

# Feasibility Study for Sediments in Tidal Flats and Outfall 008

## GEOTECHNICAL DATA REPORT

for

**Stratford Army Engine Plant  
Stratford, Connecticut**

**Contract No.: W912WJ-15-D-0003  
Task Order No.: 003**

**September 4, 2020**

**Prepared for:**



**New England District  
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*This is to certify that Wood has performed a peer technical review of this deliverable under USACE NAE Contract No. W912WJ-15-D-0003 consistent with Wood Quality Management Program Procedure-PJM-PRO-002, Technical Review.*



United States Army Corps of Engineers, New England District  
Stratford Army Engine Plant, Stratford, CT  
Geotechnical Data Report


### QUALITY ASSURANCE STATEMENT

Delivery Order Title: Stratford Army Engine Plant Geotechnical Data Report

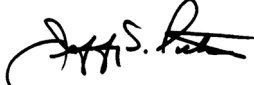
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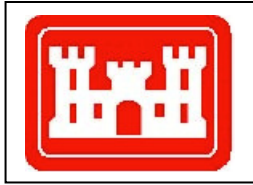
Wood Environment & Infrastructure, Inc. (Wood) (Formerly Amec Foster Wheeler) has prepared this Geotechnical Data Report for the Feasibility Study for the Stratford Army Engine Plant, Stratford, CT project. The Program Manager and Project Manager have completed a technical and quality assurance review of this document for technical accuracy and completeness, in accordance with the objectives of the revised Performance Work Statement, dated November 26, 2019 and Wood's Final Proposal, dated November 26, 2019.

  
\_\_\_\_\_  
Rod Pendleton, P.G.  
Project Manager

9/4/2020  
Date

  
\_\_\_\_\_  
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9/4/2020  
Date



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- Appendix A Geotechnical Boring Records and Photo Log
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## GLOSSARY OF ABBREVIATIONS AND ACRONYMS

Amec Foster Wheeler ASTM	Amec Foster Wheeler Environment & Infrastructure American Society for Testing and Materials
bgs	below ground surface
c	cohesion
c'	effective cohesion
CENAE	United States Army Corps of Engineers New England District
CIUC	consolidated isotropic undrained compression
CT DEEP	Connecticut Department of Energy and Environmental Protection
FS	Feasibility Study
FSP	Field Sampling Plan
GBA	Geoprofessional Business Association
GIS	geographic information system
GPS	global positioning system
NAD	North American Datum
NAVD	North American Vertical Datum
NEBC	New England Boring Contractors
NPDES	National Pollutant Discharge Elimination System
OD	outside diameter
PCB	Polychlorinated Biphenyls
$\phi$	friction angle
$\phi'$	effective friction angle
Project	Stratford Army Engine Plant Feasibility Study
psf	pounds per square foot
RCRA	Resource Conservation and Recovery Act
SAEP	Stratford Army Engine Plant
SPT	standard penetration test
TSCA	Toxic Substances Control Act



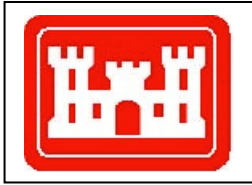
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USACE  
U.S. Army  
USCS

United States Army Corps of Engineers  
United States Department of the Army  
Unified Soil Classification System

Wood

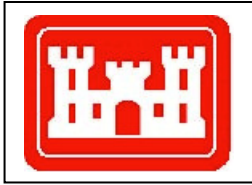
Wood Environment & Infrastructure Solutions, Inc.



## 1.0 INTRODUCTION

Wood Environment & Infrastructure Solutions, Inc. (Wood) is pleased to present this Geotechnical Data Report (Report) for the Stratford Army Engine Plant (SAEP) Feasibility Study (FS) in Stratford, Connecticut on behalf of the United State Army Corps of Engineers (USACE), New England District (CENAE). The purpose of the investigation was to explore and characterize the subsurface conditions and obtain preliminary geotechnical data to support planning, design, and construction of the proposed remediation of contaminated sediments in the Tidal Flats area adjacent to the SAEP facility and in the Outfall 008 Drainage Ditch area. The geotechnical investigation was performed and this Report was prepared in accordance with Wood's Revised Fee Proposal dated November 26, 2019 and Wood's Final Field Sampling Plan dated February 12, 2020.

The following sections of this Report review available project information, summarize the geotechnical exploration and laboratory testing programs, and describe the subsurface conditions encountered.



## 2.0 PROJECT INFORMATION

The following sections identify the project datum and provide general descriptions of the site and the regional geologic setting.

### 2.1 Datum

Elevations reported herein are based on the North American Vertical Datum (NAVD) of 1988. Elevations are reported in units of feet. The horizontal datum is the North American Datum (NAD) of 1983, Connecticut State Plane.

### 2.2 Site Description

The former SAEP is located at 550 Main Street, Stratford, Connecticut (i.e., the Site). The Site Areas of Investigation for this project are the Tidal Flats area between the SAEP and the Housatonic River channel, and the Outfall 008 Drainage Ditch (**Figure 1**).

The property was initially developed in 1927 for Sikorsky Aircraft. Aircraft and engines have been manufactured at the facility since 1929. Wastes generated included waste oils, fuels, solvents, and paints. An on-site chemical waste treatment plant operated to treat waste generated at the facility, and released effluent to the Housatonic River under a National Pollutant Discharge Elimination System (NPDES) permit. Lagoons on the Site were regulated under the Resource Conservation and Recovery Act (RCRA), and were closed under RCRA in the 1980s. The facility was cited in 1983 for violating the Toxic Substances Control Act (TSCA) regarding reporting of polychlorinated biphenyl (PCB)-containing transformers. The Site was owned by the United States (U.S.) Air Force until 1976, when ownership was transferred to the U.S. Army.

All manufacturing operations at the facility have ceased, and some office space is currently utilized for site security and building maintenance. The Connecticut Department of Energy and Environmental Protection (CT DEEP) is the lead regulatory agency in remedial oversight at the Site.

### 2.3 Regional Geologic Setting

The Surficial Materials Map of Connecticut (Stone et al., 1992) generally maps the surficial geology of the Site as artificial fill (af), sand over fines (s/f, deltaic deposits overlying lake-bottom sediment), or sand and gravel (sg, fluvial deposits). Mapping also indicates that salt-marsh and tidal-marsh deposits are present proximate to the Site to the northeast (across the Housatonic River) and to the southwest.

The Surficial Geologic Map of the Milford Quadrangle, Connecticut (Flint, 1967) indicates soils at the Site consist of artificial fill and/or Stratford outwash sediments (sow).

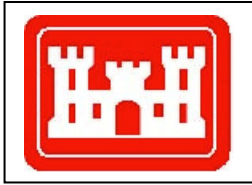
The Quaternary Geologic Map of Connecticut and Long Island Sound Basin (Stone et al., 2005) indicates soils at the Site consist of artificial fill and/or Stratford-Southport deposits (lcss; sediment



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dammed lake deposit). Tidal-marsh deposits (sm) are also shown proximate to the Site to the northeast.





### 3.0 GEOTECHNICAL SUBSURFACE INVESTIGATION PROGRAM

A geotechnical investigation was conducted at the Site to support planning, design, and construction of the proposed remediation of contaminated sediments in the Tidal Flats area adjacent to the SAEP facility and in the Outfall 008 Drainage Ditch area. The intent of the investigation was to explore and characterize the subsurface conditions and obtain preliminary geotechnical data. The primary components of the geotechnical subsurface investigation program, as completed, are described in the following subsections.

#### 3.1 Geotechnical Soil Borings

Boring locations were selected by CENAE, in relation to existing Site features and the proposed remediation and under the constraints of surface access and underground or overhead utility conflicts. Borings were located in the field by Wood via hand-held GPS. Wood subcontracted Blood Hound Underground Utility Locators, LLC to clear the boring locations of utilities prior to mobilization of the drilling subcontractor.

Wood subcontracted New England Boring Contractors (NEBC) of Glastonbury, Connecticut to advance a total of 4 geotechnical soil borings (borings), designated FD-20-01 through FD-20-04. The drilling was performed from June 15 through 18, 2020. The as-drilled boring locations are depicted on **Figure 1** and tabulated in **Table 1**. Ground surface elevation at each boring location was interpolated using GIS data/contours.

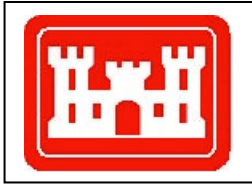
**Table 1 – Boring Location Summary**

Boring Designation	Easting (ft)	Northing (ft)	Ground Surface Elev. (ft)
FD-20-01	899,082	621,597	4
FD-20-02	898,568	621,871	5
FD-20-03	897,863	622,463	7
FD-20-04	896,182	623,896	5.5

Wood directed the drilling and sampling activities and logged the subsurface conditions encountered at the boring locations. The borings were advanced to depths ranging from 50.8 to 52 feet below the existing ground surface (bgs) via track-mounted drill equipment (Mobile B-53 rig). Solid stem augers were used to advance each borehole to approximately 5 to 10 feet bgs. The borings were then advanced using rotary-wash drilling methods using 4-inch diameter flush-joint steel casing (driven) or open-hole techniques.

As the borings were advanced through overburden soils, geotechnical testing and sampling was typically carried out as follows:

- Standard Penetration Tests (SPTs) were generally conducted at regular 5-foot intervals. Soil samples were obtained via a 2-inch or 3-inch outside diameter (OD) split-spoon



samplers. SPTs were performed in general accordance with ASTM D 1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

- Shelby tube samples (3-inch diameter) were obtained at selected intervals within organic soils. Shelby tubes were collected in general accordance with ASTM D 1587, Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes.
- Soil samples were described in the field by a Wood Geotechnical Engineer based on procedures outlined in ASTM D 2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Soil samples were sealed in moisture-tight containers (i.e., screw-top glass jars).

Detailed records of the drilling, testing, and sampling completed at each soil boring location are provided in **Appendix A**. Sample photos are also provided in **Appendix A**.

Drilling fluids and soil cuttings were containerized in 55-gallon drums and temporarily staged on-site for sampling, analysis, and characterization prior to offsite disposal. The borings were tremie-grouted (cement-bentonite grout) upon completion.

## 3.2 Geotechnical Laboratory Testing

Wood subcontracted GeoTechnics of Pittsburgh, Pennsylvania to conduct geotechnical laboratory testing of selected soil samples. Testing was performed in general accordance with the referenced procedures. The following subsections summarize the testing program and procedures. Laboratory Testing Reports are provided in **Appendix B**.

### 3.2.1 Index Testing

Index testing of soil samples obtained from SPTs and Shelby tubes included the following:

- Moisture content (ASTM D 2216)
- Particle-size analysis, washed sieve only (ASTM D 6913)
- Particle-size analysis combined washed sieve/hydrometer (ASTM D 6913/7928)
- Atterberg limits (ASTM D 4318)

### 3.2.2 Shelby Tube Openings

Logs of Shelby tube contents and photographs (standard tube opening) were developed. The logs included moisture content and density data, a visual description of tube contents upon opening, and torvane strength data.



### 3.2.3 Strength Testing

Isotropic consolidated undrained compression (CIUC) triaxial compression tests (with pore water pressure measurements) were carried out on selected Shelby tube samples. CIUC testing was performed in general accordance with ASTM D 4767, Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils. The range of effective confining stresses utilized for each CIUC test was selected to be representative of in-situ stresses under existing conditions and anticipated site conditions during remedial construction.



## 4.0 SUBSURFACE CONDITIONS

The following subsections describe the soil, bedrock, and groundwater conditions encountered based on results of the geotechnical soil borings and laboratory testing.

### 4.1 Overburden Soils

The overburden soils encountered at the exploration locations appear to be generally consistent with the regional conditions described by published geologic data (Section 2.3). The following primary strata were interpreted at one or more of the boring locations:

- Fill
- Sand/Gravel Deposits (includes alluvial, fluvial, deltaic, and outwash deposits)
- Marsh Deposit
- Estuarine Deposit
- Lake-Bottom Deposit

The primary strata encountered during this investigation are described briefly in the subsections below. Field SPT N-values are corrected for hammer efficiency (assumed to be 50 percent for the safety winch hammer used), rod length, and borehole diameter to produce  $N_{60}$  values. The Geotechnical Boring Records/Logs in **Appendix A** provide detailed descriptions of the soils observed and the sampling/testing conducted at each soil boring location. Laboratory test reports are provided in **Appendix B**.

#### 4.1.1 Fill

Fill is present at the ground surface (FD-20-01 and FD-20-02) and/or beneath surface pavement (FD-20-03 and FD-20-04), and surface pavement thickness ranges from approximately 2 to 6 inches. The fill materials extend to depths ranging from approximately 5 to 6.5 feet bgs (approximately elevation +0.5 feet to -1.3 feet).

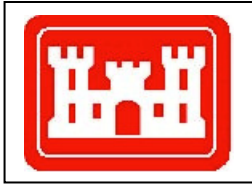
The fill is typically brown, reddish-brown, dark brown, or black, and consists of fine to coarse sand with silt and gravel or silty sand with gravel. The fill is visually classified as SW-SM, SP-SM, or SM in accordance with the Unified Soil Classification System (USCS). Occasional rootlets and brick debris were encountered within the fill.

SPT  $N_{60}$ -values range from 4 to 34 blows per foot (bpf) indicating a wide range of very loose to dense conditions. The average  $N_{60}$ -value is 15, indicating medium dense relative density.

#### 4.1.2 Sand/Gravel Deposits

Sand/Gravel deposits, interpreted to be alluvial, fluvial, deltaic, and/or outwash deposits, were encountered at each boring location beneath fill and/or beneath the estuarine deposit:

- FD-20-01: beneath estuarine deposit at approximately 21 feet bgs (elevation -17.0 feet) to the top of the lake-bottom deposit at approximately 45 feet bgs (elevation -41.0 feet).



- FD-20-02: beneath fill at approximately 5 feet bgs (elevation +0.0 feet) to the bottom of the boring at 52 feet bgs (elevation -47.0 feet).
- FD-20-03: beneath the fill at approximately 6.5 feet bgs (elevation +0.5 feet) to the top of the marsh deposit at 20.9 feet bgs (elevation -13.9 feet) and beneath the estuarine deposit at approximately 38.5 feet (elevation -31.5 feet) to the bottom of the boring at 52 feet bgs (elevation -45.0 feet).
- FD-20-04: beneath fill at approximately 5 feet bgs (elevation +0.5 feet) to the top of the lake-bottom deposit at approximately 20 feet bgs (elevation -14.5 feet).

The sand/gravel is typically brown, dark brown, or gray, and ranges in gradation from sandy gravel to silty fine sand. The sand/gravel is visually classified as GP, GP-GM, GM, SW/SP, SW/SP-SM, or SM in accordance with USCS. SPT  $N_{60}$ -values range from 4 to 68 bpf, indicating a wide range of very loose to very dense relative density. The average  $N_{60}$ -value is approximately 20, indicating medium dense conditions. The sand/gravel is typically described as moist to wet.

Moisture content ranges from 17.0 to 34.8 percent, with an average value of 23.6 percent, based on five tests. Five particle-size analyses (washed sieve and hydrometer) indicate 0.4 to 56 percent gravel, 32 to 84 percent sand, and 6 to 42 percent fines, which includes approximately 2.5 to 5 percent clay-sized particles.

#### 4.1.3 Marsh Deposit

A marsh deposit was encountered at borings FD-20-01 and FD-20-03. At FD-20-01, the top of the marsh was encountered beneath the fill at approximately 5.3 feet bgs (elevation -1.3 feet) and is approximately 10 feet thick. At FD-20-03, the top of the marsh was encountered beneath sand/gravel at approximately 20.9 feet bgs (elevation -13.9 feet) and is approximately 9.3 feet thick.

The marsh deposit is described as dark brown to black peat and is visually classified as PT in accordance with USCS. Visible organic matter (i.e., wood, roots, rootlets, fibers, etc.) was typically observed within the marsh deposit. SPT  $N_{60}$ -values range from 1 to 5 bpf with an average of 3 bpf, indicating very soft to medium stiff consistency. The marsh deposit is typically described as moist to wet.

Moisture content ranges from 203.9 to 345.8 percent, with an average value of 253 percent, based on four tests. A three-point CIUC triaxial test conducted on Shelby tube samples from FD-20-03 yielded friction angle,  $\phi$ , of 6.1 degrees, cohesion,  $c$ , of 797 psf, effective friction angle,  $\phi'$  of 25.6 degrees, and effective cohesion,  $c'$ , of 597 psf (reported peak values). Two torvane test results indicate undrained shear strength of approximately 522 and 657 psf.

#### 4.1.4 Estuarine Deposit

An estuarine deposit was encountered at borings FD-20-01 and FD-20-03 beneath the marsh deposit. At FD-20-01, the top of the estuarine was encountered beneath the marsh at



approximately 15.3 feet bgs (elevation -11.3 feet) and is approximately 5.7 feet thick. At FD-20-03, the top of the estuarine was encountered beneath marsh at approximately 30.2 feet bgs (elevation -23.2 feet) and is approximately 8.3 feet thick.

The estuarine deposit is described as dark gray to black organic silt with lesser, varying amounts of fine to coarse sand and clay. The estuarine deposit is visually classified as OH or OL in accordance with USCS. SPT  $N_{60}$ -values range from 1 to approximately 4 bpf with an average of 2 bpf, indicating very soft to soft consistency or very loose relative density. The estuarine deposit is typically described as moist to wet.

Moisture content ranges from 76.4 to 89.7 percent, with an average value of 84.5 percent, based on five tests. Moisture content of a sand seam within the deposit is 23.4 percent. An Atterberg limits test from FD-20-01 indicates Liquid Limit (LL) of 67, plastic limit (PL) of 50, and plasticity index (PI) of 17; an Atterberg limits test from FD-20-03 indicates the specimen is non-plastic. Two particle-size analyses (washed sieve and hydrometer) indicate 0 to 0.3 percent gravel, 10.4 to 41.6 percent sand, and 58.1 to 89.6 percent fines, which includes approximately 15 to 20 percent clay-sized particles. A three-point CIUC triaxial test was conducted on Shelby tube samples from FD-20-01 yielded  $\phi$  of 16.9 degrees,  $c$  of 207 psf,  $\phi'$  of 42.5 degrees, and  $c'$  of 83 psf (reported peak values). One torvane test result indicates undrained shear strength of approximately 83 psf.

#### **4.1.5 Lake-Bottom Deposit**

A lake-bottom deposit was encountered at borings FD-20-01 and FD-20-04 beneath the sand/gravel deposit. At FD-20-01, the top of the lake-bottom was encountered at approximately 45 feet bgs (elevation -41 feet). At FD-20-04, the top of the lake-bottom was encountered at approximately 20 feet bgs (elevation -14.5 feet). The thickness of the lake-bottom deposit is unknown as the deposit was not fully penetrated at the boring locations.

The lake-bottom deposit is described as brown to gray fine sand, silty fine sand, and fine sandy non-plastic silt. The lake-bottom is visually classified as SP, SM, or ML in accordance with USCS. SPT  $N_{60}$ -values range from 6 to 41 bpf with an average of 20 bpf, indicating loose to dense relative density. SPT- $N_{60}$  values generally increased with increasing depth bgs. The lake-bottom deposit is typically described as wet.

Moisture content is 30.3 percent, based on one test. A particle-size analysis (washed sieve and hydrometer) indicate 0 percent gravel, 12.3 percent sand, and 87.7 percent fines, which includes approximately 12 percent clay-sized particles.

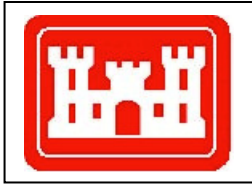
#### **4.2 Bedrock**

Bedrock was not encountered at any of the borings advanced as part of this investigation because the borings were not advanced deep enough.



### 4.3 Groundwater

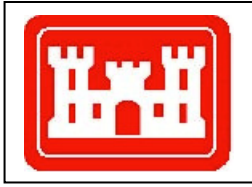
Groundwater was encountered during drilling, and measured following the completion of drilling, at each boring location at depths ranging from approximately 4 to 6 feet bgs (approximately elevation -1.2 to +3.0 feet). Site groundwater levels will fluctuate in response to precipitation events, seasonal conditions, construction activity, site use/activity, and adjacent site use/activity, and may therefore vary from those presented herein.



## 5.0 CLOSING

The findings presented herein were prepared in accordance with generally accepted geotechnical engineering principles and professional engineering practice, consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. We make no other warranty, either expressed or implied. The findings presented herein are based on the results of the geotechnical explorations and laboratory testing, combined with an interpolation of soil and groundwater conditions between and beyond the widely-spaced explorations. Important information from the Geoprosessional Business Association (GBA) regarding the limitations of this Geotechnical Data Report is provided in **Appendix C**.





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## 6.0 REFERENCES

Flint, R.F. (1967), "Surficial Geologic Map of the Milford Quadrangle, Connecticut". State of Connecticut Geological and Natural History Survey.

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., Thompson, W.B. (2005). "Quaternary Geologic Map of Connecticut and Long Island Sound Basin". Scientific Investigations Map 2784. U.S. Department of the Interior and U.S. Geological Survey.

Stone, J.R., Schafer, J.P., London, E.H., Thompson, W.B. (1992). "Surficial Materials Map of Connecticut". U.S. Department of the Interior and U.S. Geological Survey.



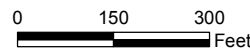
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## FIGURES



2016 Aerial Imagery:  
Connecticut Environmental Conditions Online

Prepared/Date: BRP 09-01-20 | Checked/Date: NDL 09-01-20



**Legend**

- Geotechnical Boring Locations
- 1 Foot Ground Elevation Contour

**Figure 1**  
Geotechnical Boring Locations

Stratford Army Engine Plant  
Stratford, Connecticut

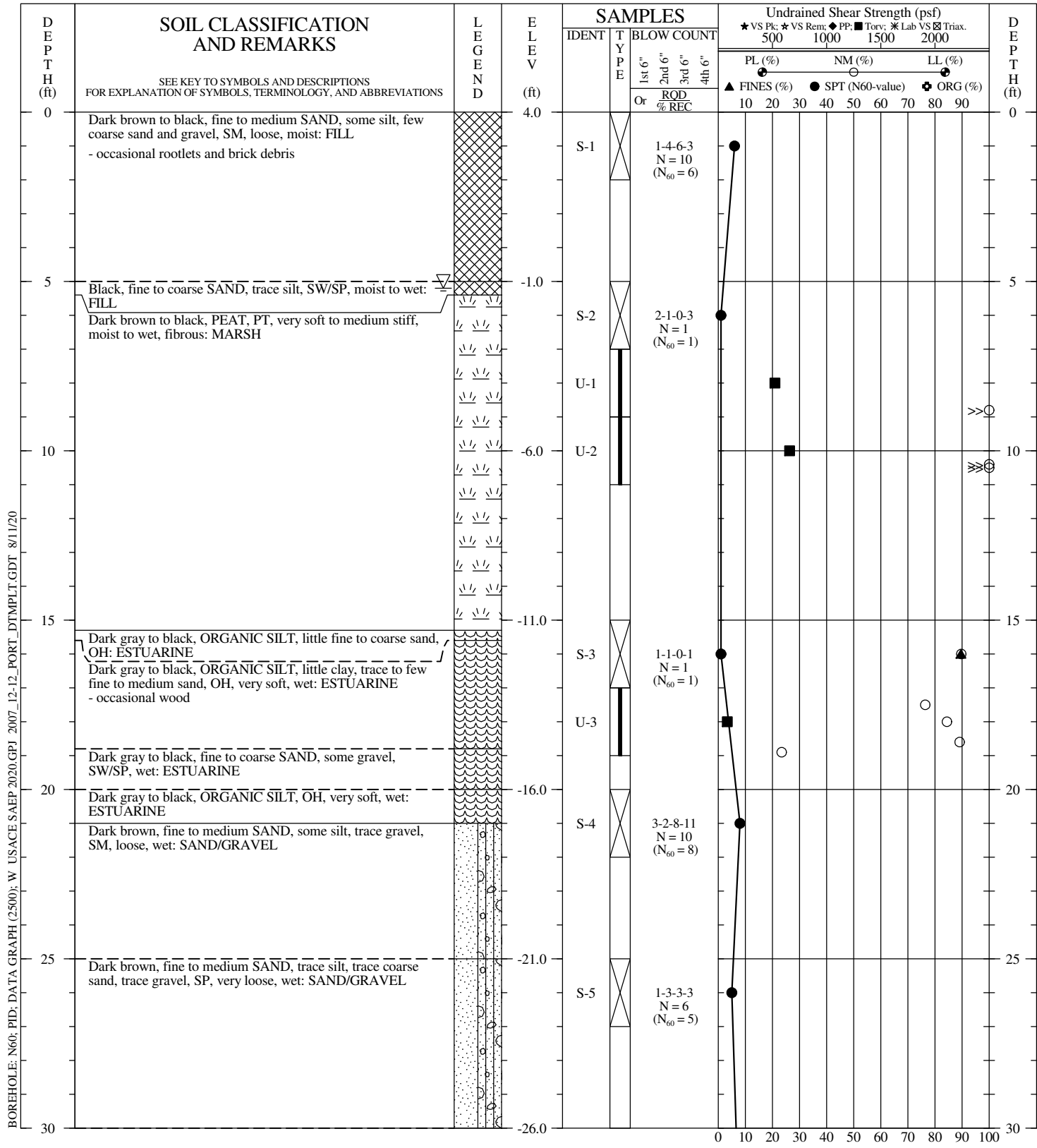


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**APPENDIX A**  
**GEOTECHNICAL BORING RECORDS & PHOTO LOG**

MAJOR DIVISIONS			GROUP SYMBOLS	GENERAL DESCRIPTIONS	TYPICAL SYMBOLS																				
<b>COARSE GRAINED SOILS</b> (More than 50% RETAINED on No. 200 sieve)	<b>GRAVELS</b> (More than 50% of coarse fraction RETAINED on No. 4 sieve)	<b>CLEAN GRAVELS</b> (Less than 5% fines)	GW	Well graded gravels or gravel-sand mixtures; trace or no fines.		Shelby Tube		Auger Cuttings																	
		<b>GRAVELS WITH FINES</b> (More than 12% fines)	GP	Poorly graded gravels or gravel-sand mixtures; trace or no fines.		Standard Split Spoon Sample		3" Split Spoon Sample																	
		<b>SANDS</b> (50% or more of coarse fraction PASSES the No. 4 sieve)	<b>CLEAN SANDS</b> (Less than 5% fines)	GM	Silty gravels or gravel-sand-silt mixtures.		Rock Core		Dynamic Cone Penetrometer																
			<b>SANDS WITH FINES</b> (More than 12% fines)	GC	Clayey gravels or gravel-sand-clay mixtures.		Vane Shear		Bulk/Grab Sample																
	<b>FINE GRAINED SOILS</b> (50% or more PASSES the No. 200 sieve)	<b>SILTS AND CLAYS</b> (Liquid Limit LESS than 50)	SW	Well graded sands or sand-gravel mixtures; trace or no fines.		Geoprobe Sample		Sonic or Vibro-Core Sample																	
			SP	Poorly graded sands or sand-gravel mixtures, trace or no fines.		Water Table at time of drilling		Water Table after 24 hours																	
			SM	Silty sands or sand-gravel-silt mixtures.	<b>CORRELATION OF STANDARD PENETRATION TEST (SPT) WITH RELATIVE DENSITY AND CONSISTENCY</b>																				
		SC	Clayey sands or sand-gravel-clay mixtures.	GRAVEL, SAND, & SILT (NON-PLASTIC)						SILT (PLASTIC) & CLAY															
				N or N <sub>60</sub>						Relative Density	N or N <sub>60</sub>	Su (psf)	Consistency												
		<b>HIGHLY ORGANIC SOILS</b>	<b>SILTS AND CLAYS</b> (Liquid Limit of 50 or GREATER)	ML	Inorganic silts or rock flour. Non-plastic or very slightly plastic. PI < 4 or plots below "A" line.	0 - 4	Very Loose	0 - 2	0 - 250	Very Soft															
CL	Inorganic lean clay. Low to medium plasticity. PI > 7 and plots on or above "A" line.			4 - 10	Loose	2 - 4	250 - 500	Soft																	
OL	Organic silts, clays, and silty clays. Low to medium plasticity.			10 - 30	Medium Dense	4 - 8	500 - 1000	Medium Stiff																	
				30 - 50	Dense	8 - 15	1000 - 2000	Stiff																	
					Over 50	Very Dense	15 - 30	2000 - 4000	Very Stiff																
							Over 30	Over 4000	Hard																
					SPT Notes: WR = Weight of Rods; WH = Weight of Hammer																				
					TERMS DESCRIBING SOILS (excludes particles > 3", organics, debris, etc.)		TERMS DESCRIBING MATERIALS (i.e. particles > 3", organics, debris, etc.)																		
					Trace: Particles present, but < 5%		Occasional: Particles present, but < 10%																		
					Few: 5% to 15%		Some: 10% to 25%																		
					Little: 15% to 25%		Frequent: > 25%																		
					Some: 25% to 50%																				
					TERMS DESCRIBING MOISTURE		TERMS DESCRIBING STRUCTURE																		
					Dry: Absence of moisture; dusty		Layer: > 3" thick																		
					Moist: Damp, but no visible water		Seam: 1/16" to 3" thick																		
					Wet: Visible/free water		Parting: < 1/16" thick																		
<b>BOUNDARY CLASSIFICATIONS:</b> Soils possessing characteristics of two groups are designated by combinations of group symbols.					<b>KEY TO SYMBOLS AND DESCRIPTIONS</b>																				
										<table border="1"> <tr> <td rowspan="2">SILT OR CLAY</td> <td colspan="3">SAND</td> <td colspan="2">GRAVEL</td> <td rowspan="2">Cobbles</td> <td rowspan="2">Boulders</td> </tr> <tr> <td>Fine</td> <td>Medium</td> <td>Coarse</td> <td>Fine</td> <td>Coarse</td> </tr> <tr> <td>No.200</td> <td>No.40</td> <td>No.10</td> <td>No.4</td> <td>3/4"</td> <td>3"</td> <td>12"</td> <td></td> </tr> </table> <p style="text-align: center;">U.S. STANDARD SIEVE SIZE</p>					SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders	Fine	Medium	Coarse
SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders																		
	Fine	Medium	Coarse	Fine	Coarse																				
No.200	No.40	No.10	No.4	3/4"	3"	12"																			

References: ASTM D 2487 (Unified Soil Classification System) and ASTM D 2488 (Visual-Manual Procedure).



