive	SC
(14.5-16') SILTY CLAY, soft, gray with black streaks, very moist, low plasticity, cohesive	CL
(16-24.2') SILTY SAND, medium dense, dark brown and very dark gray, wet, non plasticity, non cohesive	CL
(24.2-28') CLAY, soft, dark gray, very moist, low plasticity, cohesive	CL
(28-30') CLAY, firm, grayish green with black streaks, moist, low plasticity, cohesive	CL

End of boring



Depth (ft.)	REMARKS
~4	Clay breaks on flat planes into cubes
~17-19	Moderate sheen with trace petroleum-like product with moderate odor
19.2	Wet at 19.2' bgs
~25	Possible saturated product present from 24.2-28' bgs

Boring terminated at 30' due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.25'
Riser: 0 - 10' bgs
Screen: 10 - 25' bgs [Slot Size: 0.010"]
Sand Pack: 8 - 25' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs, 25-30' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

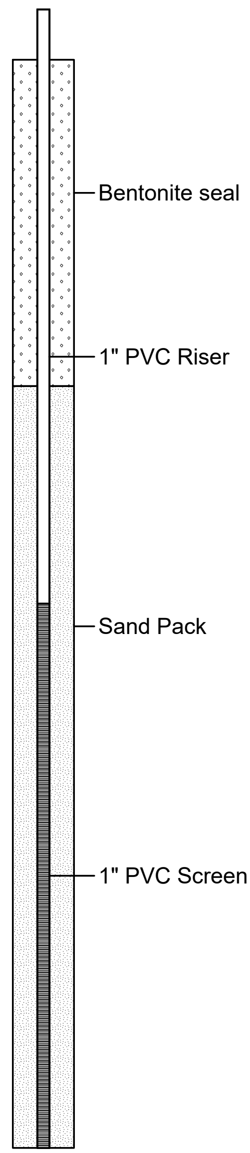
Boring ID: B14-017-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin; M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/13/17
Piezometer Installation Date	: 9/13/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569668.86
Easting (US ft)	: 1459715.98
0-Hr DTW	: 12.63' TOC
48-Hr DTW	: 12.76' TOC
No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	74	-	B14-017-SB-1	(0-1') SILTY SAND with some SLAG GRAVEL, loose, brown with gray, dry, non plastic, non cohesive	SM	
		0.3		(1-14.5') SLAG GRAVEL, fine to coarse, with SAND, medium dense to dense, gray and reddish brown, dry then moist from 4-9.5' bgs, moist at 9.5' bgs, wet at 14' bgs	GW	
		0.9				
		13.9	B14-017-SB-4			
		1.6				
5	72	-				
		7.2				
		7.5				
		0.7				
		1.3	B14-017-SB-10			
10	40	-				
		-				
		-				
		-				Wet at 14' bgs
		-				
15	30	-		(14.5-19.5') SLAG GRAVEL, fine, with SILT, loose, black and gray, wet, non plastic, non cohesive	GP	Very small trace sheen, no odor from 14.5-15' bgs, light sheen 18-19.5' bgs
		-				
		-				
		-				
		-		(19.5-20') CLAY, soft, brownish gray and black, very moist, low plasticity, cohesive	CL	
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.25'
Riser: 0 - 10' bgs
Screen: 10 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 6 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 6' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-021-SB/PZ

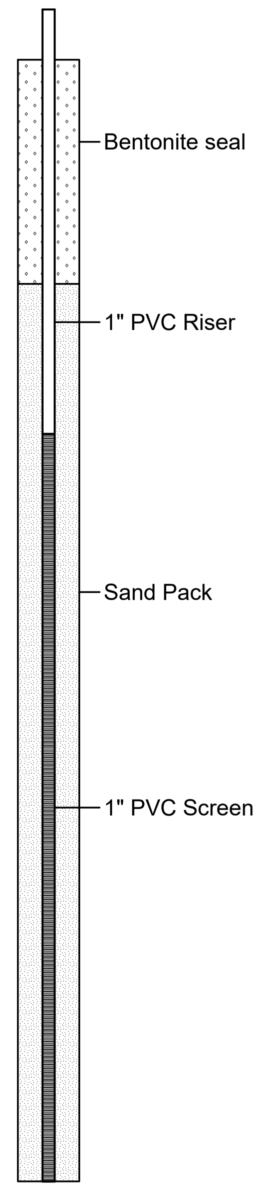
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/7/17
Piezometer Installation Date	: 9/7/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569933.44
Easting (US ft)	: 1457689.82
0-Hr DTW	: 3.80' TOC
48-Hr DTW	: 4.01' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	B14-021-SB-1	(0-5') SANDY SILT, soft to firm, reddish brown to brownish black, moist, non plastic, non cohesive		Organic matter present
		-				
	50	0.2			ML	
		0.4				
		0.3				
5		-		(5-7') CLAY, soft, gray, very moist, low plasticity, cohesive		
		-			CL	
	60	8.0		(7-13') SAND, loose, black, very moist to wet, non plastic, non cohesive		
		1.2	B14-021-SB-9			
		1.3				Wet at 9' bgs Black, oily water with petroleum-like odor
10		-			SP	Dark amber product from 9-10' bgs
		7.4				
	100	11.7				
		2.3		(13-15') CLAY, medium firm, very moist, low plasticity, cohesive		
		1.3			CL	
15				End of boring		



Boring terminated at 15' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 0.97'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-022-SB/PZ

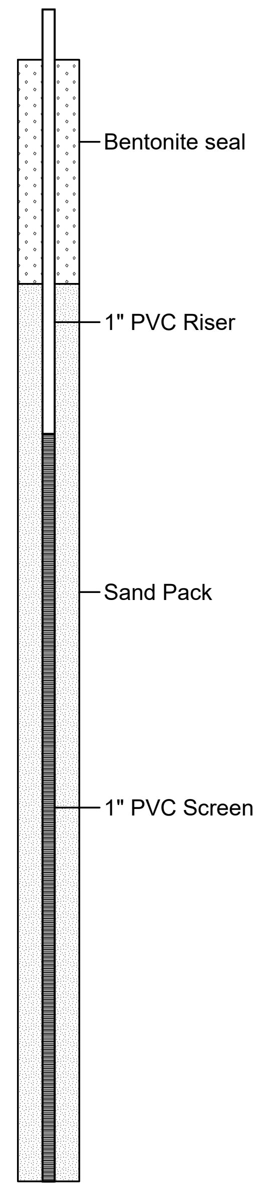
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/7/17
Piezometer Installation Date	: 9/7/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569972.88
Easting (US ft)	: 1458033.97
0-Hr DTW	: 5.67' TOC
48-Hr DTW	: 5.74' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	B14-022-SB-1	(0-3') SILT with some SAND, firm, dark brown, moist, low plasticity, non cohesive	ML	
		-				
	40	0.0				
		0.0		(3-6') SAND with some SILT, loose, light brown, dry, non plastic non cohesive	SW	
		0.0				
5		-				
		-		(6-7.5') CLAY, very firm to soft, dark grayish brown, moist to very moist, low plasticity, cohesive	CL	
			B14-022-SB-7.5			
	70	-		(7.5-11') SAND, loose, black, wet, non plastic, non cohesive	SP	Wet at 7.5' bgs Black, oily water with petroleum-like odor
		-				
		-				
10		-				
		-		(11-15') CLAY, soft, black, wet, low plasticity, cohesive	CL	
	100	-				
		-				
		-				
15				End of boring		



Boring terminated at 15' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 0.80'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-028-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/11/17
Piezometer Installation Date	: 9/11/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569759.83
Easting (US ft)	: 1459127.34
0-Hr DTW	: 16.30' TOC
48-Hr DTW	: 16.29' TOC

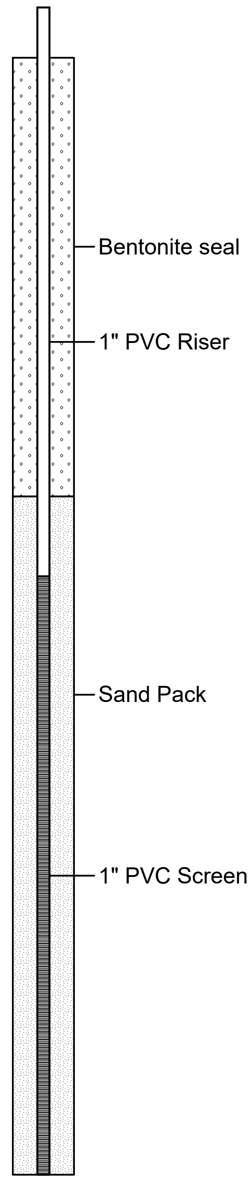
No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery
0-5	80
5-10	100
10-15	90
15-20	80
20-25	40
25-28	100

Depth (ft.)	PID Reading (PPM)	Sample No/Interval
0-1	-	B14-028-SB-1
1	1.7	
2-3	5.1	
3-4	6.0	
4-5	1.8	
5-6	3.1	
6-7	7.6	
7-8	20.5	B14-028-SB-8
8-9	10.9	
9-10	4.1	B14-028-SB-10
10-11	-	
11-12	7.3	
12-13	11.1	
13-14	2.1	
14-15	4.2	
15-16	-	
16-17	-	
17-18	-	
18-19	-	
19-20	-	
20-21	-	
21-22	-	
22-23	-	
23-24	-	
24-25	-	
25-26	-	
26-27	-	
27-28	-	

DESCRIPTION	USCS	REMARKS
(0-3.8') SILTY SAND, brown, and SLAG SAND and GRAVEL, gray, loose, dry, non plastic, non cohesive	SM	
(3.8-6') WEATHERED SANDSTONE, GRAVEL and COBBLE-sized, light yellowish brown to reddish yellow at 5.5' bgs, dry	GW	
(6-7') SLAG SAND and GRAVEL, loose, dark gray, dry, non plastic, non cohesive	SW/GW	
(7-9.5') GRAVELLY CLAY with some SLAG GRAVEL, firm, gray and reddish yellow mottling, moist, medium plasticity, cohesive	CL	
(9.5-15.5') SLAG SAND and GRAVEL, loose, dark gray, with some WEATHERED SANDSTONE pockets, SAND-sized, light yellowish brown, dry, non plastic, non cohesive	SW/GW	
(15.5-17') SAND and GRAVEL with some SLAG, loose, dark gray, dry, non plastic, non cohesive	SW/GW	
(17-18') SAND, loose, brown, moist then wet at 17.5' bgs, non plastic, non cohesive	SW/GW	Wet at 17.5' bgs
(18-19') SLAG SAND and GRAVEL, medium dense, dark gray, wet, non plastic, non cohesive	SW/GW	
(19-21.5') SLAG GRAVEL with SAND, medium dense, black, wet, non plastic, non cohesive	SW/GW	Petroleum type odor, very oily feel, heavy sheen, black product from 19-28' bgs
(21.5-23.5') SILTY SAND, medium dense, black, wet, non plastic, non cohesive	SM	
(23.5-28') SANDY GRAVEL SLAG with BRICK GRAVEL chunk at 25' bgs, medium dense, black, wet, non plastic, non cohesive	SW/GW	

End of boring



Boring terminated at 28' bgs due to refusal and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.20'
Riser: 0 - 13' bgs
Screen: 13 - 28' bgs [Slot Size: 0.010"]
Sand Pack: 11 - 28' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 11' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-034-SB/PZ

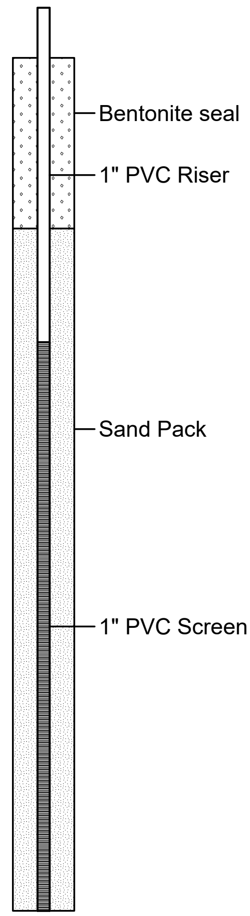
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.; L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: Mike Garvine
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/6/17
Piezometer Installation Date	: 11/21/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569543.46
Easting (US ft)	: 1457406.41
0-Hr DTW	: 13.08' TOC
48-Hr DTW	: 10.74' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-1	49	-	B14-034-SB-1	(0-4') SILTY SAND, medium dense to dense, dark yellowish brown, dry, non plastic, non cohesive	SM	Piezometer installed after receipt of soil boring analytical results Moderate organics present
1-2		-				
2-3		0.0				
3-4		0.0				
4-5		0.0	B14-034-SB-5	(4-5.5') CLAY, hard, brownish gray, strong brown, and yellowish red, dry, low plasticity, cohesive	CL	
5-6	80	-		(5.5-8.5') SLAG and BRICK, fine GRAVEL to very coarse SAND-sized, dark brown, strong brown, and yellow, wet, non plastic, non cohesive	GW/SW	Wet at 6' bgs
6-7		6.4				
7-8		5.3				
8-9		18.3		(8.5-14.5') CLAY, firm to soft, light gray, moist, low plasticity, cohesive	CL	
9-10		2.7				
10-11	84	-				
11-12		-				
12-13		-				
13-14		-				
14-15		-		(14.5-20') SLAG, SAND and GRAVEL, dense, very dark brown, wet, non plastic, non cohesive	SW/GW	
15-16	70	-				
16-17		-				
17-18		-				
18-19		-				
19-20		-				
20				End of boring		



Boring terminated at 20' bgs due to water.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.83'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-035-SB/PZ

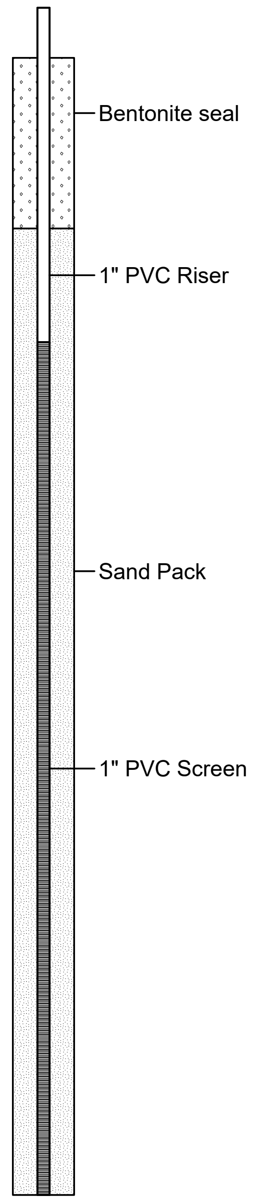
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/15/17
Piezometer Installation Date	: 11/16/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 570777.84
Easting (US ft)	: 1459711.44
0-Hr DTW	: 8.75' TOC
48-Hr DTW	: 8.68' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	No Samples Collected	(0-4') SAND with some GRAVEL, loose, brown, dry, no plasticity, no cohesion	SW	
		-				
	34	-				
		11.4				
		4.7		(4-18.5') SLAG GRAVEL with some SAND-sized, medium dense, dark grey and brown but black at 9.5' bgs, wet at 7.5' bgs, no plasticity, no cohesion	GW/SW	
5		-				
		-				Wet at 7.5' bgs
	44	-				
		-				
		0.4				Slight petroleum-like odor and slight sheen from 9.5-19' bgs
10		-				
		-				
	40	-				
		-				
		-				
15		-				
		-				
	70	-				
		-				
		-		(18.5-20') CLAY, soft, moist, medium plasticity, cohesive	CL	
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.90'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

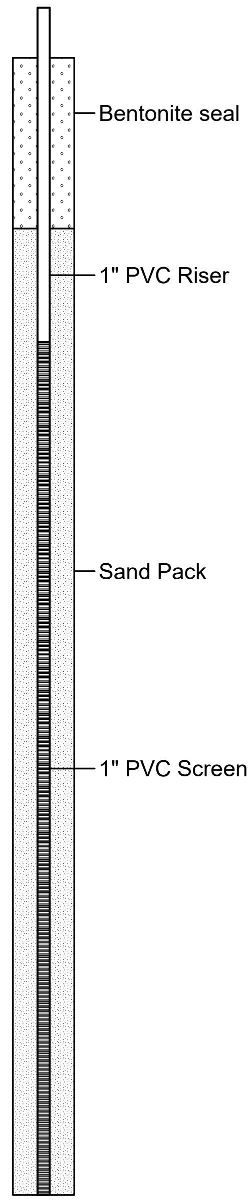
Boring ID: B14-036-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/22/17
Piezometer Installation Date	: 11/22/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569767.58
Easting (US ft)	: 1457678.02
0-Hr DTW	: 5.43' TOC
48-Hr DTW	: 5.10' TOC
No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-		(0-1') SILTY SAND, medium dense, reddish brown, moist, no plasticity, no cohesion	SM	
		-		(1-15') CLAY, soft, greenish gray, moist to very moist, low plasticity, cohesive		
	20	-	No Samples Collected			
		-				
		0.0				
5		-				No water encountered
		-				
	20	-			CL	
		-				
		0.0				
10		-				
		-				
	40	-				
		0.0				
		0.0				
15		-		(15-20') Soils not logged		
		-				
	60	0.0			CL	
		0.0				
		0.0				
20				End of boring		



Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

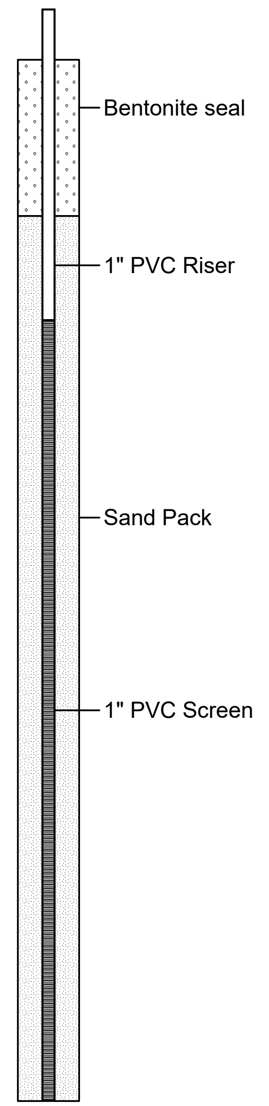
Riser Stickup: 2.76'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc. Engineers and Scientists	Client: EnviroAnalytics Group ARM Project No.: 150300M-17-3 Project Description: Sparrows Point - Parcel B14 Site Location: Sparrows Point, MD ARM Representative: L. Perrin Checked by: M. Replogle, E.I.T. Drilling Company: Allied Drilling Co. Driller: R. Sites Drilling Equipment: Geoprobe 7822DT	Soil Boring Installation Date: 11/14/17 Piezometer Installation Date: 11/14/17 Casing/Riser/Screen Type: PVC Borehole Diameter: 2.25" Riser/Screen Diameter: 1" Northing (US ft): 569480.98 Easting (US ft): 1457196.68 0-Hr DTW: 11.11' TOC 48-Hr DTW: 10.90' TOC No LNAPL or DNAPL detected at 0 or 48 hours

Boring ID: B14-037-SB/PZ

(page 1 of 1)

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-4.5	50 (0-5)	-, -, -, 14.0, 1.2	No Samples Collected	(0-4.5') Non-native SAND with fine GRAVEL and SILT, medium dense, brown with trace yellow, dry, no plasticity, no cohesion	SW/GP	
4.5-15	22 (5-10); 44 (10-15)	-, -, -, 0.5, 3.3, -, -, 0.0, 4.3, 0.0		(4.5-15') BRICK and SLAG GRAVEL with SILT, medium dense to dense at 9.8' bgs, red to dark reddish brown at 9.8' bgs, dry but wet at 9.8' bgs, no plasticity, no cohesion	GW-GM	Wet at 9.5' bgs Trace sheen from 9.8-15' bgs
15-19	100 (15-20)	-, -, -, 5.6		(15-19') CLAYEY SILT, soft, black, wet, low plasticity, cohesive	ML	Strong petroleum-like odor with light sheen from 15-19' bgs, no visible product
19-19.5		1.2		(19-19.5') SILTY CLAY, firm to soft, greenish gray and black mottling, very moist to moist, low plasticity, cohesive	CL	
19.5-20				(19.5-20') SAND, fine to medium, with CLAY, medium dense, brownish gray with some black mottling, wet, no plasticity, no cohesion	SW-SC	
				End of boring		

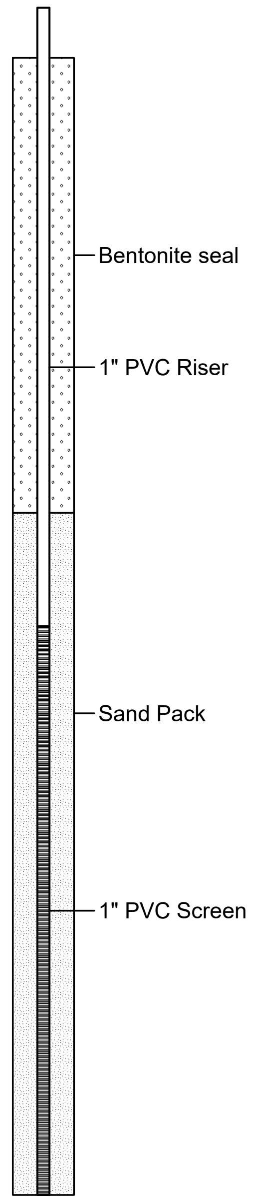


Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.96'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc. Engineers and Scientists		
Boring ID: B14-038-SB/PZ (page 1 of 1)	Client : EnviroAnalytics Group ARM Project No. : 150300M-17-3 Project Description : Sparrows Point - Parcel B14 Site Location : Sparrows Point, MD ARM Representative : L. Perrin Checked by : M. Replogle, E.I.T. Drilling Company : Allied Drilling Co. Driller : R. Sites Drilling Equipment : Geoprobe 7822DT	Soil Boring Installation Date : 11/14/17 Piezometer Installation Date : 11/14/17 Casing/Riser/Screen Type : PVC Borehole Diameter : 2.25" Riser/Screen Diameter : 1" Northing (US ft) : 569414.22 Easting (US ft) : 1458151.98 0-Hr DTW : 18.99' TOC 48-Hr DTW : 18.25' TOC No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-5	20	-, -, -, -, 0.6	No Samples Collected	(0-13.5') SILTY CLAY with some SAND, firm to very firm, brownish red with trace black streaks from 12.5-13' bgs, moist, low plasticity, cohesive	CL	
5-10	24	-, -, -, -, 0.2				
10-15	50	-, -, -, 24.7, 4.1				Wet at 13.5' bgs
				(13.5-14.2') SAND, fine to medium, greenish gray and black, wet, no plasticity, no cohesion	SW	Trace visible product at 14' bgs
15-20	52	-, -, 0.0, 0.6, 1.2		(14.2-17.5') SILTY CLAY, firm, black, very moist, low plasticity, cohesive	CL	Moderate petroleum-like odor from 13.5-17.5' bgs
				(17.5-20') CLAY, firm to very firm, greenish gray with some black streaks, moist, low plasticity, cohesive	CL	
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.69'
Riser: 0 - 10' bgs
Screen: 10 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 8 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 8' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-039-SB/PZ

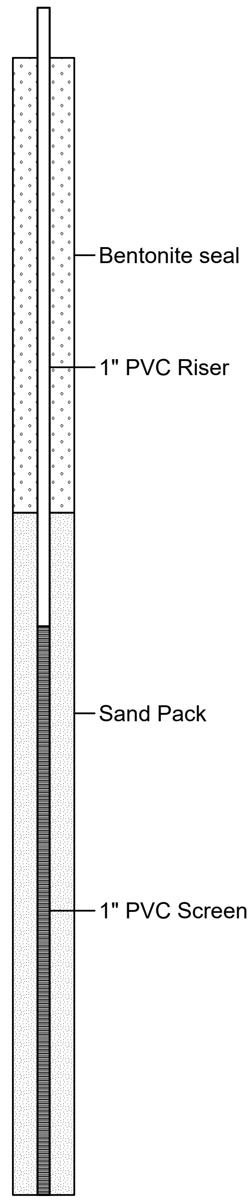
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/14/17
Piezometer Installation Date	: 11/14/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569623.49
Easting (US ft)	: 1458112.05
0-Hr DTW	: 9.75' TOC
48-Hr DTW	: 9.28' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	10	-, -, -, -, 0.0	No Samples Collected	(0-11') SILTY CLAY, firm, brownish red, moist, low plasticity, cohesive	CL	
5	14	-, -, -, -, 1.2				
10	50	-, -, 3.3, 5.5, 26.0		(11-16') CLAYEY SILT with trace SAND, black, very moist, low plasticity, cohesive	ML	Moderate petroleum-like odor from 12.5-19.5' bgs, no visible product
15	40	-, -, -, 0.2, 0.4		(16-19.5') SAND, fine to medium, black and brownish gray, wet, no plasticity, no cohesion	SW	Wet at 18' bgs
				(19.5-20') CLAY, soft, black, very moist, low plasticity, cohesive	CL	
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.70'
Riser: 0 - 10' bgs
Screen: 10 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 8 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 8' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-040-SB/PZ

