



GEOTECHNICAL BASELINE REPORT (GBR)

US 301 over Four Hole Swamp

Orangeburg County, South Carolina
SCDOT Project ID No. 0040308
ESP Project Number: JN11.307

Prepared For:

South Carolina Department of Transportation
955 Park Street
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Prepared By:

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April 27, 2022



April 27, 2022

South Carolina Department of Transportation
955 Park Street, Room 406
Columbia, South Carolina 29201

Attention: Mr. Trapp Harris, PE

Reference: **GEOTECHNICAL BASELINE REPORT (GBR)**
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Orangeburg County, South Carolina
SCDOT Project ID No. 0040308
ESP Project No. JN11.307

Dear Mr. Harris:

ESP Associates, Inc. (ESP) is pleased to submit this Geotechnical Base Line Report (GBLR) for the referenced project. The purpose of this report is to provide limited, preliminary geotechnical information on a design-build project to help the contractor bid the project with a certain degree of knowledge and acceptable risk. Our services were performed in general accordance with the On-Call Consultant Work Order Form 00200-W-7 dated January 27, 2022.

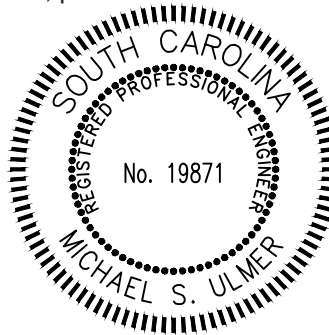
ESP appreciates the opportunity to work with the SCDOT on this project. If you have questions concerning this report, or if we may be of further assistance, please contact us.

Sincerely,

ESP Associates, Inc.

A handwritten signature in blue ink that reads "Matthew M. Lattin".

Matthew M. Lattin, PE
Senior Engineer
PE No. 33709



Michael S. Ulmer, PE
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Electronic submission (1)
cc:/

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1.0 PROJECT DESCRIPTION

We understand that the SCDOT plans to replace the twin, parallel bridges along US-301 (Five Chop Road) over Four Hole Swamp located approximately eight miles west of Santee in Orangeburg County, South Carolina. The project includes the approach work associated with the bridge replacements and will incorporate safety improvements along US 301 connecting two adjacent safety projects. However, this GBLR does not include information associated with the two adjacent safety projects. The site location is shown in the Site Location Map (Figure 1) in Appendix I, and the test locations are shown on the Test Location Plan (Figure 2) in Appendix I.

Table 1-1: Bridge Location

Project ID	Route	Route Name	Crossing	County	Latitude	Longitude
0040308	US 301	Five Chop Road	Four Hole Swamp	Orangeburg	33.457426°	-80.64770°

The area surrounding the site generally consists of undeveloped, wooded swamp to the north and south of the existing bridges within the river floodplain and wooded uplands above the floodplain. Underground utilities are located within the outside shoulders and adjacent to US 301. US 301 is a four-lane, US highway with a grass median, narrow grass shoulders, earthen approach embankments, and guardrails approaching the bridges. The larger area is rural farm land and woodlands with scattered residential and commercial development.

2.0 FIELD EXPLORATION

The field exploration, laboratory testing, and geological information presented in this GBLR is a compilation of the following sources:

- *Revised Geotechnical Data Report* prepared by Infrastructure Corporation of America (ICA) Engineering dated October 17, 2014;
- *Geotechnical Subsurface Data Report* prepared by Professional Services Industries, Inc. (PSI) dated February 27, 2015;
- *Geotechnical Engineering Evaluation* prepared by GeoStellar Engineering, LLC dated March 16, 2016 (revised draft); and
- Soil test borings, cone penetration test (CPT) soundings, and laboratory testing performed by ESP in February 2022.

ESP has prepared this GBLR to meet the requirements in the SCDOT's *Geotechnical Design Manual* Version 2.0 (GDM). The 2014 ICA and 2015 PSI reports appear to meet the requirements of the GDM in force at that time; however, elements of the field exploration, laboratory testing, and reporting do not meet current GDM requirements. The ICA and PSI information is presented "as is," and no attempt has been made to revise or update the ICA or PSI information to current GDM requirements.

ESP has performed the scope of services in On-Call Consultant Work Order Form 00200-W-7 without significant deviation, except that the CPT soundings scheduled for 60 foot depths all refused (i.e., maximum reaction force of 25-ton truck) at a depth of approximately 20 feet below the existing ground surface in the top of the Santee Limestone.

2.1 Field Testing

Subsurface investigations were performed by ICA in April 2014 and PSI in December 2014. ICA performed 16 soil test borings (STB) with four rock cores, four hand-auger borings (HA), two bulk samples (BS), and a multichannel analysis of surface waves (MASW). PSI performed seven STBs and two dilatometer test soundings (DMT).

ESP was on site on February 8, 2022, to perform four cone penetration test (CPT) soundings and collect cores from the westbound bridge piers. Drill rigs and crews were mobilized on February 23 through March 1, 2022, to perform 11 STB, one rock core, and two bulk samples.

The ESP test locations were established in the field by ESP personnel measuring distances from the existing bridge features. Upon completion of field testing, the test locations were surveyed by an ESP licensed surveyor using a Dual-Frequency GPS tied to the South Carolina Virtual Reference Station Network. Coordinate values are based on Horizontal Datum NAD 83-2011 (adjusted) and Vertical NAVD 88 GPS (derived). All of the test locations have been surveyed. The PSI boring coordinates are based on SC Grid NAD-83 and vertical datum is NAVD-88. No datum is provided in the ICA report; however, the



provided survey information indicates PSI and ICA apparently used the same datums. The surveyed test location coordinates, elevations, stations, and offsets are shown in the header sections of the individual logs. Approximate test locations are shown on the Test Location Plan (Figure 2) in Appendix I. Table 2-1 summarizes the compiled subsurface investigation program.

Table 2-1: Field Testing Locations

Test No.	Test Type	Depth (ft)	Lat.	Long.	Northing	Easting	Elev. (ft)	Station	Offset
ESP Test Locations									
STB-01	SPT	100.0	33.457291	-80.648240	591033.1	2107269.9	120.40	5989+32.04	23.80' L
STB-01A	Bulk	5.0	33.457291	-80.648240	591033.1	2107269.9	120.40	5989+32.04	23.80' L
STB-02	SPT	100.0	33.457422	-80.647239	591081.8	2107575.0	120.62	5992+40.97	22.73' L
STB-03	SPT	110.0	33.457331	-80.647949	591048.0	2107358.6	120.46	5990+22.01	22.82' L
STB-04	SPT	110.0	33.457360	-80.647725	591058.7	2107427.0	120.49	5990+91.23	22.80' L
STB-05	SPT	110.0	33.457389	-80.647499	591069.5	2107495.7	120.50	5991+60.74	22.65' L
STB-06	SPT	30.0	33.457251	-80.648555	591018.3	2107173.9	120.31	5988+34.96	23.59' L
STB-07	SPT	30.0	33.457458	-80.646948	591095.1	2107663.8	120.38	5993+30.81	23.26' L
STB-08	SPT	10.0	33.457134	-80.649858	590974.4	2106776.9	119.55	5984+35.87	5.80' L
STB-08A	Bulk	5.0	33.457134	-80.649858	590974.4	2106776.9	119.55	5984+35.87	5.80' L
STB-09	SPT	10.0	33.457189	-80.649204	590994.9	2106976.0	120.14	5986+35.81	16.25' L
STB-10	SPT	10.0	33.457571	-80.646305	591136.9	2107859.7	120.38	5995+30.85	12.25' L
STB-10A	Bulk	5.0	33.457571	-80.646305	591136.9	2107859.7	120.38	5995+30.85	12.25' L
STB-11	SPT	10.0	33.457678	-80.645675	591176.5	2108051.7	119.68	5997+26.63	2.67' L
CPT-01	CPT	21.6	33.457292	-80.648231	591033.4	2107272.6	120.42	5989+34.81	23.92' L
CPT-02	CPT	21.7	33.457421	-80.647245	591081.3	2107573.3	120.52	5992+39.29	22.98' L
CPT-03	CPT	20.2	33.457481	-80.648303	591102.1	2107250.6	119.41	5989+23.65	47.34' R
CPT-04	CPT	19.1	33.457579	-80.646780	591139.5	2107714.9	120.11	5993+88.10	12.72' R
PSI Test Locations									
B-1A	SPT	120.0	33.4575	-80.6472	590040.7	2107557.0	119.85	5949+31.74	8.75' R
B-3A	SPT	131.2	33.4575	-80.6475	591113.7	2107481.3	120.26	5950+10.72	6.25' L
B-5A	SPT	132.7	33.4575	-80.6478	591114.3	2107391.8	120.29	5950+99.11	8.13' R
B-6A	SPT	131.7	33.4575	-80.6478	591092.4	2107351.1	120.28	5951+42.68	7.28' L
B-7A	SPT	132.0	33.4575	-80.6481	591101.0	2107304.3	120.7	5951+87.63	8.39' R
RW-3A	UD	13.0	-	-	591132.5	2107609.3	120.15	5948+81.36	7.49' L
RW-3B	SPT	16.0	-	-	591135.5	2107597.8	120.22	5948+82.94	7.41' L
DMT-1	DMT	-	-	-	591126.1	2107565.6	120.09	5949+26.50	7.81' L
DMT-2	DMT	-	-	-	591077.6	2107262.9	119.98	5952+32.10	8.24' L

Test No.	Test Type	Depth (ft)	Lat.	Long.	Northing	Easting	Elev. (ft)	Station	Offset
ICA Test Locations									
B-1	SPT	102.5	33.45753	-80.64727	-	-	119.9	5949+31	13' L
B-2	SPT	111.5	33.45757	-80.6474	-	-	108.8	5949+65	9' R
B-3	SPT	101.5	33.45751	-80.64752	-	-	108.8	5950+02	3' R
B-4	SPT	101.5	33.45754	-80.64764	-	-	107.9	5950+42	8' R
B-5	SPT	101.3	33.45747	-80.64781	-	-	105.5	5950+98	8' L
B-6	SPT	35.2	33.4575	-80.64796	-	-	107.8	5951+41	8' R
B-7	SPT	41.0	33.45744	-80.6481	-	-	105.0	5951+86	8' L
B-8	SPT	101.4	33.45747	-80.64821	-	-	120.0	5952+17	8' R
B-9	SPT	101.5	33.45742	-80.64824	-	-	120.0	5952+28	8' L
Bulk-1	Bulk	5.0	-	-	-	-	-	5949+31	13' L
Bulk-2	Bulk	5.0	-	-	-	-	-	5952+17	8' R
SA-1	Seismic	92.6	-	-	-	-	-	5952+40	14' R
RW-1	SPT	41.4	33.45758	-80.64675	-	-	119.9	5947+73	20' L
RW-2	SPT	41.5	33.45765	-80.64698	-	-	119.1	5948+38	18' R
RW-3	SPT	33.7	33.45753	-80.64711	-	-	120.2	5948+83	13' L
RW-4	SPT	25.1	33.45749	-80.64832	-	-	119.5	5952+50	20' R
RW-5	SPT	41.4	33.45736	-80.64836	-	-	120.3	5952+70	10' L
RW-6	SPT	20.9	33.45746	-80.64868	-	-	119.2	5953+15	22' R
RW-7	SPT	21.8	33.45733	-80.64868	-	-	119.7	5953+66	20' R
HA-1	HA/DCP	10.5	33.45775	-80.64687	-	-	112.9	5948+00	50' R
HA-2	HA/DCP	7.5	33.45773	-80.6472	-	-	112.1	5949+00	60' R
HA-3	HA/DCP	10.5	33.45755	-80.64824	-	-	110.7	5952+23	40' R
HA-4	HA/DCP	3.5	33.45754	-80.64834	-	-	112.8	5952+54	42' R

2.2 Exploration Procedures

The following sections summarize the field test procedures. The field testing data are organized into appendices of this report as follows:

- Appendix II – Field Testing
- Appendix III – Shear Wave Velocity Data

Interpreted subsurface conditions encountered by the soundings and borings are shown on the CPT logs, DMT logs, and Soil Test Boring Logs in Appendix II. These records represent the geotechnical engineer's (i.e., ESP, PSI, ICA) interpretation of the subsurface conditions based on the test data. Stratification lines on the logs represent approximate boundaries between soil types; however, the actual transition may be gradual and the thicknesses of the strata will vary across the site. The ESP soil samples will be retained in our laboratory for a period of seven years, or until substructure construction has been completed, whichever comes first.

2.2.1 Encroachment and Traffic Control

ESP submitted an Encroachment Permit Application to the SCDOT to work within the SCDOT right of way. The field work was performed under Permit No. 251864, including the traffic control plan presented in the application.

Traffic control was required to perform the field testing at the subject site. Cones, signs, and an attenuator truck were used to close a single lane of eastbound US 301 to perform the work. Traffic control configurations and work hours were in accordance with SCDOT Standard Drawing 610-105-01 and hourly lane closure restrictions.

2.2.2 Pavement and Bridge Deck Cores

Pavements and bridge decks were cored to facilitate the borings and soundings for the ICA, PSI, and ESP investigations. No pavement core information is provided in the ICA report, and four bridge deck cores (B-5 through B-8) varied from 20 to 21 inches in length. Core data is included on the PSI boring logs. Pictures of the ESP asphalt cores are included in Appendix II, and core data is included on the ESP boring logs.

2.2.3 Cone Penetration Test (CPT) Soundings

The CPT soundings were performed in general accordance with ASTM D5778 using a truck-mounted rig. Following the completion of the soundings and the recording of groundwater measurements, the boreholes were abandoned by grouting with bentonite and Portland cement, and the pavement was patched. All four soundings refused (i.e., maximum reaction force) at depths from approximately 19 to 22 feet below the pavement surface. The CPT sounding logs are included in Appendix II.

2.2.4 Dilatometer Soundings

Two flat-plate dilatometer (i.e., Marchetti) soundings (ASTM D6635) were included in the PSI report. The raw data and DMT logs are included in Appendix II.

2.2.5 Soil Test Borings

Soil test borings with split-spoon sampling and Standard Penetration Testing (SPT) were performed in general accordance with ASTM D1586 using CME-45C, CME-45D, CME-55, and CME-550X with hammer energy ratio from 76% to 91%. The borings were generally sampled continuously in the top 10 feet and at 5-foot intervals thereafter. ESP boring STB-02, a companion to CPT-02, was continuously sampled to a depth of 48 feet. Following the completion of drilling and the recording of groundwater measurements, the ESP boreholes were abandoned by filling with bentonite and Portland cement grout. No undisturbed (Shelby tube) samples were obtained. Two bulk samples were collected with the 2014 ICA borings, and three bulk samples were collected by ESP.

2.2.6 Rock Coring

Rock coring was performed in four of the 2014 ICA borings (B-5 through B-8) due to casing refusal at depths from 10 to 30 feet below the ground surface within the Santee Formation. Four 5-foot NQ core runs were performed, recovery (REC) ranged from 46 to 100 percent, and rock quality designation (RQD) ranged from 0 to 64 percent. No coring was performed in the 2015 PSI borings. ESP performed one 5-ft, NQ rock

core run in boring STB-01 from approximately 23.5 to 28.5 feet below the existing ground surface, REC was 8 percent, and RQD was 8 percent.

2.2.7 Geophysical Testing and ADRS

The 2014 ICA report included shear wave velocity (V_s) testing using multichannel analysis of surface waves (MASW) and Microtremor Array Measurements (MAM) performed by Terracon. The site stiffness ($V_{s,H}^*$) was reported to be 1083 ft/sec, the coefficient of variability (COV) was 0.44, and the Site Class was D. The Terracon information is included in Appendix III.

Seismic CPT shear wave testing was performed by S&ME for ESP in CPT sounding CPT-2. The sounding refused at a depth of 22 feet below the existing ground surface; therefore, the V_s measurements were limited to this depth. A site stiffness of 798 ft/sec was calculated for the top 22 feet. The seismic CPT data is included in Appendix III.

The 3-Point Acceleration Design Response Spectrum (ADRS) provided by the SCDOT is also included in Appendix III.

3.0 LABORATORY TESTING

Laboratory testing was performed for the 2014 ICA investigation, 2015 PSI investigation, and 2022 ESP investigation. Table 3-1 summarizes the testing performed, and the test data is presented in Appendix IV.

Table 3-1: Laboratory Testing Summary

Report	Test Type	Quantity
2022 ESP	Natural Moisture Content	30
	Wash #200	20
	Hydrometer	10
	Atterberg Limits	30
	Organic Content	1
	Soil pH	1
	Soil Resistivity	1
	Chloride in Soil	1
	Sulfate in Soil	1
	Standard Proctor	3
	California Bearing Ratio	2
Triaxial Shear (CU)	1	
2015 PSI	Natural Moisture Content	49
	Grain Size	40
	Hydrometer	9
	Atterberg Limits	49
	Consolidation	1
	Triaxial Shear (CU)	1
	Soil pH	4
	Soil Resistivity	4
	Chloride in Soil	3
	Sulfate in Soil	3
2014 ICA	Natural Moisture Content	69
	Wash #200	85
	Hydrometer	14
	Atterberg Limits	70
	Unconfined Compression (rock)	17
	Direct Shear	2

4.0 SITE GEOLOGY

The project site is located in the Middle Coastal Plain Province within the Marietta Unit (previously Sunderland or Okefenokee) that is typically found between the Surry Scarp at elevation 90 feet and the Parlor Scarp at elevation 140 feet-msl. Specifically, the site is within the floodplain of Four Hole Swamp. The surface topography of this region is marked by abandoned shorelines that form marine terraces. At the project site, the surface geology generally consists of Holocene materials (i.e., alluvium) underlain by Pleistocene materials (e.g., Marietta Unit) and then the Eocene Santee Limestone, Warley Hill, and Congaree Formations.

The Santee Limestone and Warley Hill formations were formed during the middle of the Eocene epoch, and the Congaree formation was formed during the late Eocene epoch. All three formations are considered part of the Orangeburg Group. The Santee Limestone is composed of fossiliferous limestone with sand, marl, and shell beds. The Warley Hill Formation is composed of fine, green to yellow glauconitic sand. The Congaree formation is composed of light gray to green shale alternating with thin bedded fine grained siltstone, glauconitic sand, and interstitial clay.

The previous investigations identified anomalous weak soil conditions (i.e. WOH or very low N values) below the Santee Formation. SCDOT's concerns that these anomalous conditions may adversely affect foundation performance and/or bridge embankment performance during the Extreme Event I limit state prompted consultation with of the South Carolina Geological Survey to better understand the project site geology. Mr. William R. Doar, III (Senior Geologist – Coastal Plain) opined that the formation below the Santee Limestone, which was classified as the Congaree, may in fact be the Warley Hill Formation. He also suggested that the weak soil zones are not likely to be relic karst sinkholes but are likely to be relic scour holes caused by wave action filled with sands and then overlain by the Santee Limestone Formation.

5.0 SUBSURFACE CONDITIONS

5.1 Soil Stratigraphy

Table 5-1 presents generalized subsurface conditions at the site, and a Subsurface Profile is attached as Figure 3 in Appendix I. The information in Table 5-1 and Figure 3 are general in nature and highlight the major subsurface features and material characteristics. The boring, CPT, and DMT records in Appendix III should be reviewed for specific information at each test location. Subsurface conditions will vary between the test locations. The stratification lines were used for our preliminary analytical purposes, are for illustration purposes, and should not be used for design or construction purposes. The Geotechnical Engineer of Record (GEOR) for the project must review the data submitted in this report and develop their own interpretation of the testing results.

Surface materials encountered at the existing ground surface in the 2022 ESP borings consisted of 7½ to 10 inches of asphalt pavement in the roadway, 2 to 3 inches of organic laden topsoil in the median, and 15 inches of reinforced concrete in the bridge deck. Surface materials are not reported in the 2014 ICA report. The 2015 PSI reports 8 inches of asphalt in the roadway and 18 to 25-inches of asphalt, stabilized base, and reinforced concrete on the bridge deck.

Table 5-1: Generalized Subsurface Conditions

Formation	Approx. Elevation (Feet NAVD88)		SPT-N values	Average CPT Tip Resistance	Soil Behavior Type	USCS Symbol
	Top	Bottom	(bpf)	(tsf)		
Recent (Embankment)	120	110	2 - 100+	52	Sand-Like	SP, SW-SM, SM
					Clay-Like	SC
Marietta Unit (Alluvium)	110	100	0 - 32	118	Sand-Like	SP, SM, ML
					Clay-Like	SC-SM, SC, CL
Santee Limestone	100	30	0 - 100+	-	Sand-Like	SC, ML
					Clay-Like	SM, ML
Warley Hill	30	10	3 - 100+	-	Sand-Like	SP-SM, SW- SM, SC-SM
					Clay-Like	SM, MH
Congaree	10	-	0 - 100+	-	Sand-Like	SW-SM, SM
					Clay-Like	MH, CL, CH

Table 5-1 groups the alluvium and the Marietta Unit together; however, these are technically distinct strata. All of the boring logs describe the materials as “alluvium” right to the top of the Santee Limestone, and none of the logs differentiate the materials. Use of “Marietta Unit” in the general profile comes more from mapping than description, although the material descriptions generally agree with the Unit descriptions.

The Marietta Unit is Pleistocene and older than a Holocene alluvium. While there is some looser “alluvial” material in the boring data, there is no obvious demarcation in the Vs data, CPT data, or boring data that would indicate a clear boundary. This is likely due to potential scour and redeposition of material that has removed, partially or wholly, Marietta Unit soils at the bridge site. As such, there appears to be no significant difference in engineering behavior, so the materials are combined in Table 5-1.

5.2 Rock Conditions

ICA reports that SPT refusal was encountered at different levels within the Santee Limestone at 14 borings due to strong cementation. Review of all of the boring data indicates the Santee sediments exhibited widely varying cementation levels at variable elevations that are not uniformly stratified across the site. Congaree sediments also exhibited thin seams of moderate to strong cementation but not to the vertical extent of the Santee Limestone. Strata with very dense/very hard materials are highlighted in Figure 3 for illustrative purposes.

ICA found the cementation sufficient for coring within the Santee sediments in four borings (B-5 through B-8). Beginning at depths from approximately 20 to 21 feet below the ground surface, four 5-foot NQ core runs were performed, recovery (REC) ranged from 46 to 100 percent, and rock quality designation (RQD) ranged from 0 to 64 percent. Selected core samples were subjected to unconfined compression testing with calcareous sandstone samples ranging from 261 psi to 4,688 psi and calcarenite samples ranging from 116 psi to 643 psi. No coring was performed in the 2015 PSI borings. ESP performed one 5-ft, NQ rock core run in boring STB-01 from approximately 23.5 to 28.5 feet below the existing ground surface, REC was 8 percent, and RQD was 8 percent.

5.3 Site Stiffness

The 2014 ICA report included shear wave velocity (Vs) testing using multichannel analysis of surface waves (MASW) and Microtremor Array Measurements (MAM) performed by Terracon. Seismic CPT shear wave testing was performed by S&ME for ESP in CPT sounding CPT-2. Review of the provided SCDOT ADRS indicates the shallow shear wave data was combined with deep hole data to produce a site stiffness ($(V_{s,H}^*)$) over a 500 foot depth (H=500 feet to B/C boundary) of approximately 1,600 feet/sec. This information is included in Appendix III.

5.4 Groundwater Conditions

Subsurface water levels were measured immediately following the completion of the borings and 24 hours after drilling, where available. The water levels are presented on the Soil Test Logs and the subsurface profile. Groundwater was measured in the embankment borings at depths ranging from approximately 0 to 13 feet below the existing ground surface. Water depths for borings in the river were not reported by ICA or PSI. Water depths was approximately 1½ feet in the ESP bridge borings. Subsurface water and river water elevations will vary.

6.0 DESIGN AND CONSTRUCTION CONSIDERATIONS

Chapter 21 of the SCDOT GDM provides that the GBR should provide limited, preliminary geotechnical information on a design-build project to help the contractor bid the project with a certain degree of knowledge and acceptable risk. The preliminary design and construction considerations submitted herein are based, in part, upon data obtained from our preliminary field exploration and laboratory testing program. Subsurface conditions across the site will vary, as will grading and construction details. Additional geotechnical exploration and analysis will be required to provide detailed analysis and recommendations for the project.

6.1 Site Preparation

Site preparation should be performed in accordance with Section 201 of the 2007 SCDOT *Standard Specifications for Highway Construction*, supplemental specifications, and/or special provisions. The existing roadway and bridge embankments will likely be widened with “sliver fills” into low, wet areas. The boring data does not indicate deep mucking will be required; however, some mucking and stabilization with crushed stone and/or geotextiles should be expected. Raising new fill areas with crushed stone may also be required if grading takes place during high-water events. Generally, areas to receive new fill placement should remove trees and shrubs, grub root systems, and strip organic laden topsoil to depths as required. Stump holes and other holes and other excavations should be cleaned of debris, backfilled with suitable material, and properly compacted.

6.2 Geotechnical Seismic Hazard Potential

The soils encountered in the borings and soundings were evaluated for shear strength loss (SSL) based on the SPT and CPT testing, laboratory index testing, and the depth to the water table. The soils between the water table and the Santee Formation are generally loose to medium dense sands with varying fines (i.e., silt and clay) content that exhibit both sand-like and clay-like ($PI > 8$) behavior. Preliminary analyses indicate that soils in this layer are susceptible to cyclic liquefaction or softening. Our preliminary analyses indicate the risk that liquefaction induced settlements would exceed GDM limits is low; however, the SSL does affect bridge embankment stability as discussed in Section 6.4 below.

The materials that compose the Santee Limestone, Warley Hill, and Congaree Formations are generally not susceptible to SSL. However, the anomalous weak soil discussed in Section 4.0 above are theoretically liquefiable during the FEE and SEE events. These zones are relatively deep in the ground and appear to be confined below the Santee Formation; therefore, it is unlikely SSL in these zones would significantly affect bridge embankments. These zones could possibly affect foundations and should be considered in foundation analyses for Extreme Event I limit state load cases if tip influence zones approach these depths.

6.3 Static Settlement

Thick layers of normally-consolidated, clay-like soils that would be susceptible to time-dependent consolidation settlements were not encountered in the borings and soundings. As such, embankment

settlements will be mostly elastic in nature, and we anticipate the majority of static settlement due to new fill placement will occur during construction without long waiting periods.

6.4 Embankment Stability

Preliminary slope stability analyses were performed on a 15-foot high embankment using a representative soil profile. The analyses indicate the global stability resistance factor appears to meet GDM requirements under static conditions. Under pseudo-static loading, embankments do not appear to be stable due to SSL, and large displacements are predicted by simplified Newmark analyses. Embankment reinforcement and/or ground improvement will likely be necessary to satisfy performance requirements developed by joint consultation of the GEOR and SEOR.

6.5 Pile Foundations

We expect pile foundations will be used to support bridge end and interior bents. We assume piles will penetrate some length into the Santee Limestone Formation. We also assume driven pile installation would be preferred; however, very dense/hard soils are present within the Santee Limestone, and hard driving conditions will be encountered. As such, there is a potential for predrilling at this site. Pile foundation considerations are discussed in the following sections.

6.5.1 Axial Resistance

Strength limit state axial loading or Extreme Event I lateral response (i.e. fixity) will likely govern the geotechnical pile design. Driven piles will develop driving resistance through skin friction and end bearing in the Santee Limestone and possibly lower formations. The Marietta Unit will not contribute significantly to axial resistance, and the GEOR should consider the anomalous zones of weak soils in their design. We expect that medium-sized pile hammers will be required to advance low-displacement piles through the very dense/very hard materials within the Santee Limestone. The Contractor should exercise care to not over-drive, over-stress, or damage piles during installation, and it will be important to size hammers that can both efficiently install piles and mobilize the required driving resistance during restrike if necessary.

Displacement piles are suitable at the site, and we expect a composite pile section would be used to reduce the length of the PSC section driven into the Santee Limestone. We expect that medium to large-sized pile hammers will be required to install displacement piles through the very dense/very hard materials within the Santee Limestone to minimum pile tip elevations.

Axial driving resistance must be confirmed with Pile Dynamic Analyses (PDA) testing with CAPWAP analyses. Restrikes should be performed, if necessary. The minimum number of required PDA tests must be in accordance with the GDM.

6.5.2 Lateral Response

We expect abutment piles will developed adequate lateral stability from the embankment fill and Coastal Plain soils and formations. Seismic bridge abutment backwall passive pressures must be calculated in accordance with Chapter 14 of the GDM.

At interior bents, portions of the Marietta Unit soils will experience SSL during the Extreme Event I and will not provide lateral resistance resulting in long unsupported pile lengths from the cap to the top of the Santee Limestone. This will require close coordination between the SEOR and GEOR to develop structural and geotechnical pile designs that meets structural and geotechnical performance requirements.

6.5.3 Constructability

Driven piles will likely use a diesel pile hammer. We anticipate that low-displacement piles (i.e. steel H-piles or open-ended steel pipe piles) will be used at end and interior bents, although exposed steel piles will not be allowed at interior bents. Composite piles with PSC tops and steel H-pile points may also be used at interior bents. If final pile loads are large, steel and composite piles may be long, require a splice, and be driven in two sequences. The contractor should limit time between sequences as much as practicable to limit potential pile “freeze” that may make mobilization of the second sequence difficult.

Hard driving is expected for PSC in the Santee Limestone, and large composite piles will likely experience practical refusal. Contractors should consider a robust pile monitoring and load testing program to monitor pile driving stresses during installation and to confirm driven resistance to optimize both the geotechnical pile design and pile installation process. Installation aids, such as predrilling, should also be considered.

6.6 Drilled Shaft Foundations

Drilled shaft would be a foundation option at interior bents. We expect that drilled shaft sizes would range from 36 inch to 60 inch in diameter. Drilled shaft considerations are discussed in the following sections.

6.6.1 Axial Resistance

The Strength limit state axial loading conditions will likely govern geotechnical shaft design. Shafts will develop axial resistance through skin friction and end bearing in the Santee Limestone and possibly lower formations. Shafts will be cased, and in accordance with SCDOT policy, the skin resistance on the casing must be ignored. The bearing geologic formations will have a stiff response to loading, so the GEOR should consider appropriate strain-compatibly limits on end bearing if using both skin friction and end bearing in the design. Design-build teams should evaluate whether load testing, and the associated effect on geotechnical resistance factors, would benefit to the project. If load test is performed, it must meet GDM requirements.

6.6.2 Lateral Response

Portions of the Marietta Unit soils will experience SSL during the Extreme Event I and will not provide lateral resistance resulting in long unsupported column and shaft lengths from the cap to the top of the Santee Limestone. This will require close coordination between the SEOR and GEOR to develop structural and geotechnical shaft designs that meets structural and geotechnical performance requirements.

6.6.3 Constructability

We anticipate drilled shafts will be installed using the wet method of construction with casing. Steel casing should be advanced and seated into the top of the Santee Limestone to “seal” the casing and reduce water intrusion. If an effective seal is established, the drilled shaft contractor may be able to dewater the hole, maintain a stable bottom, and place concrete using dry methods. If an effective seal cannot be obtained,

shaft must be constructed using wet construction methods. Both dry and wet methods must meet SCDOT construction requirements.

Drilled shaft construction will require excavation of very dense/hard soils with N values in excess of 100 blows/foot and rock. The boring and rock testing data indicate relatively weak rock conditions. Contractors should prepare their drilled shaft installation plan to efficiently excavate the reported materials, including some rock.

6.7 Vibration Monitoring Assessment

There are no structures within 1,500 feet of the bridge site; therefore, it does not appear that vibration monitoring will be required.

6.8 Corrosion Potential

Corrosion series tests included in the 2015 PSI report and performed by ESP is summarized in Table 6-1 below. Based on Table 7-34 in the GDM, the soils at this site appear to be somewhat aggressive for foundations. This must be confirmed by the SEOR during the design phase of the project.

Sample	Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)	pH
B-1A SS7	2600	-	-	3.90
B-1A SS-9/10	1500	555	5	7.65
B-3A SS-3/4	7600	111	2	7.45
B-5A SS-8/9/10	1800	396	4	7.60
STB-02 SS-06	1325	< 10	21	6.09

ESP extracted cores from the existing concrete piers of the southbound bridge and submitted them for petrographic analyses. The analyses indicate distress observed on the surface of the pier cores was due, primarily, to acid attack of the exposed cement paste. The full report prepared by Wiss, Janney, Elstner Associates, Inc. (WJE) dated Marth 11, 2022, is submitted under separate cover.

6.9 Exiting Pavement & Subgrade Conditions

Eight pavement cores were collected from the borings and CPT soundings on US 301. Photographs of the cores are provided in Appendix II. Review of the extracted cores indicates the existing asphalt thickness varies from approximately 7½ to 10 inches, and the pavement section is composed of at least two courses of asphalt concrete over a sand-asphalt base.

Bulk samples were collected from three of the four ESP median borings (STB-01, STB-08, and STB-10). Laboratory testing indicates the samples consist of low-plasticity clayey sands (SC, SC-SM) with fines content from 25 to 29 percent. Standard Proctor compaction testing indicates optimum moisture contents from 9.3 to 10.9 percent and maximum dry densities from 123.6 to 126.4 pcf. The boring data indicates the



shallow subgrade in the median is relatively well compacted, and laboratory California Bearing Ratio (CBR) tests ranged from 20 to 38.

7.0 LIMITATIONS OF REPORT

This GBR has been prepared in accordance with generally accepted geotechnical engineering practice with regard to the specific conditions and requirements of this site. The conclusions and recommendations contained in this report were based on the applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

ESP relied on project information provided to us to perform the exploration. If the project information as described in this report is not accurate, or if it changes during project development, we request notification so we may modify our analyses based on this additional information if necessary.

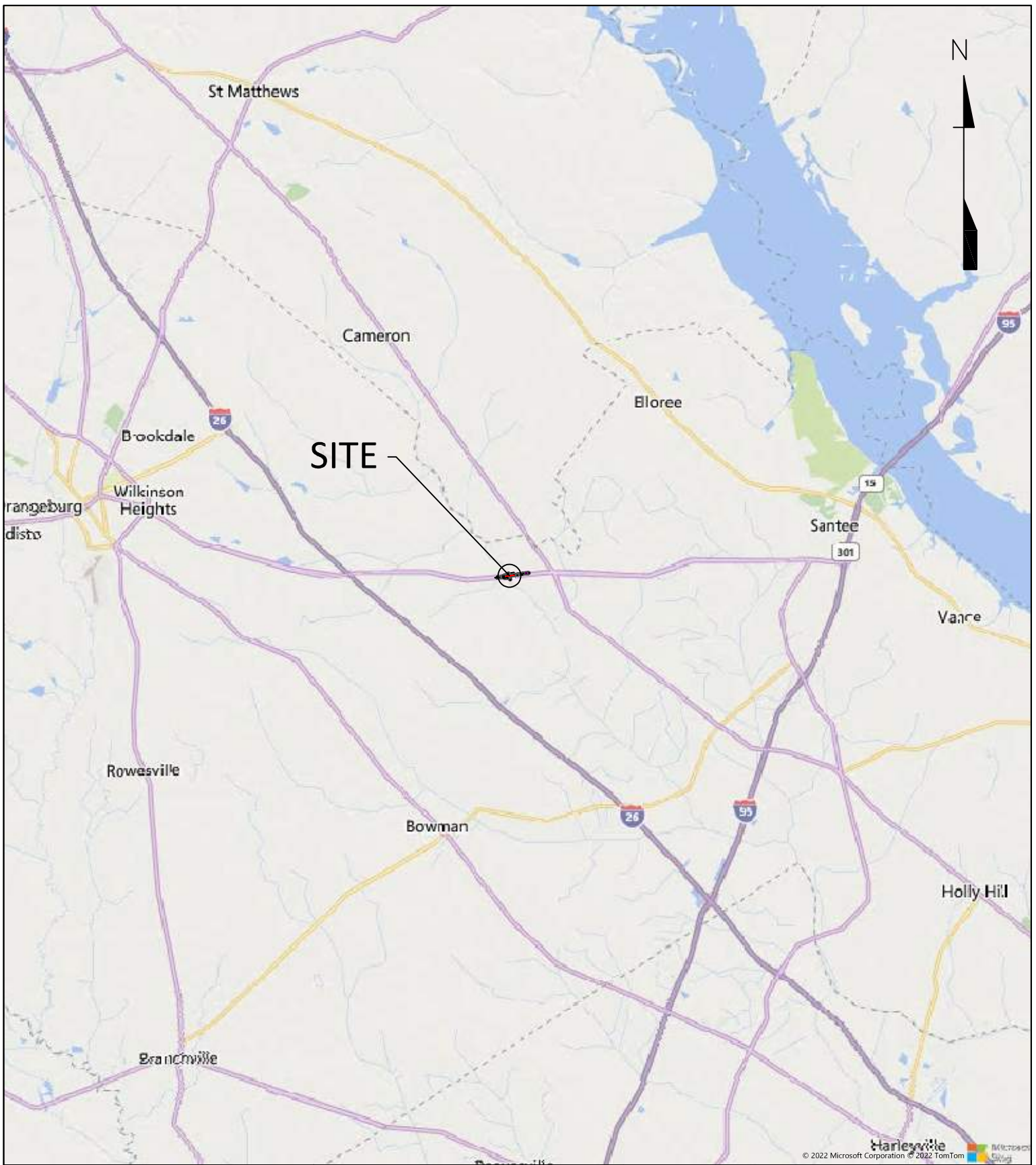
Our findings are based on limited data from the field exploration program. Subsurface conditions may vary widely within explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different from those described in our report, we should be notified. The Geotechnical Engineer of Record (GEOR) for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

Appendix I

Site Location Map – Figure 1

Test Location Plan – Figure 2

Generalized Subsurface Profile – Figure 3



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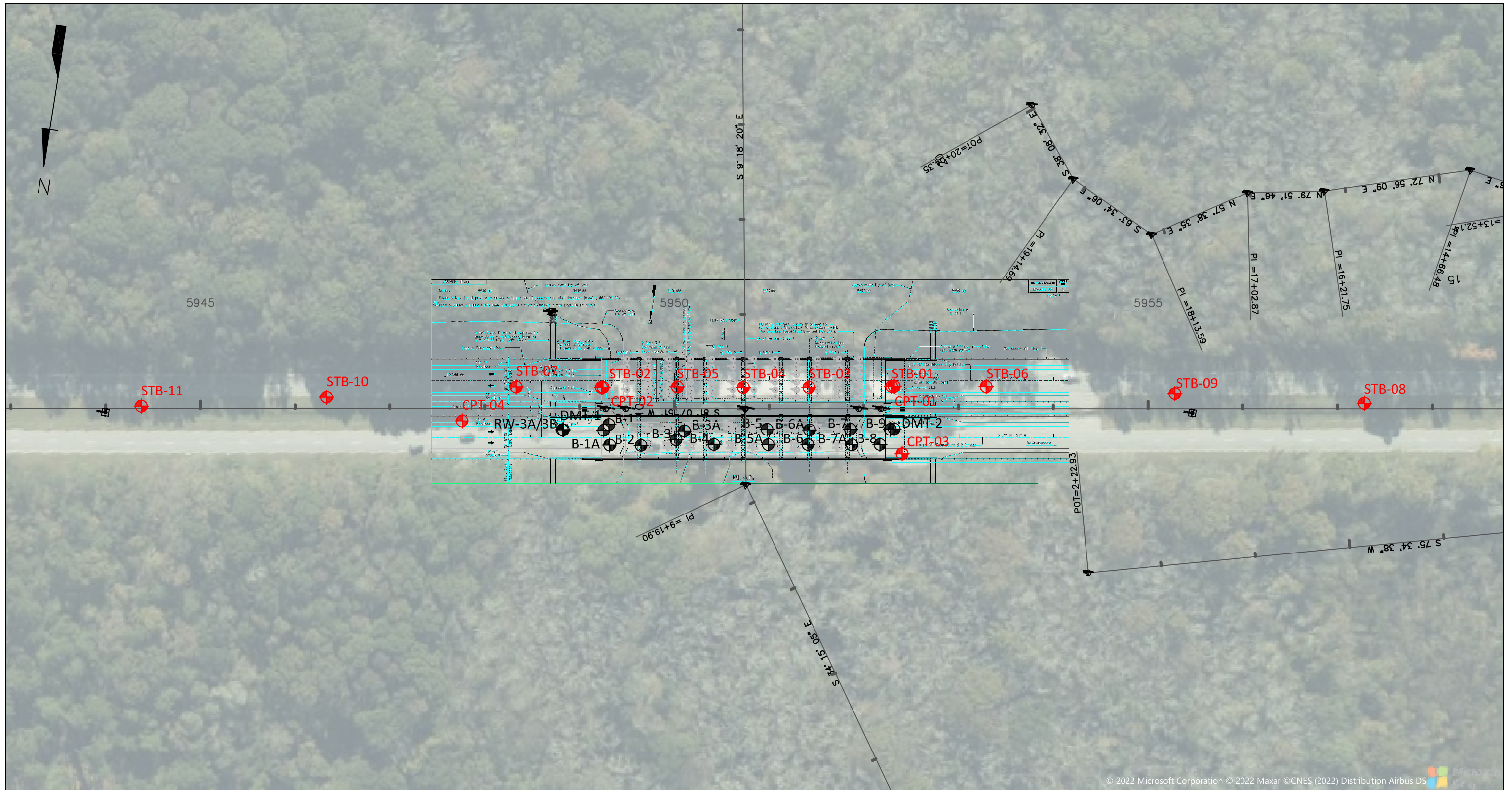
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SCALE:	NTS
DRAWN BY:	MML
CHECKED BY:	MSU
DATE:	FEBRUARY 21, 2022

SHEET TITLE:
FIGURE 1
SITE LOCATION MAP


PROJECT:
US-301 OVER
FOUR HOLE SWAMP
 ORANGEBURG COUNTY, SOUTH CAROLINA



ESP Associates, Inc.
 2145 N. Center Street
 Suite E-503
 North Charleston, SC 29406
 843-714-2040
 www.espassociates.com



LEGEND

 - APPROXIMATE TEST LOCATION

ESP HAS MODIFIED THE CONCEPTUAL PLANS AND ASSOCIATED DIGITAL DATA TITLED, "BRIDGE PLAN & PROFILE REPLACE US 301 NORTHBOUND OVER FOUR HOLE SWAMP," DATED 02-22 TO SHOW THE APPROXIMATE TEST LOCATIONS ONLY. NO OTHER INFORMATION IS EXPRESSED OR IMPLIED. PRELIMINARY, NOT FOR CONSTRUCTION.