BOREHOLE: N60; PID; DATA GRAPH (2500); W USACE SAEP 2020.GPI 2007\_12-12\_PORT\_DTMP.LT.GDT 8/11/20

DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.

LOGGED BY: NDL CHECKED BY/DATE: RSE/8-7-20

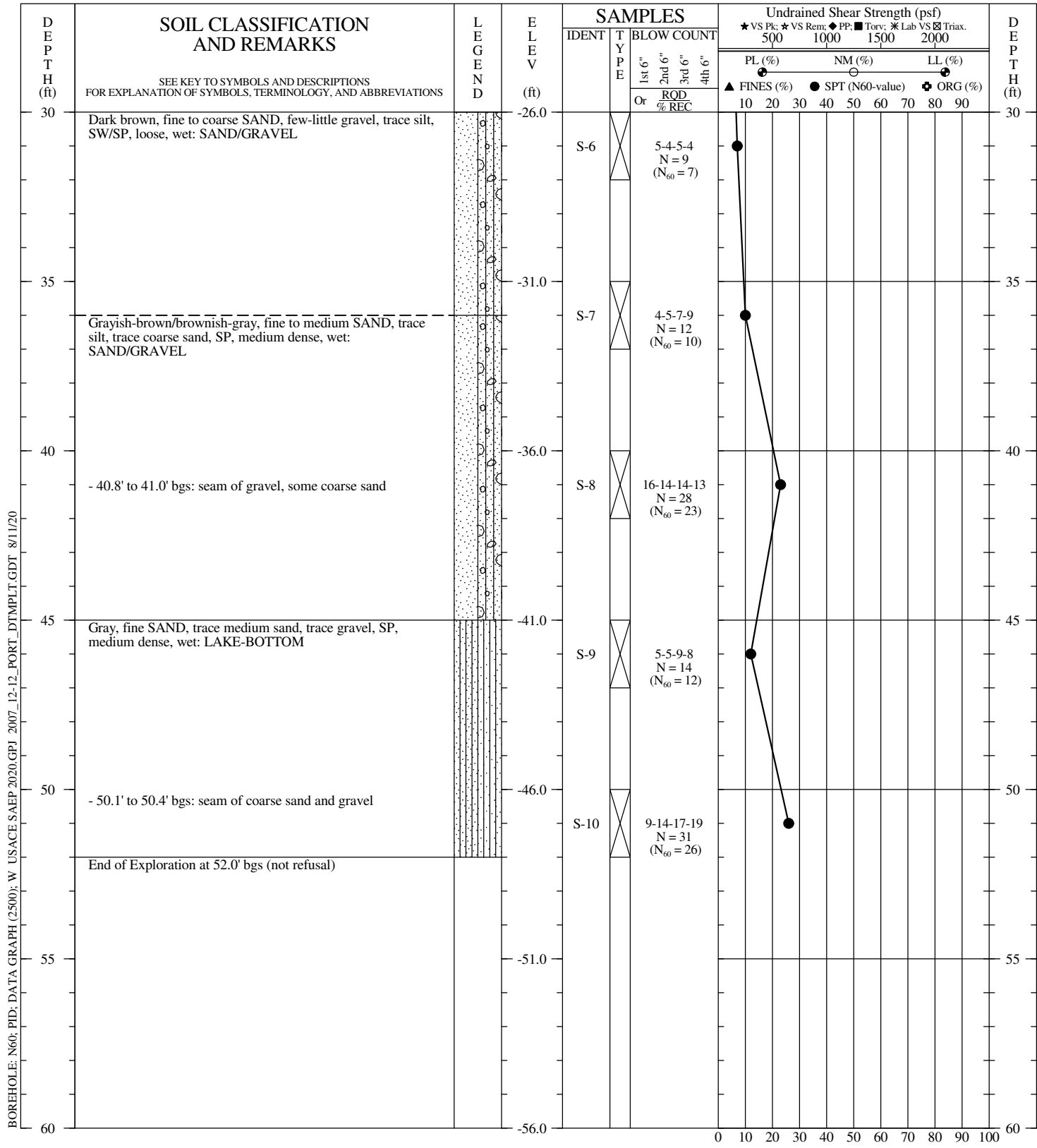
**GEOTECHNICAL BORING RECORD**

**BOREHOLE NO.:** FD-20-01  
**DRILLED:** 6/18/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

**PAGE 1 OF 2**

THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.





BOREHOLE: N60; PID; DATA GRAPH (2500); W USACE SAEP 2020.GPJ 2007\_12-12\_PORT\_DTMP.LT.GDT 8/11/20

DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.  
 LOGGED BY: NDL CHECKED BY/DATE: RSE/8-7-20

**GEOTECHNICAL BORING RECORD**

**BOREHOLE NO.:** FD-20-01  
**DRILLED:** 6/18/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

**PAGE 2 OF 2**

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**PHOTO 1:**  
FD-20-01



**PHOTO 2:**  
FD-20-01





**PHOTO 3:**

FD-20-01  
S-1  
0' - 2'



**PHOTO 4:**

FD-20-01  
S-2  
5' - 7'



**PHOTO 5:**

FD-20-01

U-1

7' – 9'

\*Photo taken prior to  
sealing tube



**PHOTO 6:**

FD-20-01

U - 2

9' – 11'

\*Photo taken prior to  
sealing tube



**PHOTO 7:**

FD-20-01  
S-3  
15' - 17'



**PHOTO 8:**

FD-20-01  
U-3  
17' - 19'



**PHOTO 9:**

FD-20-01  
S-4  
20' – 22'



**PHOTO 10:**

FD-20-01  
S-5  
25' – 27'



**PHOTO 11:**

FD-20-01  
S-6  
30' – 32'



**PHOTO 12:**

FD-20-01  
S-7  
35' – 37'



**PHOTO 13:**

FD-20-01  
S-8  
40' – 42'



**PHOTO 14:**

FD-20-01  
S-9  
45' – 47'



**PHOTO 15:**

FD-20-01  
S-10  
50' – 52'



**PHOTO 16:**

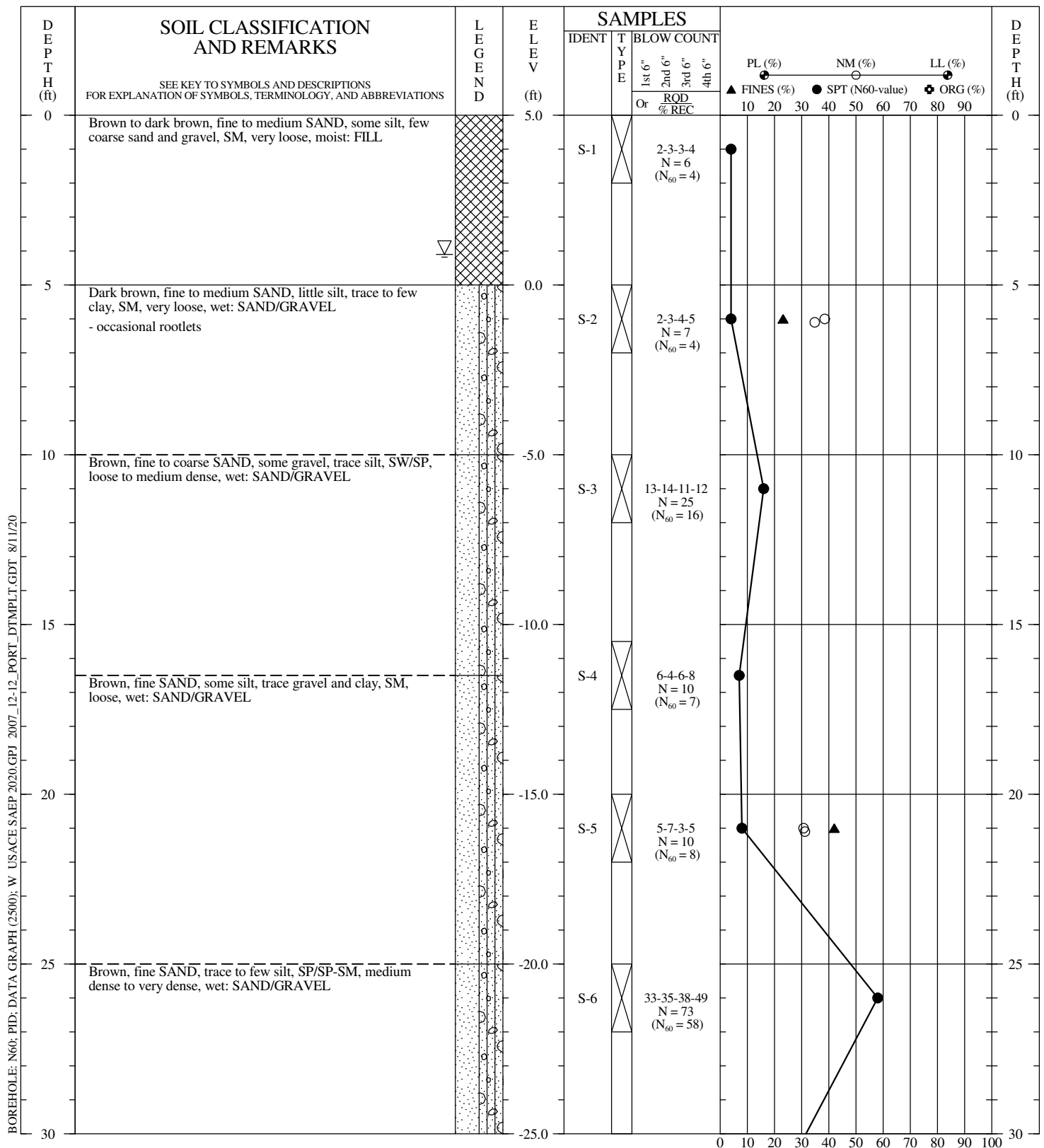
FD-20-01



**PHOTO 17:**

FD-20-01





DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.

LOGGED BY: NDL CHECKED BY/DATE: RSE/8-7-20

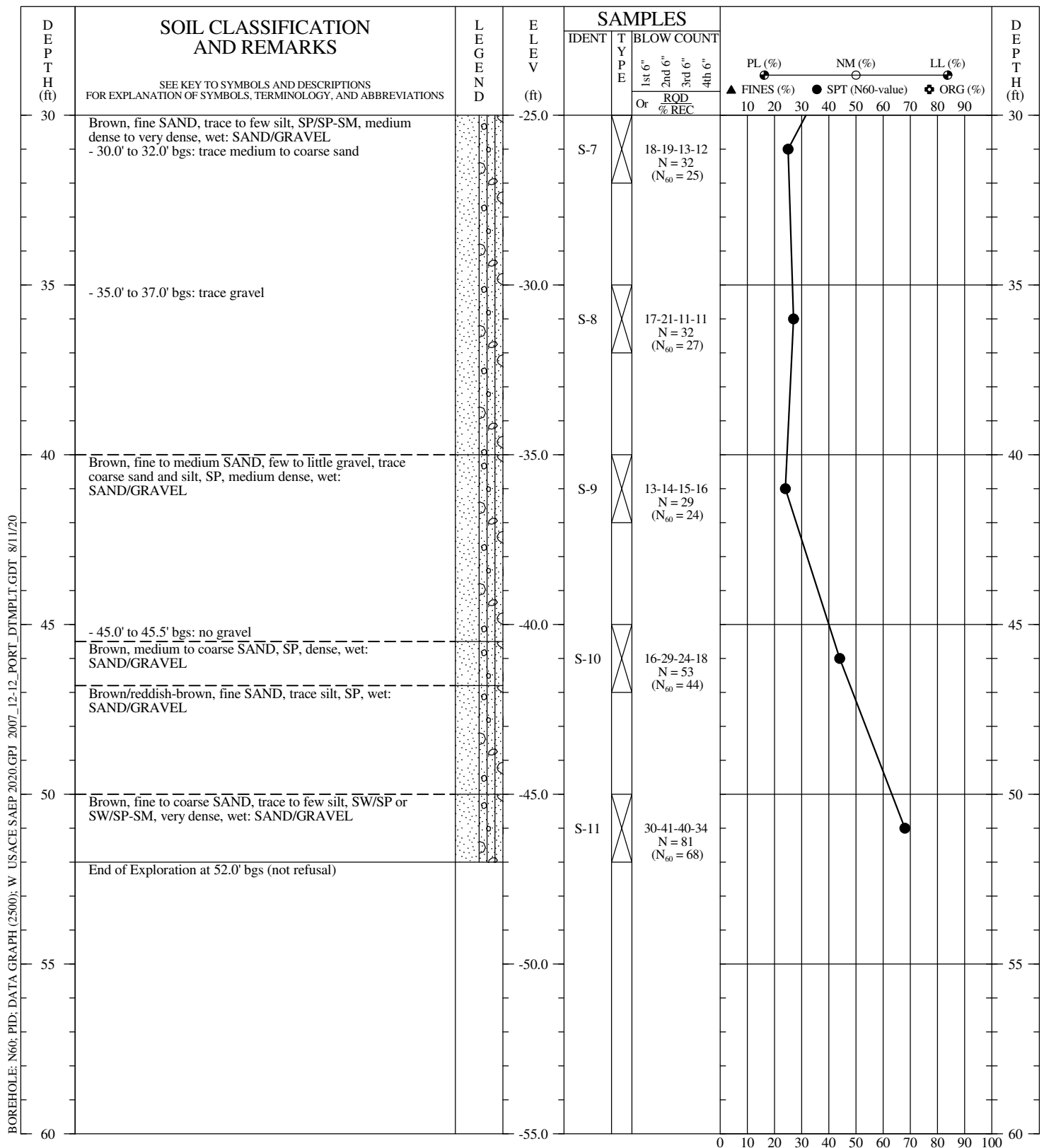
THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### GEOTECHNICAL BORING RECORD

**BOREHOLE NO.:** FD-20-02  
**DRILLED:** 6/17/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

PAGE 1 OF 2

**wood.**



DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.

LOGGED BY: NDL CHECKED BY/DATE: RSE/8-7-20

THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### GEOTECHNICAL BORING RECORD

**BOREHOLE NO.:** FD-20-02  
**DRILLED:** 6/17/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

PAGE 2 OF 2

**wood.**



**PHOTO 1:**

FD-20-02



**PHOTO 2:**

FD-20-02



**PHOTO 3:**

FD-20-02  
S-1  
0' - 2'



**PHOTO 4:**

FD-20-02  
S-2  
5' - 7'



**PHOTO 5:**

FD-20-02  
S-3  
10' – 12'



**PHOTO 6:**

FD-20-02  
S-4(1)  
15.5' – 17.5'



**PHOTO 7:**

FD-20-02  
S-4(2)  
15.5' – 17.5'  
\*3" Split-Spoon



**PHOTO 8:**

FD-20-02  
S-5  
20' – 22'



**PHOTO 9:**

FD-20-02  
S-6  
25' - 27'



**PHOTO 10:**

FD-20-02  
S-7  
30' - 32'



**PHOTO 11:**

FD-20-02  
S-8  
35' – 37'



**PHOTO 12:**

FD-20-02  
S-9  
40' – 42'





**PHOTO 13:**

FD-20-02  
S-10  
45' – 47'



**PHOTO 14:**

FD-20-02  
S-11  
50' – 52'



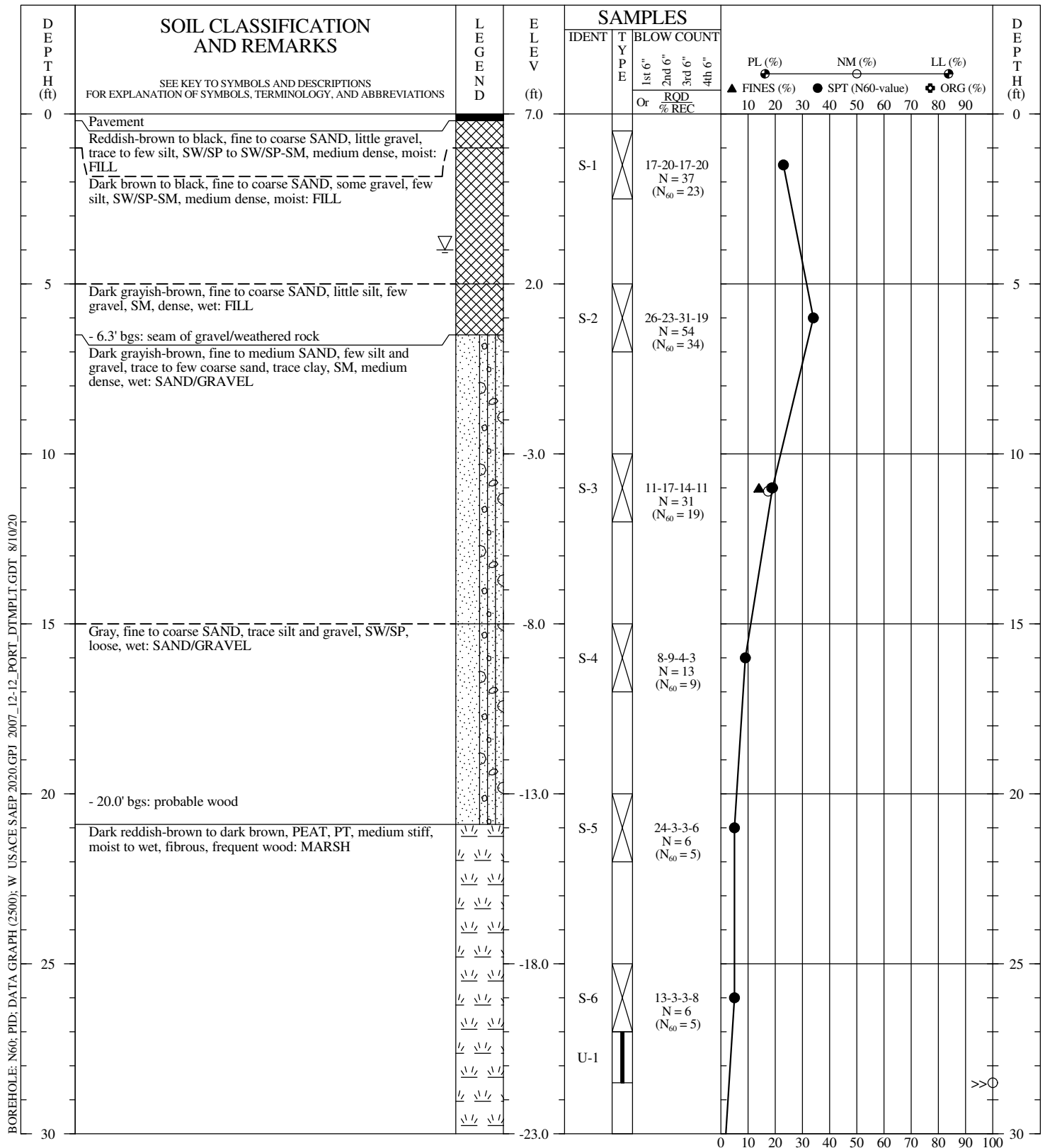
**PHOTO 15:**

FD-20-02



**PHOTO 16:**

FD-20-02



BOREHOLE: N60; PID; DATA GRAPH (2500); W USACE SAEP 2020.GPJ 2007\_12-12\_PORT\_DTIMPLT.GDT 8/10/20

**DRILLER:** New England Boring Contractors  
**EQUIPMENT:** Mobile B-53  
**METHOD:** Rotary Wash (Variable)  
**HOLE DIAM.:** 4"  
**SPTs:** Safety winch; N-rods  
**REMARKS:** Boring backfilled with cement-bentonite grout upon completion.  
  
**LOGGED BY:** NDL      **CHECKED BY/DATE:** RSE/8-7-20

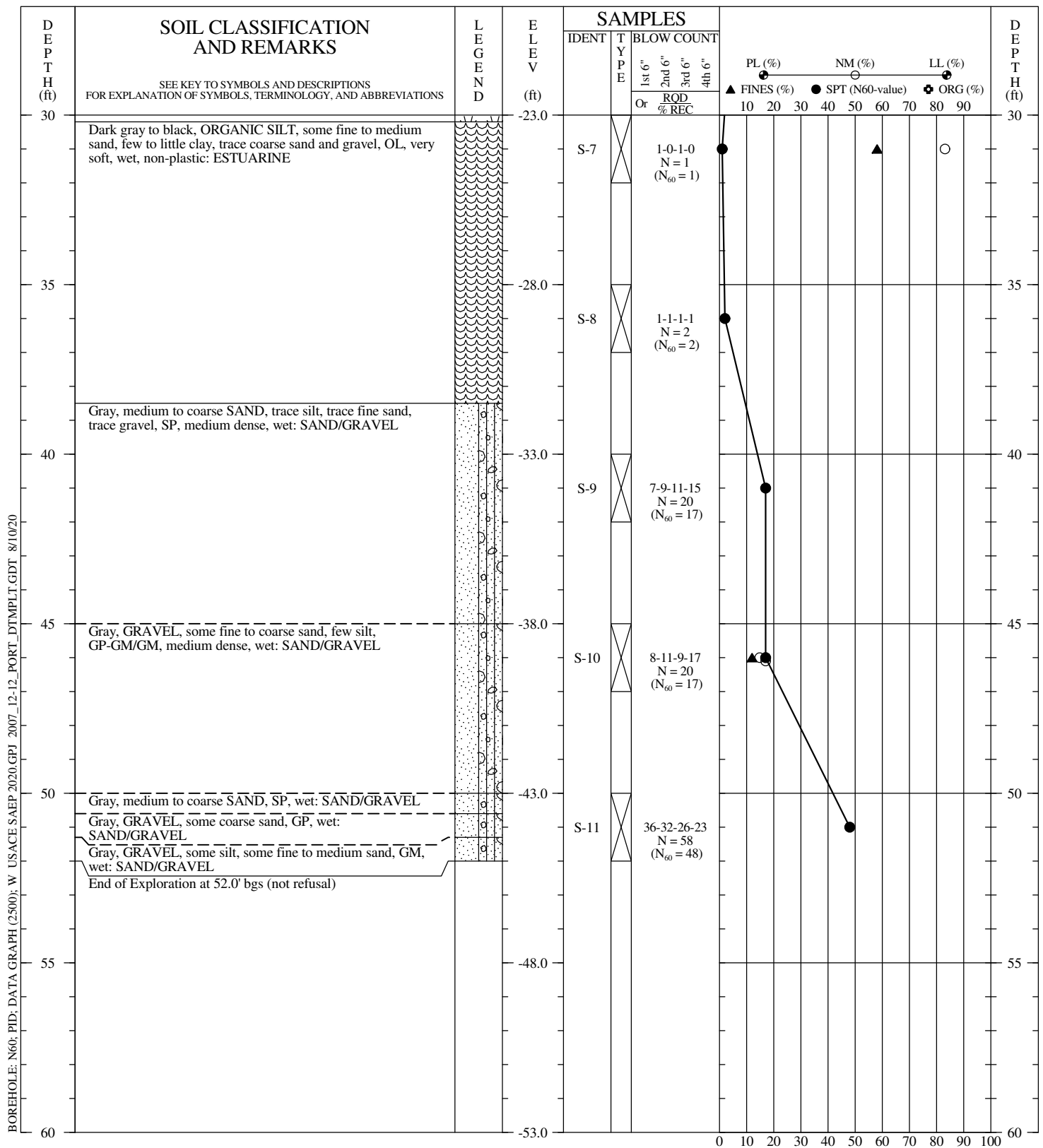
**GEOTECHNICAL BORING RECORD**

**BOREHOLE NO.:** FD-20-03  
**DRILLED:** 6/15/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

**PAGE 1 OF 2**

THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.





BOREHOLE: N60; PID; DATA GRAPH (2500); W USACE SAEP 2020.GPJ 2007\_12-12\_PORT\_DT.MPLT.GDT 8/10/20

**DRILLER:** New England Boring Contractors  
**EQUIPMENT:** Mobile B-53  
**METHOD:** Rotary Wash (Variable)  
**HOLE DIAM.:** 4"  
**SPTs:** Safety winch; N-roads  
**REMARKS:** Boring backfilled with cement-bentonite grout upon completion.  
  
**LOGGED BY:** NDL      **CHECKED BY/DATE:** RSE/8-7-20

**GEOTECHNICAL BORING RECORD**

**BOREHOLE NO.:** FD-20-03  
**DRILLED:** 6/15/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

**PAGE 2 OF 2**

THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.