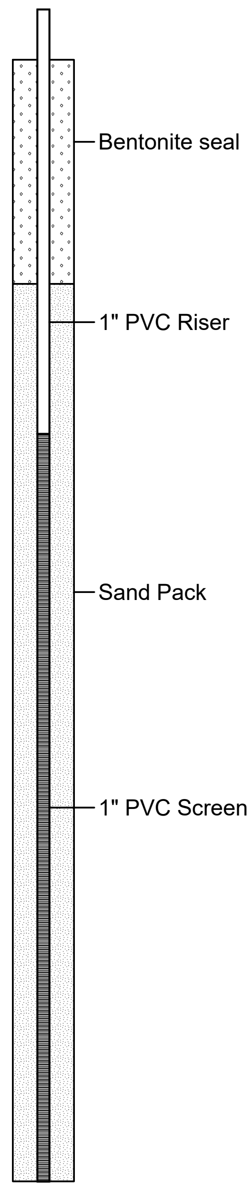
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/22/17
Piezometer Installation Date	: 11/22/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569788.42
Easting (US ft)	: 1458075.59
0-Hr DTW	: 8.68' TOC
48-Hr DTW	: 8.73' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0						
		-		(0-8.7') SANDY SILT grading to SAND with SILT, fine to medium, firm to soft then medium dense, reddish brown from 0-7.6' bgs, black from 7.6-8.7' bgs, moist to wet at 7.6' bgs, low plasticity and cohesive grading to no plasticity and no cohesion		
		-	No Samples Collected			
	16	-				
		-				
		0.0			ML-SW	
5						
		-				
		2.6				
	70	3.8				Wet at 7.6' bgs
		7.4				
		2.1		(8.7-15') SILTY CLAY, soft, black to gray with trace black streaks at 13.7' bgs, very moist, low plasticity, cohesive		Moderate petroleum-like odor from 7.8-13' bgs, no visible product
10						
		-				
		0.9			CL	
	72	0.2				
		0.2				
		0.1				
15				End of boring		



Boring terminated at 15' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.65'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

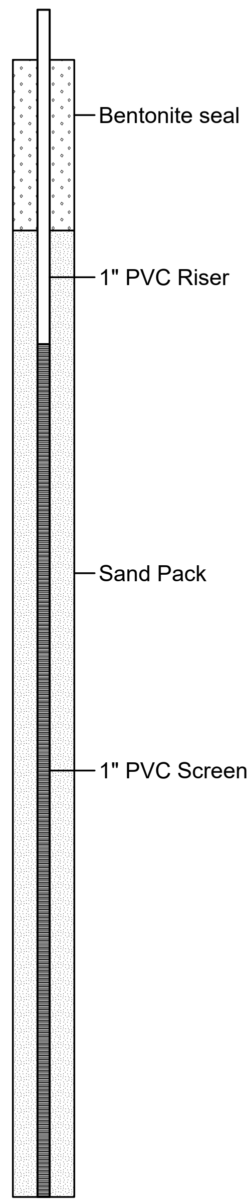
Boring ID: B14-041-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/14/17
Piezometer Installation Date	: 11/14/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569378.69
Easting (US ft)	: 1457655.45
0-Hr DTW	: 8.08' TOC
48-Hr DTW	: 6.92' TOC
No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	No Samples Collected	(0-9.8') SILT with some SAND, medium dense, brownish red, moist, low plasticity, cohesive	ML	
		-				
	40	-				
		0.7				
		0.5				
5		-				
		-				
	10	-				
		-				Wet at 9.8' bgs
		13.1				
10		-		(9.8-18.3') SILT with trace SAND, soft, black, wet, low plasticity, cohesive	ML	
		-				
	20	-				
		-				Strong petroleum-like odor from 9.8-18' bgs
		2.8				
15		-				
		0.6				Light sheen from 16-18' bgs
	76	0.4				
		0.0		(18.3-20') CLAY, soft, greenish gray with trace black streaks, low plasticity, cohesive	CL	
		0.0				
20				End of boring		



Boring terminated at 20' bgs due to water and piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.72'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-042-SB/PZ

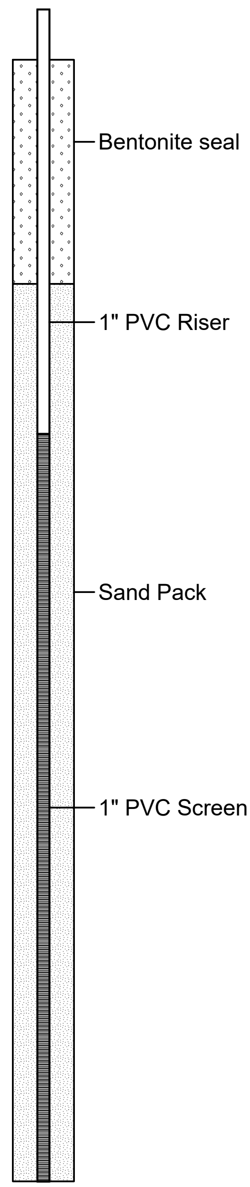
(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 11/21/17
Piezometer Installation Date	: 11/21/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569587.03
Easting (US ft)	: 1457662.39
0-Hr DTW	: 15.05' TOC
48-Hr DTW	: 7.01' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		-	No Samples Collected	(0-4') CLAYEY SILT with SAND, firm, reddish brown, dry to very moist, low plasticity, cohesive	ML	
		-				
	30	-				
		0.3				
		5.4		(4-15') CLAY, soft, greenish gray, very moist, low plasticity, cohesive	CL	
5		-				No water encountered
		-				
	40	-				
		0.0				Pungent sewage-like odor from 8-10' bgs
		0.0				
10		-				
		-				
	60	0.0				
		0.0				
		0.0				
15				End of boring		



Boring terminated at 15' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.86'
Riser: 0 - 5' bgs
Screen: 5 - 15' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 15' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips]

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: M. Replogle, E.I.T.
Checked by	: M. Replogle, E.I.T.
Drilling Company	: Allied Drilling Co.
Driller	: R. Sites
Drilling Equipment	: Geoprobe 7822DT

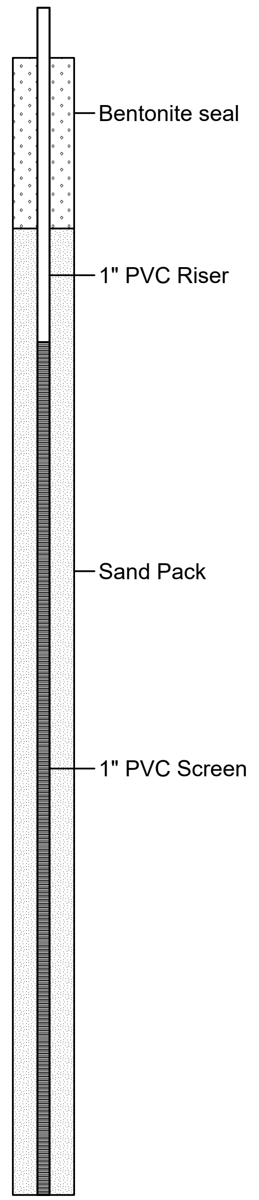
Soil Boring Installation Date	: 11/16/17
Piezometer Installation Date	: 11/16/17
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569649.38
Easting (US ft)	: 1458584.70
0-Hr DTW	: 6.53' TOC
48-Hr DTW	: 6.55' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-043-SB/PZ

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-5	6	-, -, -, 0.0	No Samples Collected	(0-5') SILT, reddish brown, soft, dry to moist, no plasticity, no cohesion	ML	Some organic material present
5-10	0	-, -, -, -, -		(5-15') No recovery		No water encountered
10-15	2	-, -, -, -, -				
15-20	28	-, -, -, 0.0, 0.0		(15-20') CLAY, soft, olive gray, moist, medium plasticity, cohesive	ML	



End of boring

Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 2.98'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips)]

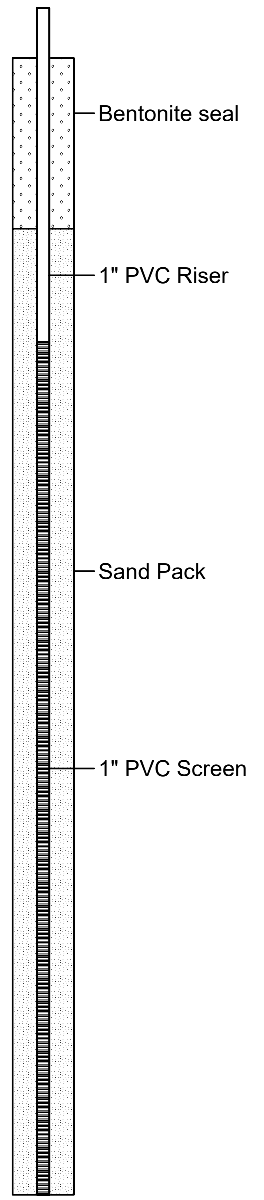
ARM Group Inc.
Engineers and Scientists

Boring ID: B14-044-SB/PZ

(page 1 of 1)

Client	: EnviroAnalytics Group	Soil Boring Installation Date	: 9/20/2018
ARM Project No.	: 150300M-17-3	Piezometer Installation Date	: 9/20/2018
Project Description	: Sparrows Point - Parcel B14	Casing/Riser/Screen Type	: PVC
Site Location	: Sparrows Point, MD	Borehole Diameter	: 2.25"
ARM Representative	: L. Perrin	Riser/Screen Diameter	: 1"
Checked by	: M. Replogle, E.I.T.	Northing (US ft)	: 569295.33
Drilling Company	: GSI	Easting (US ft)	: 1456738.31
Driller	: Don Marchese	0-Hr DTW	: 12.67' TOC
Drilling Equipment	: Geoprobe 7822DT	48-Hr DTW	: 12.73' TOC
		No LNAPL or DNAPL detected at 0 or 48 hours	

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0				(0-20') SLAG GRAVEL with SAND, medium dense, light gray and gray then red from 12.5-14' bgs, black from 14-20' bgs, dry then moist from 8-10' bgs, wet at 12.5' bgs, no plasticity, no cohesion		
		-				
		-				
	46	0.0	No Samples Collected			
		0.0				
		0.0				
5						
		-				
		-				
	40	-				
		0.0				
		0.0				
10					GW/SW	
		-				
		-				
	48	-				Wet at 12.5' bgs
		0.0				
		0.0				
15						
		-				
		-				
	50	-				
		-				
		-				
20				End of boring		



Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.71'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips)]

ARM Group Inc.
Engineers and Scientists

Boring ID: B14-045-SB/PZ

(page 1 of 1)

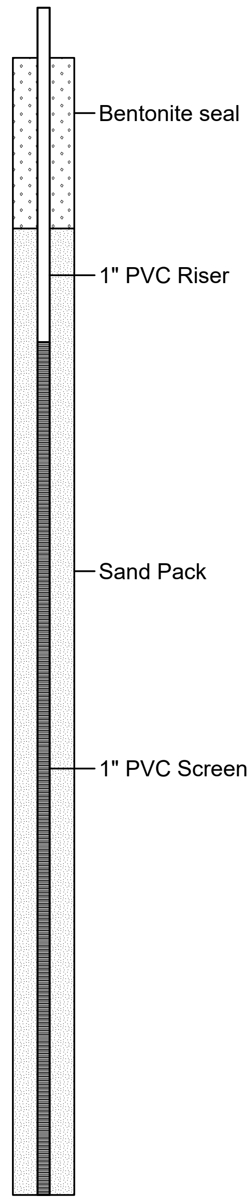
Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: GSI
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/20/2018
Piezometer Installation Date	: 9/20/2018
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569334.24
Easting (US ft)	: 1457253.56
0-Hr DTW	: 12.19' TOC
48-Hr DTW	: 12.02' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0-5	90	0.0, 0.0, 0.1, 0.2, 0.0	No Samples Collected	(0-6') Non-native SAND and SLAG GRAVEL, dense, brown with gray, dry, no plasticity, no cohesion	SW/GW	
5-10	60	-, -, 0.0, 0.0, 0.0		(6-11.5') Non-native SAND with trace GRAVEL, dense, dark brown, dry, no plasticity, no cohesion	SW	
10-15	40	-, -, -, 0.0, 0.0		(11.5-20') SLAG/BRICK GRAVEL, fine, with SAND, medium dense to dense, dark brown, wet, no plasticity, no cohesion	GP/SW	Wet at 13' bgs
15-20	60	-, -, 0.0, 0.0, 0.0				

End of boring



Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.31'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips)]

ARM Group Inc.
Engineers and Scientists

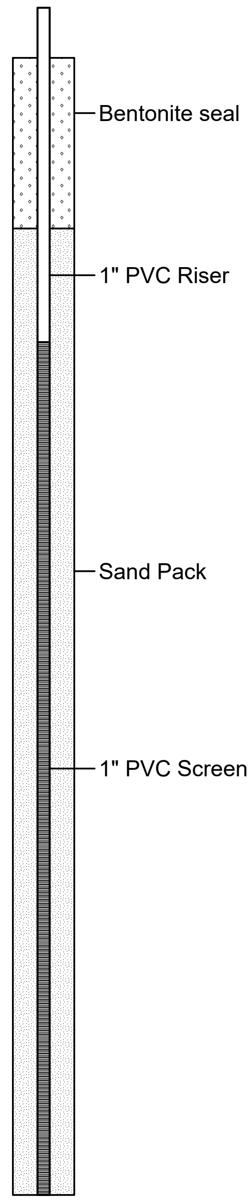
Boring ID: B14-046-SB/PZ

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: GSI
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/20/2018
Piezometer Installation Date	: 9/20/2018
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569607.40
Easting (US ft)	: 1457066.87
0-Hr DTW	: 10.91' TOC
48-Hr DTW	: 10.86' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0		0.2		(0-6') Non-native SAND with fine SLAG GRAVEL, dense, brown with gray, dry, no plasticity, no cohesion		
		0.0				
	96	4.5	No Samples Collected		SW/GP	
		0.6				
		0.4				
5		-				
		0.0		(6-9') SANDY SILT, soft, dark brown, very moist, low plasticity, cohesive		
	90	0.0			ML	
		0.0				
		0.0		(9-10') SILTY SAND, fine to coarse, with trace fine GRAVEL, medium dense, very dark brown to black, wet, no plasticity, no cohesion	SM	Wet at 9' bgs
10		-		(10-20') NO RECOVERY; wet liners		
		-				
	0	-				
		-				
		-				
15		-			-	
		-				
	0	-				
		-				
		-				
20				End of boring		



Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.47'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips)]

ARM Group Inc.
Engineers and Scientists

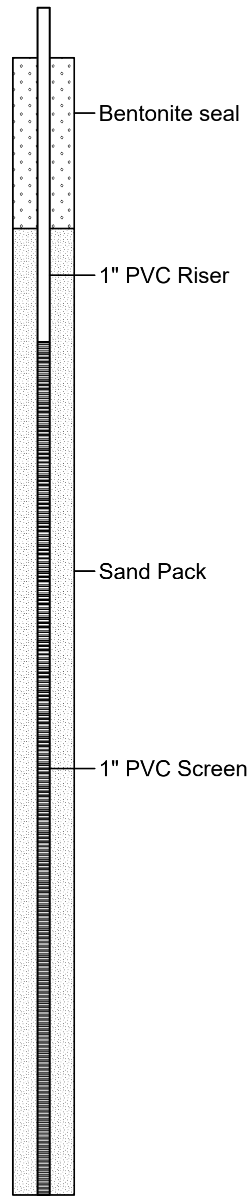
Boring ID: B14-047-SB/PZ

Client	: EnviroAnalytics Group
ARM Project No.	: 150300M-17-3
Project Description	: Sparrows Point - Parcel B14
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle, E.I.T.
Drilling Company	: GSI
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Soil Boring Installation Date	: 9/20/2018
Piezometer Installation Date	: 9/20/2018
Casing/Riser/Screen Type	: PVC
Borehole Diameter	: 2.25"
Riser/Screen Diameter	: 1"
Northing (US ft)	: 569742.29
Easting (US ft)	: 1457172.08
0-Hr DTW	: 11.09' TOC
48-Hr DTW	: 10.97' TOC

No LNAPL or DNAPL detected at 0 or 48 hours

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample No/Interval	DESCRIPTION	USCS	REMARKS
0	76	-	No Samples Collected	(0-6') Non-native SAND with fine SLAG GRAVEL, dense, brown with gray, dry, no plasticity, no cohesion	SW/GP	
		0.4				
		0.3				
		0.0				
		0.7				
5	22	-				
		-		(6-9') SANDY SILT, soft, dark brown, very moist, low plasticity, cohesive	ML	
		-				
		-				
		0.2		(9-10') SILTY SAND, fine to coarse, with trace fine GRAVEL, medium dense, very dark brown to black, wet, no plasticity, no cohesion	SM	Wet at 9.5' bgs
10	40	-		(10-20') NO RECOVERY; wet liners	-	
		-				
		-				
		0.0				
		0.0				
15	24	-				
		-				
		-				
		-				
		0.0				
20				End of boring		



Boring terminated at 20' bgs due to piezometer installation.
TOC: Top of PVC casing
DTW: Depth to water
bgs: Below ground surface
AMSL: Above mean sea level

Riser Stickup: 3.53'
Riser: 0 - 5' bgs
Screen: 5 - 20' bgs [Slot Size: 0.010"]
Sand Pack: 3 - 20' bgs [Grain Size: WG #2]
Bentonite Seal: 0 - 3' bgs [Grain Size: 3/8" chips)]

APPENDIX B

NAPL Gauging Activities
Parcel B14
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	B14-002-PZ			B14-006-PZ			B14-007-PZ			B14-008-PZ			B14-010-PZ			B14-011-PZ		
Notification Date	NA			NA			NA			NA			NA			NA		
Installation Date	9/14/2017			9/13/2017			11/16/2017			11/15/2017			9/13/2017			9/7/2017		
Abandonment Date	NA			NA			NA			NA			NA			NA		
Well Total Depth (Feet bgs)	10			10			15			22			20.58			20		
Screen Interval (Feet bgs)	5-10			5-10			5-15			7-22			5.58-20.58			10-20		
Riser Stick-Up (Feet)	2.80			2.95			2.70			2.50			3.52			1.00		
	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)
9/7/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	5.1	-
9/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	5.69	-
9/12/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	NM	NM
9/13/2017	NA	NA	NA	-	3.61	-	NA	NA	NA	NA	NA	NA	-	11.02	-	NM	NM	NM
9/14/2017	-	11.88	-	NM	NM	NM	NA	NA	NA	NA	NA	NA	NM	NM	NM	NM	NM	NM
9/15/2017	NM	NM	NM	-	4.12	-	NA	NA	NA	NA	NA	NA	-	11.14	-	NM	NM	NM
9/18/2017	-	4.45	-	NM	NM	NM	NA	NA	NA	NA	NA	NA	NM	NM	NM	NM	NM	NM
10/10/2017	NM	NM	NM	NM	NM	NM	NA	NA	NA	NA	NA	NA	NM	NM	NM	NM	NM	NM
10/11/2017	NM	NM	NM	NM	NM	NM	NA	NA	NA	NA	NA	NA	NM	NM	NM	**6.85**	**7.03**	**0.18**
10/16/2017	**4.71**	**4.72**	**0.01**	**4.58**	**4.6**	**0.02**	NA	NA	NA	NA	NA	NA	-	11.2	-	NM	NM	NM
11/14/2017	NM	NM	NM	NM	NM	NM	NA	NA	NA	NA	NA	NA	NM	NM	NM	NM	NM	NM
11/15/2017	NM	NM	NM	NM	NM	NM	NA	NA	NA	-	6.85	-	NM	NM	NM	NM	NM	NM
11/16/2017	NM	NM	NM	NM	NM	NM	-	5.84	-	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/17/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	3.48	-	NM	NM	NM	NM	NM	NM
11/20/2017	NM	NM	NM	NM	NM	NM	-	5.9	-	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/21/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/22/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/28/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/29/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
12/21/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1/4/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/1/2018	NM	NM	NM	NM	NM	NM	**6**	**6.32**	**0.32**	**trace**	**2.24**	**trace**	NM	NM	NM	NM	NM	NM
6/4/2018	NM	NM	NM	-	10.34	-	**4.66**	**5.34**	**0.68**	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/20/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/24/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/11/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/14/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/19/2019	**3.79**	**4.28**	**0.49**	**2.94**	**3.18**	**0.24**	**4.8**	**6.63**	**1.83**	**2.75**	**2.79**	**0.04**	NM	NM	NM	**4.53**	**6.28**	**1.75**
11/26/2019	Could not locate - vegetation			**4.84**	**4.98**	**0.14**	**9.83**	**9.9**	**0.07**	Could not locate - vegetation			Destroyed			NM	NM	NM
11/27/2019				NM	NM	NM	NM	NM	NM							**8.16**	**9.53**	**1.37**

NA = Not Applicable
NM = Not Measured
SHADED = NAPL Detection
bgs = below ground surface

NAPL Gauging Activities
Parcel B14
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	B14-012-PZ			B14-013-PZ			B14-015-PZ			B14-017-PZ			B14-021-PZ			B14-022-PZ		
Notification Date	NA			NA			NA			NA			NA			NA		
Installation Date	9/15/2017			11/21/2017			9/12/2017			9/13/2017			9/7/2017			9/7/2017		
Abandonment Date	NA			NA			NA			NA			NA			NA		
Well Total Depth (Feet bgs)	20			20			25			17.68			15			15		
Screen Interval (Feet bgs)	10-20			5-20			5-25			7.68-17.68			5-15			5-15		
Riser Stick-Up (Feet)	3.05			2.90			2.25			2.25			0.97			0.80		
	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)
9/7/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	3.8	-	**trace**	**5.67**	**trace**
9/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	4.01	-	-	5.74	-
9/12/2017	NA	NA	NA	NA	NA	NA	-	14.18	-	NA	NA	NA	NM	NM	NM	NM	NM	NM
9/13/2017	NA	NA	NA	NA	NA	NA	NM	NM	NM	-	12.63	-	NM	NM	NM	NM	NM	NM
9/14/2017	NA	NA	NA	NA	NA	NA	-	14.06	-	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/15/2017	-	9.26	-	NA	NA	NA	NM	NM	NM	-	12.76	-	NM	NM	NM	NM	NM	NM
9/18/2017	-	9.16	-	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/10/2017	**10.11**	**10.17**	**0.06**	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/11/2017	**trace**	**10.1**	**trace**	NA	NA	NA	NM	NM	NM	NM	NM	NM	**4.65**	**5.24**	**0.59**	-	6.82	-
10/16/2017	**trace**	**10.12**	**trace**	NA	NA	NA	-	14.23	-	-	12.79	-	NM	NM	NM	NM	NM	NM
11/14/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/15/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/16/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/17/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/20/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/21/2017	NM	NM	NM	-	7.6	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/22/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/28/2017	NM	NM	NM	**7.85**	**8.01**	**0.16**	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/29/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
12/21/2017	NM	NM	NM	**7.45**	**7.76**	**0.31**	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1/4/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/1/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6/4/2018	NM	NM	NM	**6.02**	**7.75**	**1.73**	NM	NM	NM	-	12.24	-	NM	NM	NM	NM	NM	NM
9/20/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/24/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/11/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/14/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/19/2019	**8.18**	**8.31**	**0.13**	**6.65**	**9.22**	**2.57**	-	14.08	-	NM	NM	NM	**2.95**	**4.71**	**1.76**	-	4.8	-
11/26/2019	**trace**	**12.96**	**trace**	**trace**	**10.77**	**trace**	Destroyed			-	13.06	-	Could not locate - vegetation			NM	NM	NM
11/27/2019	NM	NM	NM	NM	NM	NM				NM	NM	NM				-	7.87	-