PROJECT NO.:	JN11.307
SCALE:	1" = 100'
DRAWN BY:	MML
CHECKED BY:	MSU
DATE:	FEBRUARY 21, 2022

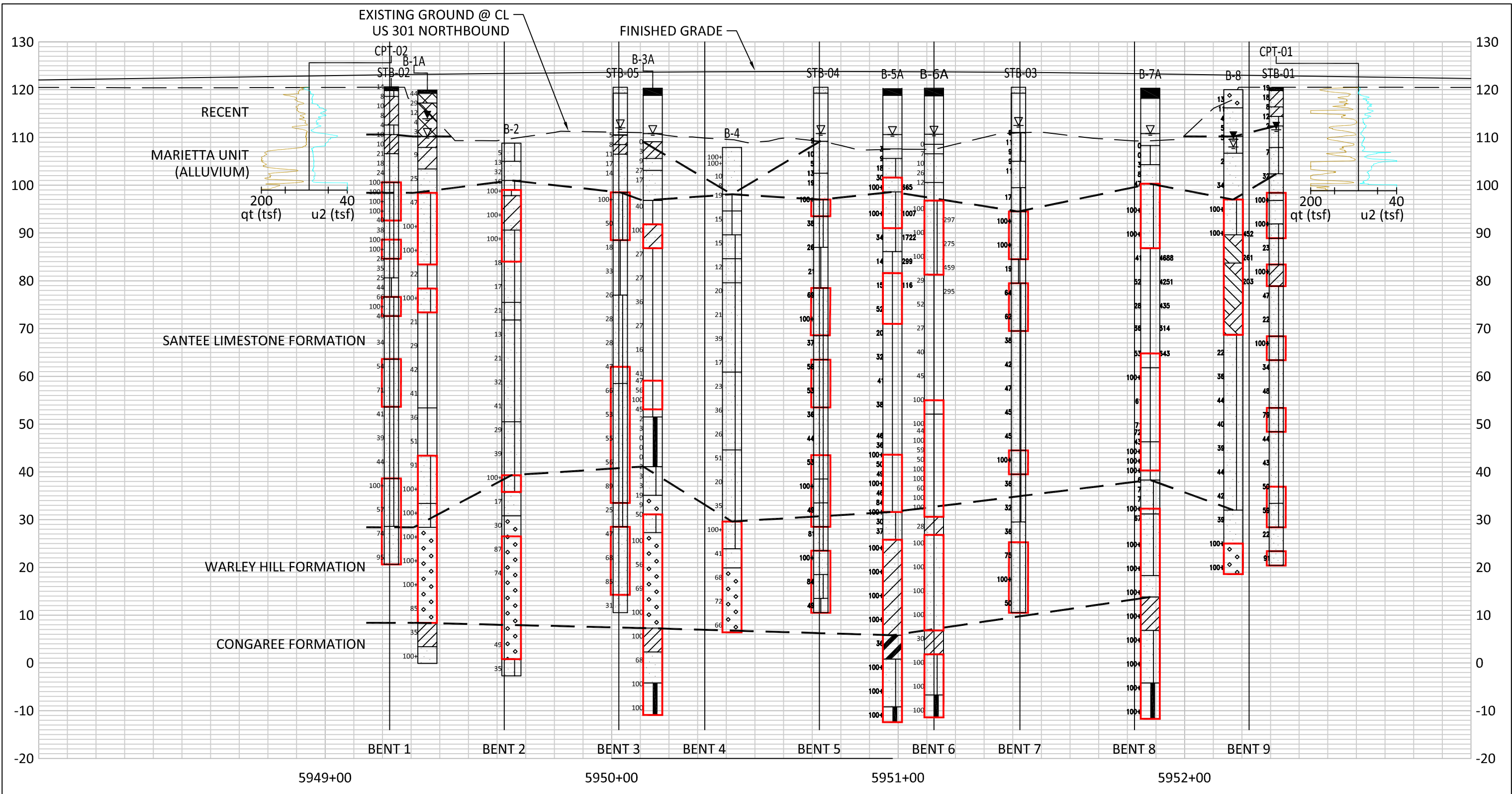
SHEET TITLE: **FIGURE 2
TEST LOCATION PLAN**

PROJECT: **US-301 OVER
FOUR HOLE SWAMP**

ORANGEBURG COUNTY, SOUTH CAROLINA



ESP Associates, Inc.
2145 N. Center Street
Suite E-503
North Charleston, SC 29406
843-714-2040
www.espassociates.com



LEGEND

- VERY DENSE/VERY HARD MATERIAL

ESP HAS MODIFIED THE CONCEPTUAL PLANS AND ASSOCIATED DIGITAL DATA TITLED, "BRIDGE PLAN & PROFILE REPLACE US 301 NORTHBOUND OVER FOUR HOLE SWAMP," DATED 02-22 TO SHOW THE APPROXIMATE TEST LOCATIONS ONLY. NO OTHER INFORMATION IS EXPRESSED OR IMPLIED. PRELIMINARY, NOT FOR CONSTRUCTION.

PROJECT NO.:	JN11.307
SCALE:	AS SHOWN
DRAWN BY:	MML
CHECKED BY:	MSU
DATE:	FEBRUARY 21, 2022

SHEET TITLE: **FIGURE 3
SUBSURFACE PROFILE**

PROJECT: **US-301 OVER
OVER FOUR HOLE SWAMP**

ORANGEBURG COUNTY, SOUTH CAROLINA



ESP Associates, Inc.
2145 N. Center Street
Suite E-503
North Charleston, SC 29406
843-714-2040
www.espassociates.com

Appendix II

GeoScoping Form

Drill Rig Photographs

Asphalt Core Photographs

ESP Soil Test Logs

ESP CPT Logs

SPT Hammer Efficiency

PSI Soil Test Logs

PSI DMT Data

ICA Soil Test Logs

GeoScoping Form

PROJECT INFORMATION	
Project ID: 0040308	Date of Trip:
County: Organburg	Location: Four Hole Swamp
Rd/Route: US 301	Local Name: Five Chop Road
Attendees: Michael Ulmer, Matt Lattin	

EXISTING BRIDGE INFORMATION	
Bridge Length: 290' (NB), 246' (SB)	Bridge Width: 43' (NB), 31' (SB)
Superstructure Type:	Substructure Type:
Begin Bridge Sta.: 5949+27 (NB), 5949+48 (SB)	End Bridge Sta.: 5952+18 (NB), 5951+95 (SB)
Begin Bridge Embankment Sta. ¹ :	End Bridge Embankment Sta. ¹ :
Structure Number:	Posted Weight Limit:
Crossing: FOUR HOLE SWAMP	Skew: 90
Latitude: 33.457426°	Longitude: -80.64770°
Existing Fill Height:	Approximate Existing Slope Angle:

¹Begin and End Bridge Embankment 100 feet down station or up station from bridge, respectively

EXISTING ROADWAY EMBANKMENT INFORMATION		
Begin Project Sta.:	Begin Bridge Embankment Sta. ¹ :	
Accessibility Issues: STEEP, NARROW SHOULDERS, SINGLE, NARROW SOUTHBOUND BRIDGE LANE WITH PERMANENT TRAFFIC CONTROL		
Ground Cover: VARIOUS VEGETATION ON SHOULDERS AND GRASSED MEDIAN		
Existing Fill Height:	Approximate Existing Slope Angle:	
Local Development (undeveloped, developed residential, developed commercial, developed industrial, etc.):		
Topography (level, flat, rolling, steep, hillside, valley, swamp, gully, etc.):		
Traffic Control Necessary (Y/N):		
Surface Soil: CLAYEY SAND	Muck (Y/N): N	
Exposed Rock (Y/N): N	In Stream Bed (Y/N): N	In Banks (Y/N): N
Wetlands On-Site (Y/N): Y	Wetlands Adjacent (Y/N):	
Depth FG to Water: 10 TO 15 FT	Water Depth: 5 TO 10 FT	
Depth to Existing Ground:		
Scour Condition at EB:	Scour Condition at IB:	
End Bridge Embankment Sta. ¹ :	End Project Sta.:	
Accessibility Issues: STEEP, NARROW SHOULDERS, SINGLE, NARROW SOUTHBOUND BRIDGE LANE WITH PERMANENT TRAFFIC CONTROL		
Ground Cover: VARIOUS VEGETATION ON SHOULDERS AND GRASSED MEDIAN		
Existing Fill Height:	Approximate Existing Slope Angle:	
Local Development (undeveloped, developed residential, developed commercial, developed industrial, etc.):		
Topography (level, flat, rolling, steep, hillside, valley, swamp, gully, etc.):		
Traffic Control Necessary (Y/N): Y		
Surface Soil: CLAYEY SAND	Muck (Y/N): N	
Exposed Rock (Y/N): N	In Stream Bed (Y/N): N	In Banks (Y/N): N
Wetlands On-Site (Y/N): Y	Wetlands Adjacent (Y/N): Y	
Depth FG to Water: 10 TO 15 FT	Water Depth: 5 TO 10 FT	
Depth to Existing Ground:		
Scour Condition at EB: NOT OBSERVED	Scour Condition at IB: NOT OBSERVED	

GeoScoping Form

UTILITIES INFORMATION
Attached:
Above Ground/ Overhead:
Underground: VARIOUS ON NORTH AND SOUTH SIDE OF ALIGNMENT
COMMENTS

Instructions:

1. Attach boring location plan for bridge and roadway.
2. Attach all photographs taken, photographs to be labeled as to direction looking in and what is being depicted.
3. Fill out GeoScoping Form as completely as possible, using additional sheets as necessary to describe site conditions.
4. If representative of GEC on site during GeoScoping, include GEC representative's name and contact number in Attendees block.



PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 1: STB-01





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 2: STB-02





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 3: STB-03





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 4: STB-04





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 5: STB-05





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 6: STB-06 (After Drilling)





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

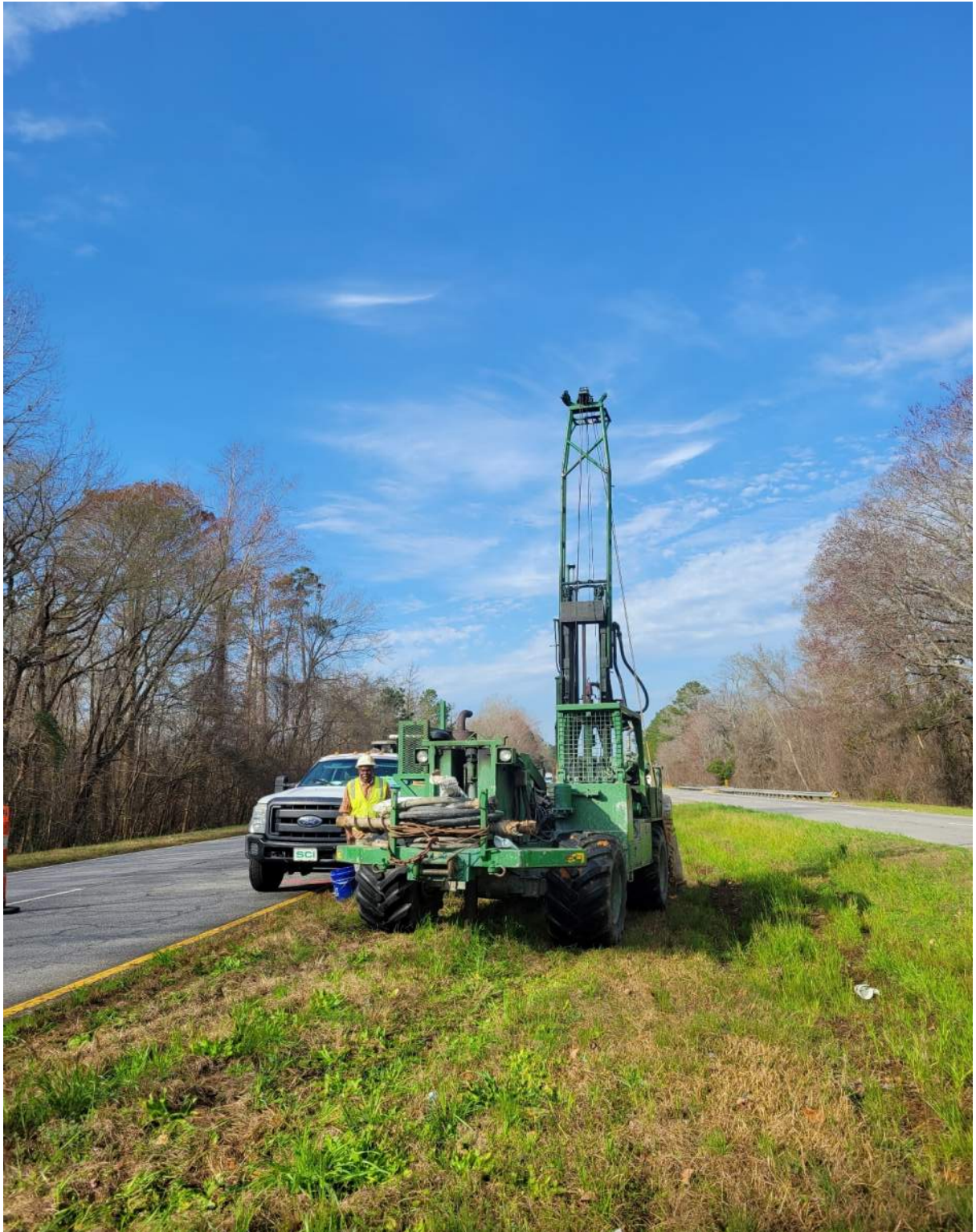
Photograph 7: STB-07 (After Drilling)





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 8: STB-08





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 9: STB-09





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 10: STB-10





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 11: STB-11





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 12: CPT-01





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 13: CPT-02





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 14: CPT-03





PHOTOGRAPHS OF DRILL RIG
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 15: CPT-04





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 1: Asphalt Core STB-01





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

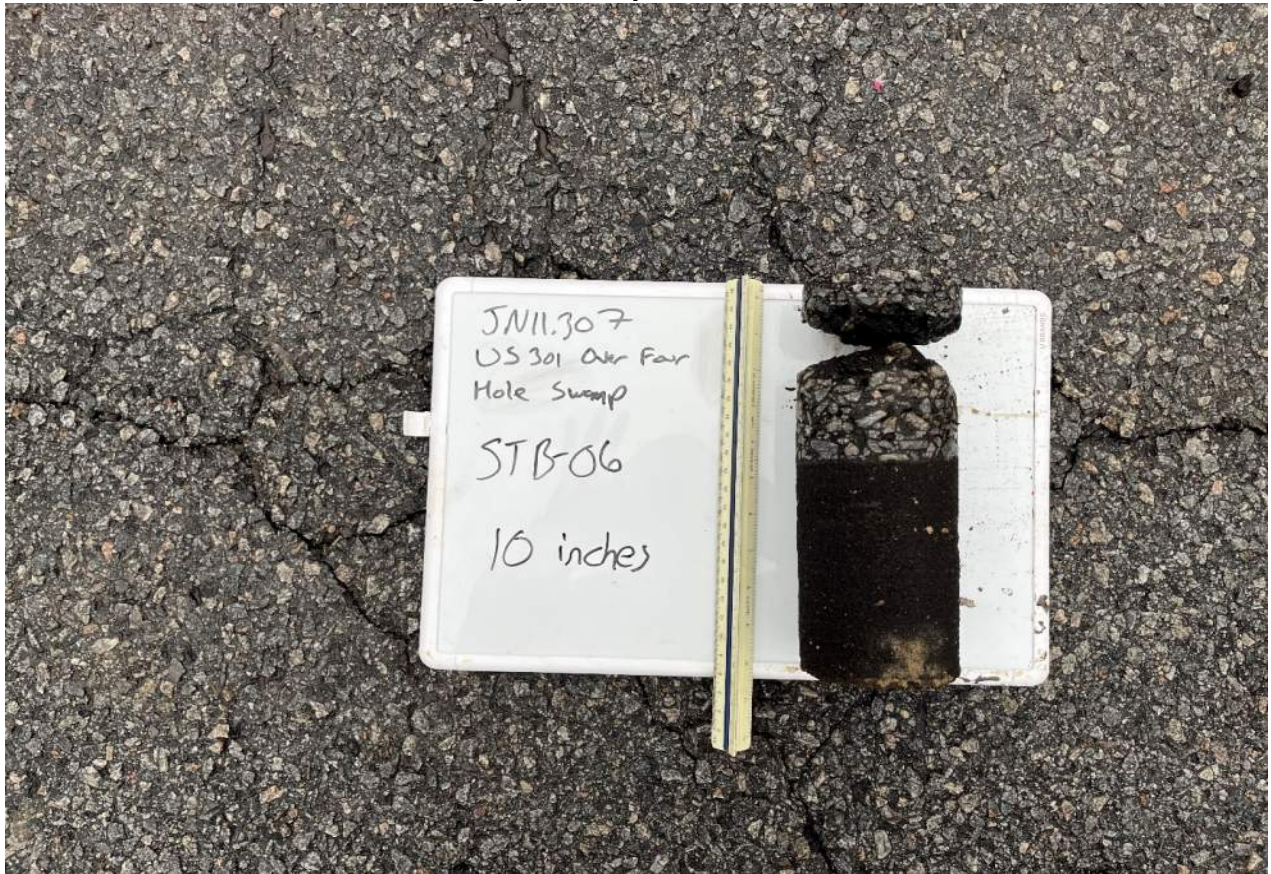
Photograph 2: Asphalt Core STB-02





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 3: Asphalt Core STB-06





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 4: Asphalt Core STB-07





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 5: Asphalt Core CPT-01





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 6: Asphalt Core CPT-02





PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

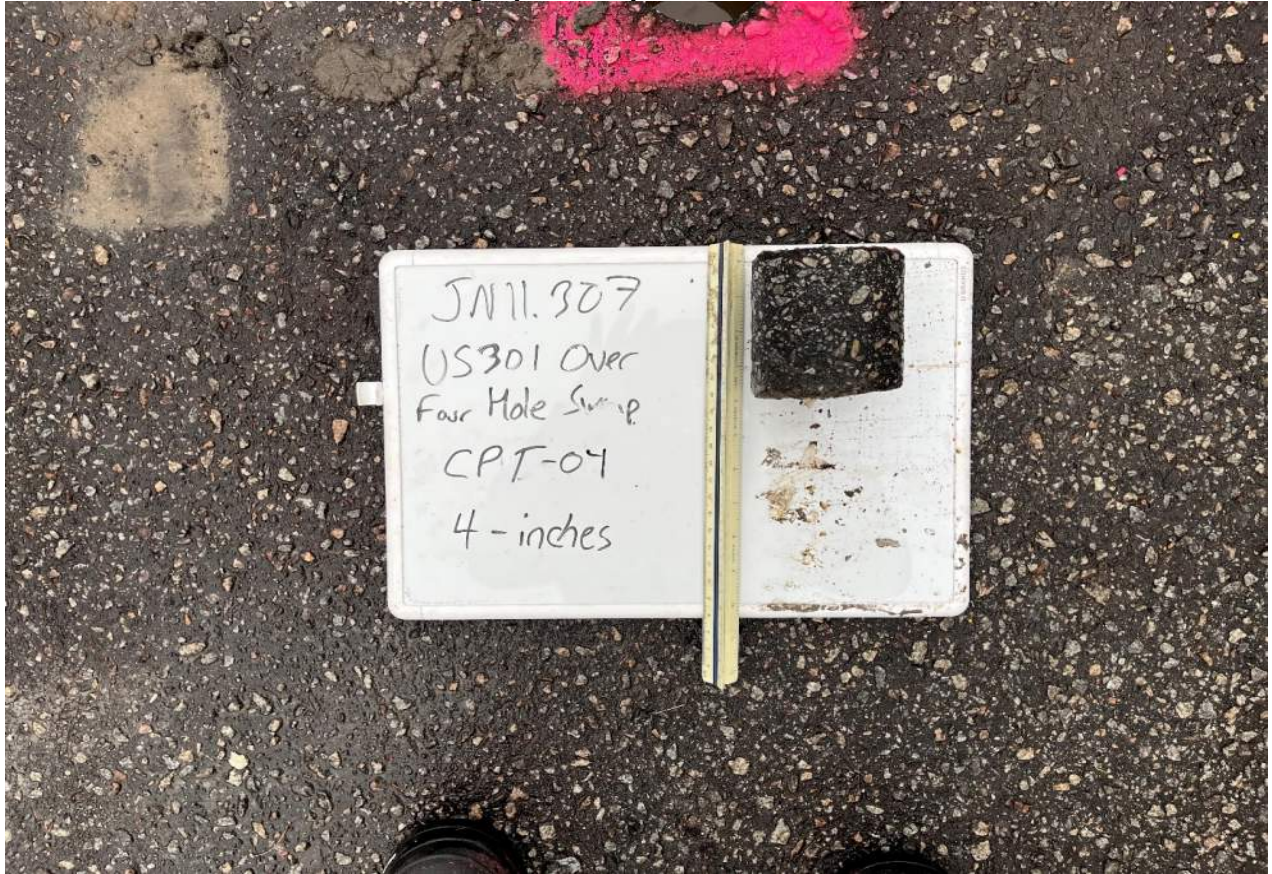
Photograph 7: Asphalt Core CPT-03





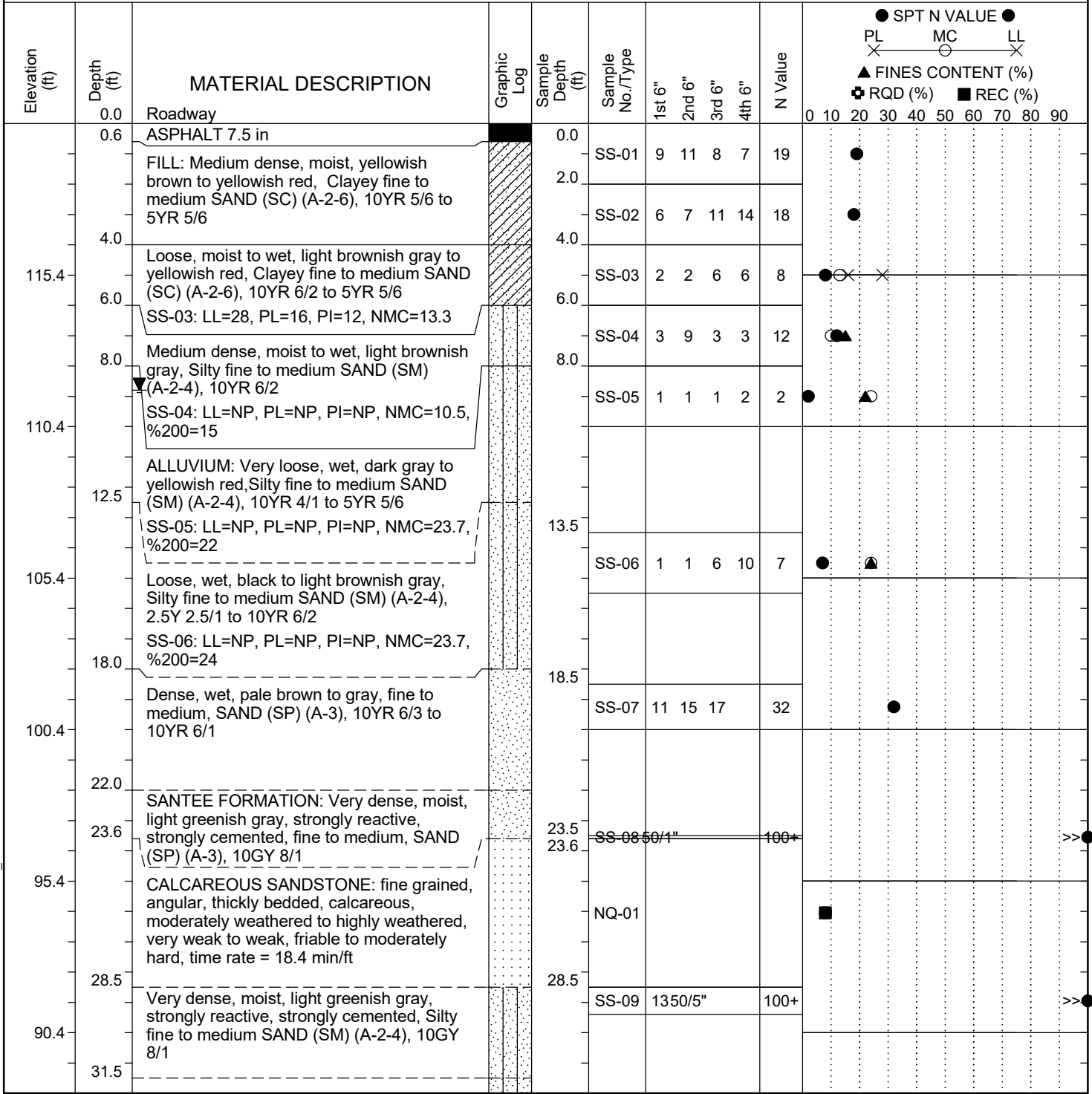
PHOTOGRAPHS OF ASPHALT CORES
Project ID: 0040308
Project Name: US-301 Over Four Hole Swamp
Location: Orangeburg County, South Carolina

Photograph 8: Asphalt Core CPT-04



SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-01
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5952+32.04	Offset:	23.80' L
Alignment:	US-301				
Elev.:	120.4 ft	Latitude:	33.4572909	Longitude:	-80.6482402
Date Started:	2/23/2022				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	4.9 ft
Date Completed:	2/24/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration	Liner Required:		Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME55	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	83%				
Core Size:	NQ	Driller:	SCI	Groundwater:	TOB
24HR	8.80 ft				



LEGEND

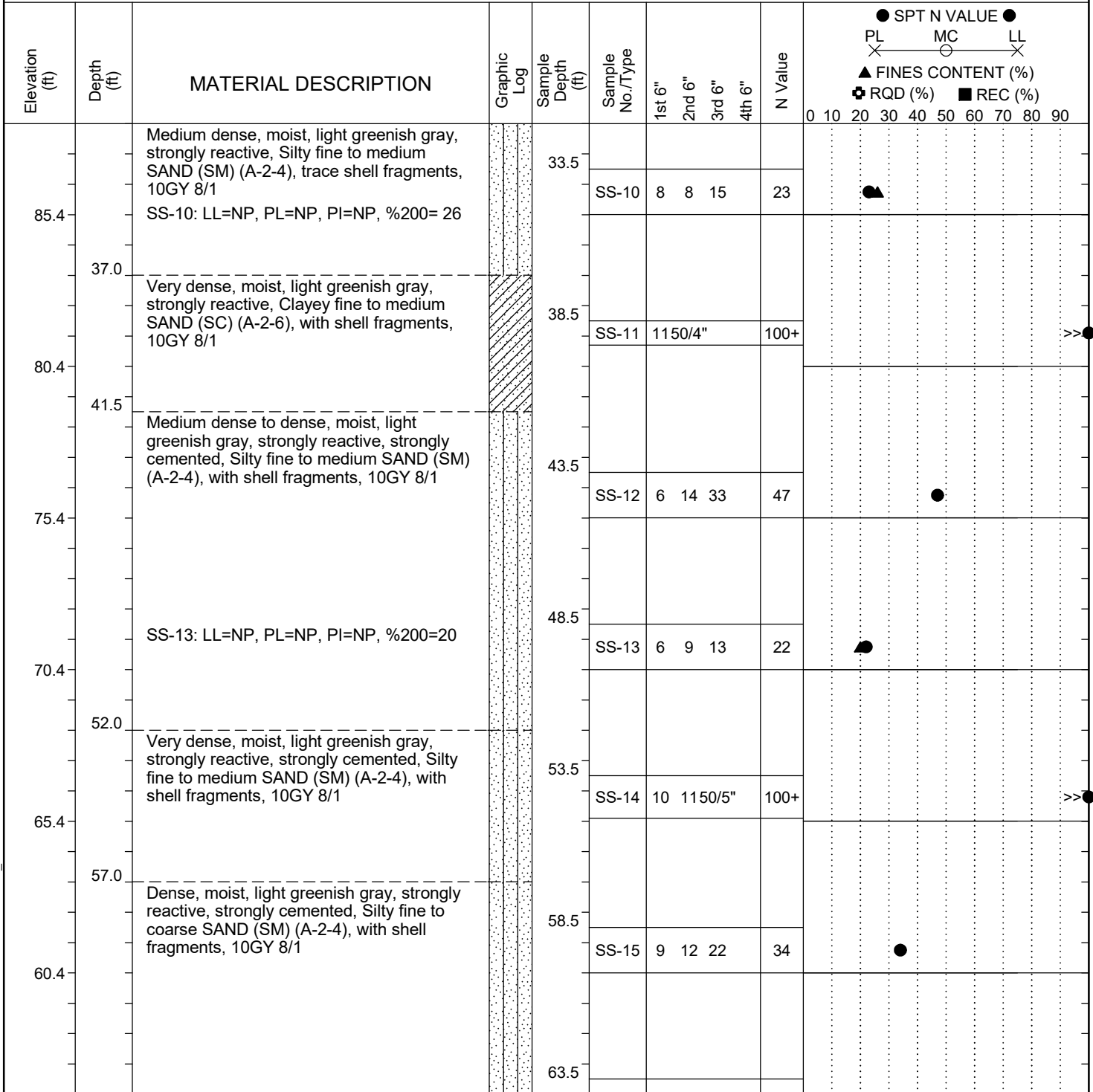
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-01
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5952+32.04	Offset: 23.80' L
Alignment: US-301	Date Started: 2/23/2022	Latitude: 33.4572909
Elev.: 120.4 ft	Longitude: -80.6482402	Date Completed: 2/24/2022
Total Depth: 100 ft	Soil Depth: 100 ft	Core Depth: 4.9 ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 83%	Core Size: NQ
Driller: SCI	Groundwater: TOB	24HR: 8.80 ft



LEGEND

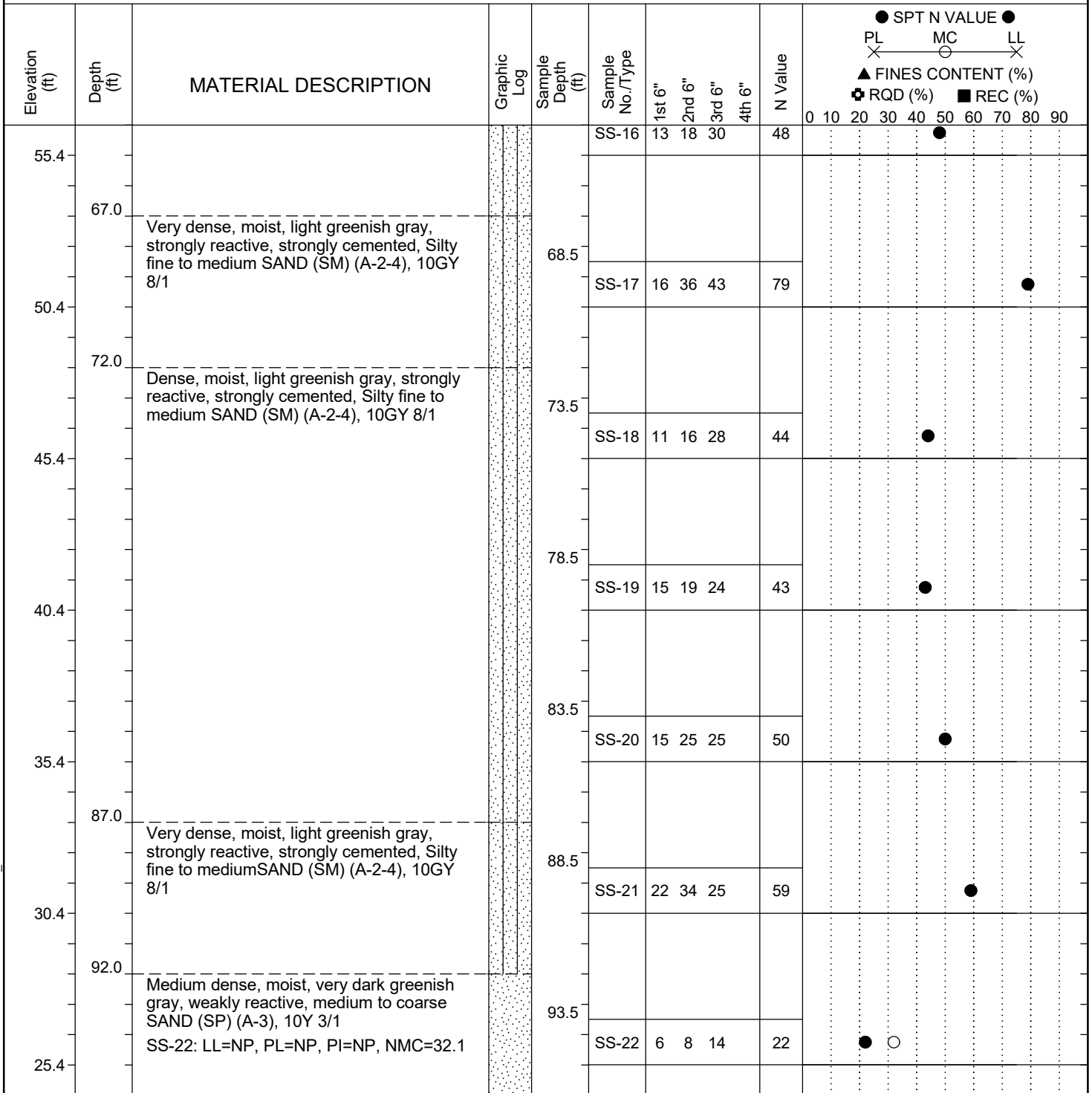
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-01
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5952+32.04	Offset:	23.80' L
Elev.:	120.4 ft	Latitude:	33.4572909	Longitude:	-80.6482402
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	4.9 ft
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME55	Drill Method:	RW	Hammer Type:	Automatic
Core Size:	NQ	Driller:	SCI	Energy Ratio:	83%
		Groundwater:	TOB	24HR	8.80 ft