**PHOTO 1:**

FD-20-03



**PHOTO 2:**

FD-20-03



**PHOTO 3:**

FD-20-03  
S-1  
0.5' – 2.5'



**PHOTO 4:**

FD-20-03  
S-2  
5' – 7'



**PHOTO 5:**

FD-20-03  
S-3  
10' - 12'



**PHOTO 6:**

FD-20-03  
S-4  
15' - 17'



**PHOTO 7:**

FD-20-03  
S-5  
20' – 22'



**PHOTO 8:**

FD-20-03  
S-6  
25' – 27'





**PHOTO 9:**

FD-20-03  
U-1  
27' – 28.5'  
\*Photo taken prior to  
sealing tube



**PHOTO 10:**

FD-20-03  
S-7  
30' – 32'



**PHOTO 11:**

FD-20-03  
S-8  
35' - 37'



**PHOTO 12:**

FD-20-03  
S-9  
40' - 42'



**PHOTO 13:**

FD-20-03  
S-10  
45' - 47'



**PHOTO 14:**

FD-20-03  
S-11  
50' - 52'



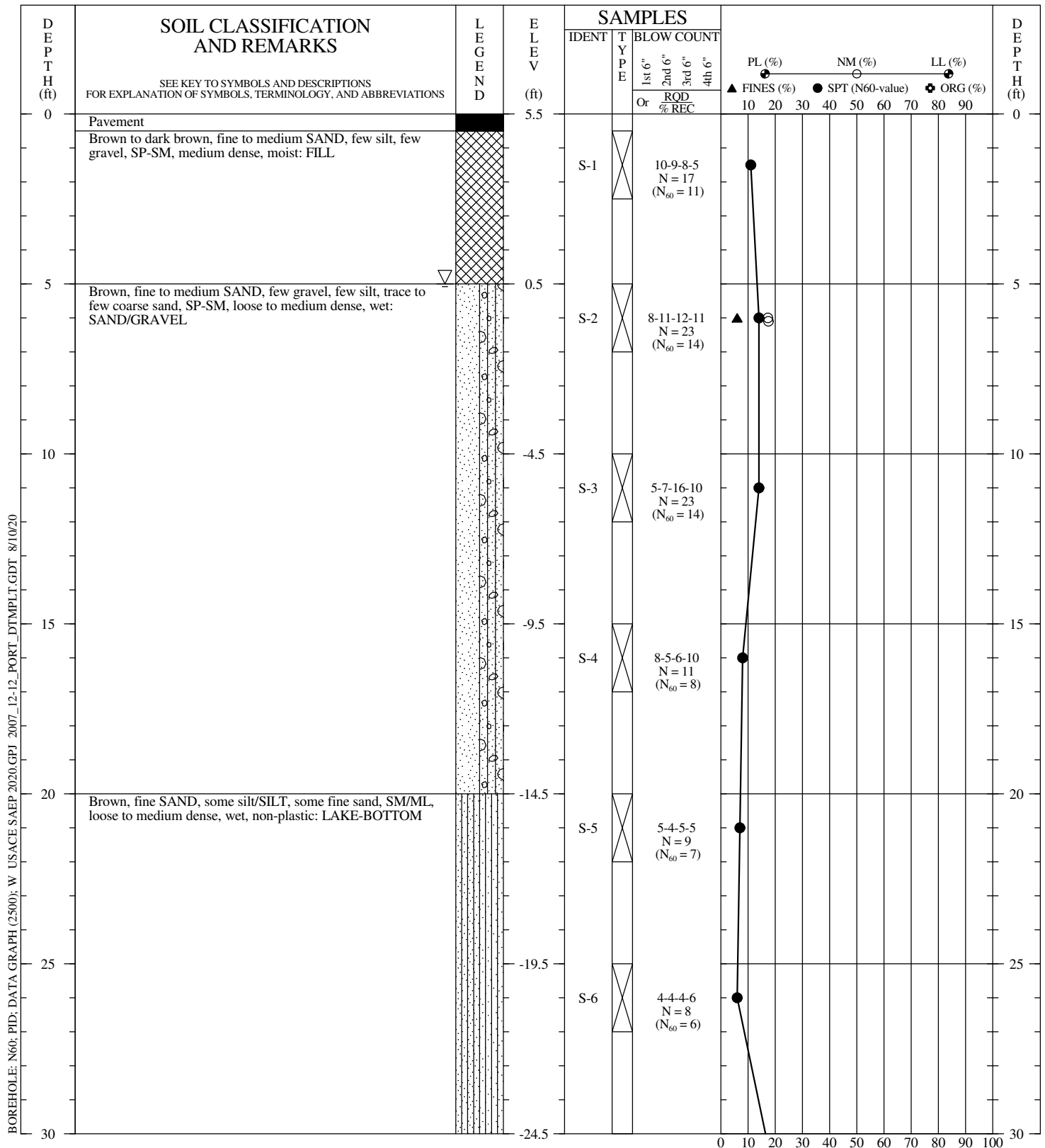
**PHOTO 15:**

FD-20-03



**PHOTO 16:**

FD-20-03



DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.

LOGGED BY: NDL      CHECKED BY/DATE: RSE/8-7-20

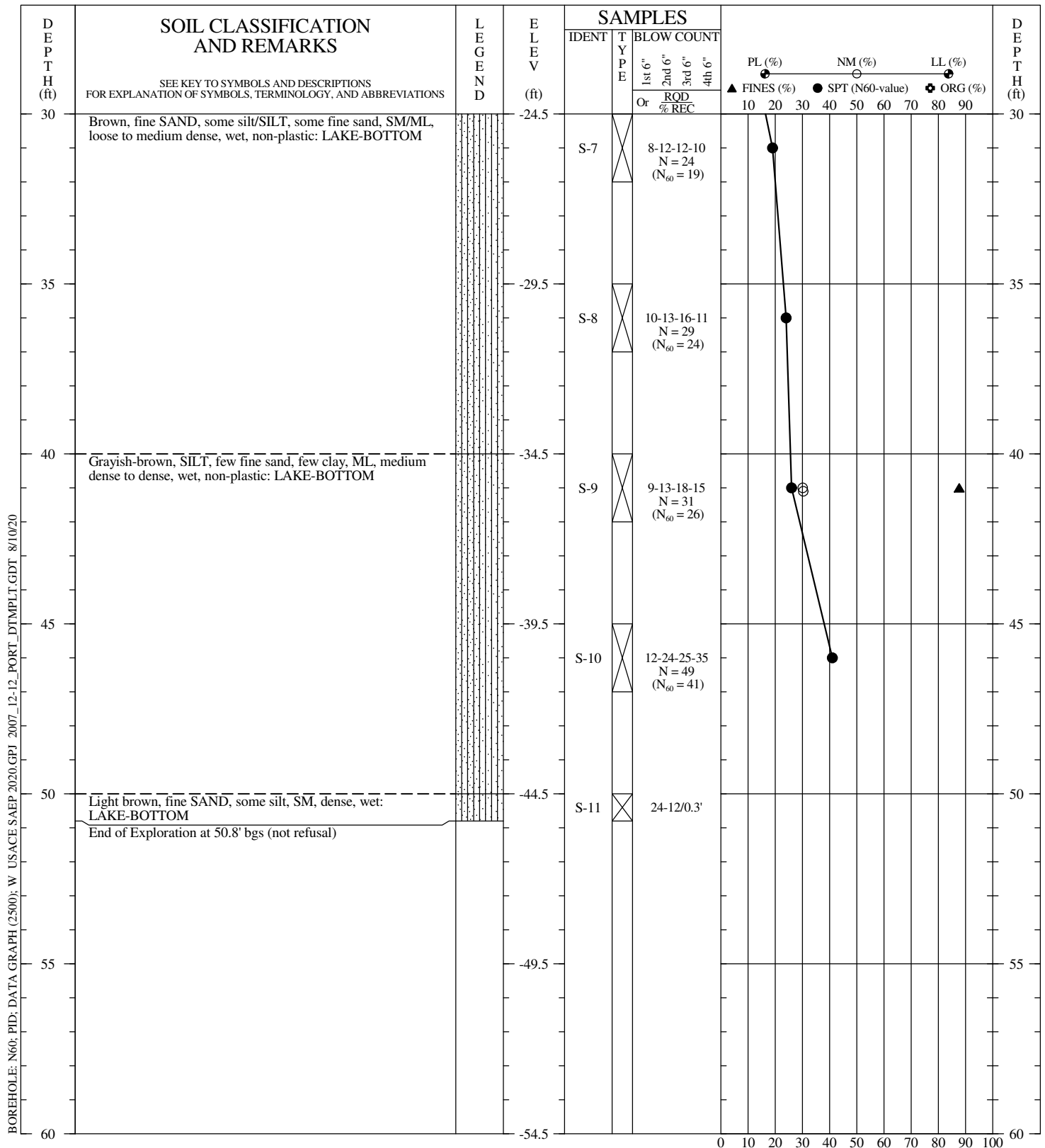
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### GEOTECHNICAL BORING RECORD

**BOREHOLE NO.:** FD-20-04  
**DRILLED:** 6/16/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

**PAGE 1 OF 2**





DRILLER: New England Boring Contractors  
 EQUIPMENT: Mobile B-53  
 METHOD: Rotary Wash (Variable)  
 HOLE DIAM.: 4"  
 SPTs: Safety winch; N-roads  
 REMARKS: Boring backfilled with cement-bentonite grout upon completion.

LOGGED BY: NDL CHECKED BY/DATE: RSE/8-7-20

THIS BOREHOLE RECORD PRESENTS A REASONABLE INTERPRETATION OF THE SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER. STRATA INTERFACES (AS SHOWN) ARE APPROXIMATE. ACTUAL TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### GEOTECHNICAL BORING RECORD

**BOREHOLE NO.:** FD-20-04  
**DRILLED:** 6/16/20  
**PROJECT:** Stratford Army Engine Plant  
**LOCATION:** Stratford, CT  
**PROJECT NO.:** 3616176064

PAGE 2 OF 2

**wood.**



**PHOTO 1:**

FD-20-04



**PHOTO 2:**

FD-20-04

S-1

0.5' - 2.5'



**PHOTO 3:**

FD-20-04  
S-2  
5' - 7'



**PHOTO 4:**

FD-20-04  
S-3  
10' - 12'





**PHOTO 5:**

FD-20-04  
S-4  
15' – 17'



**PHOTO 6:**

FD-20-04  
S-5  
20' – 22'



**PHOTO 7:**

FD-20-04  
S-6  
25' - 27'



**PHOTO 8:**

FD-20-04  
S-7  
30' - 32'



**PHOTO 9:**

FD-20-04  
S-8  
35' – 37'



**PHOTO 10:**

FD-20-04  
S-9  
40' – 42'



**PHOTO 11:**

FD-20-04  
S-10  
45' – 47'



**PHOTO 12:**

FD-20-04  
S-11  
50' – 50.8'



**PHOTO 13:**

FD-20-04



**PHOTO 14:**

FD-20-04



United States Army Corps of Engineers, New England District  
Stratford Army Engine Plant, Stratford, CT  
Geotechnical Data Report

## **APPENDIX B**

### **LABORATORY TEST REPORTS**



July 30, 2020

Project No. 2020-350-001

Mr. Nicholas Langlais  
Wood Environmental & Infrastructure  
1070 West Main Street, Suite 5  
Abingdon, VA 24210

**Transmittal**  
**Laboratory Test Results**  
**SAEP Stratford 3616176064**

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,  
**Geotechnics, Inc.**

Nathan Melaro  
Director of Operations

***We understand that you have a choice in your laboratory services  
and we thank you for choosing Geotechnics.***

## MOISTURE CONTENT

ASTM D 2216-10

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001

Lab ID:	001	005	007	008	011
Boring No.:	FD-20-01	FD-20-02	FD-20-02	FD-20-03	FD-20-03
Depth (ft):	7.0-9.0	5.0-7.0	20.0-22.0	10.0-12.0	45.0-47.0
Sample No.:	u-1	S-2	S-5	S-3	S-10
Tare Number	203	20	11	31	50
Wt. of Tare & Wet Sample (g)	363.78	33.62	54.90	82.54	38.96
Wt. of Tare & Dry Sample (g)	185.85	27.14	43.81	71.55	34.56
Weight of Tare (g)	98.58	8.52	8.32	8.32	8.61
Weight of Water (g)	177.93	6.48	11.09	10.99	4.40
Weight of Dry Sample (g)	87.27	18.62	35.49	63.23	25.95
<b>Water Content (%)</b>	<b>203.9</b>	<b>34.8</b>	<b>31.2</b>	<b>17.4</b>	<b>17.0</b>

Lab ID	012	014
Boring No.	FD-20-04	FD-20-04
Depth (ft)	5.0-7.0	40.0-42.0
Sample No.	S-2	S-9
Tare Number	19	47
Wt. of Tare & Wet Sample (g)	100.28	94.08
Wt. of Tare & Dry Sample (g)	86.64	74.22
Weight of Tare (g)	8.68	8.77
Weight of Water (g)	13.64	19.86
Weight of Dry Sample (g)	77.96	65.45
<b>Water Content (%)</b>	<b>17.5</b>	<b>30.3</b>

Notes :

Tested By SG Date 7/13/20 Checked By JLK Date 7/14/20



## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-001
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	7.0-9.0
Project No.:	2020-350-001	Shelby Tube No.:	U-1
Lab ID:	2020-350-001-001	Recovery (ft):	NA

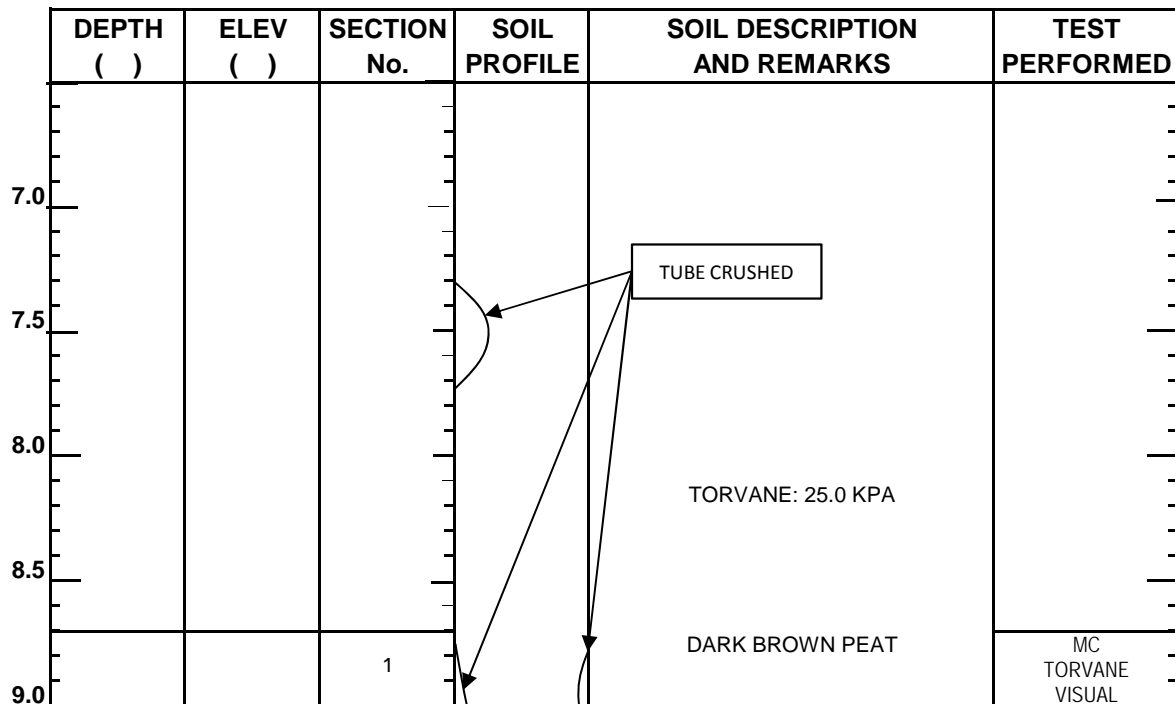
### MOISTURE CONTENT

Section Number	1
Tare Number	203
Weight of Tare & Wet Sample (g)	363.78
Weight of Tare & Dry Sample (g)	185.85
Weight of Tare (g)	98.58
Moisture Content (%)	203.88

### UNIT WEIGHT

Weight of Tube & Wet Sample (g)  
 Weight of Tube (g)  
 Weight of Wet Sample (g)  
 Length 1 (in)  
 Length 2 (in)  
 Length 3 (in)  
 Top Diameter (in)  
 Middle Diameter (in)  
 Bottom Diameter (in)  
 Sample Volume (cm<sup>3</sup>)  
 Moisture Content (%)  
 Unit Wet Weight (g/cm<sup>3</sup>)  
 Unit Wet Weight (pcf)  
**Unit Dry Weight (g/cm<sup>3</sup>)**  
**Unit Dry Weight (pcf)**

## SOIL PROFILE AND SAMPLING



*Note: When full recovery is not achieved, the elevation can not be accurately defined.  
 Indicate each cut of the tube with an arrow.  
 Indicate dividing line between soil types with a solid line.  
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.*

Tested By	RPE	Date	7/13/20	Checked By	NJM	Date	7/30/20
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## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-001
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	7.0-9.0
Project No.:	2020-350-001	Shelby Tube No.:	U-1
Lab ID:	2020-350-001-001	Recovery (ft):	NA



Section 1

Tested By RPE Date 7/13/20 Checked By NJM Date 7/30/20

## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	9.0-11.0'
Project No.:	2020-350-001	Shelby Tube No.:	U-2
Lab ID:	2020-350-001-002	Recovery (ft):	NA

### MOISTURE CONTENT

Section Number	1	2	3
Tare Number		3343	3375
Weight of Tare & Wet Sample (g)		191.20	288.64
Weight of Tare & Dry Sample (g)		60.66	97.64
Weight of Tare (g)		8.09	8.35
Moisture Content (%)		248.32	213.91

### UNIT WEIGHT

Weight of Tube & Wet Sample (g)	456.77
Weight of Tube (g)	175.19
Weight of Wet Sample (g)	281.58
Length 1 (in)	2.385
Length 2 (in)	2.398
Length 3 (in)	2.387
Top Diameter (in)	2.872
Middle Diameter (in)	2.883
Bottom Diameter (in)	2.885
Sample Volume (cm <sup>3</sup> )	255.14
Moisture Content (%)	213.91
Unit Wet Weight (g/cm <sup>3</sup> )	1.10
Unit Wet Weight (pcf)	68.87
<b>Unit Dry Weight (g/cm<sup>3</sup>)</b>	<b>0.35</b>
<b>Unit Dry Weight (pcf)</b>	<b>21.9</b>

## SOIL PROFILE AND SAMPLING

DEPTH ( )	ELEV ( )	SECTION No.	SOIL PROFILE	SOIL DESCRIPTION AND REMARKS	TEST PERFORMED
9.0				TORVANE: 31.5 KPA	
9.5					
10.0					
10.5		3	[Cross-hatched]	DARK BROWN PEAT	UNIT WEIGHT MC
10.5		2	[Cross-hatched]		TORVANE MC
11.0		1	[Grid]	WAX	NA

*Note: When full recovery is not achieved, the elevation can not be accurately defined.  
 Indicate each cut of the tube with an arrow.  
 Indicate dividing line between soil types with a solid line.  
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.*

Tested By	RPE	Date	7/13/20	Checked By	NJM	Date	7/30/20
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## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	9.0-11.0'
Project No.:	2020-350-001	Shelby Tube No.:	U-2
Lab ID:	2020-350-001-002	Recovery (ft):	NA

Section 1



Section 2



Section 3



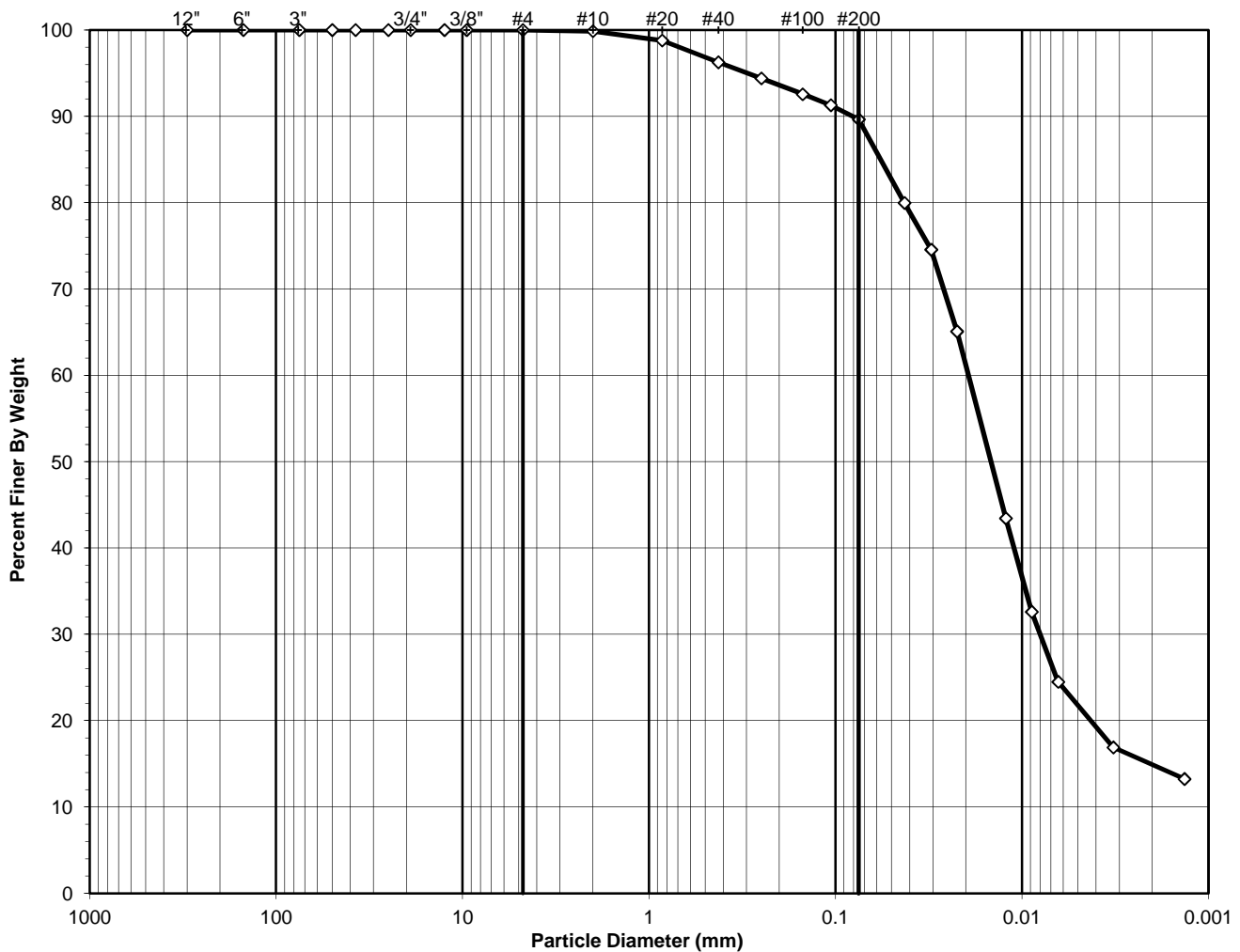
Tested By RPE Date 7/13/20 Checked By NJM Date 7/30/20

## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	15.0-17.0'
Project No.:	2020-350-001	Sample No.:	S-3
Lab ID:	2020-350-001-003	Soil Color:	Dark Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
**MH, TESTED**

**D50 = 0.01**

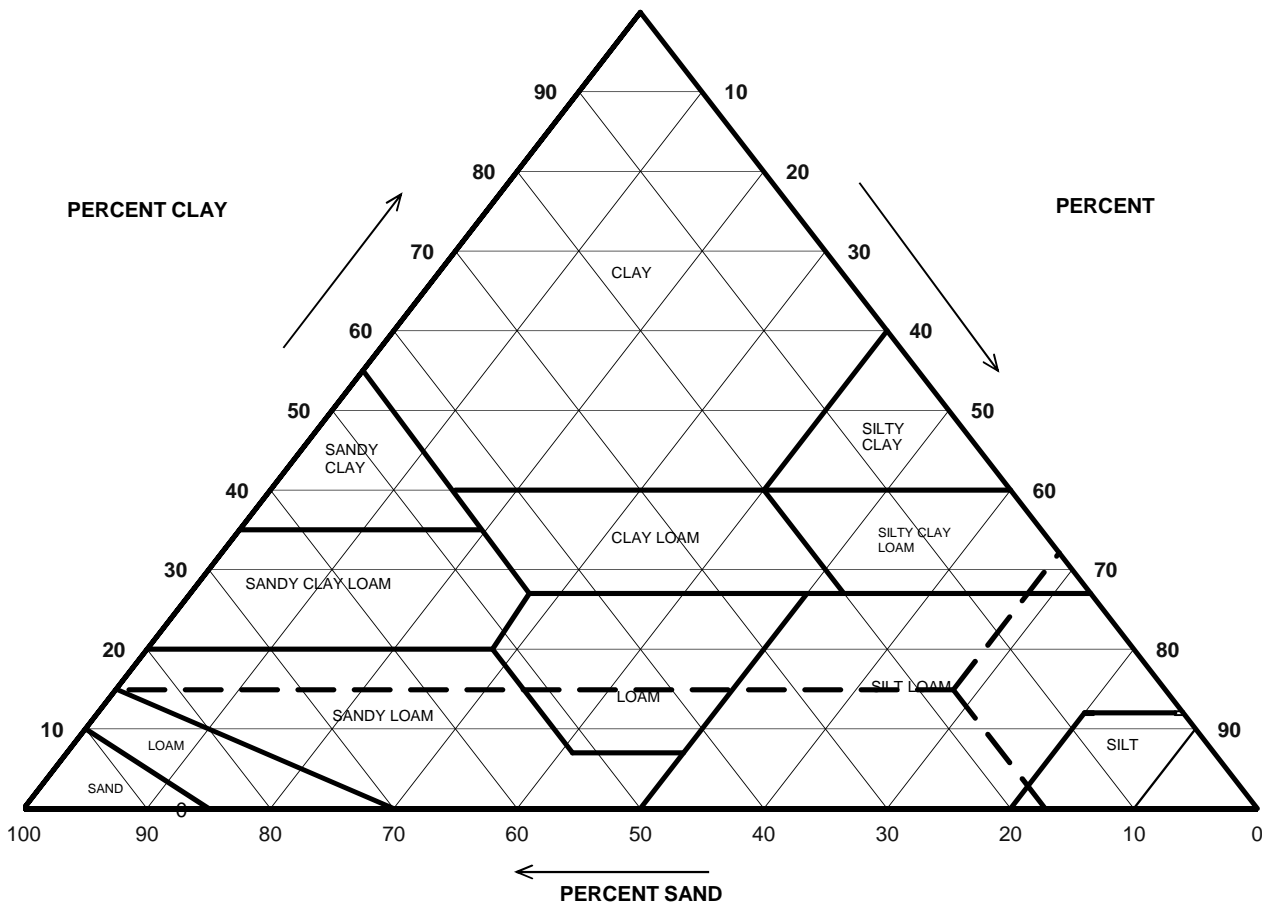
**USCS Classification:**  
**ELASTIC SILT**

Tested By LF	Date 7/28/20	Checked By JLK	Date 7/29/20
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## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-003

Boring No.: FD-20-01  
 Depth (ft): 15.0-17.0'  
 Sample No.: S-3  
 Soil Color: Dark Gray



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		<b>Gravel</b>	<b>0.13</b>	
<b>2</b>	<b>99.87</b>	<b>Sand</b>	<b>17.17</b>	<b>17.19</b>
<b>0.05</b>	<b>82.70</b>	<b>Silt</b>	<b>67.80</b>	<b>67.89</b>
<b>0.002</b>	<b>14.90</b>	<b>Clay</b>	<b>14.90</b>	<b>14.92</b>

**USDA Classification: SILT LOAM**

# WASH SIEVE ANALYSIS

ASTM D6913-17



Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-003

Boring No.: FD-20-01  
 Depth (ft): 15.0-17.0'  
 Sample No.: S-3  
 Soil Color: Dark Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2042	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	364.91	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	364.91	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.98	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	216.93	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>0.0</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	216.93
Tare No. (Sub-Specimen)	2042	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	364.91	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	147.98	Dry Weight of - 3/4" Sample (g):	216.93
Sub-Specimen Wet Weight (g):	216.93	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	216.93
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25	0.00	0.00	0.00	100.00	100.00
3/4"	19	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	0.00	( ** )	0.00	100.00	100.00
3/8"	9.5	0.00	0.00	0.00	100.00	100.00
#4	4.75	0.00	0.00	0.00	100.00	100.00
#10	2	0.29	0.13	0.13	99.87	99.9
#20	0.85	2.35	( ** )	1.22	98.78	98.8
#40	0.425	5.47	2.52	3.74	96.26	96.3
#60	0.25	4.05	1.87	5.61	94.39	94.4
#100	0.15	3.99	1.84	7.44	92.56	92.6
#140	0.106	2.74	1.26	8.71	91.29	91.3
#200	0.075	3.57	1.65	10.35	89.65	89.6
Pan	-	194.47	89.65	100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By LF Date 7/28/20 Checked By JLK Date 7/29/20

## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	15.0-17.0'
Project No.:	2020-350-001	Sample No.:	S-3
Lab ID:	2020-350-001-003	Soil Color:	Dark Gray

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	35.0	23.2	5.45	10.6	0.0426	89.2	80.0
2	33.0	23.2	5.45	11.0	0.0307	83.2	74.6
4	29.5	23.2	5.45	11.6	0.0223	72.6	65.1
15	21.5	23.2	5.45	13.1	0.0122	48.5	43.4
30	17.5	23.2	5.45	13.8	0.0089	36.4	32.6
60	14.5	23.2	5.45	14.3	0.0064	27.3	24.5
240	11.5	23.7	5.25	14.9	0.0032	18.9	16.9
1440	10.5	22.7	5.63	15.0	0.0013	14.8	13.2

### Soil Specimen Data

Tare No.:	700	Percent Finer than # 200:	89.65
Wt. of Tare & Dry Material (g):	124.81	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	87.05		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	32.76		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/27/20	Checked By	JLK	Date	7/29/20
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page 4 of 4