NA = Not Applicable
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SHADED = NAPL Detection
bgs = below ground surface

NAPL Gauging Activities
Parcel B14
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	B14-028-PZ			B14-034-PZ			B14-035-PZ			B14-036-PZ			B14-037-PZ			B14-038-PZ		
Notification Date	NA			NA			NA			NA			NA			NA		
Installation Date	9/11/2017			11/21/2017			11/16/2017			11/22/2017			11/14/2017			11/14/2017		
Abandonment Date	NA			NA			NA			NA			NA			NA		
Well Total Depth (Feet bgs)	28			15			20			20			20			20		
Screen Interval (Feet bgs)	13-28			5-15			5-20			5-20			5-20			10-20		
Riser Stick-Up (Feet)	3.20			2.83			2.90			2.76			2.96			2.69		
	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)
9/7/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/11/2017	-	16.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/12/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/13/2017	-	16.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/14/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/15/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/18/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/10/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/11/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2017	-	16.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/14/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	11.11	-	-	18.99	-
11/15/2017	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	NM	NM	NM	NM	NM
11/16/2017	NM	NM	NM	NA	NA	NA	-	8.75	-	NA	NA	NA	-	10.9	-	**9.25**	**13.25**	**4**
11/17/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM
11/20/2017	NM	NM	NM	NA	NA	NA	-	8.68	-	NA	NA	NA	NM	NM	NM	NM	NM	NM
11/21/2017	NM	NM	NM	-	13.08	-	NM	NM	NM	NA	NA	NA	NM	NM	NM	NM	NM	NM
11/22/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	5.43	-	NM	NM	NM	NM	NM	NM
11/28/2017	NM	NM	NM	-	10.74	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/29/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	5.6	-	NM	NM	NM	NM	NM	NM
12/21/2017	NM	NM	NM	-	11.11	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1/4/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	5.22	-	NM	NM	NM	NM	NM	NM
2/1/2018	NM	NM	NM	NM	NM	NM	-	9.02	-	NM	NM	NM	**11.9**	**12.02**	**0.12**	**12.8**	**17.7**	**4.9**
6/4/2018	NM	NM	NM	NM	NM	NM	-	8.02	-	NM	NM	NM	-	9.92	-	NM	NM	NM
9/20/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
9/24/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10/11/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/14/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/19/2019	NM	NM	NM	-	8.65	-	NM	NM	NM	-	2.12	-	**10.5**	**10.53**	**0.03**	**11.74**	**12.59**	**0.85**
11/26/2019	Destroyed			NM	NM	NM	Destroyed			Could not locate - vegetation			**trace**	**10.72**	**trace**	**16.29**	**16.56**	**0.27**
11/27/2019				Destroyed									NM	NM	NM	NM	NM	NM

NA = Not Applicable
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SHADED = NAPL Detection
bgs = below ground surface

Sample ID	B14-039-PZ			B14-040-PZ			B14-041-PZ			B14-042-PZ			B14-043-PZ			B14-044-PZ		
Notification Date	NA			NA			NA			NA			NA			NA		
Installation Date	11/14/2017			11/22/2017			11/14/2017			11/21/2017			11/16/2017			9/20/2018		
Abandonment Date	NA			NA			NA			NA			NA			NA		
Well Total Depth (Feet bgs)	20			15			20			15			20			20		
Screen Interval (Feet bgs)	10-20			5-15			5-20			5-15			5-20			5-20		
Riser Stick-Up (Feet)	2.70			2.65			2.72			2.86			2.98			3.71		
	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)
9/7/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/12/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/13/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/14/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/15/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/18/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/10/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/14/2017	-	9.75	-	NA	NA	NA	-	8.08	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/15/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/16/2017	-	9.28	-	NA	NA	NA	**6.71**	**6.92**	**0.21**	NA	NA	NA	-	6.53	-	NA	NA	NA
11/17/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NA	NA	NA	NM	NM	NM	NA	NA	NA
11/20/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	NA	NA	NA	-	6.55	-	NA	NA	NA
11/21/2017	NM	NM	NM	NA	NA	NA	NM	NM	NM	-	15.05	-	NM	NM	NM	NA	NA	NA
11/22/2017	NM	NM	NM	-	8.68	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NA	NA	NA
11/28/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	7.01	-	NM	NM	NM	NA	NA	NA
11/29/2017	NM	NM	NM	-	8.73	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NA	NA	NA
12/21/2017	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	7.03	-	-	6.75	-	NA	NA	NA
1/4/2018	NM	NM	NM	-	8.84	-	NM	NM	NM	NM	NM	NM	NM	NM	NM	NA	NA	NA
2/1/2018	**9.02**	**10.32**	**1.3**	NM	NM	NM	**6.6**	**9.1**	**2.5**	NM	NM	NM	NM	NM	NM	NA	NA	NA
6/4/2018	**7.31**	**9.64**	**2.33**	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NA	NA	NA
9/20/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	12.67	-
9/24/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	12.73	-
10/11/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11/14/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
2/19/2019	Destroyed			-	7.08	-	**7.02**	**8.02**	**1**	-	5.86	-	-	5.49	-	NM	NM	NM
11/26/2019				NM	NM	NM	Destroyed			Destroyed			-	8.39	-	NM	NM	NM
11/27/2019				Could not locate - vegetation									NM	NM	NM	-	13.16	-

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bgs = below ground surface

NAPL Gauging Activities
Parcel B14
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	B14-045-PZ			B14-046-PZ			B14-047-PZ			B14-002-PDI			B14-003-PDI			B14-009-PDI		
Notification Date	NA			NA			NA			11/15/2018			2/20/2019			10/10/2018		
Installation Date	9/20/2018			9/20/2018			9/20/2018			10/11/2018			10/11/2018			10/11/2018		
Abandonment Date	NA			NA			NA			NA			NA			NA		
Well Total Depth (Feet bgs)	20			20			20			15			15			25		
Screen Interval (Feet bgs)	5-20			5-20			5-20			2-15			3-15			5-25		
Riser Stick-Up (Feet)	3.31			3.47			3.53			2.12			2.14			0.17		
	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)	Depth to NAPL (Feet TOC)	Depth to Water (Feet TOC)	NAPL Thickness (Feet)
9/7/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/12/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/13/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/14/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/15/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/18/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/10/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/11/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/14/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/15/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/16/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/17/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/20/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/21/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/28/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/29/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12/21/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/4/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2/1/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/20/2018	-	12.19	-	-	10.97	-	-	11.09	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
9/24/2018	-	12.02	-	-	10.86	-	-	10.97	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/11/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	-	6.34	-	-	10.52	-	-	8.68	-
11/14/2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	**3.9**	**5.23**	**1.33**	-	9.58	-	**trace**	**8.15**	**trace**
2/19/2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	**4.67**	**4.92**	**0.25**	**9.77**	**9.79**	**0.02**	**7.88**	**7.97**	**0.09**
11/26/2019	Destroyed			-	8.16	-	-	11.42	-	NM	NM	NM	-	14.93	-	Could not locate - vegetation		
11/27/2019				NM	NM	NM	NM	NM	NM	**6.78**	**6.8**	**0.02**	NM	NM	NM			

NA = Not Applicable
NM = Not Measured
SHADED = NAPL Detection
bgs = below ground surface

APPENDIX C

Table 1
NAPL Piezometer Construction Details and Product Thickness
Parcel B14
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	Installation Date	Well Total Depth (feet bgs)	Screen Interval (feet bgs)	Riser Stick-Up (feet)	Date of Maximum Accumulated Product Thickness	Maximum Accumulated Product Thickness (feet)
B14-002-PZ	9/14/2017	10	5-10	2.80	2/19/2019	0.49
B14-006-PZ	9/13/2017	10	5-10	2.95	2/19/2019	0.24
B14-007-PZ	11/16/2017	15	5-15	2.70	2/19/2019	1.83
B14-008-PZ	11/15/2017	22	7-22	2.50	2/19/2019	0.04
B14-010-PZ	9/13/2017	20.58	5.58-20.58	3.52	NA	NP
B14-011-PZ	9/7/2017	20	10-20	1.00	2/19/2019	1.75
B14-012-PZ	9/15/2017	20	10-20	3.05	2/19/2019	0.13
B14-013-PZ	11/21/2017	20	5-20	2.90	2/19/2019	2.57
B14-015-PZ	9/12/2017	25	5-25	2.25	NA	NP
B14-017-PZ	9/13/2017	17.68	7.68-17.68	2.25	NA	NP
B14-021-PZ	9/7/2017	15	5-15	0.97	2/19/2019	1.76
B14-022-PZ	9/7/2017	15	5-15	0.80	NA	NP
B14-028-PZ	9/11/2017	28	13-28	3.20	NA	NP
B14-034-PZ	11/21/2017	15	5-15	2.83	NA	NP
B14-035-PZ	11/16/2017	20	5-20	2.90	NA	NP
B14-036-PZ	11/22/2017	20	5-20	2.76	NA	NP
B14-037-PZ	11/14/2017	20	5-20	2.96	2/1/2018	0.12
B14-038-PZ	11/14/2017	20	10-20	2.69	2/1/2018	4.90
B14-039-PZ	11/14/2017	20	10-20	2.70	6/4/2018	2.33
B14-040-PZ	11/22/2017	15	5-15	2.65	NA	NP
B14-041-PZ	11/14/2017	20	5-20	2.72	2/1/2018	2.50
B14-042-PZ	11/21/2017	15	5-15	2.86	NA	NP
B14-043-PZ	11/16/2017	20	5-20	2.98	NA	NP
B14-044-PZ	9/20/2018	20	5-20	3.71	NA	NP
B14-045-PZ	9/20/2018	20	5-20	3.31	NA	NP
B14-046-PZ	9/20/2018	20	5-20	3.47	NA	NP
B14-047-PZ	9/20/2018	20	5-20	3.53	NA	NP

NP: No Product
NA: Not Applicable

APPENDIX D

Boring Location Plan 2

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

Project: S18032 Fitzell Substation In Situ

Location: Sparrows Point, Maryland

CPT: Fitzell Project B-214

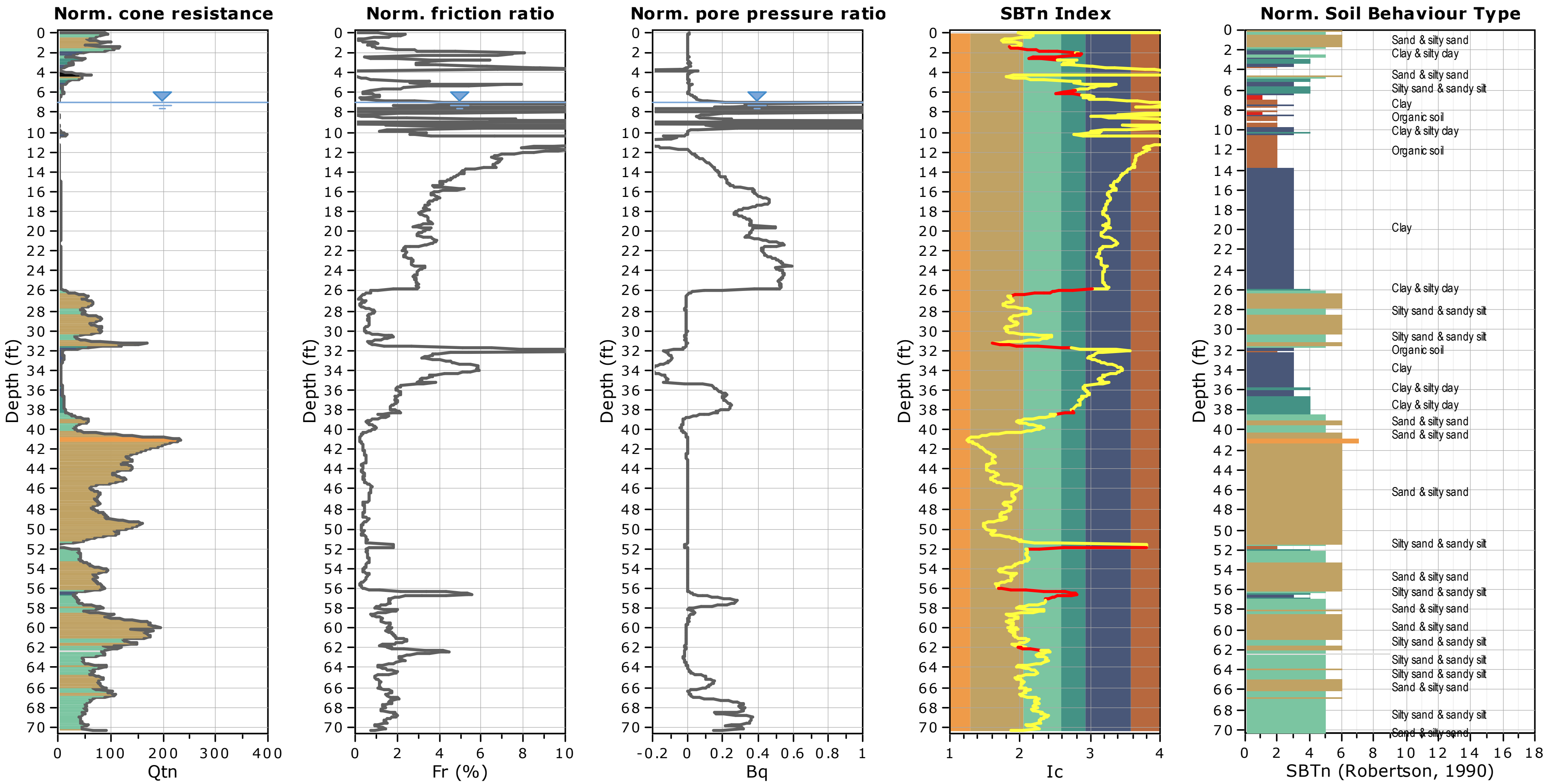
Total depth: 70.34 ft, Date: 3/8/2018

Surface Elevation: 8.00 ft

Coords: X:0.00, Y:0.00

Cone Type: NOVA U2

Cone Operator: R. Harman



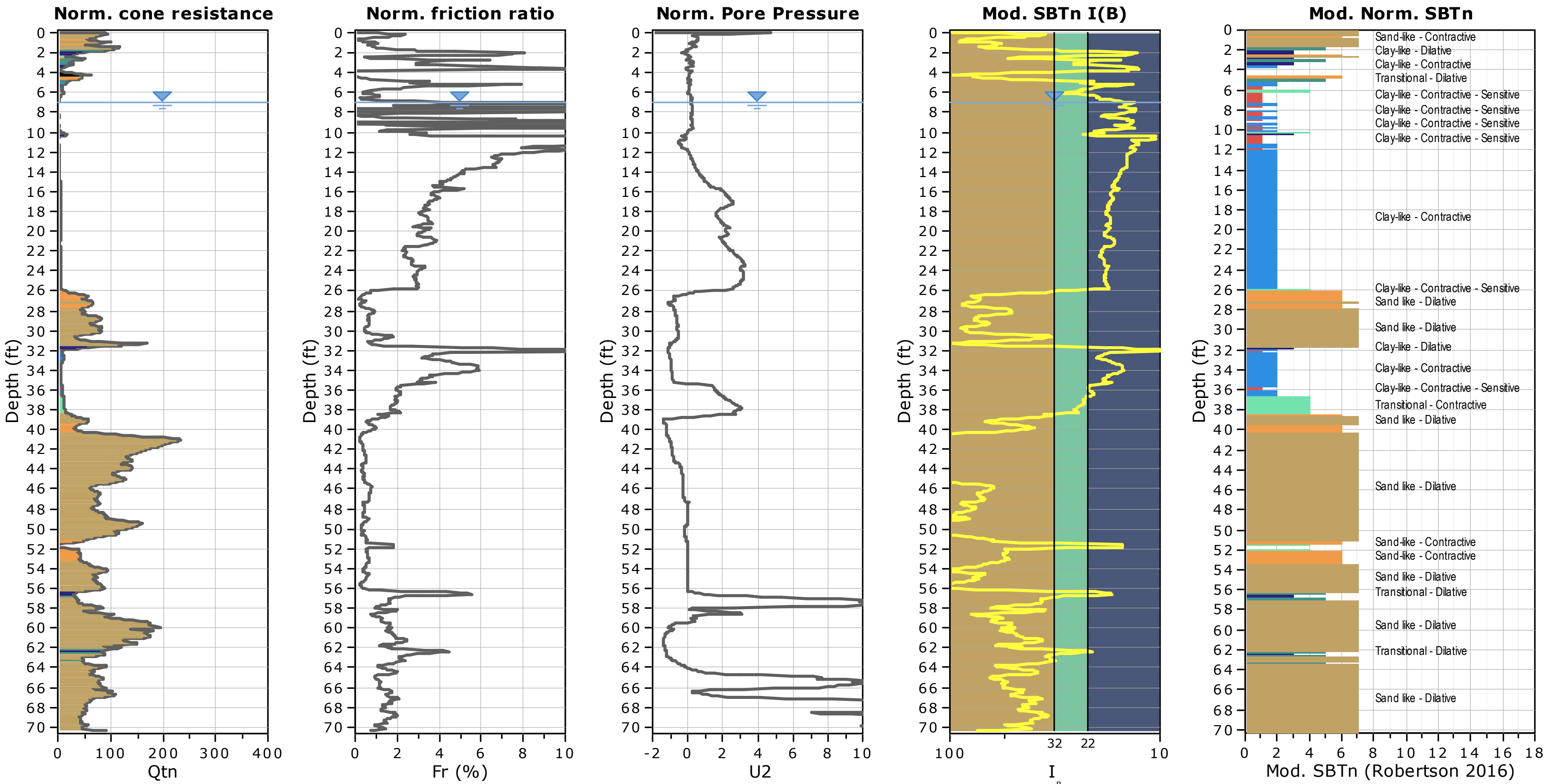
SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-214
Total depth: 70.34 ft, Date: 3/8/2018
Surface Elevation: 8.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Mod. SBTn legend

- 1. CCS: ClayLike - Contractive, Sensitive
- 2. CC: Clay-like - Contractive
- 3. CD: Clay-Like: Dilative
- 4. TC: Transitional - Contractive
- 5. TD: Transitional - Dilative
- 6. SC: Sand-like - Contractive
- 7. SD: Sand-like - Dilative

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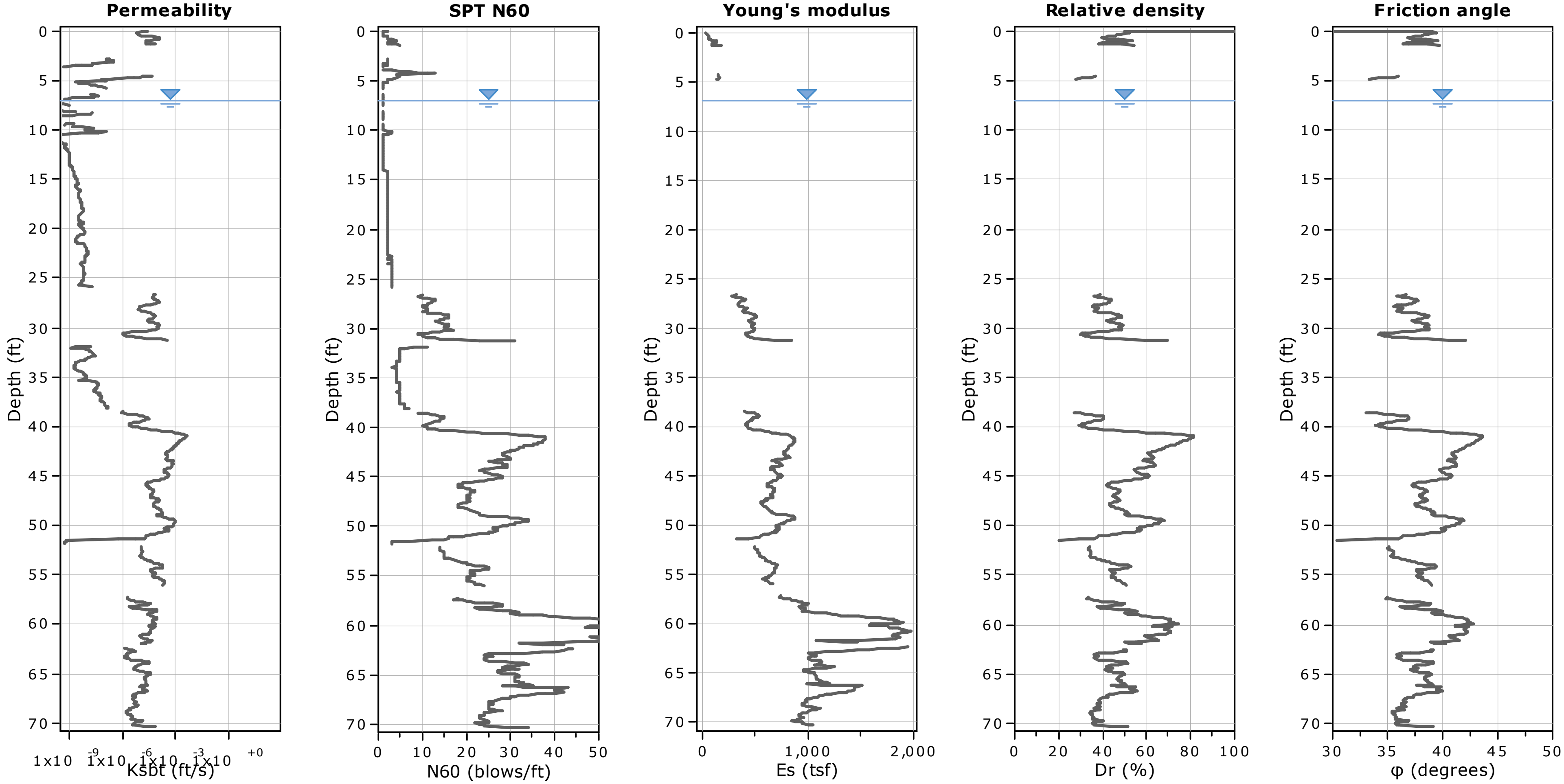
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-214
Total depth: 70.34 ft, Date: 3/8/2018
Surface Elevation: 8.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: S18032 Fitzell Substation In Situ
Location: Sparrows Point, Maryland