LEGEND

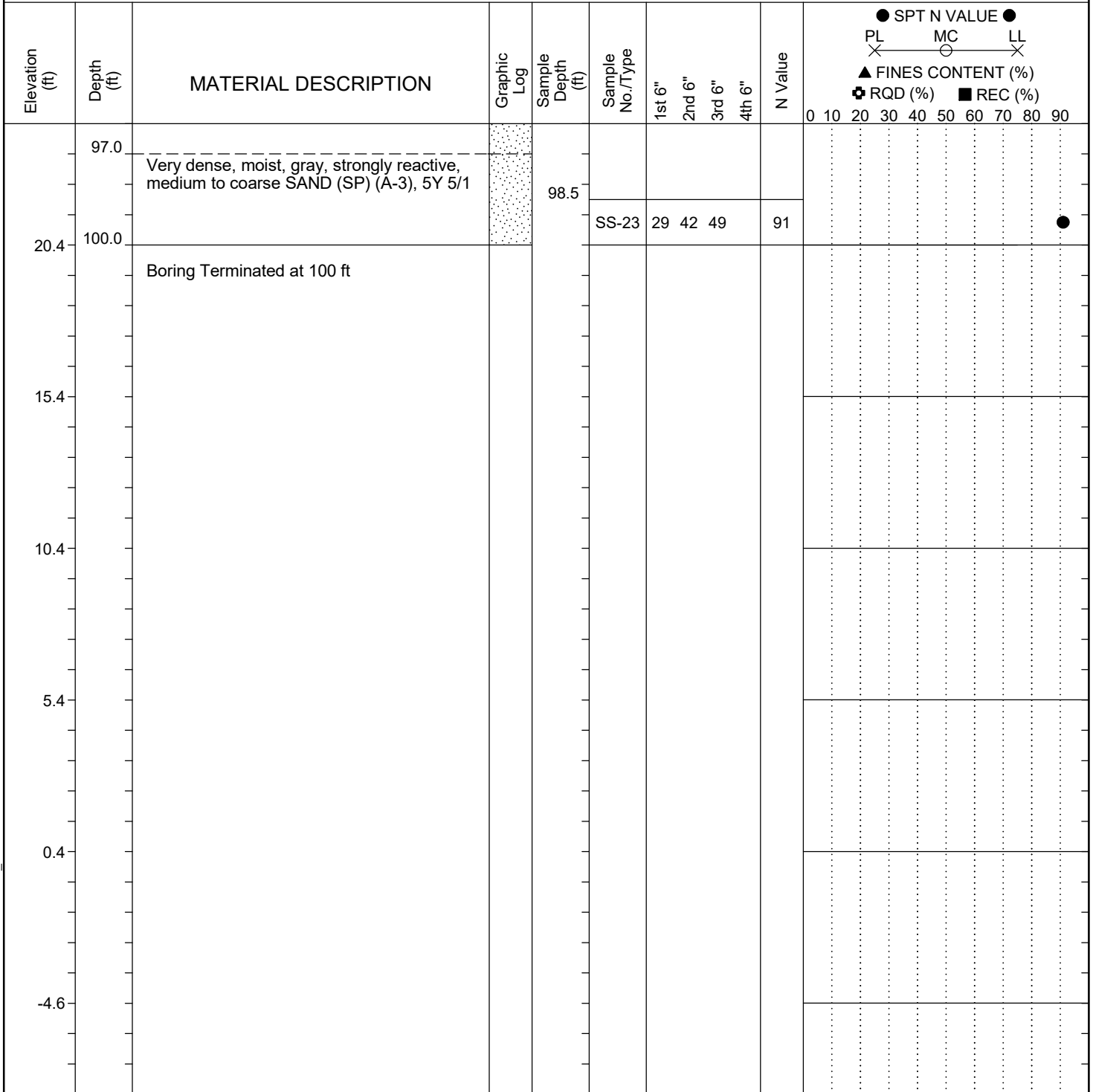
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SC.DOT US301 OVER FOUR HOLE SWAMP.GPJ SCDOT_DATA\TEMPLATE.GDT 3/31/22

SAMPLER TYPE		DRILLING METHOD	
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UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-01
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5952+32.04	Offset:	23.80' L
Alignment:	US-301				
Elev.:	120.4 ft	Latitude:	33.4572909	Longitude:	-80.6482402
Date Started:	2/23/2022				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	4.9 ft
Date Completed:	2/24/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME55	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	83%				
Core Size:	NQ	Driller:	SCI	Groundwater:	TOB
24HR	8.80 ft				



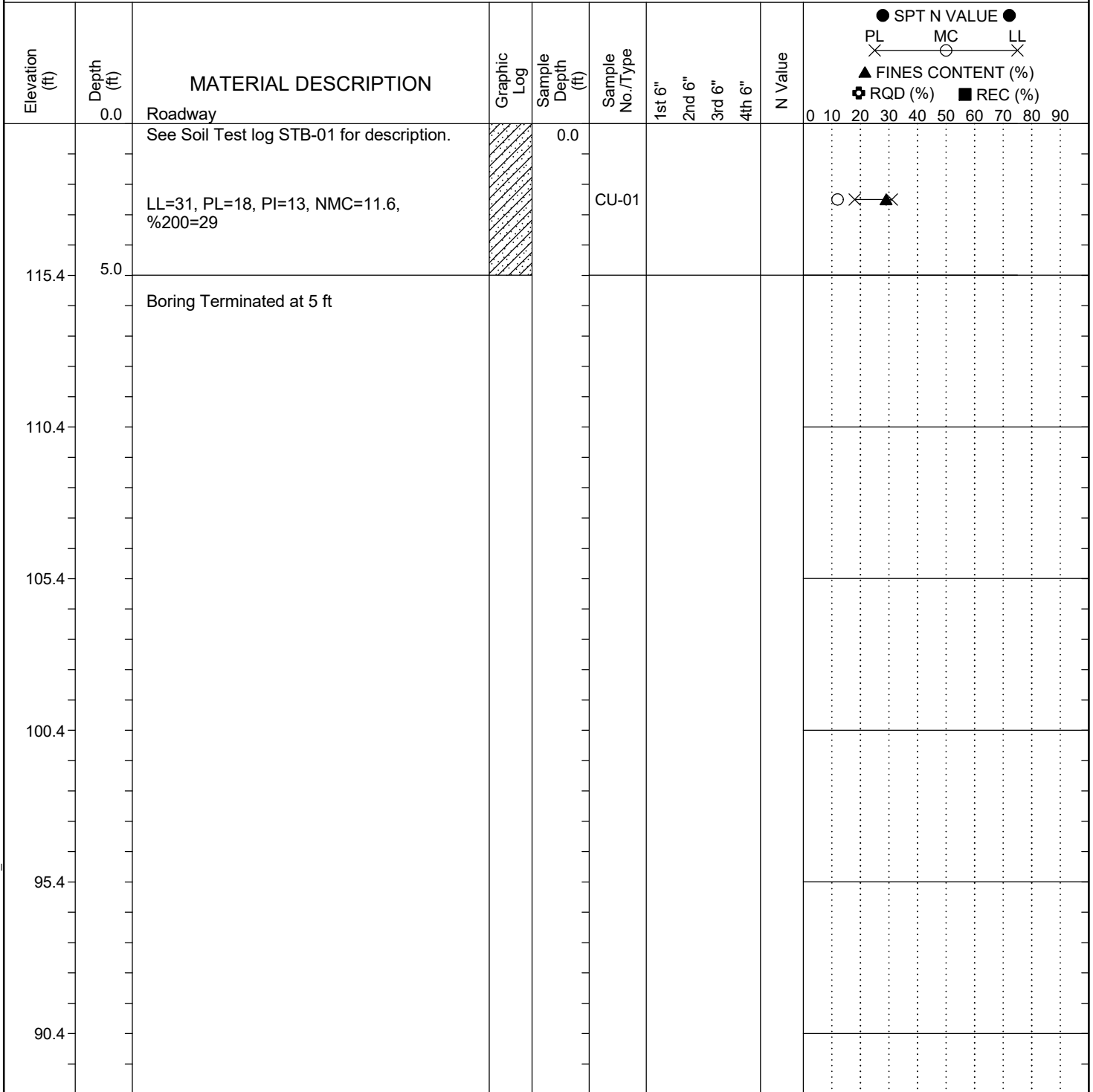
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308		County: Orangeburg		Boring No.: STB-01A	
Site Description: US-301 Over Four Hole Swamp				Route: US-301	
Eng./Geo.: A. Roseman		Boring Location: 5952+32.04		Offset: 23.80' L	Alignment: US-301
Elev.: 120.4 ft	Latitude: 33.4572909	Longitude: -80.6482402	Date Started: 2/24/2022		
Total Depth: 5 ft	Soil Depth: 5 ft	Core Depth: ft	Date Completed: 2/24/2022		
Bore Hole Diameter (in): 4.25		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME55	Drill Method: HSA	Hammer Type:		Energy Ratio:	
Core Size:	Driller: SCI	Groundwater: TOB		24HR	



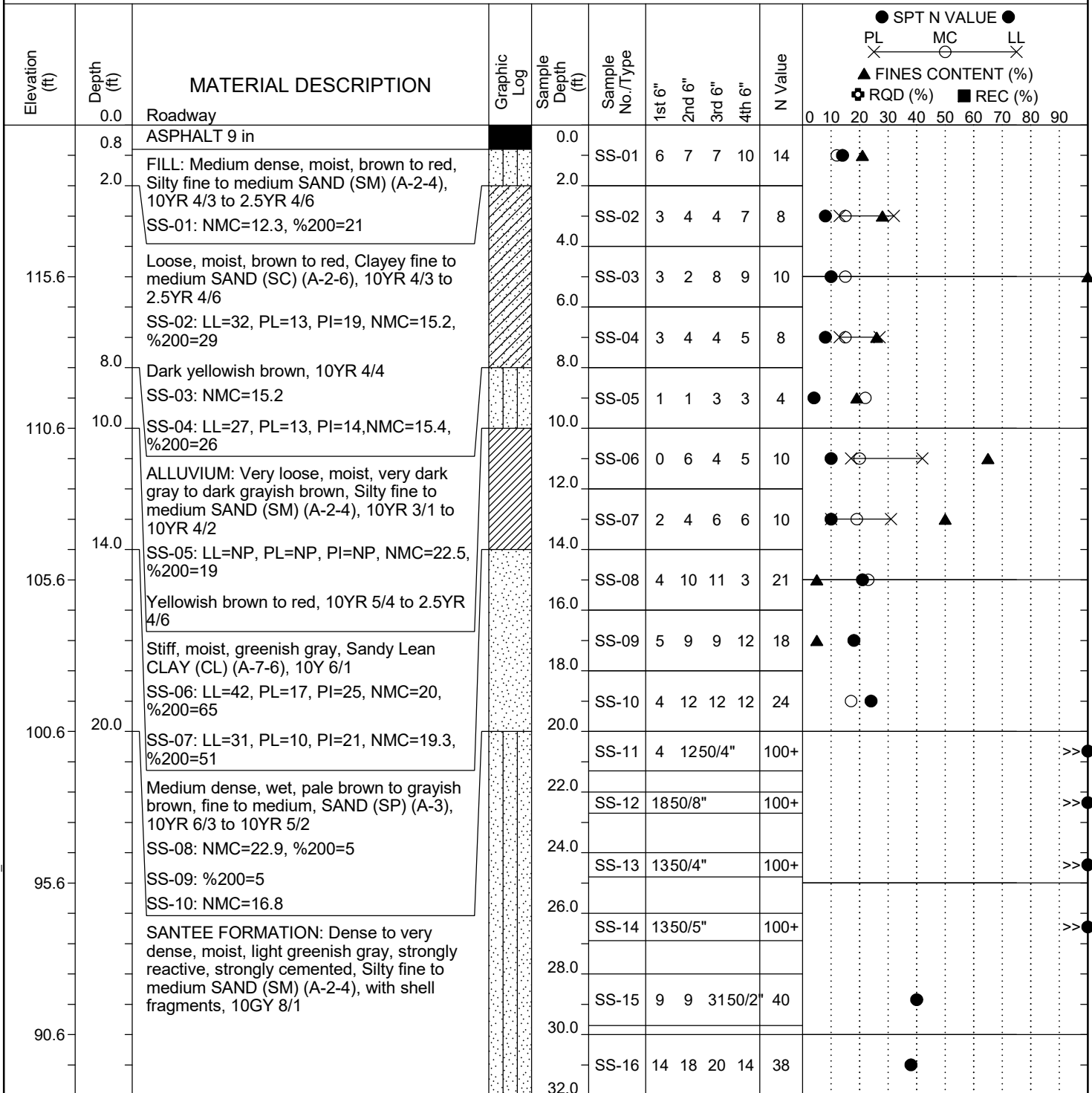
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-02
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5949+23.11	Offset: 22.73' L
Alignment: US-301	Date Started: 2/24/2022	Date Completed: 2/24/2022
Elev.: 120.6 ft	Latitude: 33.4574219	Longitude: -80.6472393
Total Depth: 100 ft	Soil Depth: 100 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME550X	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 91%	Groundwater: TOB
Core Size:	Driller: SCI	24HR



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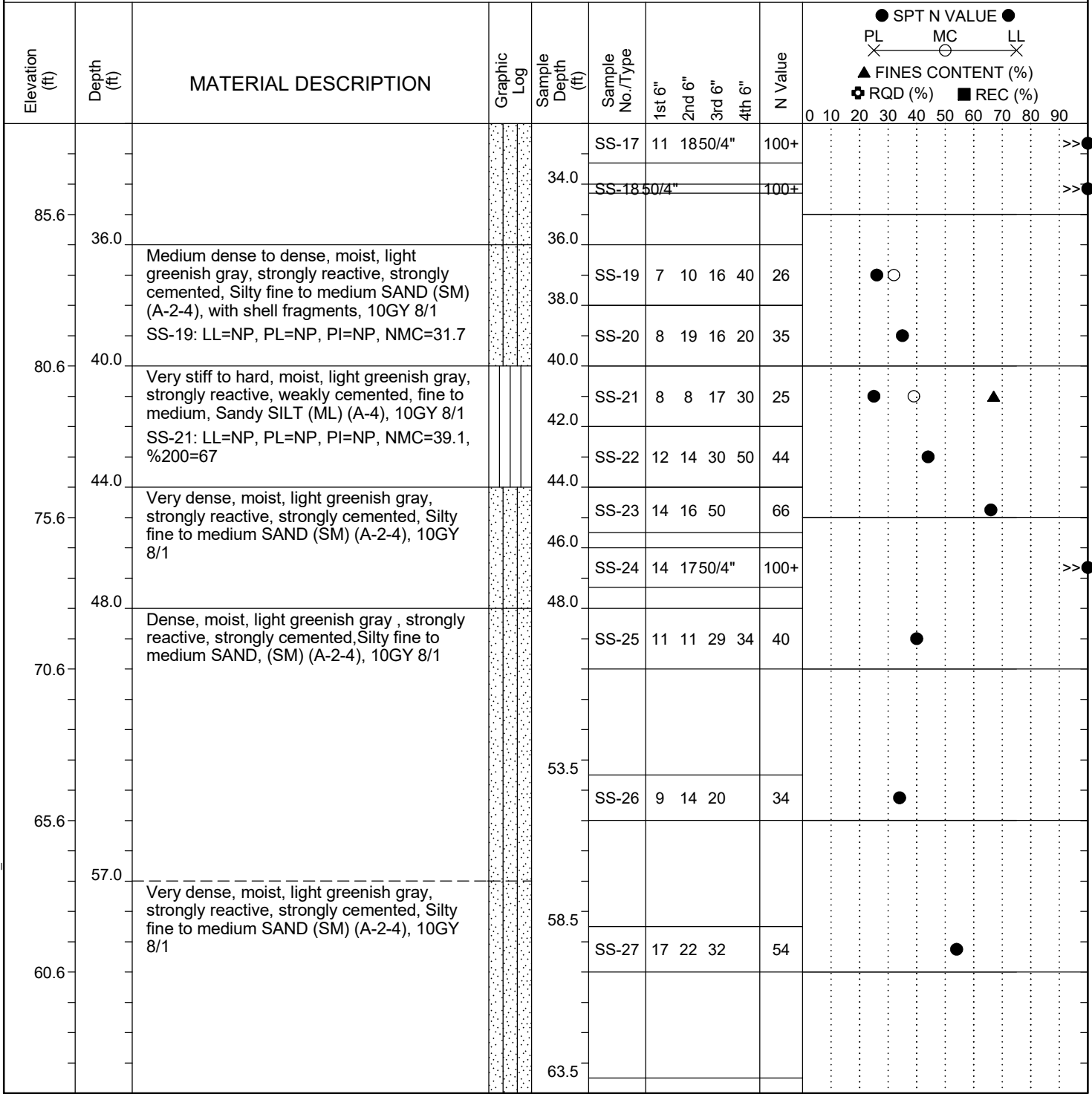
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-02
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5949+23.11	Offset: 22.73' L
Alignment: US-301	Date Started: 2/24/2022	Date Completed: 2/24/2022
Elev.: 120.6 ft	Latitude: 33.4574219	Longitude: -80.6472393
Total Depth: 100 ft	Soil Depth: 100 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME550X	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 91%	Groundwater: TOB
Core Size:	Driller: SCI	24HR



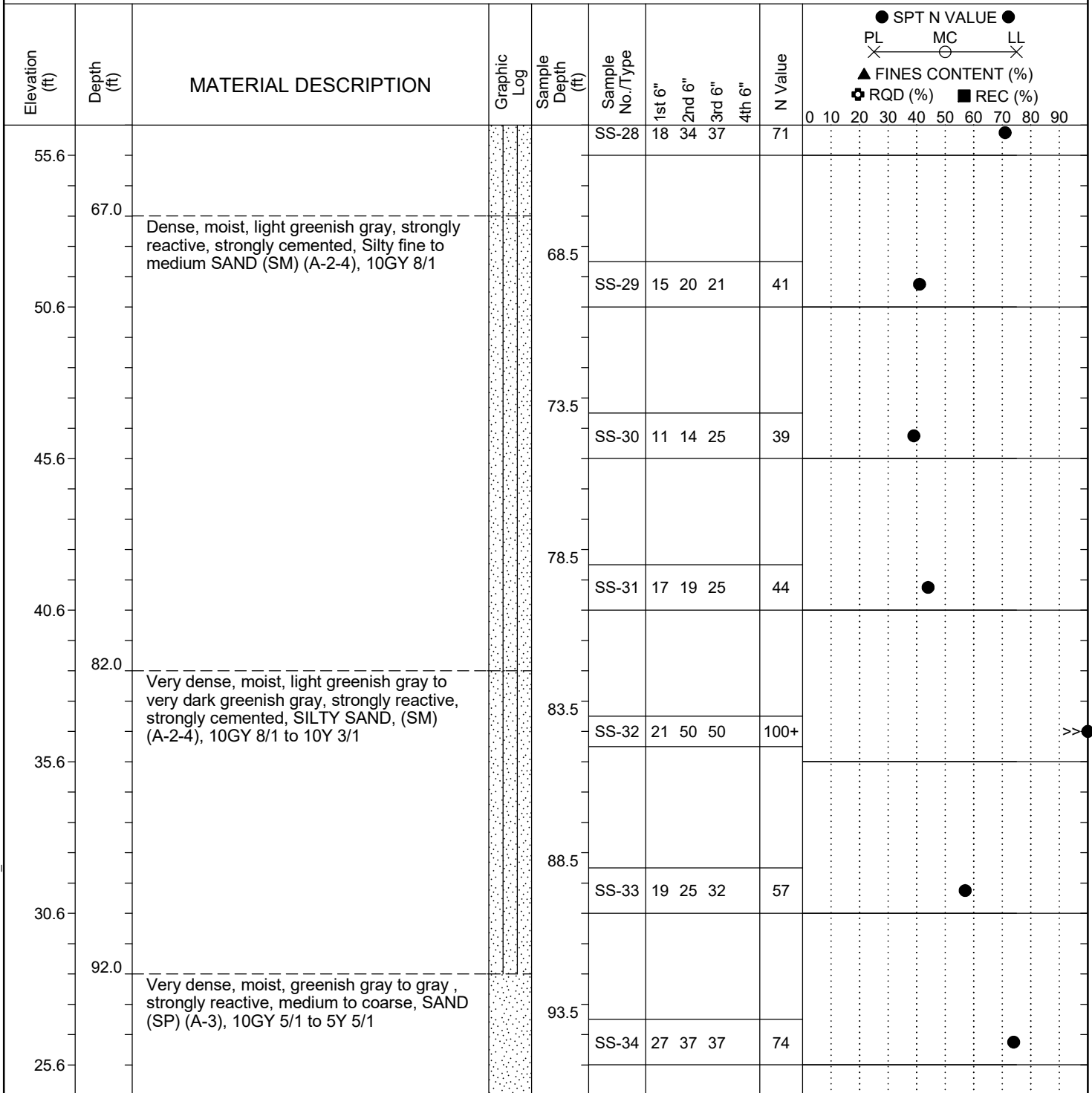
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT US301 OVER FOUR HOLE SWAMP.GPJ SCDOT_DATA TEMPLATE.GDT 3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-02
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5949+23.11	Offset:	22.73' L
Alignment:	US-301				
Elev.:	120.6 ft	Latitude:	33.4574219	Longitude:	-80.6472393
Date Started:	2/24/2022				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	ft
Date Completed:	2/24/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB
				24HR	



LEGEND

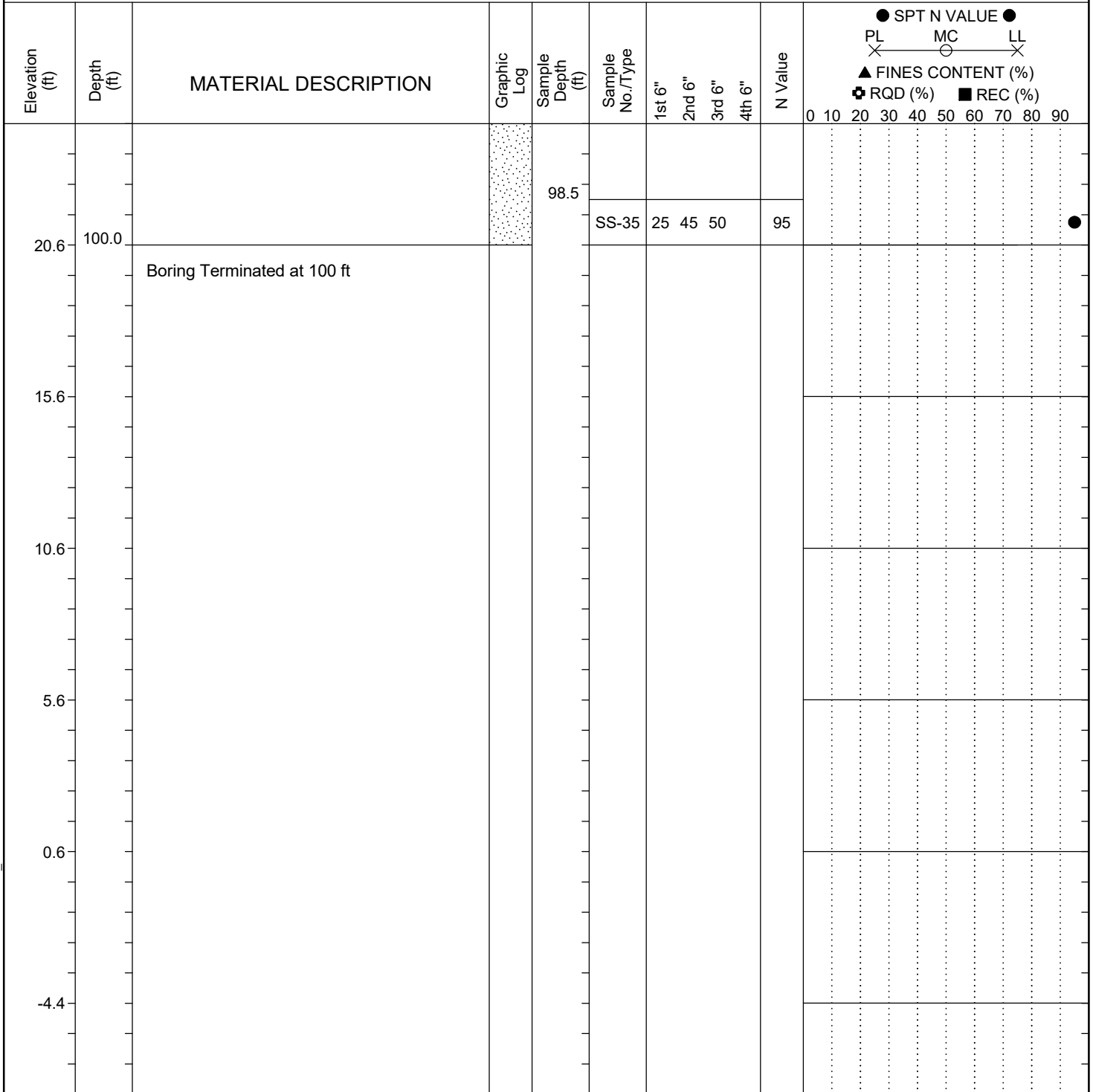
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-02
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5949+23.11	Offset:	22.73' L
Alignment:	US-301				
Elev.:	120.6 ft	Latitude:	33.4574219	Longitude:	-80.6472393
Date Started:	2/24/2022				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	ft
Date Completed:	2/24/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB
				24HR	



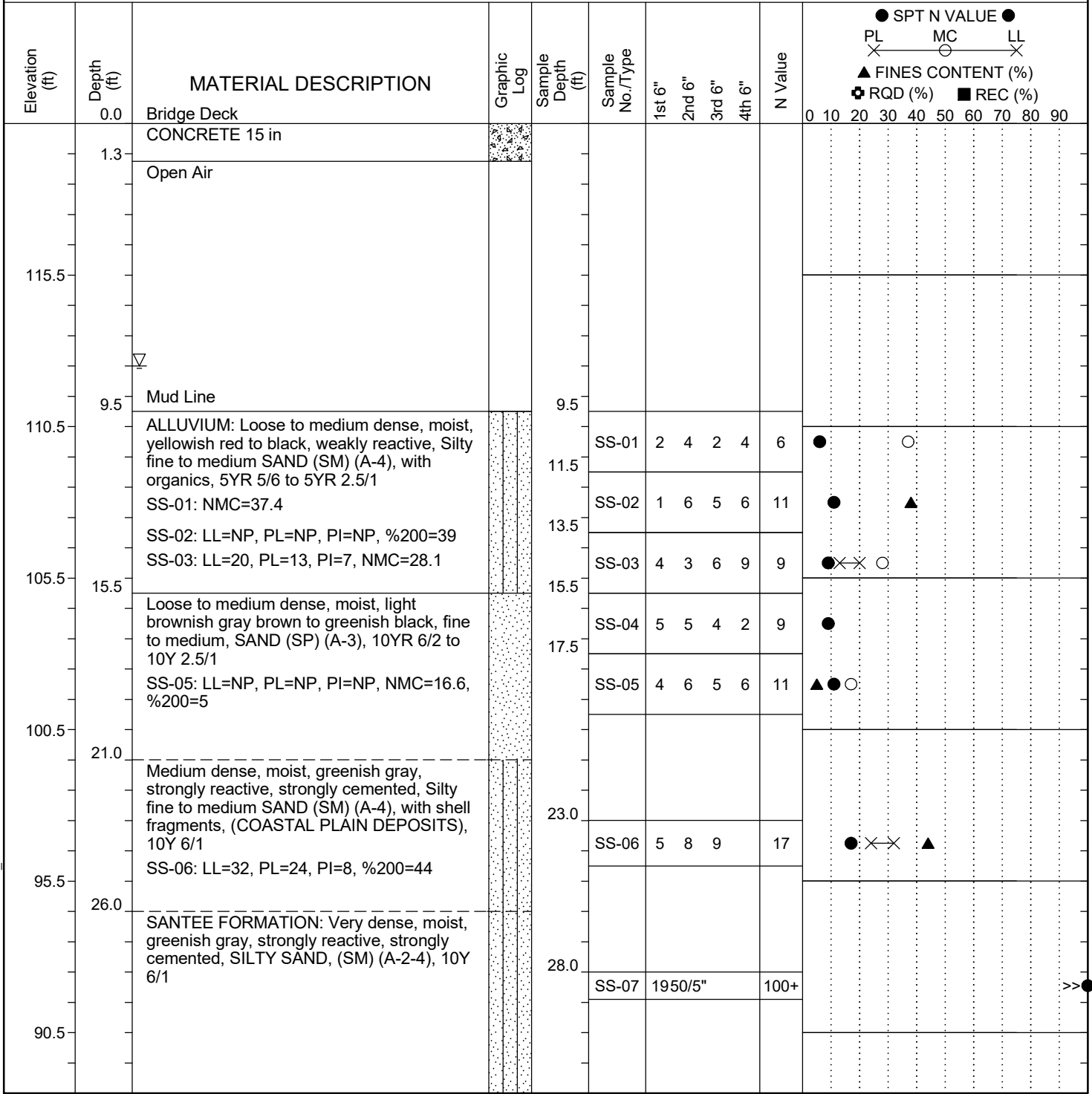
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-03
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5951+42.07	Offset: 22.82' L
Alignment: US-301	Date Started: 2/25/2022	Date Completed: 3/28/2022
Elev.: 120.5 ft	Latitude: 33.4573309	Longitude: -80.6479491
Total Depth: 110 ft	Soil Depth: 109.5 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 83%	Groundwater: TOB 8 ft
Core Size:	Driller: SCI	24HR



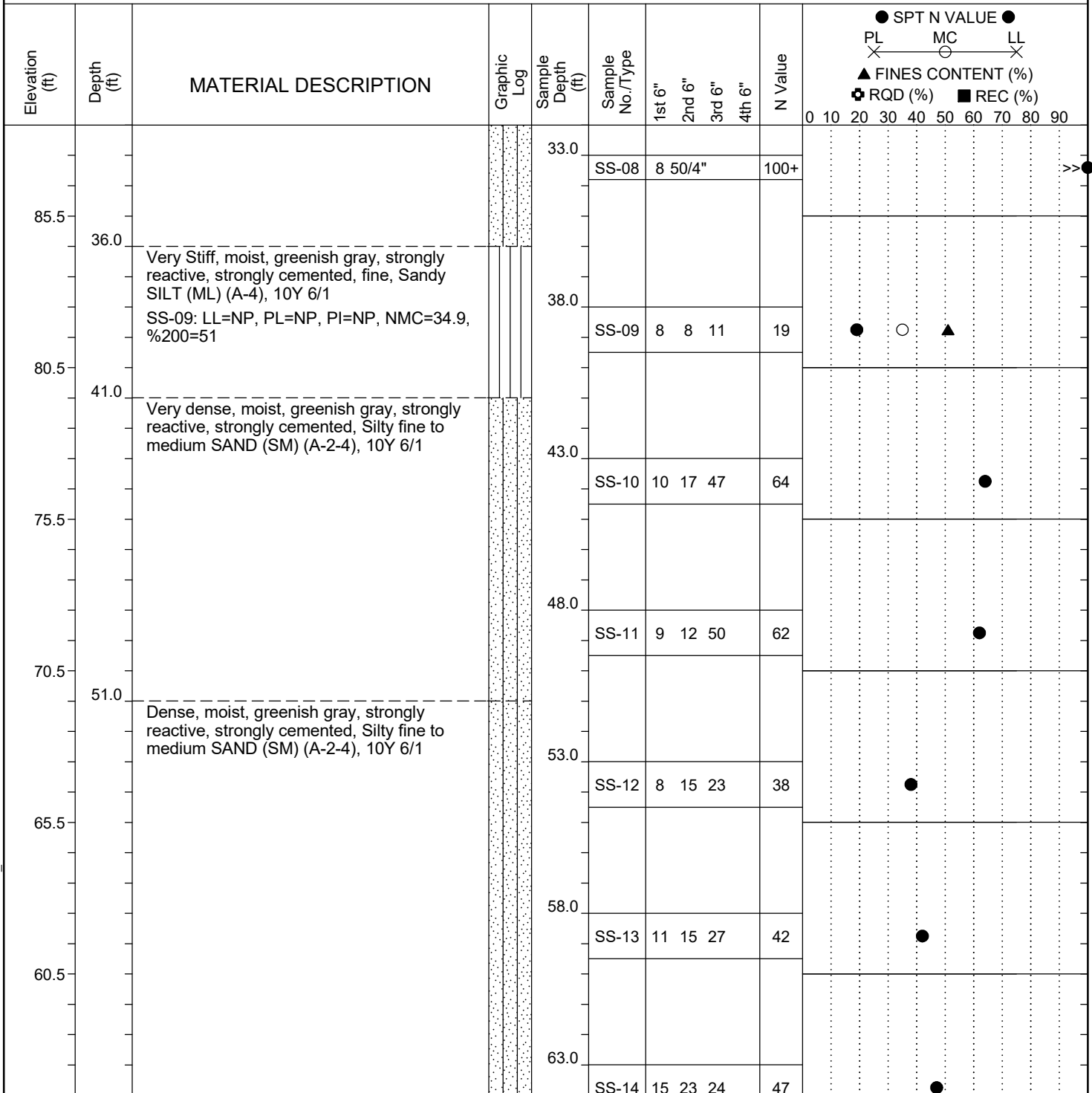
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-03
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5951+42.07	Offset:	22.82' L
Elev.:	120.5 ft	Latitude:	33.4573309	Longitude:	-80.6479491
Total Depth:	110 ft	Soil Depth:	109.5 ft	Core Depth:	ft
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME55	Drill Method:	RW	Hammer Type:	Automatic
Core Size:		Driller:	SCI	Energy Ratio:	83%
		Groundwater:	TOB	8 ft	24HR



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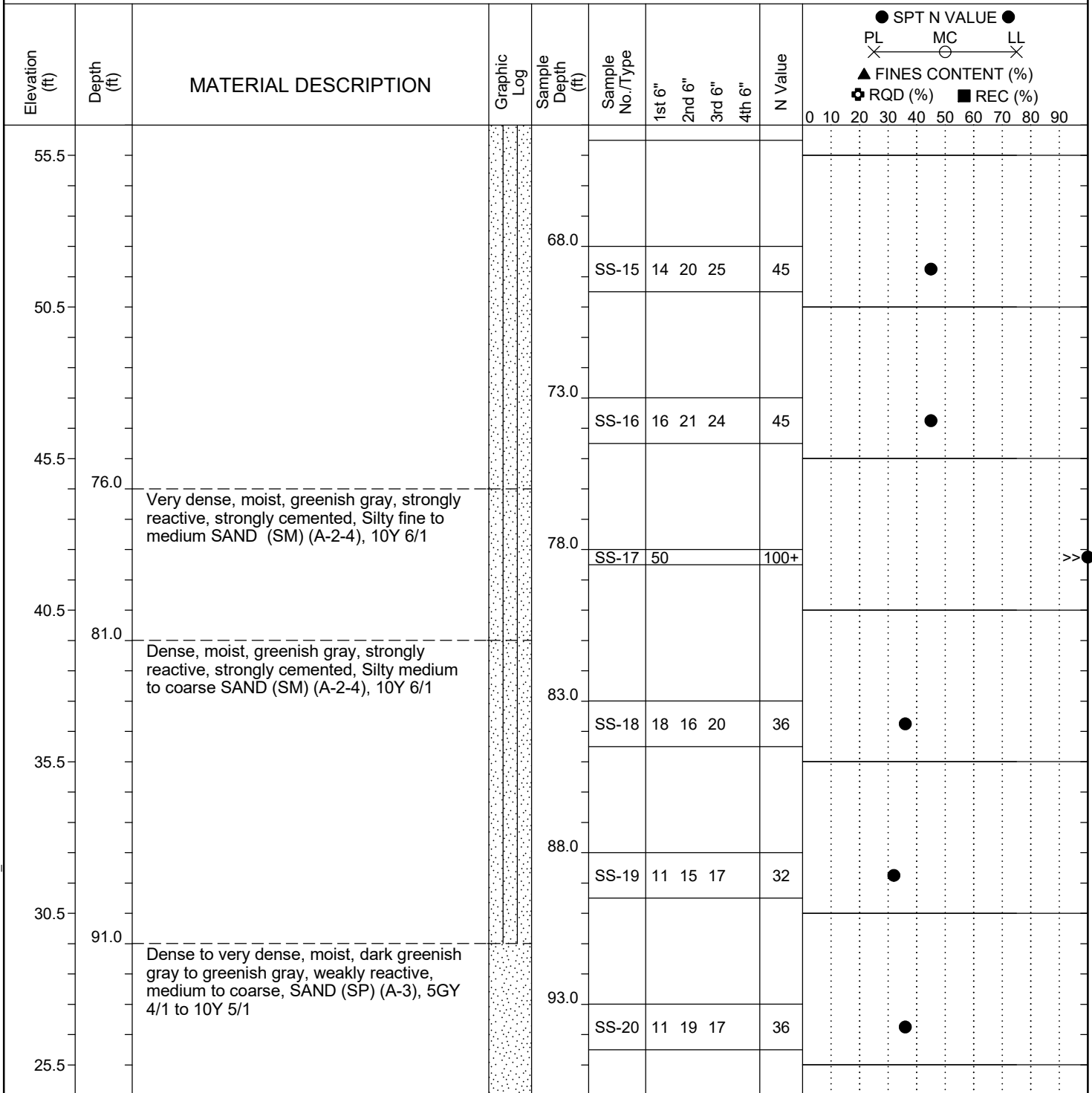
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-03
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5951+42.07	Offset: 22.82' L
Alignment: US-301	Date Started: 2/25/2022	Date Completed: 3/28/2022
Elev.: 120.5 ft	Latitude: 33.4573309	Longitude: -80.6479491
Total Depth: 110 ft	Soil Depth: 109.5 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 83%	Groundwater: TOB 8 ft
Core Size:	Driller: SCI	24HR



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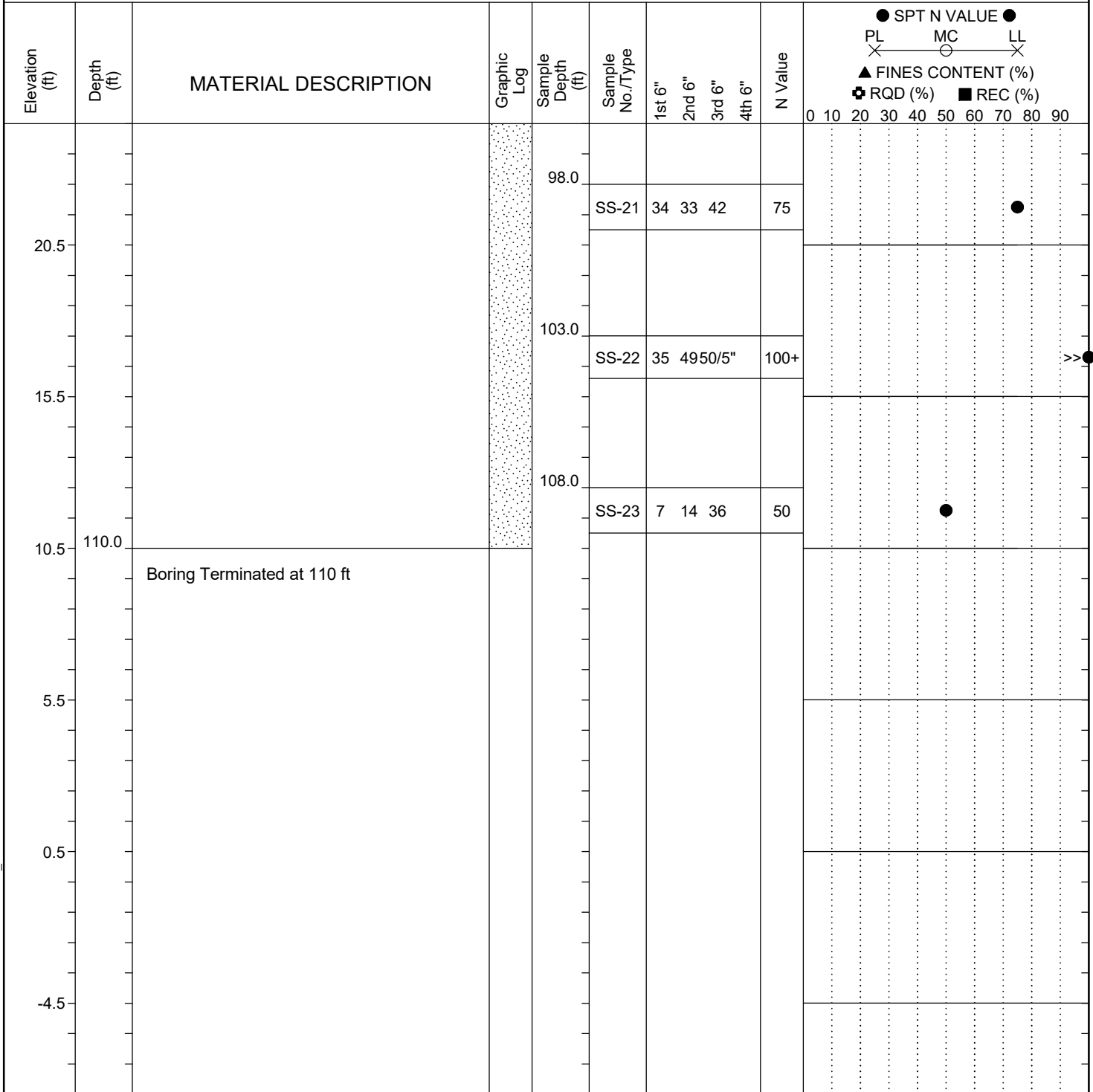
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-03
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5951+42.07	Offset:	22.82' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573309	Longitude:	-80.6479491
Date Started:	2/25/2022				
Total Depth:	110 ft	Soil Depth:	109.5 ft	Core Depth:	ft
Date Completed:	3/28/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME55	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	83%				
Core Size:		Driller:	SCI	Groundwater:	TOB 8 ft
24HR					