### ATTERBERG LIMITS

ASTM D 4318-17

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-003

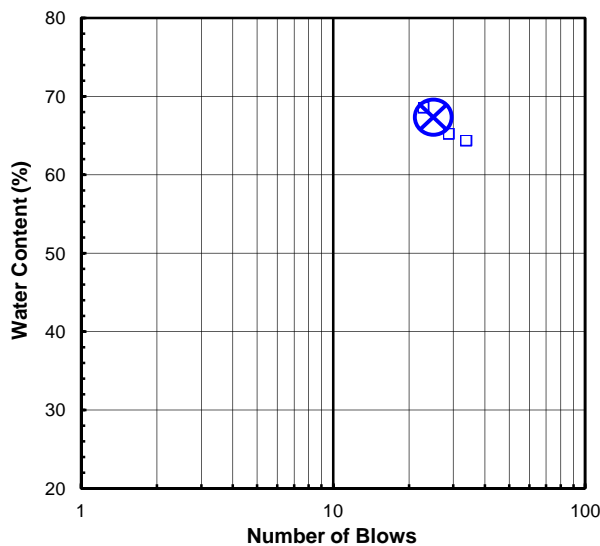
Boring No.: FD-20-01  
 Depth (ft): 15.0-17.0'  
 Sample No.: S-3  
 Soil Description: DARK GRAY ELASTIC SILT

**Note: The USCS symbol used with this test refers only to the minus No. 40** (Minus No. 40 sieve material, Air dried)  
**sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

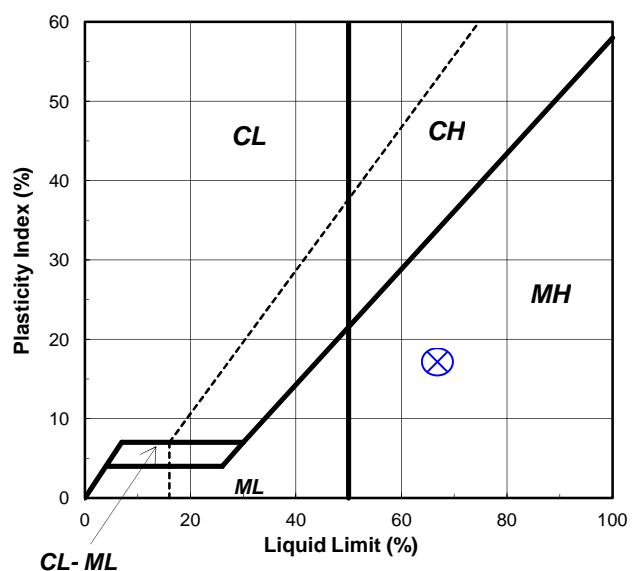
As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	13	319	235	542	U
Wt. of Tare & Wet Sample (g):	39.92	40.69	38.91	40.52	L
Wt. of Tare & Dry Sample (g):	25.15	32.85	30.96	32.33	T
Weight of Tare (g):	8.68	20.65	18.75	20.37	I
Weight of Water (g):	14.8	7.8	8.0	8.2	P
Weight of Dry Sample (g):	16.5	12.2	12.2	12.0	O
Was As Received MC Preserved:	Yes				I
<b>Moisture Content (%):</b>	<b>89.7</b>	<b>64.3</b>	<b>65.1</b>	<b>68.5</b>	<b>N</b>
<b>Number of Blows:</b>		<b>34</b>	<b>29</b>	<b>23</b>	<b>T</b>

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	6234	305		<b>Liquid Limit (%): 67</b>
Wt. of Tare & Wet Sample (g):	24.80	25.60		<b>Plastic Limit (%): 50</b>
Wt. of Tare & Dry Sample (g):	22.76	23.44		<b>Plasticity Index (%): 17</b>
Weight of Tare (g):	18.68	19.05		<b>USCS Symbol: MH</b>
Weight of Water (g):	2.0	2.2		
Weight of Dry Sample (g):	4.1	4.4		
<b>Moisture Content (%):</b>	<b>50.0</b>	<b>49.2</b>	<b>0.8</b>	
<i>Note: The acceptable range of the two Moisture Contents is <math>\pm</math> 0.84</i>				

Flow Curve



Plasticity Chart



Tested By JP Date 7/22/20 Checked By BRB Date 7/24/20

## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	17.0-19.0
Project No.:	2020-350-001	Shelby Tube No.:	U-3
Lab ID:	2020-350-001-004	Recovery (ft):	NA

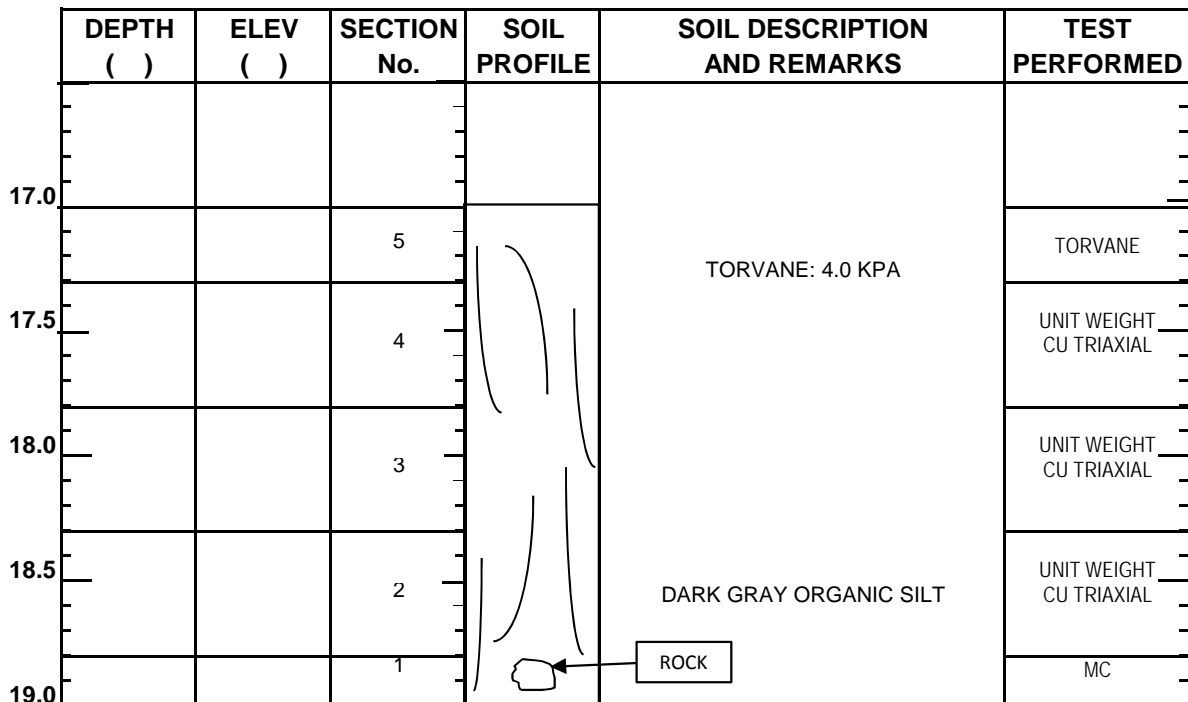
### MOISTURE CONTENT

Section Number	1	2	3	4
Tare Number	1596			
Weight of Tare & Wet Sample (g)	442.34			
Weight of Tare & Dry Sample (g)	376.72			
Weight of Tare (g)	96.43			
Moisture Content (%)	23.41			

### UNIT WEIGHT

Weight of Tube & Wet Sample (g)	1524.50	1512.90	1405.60
Weight of Tube (g)	421.20	434.55	432.53
Weight of Wet Sample (g)	1103.30	1078.35	973.07
Length 1 (in)	5.825	6.023	6.004
Length 2 (in)	5.827	6.002	5.955
Length 3 (in)	5.806	5.996	5.971
Top Diameter (in)	2.885	2.884	2.895
Middle Diameter (in)	2.889	2.898	2.891
Bottom Diameter (in)	2.902	2.889	2.897
Sample Volume (cm <sup>3</sup> )	626.41	645.87	644.39
Moisture Content (%)	23.41	23.41	23.41
Unit Wet Weight (g/cm <sup>3</sup> )	1.76	1.67	1.51
Unit Wet Weight (pcf)	109.90	104.18	94.23
<b>Unit Dry Weight (g/cm<sup>3</sup>)</b>	<b>1.43</b>	<b>1.35</b>	<b>1.22</b>
<b>Unit Dry Weight (pcf)</b>	<b>89.1</b>	<b>84.4</b>	<b>76.4</b>

## SOIL PROFILE AND SAMPLING



*Note:* When full recovery is not achieved, the elevation can not be accurately defined.  
 Indicate each cut of the tube with an arrow.  
 Indicate dividing line between soil types with a solid line.  
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.

Tested By	RPE	Date	7/21/20	Checked By	NJM	Date	7/30/20
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## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	17.0-19.0
Project No.:	2020-350-001	Shelby Tube No.:	U-3
Lab ID:	2020-350-001-004	Recovery (ft):	NA

Section 2



Section 3



Section 4

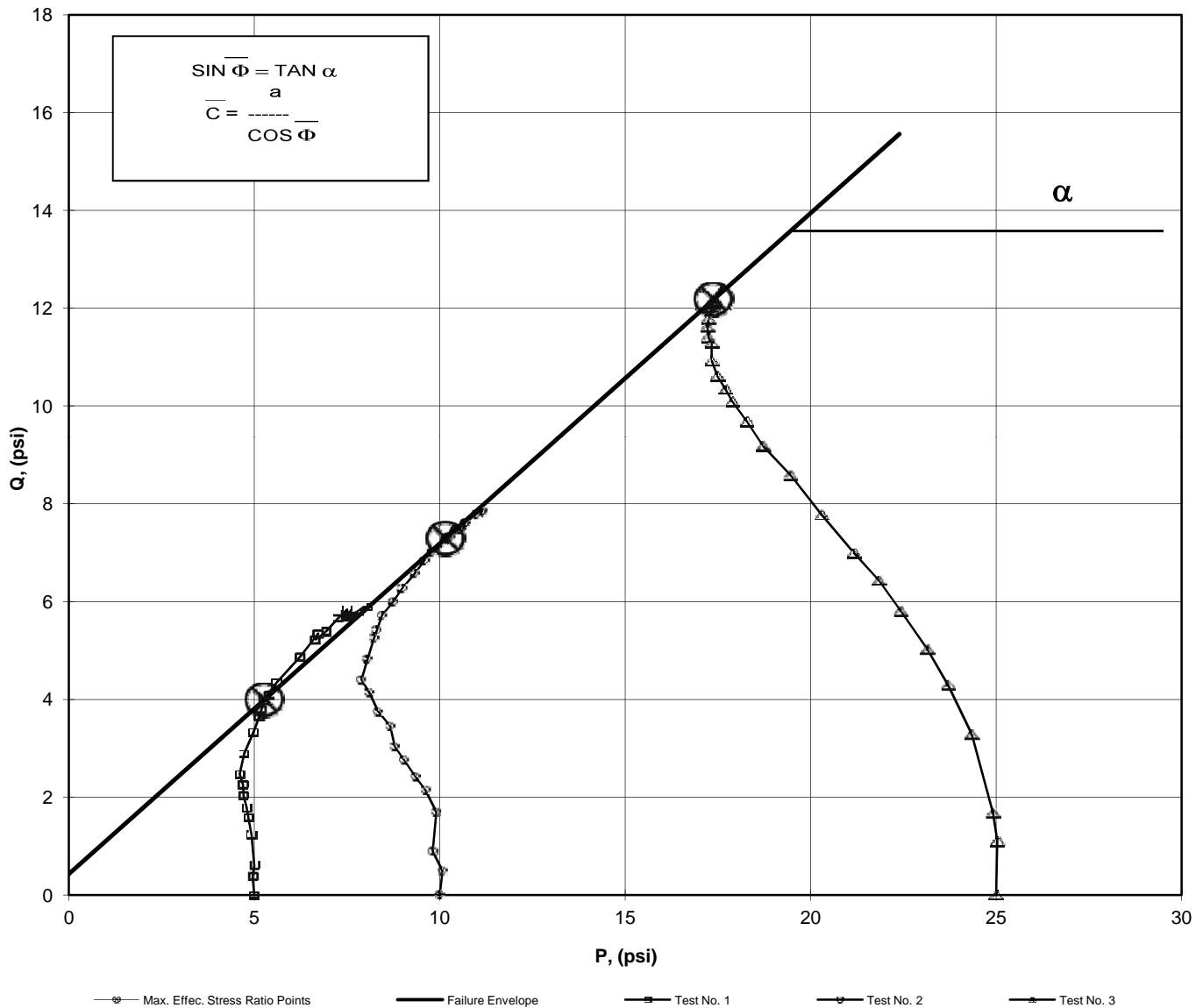


Tested By RPE Date 7/21/20 Checked By NJM Date 7/30/20

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.0-19.0
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

**Consolidated Undrained Triaxial Test with Pore Pressure**

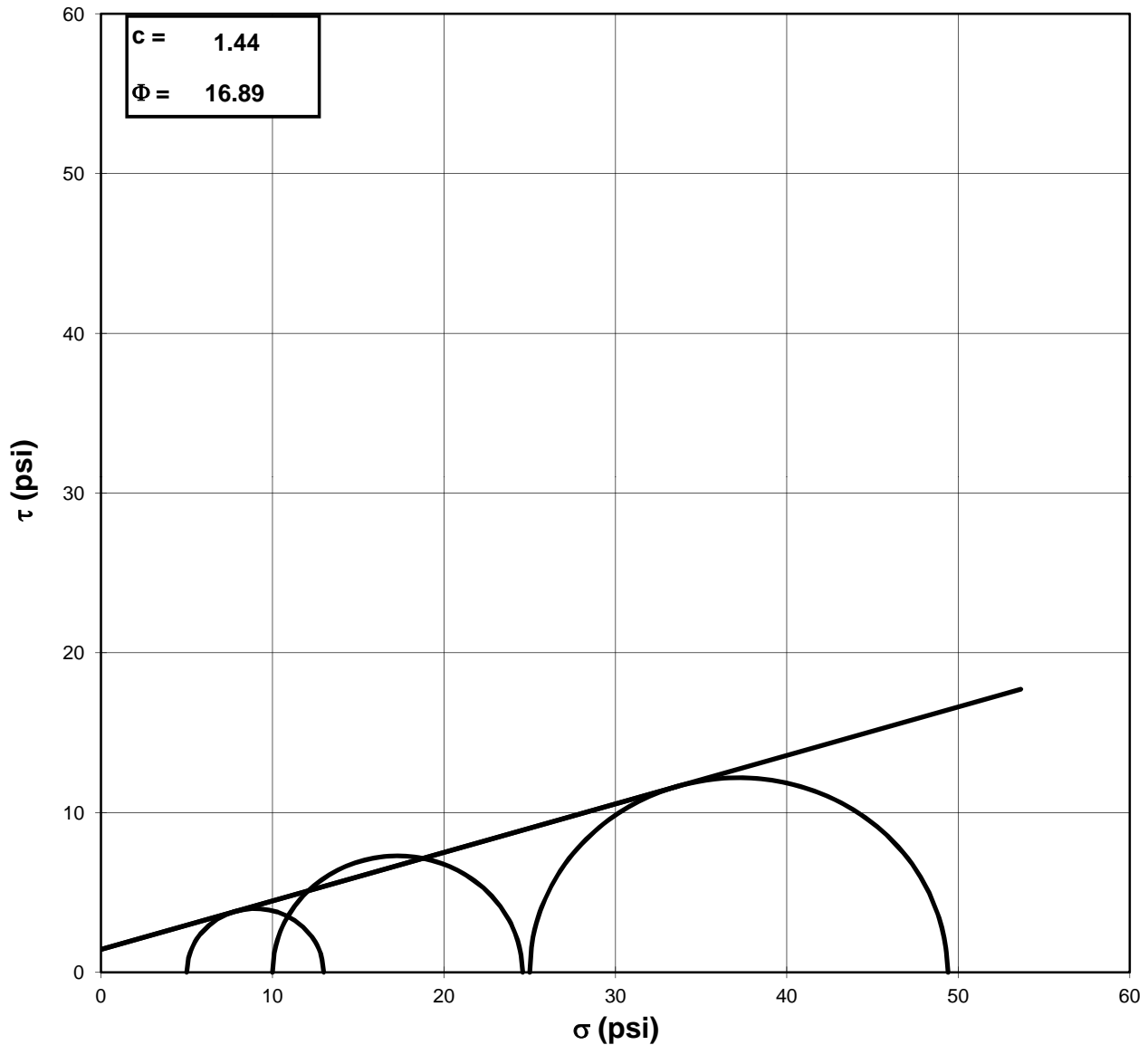


<b>a</b>	<b>=</b>	<b>0.43</b>	<b><math>\overline{C}</math></b>	<b>=</b>	<b>0.58</b>
<b><math>\alpha</math></b>	<b>=</b>	<b>34.1</b>	<b><math>\overline{\Phi}</math></b>	<b>=</b>	<b>42.52</b>

Tested By: JAB      Date: 7/21/20      Approved By: NJM      Date: 7/28/20

**MOHR TOTAL STRENGTH ENVELOPE**  
ASTM D4767-11

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.0-19.0
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		
Visual Description:	Dark Gray Organic Silt (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: JAB      Date: 7/21/20      Approved By: NJM      Date: 7/28/20

page 2 of 10      DCN: CT-S28      DATE: 4/12/13      REVISION: 3

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS**  
ASTM D4767-11



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	18.3-18.8
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

Stage No.	1
Test No.	1

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	5.825	Diameter 1:	2.885
Length 2:	5.827	Diameter 2:	2.889
Length 3:	5.806	Diameter 3:	2.902
<i>Avg. Length:</i>	5.819	<i>Avg. Diam.:</i>	2.892

**PRESSURES (psi)**

Cell Pressure (psi)	37
Back Pressure (psi)	32
Eff. Conf. Pressure (psi)	5.0
Pore Pressure	
Response (%)	99

**VOLUME CHANGE**

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	9.6
Final Change (ml)	14.4

**MAXIMUM OBLIQUITY POINTS**

$\bar{P}$	=	5.27
Q	=	3.99

Initial Dial Reading (mil)	17
Dial Reading After Saturation (mil)	53
Dial Reading After Consolidation (mil)	105

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
10.0	0.000	32.0
14.7	0.002	32.4
17.7	0.003	32.6
25.9	0.009	33.3
30.2	0.014	33.7
32.9	0.020	34.0
36.1	0.030	34.3
39.0	0.038	34.6
41.9	0.050	34.9
47.4	0.071	35.2
53.3	0.100	35.4
58.0	0.134	35.5
60.0	0.168	35.6
63.0	0.209	35.7
64.6	0.239	35.7
68.4	0.280	35.7
76.2	0.336	35.6
83.4	0.394	35.6
82.3	0.438	35.6
85.5	0.497	35.5
89.9	0.540	35.4
93.1	0.584	35.3
92.7	0.626	35.3
92.1	0.655	35.2
92.7	0.685	35.2
93.4	0.715	35.1
94.2	0.745	35.1
96.1	0.788	35.0
98.1	0.833	34.9
98.6	0.861	34.8
97.3	0.890	34.9

Tested By: JAB      Date: 7/21/20      Input Checked By: KC      Date: 7/28/20

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	18.3-18.8
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

Effective Confining Pressure (psi)	5.0	Stage No.	1
		Test No	1

**INITIAL DIMENSIONS**

Initial Sample Length (in)	5.82
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.57
Initial Sample Volume (in <sup>3</sup> )	38.23

**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	36.64
Length After Consolidation (in)	5.73
Area After Consolidation (in <sup>2</sup> )	6.393

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
0.03	0.74	0.41	5.32	4.6	1.161	0.57	4.96	0.37
0.05	1.20	0.60	5.60	4.4	1.274	0.50	5.00	0.60
0.15	2.48	1.32	6.16	3.7	1.673	0.54	4.92	1.24
0.25	3.16	1.74	6.42	3.3	1.967	0.56	4.84	1.58
0.36	3.57	1.99	6.58	3.0	2.185	0.56	4.80	1.79
0.52	4.06	2.32	6.74	2.7	2.513	0.58	4.71	2.03
0.67	4.51	2.56	6.95	2.4	2.847	0.57	4.69	2.25
0.87	4.94	2.86	7.07	2.1	3.313	0.59	4.61	2.47
1.23	5.78	3.17	7.62	1.8	4.153	0.55	4.73	2.89
1.74	6.66	3.35	8.31	1.6	5.039	0.51	4.98	3.33
2.33	7.33	3.52	8.81	1.5	5.957	0.49	5.15	3.67
2.92	7.59	3.60	8.99	1.4	6.427	0.48	5.19	3.80
3.64	7.98	3.72	9.26	1.3	7.234	0.47	5.27	3.99
4.16	8.18	3.68	9.51	1.3	7.188	0.45	5.41	4.09
4.89	8.69	3.74	9.95	1.3	7.908	0.43	5.61	4.35
5.87	9.75	3.64	11.11	1.4	8.145	0.38	6.24	4.87
6.87	10.70	3.63	12.07	1.4	8.801	0.34	6.72	5.35
7.64	10.45	3.57	11.88	1.4	8.297	0.35	6.65	5.22
8.67	10.78	3.46	12.33	1.5	7.989	0.32	6.94	5.39
9.43	11.32	3.40	12.92	1.6	8.058	0.30	7.26	5.66
10.18	11.68	3.34	13.34	1.7	8.029	0.29	7.50	5.84
10.93	11.52	3.27	13.25	1.7	7.665	0.29	7.49	5.76
11.43	11.37	3.16	13.21	1.8	7.182	0.28	7.52	5.68
11.95	11.39	3.18	13.22	1.8	7.242	0.28	7.52	5.70
12.48	11.42	3.14	13.29	1.9	7.126	0.28	7.58	5.71
13.00	11.46	3.07	13.39	1.9	6.923	0.27	7.66	5.73
13.76	11.62	3.01	13.61	2.0	6.846	0.26	7.80	5.81
14.53	11.78	2.95	13.83	2.1	6.736	0.25	7.94	5.89
15.02	11.78	2.84	13.93	2.2	6.464	0.24	8.04	5.89
15.53	11.53	2.86	13.68	2.1	6.380	0.25	7.91	5.77

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.8-18.3
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

Stage No.	1
Test No.	2

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	6.023	Diameter 1:	2.884
Length 2:	6.002	Diameter 2:	2.890
Length 3:	5.996	Diameter 3:	2.889
Avg. Length	6.007	Avg. Diam.:	2.888

**PRESSURES (psi)**

Cell Pressure (psi)	41.5
Back Pressure (psi)	31.5
Eff. Conf. Pressure (psi)	10.0
Pore Pressure Response (%)	99

**VOLUME CHANGE**

Initial Burette Reading (ml)	72.0
Final Burette Reading (ml)	34.8
Final Change (ml)	37.2

**MAXIMUM OBLIQUITY POINTS**

P	=	10.16
Q	=	7.29

Initial Dial Reading (mil)	34
Dial Reading After Saturation (mil)	70
Dial Reading After Consolidation (mil)	221

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
10.8	0.000	31.5
17.0	0.001	31.9
22.0	0.003	32.6
32.1	0.009	33.3
37.7	0.014	34.0
41.1	0.020	34.6
45.4	0.029	35.2
49.0	0.037	35.7
54.2	0.049	36.3
58.2	0.069	36.9
63.4	0.099	37.5
67.1	0.134	38.0
72.9	0.171	38.3
79.0	0.214	38.5
81.4	0.244	38.6
85.8	0.285	38.8
90.4	0.341	38.7
95.0	0.402	38.8
99.8	0.447	38.7
104.3	0.507	38.7
107.6	0.551	38.7
112.3	0.595	38.6
113.4	0.641	38.6
114.3	0.672	38.5
117.2	0.703	38.5
119.1	0.733	38.4
120.2	0.762	38.4
123.7	0.807	38.3
125.8	0.852	38.2
126.0	0.882	38.2
127.6	0.912	38.1

Tested By: JAB	Date: 7/21/20	Input Checked By: KC	Date: 7/28/20
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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.8-18.3
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

Effective Confining Pressure (psi)	10.0	Stage No.	1
		Test No	2

**INITIAL DIMENSIONS**

Initial Sample Length (in)	6.01
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.55
Initial Sample Volume (in <sup>3</sup> )	39.34

**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	36.36
Length After Consolidation (in)	5.82
Area After Consolidation (in <sup>2</sup> )	6.248

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
0.02	0.99	0.42	10.57	9.6	1.103	0.43	10.07	0.50
0.04	1.79	1.08	10.71	8.9	1.201	0.61	9.81	0.90
0.15	3.40	1.79	11.60	8.2	1.414	0.53	9.91	1.70
0.24	4.29	2.53	11.76	7.5	1.575	0.60	9.61	2.15
0.34	4.83	3.07	11.77	6.9	1.697	0.64	9.35	2.42
0.49	5.51	3.71	11.80	6.3	1.876	0.68	9.05	2.76
0.64	6.07	4.24	11.82	5.8	2.054	0.71	8.79	3.03
0.83	6.90	4.78	12.11	5.2	2.322	0.70	8.67	3.45
1.19	7.50	5.40	12.09	4.6	2.631	0.73	8.34	3.75
1.70	8.28	6.04	12.25	4.0	3.089	0.74	8.10	4.14
2.31	8.80	6.51	12.29	3.5	3.524	0.75	7.89	4.40
2.93	9.65	6.77	12.88	3.2	3.988	0.71	8.06	4.83
3.67	10.51	7.02	13.49	3.0	4.532	0.67	8.23	5.26
4.19	10.83	7.11	13.72	2.9	4.747	0.66	8.30	5.41
4.89	11.42	7.27	14.15	2.7	5.181	0.64	8.44	5.71
5.86	11.99	7.25	14.74	2.8	5.358	0.61	8.75	6.00
6.90	12.54	7.28	15.26	2.7	5.612	0.59	8.99	6.27
7.68	13.15	7.24	15.90	2.8	5.771	0.56	9.33	6.57
8.71	13.67	7.25	16.42	2.8	5.965	0.54	9.59	6.83
9.47	14.03	7.24	16.80	2.8	6.077	0.52	9.78	7.02
10.23	14.58	7.13	17.45	2.9	6.078	0.49	10.16	7.29
11.01	14.62	7.11	17.50	2.9	6.064	0.49	10.20	7.31
11.54	14.65	7.05	17.60	3.0	5.957	0.49	10.28	7.32
12.08	14.97	6.96	18.00	3.0	5.927	0.47	10.52	7.48
12.59	15.15	6.91	18.24	3.1	5.910	0.46	10.66	7.58
13.10	15.21	6.92	18.29	3.1	5.938	0.46	10.69	7.61
13.86	15.57	6.80	18.77	3.2	5.872	0.44	10.98	7.79
14.63	15.72	6.71	19.01	3.3	5.773	0.43	11.15	7.86
15.15	15.65	6.71	18.94	3.3	5.755	0.43	11.12	7.83
15.66	15.76	6.56	19.21	3.4	5.581	0.42	11.32	7.88

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS**

ASTM D4767-11

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.3-17.8
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

Stage No.	1
Test No.	3

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	6.004	Diameter 1:	2.895
Length 2:	5.955	Diameter 2:	2.891
Length 3:	5.971	Diameter 3:	2.897
Avg. Length:	5.977	Avg. Diam.:	2.894

**PRESSURES (psi)**

Cell Pressure (psi)	56.9
Back Pressure (psi)	31.9
Eff. Conf. Pressure (psi)	25.0
Pore Pressure	
Response (%)	99

**VOLUME CHANGE**

Initial Burette Reading (ml)	144.0
Final Burette Reading (ml)	48.1
Final Change (ml)	95.9

**MAXIMUM OBLIQUITY POINTS**

$\bar{P}$	=	17.39
Q	=	12.18

Initial Dial Reading (mil)	30
Dial Reading After Saturation (mil)	102
Dial Reading After Consolidation (mil)	487

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
12.4	0.000	31.9
25.3	0.002	33.0
31.9	0.003	33.7
50.7	0.008	35.8
62.4	0.015	37.5
71.0	0.020	38.8
80.3	0.029	40.3
87.6	0.038	41.5
94.4	0.049	42.7
103.9	0.070	44.4
113.9	0.100	46.0
121.6	0.135	47.4
128.4	0.172	48.3
134.3	0.214	49.1
138.0	0.245	49.5
142.3	0.286	50.0
147.7	0.343	50.5
153.9	0.404	50.9
156.6	0.448	51.1
161.1	0.508	51.3
164.4	0.552	51.4
167.9	0.597	51.5
170.3	0.642	51.6
171.4	0.673	51.6
173.5	0.703	51.7
174.8	0.733	51.7
176.6	0.763	51.7
177.4	0.808	51.7
179.2	0.853	51.6
179.2	0.883	51.6
179.7	0.913	51.6