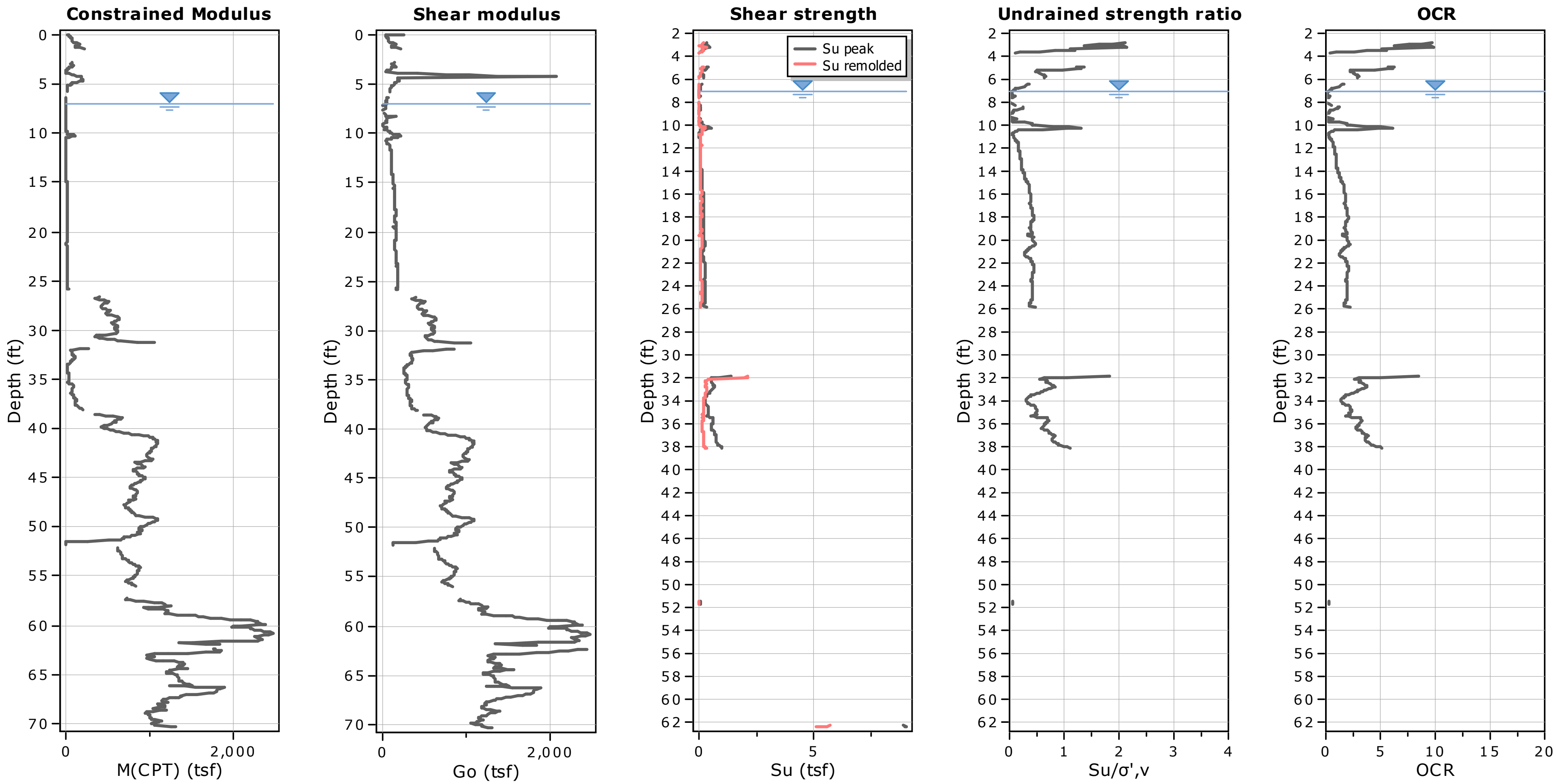
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-214
Total depth: 70.34 ft, Date: 3/8/2018
Surface Elevation: 8.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**

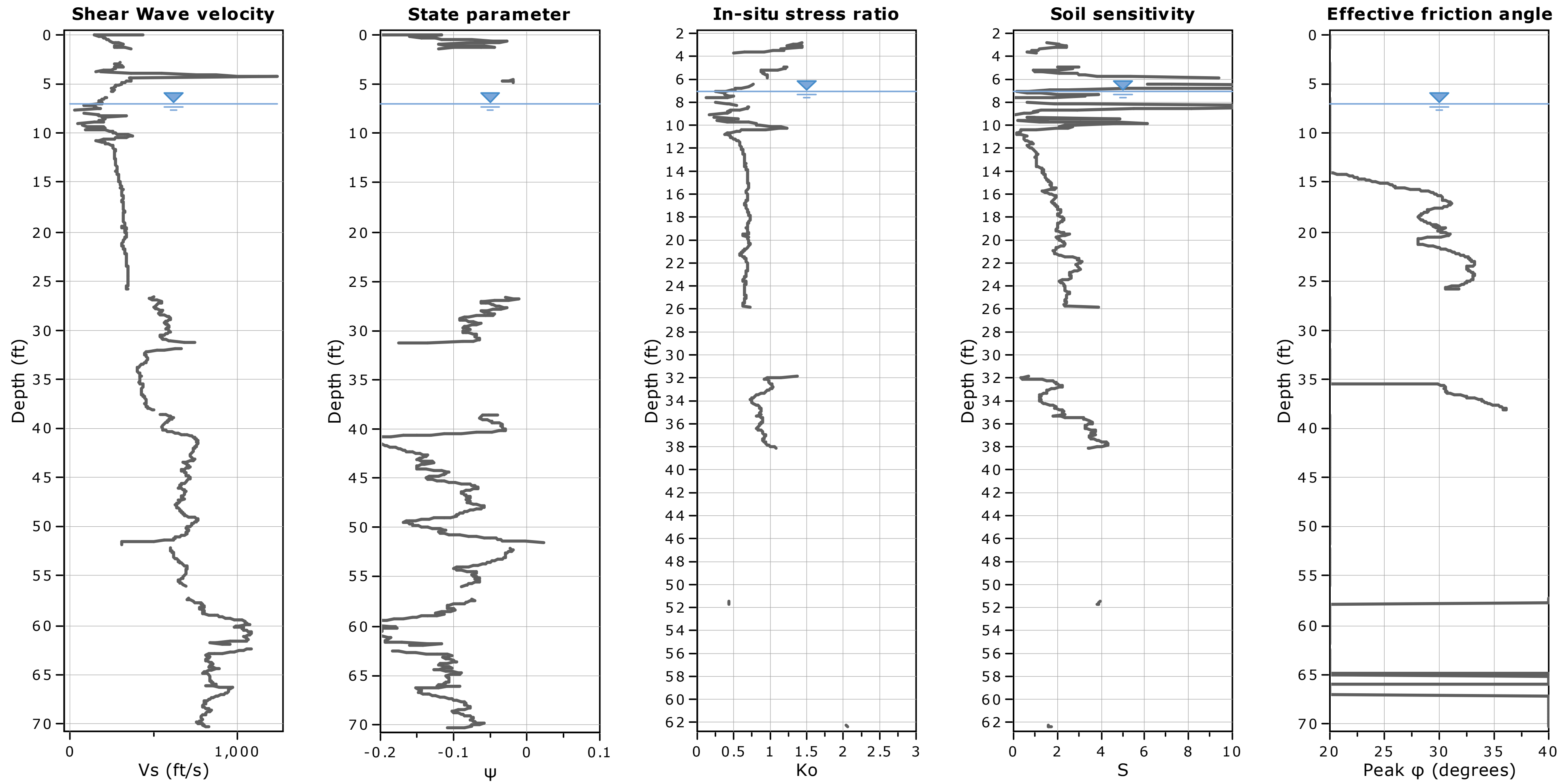


Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-214
Total depth: 70.34 ft, Date: 3/8/2018
Surface Elevation: 8.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

Dissipation Tests Results

Dissipation tests

Dissipation tests consists of stopping the piezocone penetration and observing porepressures (u) with elapsed time (t). The data are automatic recorded by the field computer and should take place until a minimum of 50% dissipation.

The porepressures are plotted as a function of square root of (t). The graphical technique suggested by Robertson and Campanella (1989), yields a value for t_{50}, which corresponds to the time for 50% consolidation.

The value of the coefficient of consolidation in the radial or horizontal direction c_h was then calculated by Houlsby and Teh's (1988) theory using the following equation:

$$c_h = \frac{T \times r^2 \times I_r^{0.5}}{t_{50}}$$

where:

T: time factor given by Houlsby and Teh's (1988) theory corresponding to the porepressure position
r: piezocone radius
I_r: stiffness index, equal to shear modulus G divided by the undrained strength of clay (S_u).
t_{50}: time corresponding to 50% consolidation

Permeability estimates based on dissipation test

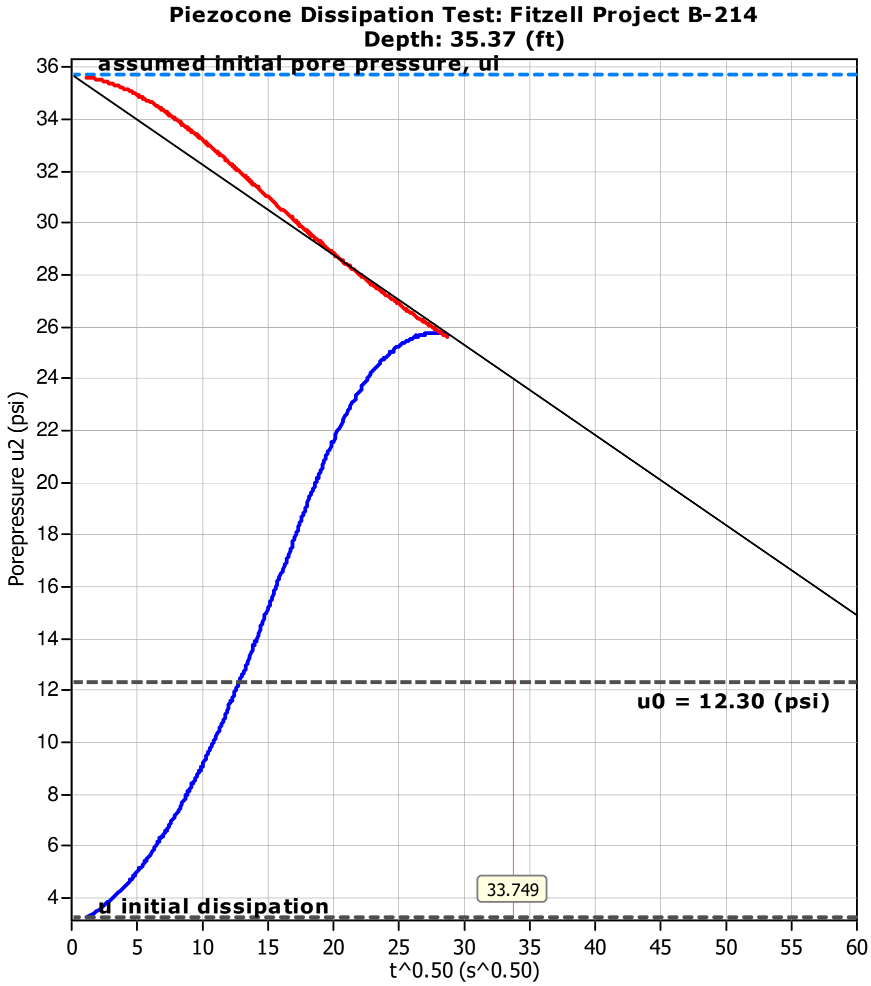
The dissipation of pore pressures during a CPTu dissipation test is controlled by the coefficient of consolidation in the horizontal direction (c_h) which is influenced by a combination of the soil permeability (k_h) and compressibility (M), as defined by the following:

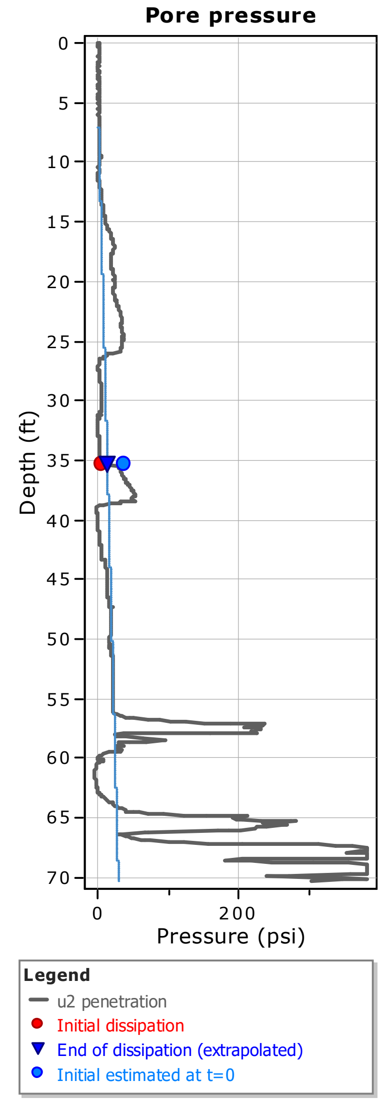
$$k_h = c_h \times \gamma_w / M$$

where: M is the 1-D constrained modulus and γ_w is the unit weight of water, in compatible units.

Tabular results

CPTU Borehole	Depth (ft)	$(t_{50})^{0.50}$	t_{50} (s)	t_{50} (years)	G/S_u	c_h (ft²/s)	c_h (ft²/year)	M (tsf)	k_h (ft/s)
Fitzell Project B-214	35.37	33.7	1139	3.61E-005	704103.13	6.18E-004	19479	35.01	5.51E-007


Piezocone Dissipation Test: Fitzell Project B-214
Depth: 35.37 (ft)
assumed initial pore pressure, ui
u0 = 12.30 (psi)
u initial dissipation
33.749
Porepressure u2 (psi)
t^0.50 (s^0.50)


Pore pressure
Depth (ft)
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0

HILLIS-CARNES
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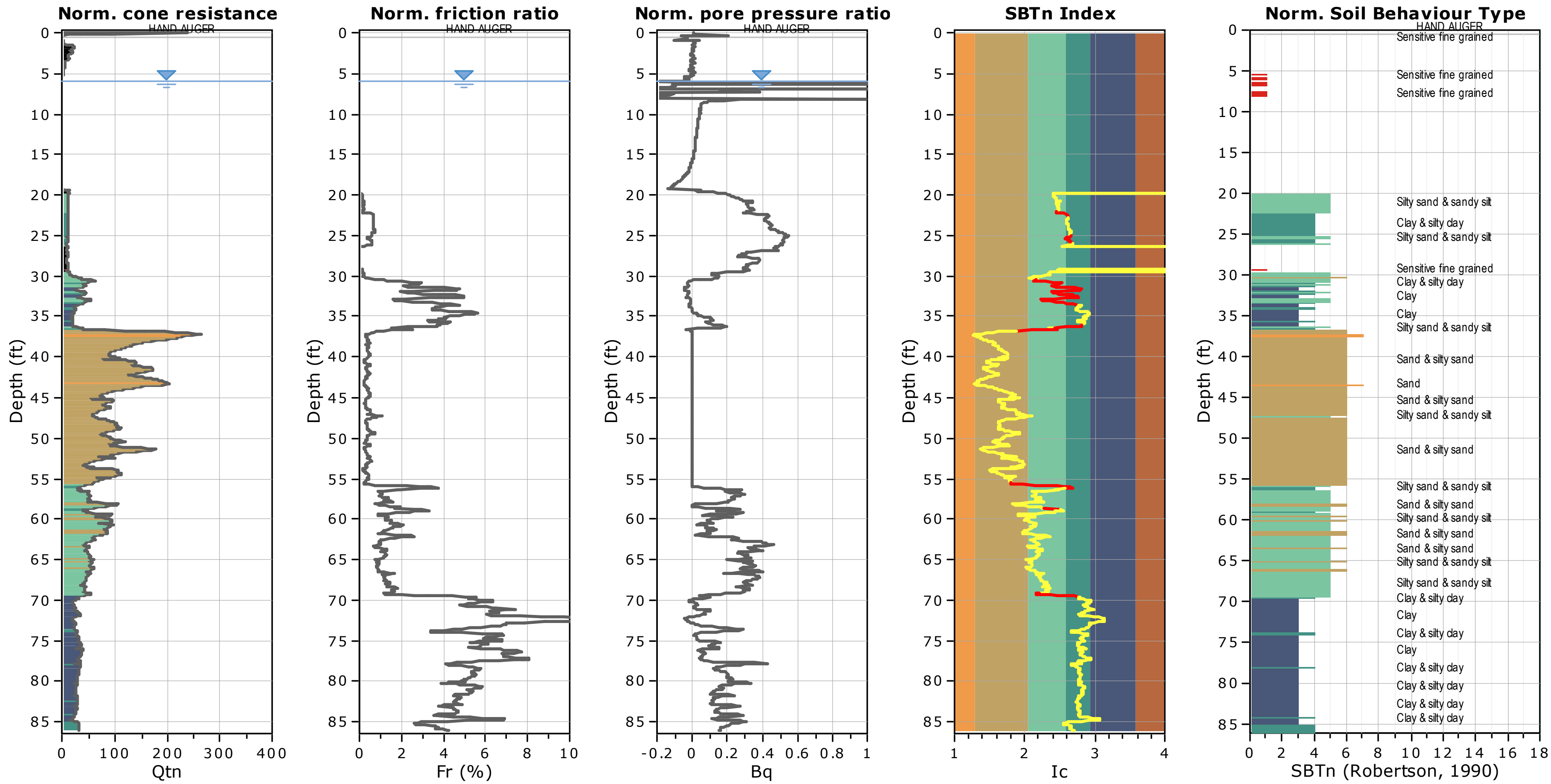
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

Project: **S18032 Fitzell Substation In Situ**

Location: **Sparrows Point, Maryland**

CPT: Fitzell Project B-215 offset

Total depth: 86.09 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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Engineering Associates, Inc.
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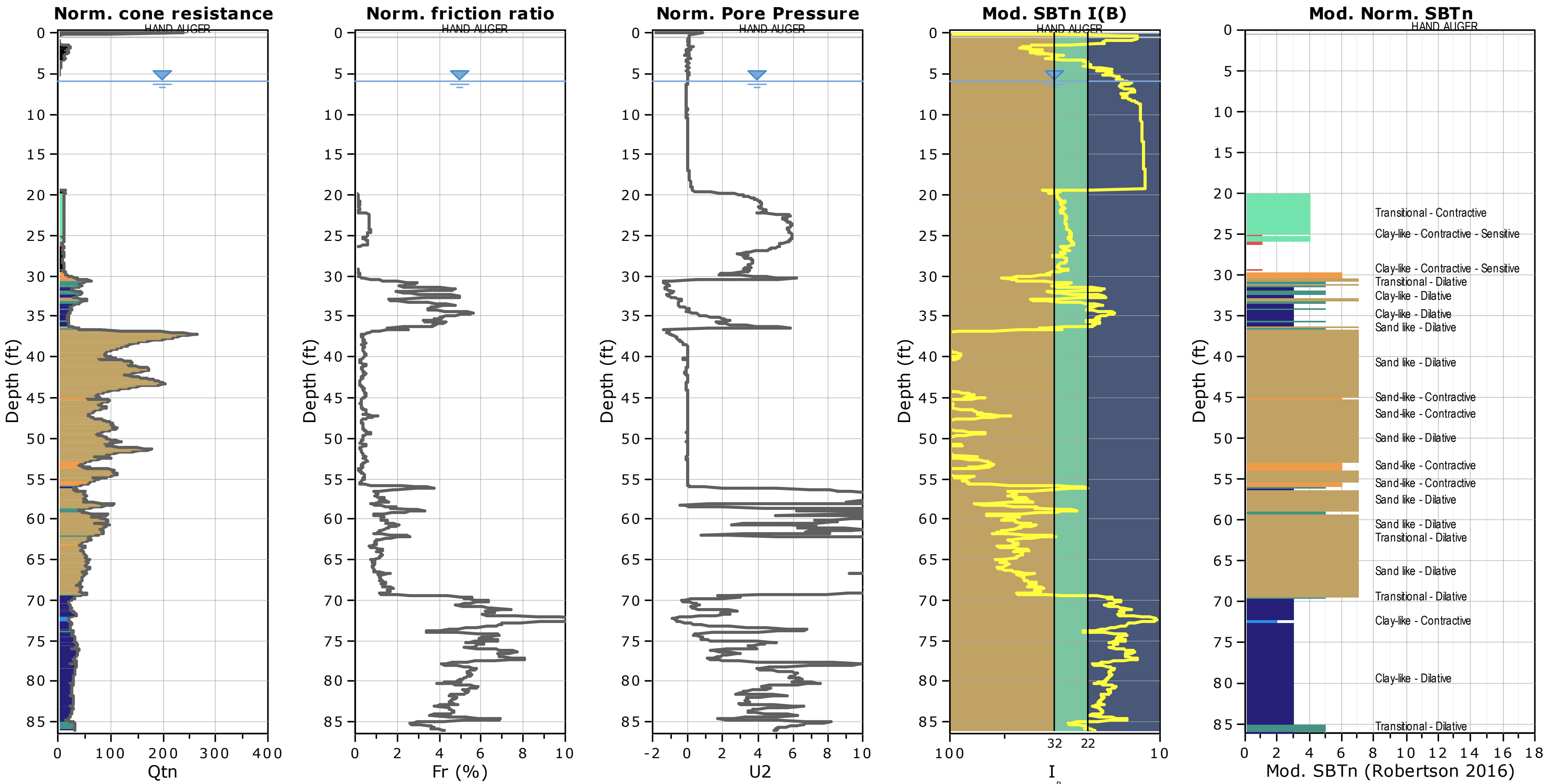
CPT: Fitzell Project B-215 offset

Total depth: 86.09 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**

Location: **Sparrows Point, Maryland**



Mod. SBTn legend

- 1. CCS: ClayLike - Contractive, Sensitive
- 2. CC: Clay-like - Contractive
- 3. CD: Clay-Like: Dilative
- 4. TC: Transitional - Contractive
- 5. TD: Transitional - Dilative
- 6. SC: Sand-like - Contractive
- 7. SD: Sand-like - Dilative