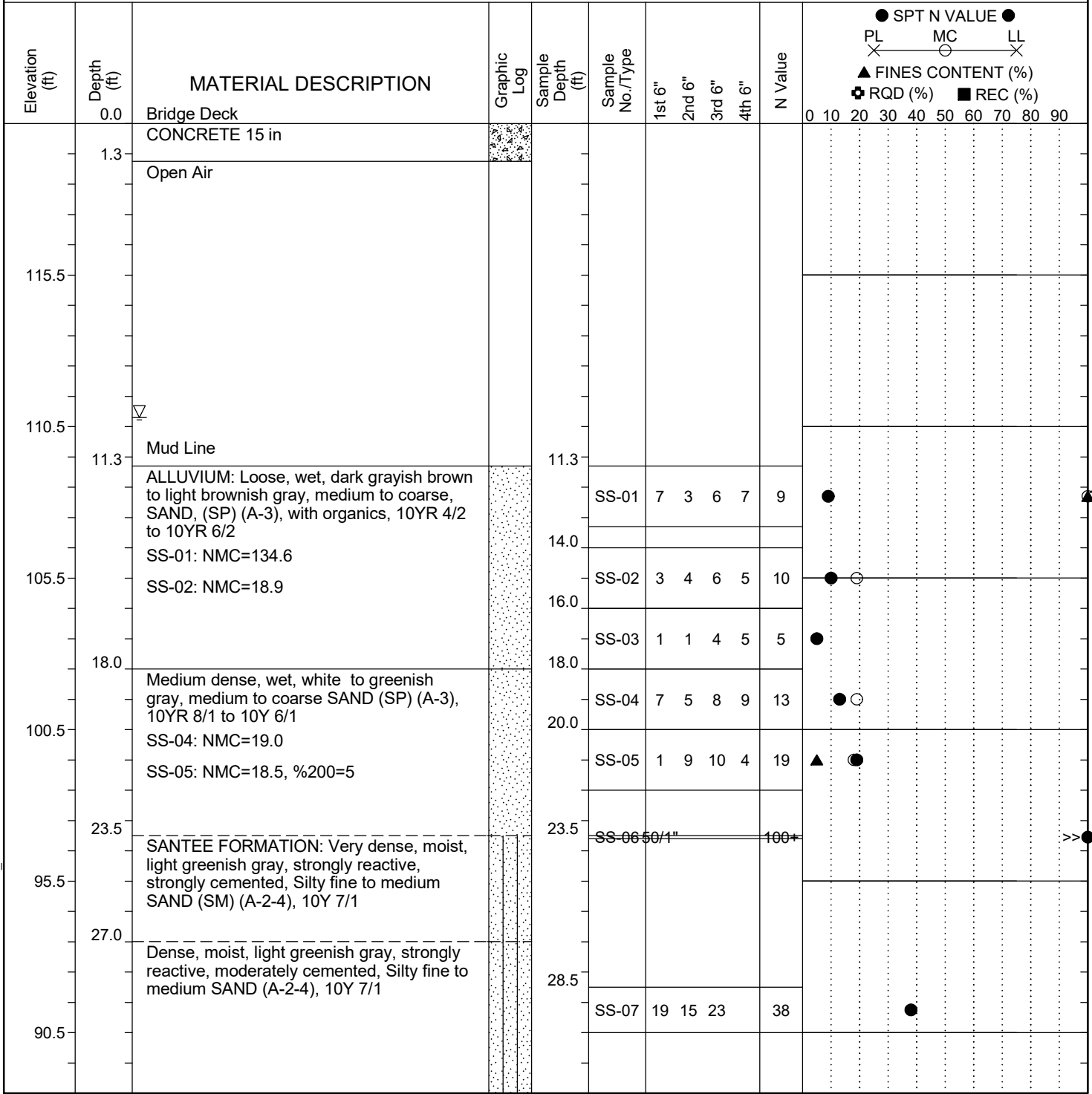
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-04
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5950+72.85	Offset: 22.80' L
Alignment: US-301	Date Started: 2/28/2022	Date Completed: 2/28/2022
Elev.: 120.5 ft	Latitude: 33.4573596	Longitude: -80.6477247
Total Depth: 110 ft	Soil Depth: 110 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME550X	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 91%	Groundwater: TOB 9.7 ft
Core Size:	Driller: SCI	24HR



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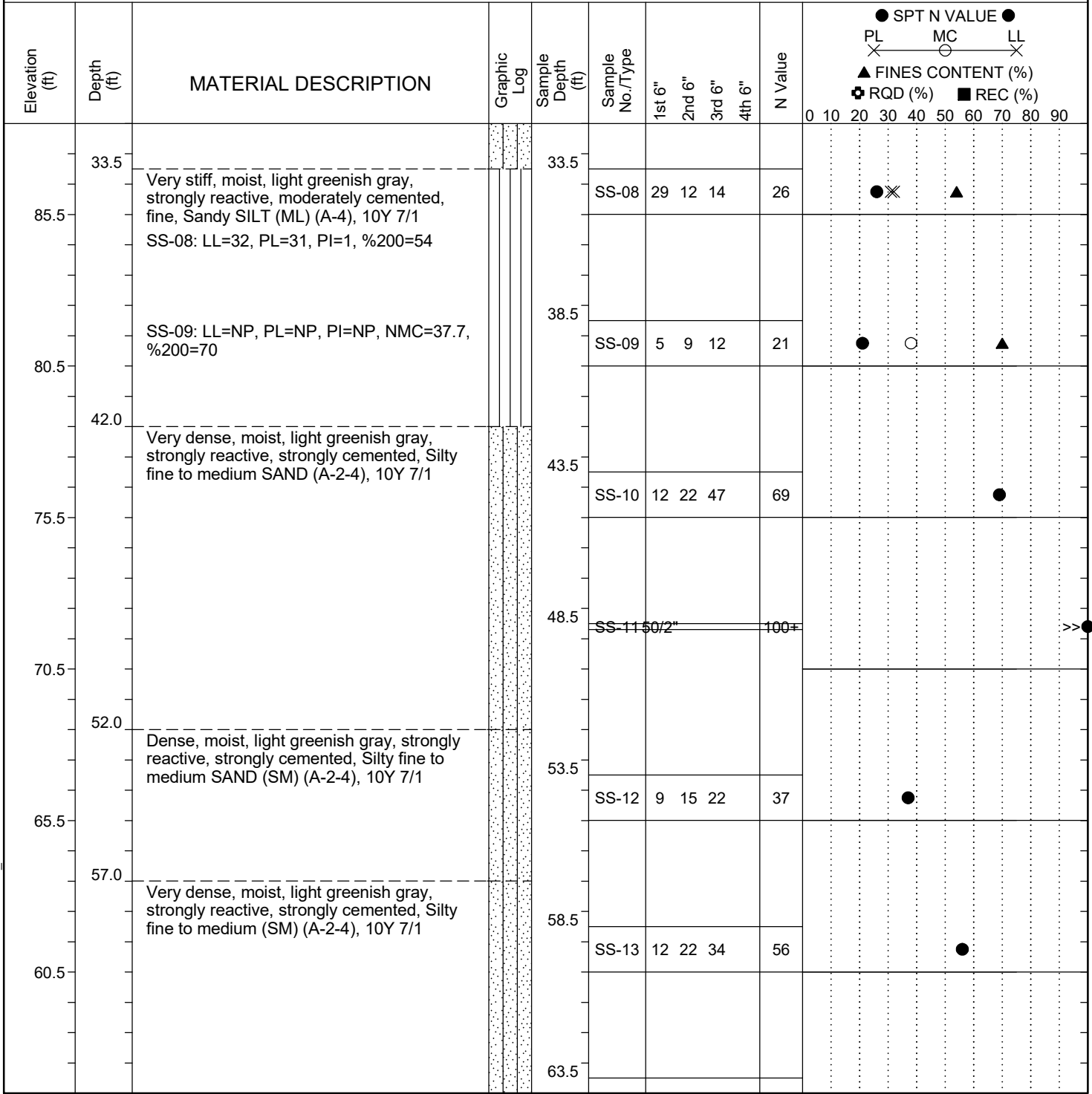
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-04
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5950+72.85	Offset: 22.80' L
Alignment: US-301	Date Started: 2/28/2022	Date Completed: 2/28/2022
Elev.: 120.5 ft	Latitude: 33.4573596	Longitude: -80.6477247
Total Depth: 110 ft	Soil Depth: 110 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME550X	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 91%	Groundwater: TOB 9.7 ft
Core Size:	Driller: SCI	24HR



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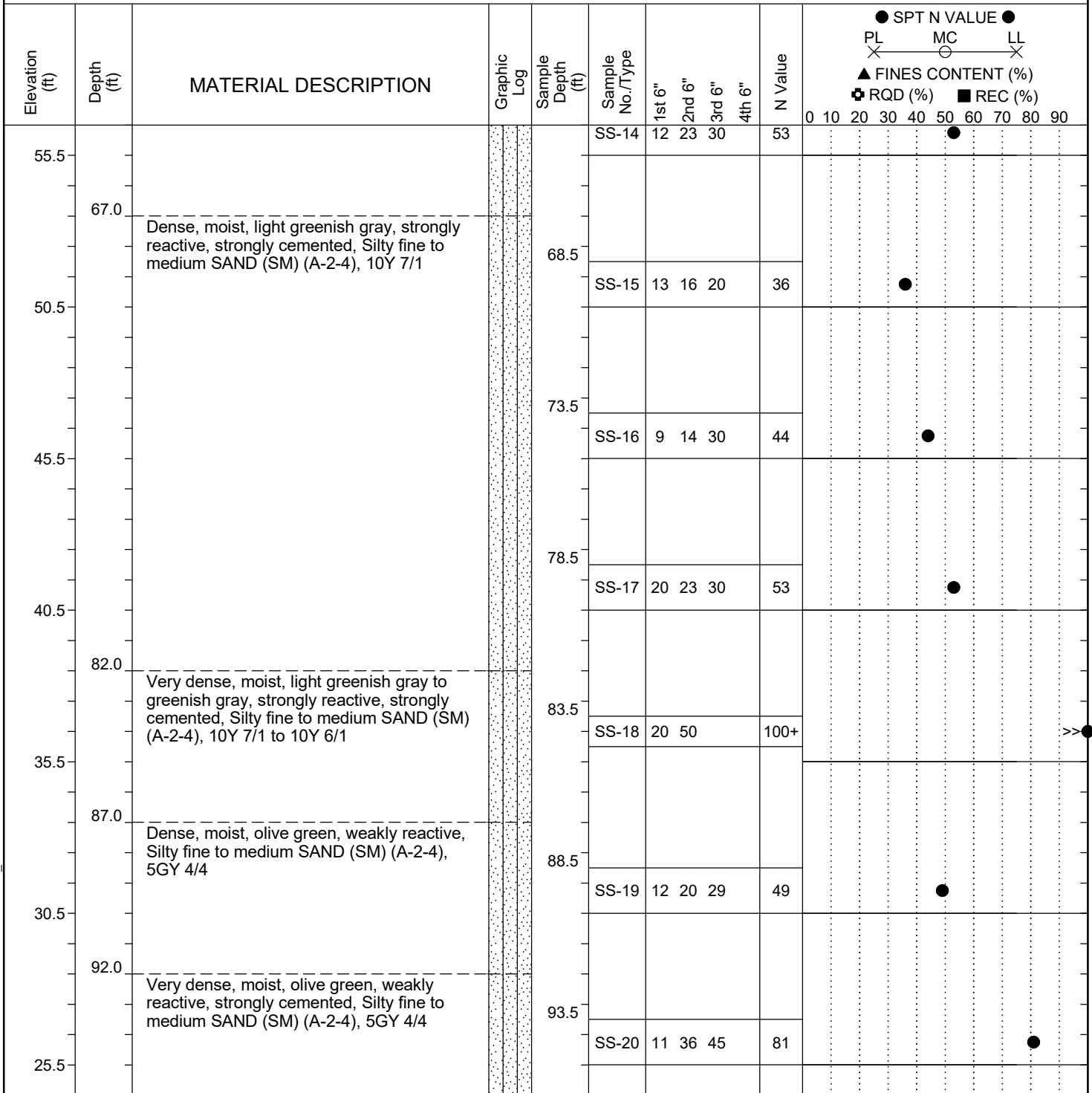
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-04
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+72.85	Offset:	22.80' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573596	Longitude:	-80.6477247
Date Started:	2/28/2022				
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Date Completed:	2/28/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 9.7 ft
				24HR	



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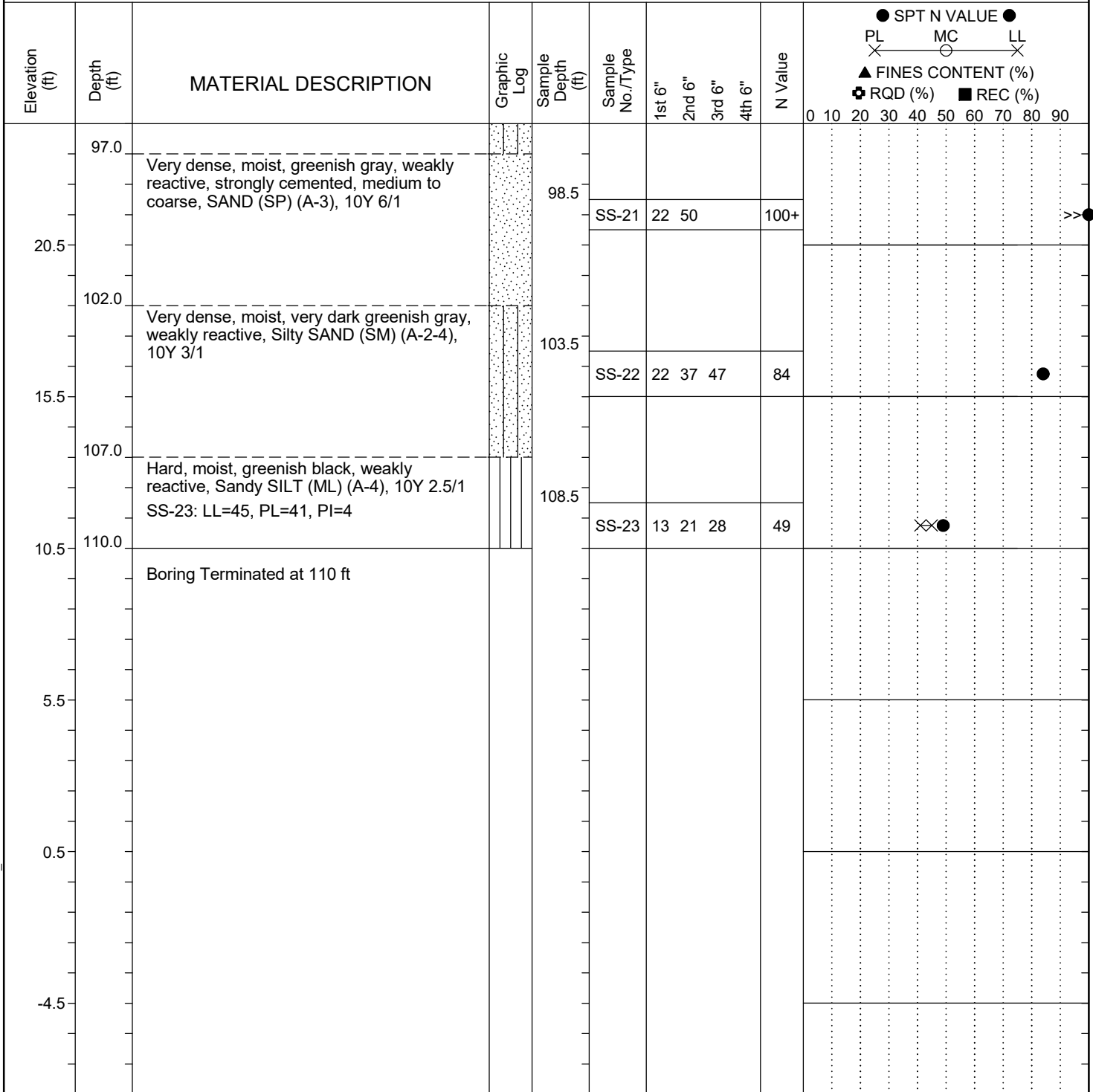
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT 3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-04
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+72.85	Offset:	22.80' L
Elev.:	120.5 ft	Latitude:	33.4573596	Longitude:	-80.6477247
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Core Size:		Driller:	SCI	Energy Ratio:	91%
		Groundwater:	TOB	9.7 ft	24HR



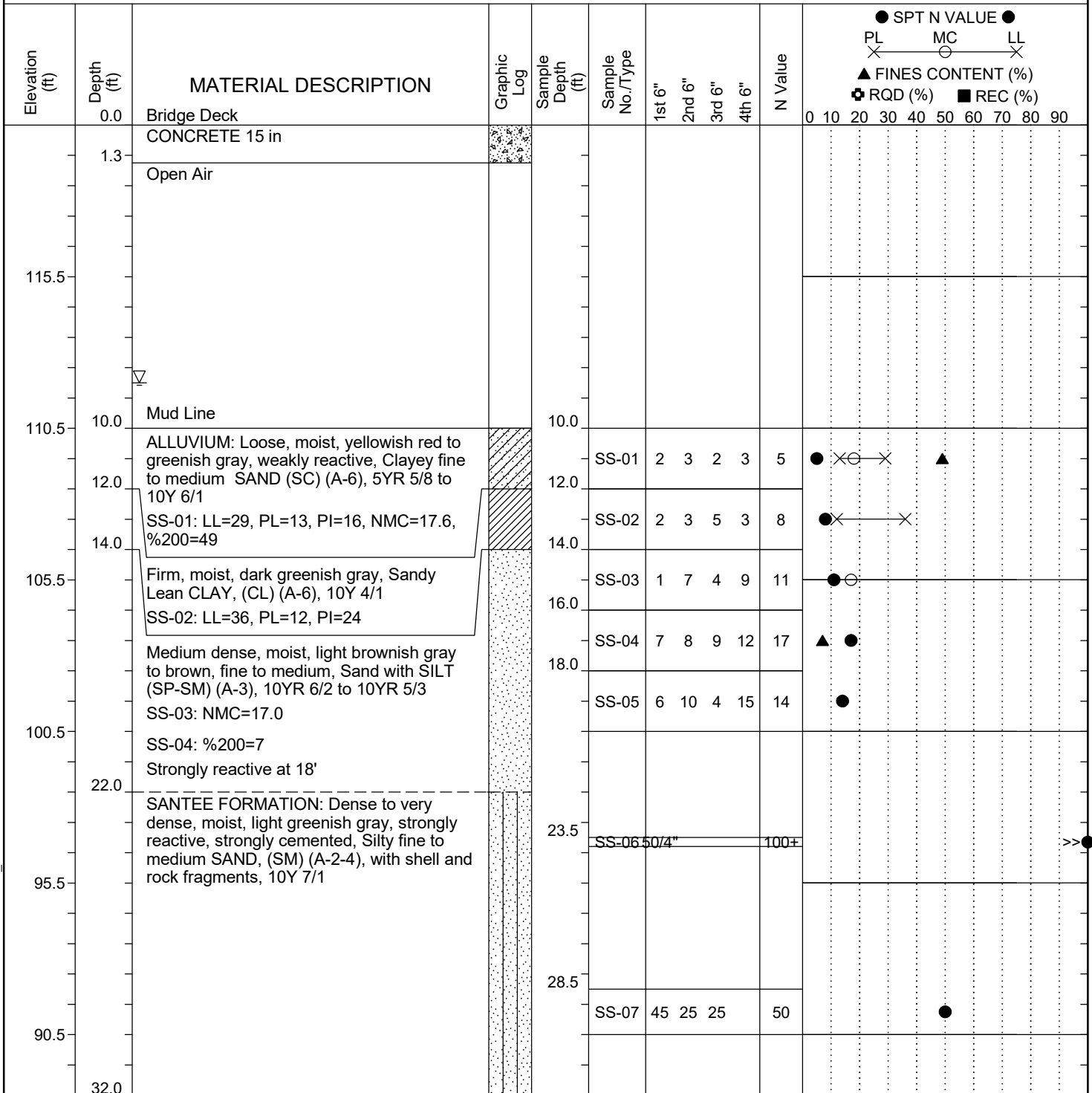
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-05
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+03.35	Offset:	22.65' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573888	Longitude:	-80.6474994
Date Started:	2/25/2022				
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Date Completed:	2/25/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 8.5 ft 24HR



LEGEND

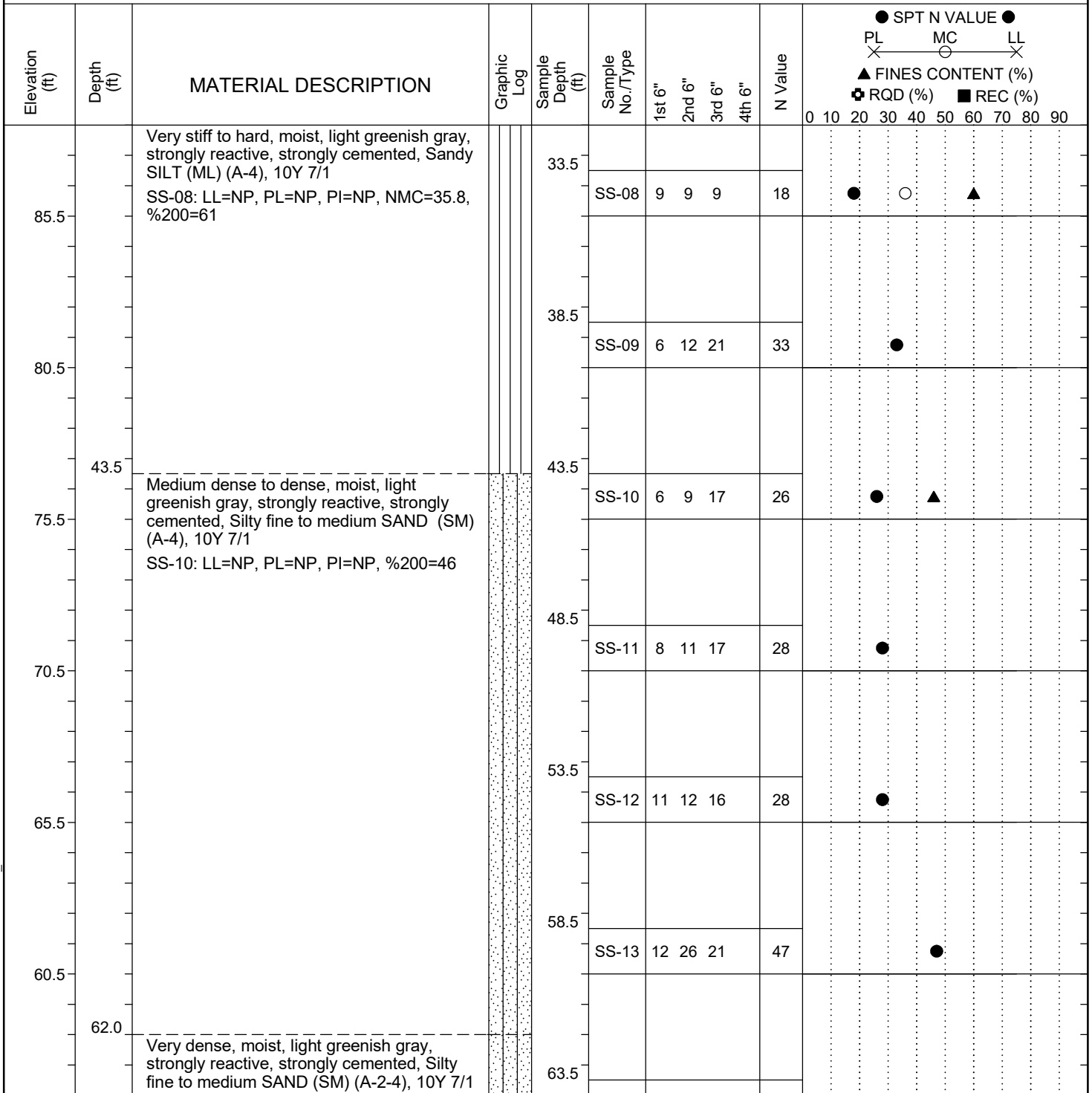
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-05
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+03.35	Offset:	22.65' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573888	Longitude:	-80.6474994
Date Started:	2/25/2022				
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Date Completed:	2/25/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration	Liner Required:		Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 8.5 ft
24HR					



LEGEND

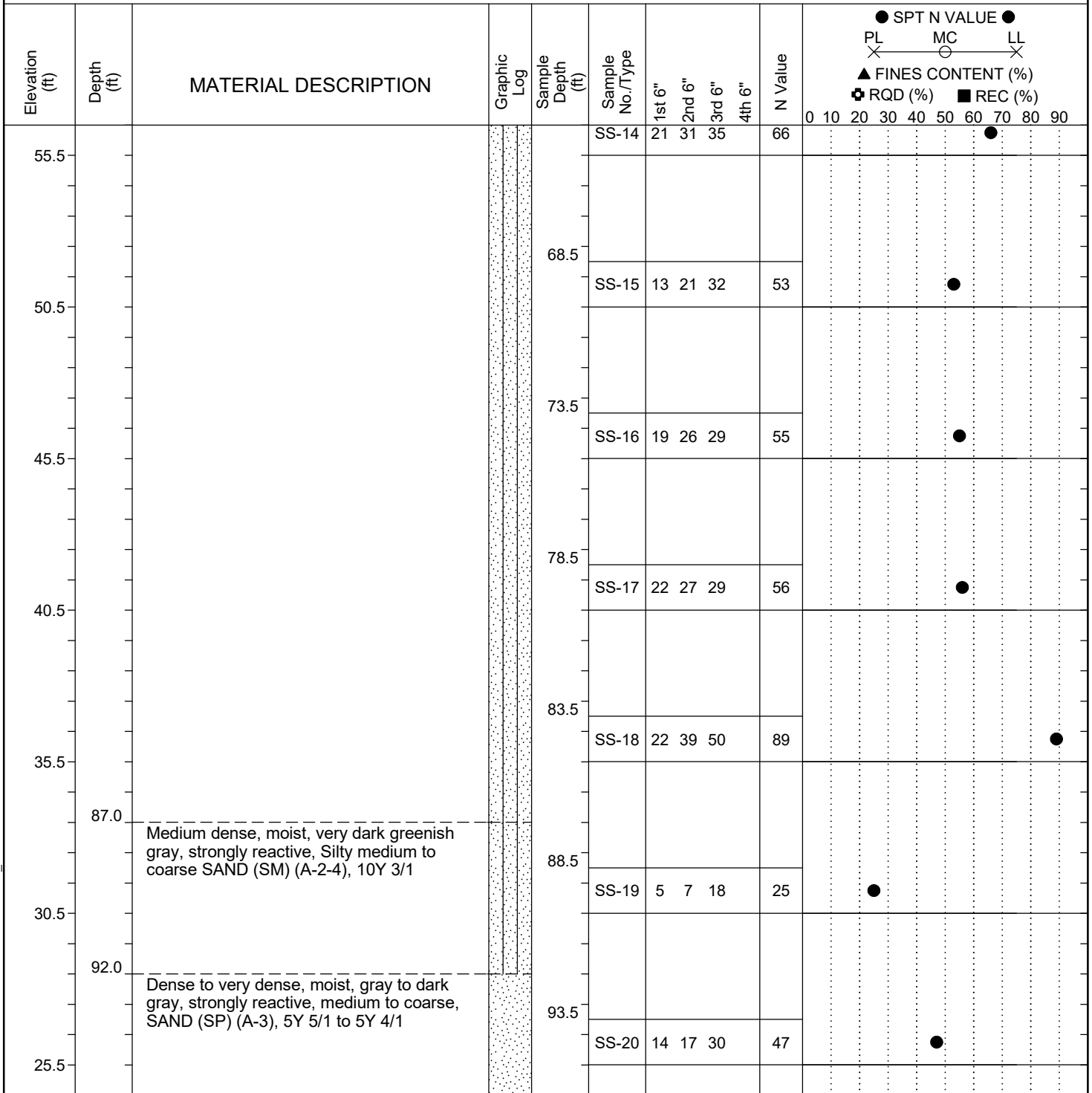
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT 3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-05
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+03.35	Offset:	22.65' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573888	Longitude:	-80.6474994
Date Started:	2/25/2022				
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Date Completed:	2/25/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 8.5 ft
24HR					



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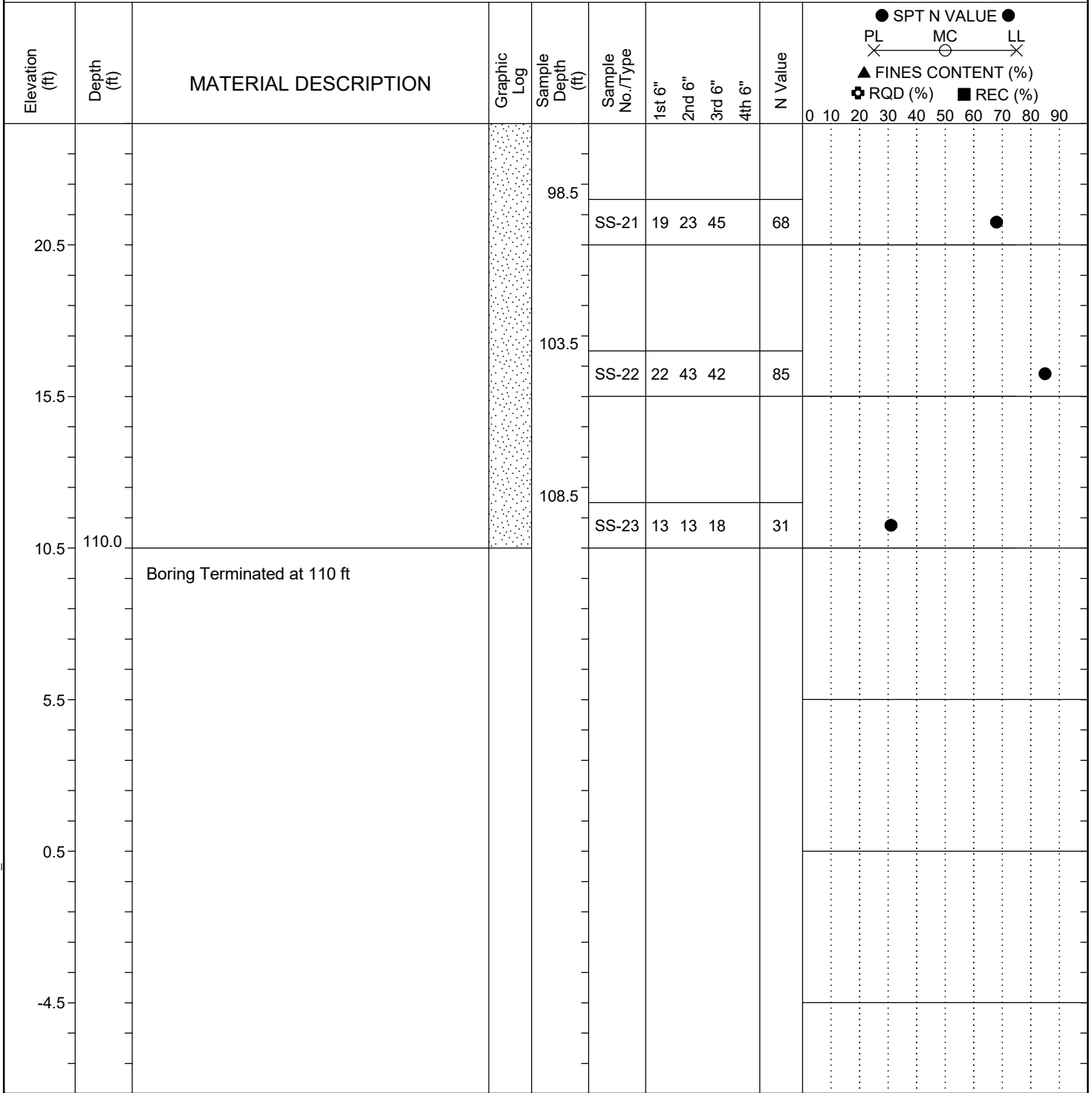
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SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-05
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5950+03.35	Offset:	22.65' L
Alignment:	US-301				
Elev.:	120.5 ft	Latitude:	33.4573888	Longitude:	-80.6474994
Date Started:	2/25/2022				
Total Depth:	110 ft	Soil Depth:	110 ft	Core Depth:	ft
Date Completed:	2/25/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 8.5 ft 24HR



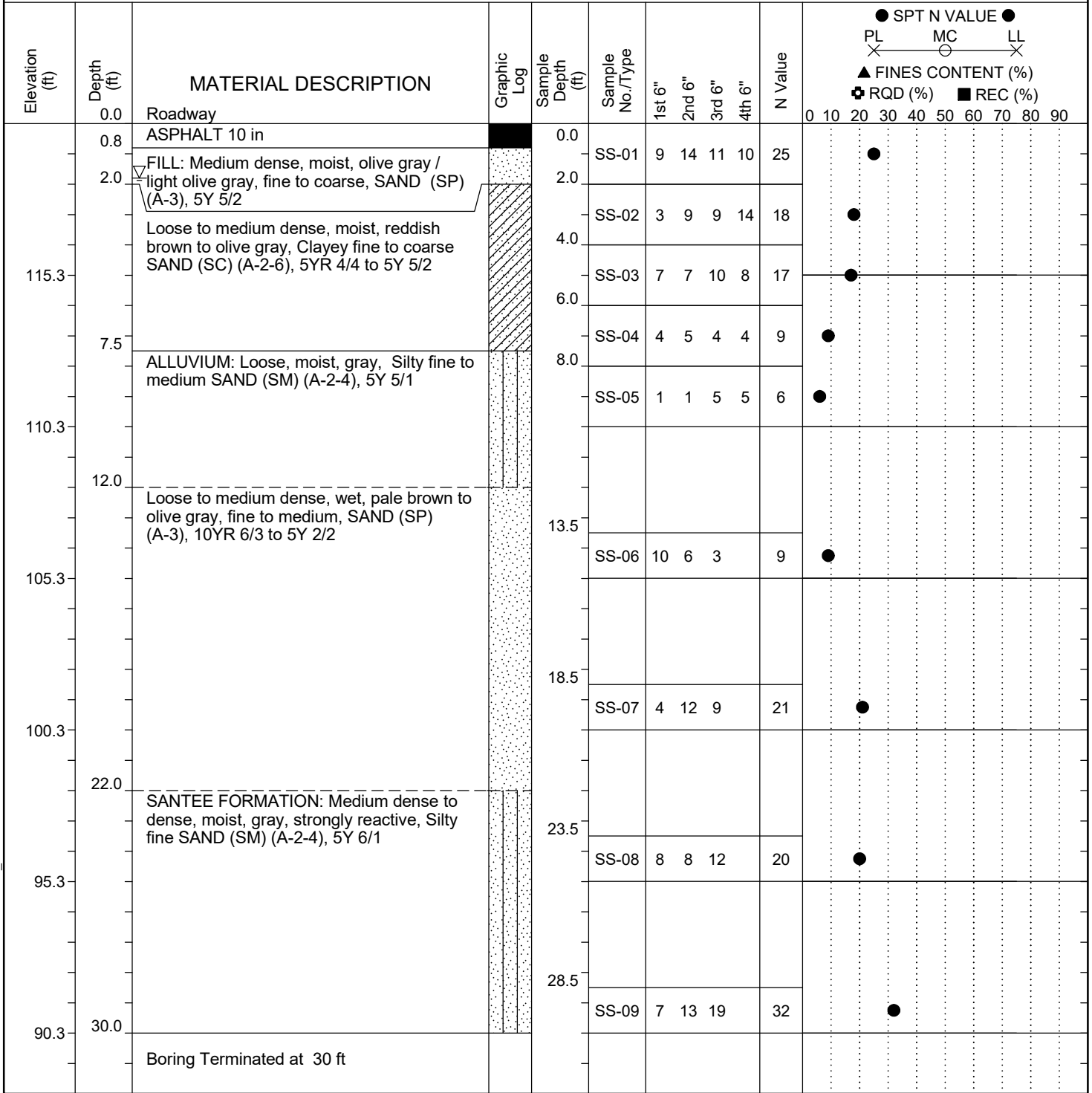
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-06
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	M. Lattin	Boring Location:	5953+29.12	Offset:	23.59' L
Alignment:	US-301				
Elev.:	120.3 ft	Latitude:	33.4572513	Longitude:	-80.648555
Date Started:	2/23/2022				
Total Depth:	30 ft	Soil Depth:	30 ft	Core Depth:	ft
Date Completed:	2/23/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 1.80 ft 24HR