Tested By:	JAB	Date:	7/21/20	Input Checked By:	KC	Date:	7/28/20
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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.3-17.8
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

<i>Effective Confining Pressure (psi)</i>	25.0	<i>Stage No.</i>	1
		<i>Test No</i>	3

**INITIAL DIMENSIONS**

Initial Sample Length (in)	5.98
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.58
Initial Sample Volume (in <sup>3</sup> )	39.32

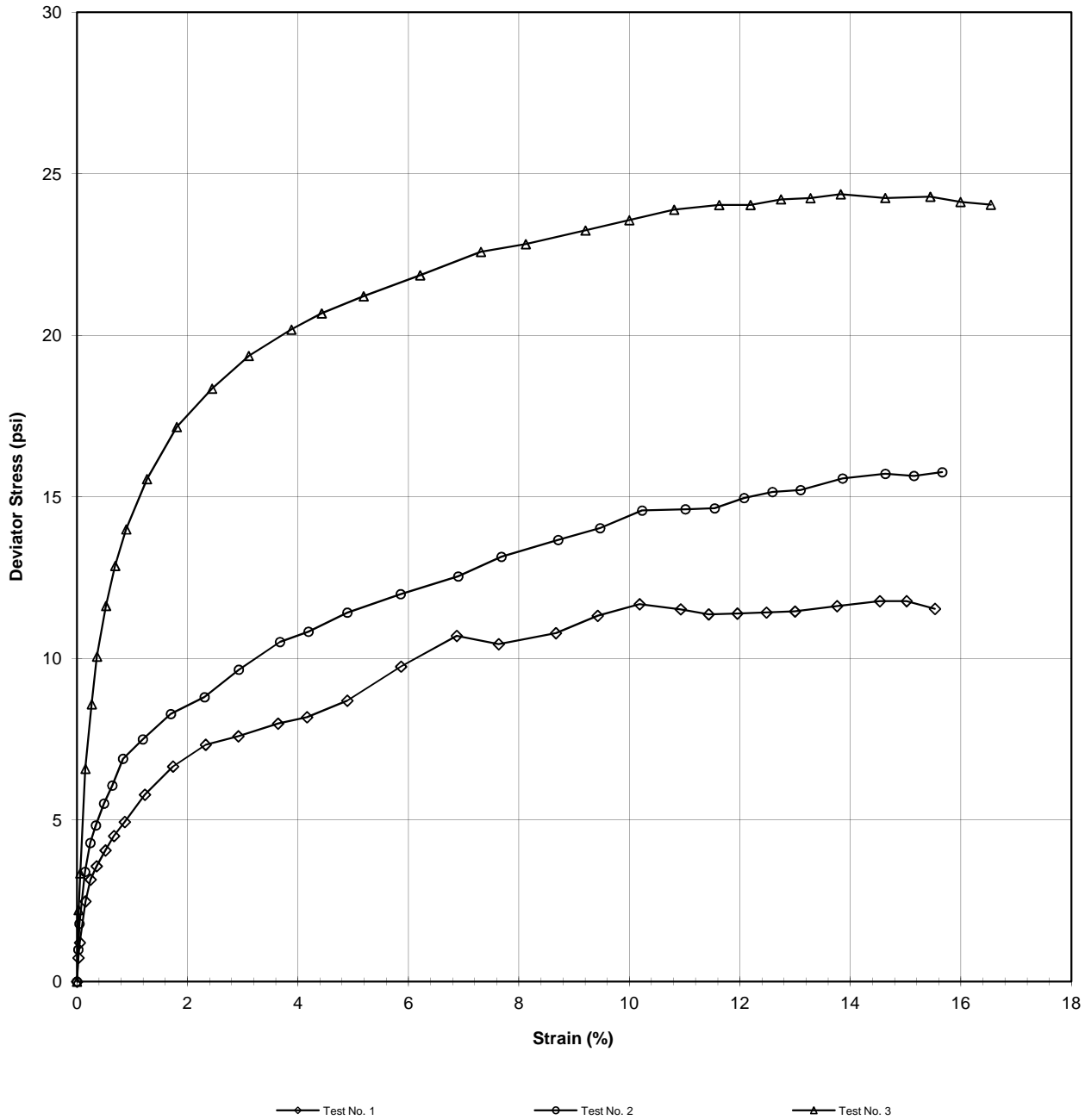
**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	32.05
Length After Consolidation (in)	5.52
Area After Consolidation (in <sup>2</sup> )	5.806

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
0.03	2.22	1.07	26.14	23.9	1.093	0.49	25.03	1.11
0.06	3.35	1.76	26.59	23.2	1.144	0.53	24.92	1.68
0.15	6.59	3.95	27.64	21.1	1.313	0.61	24.35	3.29
0.27	8.59	5.58	28.00	19.4	1.442	0.66	23.71	4.29
0.36	10.06	6.89	28.17	18.1	1.555	0.69	23.14	5.03
0.53	11.63	8.39	28.24	16.6	1.700	0.73	22.43	5.81
0.69	12.87	9.60	28.27	15.4	1.835	0.75	21.84	6.43
0.89	14.00	10.83	28.16	14.2	1.988	0.78	21.17	7.00
1.27	15.55	12.48	28.07	12.5	2.242	0.81	20.30	7.78
1.81	17.17	14.12	28.05	10.9	2.578	0.83	19.46	8.58
2.45	18.35	15.45	27.90	9.5	2.922	0.85	18.72	9.18
3.11	19.36	16.40	27.96	8.6	3.251	0.86	18.28	9.68
3.88	20.18	17.20	27.98	7.8	3.586	0.86	17.89	10.09
4.43	20.68	17.63	28.05	7.4	3.806	0.86	17.71	10.34
5.19	21.21	18.11	28.10	6.9	4.080	0.86	17.49	10.61
6.21	21.86	18.60	28.26	6.4	4.415	0.86	17.33	10.93
7.31	22.59	18.96	28.63	6.0	4.740	0.85	17.33	11.29
8.12	22.82	19.17	28.65	5.8	4.918	0.85	17.24	11.41
9.20	23.25	19.41	28.84	5.6	5.155	0.84	17.22	11.62
10.00	23.57	19.53	29.03	5.5	5.312	0.84	17.25	11.78
10.81	23.89	19.62	29.26	5.4	5.444	0.83	17.32	11.94
11.62	24.04	19.70	29.34	5.3	5.536	0.83	17.32	12.02
12.19	24.04	19.74	29.30	5.3	5.566	0.83	17.28	12.02
12.74	24.21	19.76	29.45	5.2	5.618	0.82	17.35	12.10
13.28	24.25	19.78	29.47	5.2	5.643	0.82	17.35	12.12
13.82	24.37	19.79	29.58	5.2	5.678	0.82	17.39	12.18
14.63	24.25	19.78	29.48	5.2	5.642	0.82	17.35	12.13
15.45	24.29	19.74	29.55	5.3	5.621	0.82	17.40	12.15
15.99	24.13	19.72	29.41	5.3	5.573	0.83	17.34	12.07
16.54	24.05	19.68	29.37	5.3	5.519	0.83	17.34	12.02

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-01
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	17.0-19.0
Project No.:	2020-350-001	Sample No.:	U-3
Lab ID:	2020-350-001-004		
Visual Description:	Dark Gray Organic Silt (UNDISTURBED)		



Tested By: JAB      Date: 7/21/20      Approved By: NJM      Date: 7/28/20

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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-004                      Specific Gravity (assumed)                      2.7

Visual Description: Dark Gray Organic Silt (UNDISTURBED)

**SAMPLE CONDITION SUMMARY**

Boring No.:	FD-20-01	FD-20-01	FD-20-01
Depth (ft):	18.3-18.8	17.8-18.3	17.3-17.8
Sample No.:	U-3	U-3	U-3
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	32	31.5	31.9
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	23.4	23.4	23.4
Total Unit Weight (pcf)	110.0	104.4	94.3
Dry Unit Weight (pcf)	89.1	84.6	76.4
Moisture Content (%) (FINAL)	39.4	45.4	58.4
Initial State Void Ratio, e	0.892	0.992	1.206
Void Ratio at Shear, e	0.813	0.841	0.798



Tested By: JAB                      Date: 7/21/20                      Input Checked By: KC                      Date: 7/28/20

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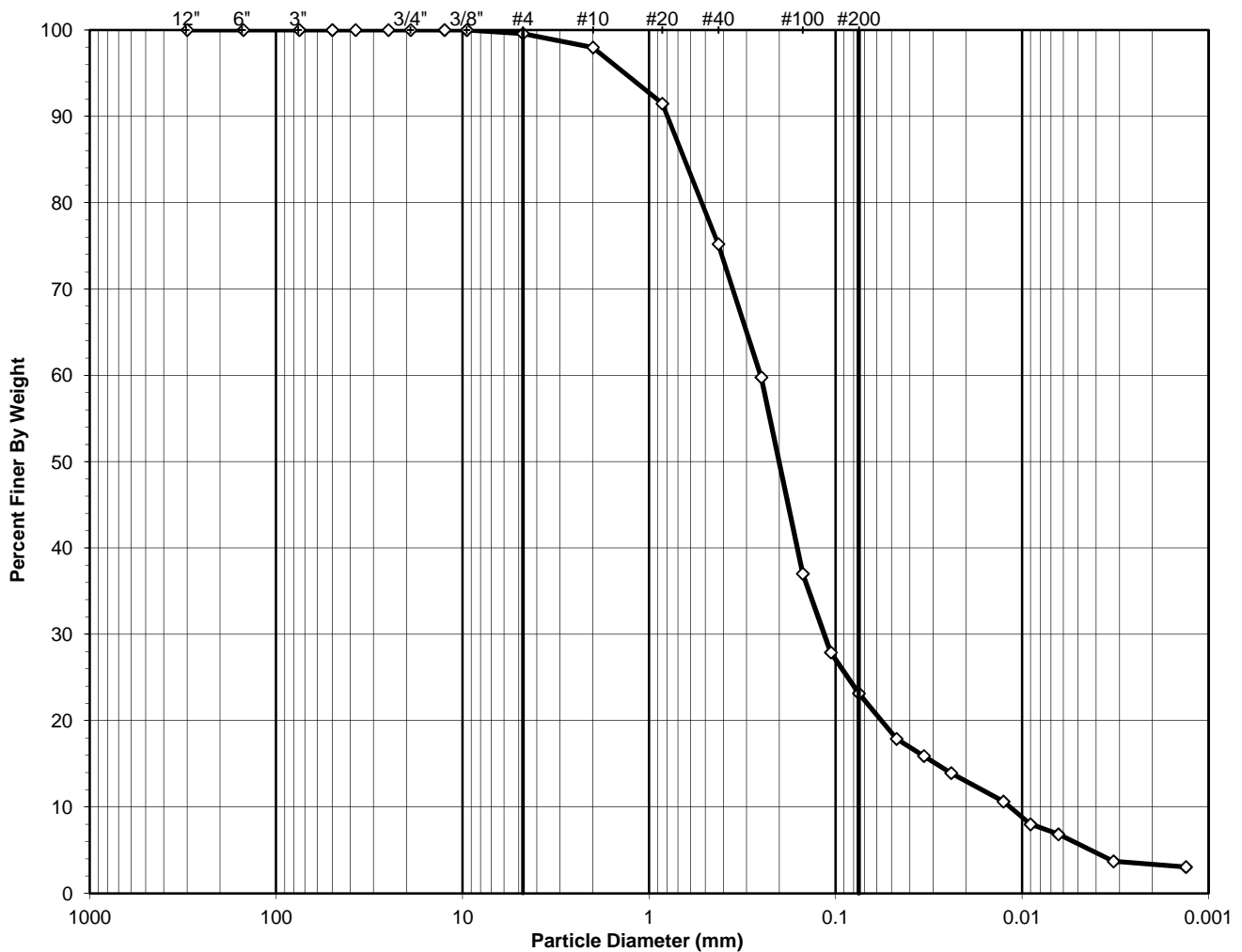
page 10 of 10                      DCN: CT-S28    DATE: 4/12/13    REVISION: 3

## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-02
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	5.0-7.0'
Project No.:	2020-350-001	Sample No.:	S-2
Lab ID:	2020-350-001-005	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
*sm, ASSUMED*

**D50 = 0.20**

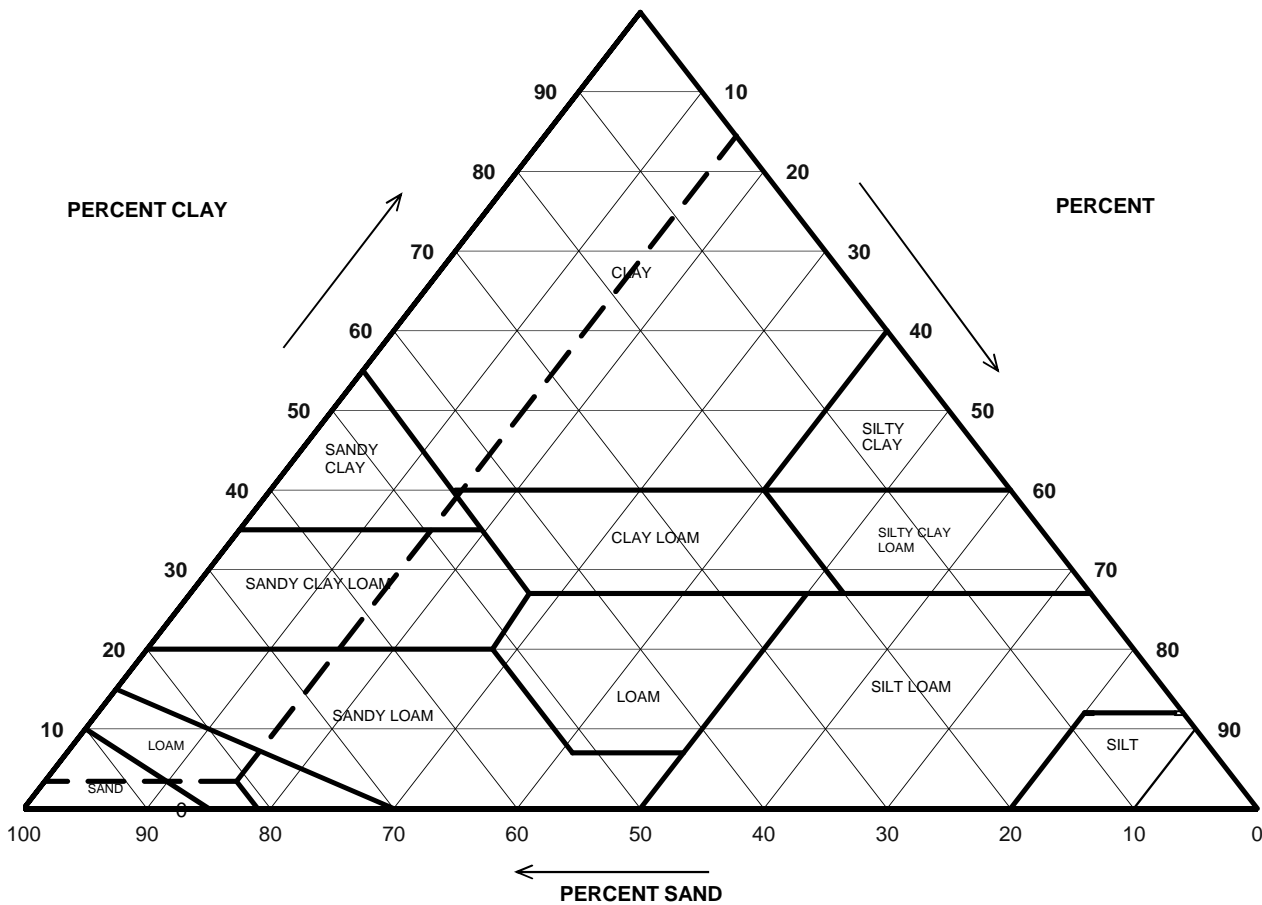
**USCS Classification:**  
**SILTY SAND**

Tested By	JF	Date	7/21/20	Checked By	JLK	Date	7/27/20
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## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-005

Boring No.: FD-20-02  
 Depth (ft): 5.0-7.0'  
 Sample No.: S-2  
 Soil Color: Brown



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		<b>Gravel</b>	<b>2.02</b>	
<b>2</b>	<b>97.98</b>	<b>Sand</b>	<b>79.40</b>	<b>81.04</b>
<b>0.05</b>	<b>18.57</b>	<b>Silt</b>	<b>15.21</b>	<b>15.53</b>
<b>0.002</b>	<b>3.36</b>	<b>Clay</b>	<b>3.36</b>	<b>3.43</b>

**USDA Classification: LOAMY SAND**

## WASH SIEVE ANALYSIS

ASTM D6913-17



Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-005

Boring No.: FD-20-02  
 Depth (ft): 5.0-7.0'  
 Sample No.: S-2  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2039	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	422.01	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	345.38	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.10	Weight of Tare (g):	NA
Weight of Water (g):	76.63	Weight of Water (g):	NA
Weight of Dry Soil (g):	199.28	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>38.5</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	199.28
Tare No. (Sub-Specimen)	2039	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	422.01	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.10	Dry Weight of - 3/4" Sample (g):	199.28
Sub-Specimen Wet Weight (g):	275.91	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	199.28
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25	0.00	0.00	0.00	100.00	100.00
3/4"	19	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	0.00	( ** )	0.00	100.00	100.00
3/8"	9.5	0.00	0.00	0.00	100.00	100.00
#4	4.75	0.82	0.41	0.41	99.59	99.6
#10	2	3.21	1.61	2.02	97.98	98.0
#20	0.85	12.96	( ** )	8.53	91.47	91.5
#40	0.425	32.42	16.27	24.79	75.21	75.2
#60	0.25	30.77	15.44	40.23	59.77	59.8
#100	0.15	45.32	22.74	62.98	37.02	37.0
#140	0.106	18.18	9.12	72.10	27.90	27.9
#200	0.075	9.45	4.74	76.84	23.16	23.2
Pan	-	46.15	23.16	100.00	-	-

**Notes :** ( \*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\*) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By JF Date 7/21/20 Checked By JLK Date 7/27/20



## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-02
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	5.0-7.0'
Project No.:	2020-350-001	Sample No.:	S-2
Lab ID:	2020-350-001-005	Soil Color:	Brown

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	18.0	25.7	4.44	13.7	0.0471	77.3	17.9
2	16.5	25.7	4.44	14.0	0.0336	68.7	15.9
4	15.0	25.7	4.44	14.2	0.0240	60.2	13.9
15	12.5	25.7	4.44	14.7	0.0126	45.9	10.6
30	10.5	25.7	4.44	15.0	0.0090	34.5	8.0
60	9.5	26.0	4.32	15.2	0.0064	29.5	6.8
240	7.0	26.3	4.19	15.7	0.0032	16.0	3.7
1440	6.5	26.3	4.19	15.8	0.0013	13.2	3.1

### Soil Specimen Data

Tare No.:	694	Percent Finer than # 200:	23.16
Wt. of Tare & Dry Material (g):	120.28	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	97.93		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	17.35		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/22/20	Checked By	JLK	Date	7/27/20
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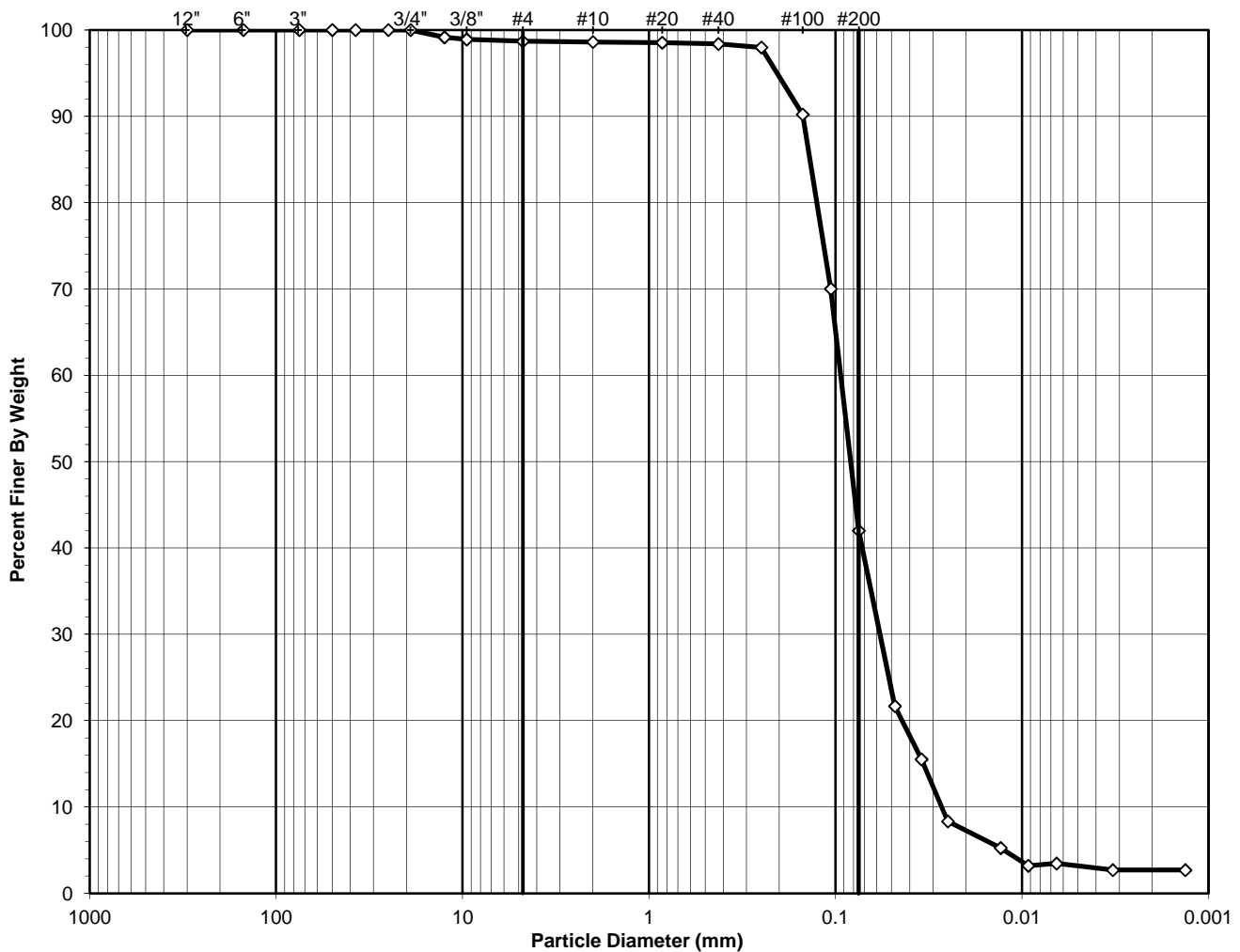
# SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-007

Boring No.: FD-20-02  
 Depth (ft): 20.0-22.0'  
 Sample No.: S-5  
 Soil Color: Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
*sm, ASSUMED*

**D50 = 0.08**

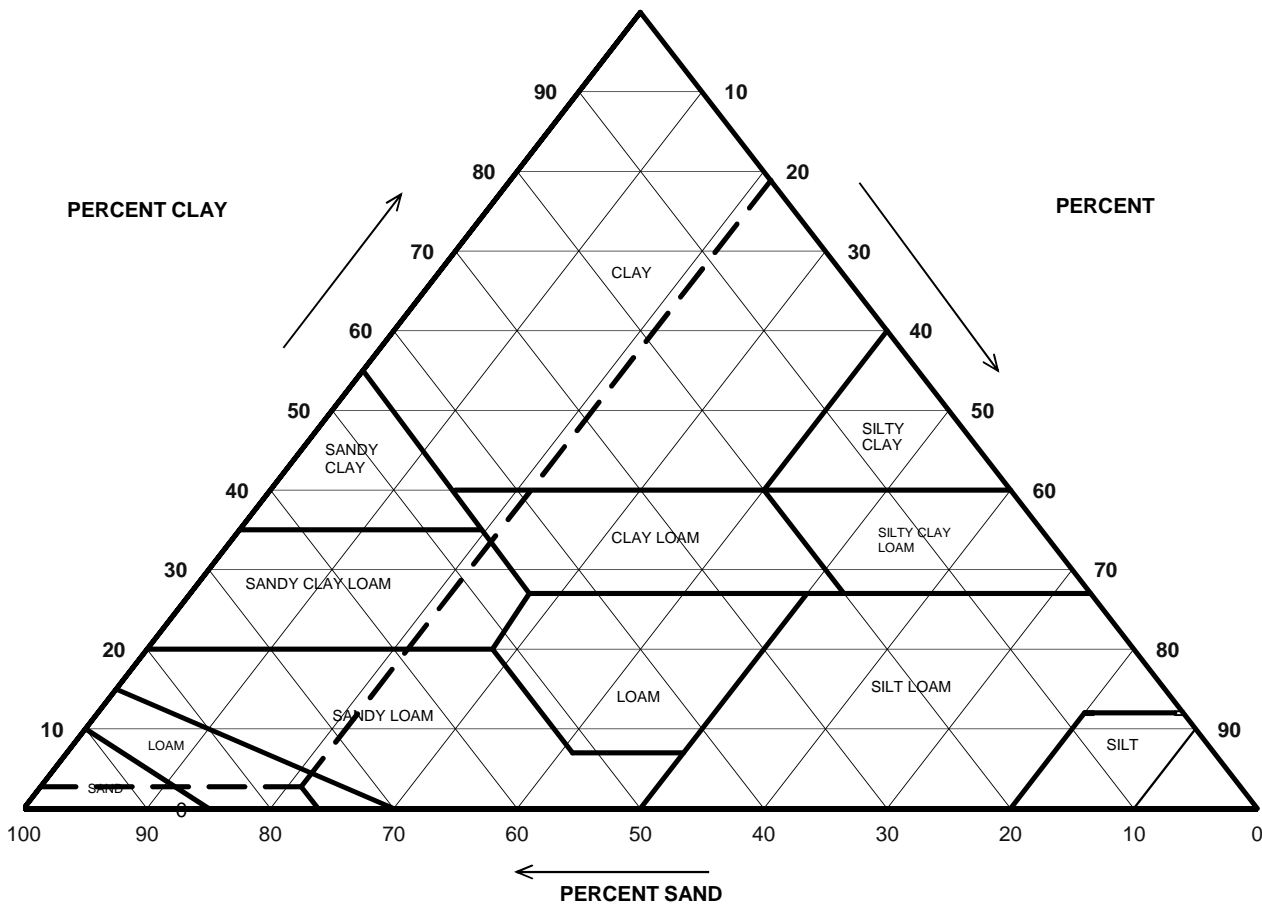
**USCS Classification:**  
**SILTY SAND**

Tested By JF Date 7/21/20 Checked By JLK Date 7/27/20

## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-007

Boring No.: FD-20-02  
 Depth (ft): 20.0-22.0'  
 Sample No.: S-5  
 Soil Color: Brown



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		<b>Gravel</b>	<b>1.39</b>	
<b>2</b>	<b>98.61</b>	<b>Sand</b>	<b>75.08</b>	<b>76.13</b>
<b>0.05</b>	<b>23.54</b>	<b>Silt</b>	<b>20.84</b>	<b>21.13</b>
<b>0.002</b>	<b>2.70</b>	<b>Clay</b>	<b>2.70</b>	<b>2.73</b>

**USDA Classification: LOAMY SAND**

## WASH SIEVE ANALYSIS

ASTM D6913-17



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-02
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	20.0-22.0'
Project No.:	2020-350-001	Sample No.:	S-5
Lab ID:	2020-350-001-007	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1484	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	600.47	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	494.58	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	149.49	Weight of Tare (g):	NA
Weight of Water (g):	105.89	Weight of Water (g):	NA
Weight of Dry Soil (g):	345.09	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>30.7</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	345.09
Tare No. (Sub-Specimen)	1484	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	600.47	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	149.49	Dry Weight of - 3/4" Sample (g):	345.09
Sub-Specimen Wet Weight (g):	450.98	Dry Weight -3/4" +3/8" Sample (g):	3.78
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	341.31
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	( *)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	2.93	( ** )	0.85	99.15	99
3/8"	9.5	0.85		1.10	98.90	99
#4	4.75	0.75		1.31	98.69	99
#10	2	0.26		1.39	98.61	99
#20	0.85	0.28	( ** )	1.47	98.53	99
#40	0.425	0.50		1.61	98.39	98
#60	0.25	1.40		2.02	97.98	98
#100	0.15	26.79		9.78	90.22	90
#140	0.106	69.68		29.97	70.03	70
#200	0.075	96.66		57.98	42.02	42
Pan	-	144.99		100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	JF	Date	7/21/20	Checked By	JLK	Date	7/27/20
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## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-02
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	20.0-22.0'
Project No.:	2020-350-001	Sample No.:	S-5
Lab ID:	2020-350-001-007	Soil Color:	Brown