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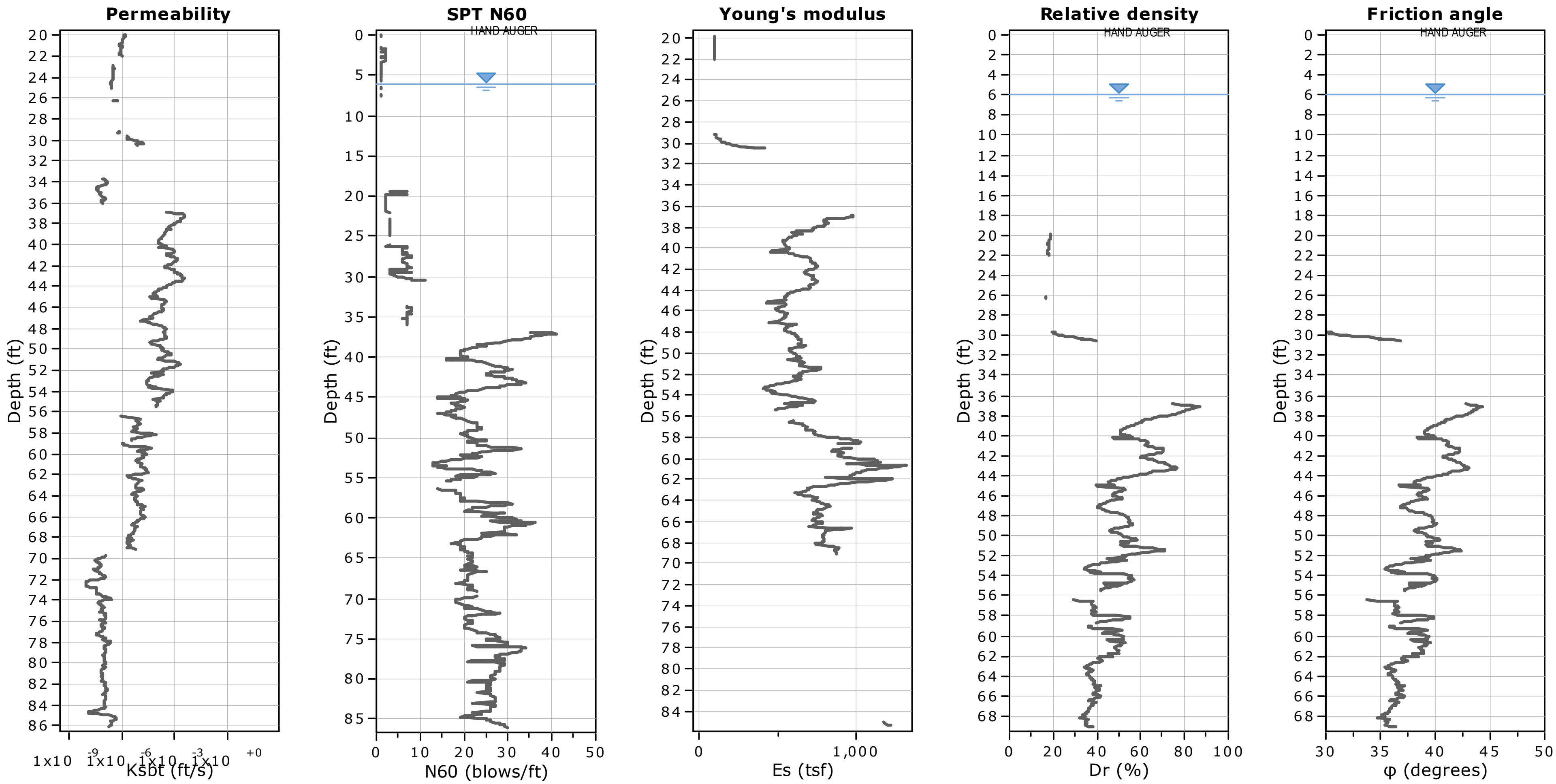
CPT: Fitzell Project B-215 offset
Total depth: 86.09 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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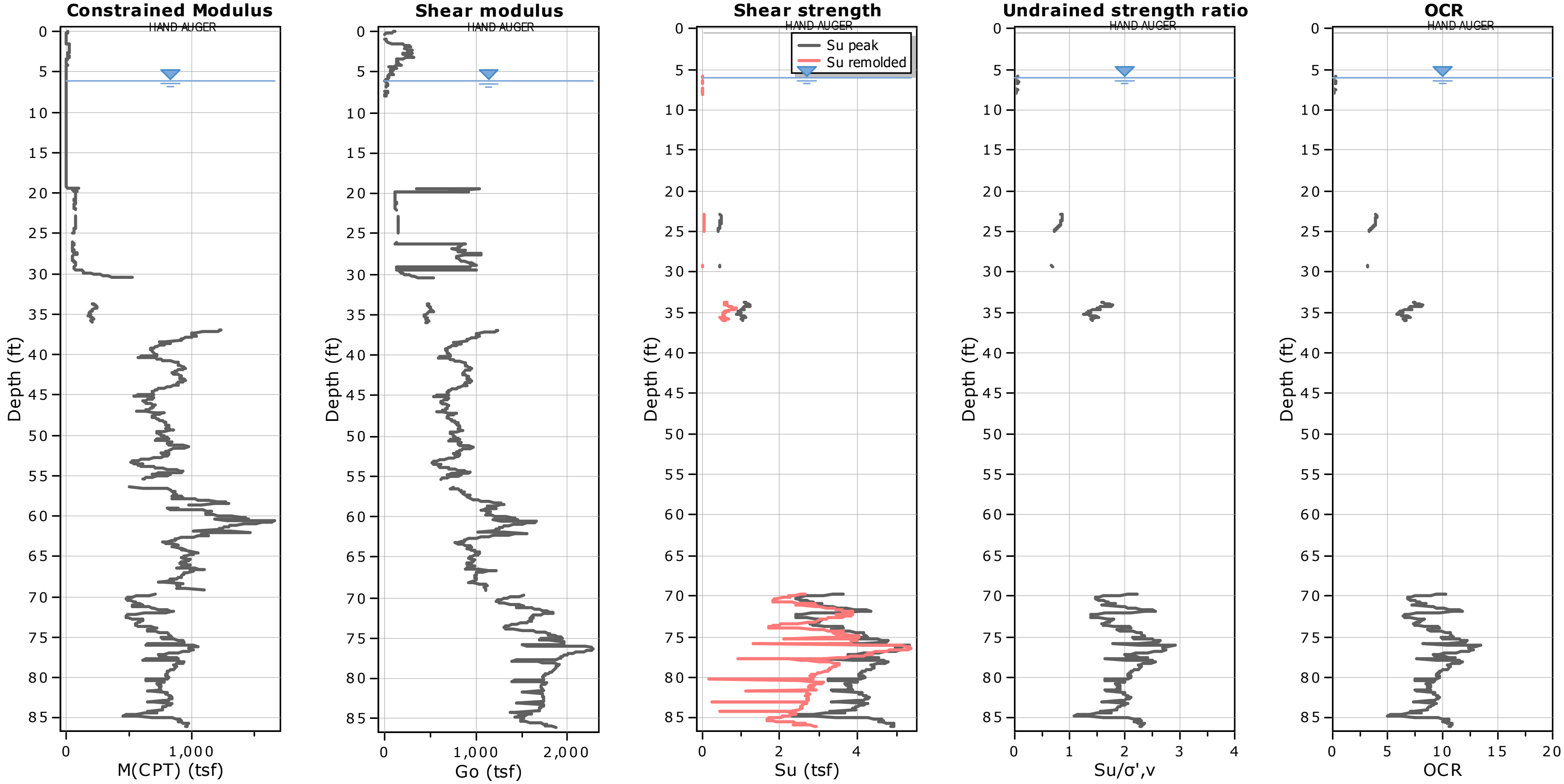
CPT: Fitzell Project B-215 offset
Total depth: 86.09 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

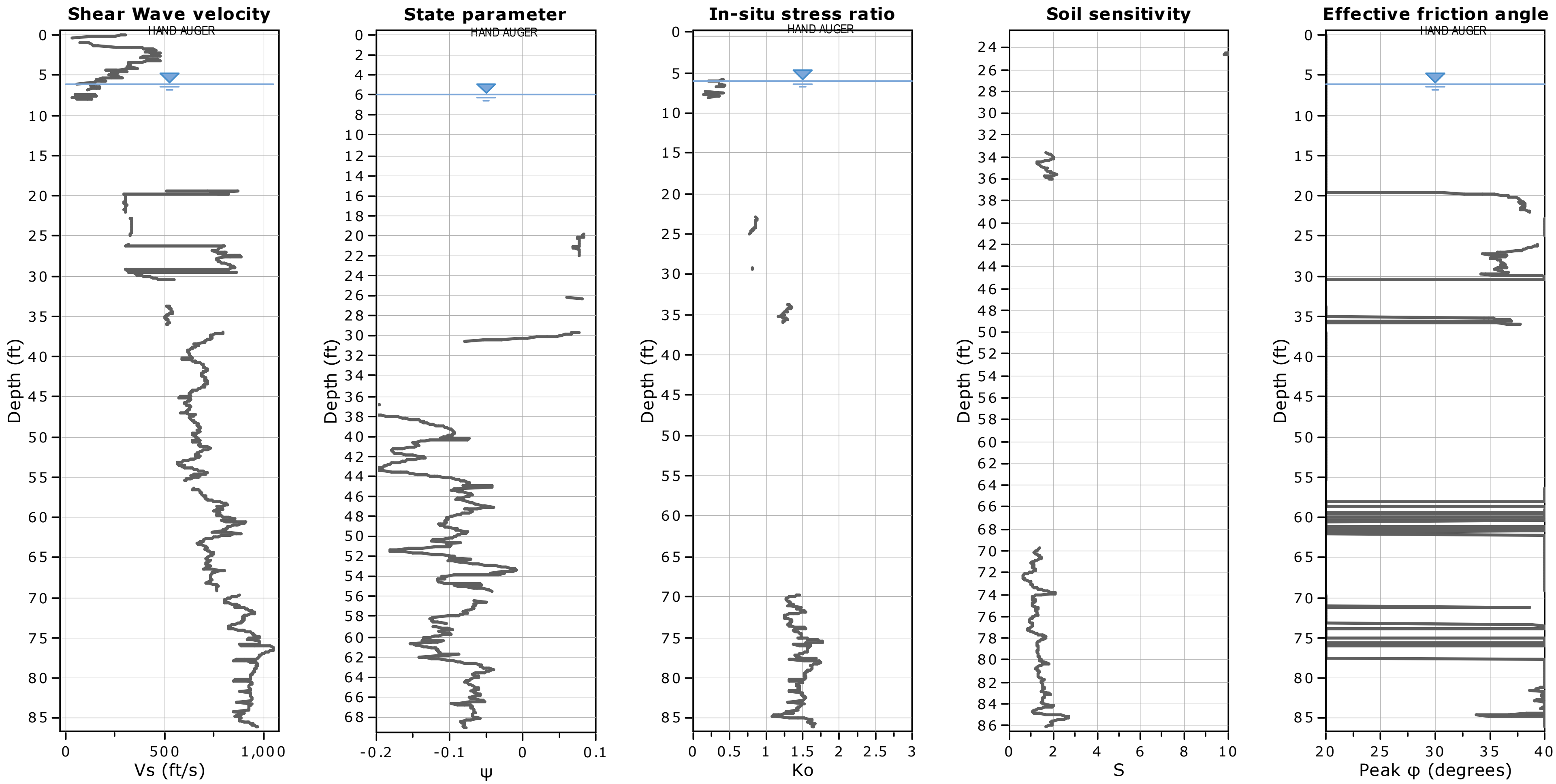
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

Project: S18032 Fitzell Substation In Situ
Location: Sparrows Point, Maryland

CPT: Fitzell Project B-215 offset
Total depth: 86.09 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

Dissipation Tests Results

Dissipation tests

Dissipation tests consists of stopping the piezocone penetration and observing porepressures (u) with elapsed time (t). The data are automatic recorded by the field computer and should take place until a minimum of 50% dissipation.

The porepressures are plotted as a function of square root of (t). The graphical technique suggested by Robertson and Campanella (1989), yields a value for t_{50}, which corresponds to the time for 50% consolidation.

The value of the coefficient of consolidation in the radial or horizontal direction c_h was then calculated by Houlsby and Teh's (1988) theory using the following equation:

$$c_h = \frac{T \times r^2 \times I_r^{0.5}}{t_{50}}$$

where:

T: time factor given by Houlsby and Teh's (1988) theory corresponding to the porepressure position
r: piezocone radius
I_r: stiffness index, equal to shear modulus G divided by the undrained strength of clay (S_u).
t_{50}: time corresponding to 50% consolidation

Permeability estimates based on dissipation test

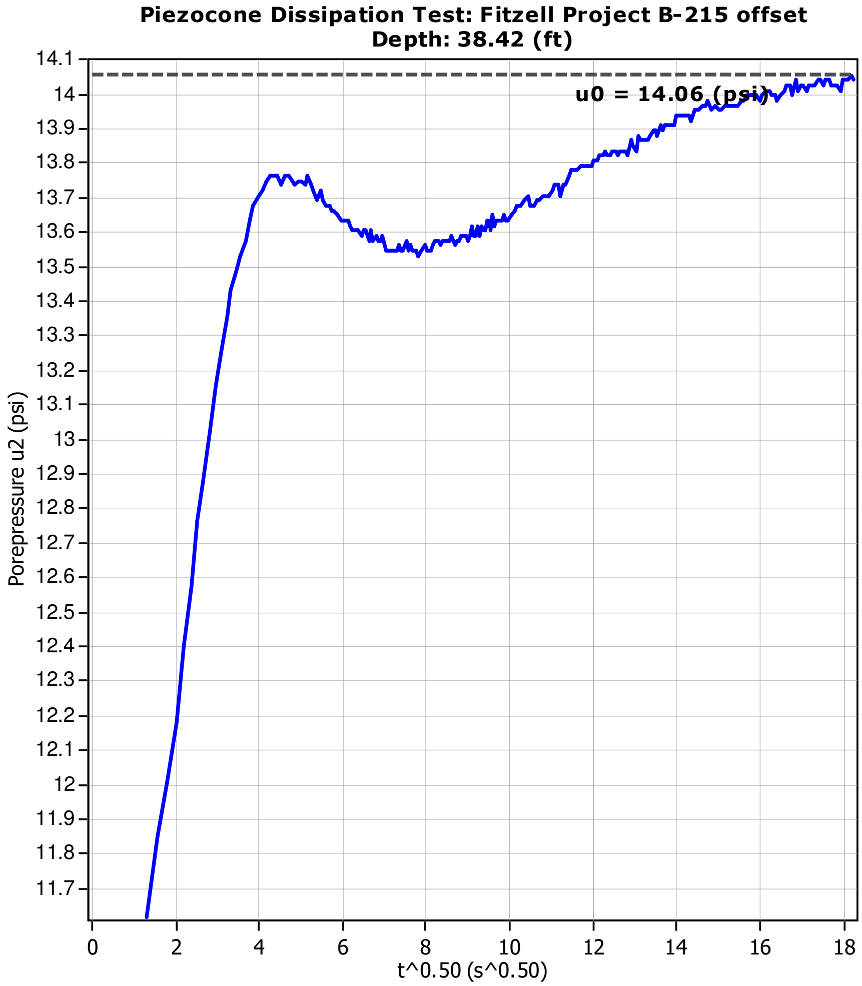
The dissipation of pore pressures during a CPTu dissipation test is controlled by the coefficient of consolidation in the horizontal direction (c_h) which is influenced by a combination of the soil permeability (k_h) and compressibility (M), as defined by the following:

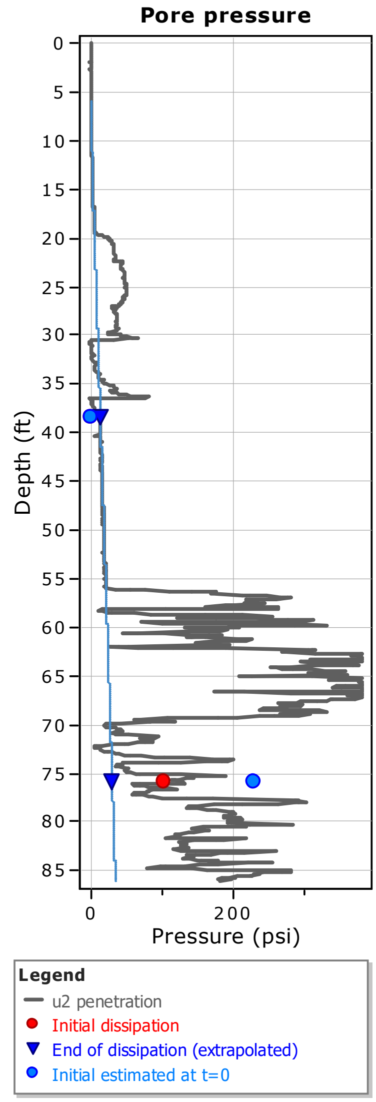
$$k_h = c_h \times \gamma_w / M$$

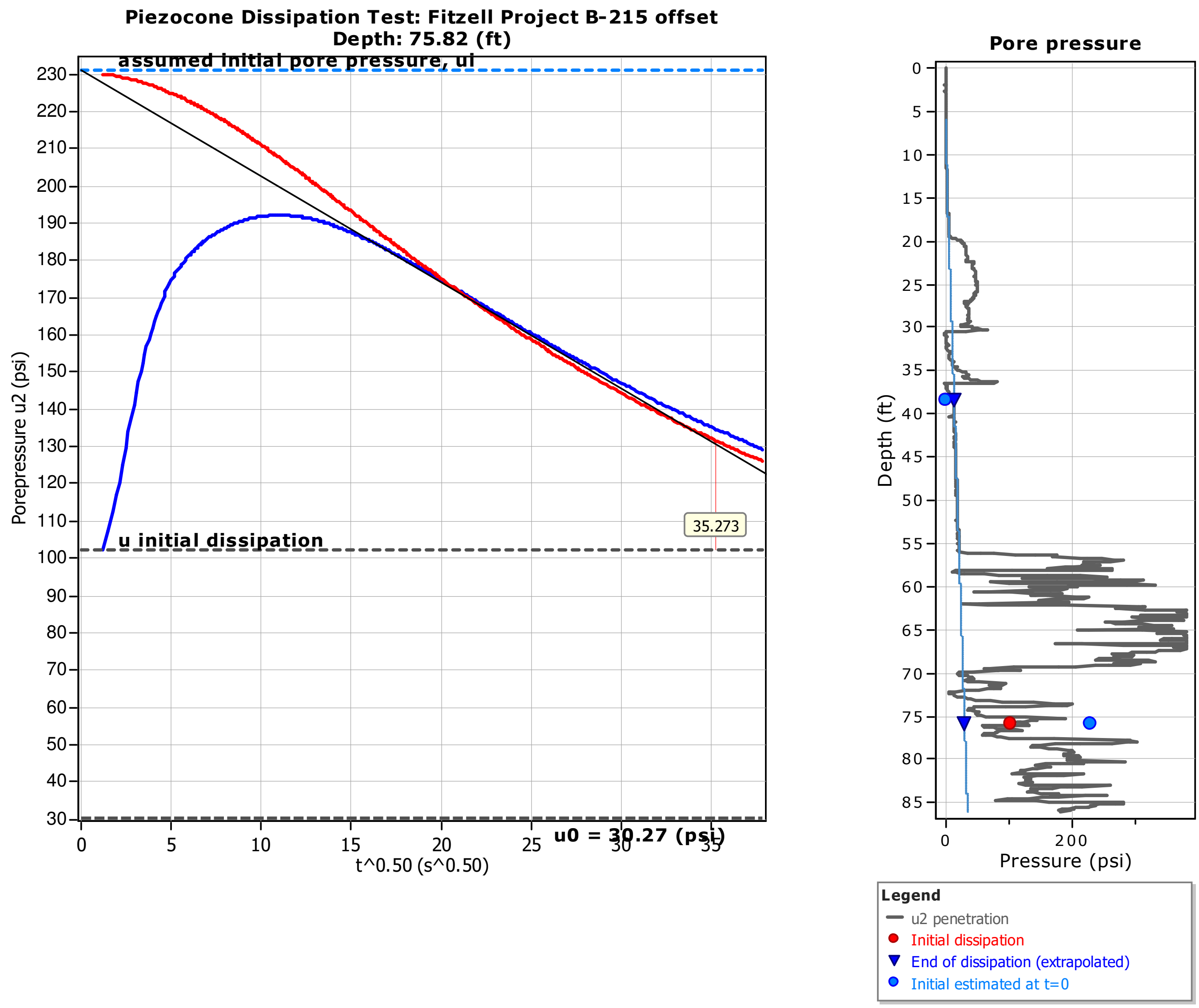
where: M is the 1-D constrained modulus and γ_w is the unit weight of water, in compatible units.

Tabular results

CPTU Borehole	Depth (ft)	$(t_{50})^{0.50}$	t_{50} (s)	t_{50} (years)	G/S_u	c_h (ft^2/s)	c_h ($ft^2/year$)	M (tsf)	k_h (ft/s)
Fitzell Project B-215	38.42	0.0	0	0.00E+000	100.00	0.00E+000	0	787.06	-1.00E+004
Fitzell Project B-215	75.82	35.3	1244	3.95E-005	429223.78	4.41E-004	13923	812.43	1.70E-008


Piezocone Dissipation Test: Fitzell Project B-215 offset
Depth: 38.42 (ft)
u0 = 14.06 (psi)
Porepressure u2 (psi)
t^0.50 (s^0.50)


Pore pressure
Depth (ft)
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0


Piezocone Dissipation Test: Fitzell Project B-215 offset
Depth: 75.82 (ft)
assumed initial pore pressure, ui
u initial dissipation
35.273
u0 = 30.27 (psi)
Porepressure u2 (psi)
t^0.50 (s^0.50)
Pore pressure
Depth (ft)
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0

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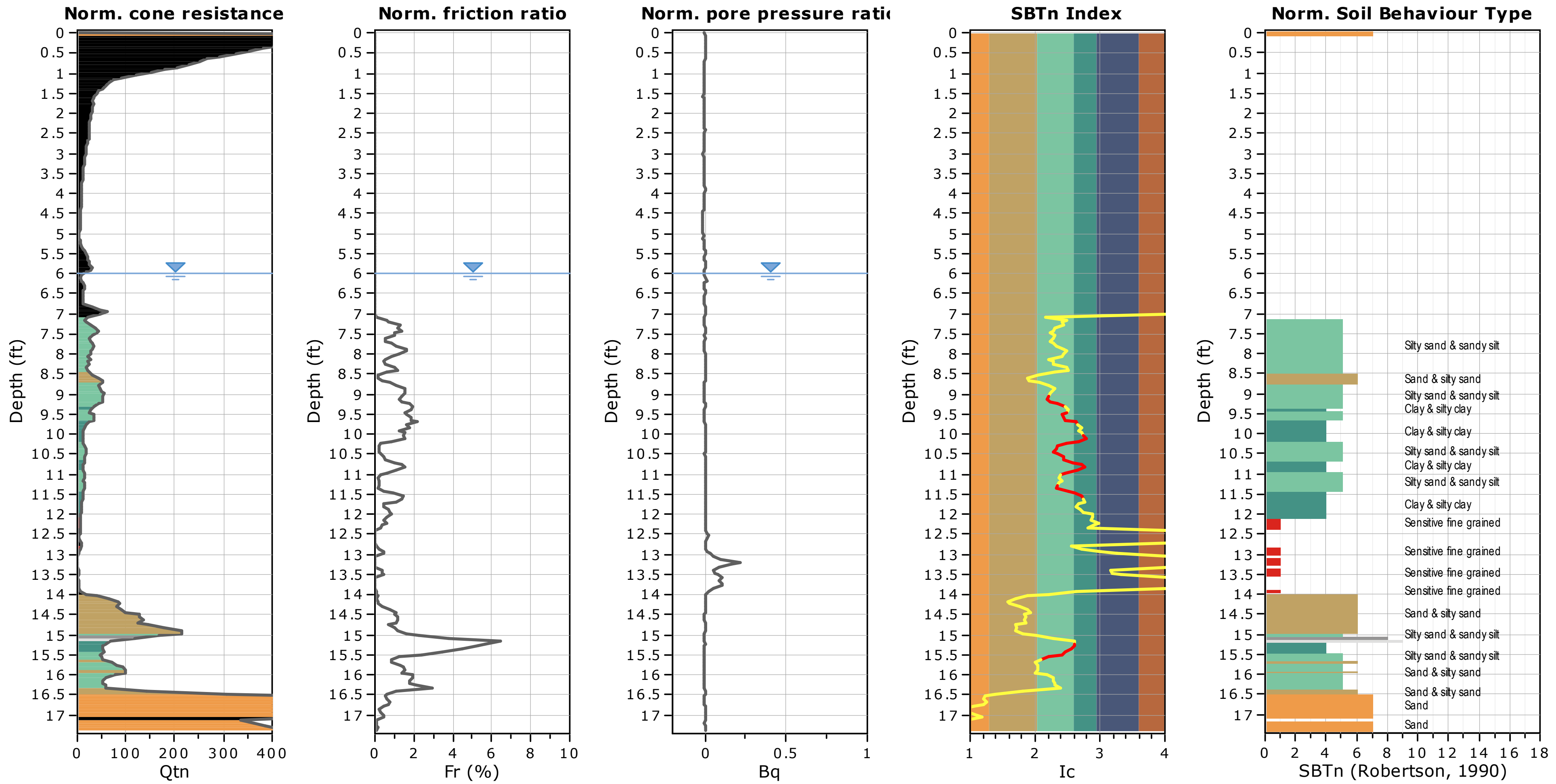
http://www.hcea.com

CPT: Fitzell Project B-215
Total depth: 17.39 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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Engineering Associates, Inc.
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http://www.hcea.com