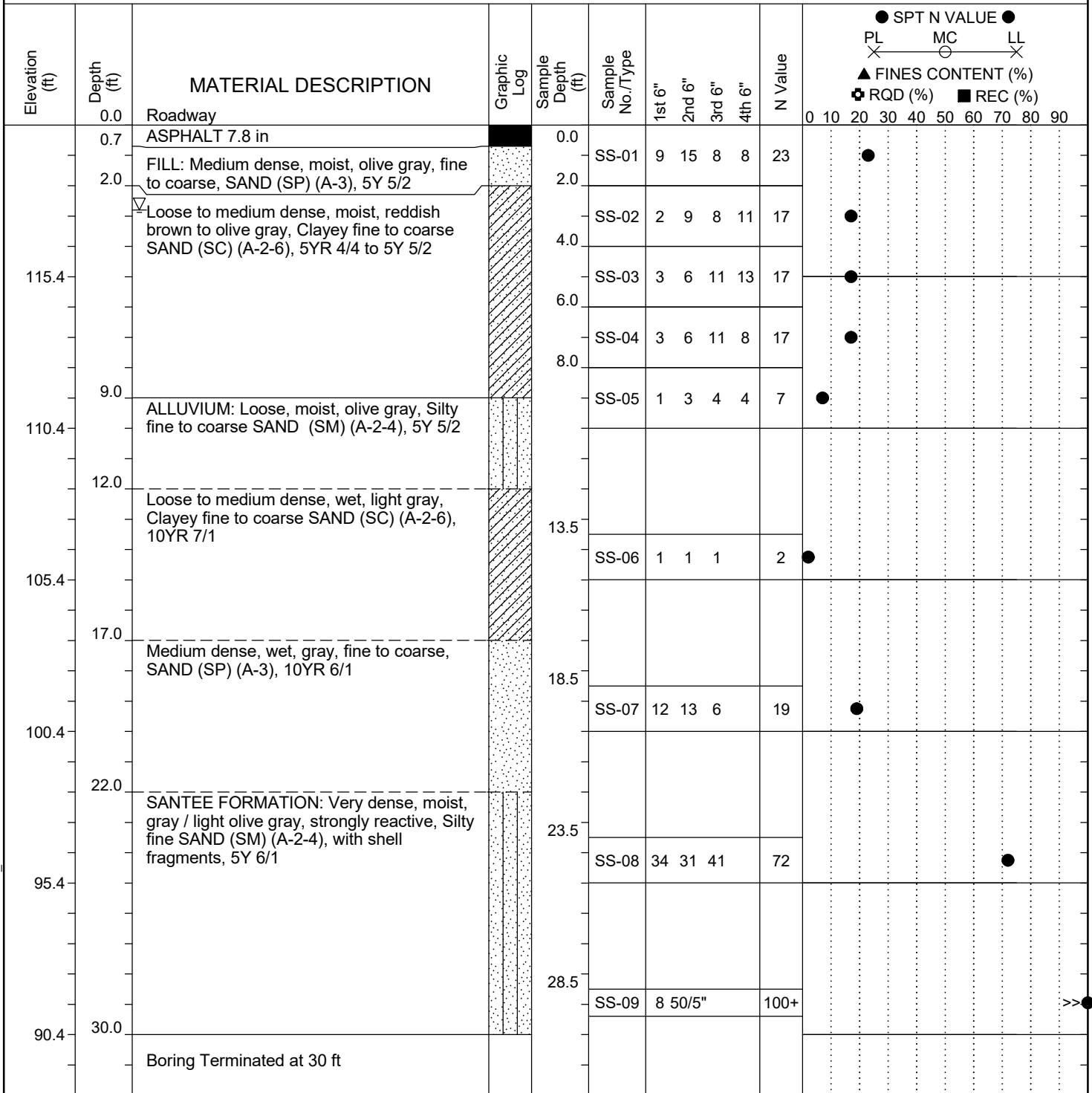
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-07
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	M. Lattin	Boring Location:	5948+33.27	Offset:	23.26' L
Alignment:	US-301				
Elev.:	120.4 ft	Latitude:	33.4574577	Longitude:	-80.6469478
Date Started:	2/23/2022				
Total Depth:	30 ft	Soil Depth:	29.4 ft	Core Depth:	ft
Date Completed:	2/23/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 2.80 ft 24HR



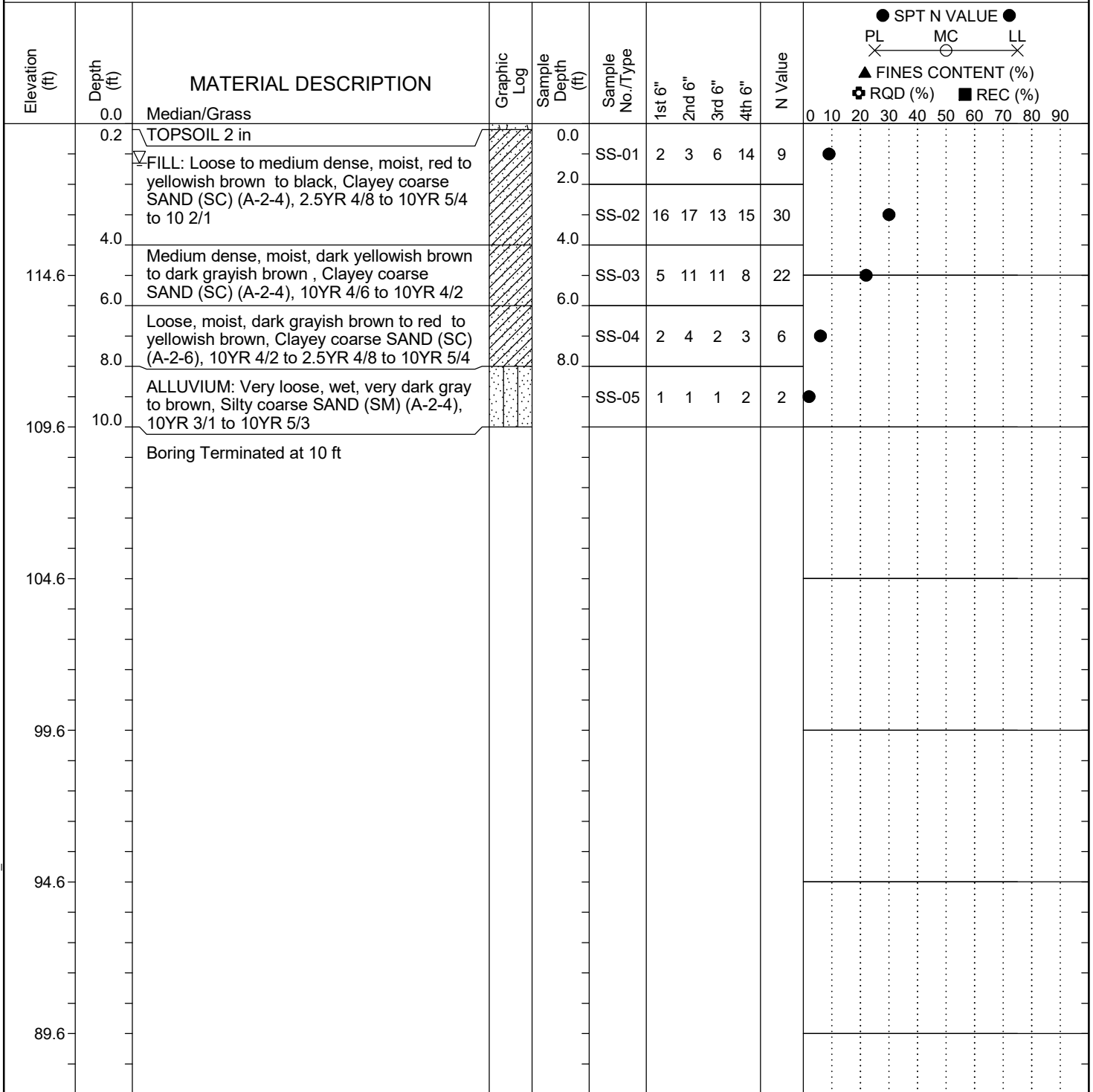
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308	County: Orangeburg	Boring No.: STB-08
Site Description: US-301 Over Four Hole Swamp		Route: US-301
Eng./Geo.: A. Roseman	Boring Location: 5957+28.22	Offset: 5.80' L
Alignment: US-301	Date Started: 2/23/2022	Date Completed: 2/23/2022
Elev.: 119.6 ft	Latitude: 33.4571341	Longitude: -80.6498576
Total Depth: 30 ft	Soil Depth: 10 ft	Core Depth: ft
Bore Hole Diameter (in): 4.25	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME550X	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 91%	Groundwater: TOB 1.30 ft 24HR
Core Size:	Driller: SCI	



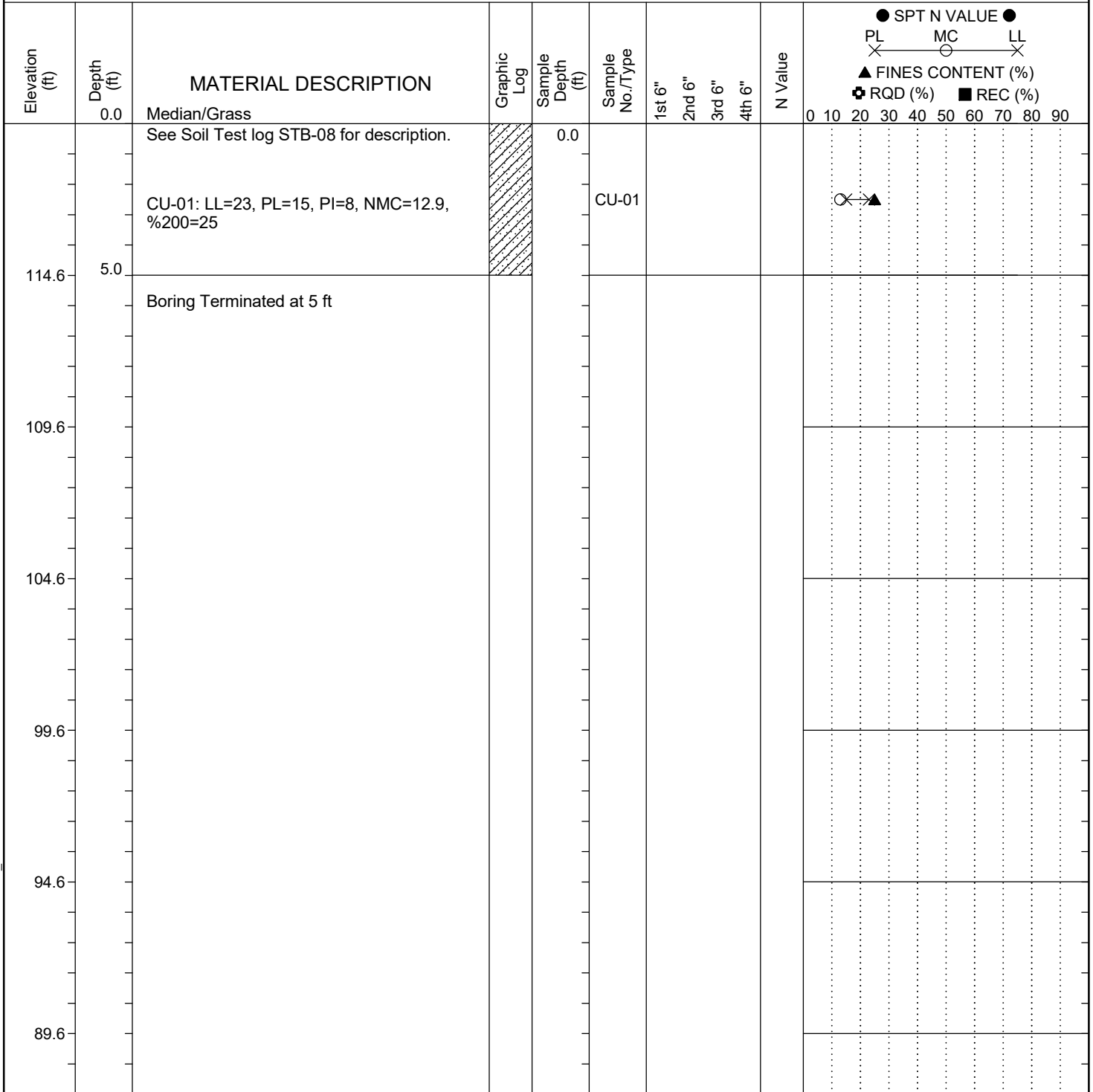
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID: 0040308		County: Orangeburg		Boring No.: STB-08A	
Site Description: US-301 Over Four Hole Swamp				Route: US-301	
Eng./Geo.: A. Roseman		Boring Location: 5957+28.22		Offset: 5.80' L	Alignment: US-301
Elev.: 119.6 ft	Latitude: 33.4571341	Longitude: -80.6498576	Date Started: 2/23/2022		
Total Depth: 5 ft	Soil Depth: 5 ft	Core Depth: ft	Date Completed: 2/23/2022		
Bore Hole Diameter (in): 4.25		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME550X	Drill Method: HSA		Hammer Type:	Energy Ratio:	
Core Size:	Driller: SCI	Groundwater: TOB	24HR		



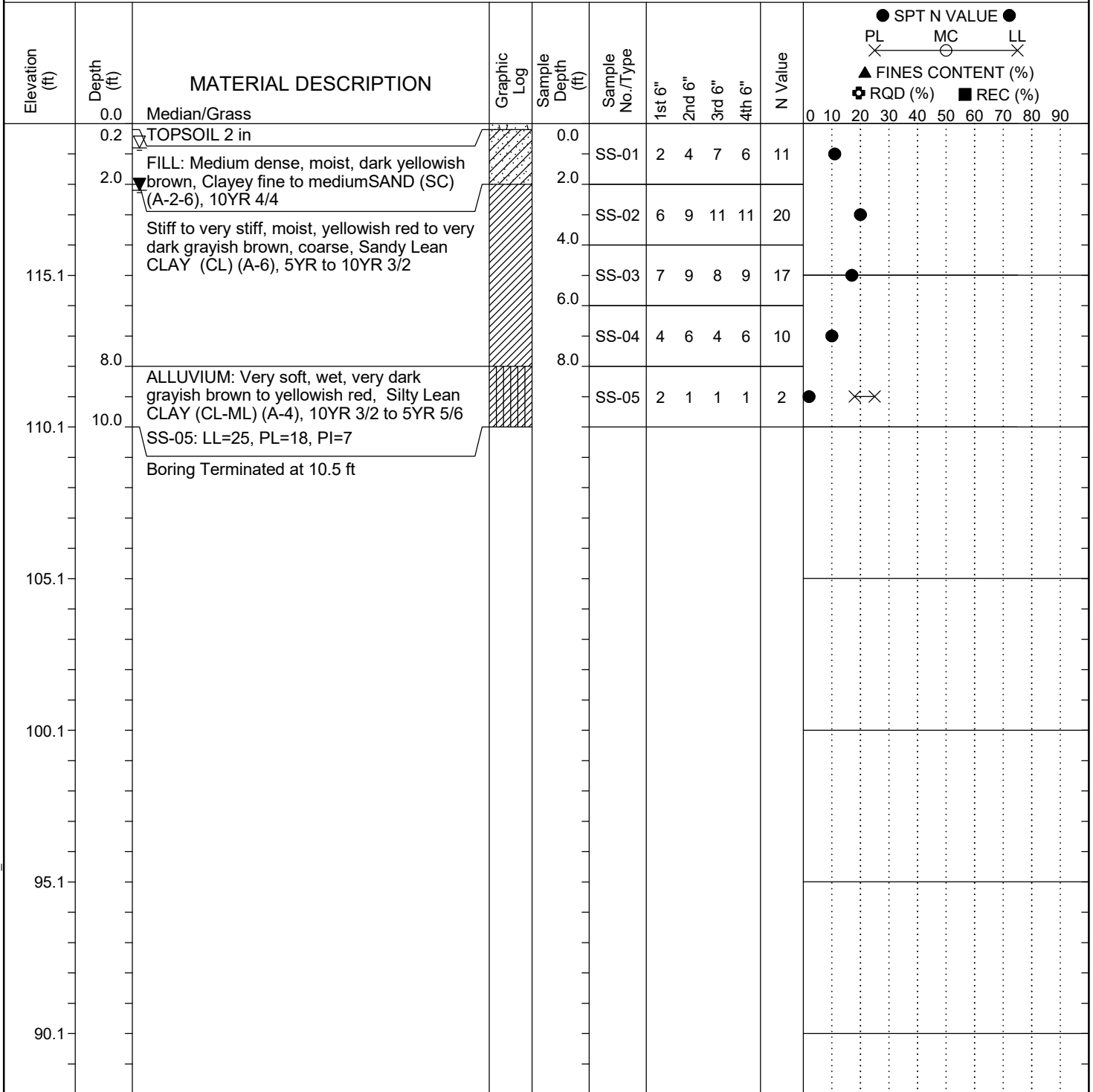
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-09
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5955+28.27	Offset:	16.25' L
Alignment:	US-301				
Elev.:	120.1 ft	Latitude:	33.4571886	Longitude:	-80.6492043
Date Started:	2/23/2022				
Total Depth:	10 ft	Soil Depth:	10 ft	Core Depth:	ft
Date Completed:	2/23/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB 0.80 ft
24HR:	2.20 ft				



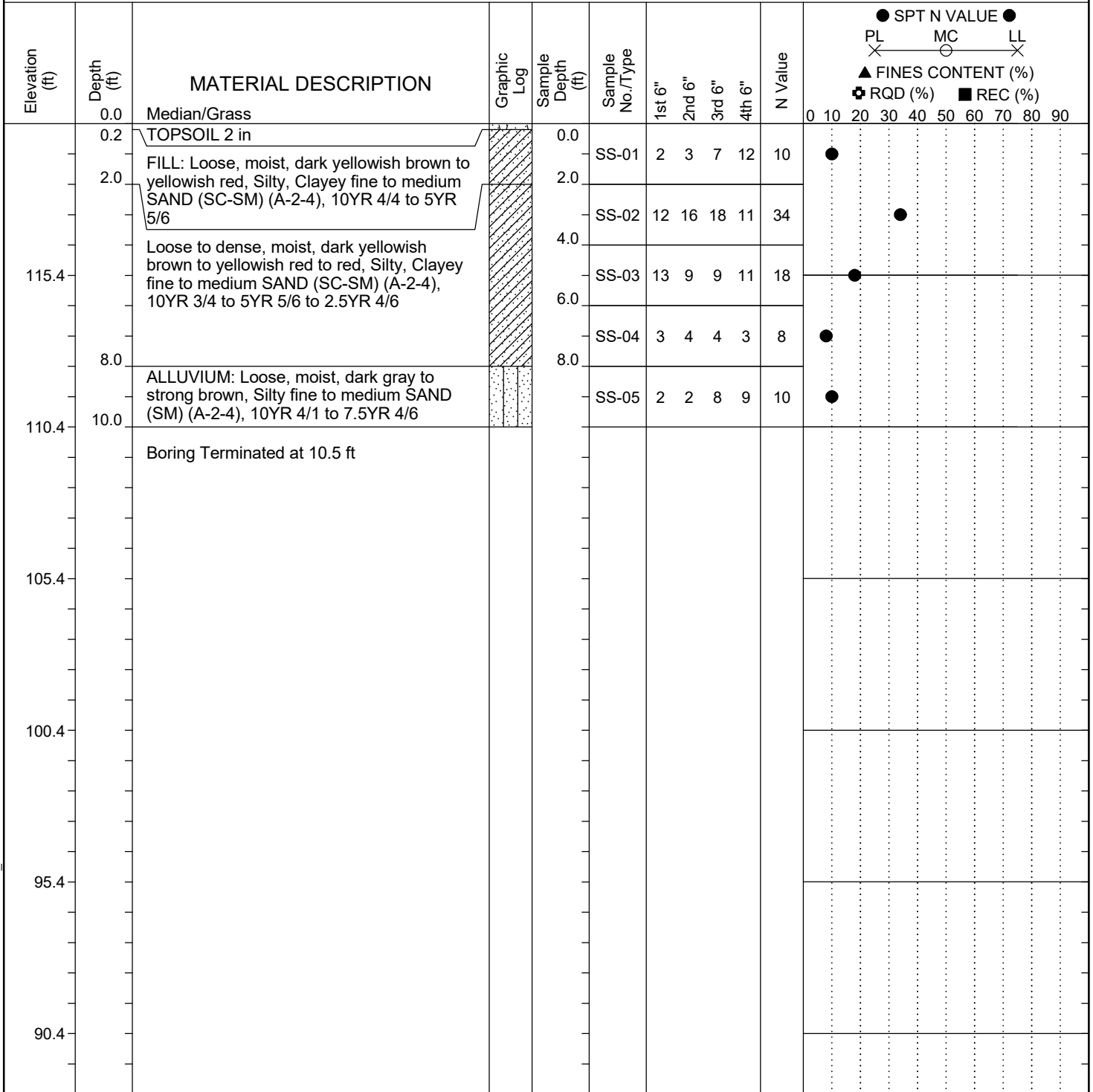
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-10
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5946+33.24	Offset:	12.25' L
Alignment:	US-301				
Elev.:	120.4 ft	Latitude:	33.4575705	Longitude:	-80.6463048
Date Started:	2/23/2022				
Total Depth:	10 ft	Soil Depth:	10 ft	Core Depth:	ft
Date Completed:	2/23/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration	Liner Required:		Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	91%				
Core Size:		Driller:	SCI	Groundwater:	TOB
				24HR	



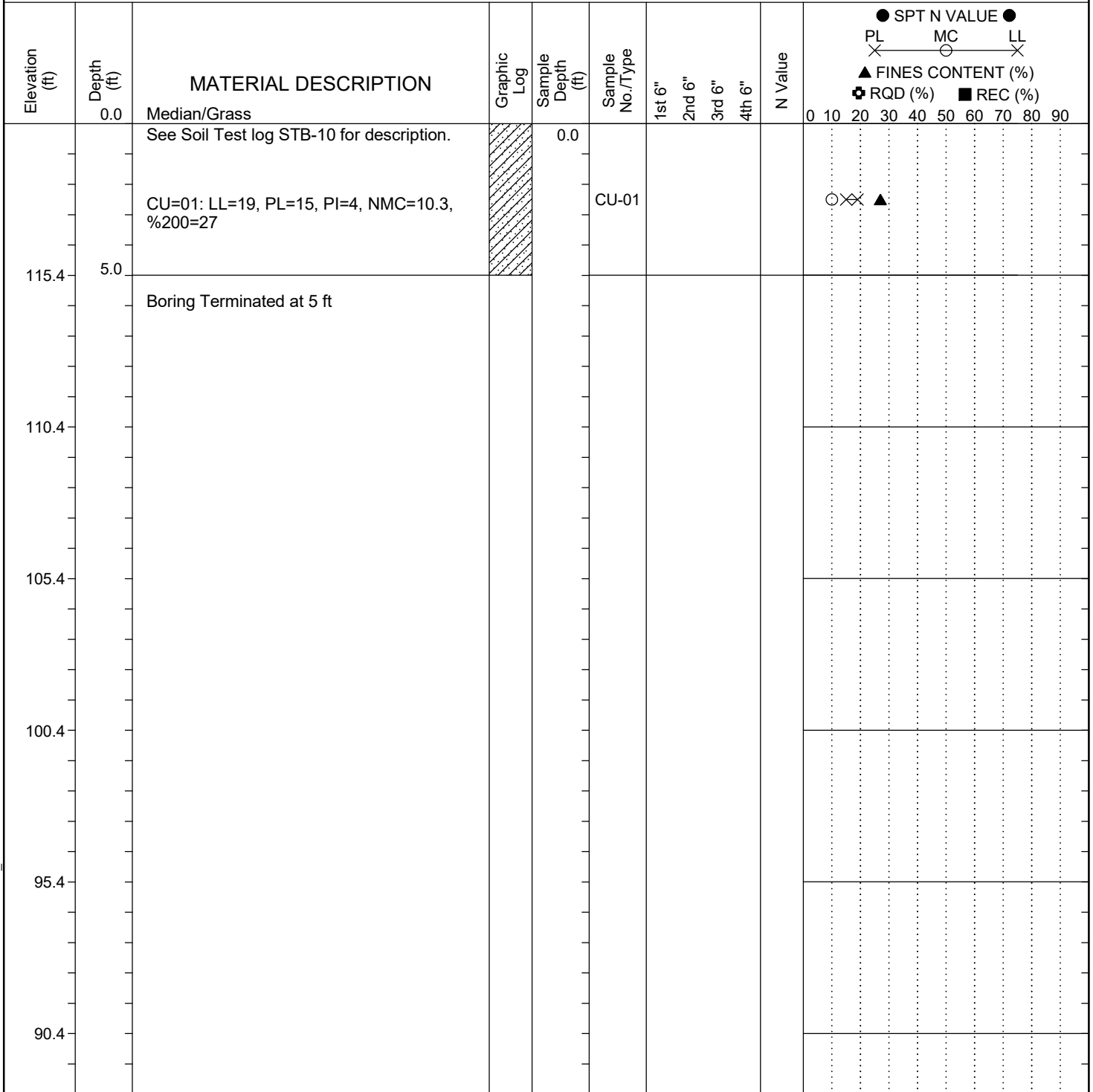
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-10A
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5946+33.24	Offset:	12.25' L
Alignment:	US-301				
Elev.:	120.4 ft	Latitude:	33.4575705	Longitude:	-80.6463048
Date Started:	2/23/2022				
Total Depth:	5 ft	Soil Depth:	5 ft	Core Depth:	ft
Date Completed:	2/23/2022				
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME550X	Drill Method:	HSA	Hammer Type:	
Energy Ratio:					
Core Size:		Driller:	SCI	Groundwater:	TOB
				24HR	



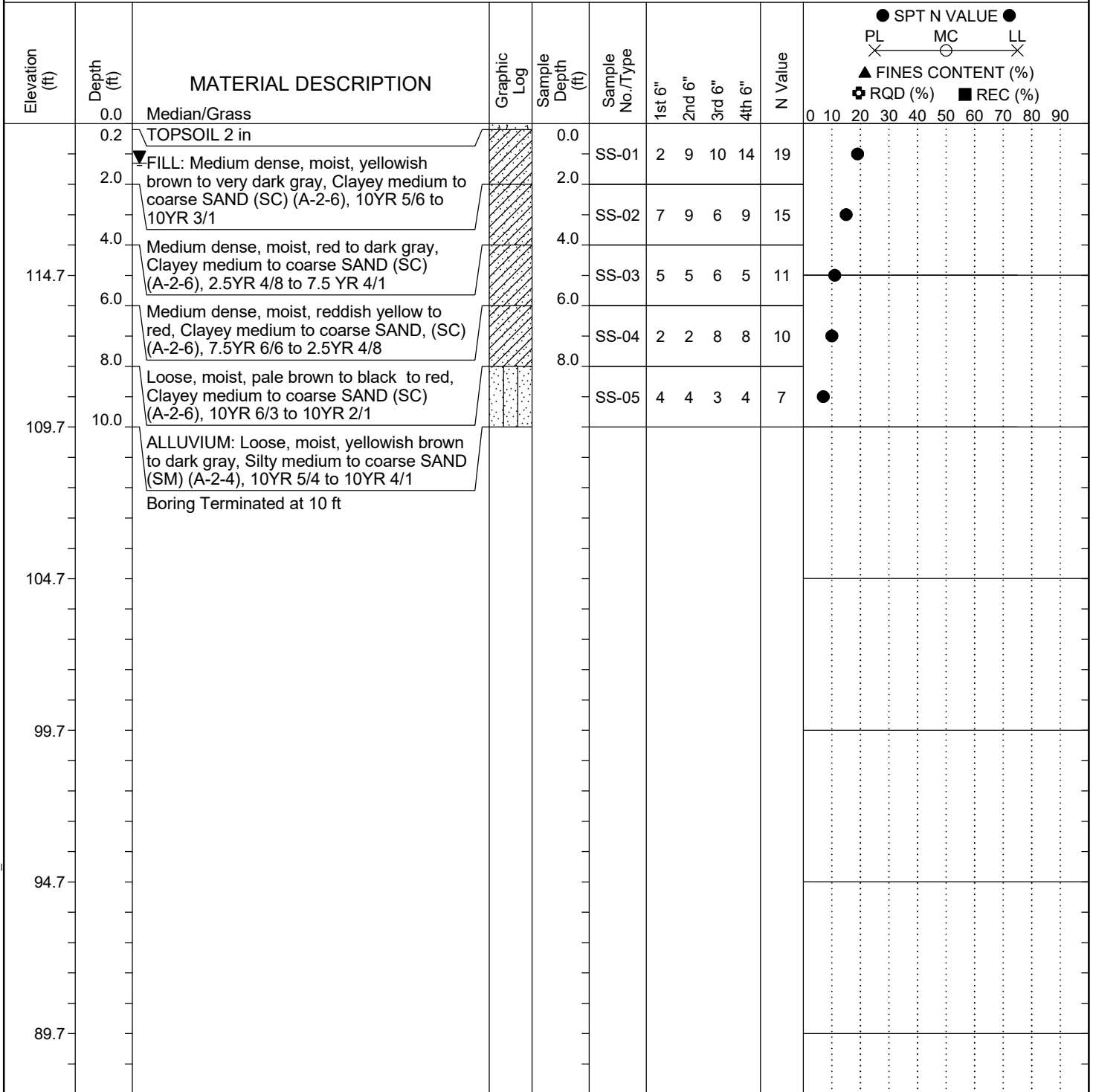
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_US301_OVER_FOUR_HOLE_SWAMP.GPJ_SCDOT_DATA_TEMPLATE.GDT_3/31/22

SCDOT Soil Test Log

Project ID:	0040308	County:	Orangeburg	Boring No.:	STB-11
Site Description:	US-301 Over Four Hole Swamp			Route:	US-301
Eng./Geo.:	A. Roseman	Boring Location:	5944+37.45	Offset:	2.67' L
Elev.:	119.7 ft	Latitude:	33.4576777	Longitude:	-80.6456749
Total Depth:	10 ft	Soil Depth:	10 ft	Core Depth:	ft
Bore Hole Diameter (in):	4.25	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME550X	Drill Method:	RW	Hammer Type:	Automatic
Core Size:		Driller:	SCI	Groundwater:	TOB
				Energy Ratio:	91%
				24HR	1.30 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	



US 301 Over Four Hole Swamp
Orangeburg County, SC
Project Number :0040308

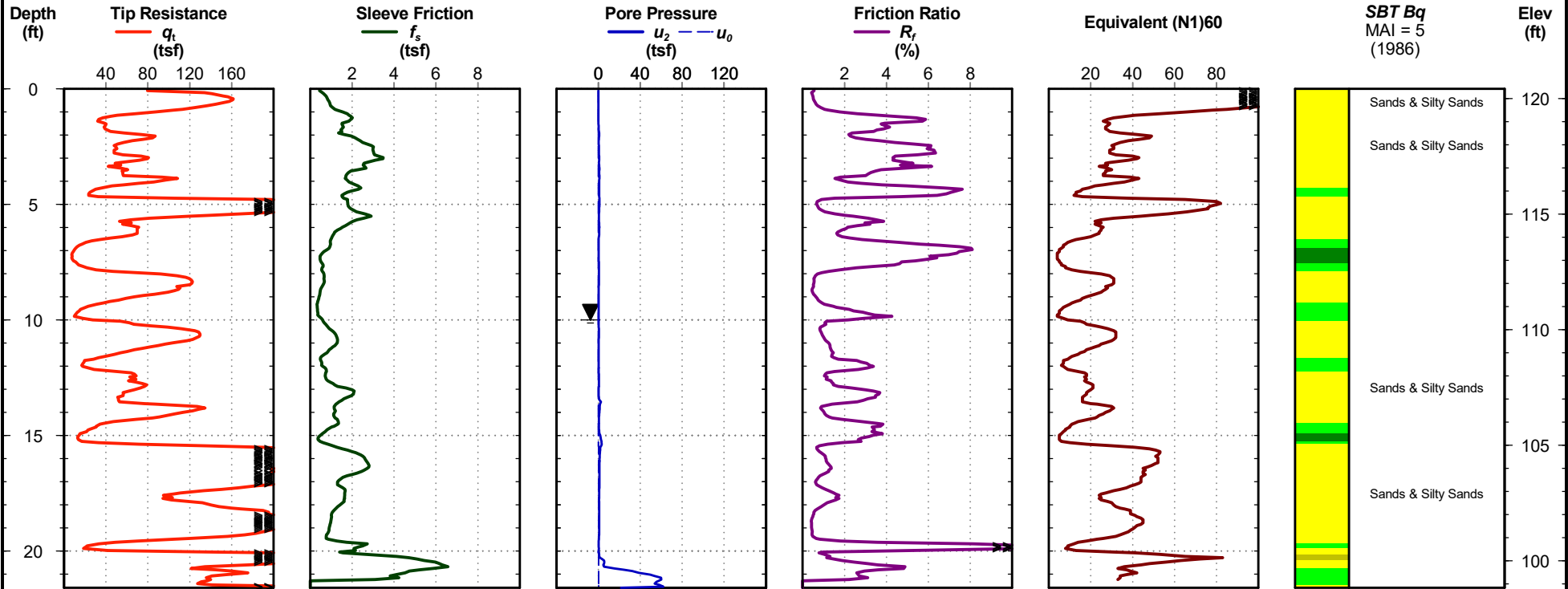
Cone Penetration Test

CPT-01

Date: Feb. 8, 2022
Estimated Water Depth: 10 ft
Rig/Operator: Truck / A. Feix

Northing: 591033.4
Easting: 2107272.6
Elevation: 120.4

Total Depth: 21.6 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



CPT REPORT - DYNAMIC US 301 OVER FOUR HOLE SWAMP.GPJ_DF STD US.LAB.GDT_3/30/22

CPT-01



US 301 Over Four Hole Swamp
Orangeburg County, SC
Project Number :0040308

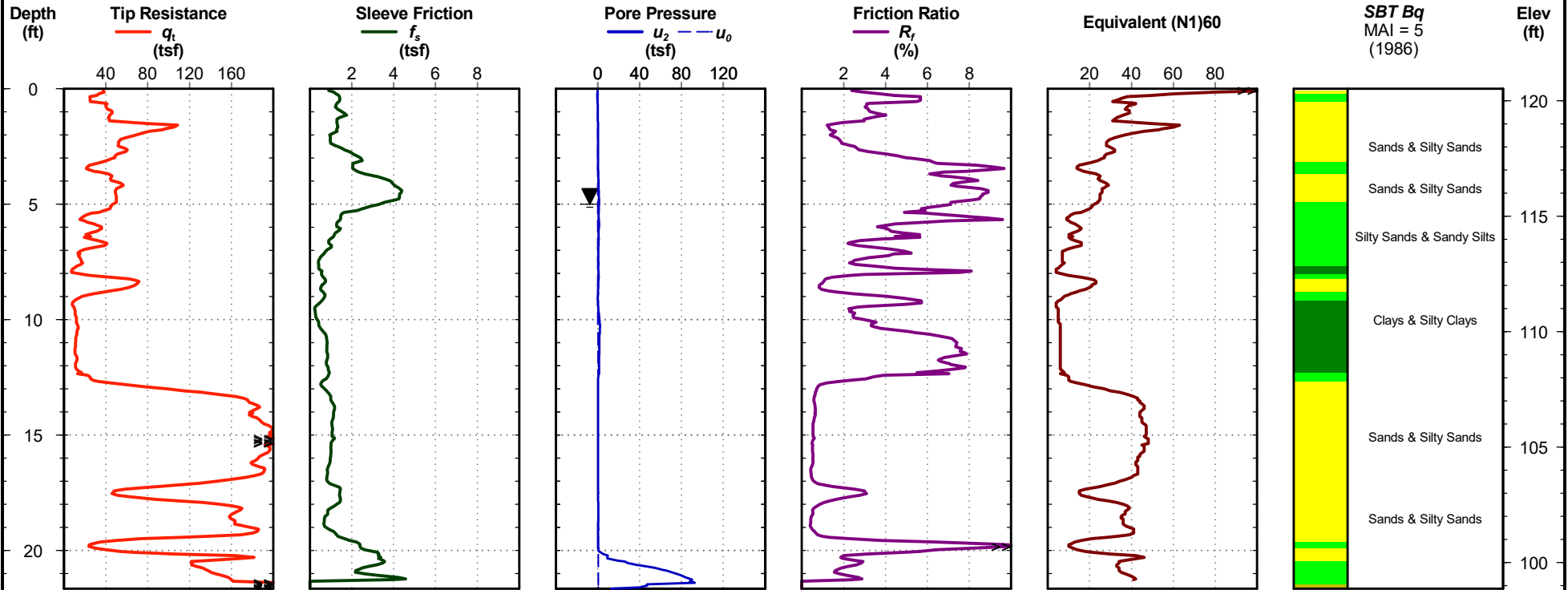
Cone Penetration Test

CPT-02

Date: Feb. 8, 2022
Estimated Water Depth: 5 ft
Rig/Operator: Truck / A. Feix

Northing: 591081.3
Easting: 2107573.3
Elevation: 120.5

Total Depth: 21.7 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



CPT REPORT - DYNAMIC US 301 OVER FOUR HOLE SWAMP.GPJ_DF STD US.LAB.GDT_3/30/22

CPT-02



US 301 Over Four Hole Swamp
Orangeburg County, SC
Project Number :0040308

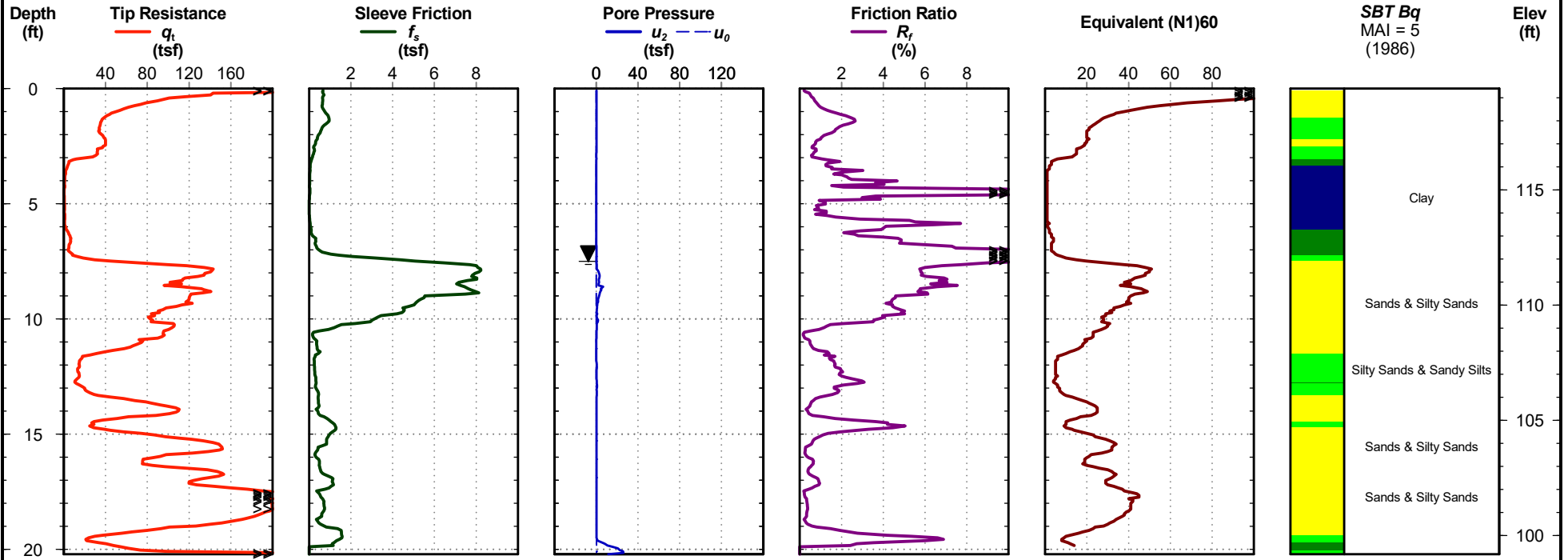
Cone Penetration Test

CPT-03

Date: Feb. 8, 2022
Estimated Water Depth: 7.5 ft
Rig/Operator: Truck / A. Feix

Northing: 591102.1
Easting: 2107250.6
Elevation: 119.4

Total Depth: 20.2 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



CPT REPORT - DYNAMIC US 301 OVER FOUR HOLE SWAMP.GPJ_DF STD US.LAB.GDT_3/30/22

CPT-03



US 301 Over Four Hole Swamp
Orangeburg County, SC
Project Number :0040308

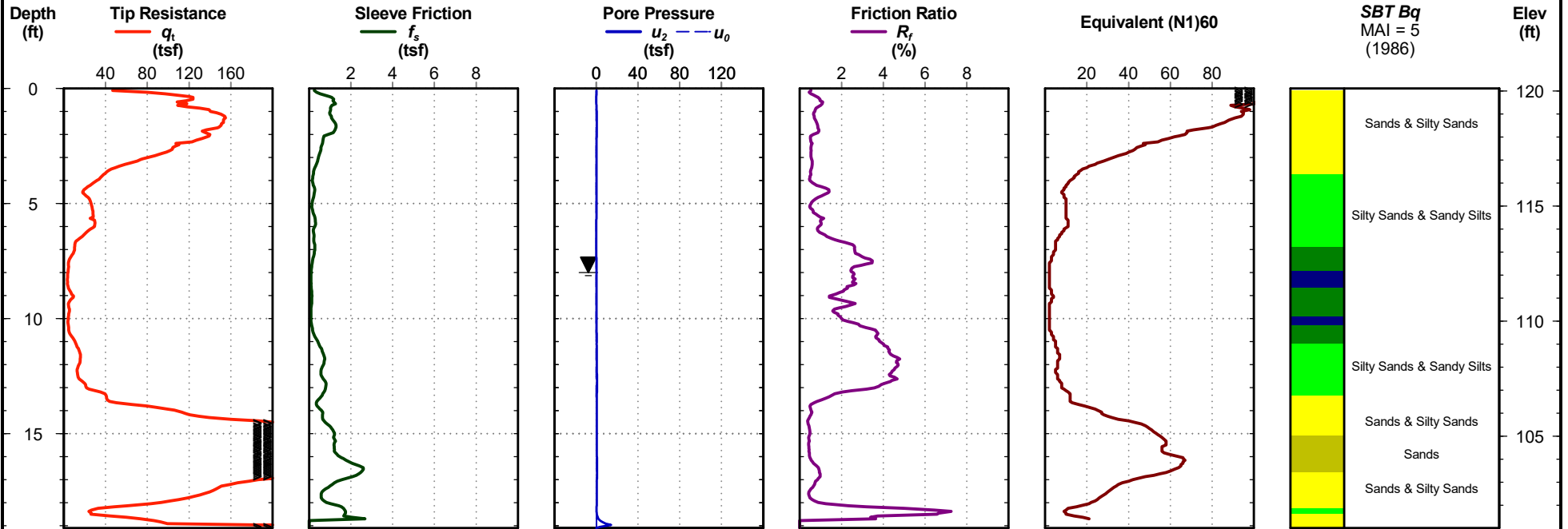
Cone Penetration Test

CPT-04

Date: Feb. 8, 2022
Estimated Water Depth: 8 ft
Rig/Operator: Truck / A. Feix

Northing: 591139.5
Easting: 2107714.9
Elevation: 120.1

Total Depth: 19.1 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



CPT REPORT - DYNAMIC US 301 OVER FOUR HOLE SWAMP.GPJ_DF STD US.LAB.GDT_3/30/22

CPT-04



SPT HAMMER EFFICIENCY

Drill Rig: CME 55
 Hammer: Automatic
 Rig Operator: Benbow
 Engineer: Henderson

Test Date: 12/7/2020
 Project No. : _____
 Location: SCI Yard
 Drilling Method: Mud Rotary