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	15.0	25.7	4.44	14.2	0.0480	51.6	21.7
2	12.0	25.7	4.44	14.8	0.0346	36.9	15.5
4	8.5	25.7	4.44	15.4	0.0250	19.8	8.3
15	7.0	25.7	4.44	15.7	0.0130	12.5	5.3
30	6.0	25.7	4.44	15.8	0.0093	7.6	3.2
60	6.0	26.0	4.32	15.8	0.0065	8.2	3.5
240	5.5	26.3	4.19	15.9	0.0033	6.4	2.7
1440	5.5	26.3	4.19	15.9	0.0013	6.4	2.7

### Soil Specimen Data

Tare No.:	1465	Percent Finer than # 200:	42.02
Wt. of Tare & Dry Material (g):	120.50	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	95.27		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	20.23		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/22/20	Checked By	JLK	Date	7/27/20
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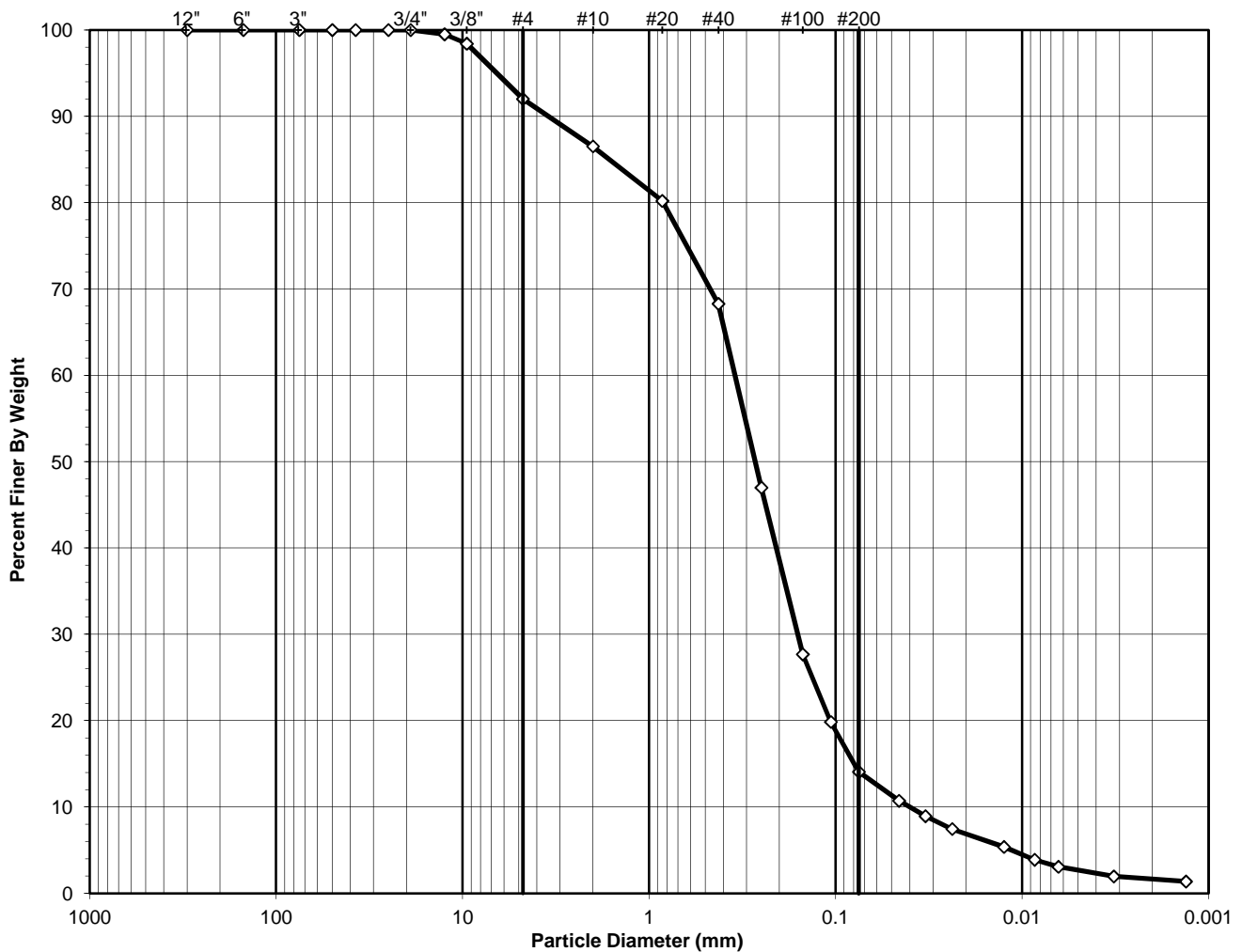
page 4 of 4

## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	10.0-12.0'
Project No.:	2020-350-001	Sample No.:	S-3
Lab ID:	2020-350-001-008	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
*sm, ASSUMED*

**D50 = 0.27**

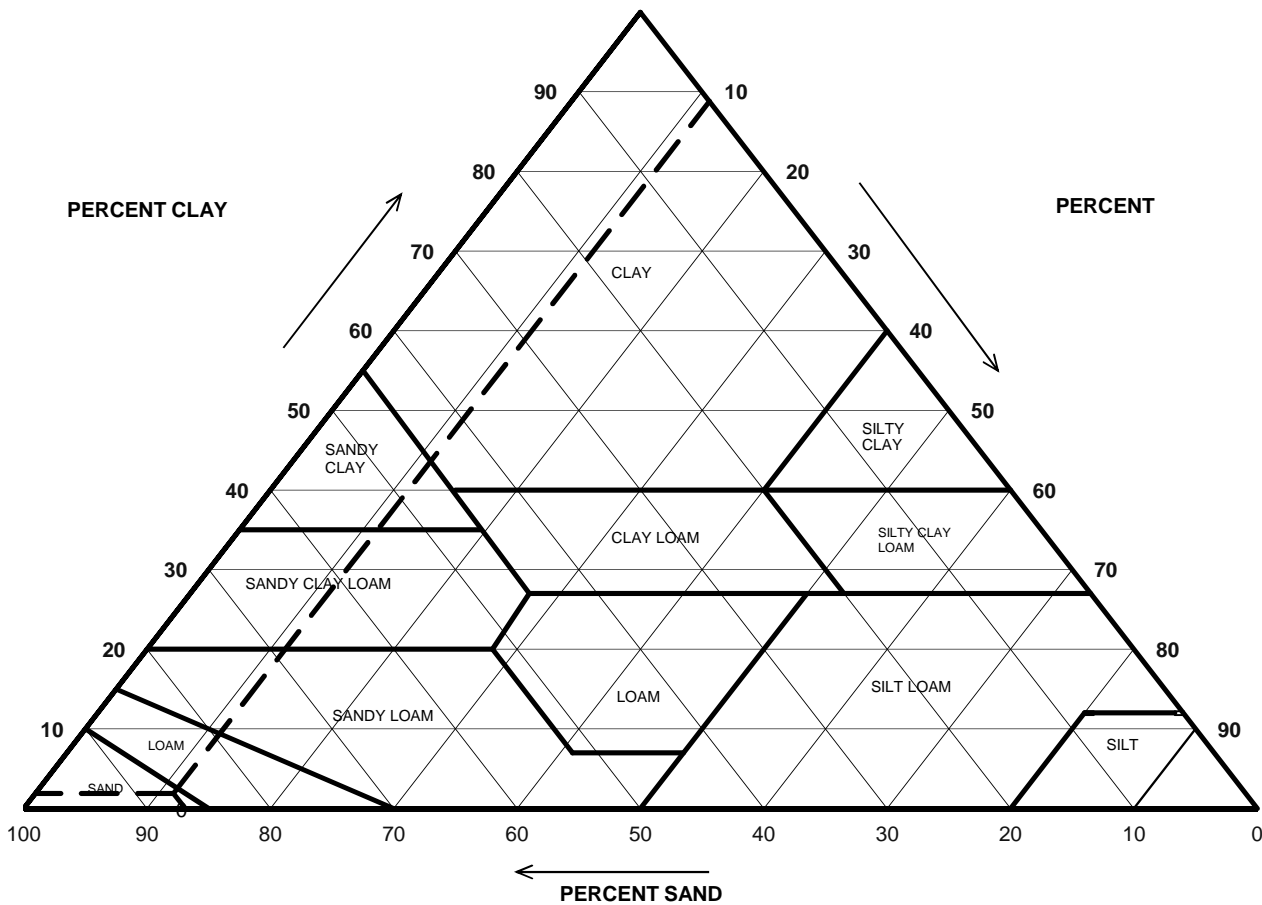
**USCS Classification:**  
**SILTY SAND**

Tested By	JF	Date	7/21/20	Checked By	JLK	Date	7/27/20
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## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-008

Boring No.: FD-20-03  
 Depth (ft): 10.0-12.0'  
 Sample No.: S-3  
 Soil Color: Brown



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		<b>Gravel</b>	<b>13.47</b>	
<b>2</b>	<b>86.53</b>	<b>Sand</b>	<b>75.19</b>	<b>86.90</b>
<b>0.05</b>	<b>11.33</b>	<b>Silt</b>	<b>9.68</b>	<b>11.19</b>
<b>0.002</b>	<b>1.65</b>	<b>Clay</b>	<b>1.65</b>	<b>1.91</b>

**USDA Classification: SAND**

## WASH SIEVE ANALYSIS

ASTM D6913-17



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	10.0-12.0'
Project No.:	2020-350-001	Sample No.:	S-3
Lab ID:	2020-350-001-008	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1443	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	716.95	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	627.10	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.53	Weight of Tare (g):	NA
Weight of Water (g):	89.85	Weight of Water (g):	NA
Weight of Dry Soil (g):	482.57	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>18.6</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	482.57
Tare No. (Sub-Specimen)	1443	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	716.95	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.53	Dry Weight of - 3/4" Sample (g):	482.57
Sub-Specimen Wet Weight (g):	572.42	Dry Weight -3/4" +3/8" Sample (g):	7.65
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	474.92
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	( *)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	2.41	( ** )	0.50	99.50	100
3/8"	9.5	5.24		1.09	98.41	98
#4	4.75	30.89		6.40	92.01	92
#10	2	26.48		5.49	86.53	87
#20	0.85	30.50	( ** )	6.32	80.21	80
#40	0.425	57.51		11.92	68.29	68
#60	0.25	102.73		21.29	47.00	47
#100	0.15	93.22		19.32	27.68	28
#140	0.106	37.78		7.83	19.85	20
#200	0.075	27.94		5.79	14.06	14
Pan	-	67.87		14.06	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	JF	Date	7/21/20	Checked By	JLK	Date	7/27/20
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## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	10.0-12.0'
Project No.:	2020-350-001	Sample No.:	S-3
Lab ID:	2020-350-001-008	Soil Color:	Brown

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	22.5	25.7	4.44	12.9	0.0457	76.2	10.7
2	19.5	25.7	4.44	13.4	0.0330	63.6	8.9
4	17.0	25.7	4.44	13.9	0.0237	53.0	7.5
15	13.5	25.7	4.44	14.5	0.0125	38.2	5.4
33	11.0	25.7	4.44	14.9	0.0086	27.7	3.9
60	9.5	26.0	4.32	15.2	0.0064	21.9	3.1
240	7.5	26.3	4.19	15.6	0.0032	14.0	2.0
1440	6.5	26.3	4.19	15.8	0.0013	9.8	1.4

### Soil Specimen Data

Tare No.:	1913	Percent Finer than # 200:	14.06
Wt. of Tare & Dry Material (g):	123.14	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	94.72		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	23.42		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/22/20	Checked By	JLK	Date	7/27/20
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## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	27.0-28.5
Project No.:	2020-350-001	Shelby Tube No.:	U-1
Lab ID:	2020-350-001-009	Recovery (ft):	1.6

### MOISTURE CONTENT

Section Number	1	2	3	4
Tare Number	2988			
Weight of Tare & Wet Sample (g)	99.34			
Weight of Tare & Dry Sample (g)	28.72			
Weight of Tare (g)	8.30			
Moisture Content (%)	345.84			

### UNIT WEIGHT

Weight of Tube & Wet Sample (g)	1085.80	1108.30	1191.10
Weight of Tube (g)	428.86	434.45	438.02
Weight of Wet Sample (g)	656.94	673.85	753.08
Length 1 (in)	5.899	5.973	6.043
Length 2 (in)	5.885	5.967	6.004
Length 3 (in)	5.923	5.969	6.033
Top Diameter (in)	2.893	2.896	2.884
Middle Diameter (in)	2.898	2.898	2.890
Bottom Diameter (in)	2.884	2.888	2.899
Sample Volume (cm <sup>3</sup> )	635.20	643.48	648.28
Moisture Content (%)	345.84	345.84	345.84
Unit Wet Weight (g/cm <sup>3</sup> )	1.03	1.05	1.16
Unit Wet Weight (pcf)	64.54	65.34	72.49
<b>Unit Dry Weight (g/cm<sup>3</sup>)</b>	<b>0.23</b>	<b>0.23</b>	<b>0.26</b>
<b>Unit Dry Weight (pcf)</b>	<b>14.5</b>	<b>14.7</b>	<b>16.3</b>

## SOIL PROFILE AND SAMPLING

DEPTH ( )	ELEV ( )	SECTION No.	SOIL PROFILE	SOIL DESCRIPTION AND REMARKS	TEST PERFORMED
26.5				TORVANE: NOT ENOUGH MATERIAL	
27.0		4	[Cross-hatched]	WAX	UNIT WEIGHT CU TRIAXIAL
27.5		3	[Diagonal lines]	DARK BROWN PEAT	UNIT WEIGHT CU TRIAXIAL
28.0		2	[Diagonal lines]		UNIT WEIGHT CU TRIAXIAL
28.5		1	[Cross-hatched]	WAX	MC

*Note:* When full recovery is not achieved, the elevation can not be accurately defined.  
 Indicate each cut of the tube with an arrow.  
 Indicate dividing line between soil types with a solid line.  
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.

Tested By	RPE	Date	7/23/20	Checked By	NJM	Date	7/30/20
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## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	27.0-28.5
Project No.:	2020-350-001	Shelby Tube No.:	U-1
Lab ID:	2020-350-001-009	Recovery (ft):	1.6

Section 2



Section 3



Section 4



Tested By RPE Date 7/23/20 Checked By NJM Date 7/30/20

## SHELBY TUBE UNIT WEIGHT

ASTM D7263-09

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth Pushed (ft):	27.0-28.5
Project No.:	2020-350-001	Shelby Tube No.:	U-1
Lab ID:	2020-350-001-009	Recovery (ft):	1.6

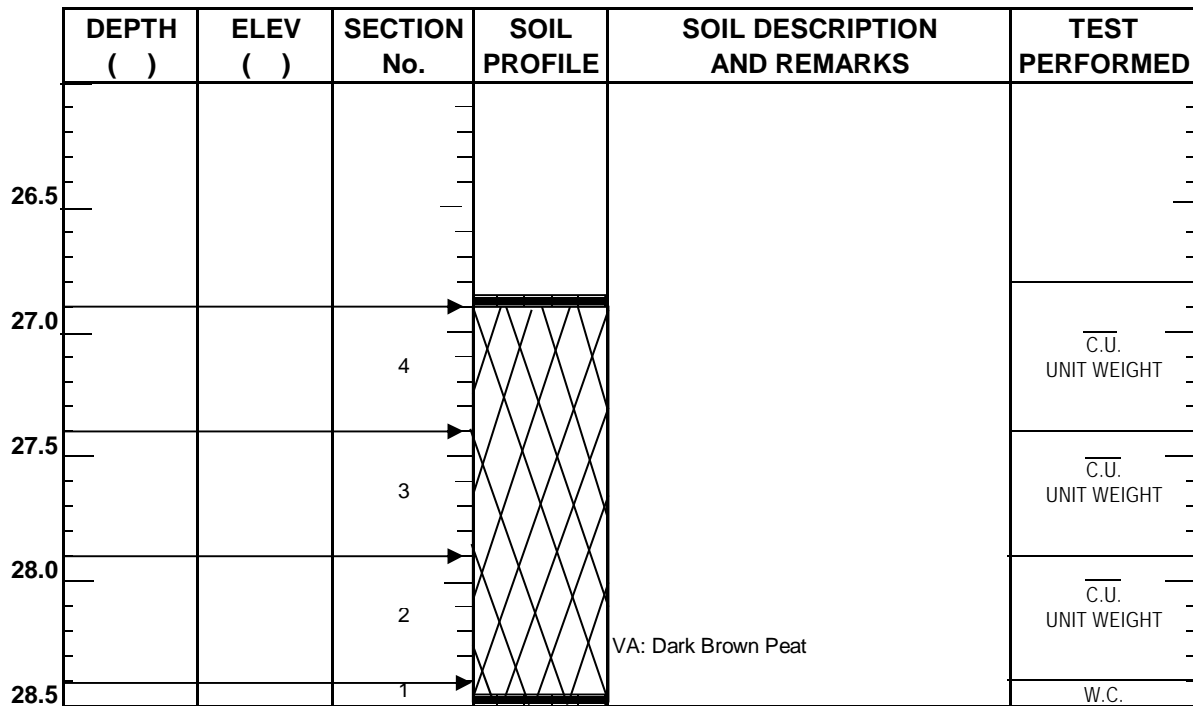
### MOISTURE CONTENT

Section Number	1	2	3	4	5
Tare Number	2988				
Weight of Tare & Wet Sample (g)	99.34				
Weight of Tare & Dry Sample (g)	28.72				
Weight of Tare (g)	8.30				
Moisture Content (%)	345.84				

### UNIT WEIGHT

Weight of Tube & Wet Sample (g)	1085.80	1108.30	1191.10
Weight of Tube (g)	428.86	434.45	438.02
Weight of Wet Sample (g)	656.94	673.85	753.08
Length 1 (in)	5.899	5.973	6.043
Length 2 (in)	5.885	5.967	6.004
Length 3 (in)	5.923	5.969	6.033
Top Diameter (in)	2.893	2.896	2.884
Middle Diameter (in)	2.898	2.898	2.890
Bottom Diameter (in)	2.884	2.888	2.899
Sample Volume (cm <sup>3</sup> )	635.20	643.48	648.28
Moisture Content (%)	345.84	345.84	345.84
Unit Wet Weight (g/cm <sup>3</sup> )	1.03	1.05	1.16
Unit Wet Weight (pcf)	64.54	65.34	72.49
<b>Unit Dry Weight (g/cm<sup>3</sup>)</b>	<b>0.23</b>	<b>0.23</b>	<b>0.26</b>
<b>Unit Dry Weight (pcf)</b>	<b>14.5</b>	<b>14.7</b>	<b>16.3</b>

## SOIL PROFILE AND SAMPLING



*Note:* When full recovery is not achieved, the elevation can not be accurately defined.  
 Indicate each cut of the tube with an arrow.  
 Indicate dividing line between soil types with a solid line.  
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.

Tested By	RPE/JAB	Date	7/23/20	Checked By	KC	Date	4/8/13
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## PHOTOGRAPHS

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-009

Boring No.: FD-20-03  
 Depth (ft): 27.4-28.4  
 Sample No.: U-1  
 Visual: Dark Brown Peat



27.9' - 28.4'



27.4' - 27.9'

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*Tested By* RPE/JAB    *Date* 7/23/20    *Checked By* KC    *Date* 9/15/15

## PHOTOGRAPHS

Client: Wood Env. & Infrastructure  
Client Reference: SAEP Stratford 3616176064  
Project No.: 2020-350-001  
Lab ID: 2020-350-001-009

Boring No.: FD-20-03  
Depth (ft): 26.9-27.4  
Sample No.: U-1  
Visual: Dark Brown Peat



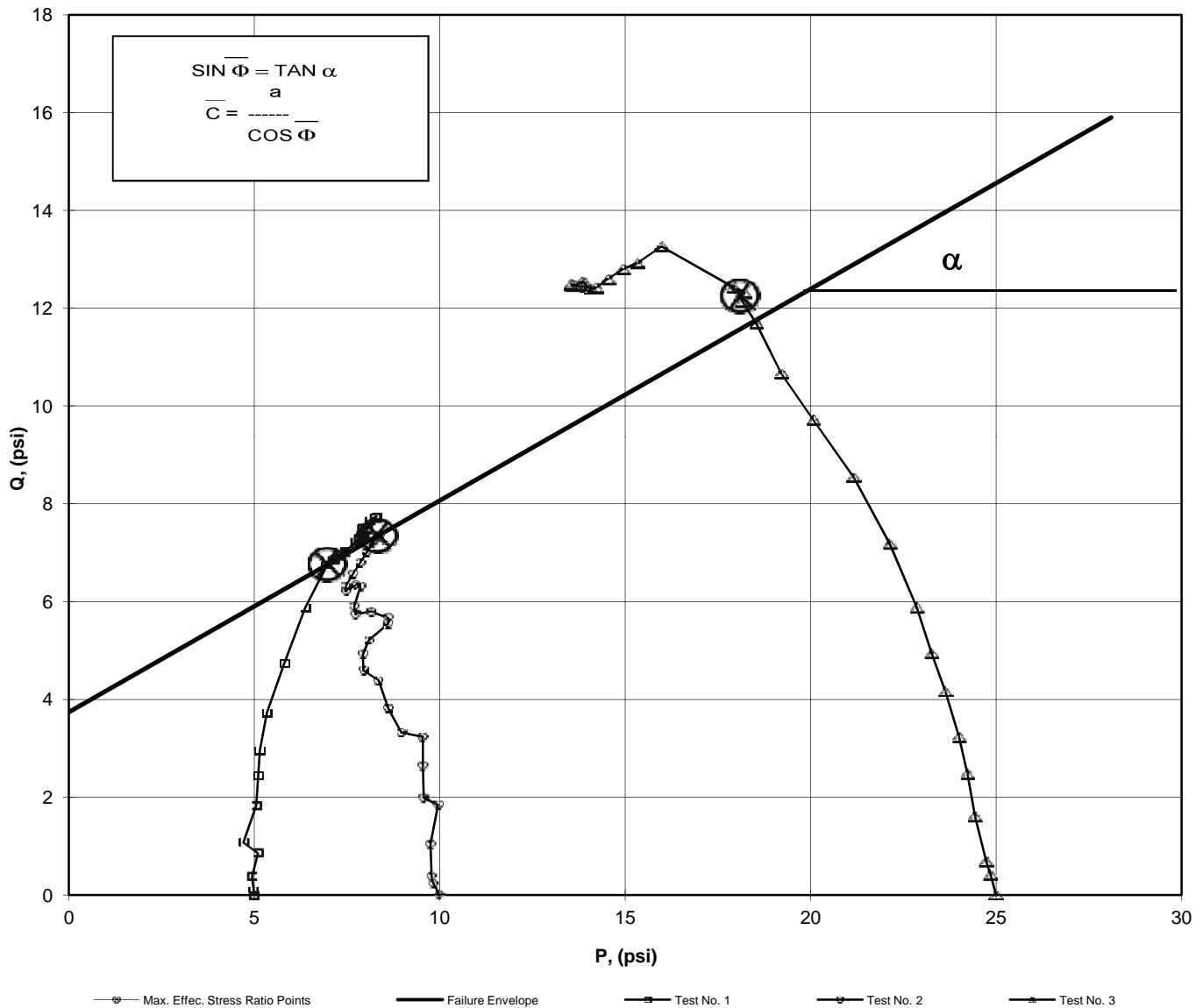
26.9' - 27.4'

Tested By RPE/JAB Date 7/23/20 Checked By KC Date 9/15/15

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	26.9-28.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

**Consolidated Undrained Triaxial Test with Pore Pressure**

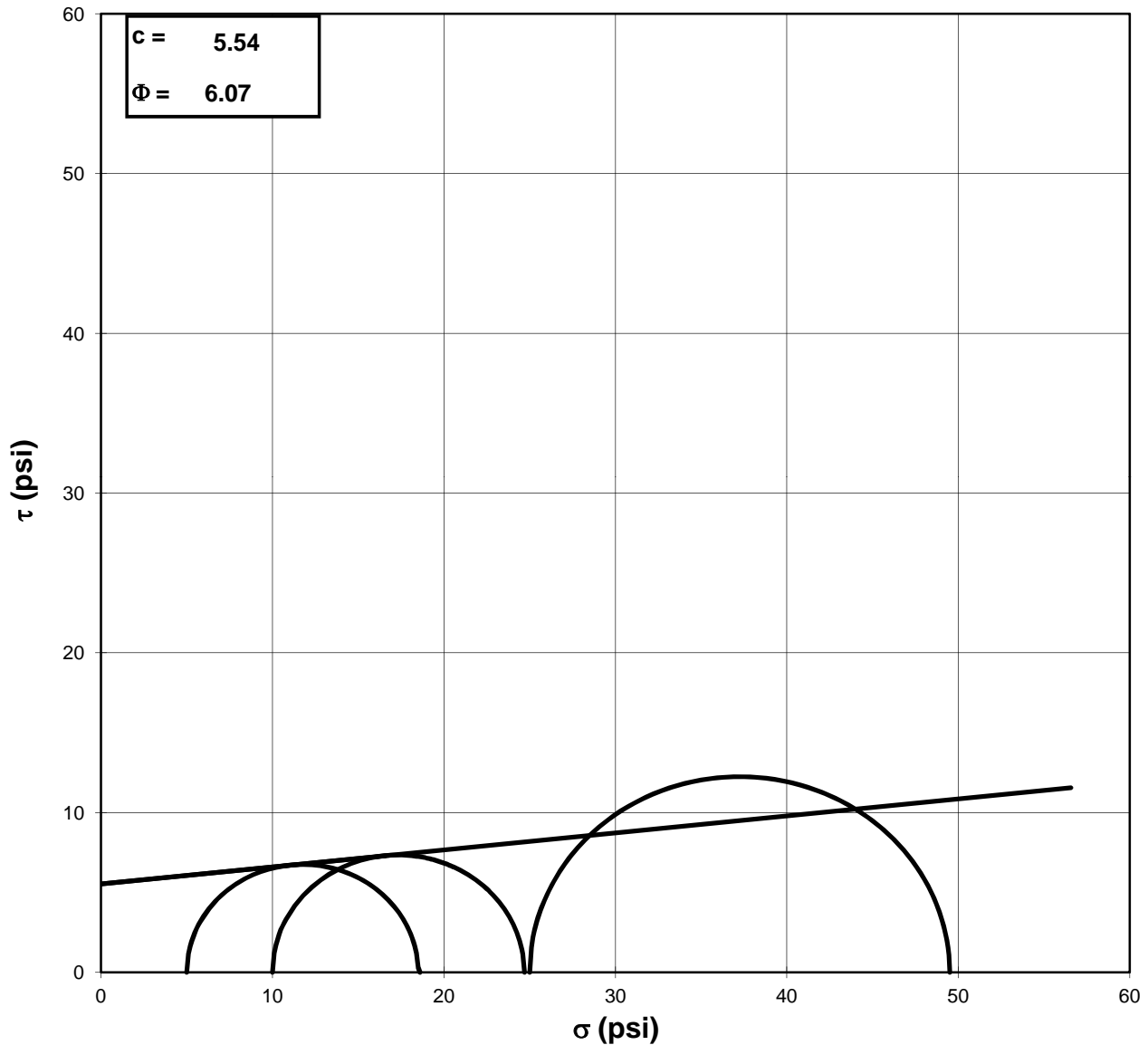


<b>a</b>	<b>=</b>	<b>3.74</b>	<b><math>\overline{C}</math></b>	<b>=</b>	<b>4.15</b>
<b><math>\alpha</math></b>	<b>=</b>	<b>23.4</b>	<b><math>\overline{\Phi}</math></b>	<b>=</b>	<b>25.64</b>

Tested By: JAB      Date: 7/23/20      Approved By: NJM      Date: 7/28/20

**MOHR TOTAL STRENGTH ENVELOPE**  
ASTM D4767-11

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	26.9-28.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		
Visual Description:	Dark Brown Peat (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: JAB      Date: 7/23/20      Approved By: NJM      Date: 7/28/20

page 2 of 10      DCN: CT-S28      DATE: 4/12/13      REVISION: 3



**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS**  
ASTM D4767-11



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	27.9-28.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