Project: **S18032 Fitzell Substation In Situ**

Location: **Sparrows Point, Maryland**

CPT: Fitzell Project B-215

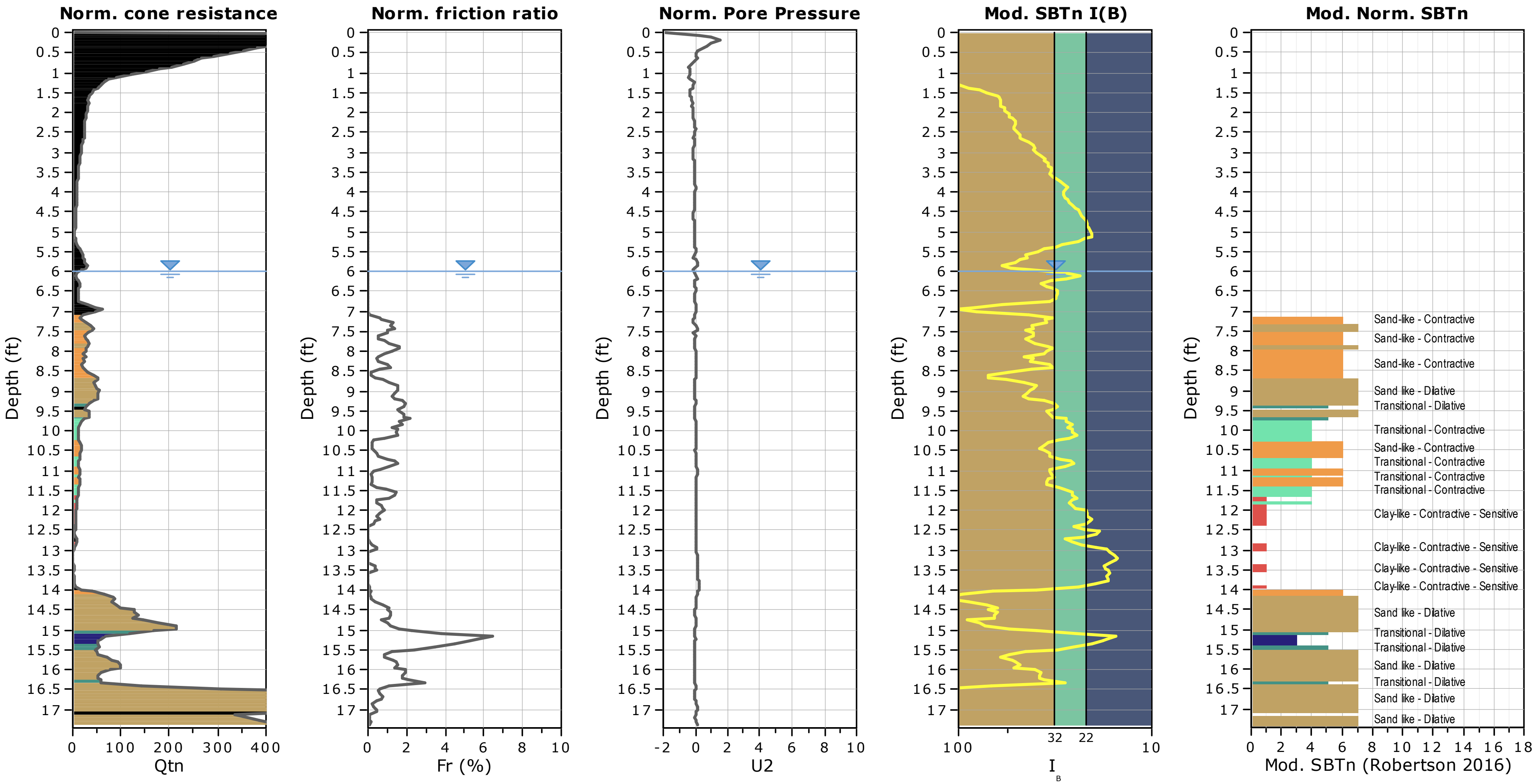
Total depth: 17.39 ft, Date: 3/8/2018

Surface Elevation: 7.00 ft

Coords: X:0.00, Y:0.00

Cone Type: NOVA U2

Cone Operator: R. Harman



Mod. SBTn legend

1. CCS: ClayLike - Contractive, Sensitive
2. CC: Clay-like - Contractive
3. CD: Clay-Like: Dilative
4. TC: Transitional - Contractive
5. TD: Transitional - Dilative
6. SC: Sand-like - Contractive
7. SD: Sand-like - Dilative

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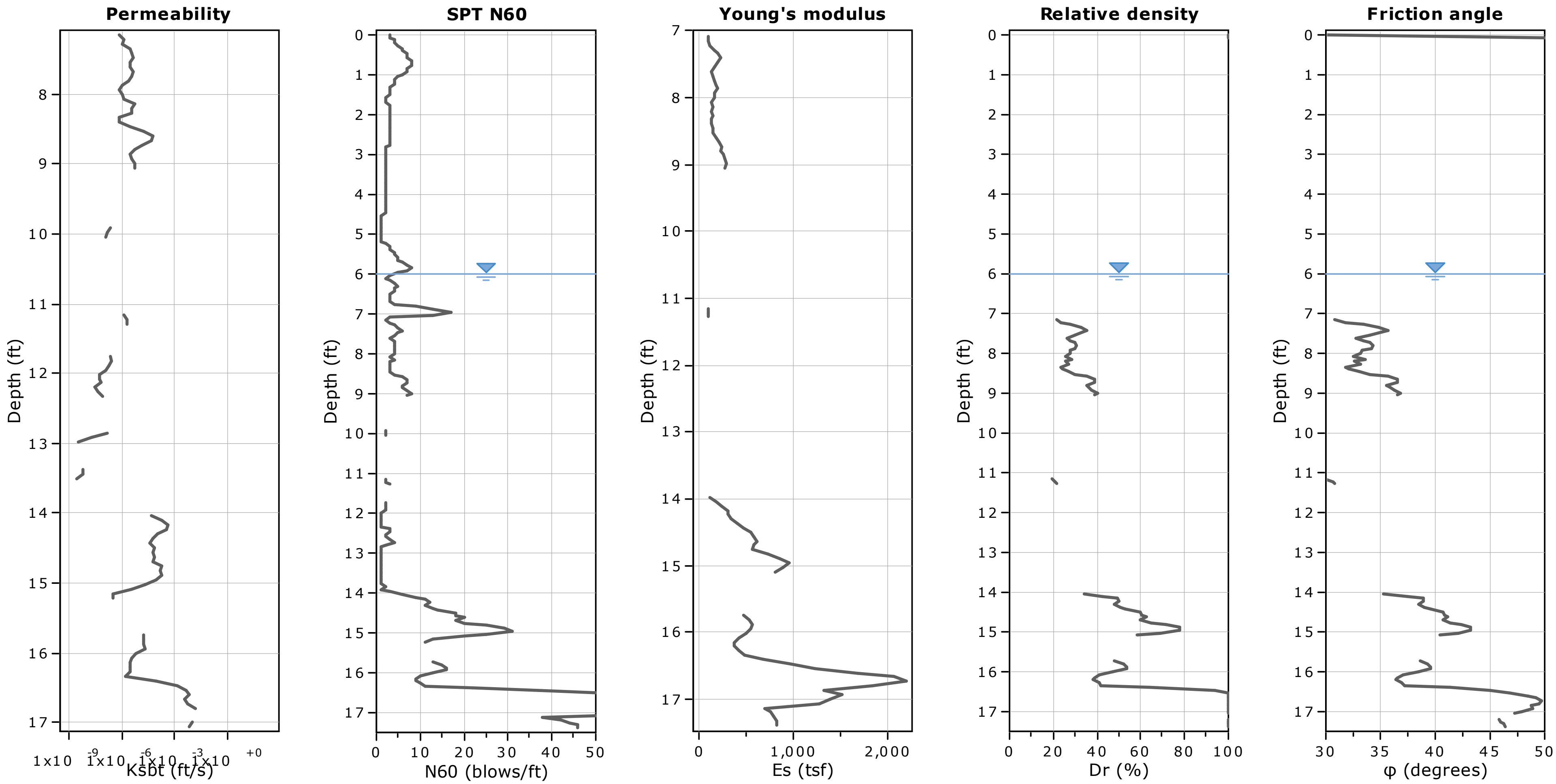
CPT: Fitzell Project B-215
Total depth: 17.39 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60}: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative desnisty constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

User defined estimation data

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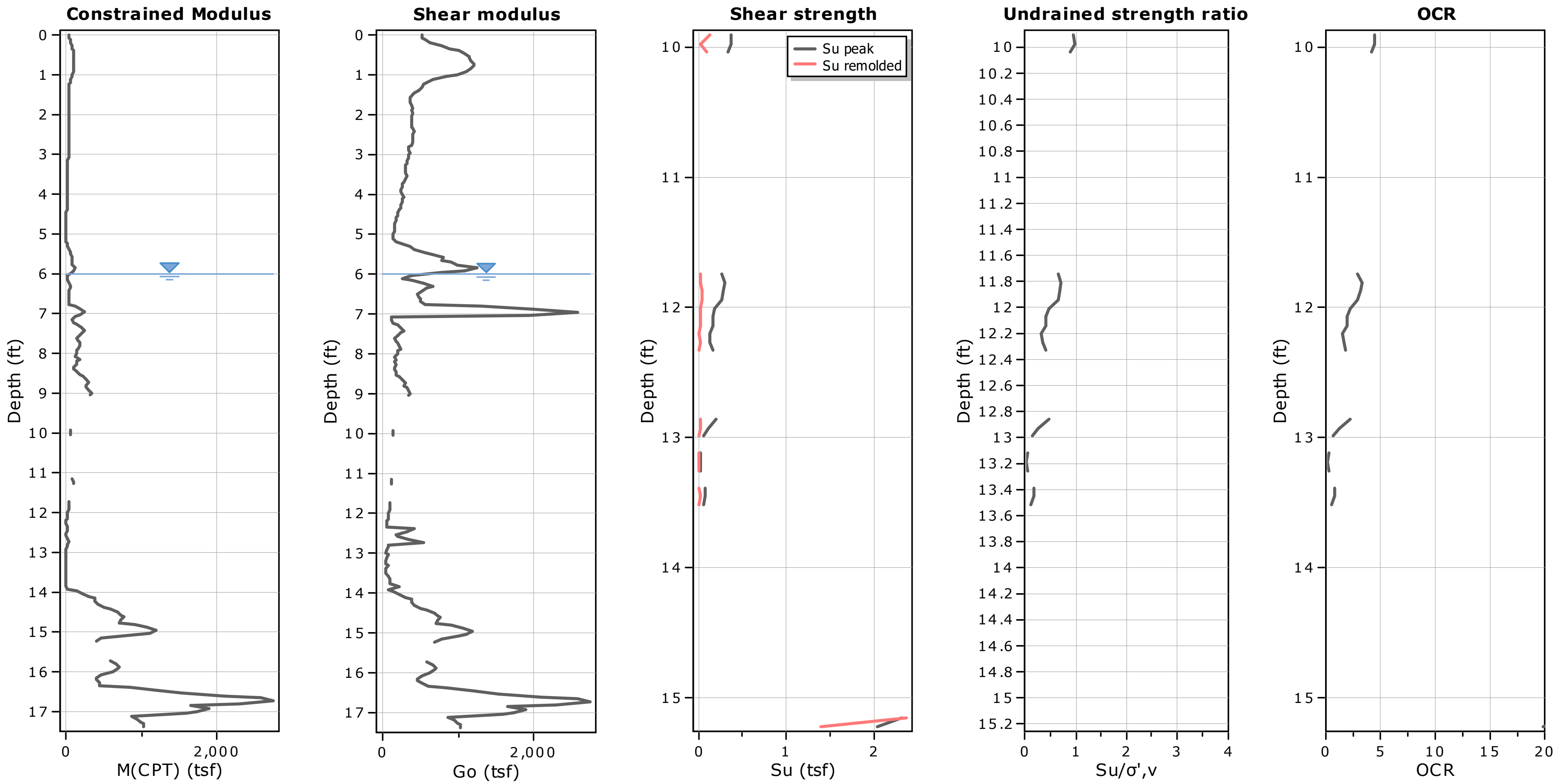
CPT: Fitzell Project B-215
Total depth: 17.39 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

HILLIS-CARNES ENGINEERING ASSOCIATES

HILLIS-CARNES
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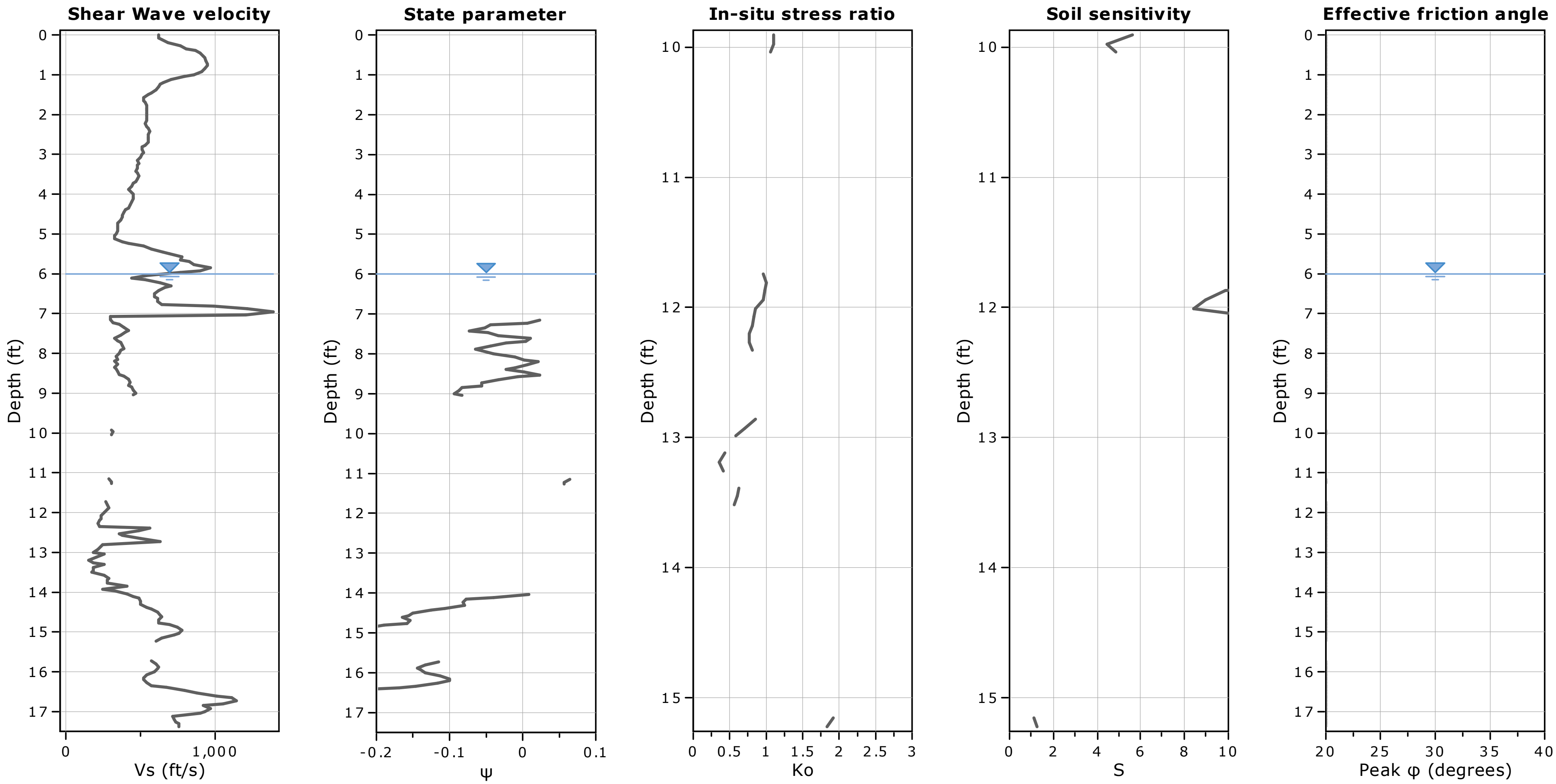
CPT: Fitzell Project B-215
Total depth: 17.39 ft, Date: 3/8/2018
Surface Elevation: 7.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

HILLIS-CARNES
Engineering Associates, Inc.
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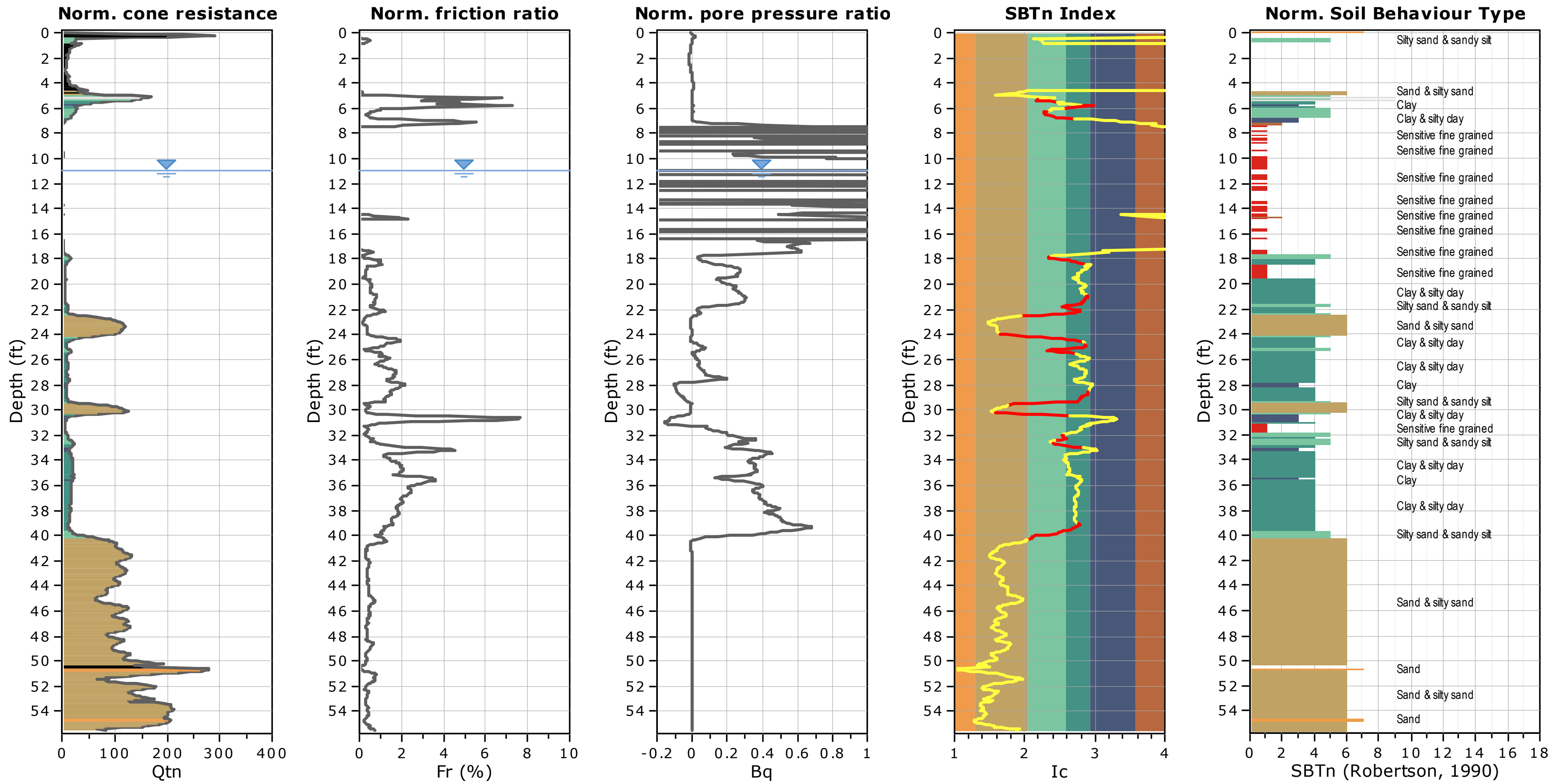
http://www.hcea.com

CPT: Fitzell Project B-216
Total depth: 55.51 ft, Date: 3/8/2018
Surface Elevation: 12.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

HILLIS-CARNES
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417 Maryland Avenue, Delmar, MD 21875
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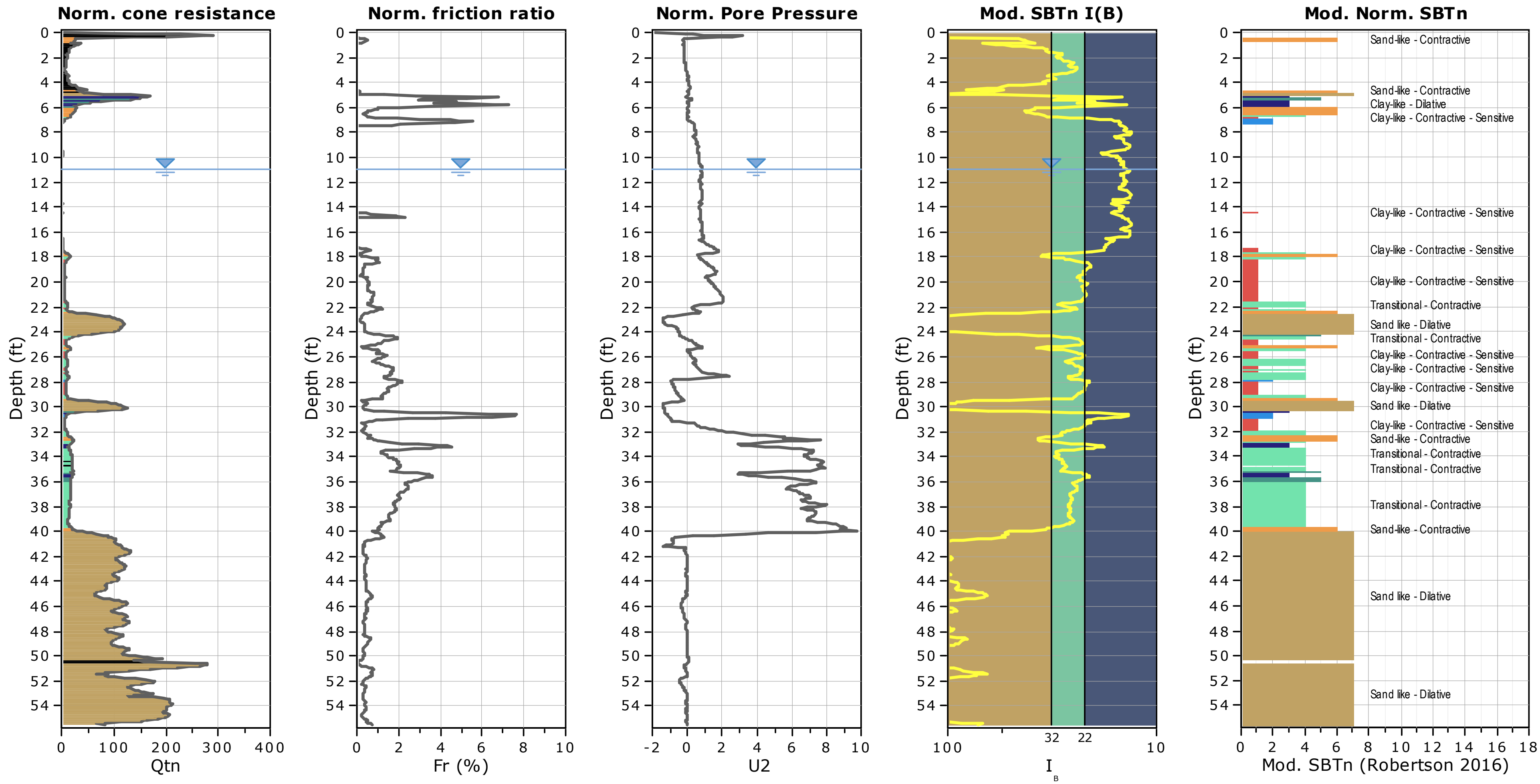
Project: S18032 Fitzell Substation In Situ

Location: Sparrows Point, Maryland

CPT: Fitzell Project B-216

Total depth: 55.51 ft, Date: 3/8/2018
Surface Elevation: 12.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman



Mod. SBTn legend

1. CCS: ClayLike - Contractive, Sensitive
2. CC: Clay-like - Contractive
3. CD: Clay-Like: Dilative
4. TC: Transitional - Contractive
5. TD: Transitional - Dilative
6. SC: Sand-like - Contractive
7. SD: Sand-like - Dilative