Boring ID: TB-1
 Rod Type: BW
 Analyzer ID: 216BW
 Rod Area: 1.82 in²

Depth: 40 ft
 LE: 43 ft
 Blow Count: 0, 1, 2

Depth: 45 ft
 LE: 48 ft
 Blow Count: 8, 9, 19

Depth: 50 ft
 LE: 53 ft
 Blow Count: 11, 15, 20

Blow No.	Energy	Blow No.	Energy
1	0.275	26	
2	0.288	27	
3	0.282	28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Blow No.	Energy	Blow No.	Energy
1	0.001	26	0.293
2	0.002	27	0.293
3	0.305	28	0.318
4	0.318	29	0.293
5	0.315	30	0.293
6	0.326	31	0.290
7	0.324	32	0.291
8	0.295	33	0.291
9	0.284	34	0.296
10	0.310	35	0.315
11	0.279	36	0.305
12	0.329	37	
13	0.322	38	
14	0.310	39	
15	0.293	40	
16	0.309	41	
17	0.303	42	
18	0.307	43	
19	0.295	44	
20	0.299	45	
21	0.291	46	
22	0.282	47	
23	0.283	48	
24	0.288	49	
25	0.308	50	

Blow No.	Energy	Blow No.	Energy
1	0.298	26	0.295
2	0.304	27	0.288
3	0.309	28	0.289
4	0.284	29	0.289
5	0.282	30	0.280
6	0.277	31	0.290
7	0.289	32	0.310
8	0.289	33	0.285
9	0.273	34	0.286
10	0.281	35	0.283
11	0.304	36	0.294
12	0.303	37	0.305
13	0.287	38	0.285
14	0.306	39	0.308
15	0.299	40	0.292
16	0.287	41	0.276
17	0.285	42	0.312
18	0.308	43	0.311
19	0.297	44	0.281
20	0.310	45	0.304
21	0.308	46	0.297
22	0.308	47	
23	0.313	48	
24	0.301	49	
25	0.307	50	

Average Energy: 0.282 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 80%
 Std. Deviation: 0.007 kip-ft

Average Energy: 0.285 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 81%
 Std. Deviation: 0.071 kip-ft

Average Energy: 0.295 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 84%
 Std. Deviation: 0.011 kip-ft

Average efficiency from all tests: 83%

Comments: LE = length of rod from below gages to bottom of sampler.
 Maximum rated energy based on a hammer weight of 0.14 kips and a drop height of 2.5 feet.

SPT HAMMER EFFICIENCY



Drill Rig: SCI CME 550X
 Hammer: Automatic
 Rig Operator: Benbow
 Engineer: Henderson

Test Date: 11/30/2020
 Project No. : _____
 Location: SCI Yard
 Drilling Method: Mud Rotary

Boring ID: TB-1
 Rod Type: BW
 Analyzer ID: 216BW
 Rod Area: 1.81 in²

Depth: 40 ft
 LE: 43 ft
 Blow Count: 0, 1, 2

Depth: 45 ft
 LE: 48 ft
 Blow Count: 10, 21, 22

Depth: 50 ft
 LE: 53 ft
 Blow Count: 8, 15, 16

Blow No.	Energy
1	0.309
2	0.289
3	0.309
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

Blow No.	Energy	Blow No.	Energy	Blow No.	Energy
1	0.318	26	0.315	51	0.319
2	0.296	27	0.315	52	0.323
3	0.313	28	0.319	53	0.319
4	0.310	29	0.317	54	
5	0.314	30	0.316	55	
6	0.313	31	0.307	56	
7	0.313	32	0.326	57	
8	0.317	33	0.307	58	
9	0.316	34	0.320	59	
10	0.309	35	0.312	60	
11	0.311	36	0.316	61	
12	0.311	37	0.312	62	
13	0.310	38	0.321	63	
14	0.319	39	0.310	64	
15	0.323	40	0.315	65	
16	0.318	41	0.318	66	
17	0.319	42	0.315	67	
18	0.319	43	0.311	68	
19	0.318	44	0.316	69	
20	0.318	45	0.316	70	
21	0.320	46	0.321	71	
22	0.322	47	0.319	72	
23	0.316	48	0.314	73	
24	0.314	49	0.324	74	
25	0.314	50	0.319	75	

Blow No.	Energy	Blow No.	Energy
1	0.339	26	0.330
2	0.326	27	0.321
3	0.325	28	0.323
4	0.326	29	0.324
5	0.327	30	0.328
6	0.320	31	0.323
7	0.327	32	0.327
8	0.326	33	0.323
9	0.324	34	0.320
10	0.327	35	0.312
11	0.316	36	0.319
12	0.321	37	0.323
13	0.317	38	0.321
14	0.318	39	0.324
15	0.324	40	
16	0.322	41	
17	0.322	42	
18	0.317	43	
19	0.320	44	
20	0.320	45	
21	0.318	46	
22	0.313	47	
23	0.324	48	
24	0.324	49	
25	0.318	50	

Average Energy: 0.302 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 86%
 Std. Deviation: 0.012 kip-ft

Average Energy: 0.316 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 90%
 Std. Deviation: 0.005 kip-ft

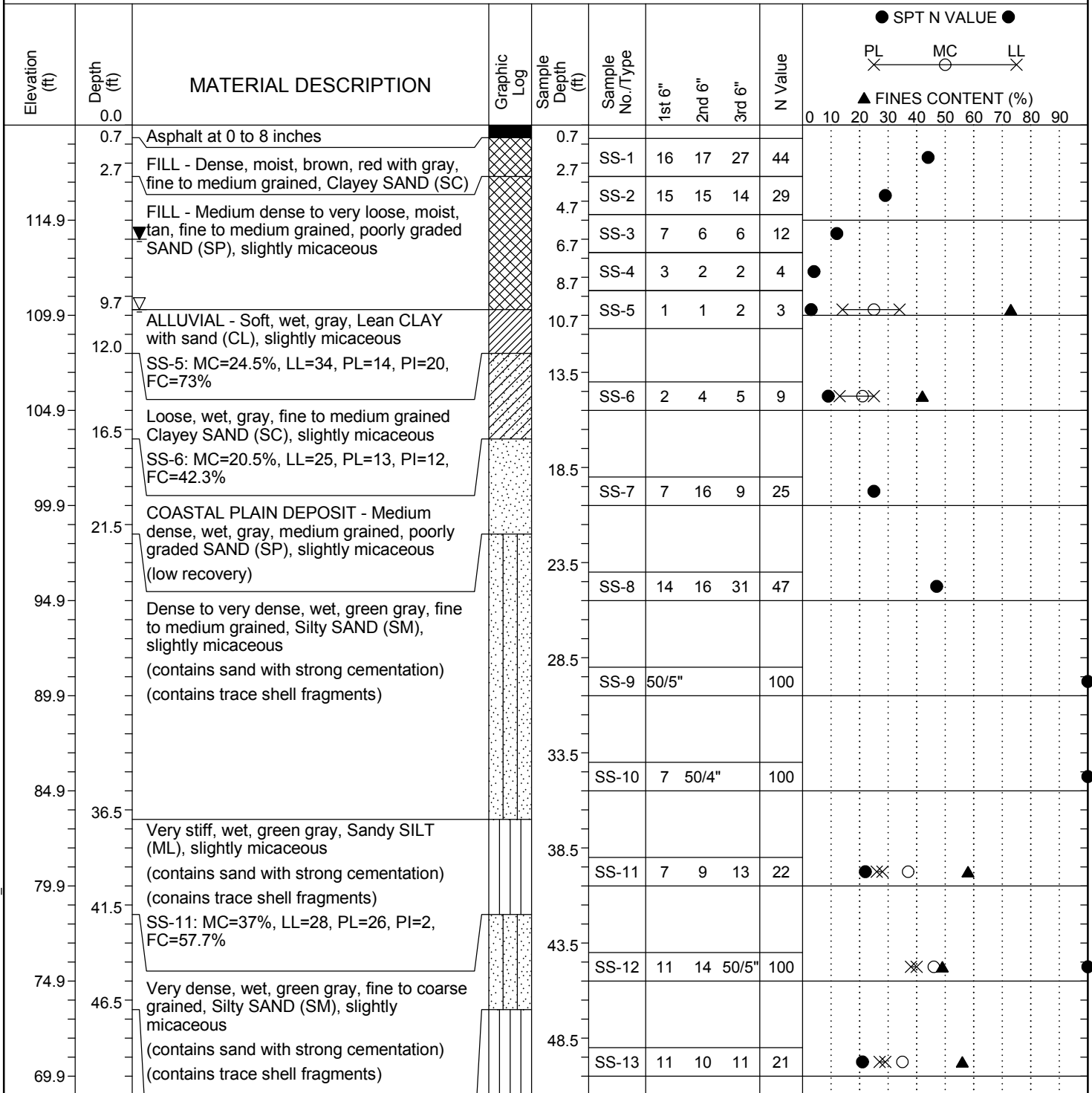
Average Energy: 0.323 kip-ft
 Max. Rated Energy: 0.350 kip-ft
 Efficiency: 92%
 Std. Deviation: 0.005 kip-ft

Average efficiency from all tests: 91%

Comments: LE = length of rod from below gages to bottom of sampler.
 Maximum rated energy based on a hammer weight of 0.14 kips and a drop height of 2.5 feet.

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-1A	Boring Location:	5949+31.74	Offset:	8.75 R	Alignment:	Proposed	
Elev.:	119.9 ft	Latitude:	33.4575	Longitude:	-80.6472	Date Started:	12/4/2014	
Total Depth:	120 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014	
Bore Hole Diameter (in):		4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.7 ft	24HR	6 ft



LEGEND

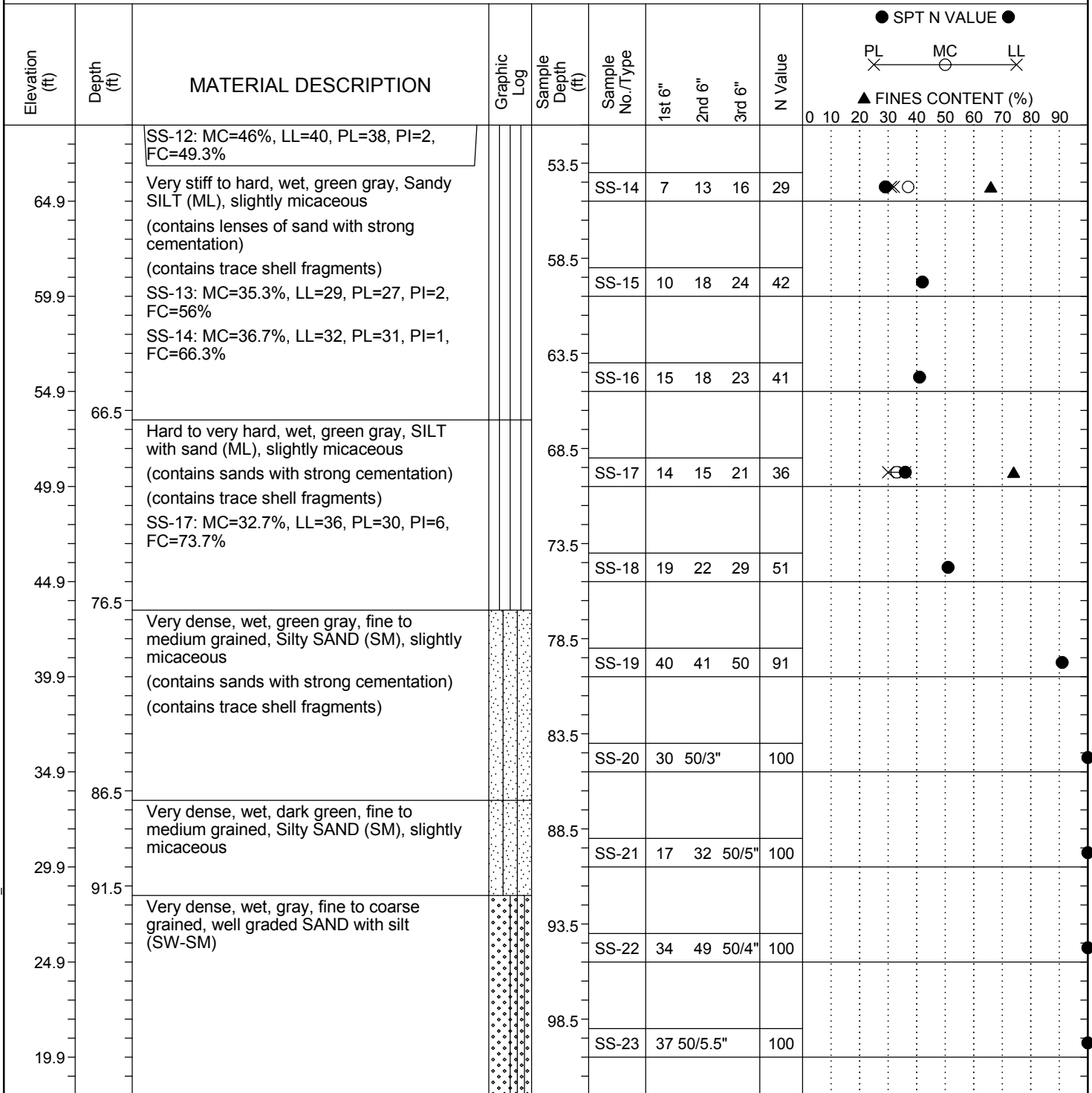
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Route:	US301	
Boring No.:	B-1A	Boring Location:	5949+31.74	Offset:	8.75 R	Alignment:	Proposed	
Elev.:	119.9 ft	Latitude:	33.4575	Longitude:	-80.6472	Date Started:	12/4/2014	
Total Depth:	120 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014	
Bore Hole Diameter (in):		4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.7 ft	24HR	6 ft



LEGEND

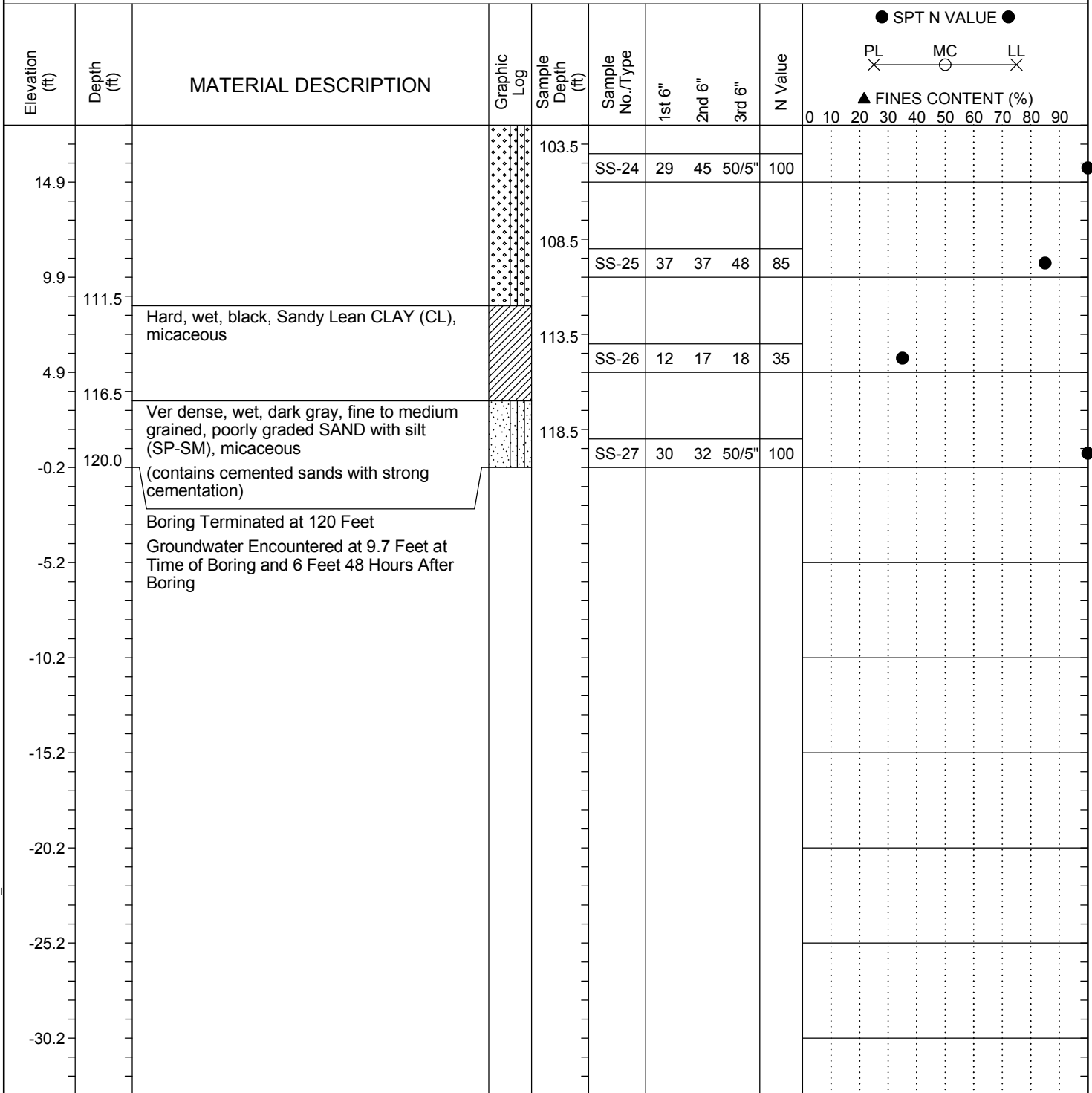
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-1A	Boring Location:	5949+31.74	Offset:	8.75 R	Alignment:	Proposed	
Elev.:	119.9 ft	Latitude:	33.4575	Longitude:	-80.6472	Date Started:	12/4/2014	
Total Depth:	120 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.7 ft	24HR 6 ft	

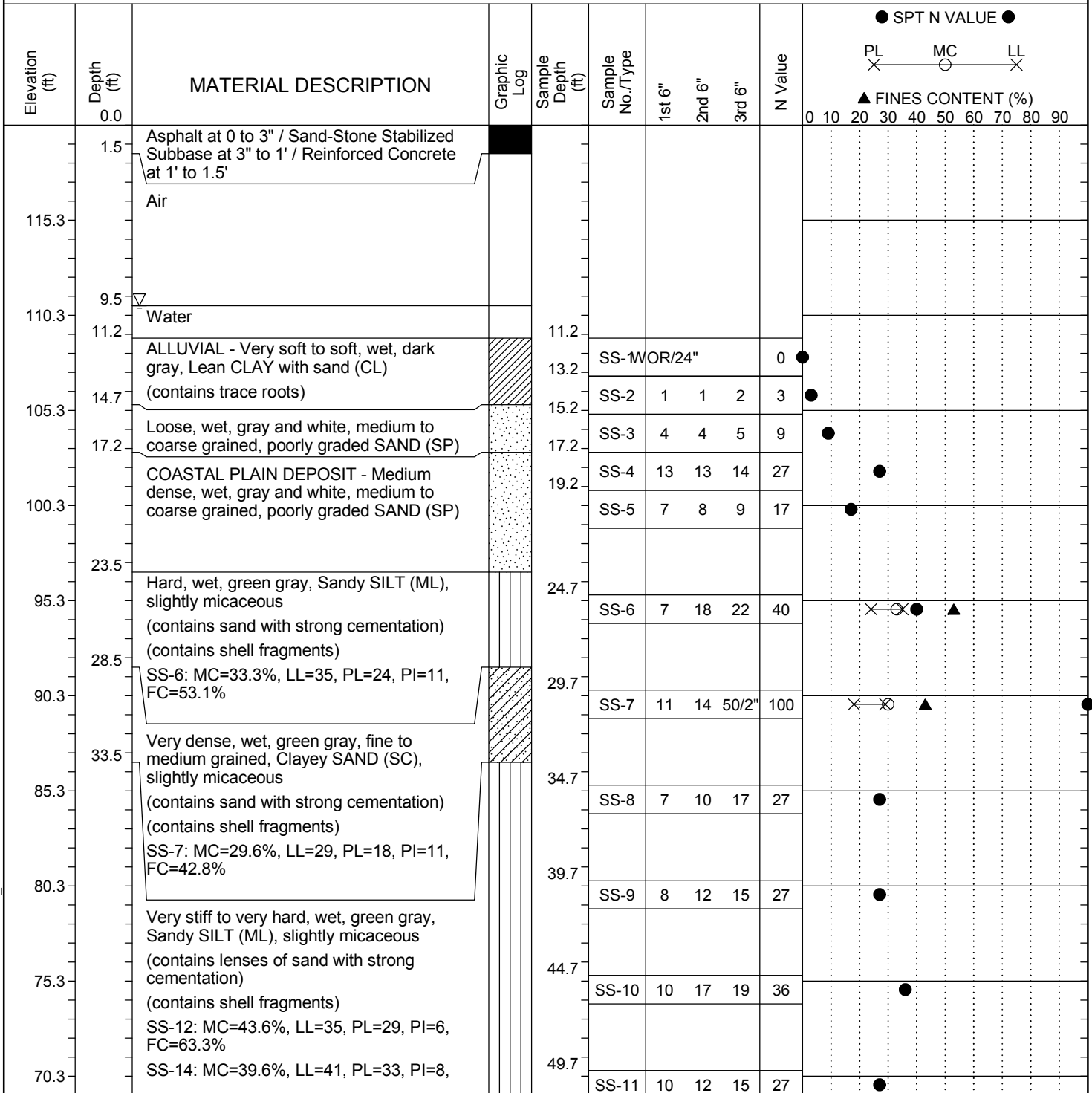


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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-3A	Boring Location:	5950+10.72	Offset:	6.25 L	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6475	Date Started:	12/8/2014	
Total Depth:	131.2 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/8/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.5 ft	24HR	



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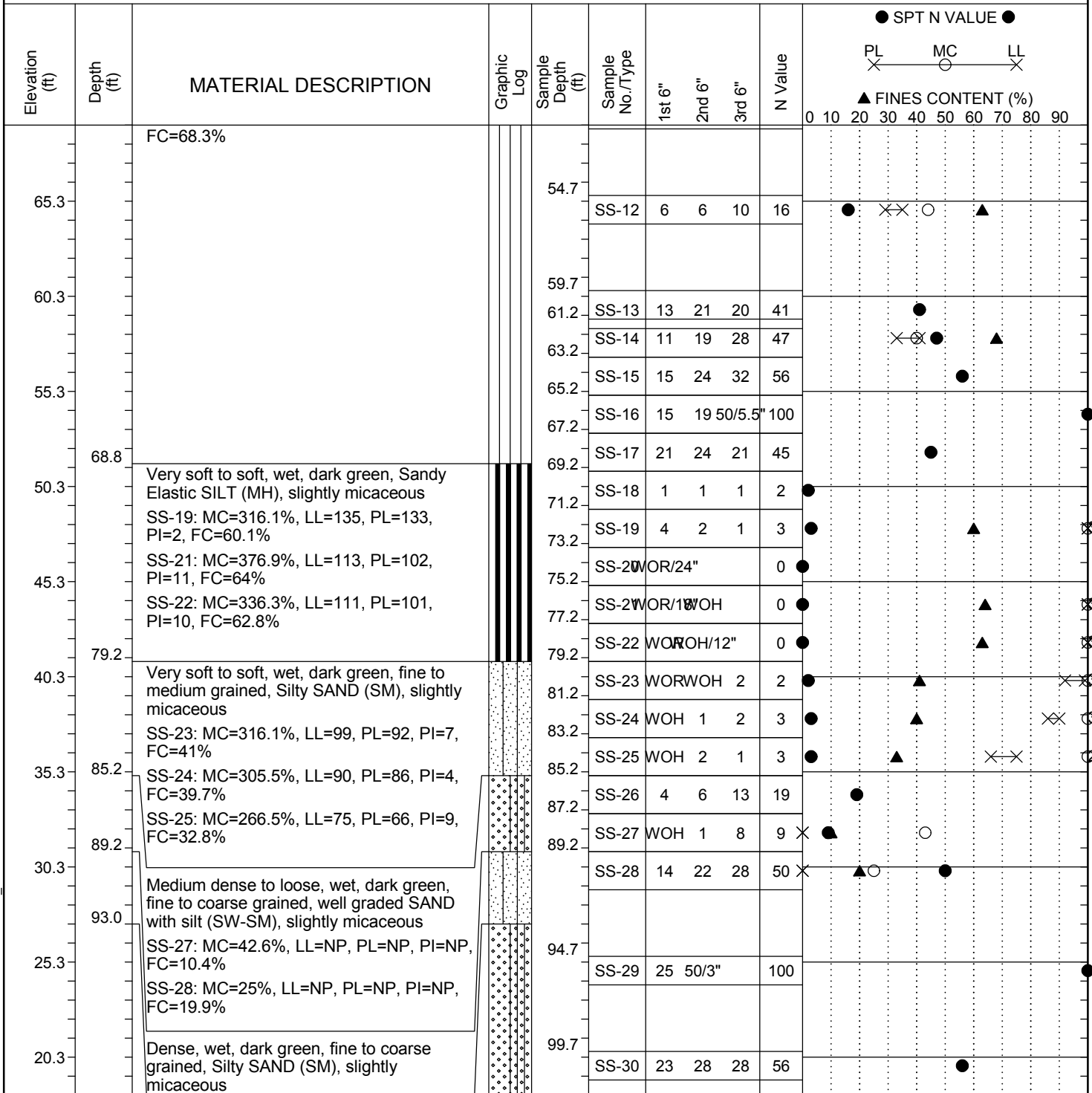
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston
Site Description:						Route:	US301
Boring No.:	B-3A	Boring Location:	5950+10.72	Offset:	6.25 L	Alignment:	Proposed
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6475	Date Started:	12/8/2014
Total Depth:	131.2 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/8/2014
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB 9.5 ft	24HR	



LEGEND

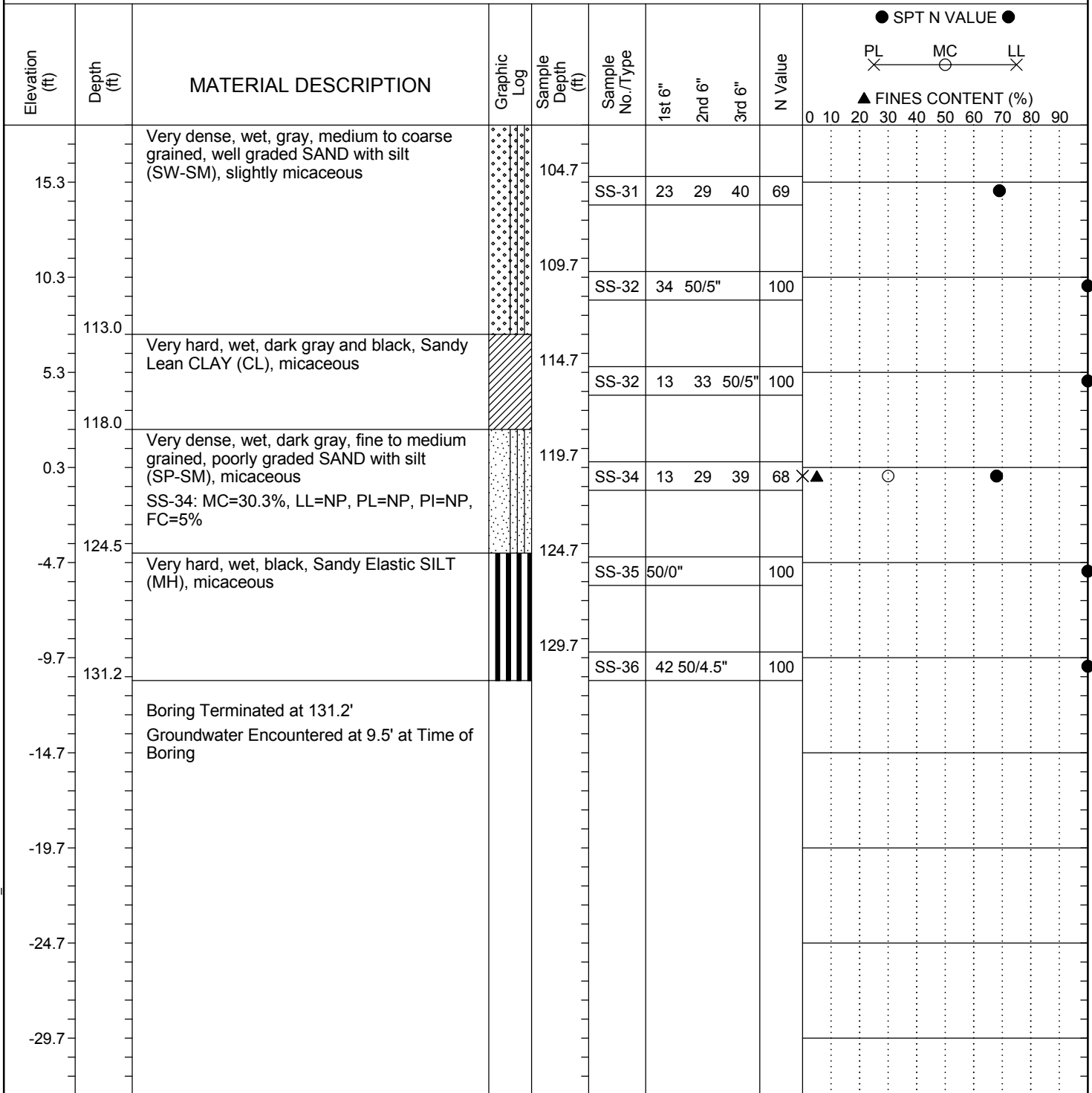
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-3A	Boring Location:	5950+10.72	Offset:	6.25 L	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6475	Date Started:	12/8/2014	
Total Depth:	131.2 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/8/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.5 ft	24HR	



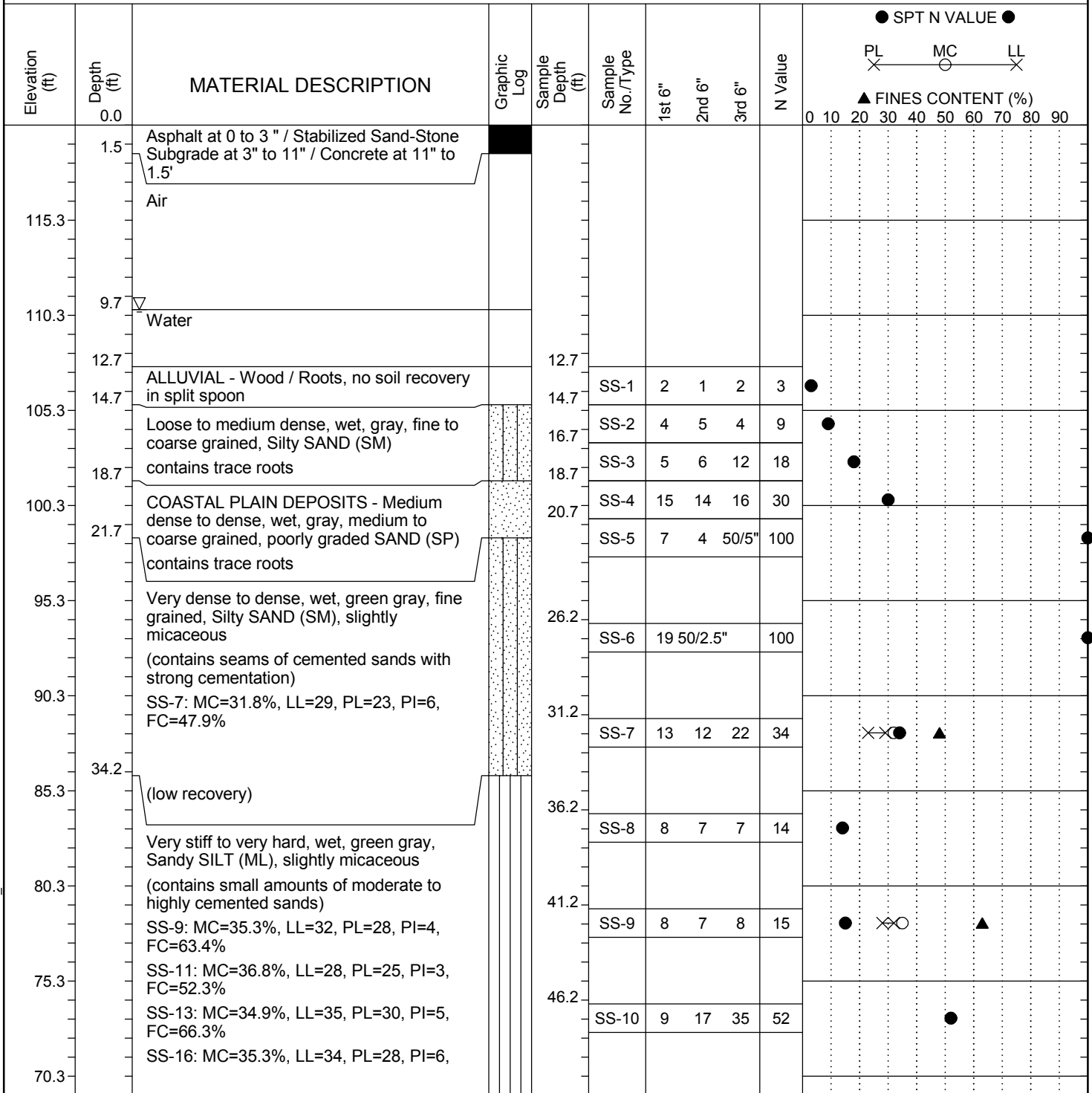
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-5A	Boring Location:	5950+99.11	Offset:	8.13 R	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/5/2014	
Total Depth:	132.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014	
Bore Hole Diameter (in):		4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.7 ft	24HR	