Stage No.	1
Test No.	1

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	5.899	Diameter 1:	2.893
Length 2:	5.925	Diameter 2:	2.898
Length 3:	5.885	Diameter 3:	2.884
Avg. Length:	5.903	Avg. Diam.:	2.892

**PRESSURES (psi)**

Cell Pressure (psi)	36.4
Back Pressure (psi)	31.4
Eff. Conf. Pressure (psi)	5.0
Pore Pressure	
Response (%)	97

**VOLUME CHANGE**

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	14.0
Final Change (ml)	10.0

**MAXIMUM OBLIQUITY POINTS**

$\bar{P}$	=	6.97
Q	=	6.75

Initial Dial Reading (mil)	33
Dial Reading After Saturation (mil)	36
Dial Reading After Consolidation (mil)	56

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
8.0	0.000	31.4
9.3	0.001	31.5
12.8	0.002	31.8
19.1	0.007	32.2
21.9	0.012	32.8
31.8	0.018	33.2
39.7	0.026	33.7
46.6	0.035	34.2
56.7	0.047	34.8
70.1	0.068	35.3
85.3	0.099	35.9
97.6	0.134	36.2
101.0	0.167	36.1
100.5	0.208	36.1
101.9	0.238	36.1
101.3	0.280	36.1
105.5	0.337	36.0
105.7	0.396	36.0
106.2	0.438	36.0
110.4	0.497	35.9
113.5	0.542	35.9
114.3	0.587	35.9
113.9	0.630	35.9
115.0	0.659	35.8
116.0	0.689	35.8
119.0	0.718	36.0
119.2	0.748	35.8
123.8	0.793	35.9
123.9	0.839	35.9
125.6	0.869	35.8
127.0	0.897	35.8

Tested By: JAB      Date: 7/23/20      Input Checked By: KC      Date: 7/28/20

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	27.9-28.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

Effective Confining Pressure (psi)	5.0	Stage No.	1
		Test No	1

**INITIAL DIMENSIONS**

Initial Sample Length (in)	5.90
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.57
Initial Sample Volume (in <sup>3</sup> )	38.77

**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	38.10
Length After Consolidation (in)	5.88
Area After Consolidation (in <sup>2</sup> )	6.479

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
0.02	0.20	0.12	5.08	4.9	1.041	0.61	4.98	0.10
0.03	0.74	0.43	5.31	4.6	1.162	0.60	4.94	0.37
0.12	1.71	0.76	5.95	4.2	1.403	0.46	5.10	0.86
0.21	2.14	1.36	5.78	3.6	1.589	0.66	4.71	1.07
0.30	3.66	1.78	6.88	3.2	2.138	0.50	5.05	1.83
0.45	4.87	2.33	7.54	2.7	2.822	0.49	5.11	2.44
0.60	5.92	2.81	8.11	2.2	3.699	0.49	5.15	2.96
0.80	7.45	3.39	9.06	1.6	5.627	0.47	5.34	3.73
1.16	9.47	3.93	10.55	1.1	9.821	0.43	5.81	4.74
1.68	11.74	4.50	12.24	0.5	24.324	0.39	6.37	5.87
2.27	13.51	4.79	13.72	0.2	63.958	0.37	6.97	6.75
2.85	13.95	4.73	14.22	0.3	53.099	0.35	7.24	6.97
3.54	13.77	4.71	14.06	0.3	48.255	0.35	7.18	6.88
4.06	13.91	4.66	14.24	0.3	42.011	0.35	7.29	6.95
4.77	13.71	4.72	13.99	0.3	50.797	0.36	7.13	6.86
5.73	14.19	4.56	14.62	0.4	33.415	0.33	7.53	7.09
6.73	14.07	4.59	14.48	0.4	35.239	0.34	7.45	7.04
7.45	14.03	4.57	14.46	0.4	33.594	0.34	7.45	7.02
8.45	14.47	4.49	14.98	0.5	29.262	0.32	7.74	7.23
9.21	14.78	4.48	15.30	0.5	29.644	0.31	7.91	7.39
9.98	14.77	4.49	15.28	0.5	29.700	0.31	7.90	7.38
10.72	14.60	4.47	15.12	0.5	28.604	0.32	7.83	7.30
11.21	14.66	4.37	15.30	0.6	24.160	0.31	7.96	7.33
11.71	14.72	4.40	15.32	0.6	25.375	0.31	7.96	7.36
12.21	15.04	4.59	15.45	0.4	37.510	0.31	7.93	7.52
12.72	14.97	4.44	15.54	0.6	27.613	0.31	8.05	7.49
13.48	15.46	4.47	15.99	0.5	30.024	0.30	8.26	7.73
14.26	15.34	4.53	15.81	0.5	33.658	0.30	8.14	7.67
14.77	15.47	4.44	16.03	0.6	28.710	0.30	8.30	7.74
15.26	15.56	4.38	16.18	0.6	26.198	0.29	8.40	7.78

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	26.9-27.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

Stage No.	1
Test No.	2

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	6.043	Diameter 1:	2.884
Length 2:	6.004	Diameter 2:	2.890
Length 3:	6.033	Diameter 3:	2.899
Avg. Length	6.027	Avg. Diam.:	2.891

**PRESSURES (psi)**

Cell Pressure (psi)	42.1
Back Pressure (psi)	32.1
Eff. Conf. Pressure (psi)	10.0
Pore Pressure Response (%)	100

**VOLUME CHANGE**

Initial Burette Reading (ml)	72.0
Final Burette Reading (ml)	29.8
Final Change (ml)	42.2

**MAXIMUM OBLIQUITY POINTS**

P	=	8.33
Q	=	7.35

Initial Dial Reading (mil)	34
Dial Reading After Saturation (mil)	71
Dial Reading After Consolidation (mil)	193

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
10.1	0.000	32.1
13.0	0.003	32.5
14.9	0.004	32.7
23.0	0.010	33.4
32.9	0.016	34.0
34.8	0.022	34.5
42.9	0.031	35.2
50.3	0.040	35.8
51.5	0.053	36.4
58.0	0.074	37.3
65.3	0.103	38.1
68.2	0.137	38.7
72.7	0.167	39.1
76.9	0.217	39.2
81.7	0.248	39.0
83.7	0.291	39.1
86.2	0.348	39.7
86.4	0.408	40.1
89.1	0.454	40.3
95.6	0.515	40.5
96.7	0.560	40.7
95.6	0.604	40.8
97.8	0.649	40.9
101.9	0.680	41.0
105.7	0.711	41.0
109.4	0.741	41.1
112.6	0.772	41.1
114.2	0.817	41.1
116.5	0.862	41.1
117.5	0.892	41.1
120.0	0.923	41.1

Tested By: JAB	Date: 7/23/20	Input Checked By: KC	Date: 7/28/20
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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	26.9-27.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

Effective Confining Pressure (psi)	10.0	Stage No.	1
		Test No	2

**INITIAL DIMENSIONS**

Initial Sample Length (in)	6.03
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.56
Initial Sample Volume (in <sup>3</sup> )	39.56

**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	36.26
Length After Consolidation (in)	5.87
Area After Consolidation (in <sup>2</sup> )	6.179

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
0.04	0.47	0.40	10.06	9.6	1.049	0.86	9.83	0.23
0.06	0.77	0.60	10.17	9.4	1.082	0.78	9.78	0.39
0.17	2.08	1.29	10.79	8.7	1.239	0.62	9.75	1.04
0.28	3.69	1.89	11.80	8.1	1.454	0.51	9.96	1.84
0.37	3.98	2.43	11.56	7.6	1.526	0.61	9.57	1.99
0.53	5.28	3.10	12.18	6.9	1.765	0.59	9.54	2.64
0.69	6.47	3.69	12.78	6.3	2.025	0.57	9.55	3.23
0.90	6.64	4.35	12.29	5.7	2.174	0.65	8.97	3.32
1.26	7.66	5.22	12.43	4.8	2.602	0.68	8.61	3.83
1.75	8.78	6.04	12.74	4.0	3.220	0.69	8.35	4.39
2.33	9.18	6.65	12.54	3.4	3.738	0.72	7.95	4.59
2.85	9.84	6.99	12.85	3.0	4.268	0.71	7.93	4.92
3.70	10.42	7.12	13.30	2.9	4.617	0.68	8.09	5.21
4.23	11.10	6.94	14.16	3.1	4.628	0.63	8.61	5.55
4.97	11.33	7.04	14.28	3.0	4.831	0.62	8.62	5.66
5.93	11.59	7.65	13.95	2.4	5.927	0.66	8.15	5.80
6.95	11.49	8.01	13.47	2.0	6.781	0.70	7.73	5.74
7.74	11.80	8.20	13.59	1.8	7.564	0.70	7.70	5.90
8.78	12.61	8.45	14.17	1.6	9.124	0.67	7.86	6.31
9.55	12.68	8.60	14.08	1.4	10.036	0.68	7.74	6.34
10.29	12.42	8.73	13.69	1.3	10.785	0.70	7.48	6.21
11.06	12.63	8.85	13.78	1.2	11.949	0.70	7.47	6.31
11.59	13.13	8.90	14.23	1.1	12.970	0.68	7.66	6.57
12.12	13.59	8.94	14.65	1.1	13.781	0.66	7.86	6.80
12.63	14.04	8.97	15.06	1.0	14.695	0.64	8.04	7.02
13.16	14.40	9.00	15.40	1.0	15.365	0.62	8.20	7.20
13.93	14.50	9.01	15.49	1.0	15.660	0.62	8.24	7.25
14.69	14.69	9.01	15.68	1.0	15.844	0.61	8.33	7.35
15.21	14.74	8.98	15.76	1.0	15.491	0.61	8.39	7.37
15.72	14.99	8.98	16.00	1.0	15.710	0.60	8.51	7.49

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS**

ASTM D4767-11

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	27.4-27.9
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

Stage No.	1
Test No.	3

**INITIAL SAMPLE DIMENSIONS (in)**

Length 1:	5.973	Diameter 1:	2.896
Length 2:	5.967	Diameter 2:	2.898
Length 3:	5.969	Diameter 3:	2.888
Avg. Length:	5.970	Avg. Diam.:	2.894

**PRESSURES (psi)**

Cell Pressure (psi)	56.3
Back Pressure (psi)	31.3
Eff. Conf. Pressure (psi)	25.0
Pore Pressure	
Response (%)	100

**VOLUME CHANGE**

Initial Burette Reading (ml)	168.0
Final Burette Reading (ml)	51.8
Final Change (ml)	116.2

**MAXIMUM OBLIQUITY POINTS**

$\bar{P}$	=	18.10
Q	=	12.25

Initial Dial Reading (mil)	34
Dial Reading After Saturation (mil)	38
Dial Reading After Consolidation (mil)	543

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.4	0.000	31.3
19.2	0.000	31.9
22.4	0.000	32.2
33.3	0.000	33.5
43.5	0.006	34.5
52.5	0.011	35.5
63.5	0.020	36.8
72.8	0.028	38.0
84.1	0.040	39.3
99.8	0.061	41.3
116.5	0.091	43.7
131.3	0.127	45.9
143.5	0.162	47.7
157.1	0.204	49.5
163.2	0.228	50.3
164.9	0.234	50.4
165.9	0.240	50.4
167.2	0.245	50.8
183.9	0.437	53.6
181.6	0.499	53.9
181.5	0.544	54.2
180.5	0.590	54.4
179.7	0.636	54.5
180.3	0.666	54.6
182.1	0.696	54.8
184.2	0.726	54.9
185.4	0.755	55.0
186.2	0.800	55.1
187.9	0.845	55.2
189.3	0.875	55.3
190.6	0.905	55.3

Tested By:	JAB	Date:	7/23/20	Input Checked By:	KC	Date:	7/28/20
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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	27.4-27.9
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		

Visual Description: Dark Brown Peat (UNDISTURBED)

<i>Effective Confining Pressure (psi)</i>	25.0	<i>Stage No.</i>	1
		<i>Test No</i>	3

**INITIAL DIMENSIONS**

Initial Sample Length (in)	5.97
Initial Sample Diameter (in)	2.89
Initial Sample Area (in <sup>2</sup> )	6.58
Initial Sample Volume (in <sup>3</sup> )	39.27

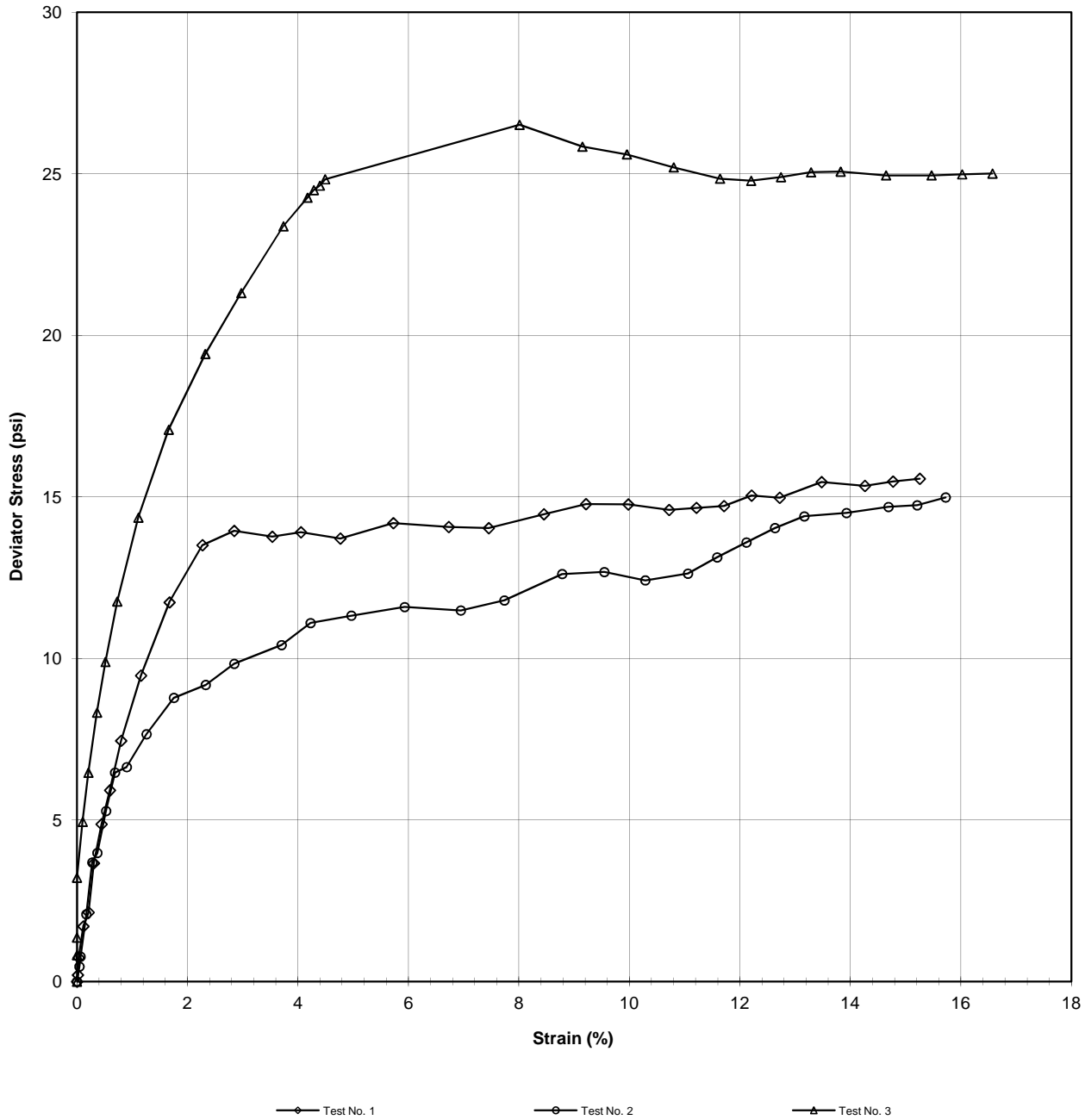
**VOLUME CHANGE**

Volume After Consolidation (in <sup>3</sup> )	32.10
Length After Consolidation (in)	5.46
Area After Consolidation (in <sup>2</sup> )	5.878

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	$Q$
0.00	0.82	0.56	25.26	24.4	1.034	0.68	24.85	0.41
0.00	1.37	0.95	25.42	24.1	1.057	0.69	24.74	0.68
0.00	3.22	2.17	26.04	22.8	1.141	0.68	24.43	1.61
0.10	4.95	3.24	26.70	21.8	1.227	0.66	24.23	2.47
0.21	6.46	4.23	27.23	20.8	1.311	0.65	24.00	3.23
0.36	8.33	5.53	27.80	19.5	1.428	0.66	23.63	4.16
0.52	9.89	6.69	28.20	18.3	1.540	0.68	23.26	4.95
0.73	11.77	8.02	28.75	17.0	1.693	0.68	22.86	5.88
1.11	14.36	10.05	29.31	15.0	1.960	0.70	22.13	7.18
1.66	17.08	12.38	29.71	12.6	2.353	0.72	21.16	8.54
2.32	19.42	14.63	29.79	10.4	2.873	0.75	20.08	9.71
2.97	21.31	16.44	29.87	8.6	3.489	0.77	19.22	10.65
3.74	23.38	18.16	30.22	6.8	4.416	0.78	18.53	11.69
4.17	24.26	18.97	30.30	6.0	5.021	0.78	18.17	12.13
4.29	24.50	19.15	30.35	5.9	5.186	0.78	18.10	12.25
4.40	24.64	19.10	30.54	5.9	5.175	0.78	18.22	12.32
4.49	24.83	19.48	30.36	5.5	5.495	0.78	17.94	12.42
8.01	26.52	22.28	29.24	2.7	10.758	0.84	15.98	13.26
9.15	25.84	22.60	28.24	2.4	11.758	0.87	15.32	12.92
9.95	25.60	22.85	27.75	2.1	12.932	0.89	14.95	12.80
10.80	25.20	23.06	27.14	1.9	13.986	0.92	14.54	12.60
11.64	24.85	23.21	26.64	1.8	14.877	0.93	14.22	12.42
12.20	24.79	23.33	26.46	1.7	15.800	0.94	14.07	12.39
12.74	24.90	23.50	26.40	1.5	17.577	0.94	13.95	12.45
13.29	25.05	23.62	26.43	1.4	19.163	0.94	13.90	12.52
13.82	25.07	23.72	26.35	1.3	20.510	0.95	13.82	12.53
14.64	24.95	23.81	26.14	1.2	22.008	0.95	13.66	12.48
15.47	24.95	23.92	26.03	1.1	24.094	0.96	13.56	12.48
16.02	24.99	23.96	26.02	1.0	25.107	0.96	13.53	12.49
16.57	25.01	24.03	25.98	1.0	26.689	0.96	13.48	12.50

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	26.9-28.4
Project No.:	2020-350-001	Sample No.:	U-1
Lab ID:	2020-350-001-009		
Visual Description:	Dark Brown Peat (UNDISTURBED)		



Tested By: JAB	Date: 7/23/20	Approved By: NJM	Date: 7/28/20
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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-009                      Specific Gravity (assumed)                      2.7

Visual Description: Dark Brown Peat (UNDISTURBED)

**SAMPLE CONDITION SUMMARY**

Boring No.:	FD-20-03	FD-20-03	FD-20-03
Depth (ft):	27.9-28.4	26.9-27.4	27.4-27.9
Sample No.:	U-1	U-1	U-1
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.001
Back Pressure (psi)	31.4	32.1	31.3
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	345.8	345.8	345.8
Total Unit Weight (pcf)	64.6	72.5	65.4
Dry Unit Weight (pcf)	14.5	16.3	14.7
Moisture Content (%) (FINAL)	254.3	277.3	272.7
Initial State Void Ratio, e	10.639	9.361	10.494
Void Ratio at Shear, e	10.440	8.497	8.396



Tested By: JAB                      Date: 7/23/20                      Input Checked By: KC                      Date: 7/28/20

page 10 of 10                      DCN: CT-S28    DATE: 4/12/13    REVISION: 3

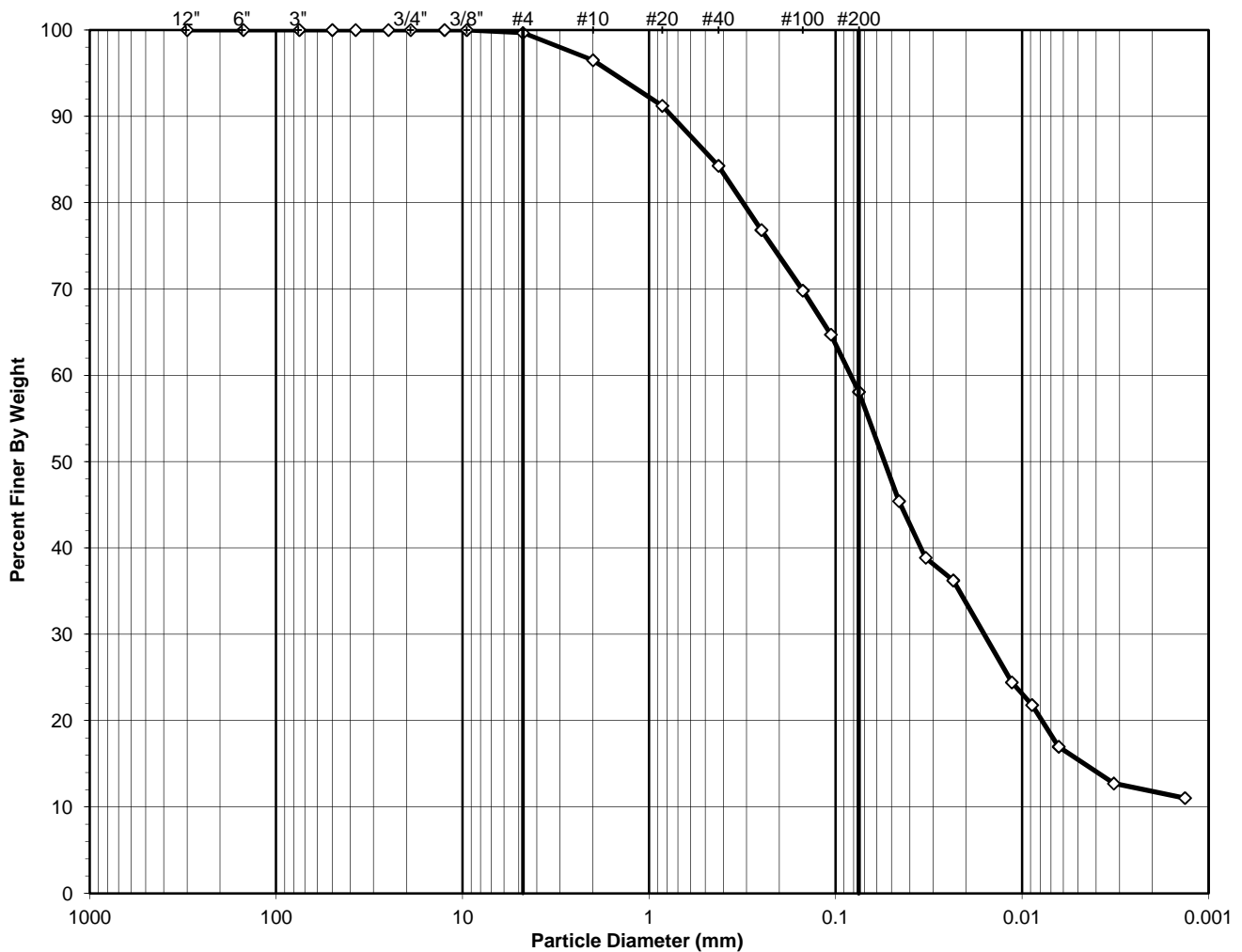


## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	30.0-32.0'
Project No.:	2020-350-001	Sample No.:	S-7
Lab ID:	2020-350-001-010	Soil Color:	Dark Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
**ML, TESTED**

**D50 = 0.05**

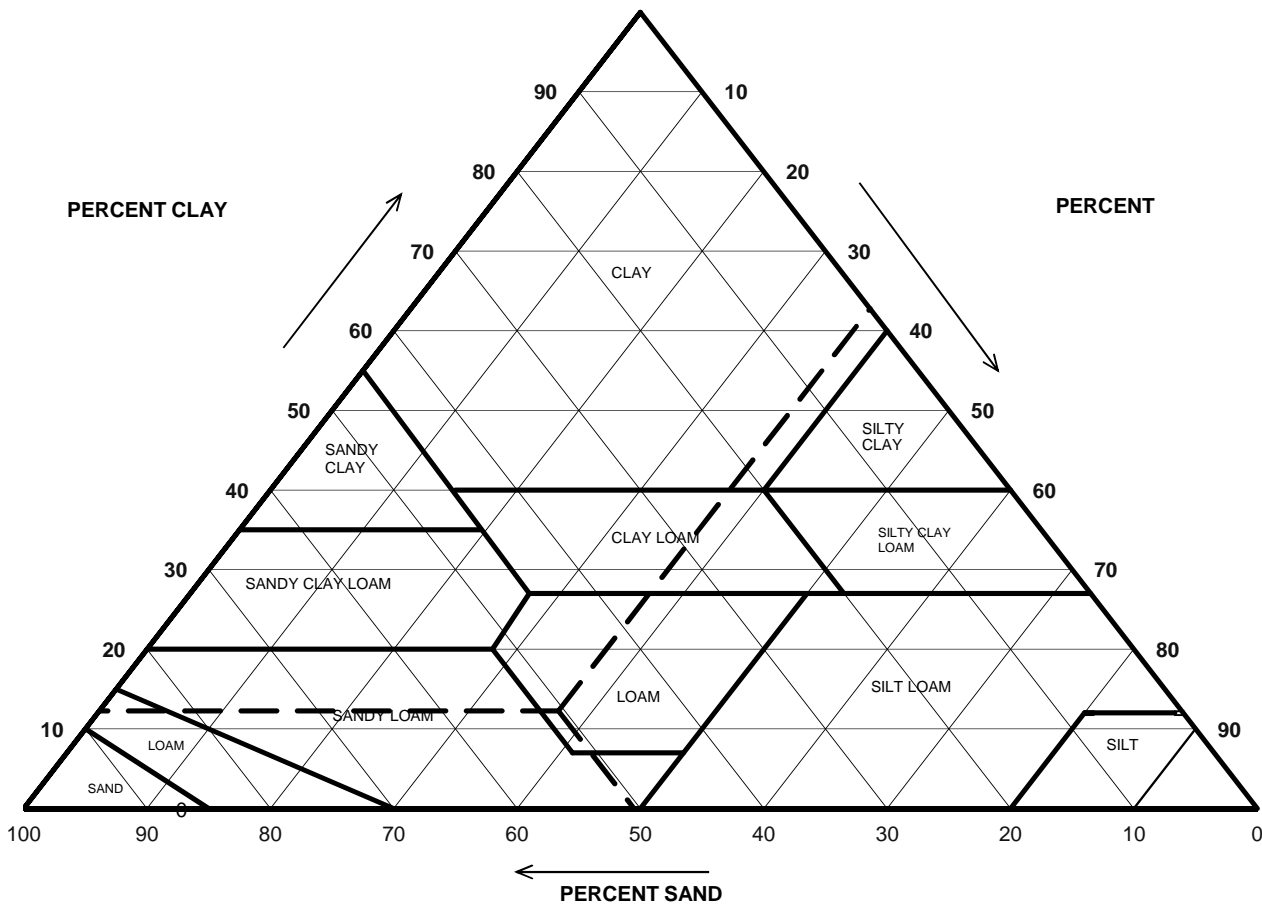
**USCS Classification:**  
**SANDY SILT**  
**(NON-PLASTIC FINES)**

Tested By LF      Date 7/23/20      Checked By BRB      Date 7/28/20

## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-010

Boring No.: FD-20-03  
 Depth (ft): 30.0-32.0'  
 Sample No.: S-7  
 Soil Color: Dark Gray



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		<b>Gravel</b>	<b>3.50</b>	
<b>2</b>	<b>96.50</b>	<b>Sand</b>	<b>48.77</b>	<b>50.54</b>
<b>0.05</b>	<b>47.73</b>	<b>Silt</b>	<b>35.92</b>	<b>37.22</b>
<b>0.002</b>	<b>11.81</b>	<b>Clay</b>	<b>11.81</b>	<b>12.24</b>