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CPT: Fitzell Project B-216
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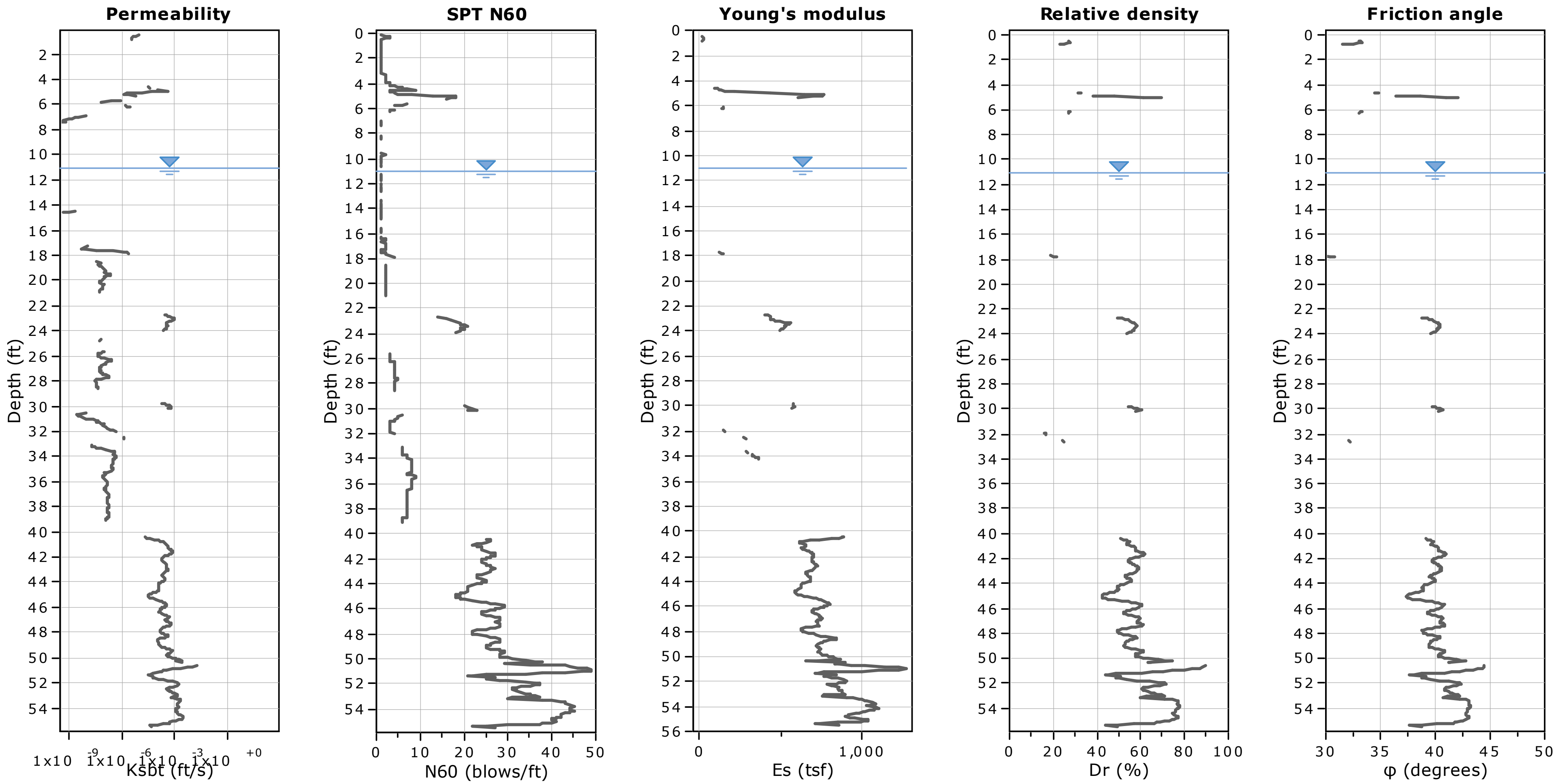
Surface Elevation: 12.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters
Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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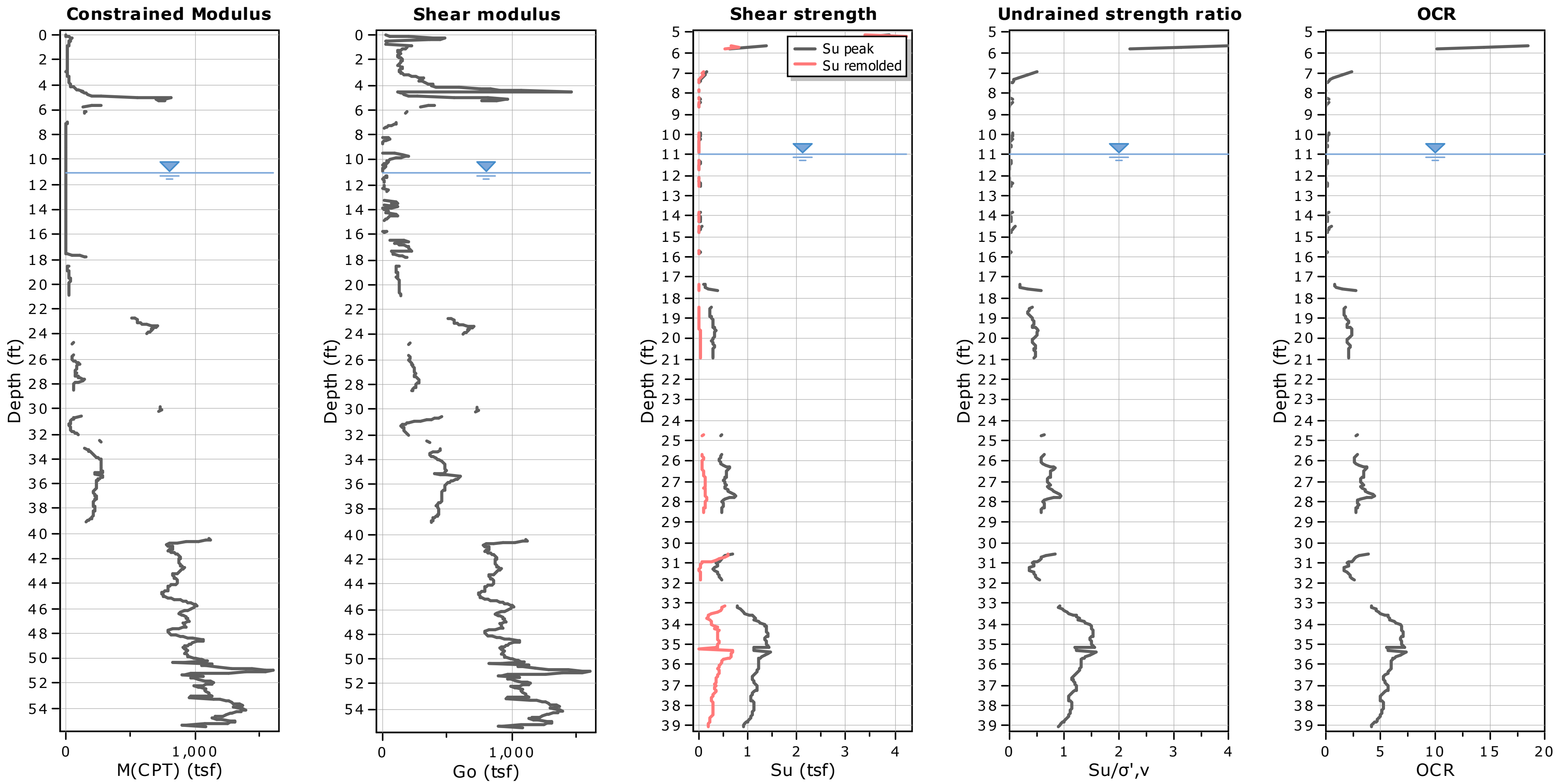
CPT: Fitzell Project B-216
Total depth: 55.51 ft, Date: 3/8/2018
Surface Elevation: 12.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

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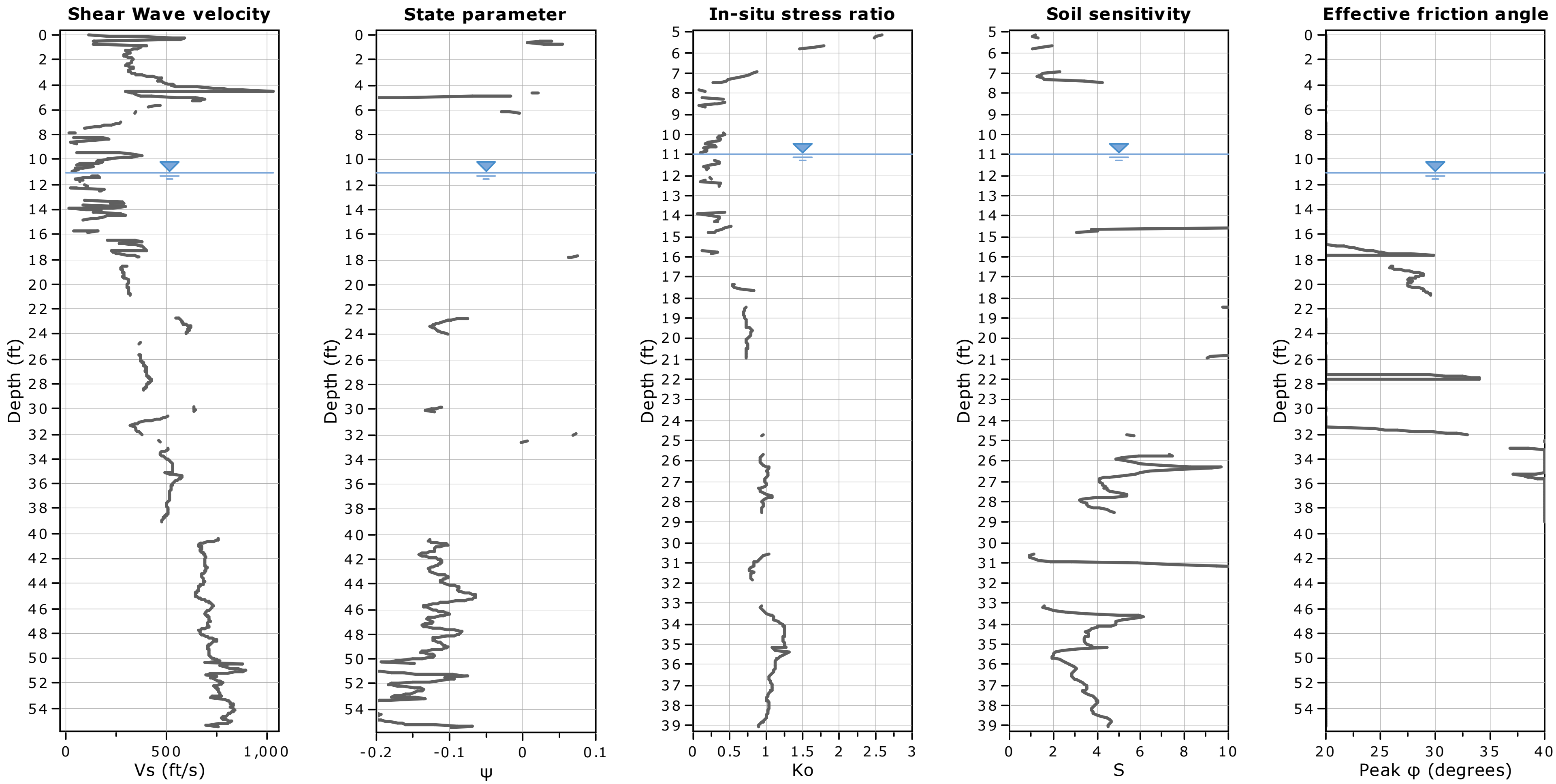
http://www.hcea.com

CPT: Fitzell Project B-216
Total depth: 55.51 ft, Date: 3/8/2018
Surface Elevation: 12.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: S18032 Fitzell Substation In Situ
Location: Sparrows Point, Maryland



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

Dissipation Tests Results

Dissipation tests

Dissipation tests consists of stopping the piezocone penetration and observing porepressures (u) with elapsed time (t). The data are automatic recorded by the field computer and should take place until a minimum of 50% dissipation.

The porepressures are plotted as a function of square root of (t). The graphical technique suggested by Robertson and Campanella (1989), yields a value for t_{50}, which corresponds to the time for 50% consolidation.

The value of the coefficient of consolidation in the radial or horizontal direction c_h was then calculated by Houlsby and Teh's (1988) theory using the following equation:

$$c_h = \frac{T \times r^2 \times I_r^{0.5}}{t_{50}}$$

where:

T: time factor given by Houlsby and Teh's (1988) theory corresponding to the porepressure position
r: piezocone radius
I_r: stiffness index, equal to shear modulus G divided by the undrained strength of clay (S_u).
t_{50}: time corresponding to 50% consolidation

Permeability estimates based on dissipation test

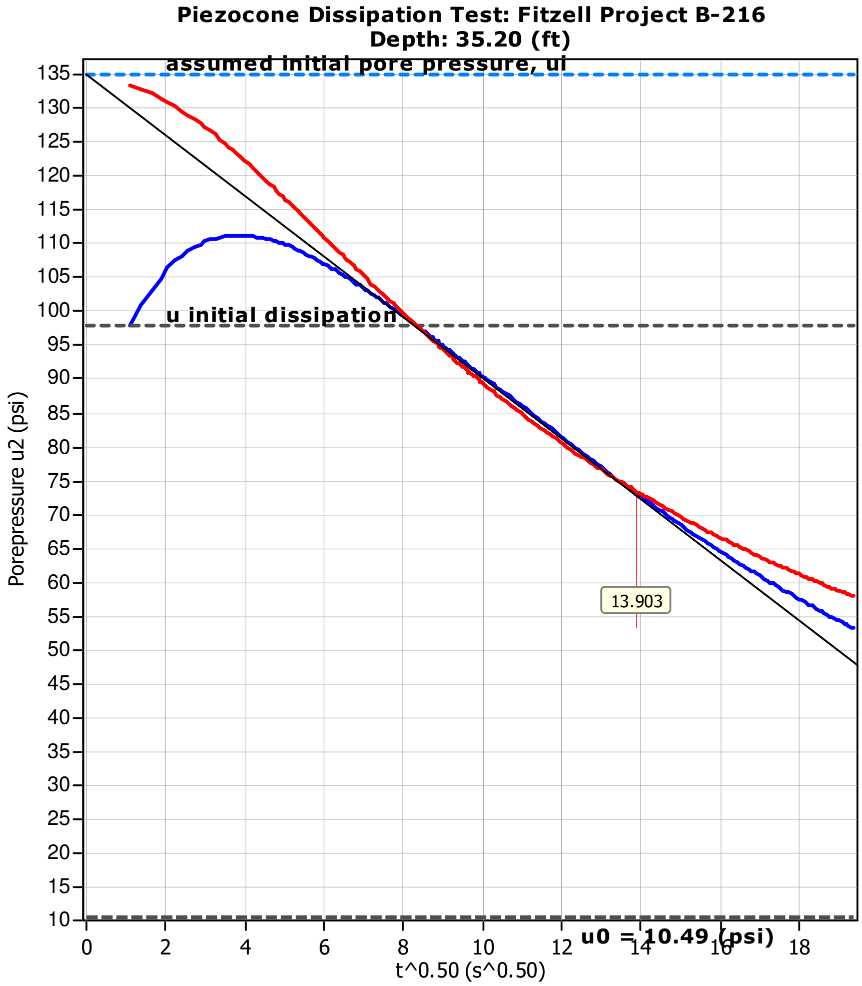
The dissipation of pore pressures during a CPTu dissipation test is controlled by the coefficient of consolidation in the horizontal direction (c_h) which is influenced by a combination of the soil permeability (k_h) and compressibility (M), as defined by the following:

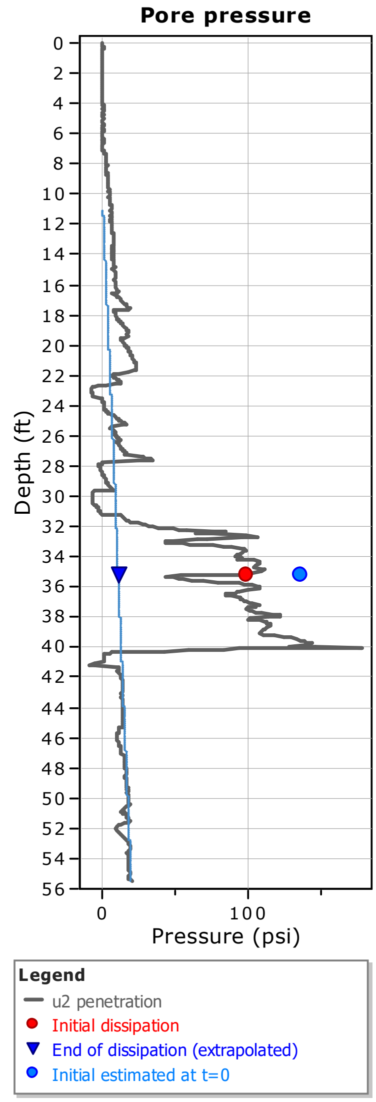
$$k_h = c_h \times \gamma_w / M$$

where: M is the 1-D constrained modulus and γ_w is the unit weight of water, in compatible units.

Tabular results

CPTU Borehole	Depth (ft)	$(t_{50})^{0.50}$	t_{50} (s)	t_{50} (years)	G/S_u	c_h (ft^2/s)	c_h (ft^2/year)	M (tsf)	k_h (ft/s)
Fitzell Project B-216	35.20	13.9	193	6.13E-006	352660.66	2.58E-003	81241	216.92	3.71E-007

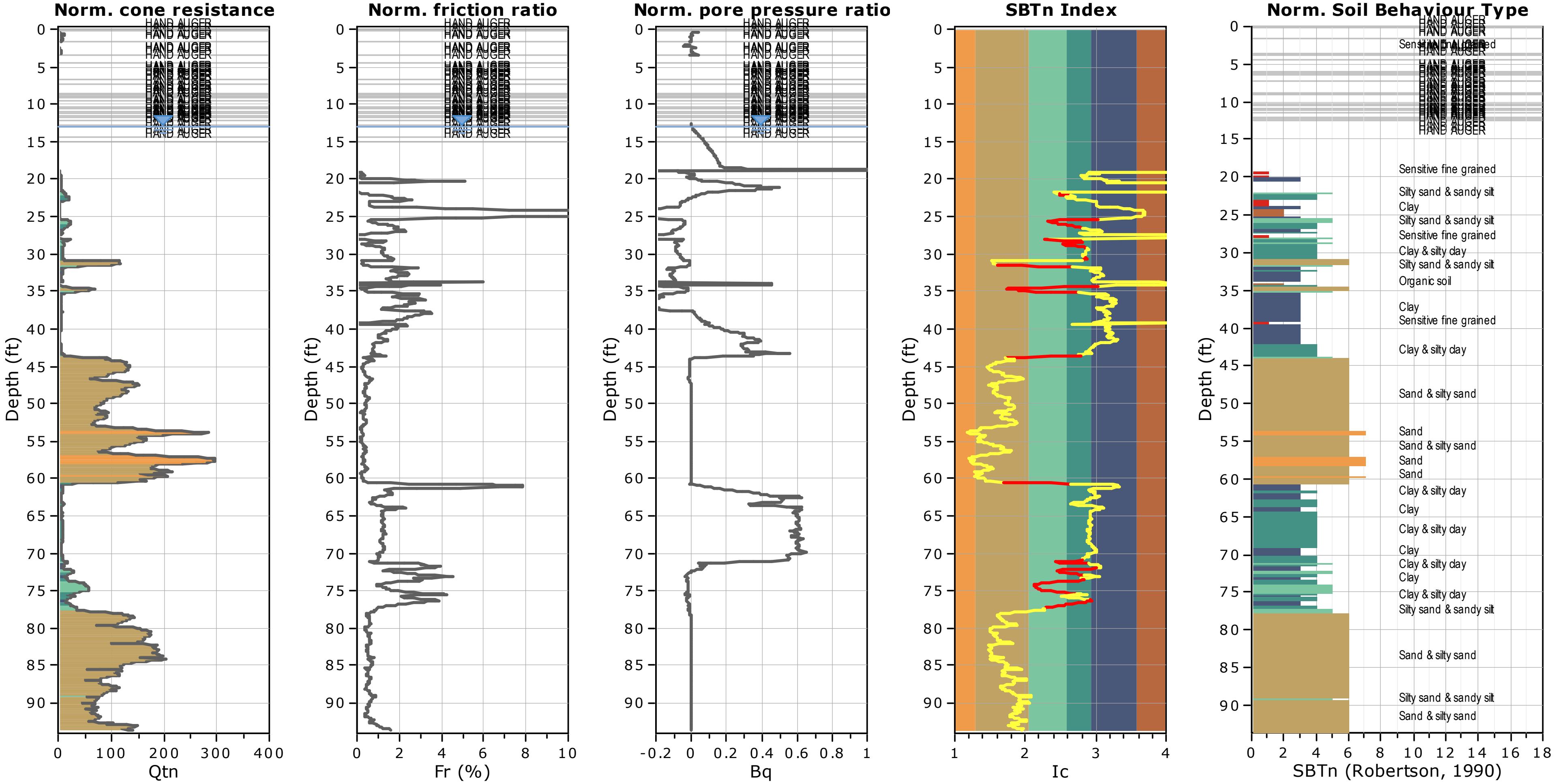

Piezocone Dissipation Test: Fitzell Project B-216
Depth: 35.20 (ft)
assumed initial pore pressure, ui
u initial dissipation
13.903
u0 = 10.49 (psi)
Porepressure u2 (psi)
t^0.50 (s^0.50)


Pore pressure
Depth (ft)
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-217
Total depth: 93.64 ft, Date: 3/8/2018
Surface Elevation: 13.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: S18032 Fitzell Substation In Situ
Location: Sparrows Point, Maryland



SBTn legend

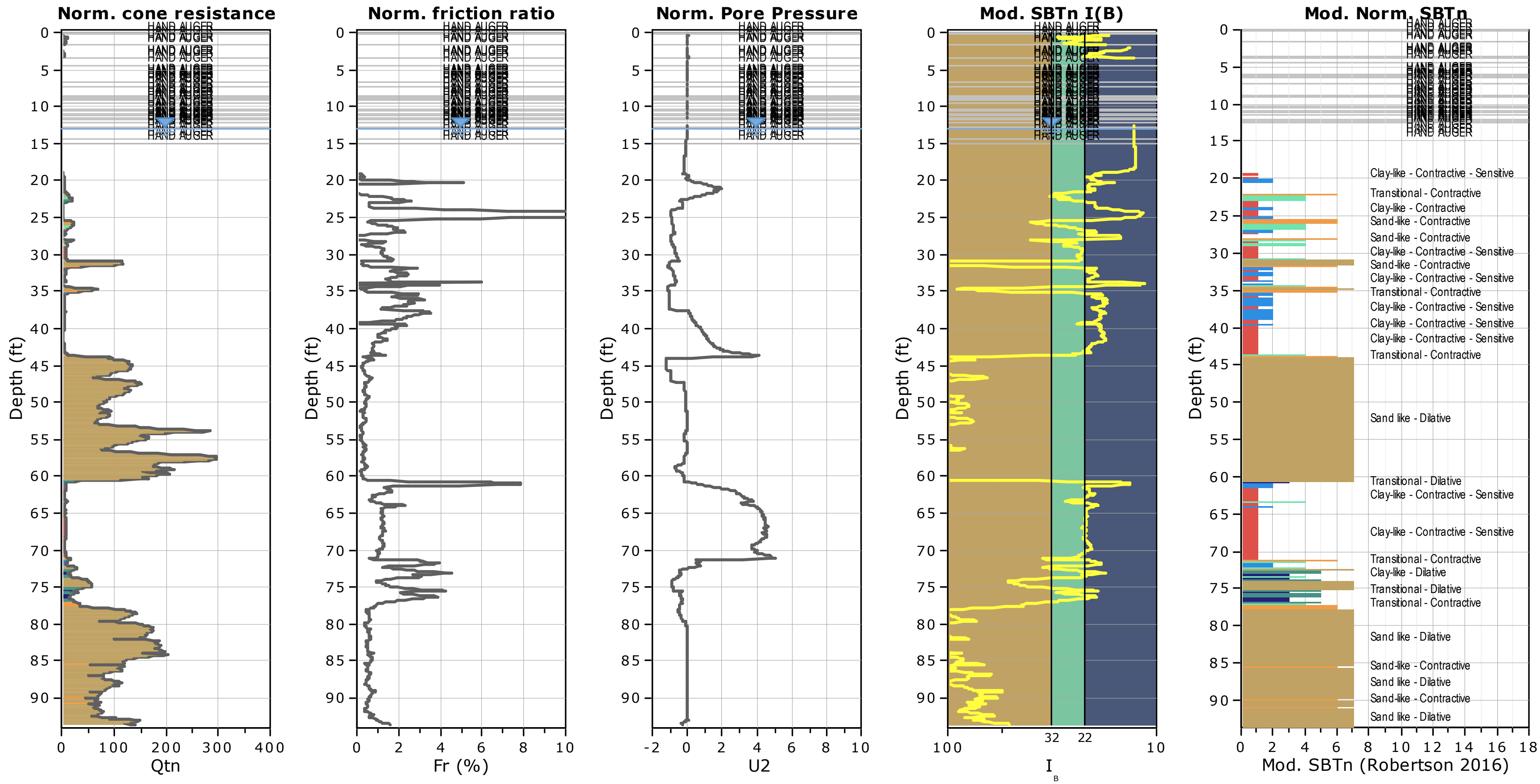
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