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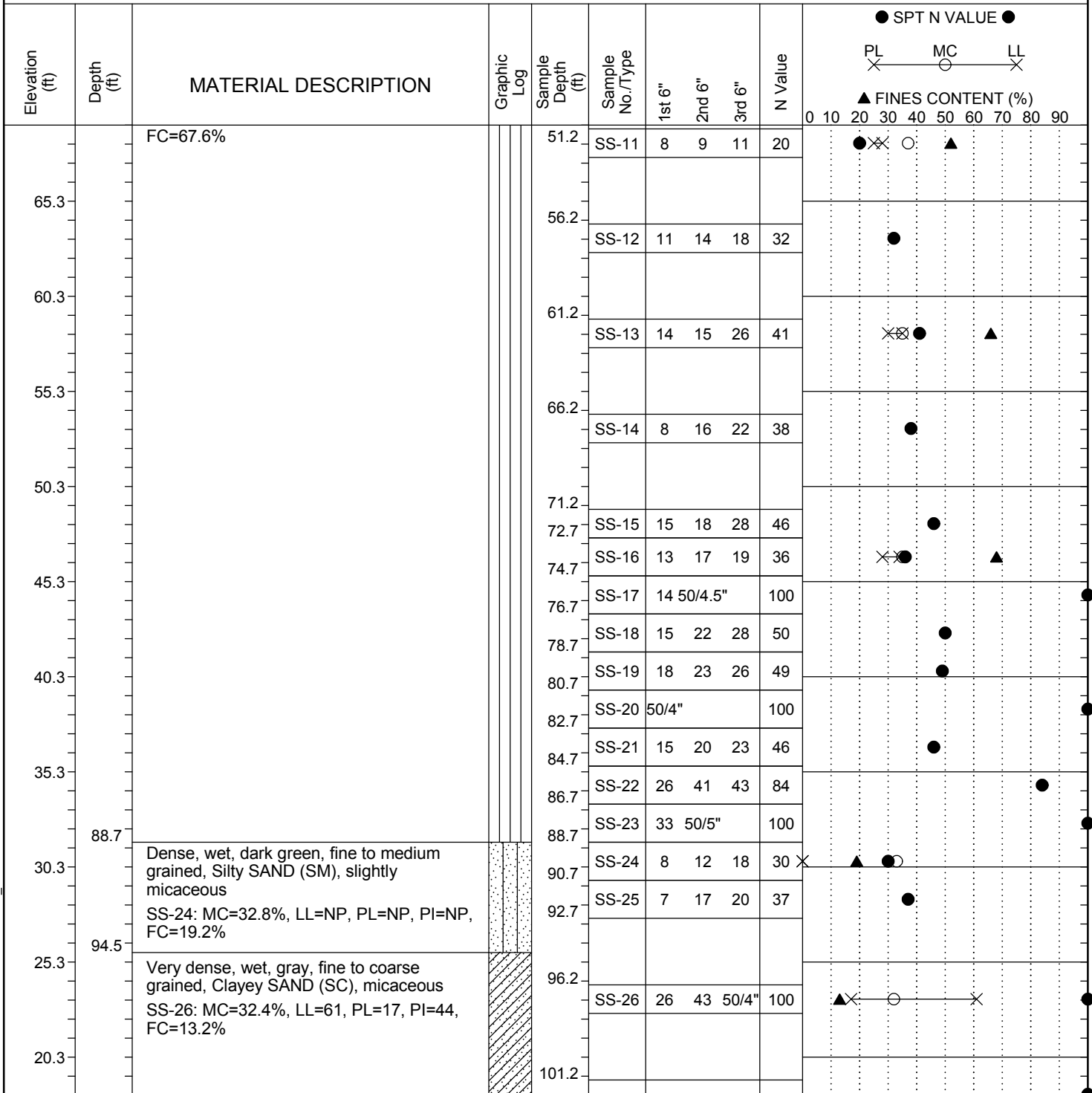
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston
Site Description:						Route:	US301
Boring No.:	B-5A	Boring Location:	5950+99.11	Offset:	8.13 R	Alignment:	Proposed
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/5/2014
Total Depth:	132.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB 9.7 ft	24HR	



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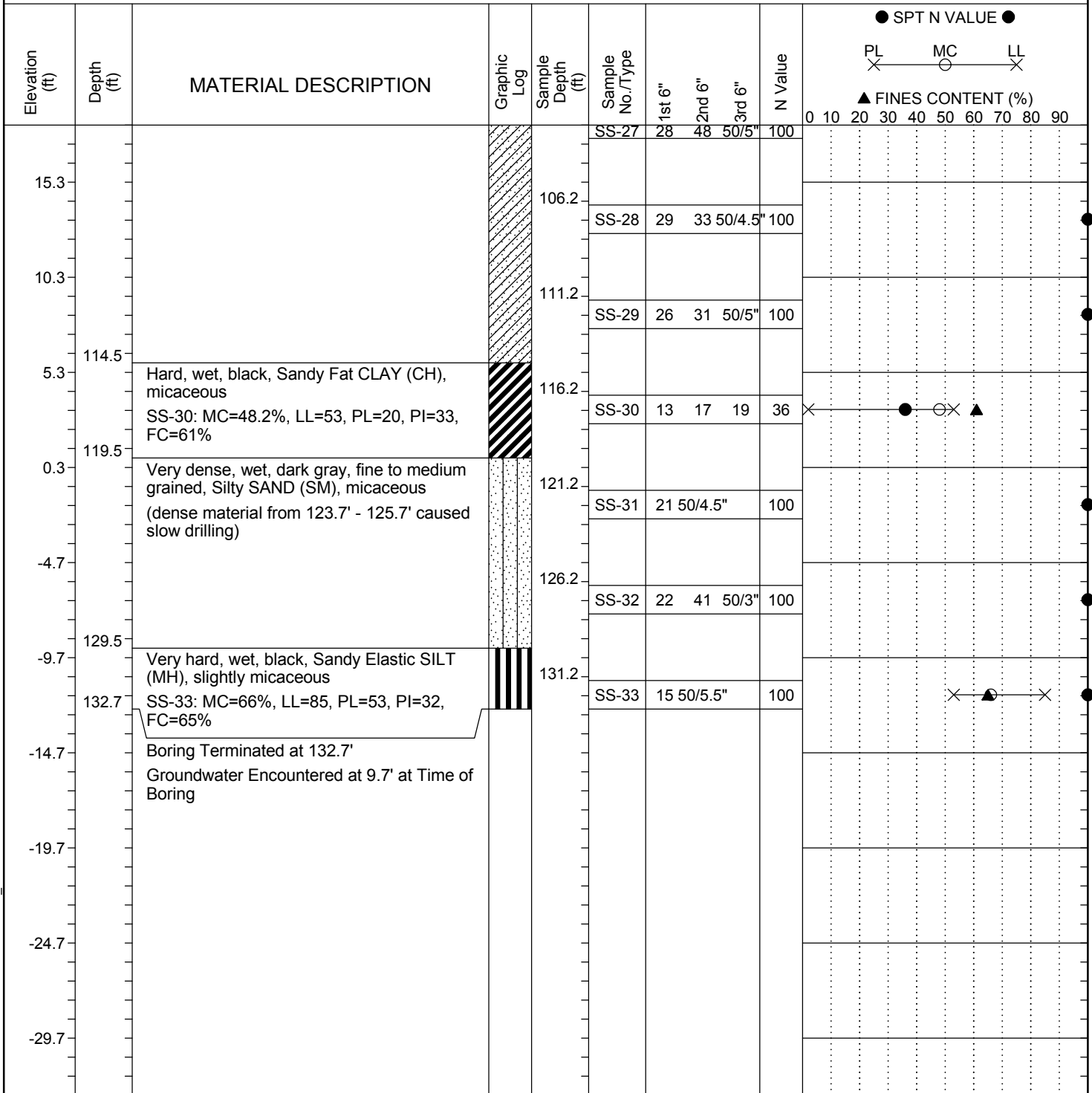
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SC.DOT 0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-5A	Boring Location:	5950+99.11	Offset:	8.13 R	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/5/2014	
Total Depth:	132.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/4/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.7 ft	24HR	



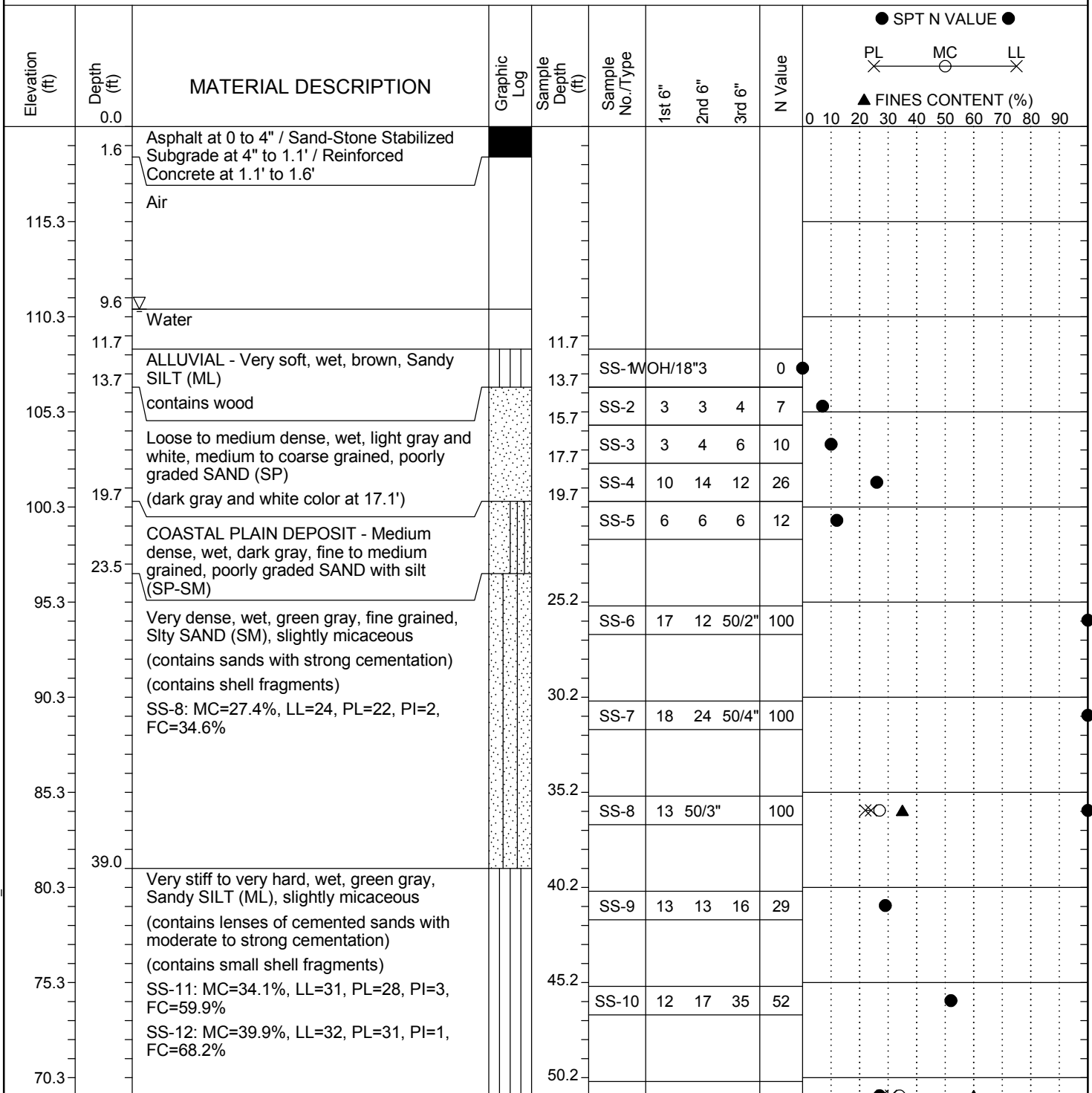
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-6A	Boring Location:	5951+42.68	Offset:	7.28 L	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/7/2014	
Total Depth:	131.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/7/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.6 ft	24HR	



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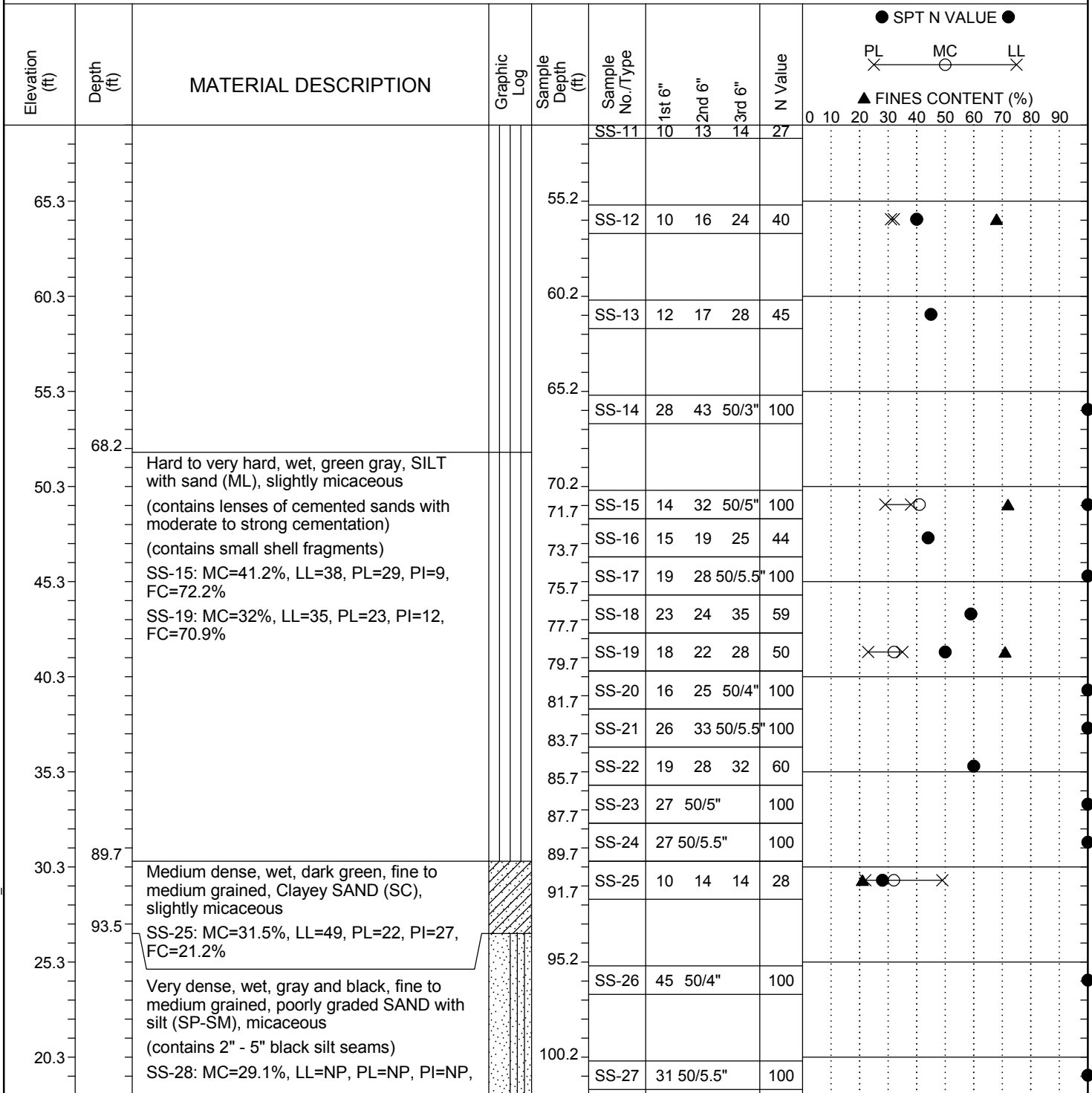
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SC_DOT 0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston
Site Description:						Route:	US301
Boring No.:	B-6A	Boring Location:	5951+42.68	Offset:	7.28 L	Alignment:	Proposed
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/7/2014
Total Depth:	131.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/7/2014
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB 9.6 ft	24HR	



LEGEND

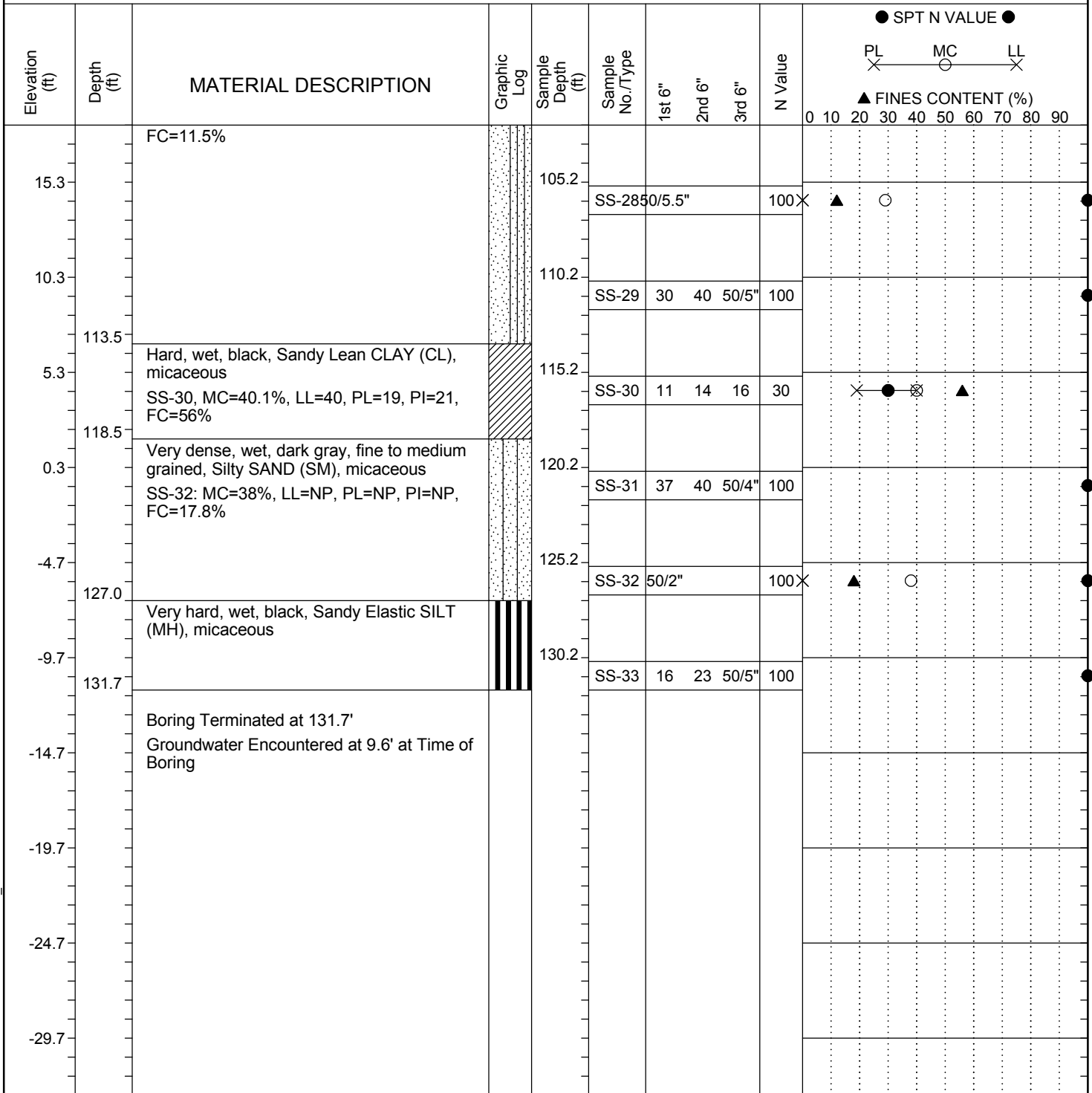
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-6A	Boring Location:	5951+42.68	Offset:	7.28 L	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6478	Date Started:	12/7/2014	
Total Depth:	131.7 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/7/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.6 ft	24HR	



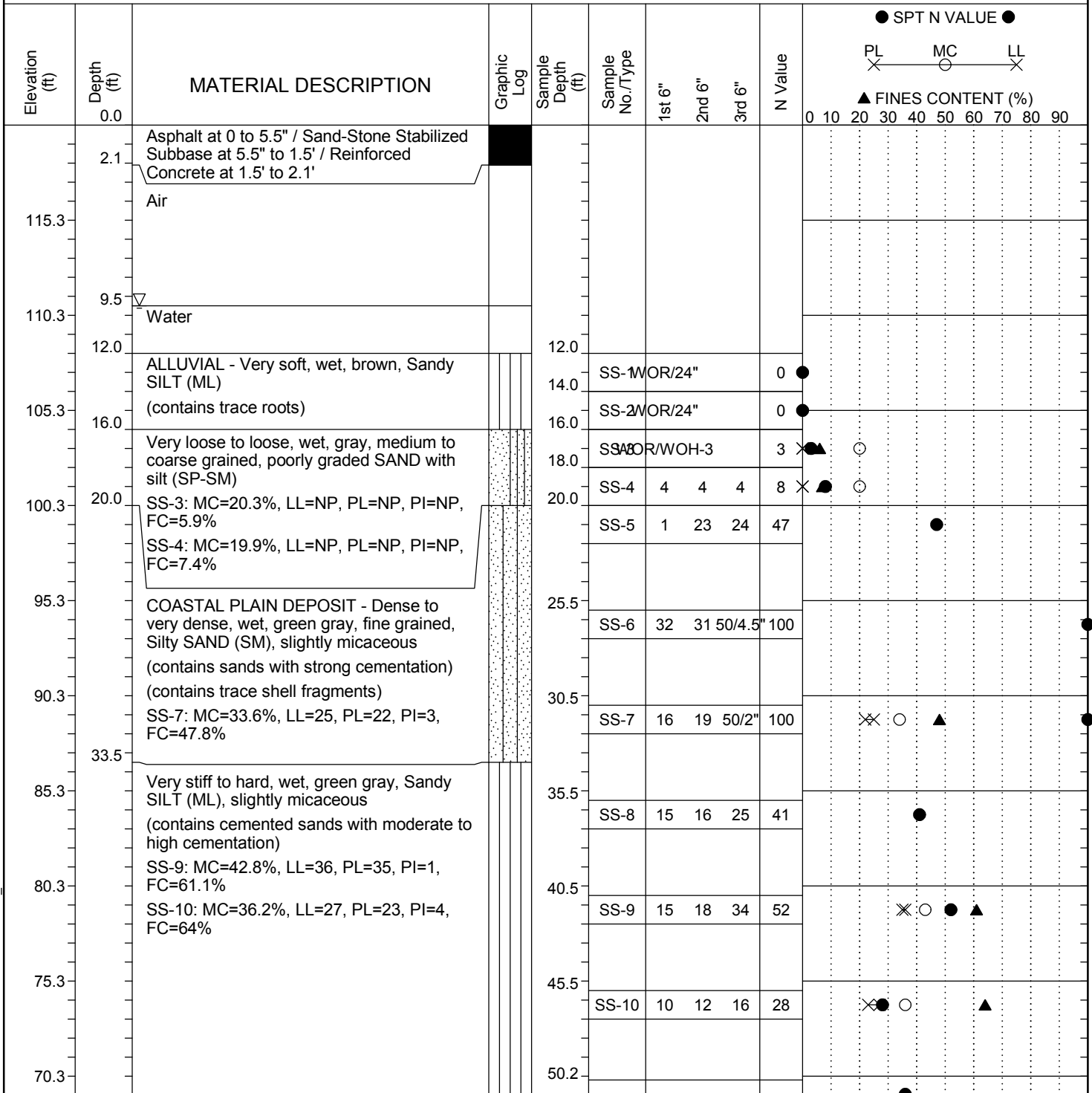
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-7A	Boring Location:	5951+87.63	Offset:	8.39 R	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6481	Date Started:	12/6/2014	
Total Depth:	132 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/6/2014	
Bore Hole Diameter (in):		4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.5 ft	24HR	



LEGEND

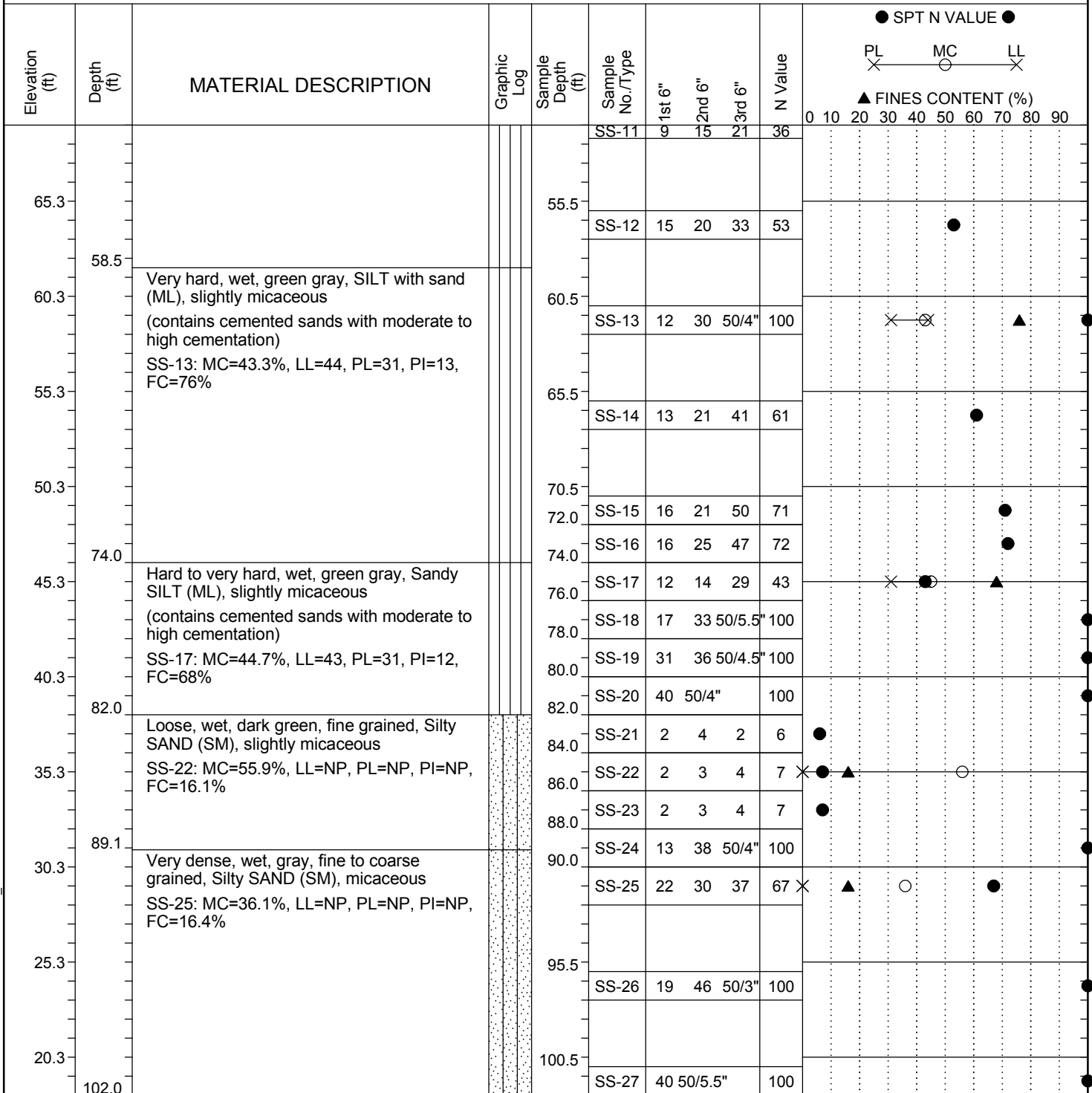
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-7A	Boring Location:	5951+87.63	Offset:	8.39 R	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6481	Date Started:	12/6/2014	
Total Depth:	132 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/6/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB 9.5 ft	24HR		



LEGEND

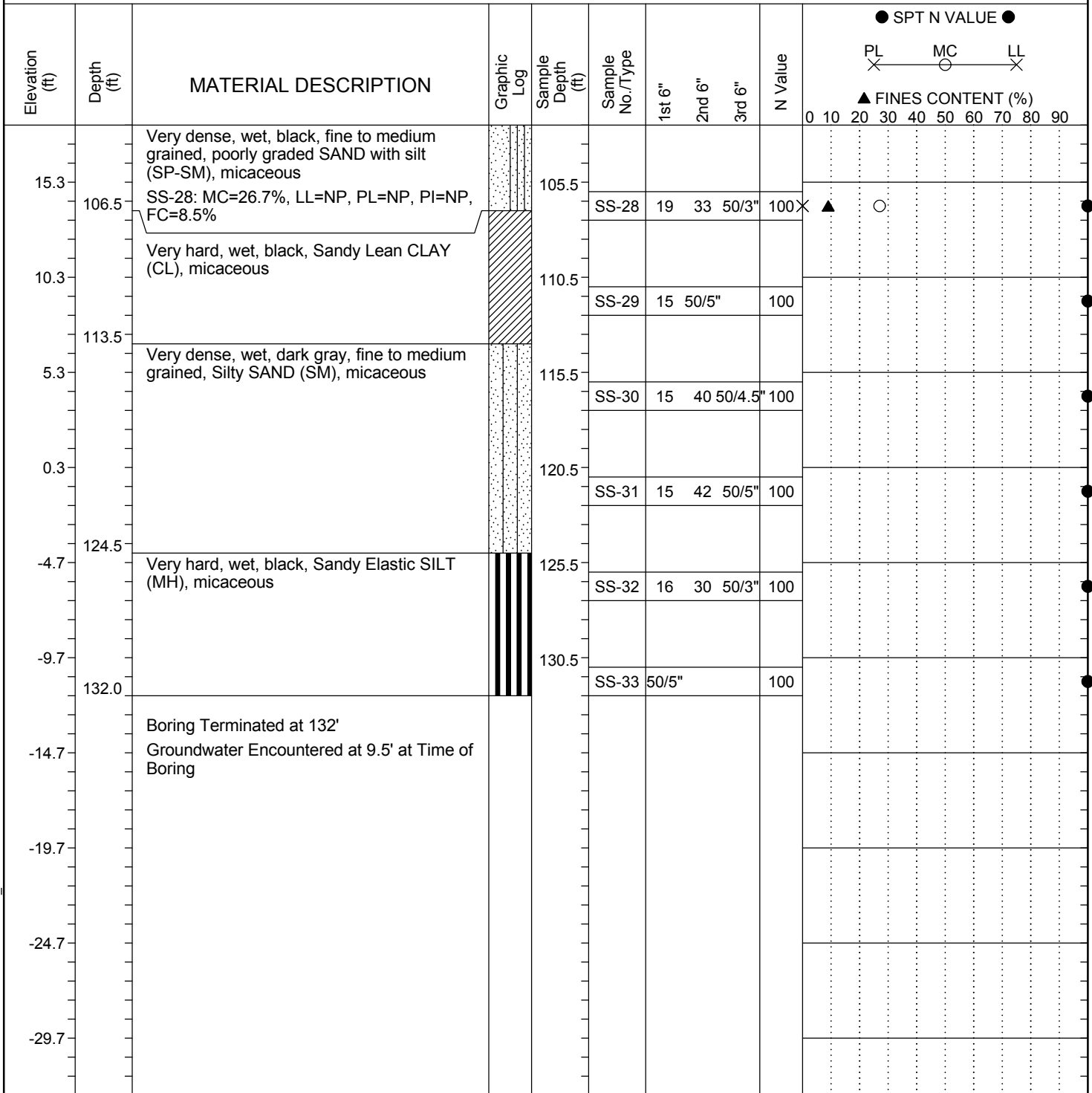
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SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	B. Livingston	
Site Description:						Bridge Replacement Over Four Hole Swamp	Route:	US301
Boring No.:	B-7A	Boring Location:	5951+87.63	Offset:	8.39 R	Alignment:	Proposed	
Elev.:	120.3 ft	Latitude:	33.4575	Longitude:	-80.6481	Date Started:	12/6/2014	
Total Depth:	132 ft	Soil Depth:	120 ft	Core Depth:	ft	Date Completed:	12/6/2014	
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	Mud Rotary	Hammer Type:	Safety Hammer	Energy Ratio:	76.4%	
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	9.5 ft	24HR	



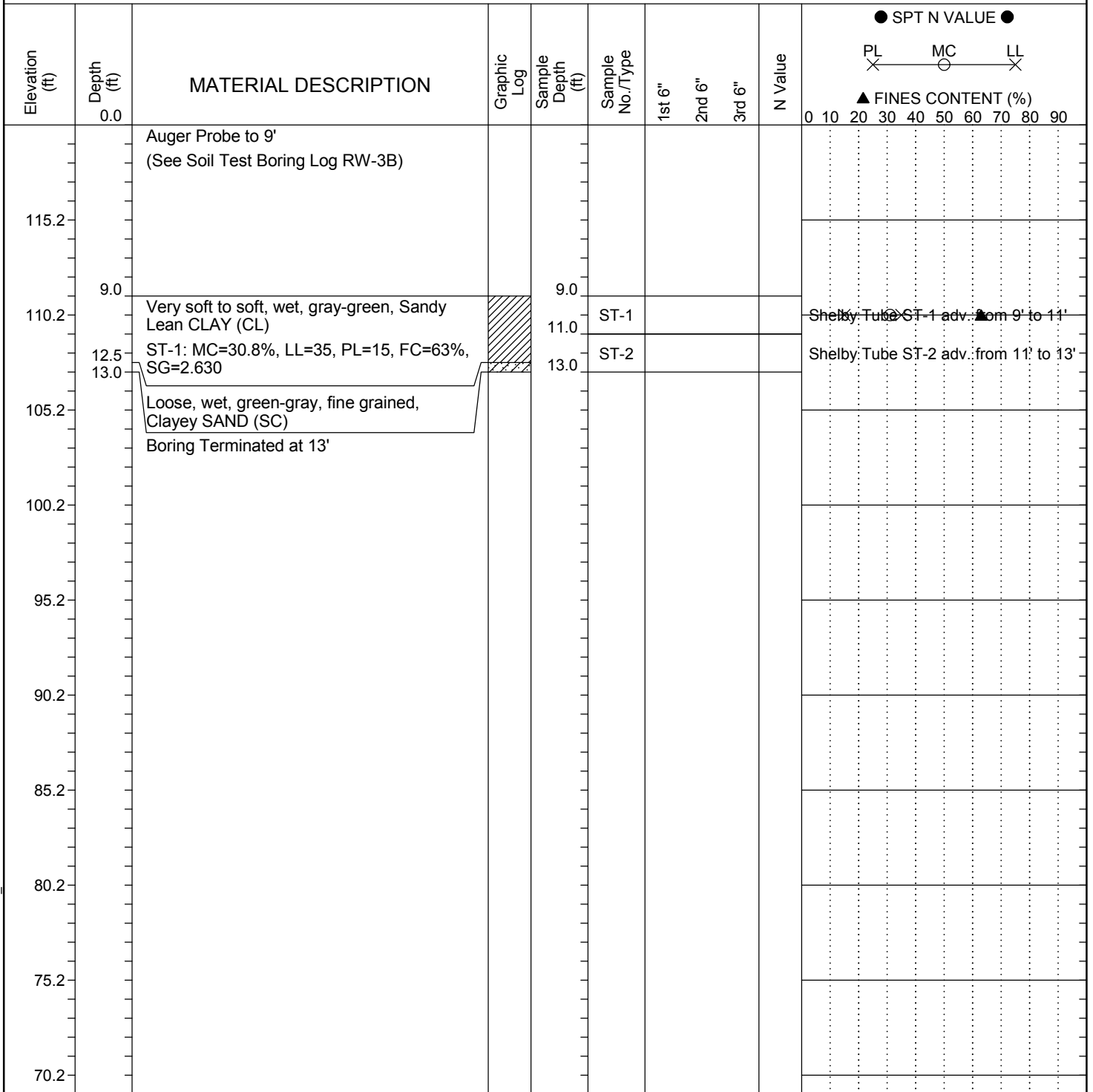
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_0451644 SCDOT FIVE CHOP ROAD.GPJ SC_DOT.GDT 2/24/15

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	R. Cannarella
Site Description: Bridge Replacement Over Four Hole Swamp						Route:	US301
Boring No.:	RW-3A	Boring Location:	5948+81.36	Offset:	7.49 L	Alignment:	Proposed
Elev.:	120.2 ft	Latitude:		Longitude:		Date Started:	01/29/2015
Total Depth:	13 ft	Soil Depth:	13 ft	Core Depth:	ft	Date Completed:	1/29/2015
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 45D	Drill Method:	HSA	Hammer Type:	Safety Hammer	Energy Ratio:	91.3%
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB	24HR	

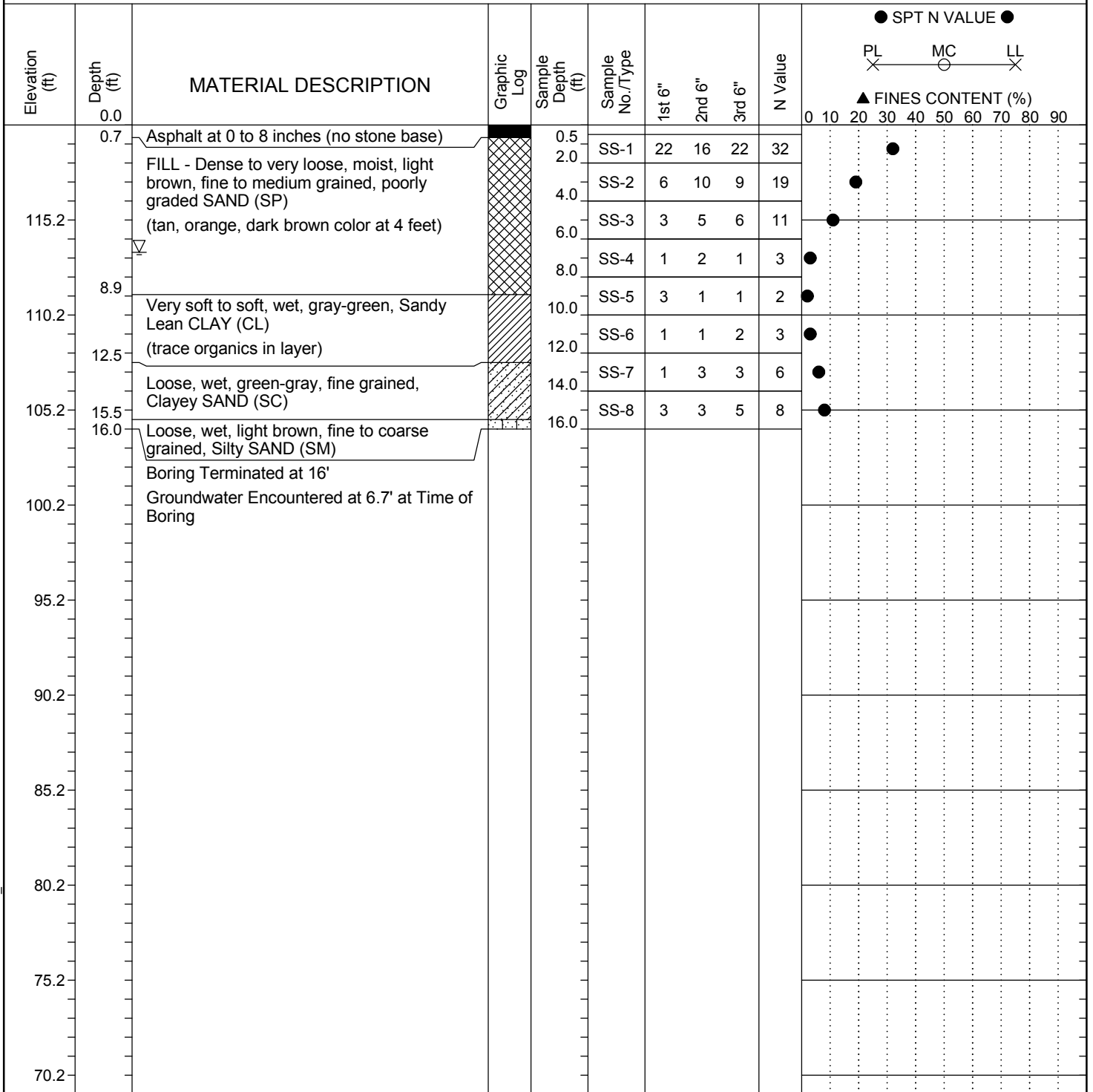


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.:	38-40308.2	Project No. (PIN):	0040308	County:	Orangeburg	Eng./Geo.:	R. Cannarella
Site Description: Bridge Replacement Over Four Hole Swamp						Route:	US301
Boring No.:	RW-3B	Boring Location:	5948+82.94	Offset:	7.41L	Alignment:	Proposed
Elev.:	120.2 ft	Latitude:		Longitude:		Date Started:	01/29/2015
Total Depth:	16 ft	Soil Depth:	16 ft	Core Depth:	ft	Date Completed:	1/29/2015
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME45D	Drill Method:	HSA	Hammer Type:	Safety Hammer	Energy Ratio:	91.3%
Core Size:		Driller:	Carolina Drilling	Groundwater:	TOB 6.7 ft	24HR	



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

In-Situ Soil Testing, L.C.