**USDA Classification: LOAM**

# WASH SIEVE ANALYSIS

ASTM D6913-17



Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-010

Boring No.: FD-20-03  
 Depth (ft): 30.0-32.0'  
 Sample No.: S-7  
 Soil Color: Dark Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1425	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	414.54	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	412.02	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.71	Weight of Tare (g):	NA
Weight of Water (g):	2.52	Weight of Water (g):	NA
Weight of Dry Soil (g):	267.31	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>0.9</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	267.31
Tare No. (Sub-Specimen)	1425	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	414.54	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.71	Dry Weight of - 3/4" Sample (g):	267.31
Sub-Specimen Wet Weight (g):	269.83	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	267.31
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.0
6"	150	0.00	0.00	0.00	100.00	100.0
3"	75	0.00	0.00	0.00	100.00	100.0
2"	50	0.00	( *)	0.00	100.00	100.0
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.0
1"	25	0.00	0.00	0.00	100.00	100.0
3/4"	19	0.00	0.00	0.00	100.00	100.0
1/2"	12.5	0.00	( ** )	0.00	100.00	100.0
3/8"	9.5	0.00	0.00	0.00	100.00	100.0
#4	4.75	0.91	0.34	0.34	99.66	99.7
#10	2	8.44	3.16	3.50	96.50	96.5
#20	0.85	14.12	( ** )	8.78	91.22	91.2
#40	0.425	18.56	6.94	15.72	84.28	84.3
#60	0.25	19.91	7.45	23.17	76.83	76.8
#100	0.15	18.73	7.01	30.18	69.82	69.8
#140	0.106	13.62	5.10	35.27	64.73	64.7
#200	0.075	17.74	6.64	41.91	58.09	58.1
Pan	-	155.28	58.09	100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By LF Date 7/23/20 Checked By BRB Date 7/28/20

## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	30.0-32.0'
Project No.:	2020-350-001	Sample No.:	S-7
Lab ID:	2020-350-001-010	Soil Color:	Dark Gray

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	21.5	26.3	4.19	13.1	0.0457	78.2	45.4
2	19.0	26.3	4.19	13.5	0.0329	66.9	38.9
4	18.0	26.3	4.19	13.7	0.0234	62.4	36.2
18	13.5	26.3	4.19	14.5	0.0114	42.1	24.4
30	12.5	26.3	4.19	14.7	0.0088	37.6	21.8
60	11.0	25.5	4.53	14.9	0.0064	29.2	17.0
240	9.5	25.2	4.65	15.2	0.0032	21.9	12.7
1440	9.5	23.6	5.29	15.2	0.0013	19.0	11.0

### Soil Specimen Data

Tare No.:	930	Percent Finer than # 200:	58.09
Wt. of Tare & Dry Material (g):	121.86	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	94.97		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	21.89		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/23/20	Checked By	BRB	Date	7/28/20
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page 4 of 4



## ATTERBERG LIMITS

ASTM D 4318-17

Client: Wood Env. & Infrastructure  
Client Reference: SAEP Stratford 3616176064  
Project No.: 2020-350-001  
Lab ID: 2020-350-001-010

Boring No.: FD-20-03  
Depth (ft): 30.0-32.0'  
Sample No.: S-7  
Color: Dark Gray  
(Minus No. 40 sieve material)

### As Received Water Content

Tare Number	33
Wt. of Tare & Wet Sample (g)	29.04
Wt. of Tare & Dry Sample (g)	19.73
Weight of Tare (g)	8.52
Weight of Water (g)	9.31
Weight of Dry Sample (g)	11.21

**Water Content (%)**                      **83.1**

# NON - PLASTIC MATERIAL

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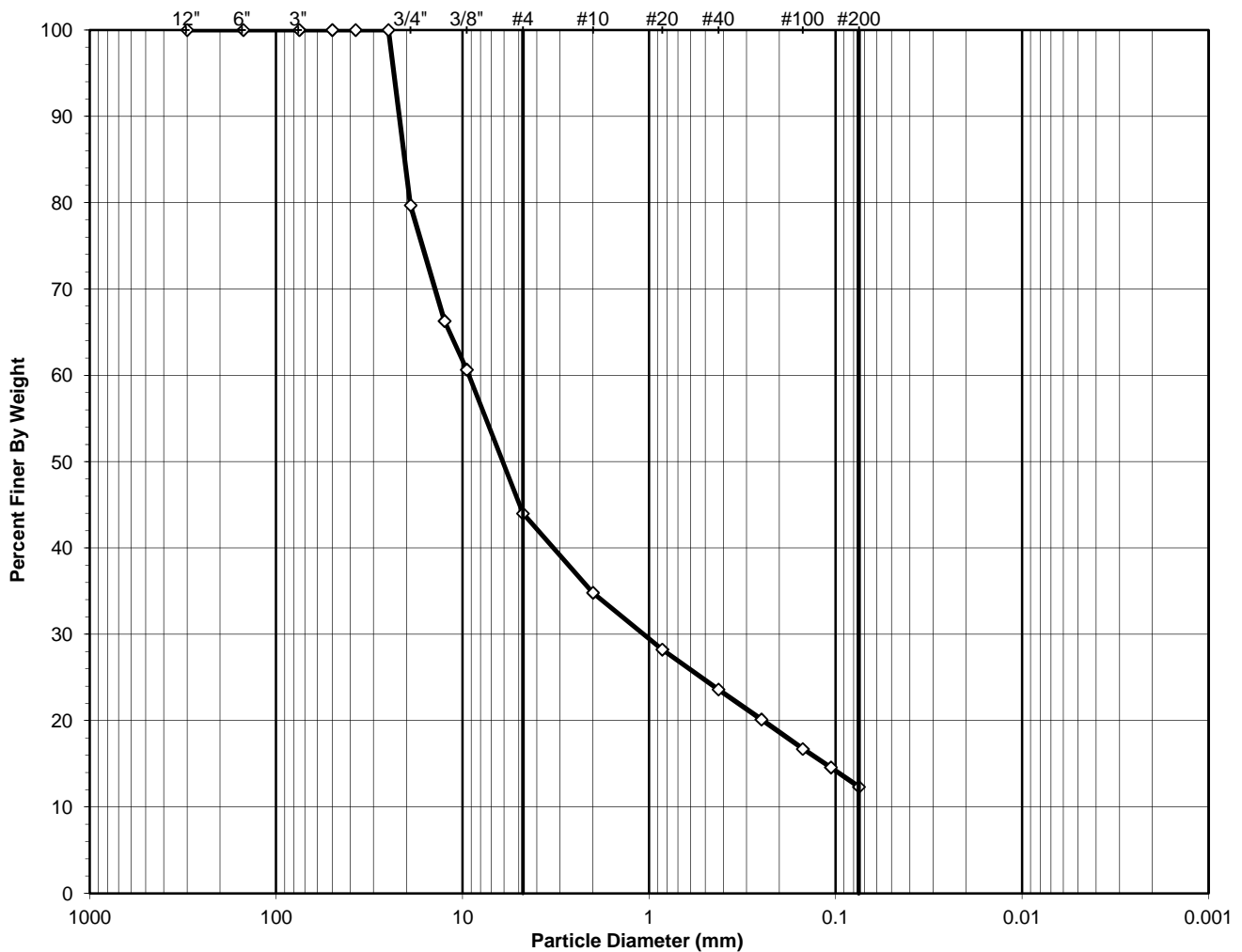
*Tested By*    *BS*                      *Date*    *7/15/20*                      *Checked By*                      *BRB*                      *Date*    *7/16/20*

## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	45.0-47.0'
Project No.:	2020-350-001	Sample No.:	S-10
Lab ID:	2020-350-001-011	Soil Color:	Dark Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
*gm, ASSUMED*

**D50 = 6.10**

**USCS Classification:**  
**SILTY GRAVEL WITH SAND**  
*(Insufficient Fines to Run Hydrometer)*

Tested By JF      Date 7/21/20      Checked By JLK      Date 7/24/20

# WASH SIEVE ANALYSIS

ASTM D6913-17



Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-03
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	45.0-47.0'
Project No.:	2020-350-001	Sample No.:	S-10
Lab ID:	2020-350-001-011	Soil Color:	Dark Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2033	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	413.23	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	379.02	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.26	Weight of Tare (g):	NA
Weight of Water (g):	34.21	Weight of Water (g):	NA
Weight of Dry Soil (g):	231.76	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>14.8</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	231.76
Tare No. (Sub-Specimen)	2033	Wet Weight of +3/4" Sample (g):	54.02
Wt. of Tare & Wet Sub-Specimen (g):	413.23	Dry Weight of + 3/4" Sample (g):	47.07
Weight of Tare (g):	147.26	Dry Weight of - 3/4" Sample (g):	184.69
Sub-Specimen Wet Weight (g):	265.97	Dry Weight -3/4" +3/8" Sample (g):	44.11
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	140.58
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	( *)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	47.07	20.31	20.31	79.69	80
1/2"	12.5	31.04	( ** )	33.70	66.30	66
3/8"	9.5	13.07	5.64	39.34	60.66	61
#4	4.75	38.61	16.66	56.00	44.00	44
#10	2	21.27	9.18	65.18	34.82	35
#20	0.85	15.25	( ** )	71.76	28.24	28
#40	0.425	10.72	4.63	76.39	23.61	24
#60	0.25	8.05	3.47	79.86	20.14	20
#100	0.15	7.92	3.42	83.28	16.72	17
#140	0.106	4.95	2.14	85.41	14.59	15
#200	0.075	5.22	2.25	87.66	12.34	12
Pan	-	28.59	12.34	100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By JF Date 7/21/20 Checked By JLK Date 7/24/20



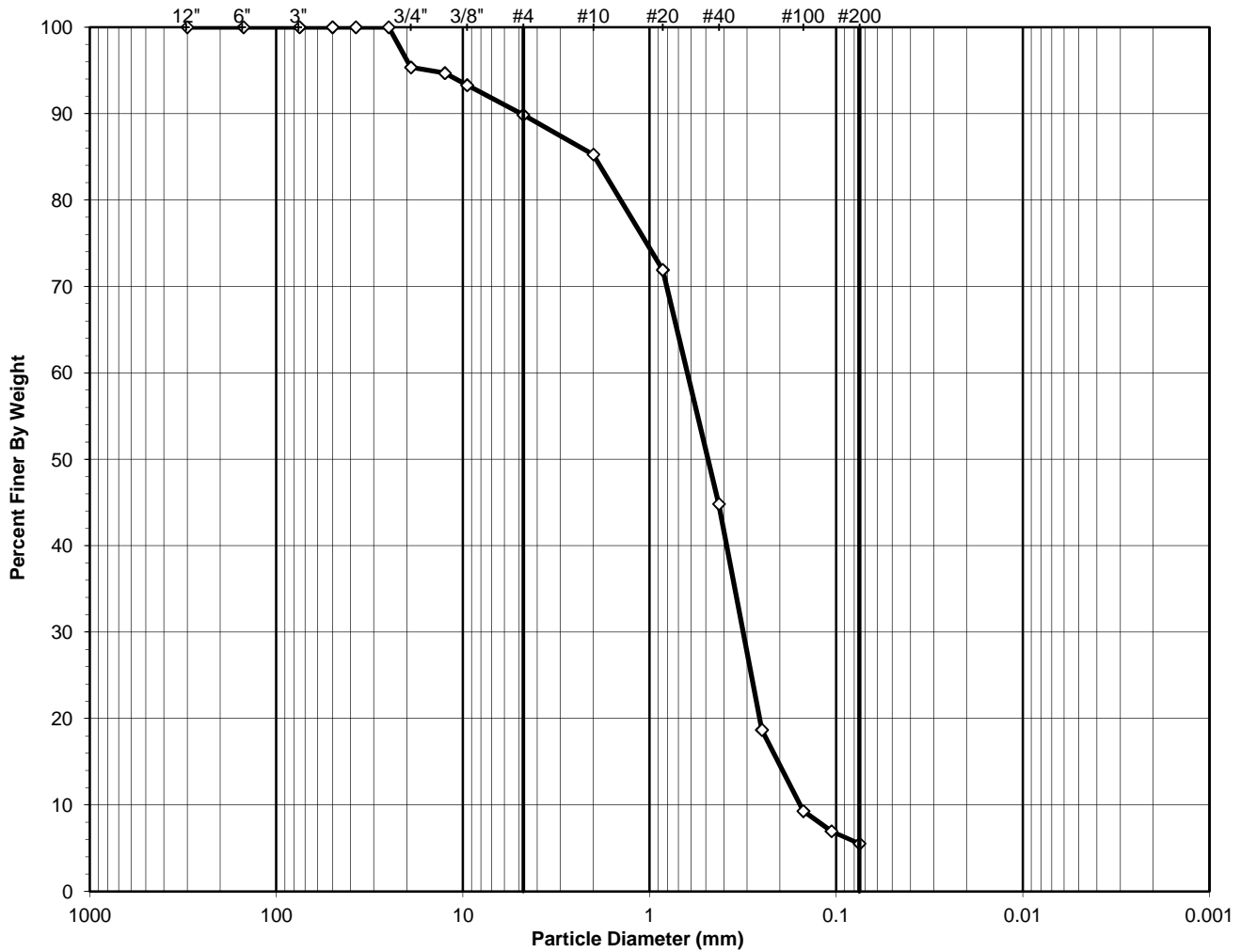
## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-012

Boring No.: FD-20-04  
 Depth (ft): 5.0-7.5'  
 Sample No.: S-2  
 Soil Color: Brown

<b>USCS</b>	<b>SIEVE ANALYSIS</b>	<b>HYDROMETER</b>
	gravel	sand
	silt and clay	



**USCS Symbol:**  
*sp-sm, ASSUMED*

**D60 = 0.63    D50 = 0.49**

**D30 = 0.31    CU = 4.02**

**USCS Classification:**  
**POORLY GRADED SAND WITH SILT**

**D10 = 0.156**

Tested By *TV*                                      Date *7/17/20*                                      Checked By *BRB*                                      Date *7/20/20*



# WASH SIEVE ANALYSIS

ASTM D6913-17



Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-012

Boring No.: FD-20-04  
 Depth (ft): 5.0-7.5'  
 Sample No.: S-2  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1504	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	718.15	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	634.24	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.01	Weight of Tare (g):	NA
Weight of Water (g):	83.91	Weight of Water (g):	NA
Weight of Dry Soil (g):	486.23	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>17.3</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	486.23
Tare No. (Sub-Specimen)	1504	Wet Weight of +3/4" Sample (g):	26.49
Wt. of Tare & Wet Sub-Specimen (g):	718.15	Dry Weight of + 3/4" Sample (g):	22.59
Weight of Tare (g):	148.01	Dry Weight of - 3/4" Sample (g):	463.64
Sub-Specimen Wet Weight (g):	570.14	Dry Weight -3/4" +3/8" Sample (g):	10.01
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	453.63
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	( *)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	22.59	4.65	4.65	95.35	95
1/2"	12.5	3.24	( ** )	5.31	94.69	95
3/8"	9.5	6.77	1.39	6.70	93.30	93
#4	4.75	16.76	3.45	10.15	89.85	90
#10	2	22.27	4.58	14.73	85.27	85
#20	0.85	64.91	( ** )	28.08	71.92	72
#40	0.425	131.73	27.09	55.17	44.83	45
#60	0.25	127.08	26.14	81.31	18.69	19
#100	0.15	45.69	9.40	90.71	9.29	9
#140	0.106	11.31	2.33	93.03	6.97	7
#200	0.075	6.98	1.44	94.47	5.53	6
Pan	-	26.90	5.53	100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

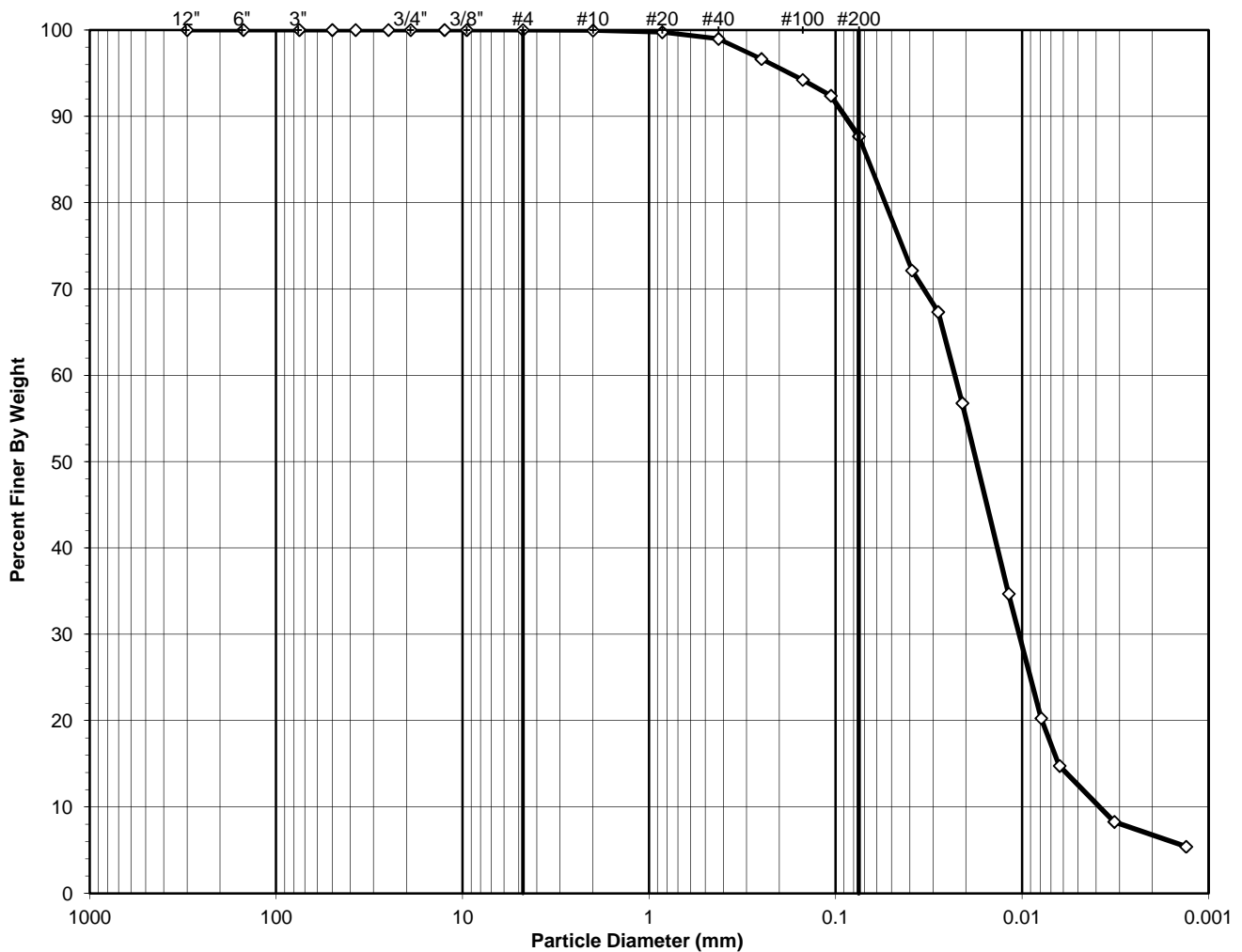
Tested By TV Date 7/17/20 Checked By BRB Date 7/20/20

## SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-04
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	40.0-42.0'
Project No.:	2020-350-001	Sample No.:	S-9
Lab ID:	2020-350-001-014	Soil Color:	Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



**USCS Symbol:**  
*ml, ASSUMED*

**D50 = 0.02**

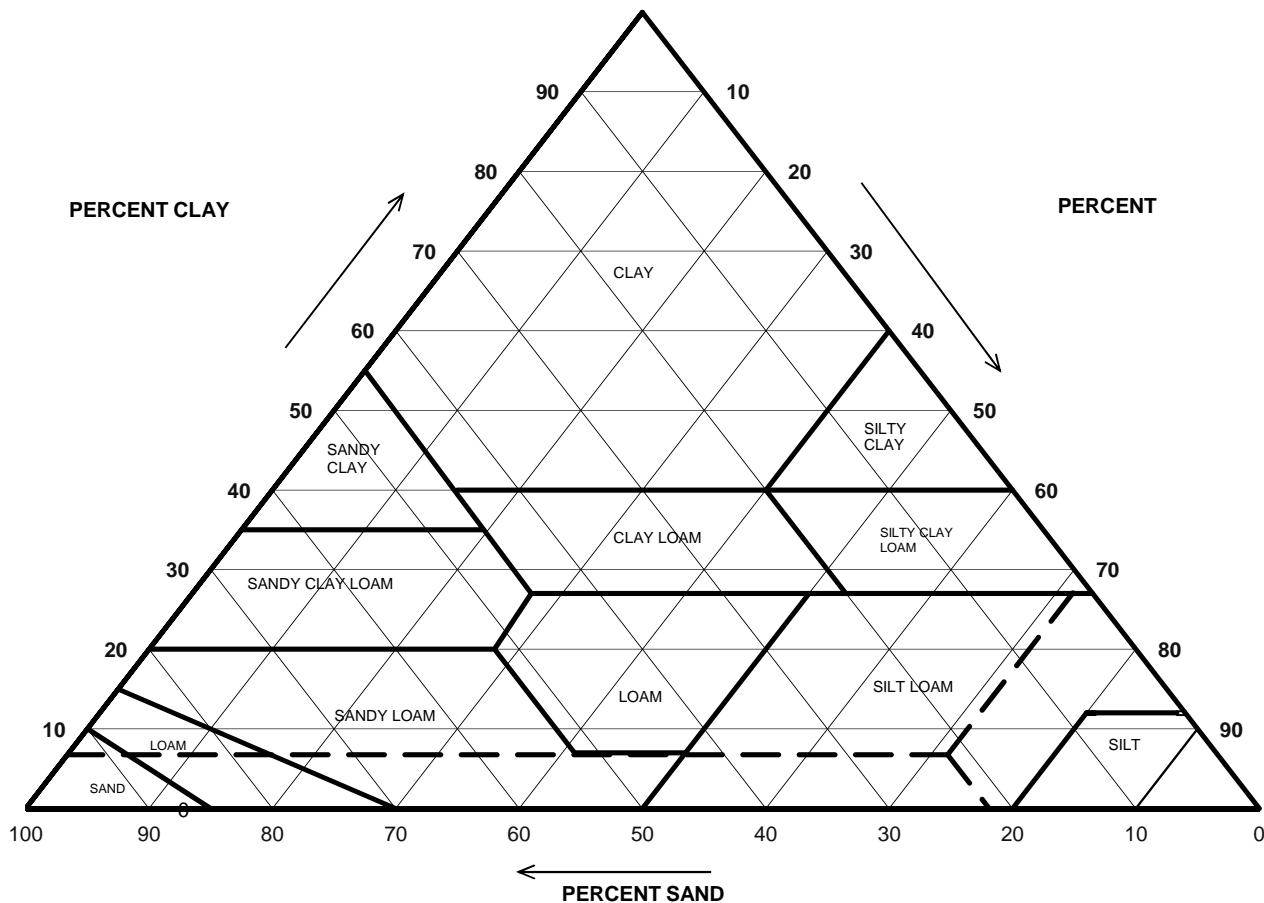
**USCS Classification:**  
**SILT**

Tested By <b>JF</b>	Date <b>7/21/20</b>	Checked By <b>JLK</b>	Date <b>7/27/20</b>
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## USDA CLASSIFICATION CHART

Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-014

Boring No.: FD-20-04  
 Depth (ft): 40.0-42.0'  
 Sample No.: S-9  
 Soil Color: Gray



USDA SUMMARY				
Particle Size (mm)	Percent Finer		Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classification

		Gravel	0.06	
2	99.94	Sand	21.88	21.89
0.05	78.07	Silt	71.31	71.35
0.002	6.75	Clay	6.75	6.76

USDA Classification: **SILT LOAM**

# WASH SIEVE ANALYSIS

ASTM D6913-17



Client: Wood Env. & Infrastructure  
 Client Reference: SAEP Stratford 3616176064  
 Project No.: 2020-350-001  
 Lab ID: 2020-350-001-014

Boring No.: FD-20-04  
 Depth (ft): 40.0-42.0'  
 Sample No.: S-9  
 Soil Color: Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1555	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	739.01	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	601.98	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.54	Weight of Tare (g):	NA
Weight of Water (g):	137.03	Weight of Water (g):	NA
Weight of Dry Soil (g):	455.44	Weight of Dry Soil (g):	NA
<b>Moisture Content (%):</b>	<b>30.1</b>	<b>Moisture Content (%):</b>	<b>0.0</b>
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	455.44
Tare No. (Sub-Specimen)	1555	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	739.01	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.54	Dry Weight of - 3/4" Sample (g):	455.44
Sub-Specimen Wet Weight (g):	592.47	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	455.44
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Accumulated Finer	
					(%)	(%)
12"	300	0.00	0.00	0.00	100.00	<b>100.0</b>
6"	150	0.00	0.00	0.00	100.00	<b>100.0</b>
3"	75	0.00	0.00	0.00	100.00	<b>100.0</b>
2"	50	0.00	( *)	0.00	100.00	<b>100.0</b>
1 1/2"	37.5	0.00	0.00	0.00	100.00	<b>100.0</b>
1"	25	0.00	0.00	0.00	100.00	<b>100.0</b>
3/4"	19	0.00	0.00	0.00	100.00	<b>100.0</b>
1/2"	12.5	0.00	( ** )	0.00	100.00	<b>100.0</b>
3/8"	9.5	0.00	0.00	0.00	100.00	<b>100.0</b>
#4	4.75	0.00	0.00	0.00	100.00	<b>100.0</b>
#10	2	0.26	0.06	0.06	99.94	<b>99.9</b>
#20	0.85	0.92	( ** )	0.26	99.74	<b>99.7</b>
#40	0.425	3.49	0.77	1.03	98.97	<b>99.0</b>
#60	0.25	10.64	2.34	3.36	96.64	<b>96.6</b>
#100	0.15	11.01	2.42	5.78	94.22	<b>94.2</b>
#140	0.106	8.36	1.84	7.61	92.39	<b>92.4</b>
#200	0.075	21.40	4.70	12.31	87.69	<b>87.7</b>
Pan	-	399.36	87.69	100.00	-	-

**Notes :** ( \* ) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 ( \*\* ) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By JF Date 7/21/20 Checked By JLK Date 7/27/20

## HYDROMETER ANALYSIS

ASTM D7928-17

Client:	Wood Env. & Infrastructure	Boring No.:	FD-20-04
Client Reference:	SAEP Stratford 3616176064	Depth (ft):	40.0-42.0'
Project No.:	2020-350-001	Sample No.:	S-9
Lab ID:	2020-350-001-014	Soil Color:	Gray

Elapsed Time (min)	Reading (mm)	Temp. (C°)	Offset (rd,m)	Effective Depth, Hm (cm)	D (mm)	Mass Percent (%) Finer, Nm	Mass Percent (%) Finer, Nm'
0	NA	NA	NA	NA	NA	NA	NA
1	42.0	25.7	4.44	9.4	0.0390	82.3	72.1
2	39.5	25.7	4.44	9.8	0.0282	76.8	67.3
4	34.0	25.7	4.44	10.8	0.0209	64.7	56.8
15	22.5	25.7	4.44	12.9	0.0118	39.6	34.7
37	15.0	25.7	4.44	14.2	0.0079	23.1	20.3
60	12.0	26.0	4.32	14.8	0.0063	16.8	14.8
240	8.5	26.3	4.19	15.4	0.0032	9.4	8.3
1440	7.0	26.3	4.19	15.7	0.0013	6.2	5.4

### Soil Specimen Data

Tare No.:	2337	Percent Finer than # 200:	87.69
Wt. of Tare & Dry Material (g):	144.07	Specific Gravity:	2.70 Assumed
Weight of Tare (g):	93.93		
Weight of Deflocculant (g):	5.0		
Weight of Dry Material (g):	45.14		

**Notes:** Hydrometer test is performed on - # 200 sieve material.

Hydrometer - 152H	G- 1819
Cylinder	G- 356
Thermometer	G- 1505
Balance	G- 657
#200 Sieve	G- 1944
Foam Inhibitor Used	No

Tested By	TO	Date	7/22/20	Checked By	JLK	Date	7/27/20
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United States Army Corps of Engineers, New England District  
Stratford Army Engine Plant, Stratford, CT  
Draft Geotechnical Data Report

**APPENDIX C**  
**INFORMATION FROM THE GEOPROFESSIONAL BUSINESS**  
**ASSOCIATION**

# Important Information about This

# Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## This Report May Not Be Reliable

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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