HILLIS-CARNES ENGINEERING ASSOCIATES

HILLIS-CARNES
Engineering Associates, Inc.
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-217
Total depth: 93.64 ft, Date: 3/8/2018
Surface Elevation: 13.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Mod. SBTn legend

1. CCS: ClayLike - Contractive, Sensitive
2. CC: Clay-like - Contractive
3. CD: Clay-Like: Dilative
4. TC: Transitional - Contractive
5. TD: Transitional - Dilative
6. SC: Sand-like - Contractive
7. SD: Sand-like - Dilative

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Surface Elevation: 13.00 ft
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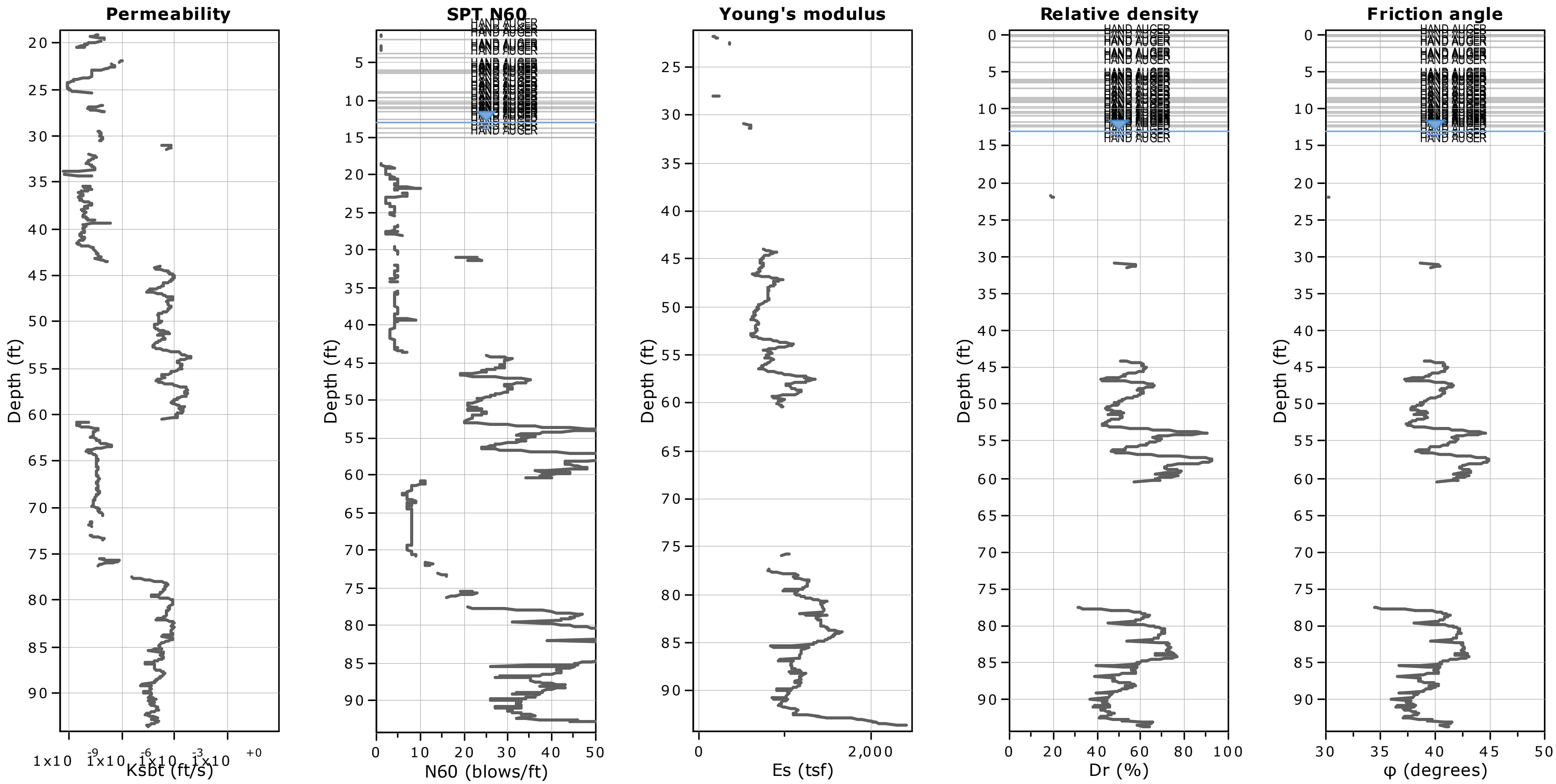
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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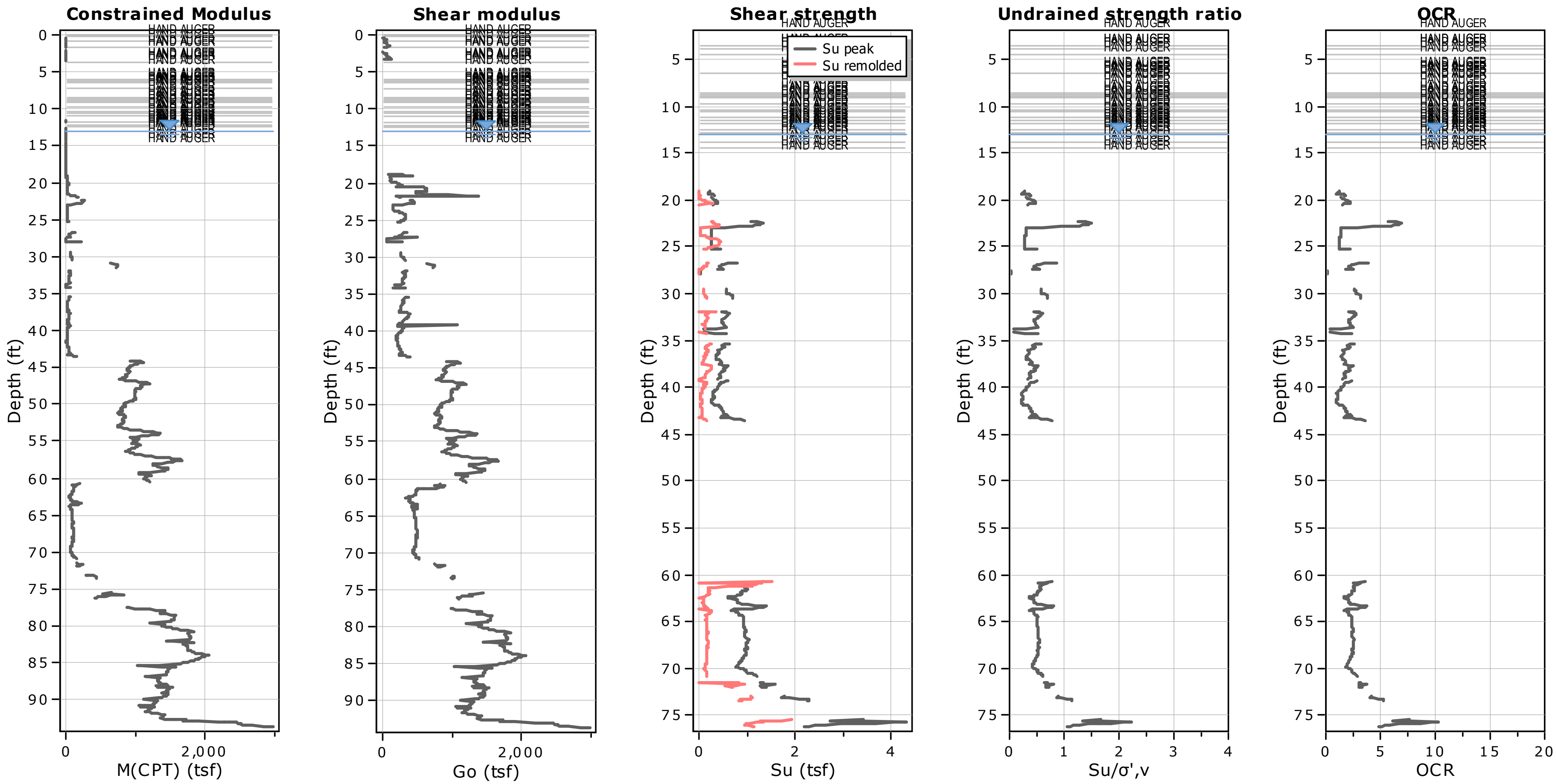
Surface Elevation: 13.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: **S18032 Fitzell Substation In Situ**
Location: **Sparrows Point, Maryland**



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

HILLIS-CARNES
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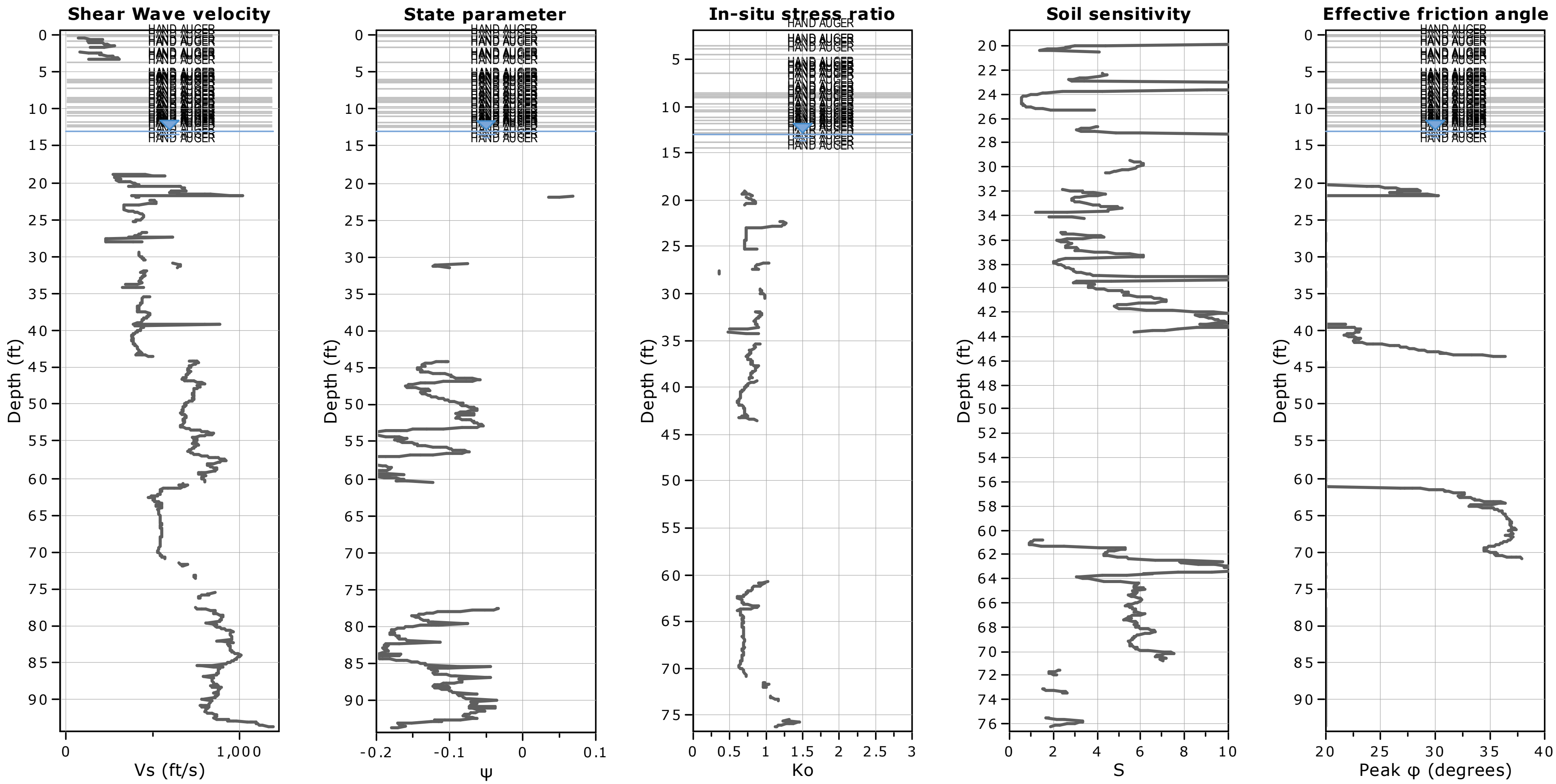
417 Maryland Avenue, Delmar, MD 21875
http://www.hcea.com

CPT: Fitzell Project B-217
Total depth: 93.64 ft, Date: 3/8/2018
Surface Elevation: 13.00 ft
Coords: X:0.00, Y:0.00
Cone Type: NOVA U2
Cone Operator: R. Harman

Project: S18032 Fitzell Substation In Situ
Location: Sparrows Point, Maryland



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

Dissipation Tests Results

Dissipation tests

Dissipation tests consists of stopping the piezocone penetration and observing porepressures (u) with elapsed time (t). The data are automatic recorded by the field computer and should take place until a minimum of 50% dissipation.

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where:

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r: piezocone radius
I_r: stiffness index, equal to shear modulus G divided by the undrained strength of clay (S_u).
t_{50}: time corresponding to 50% consolidation

Permeability estimates based on dissipation test

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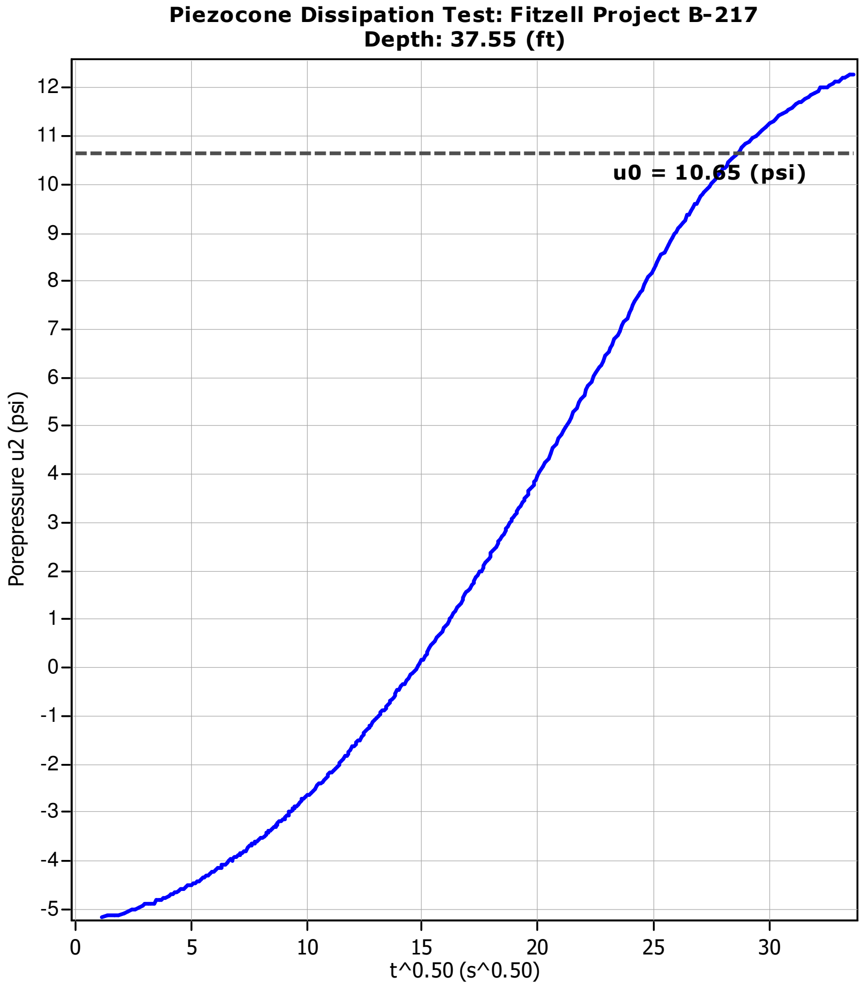
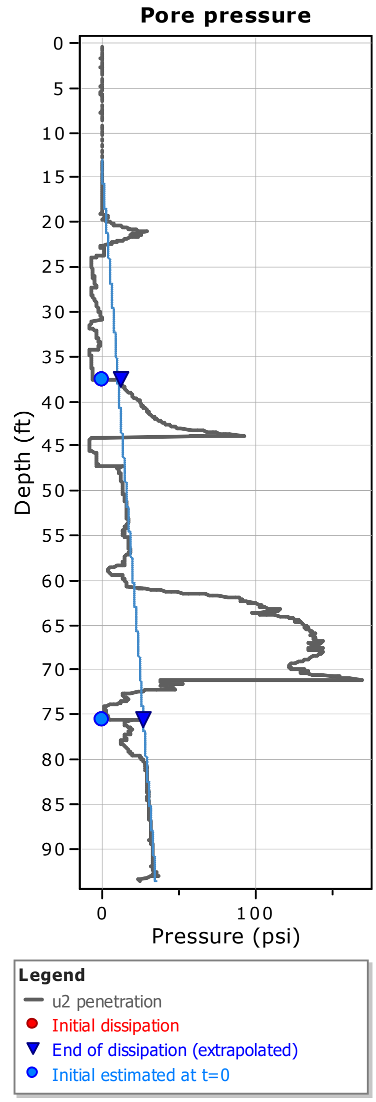
$$k_h = c_h \times \gamma_w / M$$

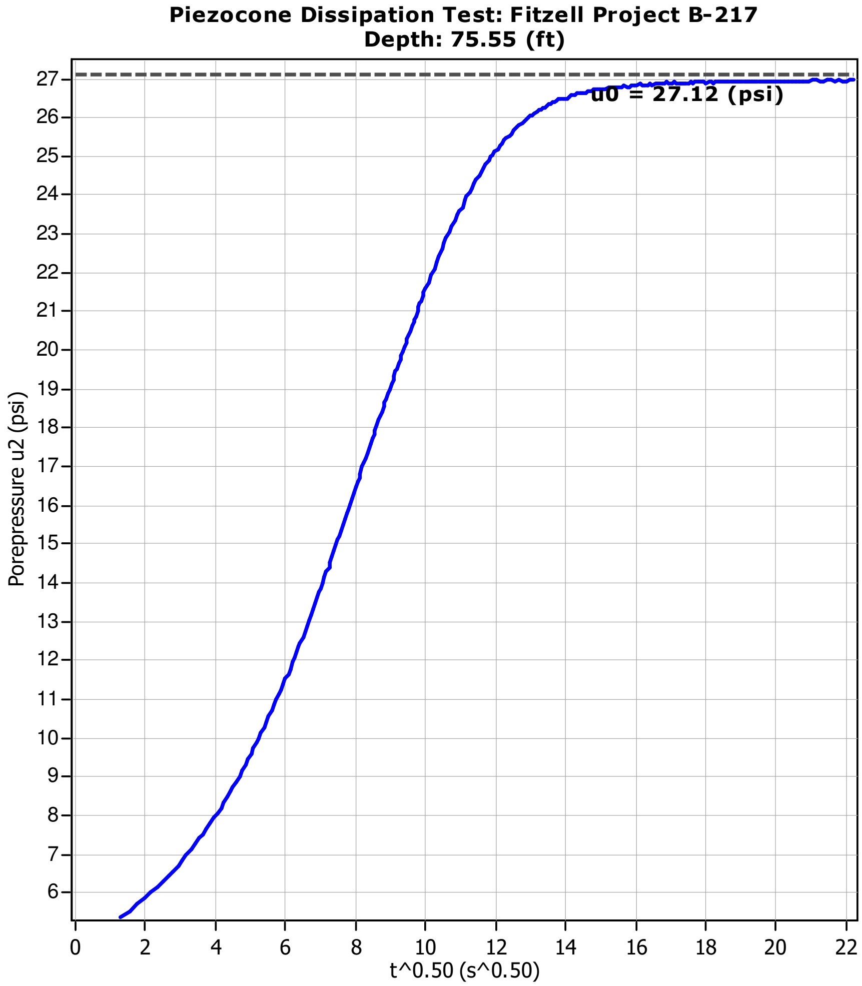
where: M is the 1-D constrained modulus and γ_w is the unit weight of water, in compatible units.

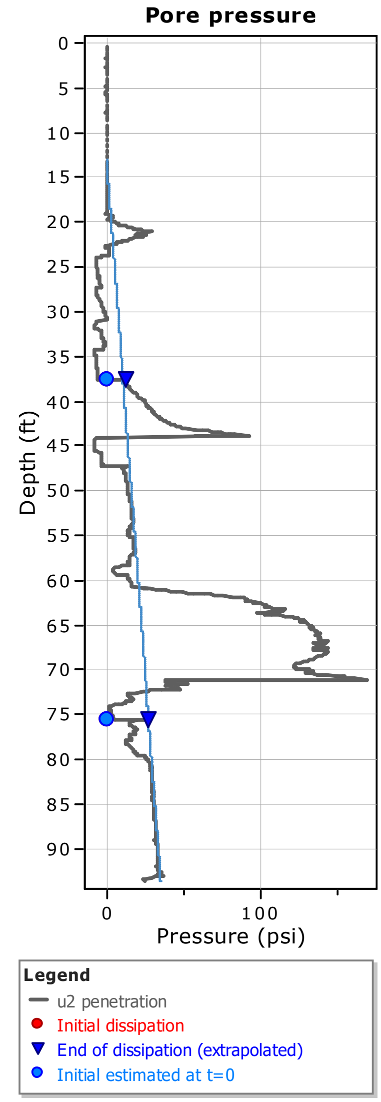
Tabular results

CPTU Borehole	Depth (ft)	$(t_{50})^{0.50}$	t_{50} (s)	t_{50} (years)	G/S_u	c_h (ft^2/s)	c_h (ft^2/year)	M (tsf)	k_h (ft/s)
Fitzell Project B-217	37.55	0.0	0	0.00E+000	648995.69	0.00E+000	0	37.02	-1.00E+004
Fitzell Project B-217	75.55	0.0	0	0.00E+000	470416.88	0.00E+000	0	534.31	-1.00E+004


Piezocone Dissipation Test: Fitzell Project B-217
Depth: 37.55 (ft)
u0 = 10.65 (psi)
Porepressure u2 (psi)
t^0.50 (s^0.50)


Pore pressure
Depth (ft)
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0


Piezocone Dissipation Test: Fitzell Project B-217
Depth: 75.55 (ft)
u0 = 27.12 (psi)
Porepressure u2 (psi)
t^0.50 (s^0.50)
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
0
2
4
6
8
10
12
14
16
18
20
22


Pore pressure
Depth (ft)
Pressure (psi)
0
100
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0

APPENDIX E

Initial Gauging Event	Date:	Time:	
Piezometer ID	Depth to Product (feet TOC) - Initial	Depth the Water (feet TOC) - Initial	Product Thickness (feet)
B14-002-PZ			
B14-006-PZ			
B14-007-PZ			
B14-008-PZ			
B14-010-PZ			
B14-011-PZ			
B14-012-PZ			
B14-013-PZ			
B14-015-PZ			
B14-017-PZ			
B14-021-PZ			
B14-022-PZ			
B14-028-PZ			
B14-034-PZ			
B14-035-PZ			
B14-036-PZ			
B14-037-PZ			
B14-038-PZ			
B14-039-PZ			
B14-040-PZ			
B14-041-PZ			
B14-042-PZ			
B14-043-PZ			

Parcel B14 NAPL Baildown Testing Piezometer No.: B14-_____-PZ

Date/Time of Measurement	Depth to Product (feet below TOC)	Depth to Water (feet below TOC)	Product Thickness (feet)	Amount of Product Removed (gallons)	Product Color/ Viscosity