Page 1a

JOB FILE: US Route 301 Bridge over Four Hole Swamp

FILE NO. : 2014-68

LOCATION: Orangeburg, SC

SNDG.BY : R. Failmezger

SNDG. DATE: 12/9/14

ANAL.BY : Roger Failmezger, P.E.

ANAL. DATE: 12/9/14

ANALYSIS PARAMETERS: LO RANGE = 9.50 BARS ROD DIAM. = 3.6 CM BL.THICK. = 15.0 MM SU FACTOR = 1
 SURF.ELEV. = 37.3 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.4 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1
 WATER DEPTH = 2.9 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.5 KGF/M DELTA-A = 0.18 BARS OCR FACTOR = 1
 SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA/PHI = 0.5 DELTA-B = 0.63 BARS M FACTOR = 1
 MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
 UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	ELEV (M)	THRUST (KGF)	A (BAR)	B (BAR)	C (BAR)	DA (BAR)	DB (BAR)	ZMRNG (BAR)	ZMLO (BAR)	ZMHI (BAR)	ZMCAL (BAR)	P0 (BAR)	P1 (BAR)	P2 (BAR)	U0 (BAR)	GAMMA (T/M3)	SVP (BAR)
0.60	36.70	7500	12.72	41.59		0.18	0.63	9.50	0.00	0.00	0.00	11.50	40.96		0.000	2.15	0.105
0.80	36.50	5000	9.85	29.12		0.18	0.63	9.50	0.00	0.00	0.00	9.11	28.49		0.000	2.15	0.147
1.00	36.30	2910	5.47	18.55		0.18	0.63	9.50	0.00	0.00	0.00	5.04	17.92		0.000	2.00	0.188
1.20	36.10	2490	4.50	15.29		0.18	0.63	9.50	0.00	0.00	0.00	4.18	14.66		0.000	2.00	0.227
1.40	35.90	2030	4.02	13.33		0.18	0.63	9.50	0.00	0.00	0.00	3.78	12.70		0.000	1.90	0.265
1.60	35.70	1530	2.69	10.64		0.18	0.63	9.50	0.00	0.00	0.00	2.51	10.01		0.000	1.90	0.303
1.80	35.50	1330	2.24	9.45		0.18	0.63	9.50	0.00	0.00	0.00	2.10	8.82		0.000	1.90	0.340
2.00	35.30	1260	2.40	8.90		0.18	0.63	9.50	0.00	0.00	0.00	2.30	8.27		0.000	1.90	0.377
2.20	35.10	970	1.55	7.43		0.18	0.63	9.50	0.00	0.00	0.00	1.48	6.80		0.000	1.80	0.414
2.40	34.90	740	1.02	5.43		0.18	0.63	9.50	0.00	0.00	0.00	1.02	4.80		0.000	1.80	0.449
2.60	34.70	760	1.36	7.27		0.18	0.63	9.50	0.00	0.00	0.00	1.29	6.64		0.000	1.80	0.484
2.80	34.50	340	1.54	2.89		0.18	0.63	9.50	0.00	0.00	0.00	1.69	2.26		0.000	1.60	0.518
3.00	34.30	340	2.26	5.05		0.18	0.63	9.50	0.00	0.00	0.00	2.34	4.42		0.010	1.70	0.540
3.20	34.10	480	2.91	6.52		0.18	0.63	9.50	0.00	0.00	0.00	2.95	5.89		0.029	1.70	0.554
3.40	33.90	650	3.09	6.75		0.18	0.63	9.50	0.00	0.00	0.00	3.13	6.12		0.049	1.80	0.569
3.60	33.70	1150	4.37	10.05		0.18	0.63	9.50	0.00	0.00	0.00	4.31	9.42		0.069	1.80	0.584
3.80	33.50	3330	2.88	16.75		0.18	0.63	9.50	0.00	0.00	0.00	2.41	16.12		0.088	1.90	0.601
4.00	33.30	5890	10.69	36.57		0.18	0.63	9.50	0.00	0.00	0.00	9.62	35.94		0.108	2.15	0.621
4.20	33.10	6280	14.39	41.59		0.18	0.63	9.50	0.00	0.00	0.00	13.25	40.96		0.128	2.15	0.644
4.40	32.90	5800	13.20	35.68		0.18	0.63	9.50	0.00	0.00	0.00	12.30	35.05		0.147	2.15	0.666
4.60	32.70	5640	12.41	35.61		0.18	0.63	9.50	0.00	0.00	0.00	11.47	34.98		0.167	2.15	0.689

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)

In-Situ Soil Testing, L.C.
 JOB FILE: US Route 301 Bridge over Four Hole Swamp
 LOCATION: Orangeburg, SC
 SNDG.BY : R. Failmezger
 ANAL.BY : Roger Failmezger, P.E.

SNDG. NO. : DMT-1

Page 1b

FILE NO. :2014-68

SNDG. DATE: 12/9/14

ANAL. DATE: 12/9/14

ANALYSIS PARAMETERS: LO RANGE = 9.50 BARS ROD DIAM. = 3.6 CM BL.THICK. = 15.0 MM SU FACTOR = 1
 SURF.ELEV. = 37.3 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.4 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1
 WATER DEPTH = 2.9 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.5 KGF/M DELTA-A = 0.18 BARS OCR FACTOR = 1
 SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA / PHI = 0.5 DELTA-B = 0.63 BARS M FACTOR = 1
 MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
 UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	ELEV (M)	KD	ID	UD	ED (BAR)	K0	SU (BAR)	QD (BAR)	PHI (DEG)	SIGFF (BAR)	PHIO (DEG)	PC (BAR)	OCR	M (BAR)	SOIL TYPE
0.60	36.70	109.50	2.56		1022	12.83		241.4	48.1	0.18	44.8	93.44	889.9	4872	SILTY SAND
0.80	36.50	61.87	2.13		673	7.32		155.1	45.5	0.25	42.3	49.87	338.8	2842	SILTY SAND
1.00	36.30	26.80	2.56		447	3.14		93.0	44.8	0.32	41.8	12.78	68.0	1535	SILTY SAND
1.20	36.10	18.40	2.51		364	2.16		80.9	44.2	0.39	41.5	7.52	33.1	1119	SILTY SAND
1.40	35.90	14.22	2.36		310	1.72		64.7	42.9	0.45	40.2	5.63	21.2	877	SILTY SAND
1.60	35.70	8.30	2.98		260	1.04		51.3	42.2	0.51	39.7	2.34	7.7	608	SILTY SAND
1.80	35.50	6.18	3.20		233	0.82		45.5	41.4	0.57	39.0	1.59	4.7	485	SILTY SAND
2.00	35.30	6.08	2.60		207	0.85		41.9	40.3	0.62	37.9	1.85	4.9	426	SILTY SAND
2.20	35.10	3.57	3.61		185	0.58		34.4	39.2	0.68	37.0	0.89	2.1	297	SAND
2.40	34.90	2.27	3.71		131	0.47		27.4	37.6	0.72	35.3	0.58	1.3	159	SAND
2.60	34.70	2.65	4.17		186	0.54		27.1	36.8	0.77	34.6	0.81	1.7	250	SAND
2.80	34.50	3.27	0.33		20	0.84	0.21					1.11	2.2	27	CLAY
3.00	34.30	4.32	0.89		72	1.04						1.79	3.3	119	CLAYEY SILT
3.20	34.10	5.27	1.01		102	1.21						2.51	4.5	190	SILT
3.40	33.90	5.41	0.97		104	1.23						2.69	4.7	196	SILT
3.60	33.70	7.25	1.21		177	1.14		30.1	34.8	0.92	32.9	4.84	8.3	387	SANDY SILT
3.80	33.50	3.86	5.91		476	0.33		128.6	45.4	1.03	44.1	0.57	0.9	796	SAND
4.00	33.30	15.31	2.77		913	1.82		194.0	43.7	1.05	42.3	14.65	23.6	2652	SILTY SAND
4.20	33.10	20.38	2.11		962	2.49		190.9	42.4	1.08	41.1	28.22	43.8	3052	SILTY SAND
4.40	32.90	18.23	1.87		790	2.24		176.8	42.2	1.11	40.9	23.68	35.5	2423	SILTY SAND
4.60	32.70	16.41	2.08		816	2.01		174.8	42.3	1.15	41.1	19.83	28.8	2422	SILTY SAND

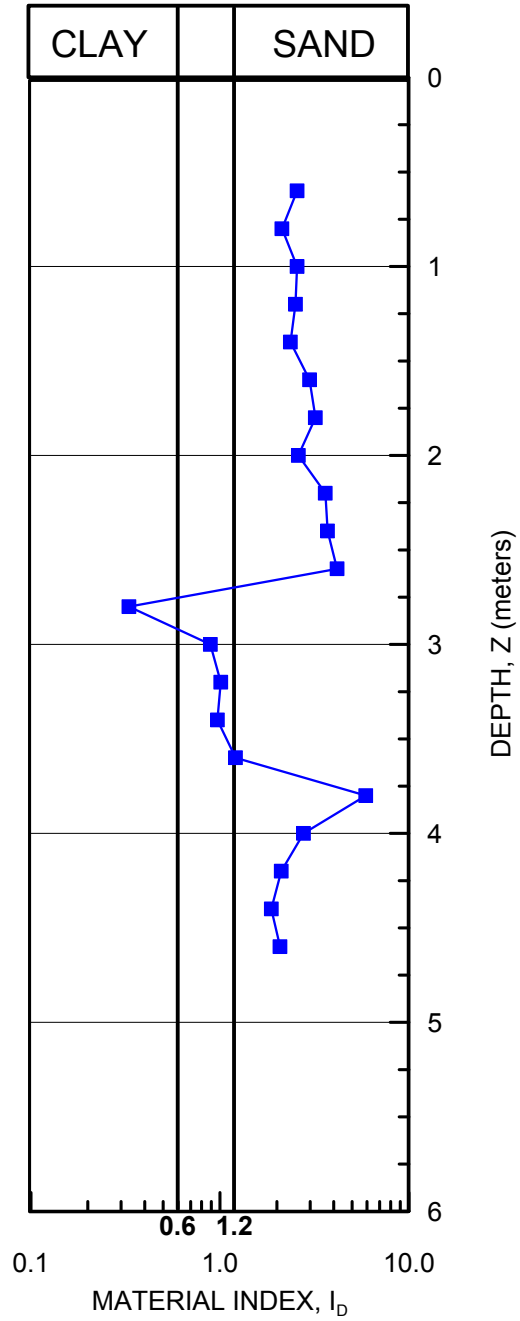
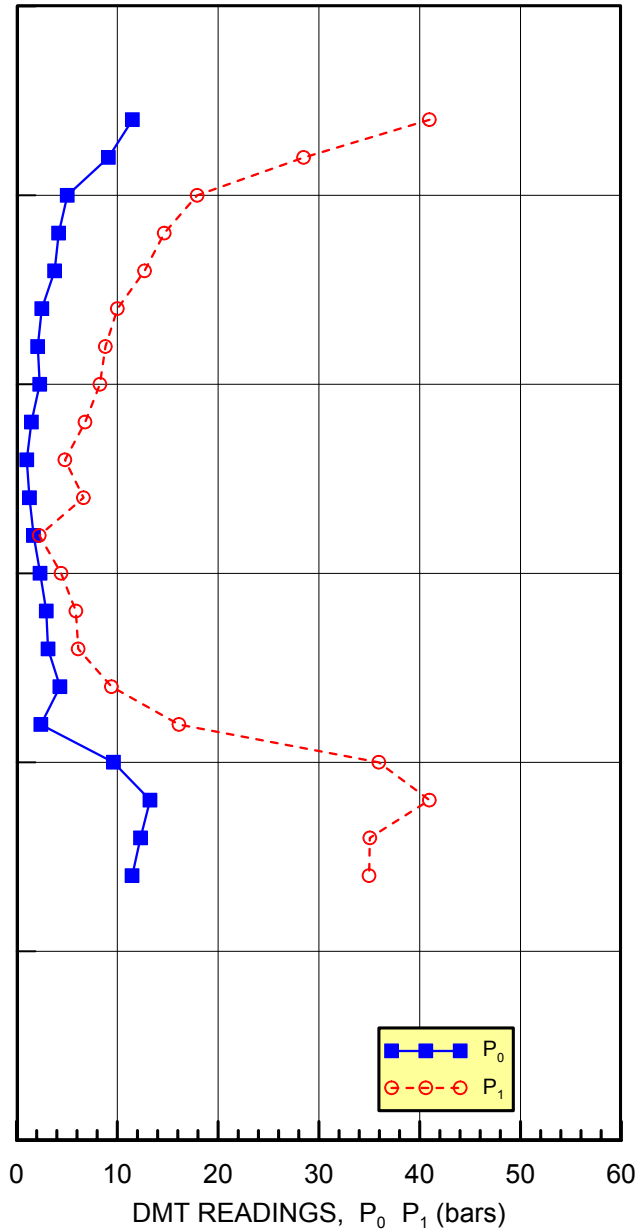
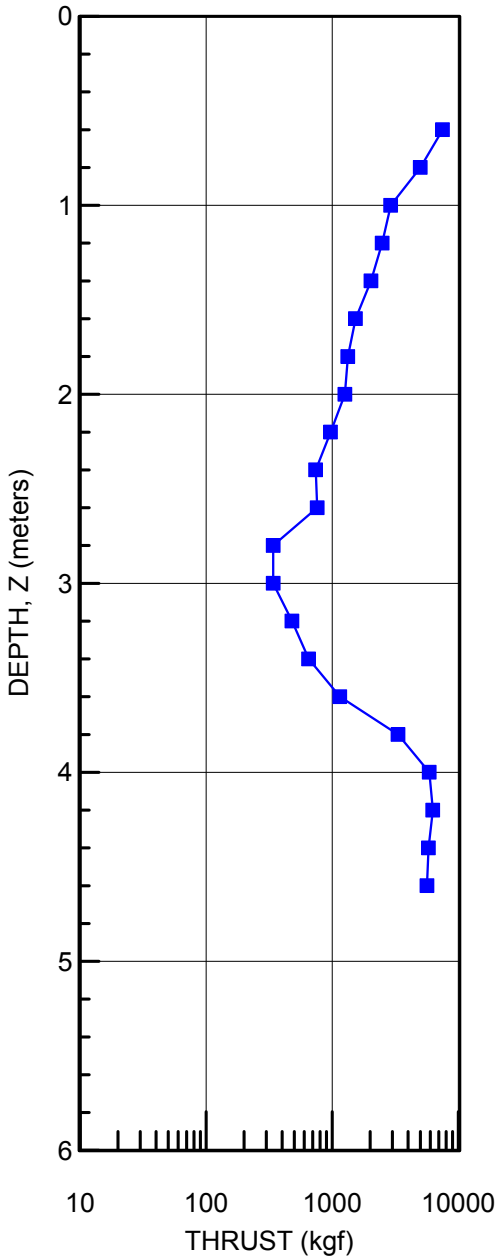
Ground Surface Elev.: ~37.3 m
Water Depth: ~2.9 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeizer
SOUNDING DATE: 12/9/14

DILATOMETER RESULTS

SOUNDING
DMT-1



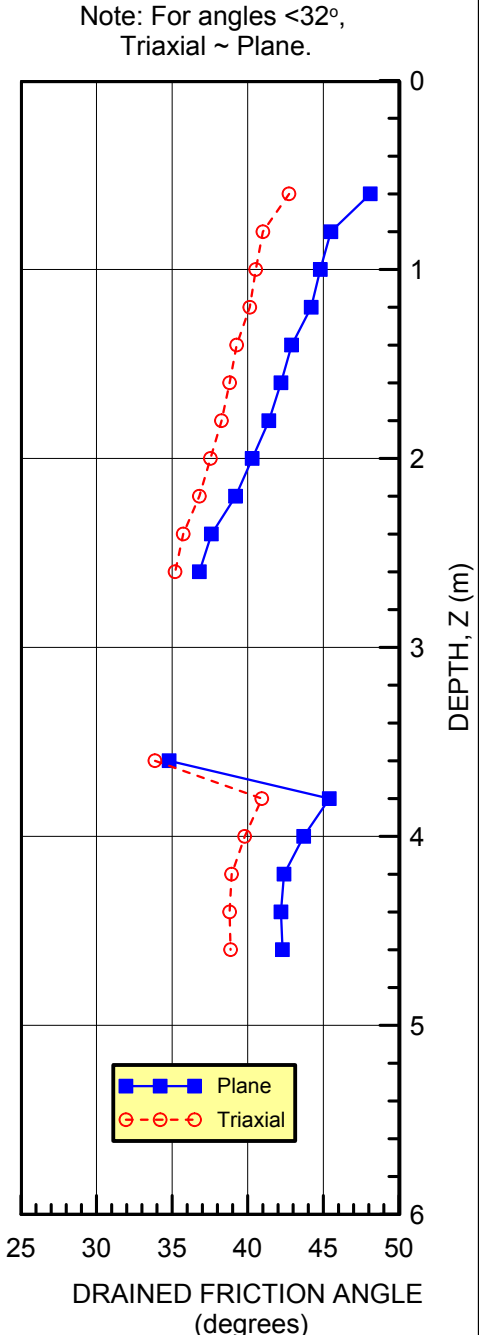
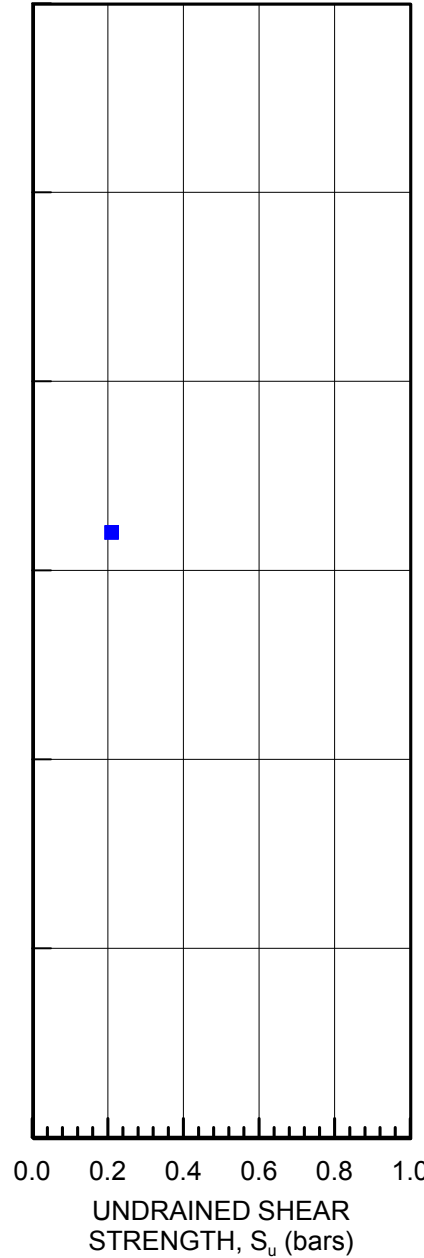
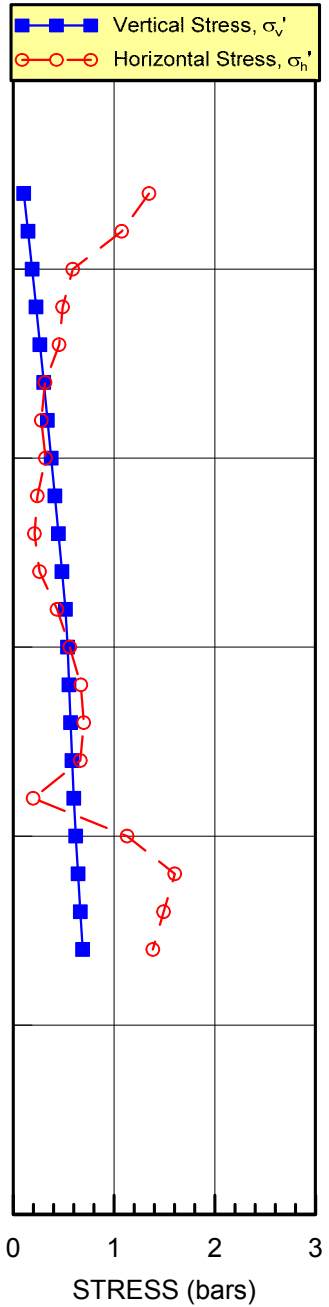
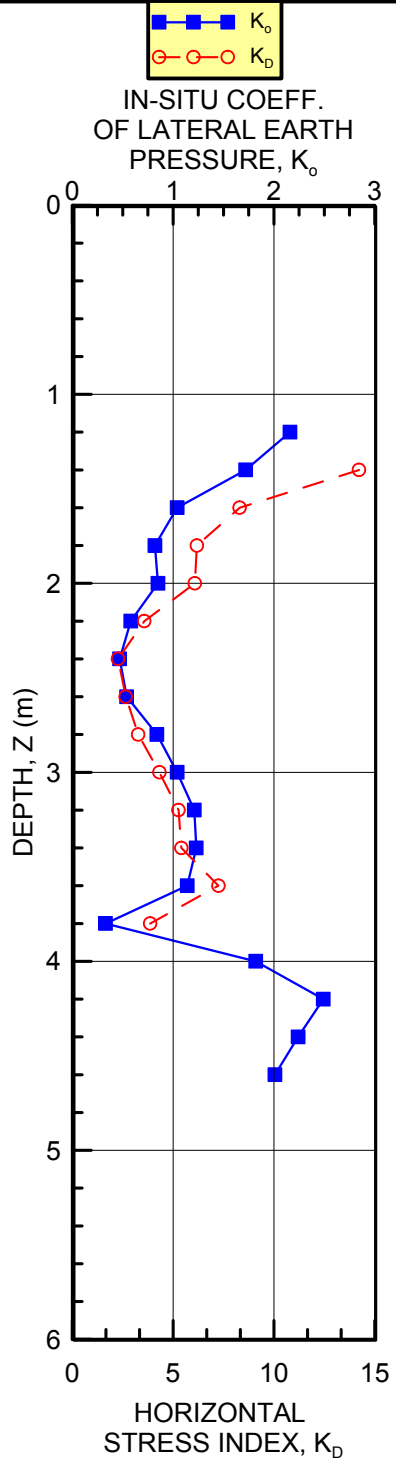
Ground Surface Elev: ~37.3 m
Water Depth: ~2.9 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeijer
SOUNDING DATE: 12/9/14

INTERPRETED DMT STRENGTH PARAMETERS

SOUNDING
DMT-1



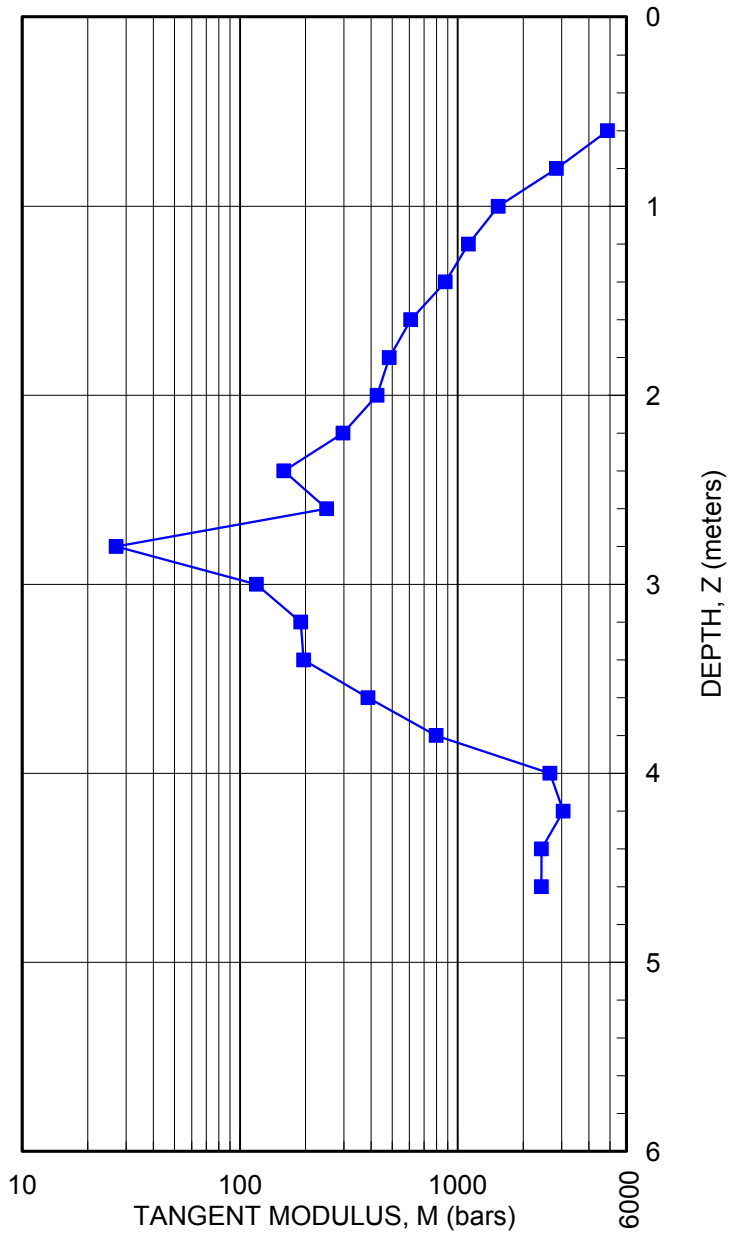
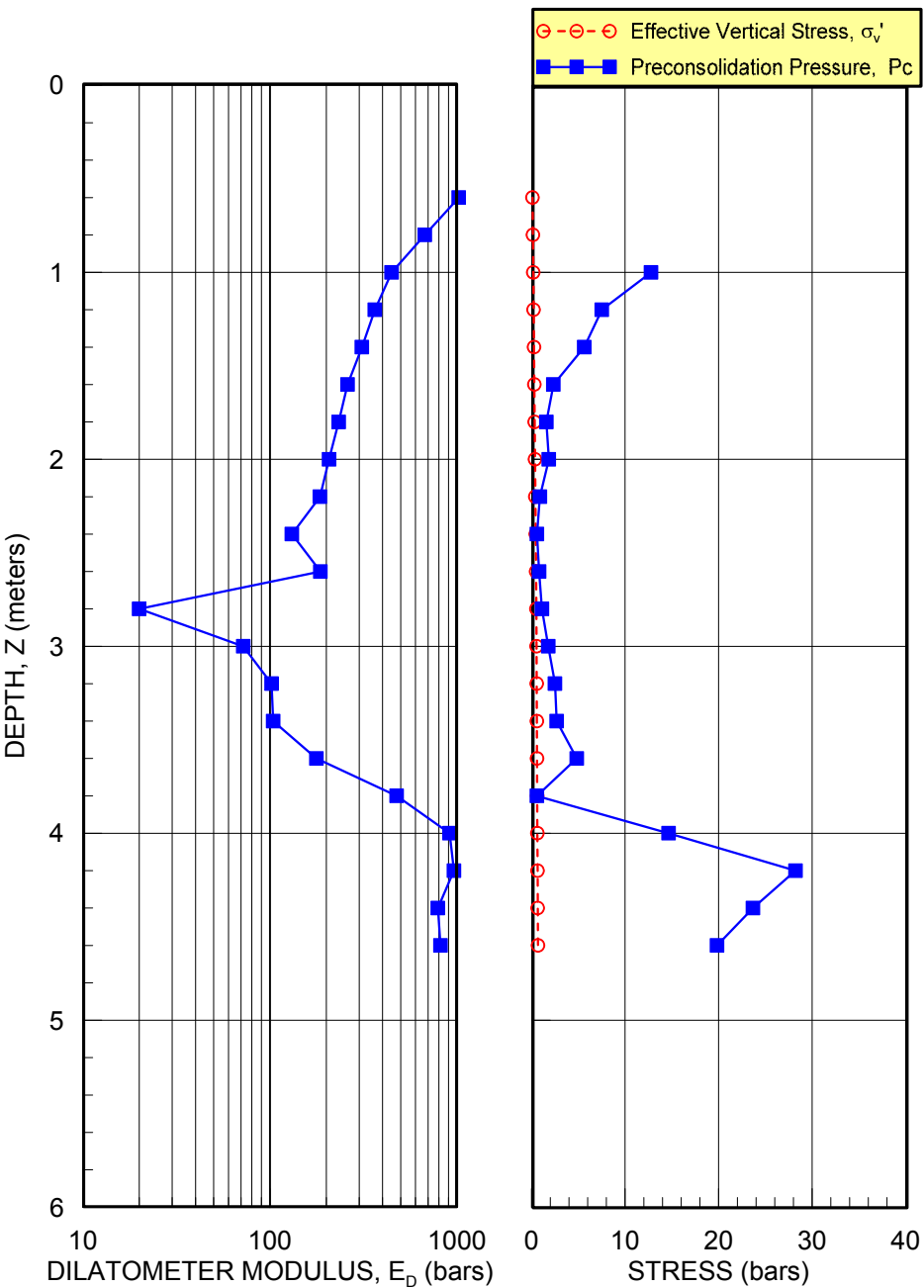
Ground Surface Elev.: ~37.3 m
Water Depth: ~2.9 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeijer
SOUNDING DATE: 12/9/14

INTERPRETED DMT DEFORMATION PARAMETERS

SOUNDING
DMT-1



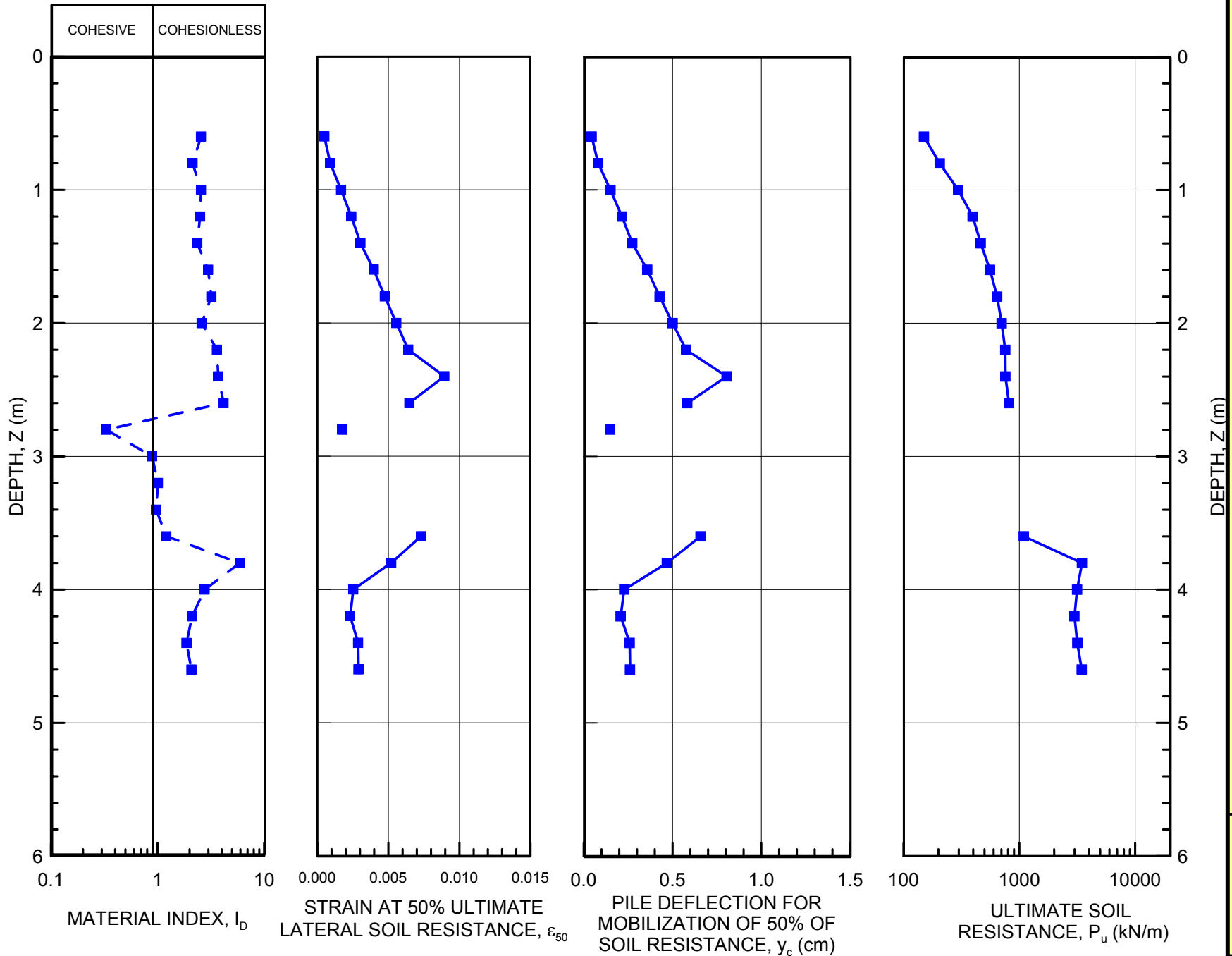
Pile Width/Diameter = 14 inches 36 cm

Ground Surface Elev: ~37.3 m
Water Depth: ~2.9 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmezzger
SOUNDING DATE: 12/9/14

SOUNDING
DMT-1



DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)

SNDG. NO. :DMT-2

In-Situ Soil Testing, L.C.

Page 1a

JOB FILE: US Route 301 Bridge over Four Hole Swamp

FILE NO. : 2014-68

LOCATION: Orangeburg, SC

SNDG.BY : R. Failmezger

SNDG. DATE: 12/9/14

ANAL.BY : Roger Failmezger, P.E.

ANAL. DATE: 12/9/14

ANALYSIS PARAMETERS: LO RANGE = 9.50 BARS ROD DIAM. = 3.6 CM BL.THICK. = 15.0 MM SU FACTOR = 1
 SURF.ELEV. = 37.4 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.4 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1
 WATER DEPTH = 3.7 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.5 KGF/M DELTA-A = 0.23 BARS OCR FACTOR = 1
 SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA/PHI = 0.5 DELTA-B = 0.36 BARS M FACTOR = 1
 MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
 UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	ELEV (M)	THRUST (KGF)	A (BAR)	B (BAR)	C (BAR)	DA (BAR)	DB (BAR)	ZMRNG (BAR)	ZMLO (BAR)	ZMHI (BAR)	ZMCAL (BAR)	P0 (BAR)	P1 (BAR)	P2 (BAR)	U0 (BAR)	GAMMA (T/M3)	SVP (BAR)
0.40	37.00	4540	6.15	25.29		0.23	0.36	9.50	0.00	0.00	0.00	5.45	24.93		0.000	2.00	0.070
0.60	36.80	4150	7.41	26.61		0.23	0.36	9.50	0.00	0.00	0.00	6.71	26.25		0.000	2.00	0.109
0.80	36.60	1980	5.06	12.41		0.23	0.36	9.50	0.00	0.00	0.00	4.95	12.05		0.000	1.80	0.147
1.00	36.40	1580	2.93	10.00		0.23	0.36	9.50	0.00	0.00	0.00	2.84	9.64		0.000	1.90	0.183
1.20	36.20	1720	3.22	12.15		0.23	0.36	9.50	0.00	0.00	0.00	3.03	11.79		0.000	1.90	0.220
1.40	36.00	1700	2.64	11.34		0.23	0.36	9.50	0.00	0.00	0.00	2.46	10.98		0.000	1.90	0.257
1.60	35.80	1450	2.56	10.41		0.23	0.36	9.50	0.00	0.00	0.00	2.43	10.05		0.000	1.90	0.295
1.80	35.60	970	2.20	8.02		0.23	0.36	9.50	0.00	0.00	0.00	2.17	7.66		0.000	1.90	0.332
2.00	35.40	640	1.36	5.27		0.23	0.36	9.50	0.00	0.00	0.00	1.42	4.91		0.000	1.80	0.368
2.20	35.20	530	0.85	4.50		0.23	0.36	9.50	0.00	0.00	0.00	0.93	4.14		0.000	1.70	0.403
2.40	35.00	520	0.71	4.77		0.23	0.36	9.50	0.00	0.00	0.00	0.77	4.41		0.000	1.70	0.436
2.70	34.70	660	1.67	6.62		0.23	0.36	9.50	0.00	0.00	0.00	1.68	6.26		0.000	1.80	0.488
2.80	34.60	700	1.35	6.49		0.23	0.36	9.50	0.00	0.00	0.00	1.35	6.13		0.000	1.80	0.505
3.00	34.40	460	1.52	2.85		0.23	0.36	9.50	0.00	0.00	0.00	1.71	2.49		0.000	1.60	0.539
3.20	34.20	200	0.88	1.73		0.23	0.36	9.50	0.00	0.00	0.00	1.10	1.37		0.000	1.50	0.569
3.40	34.00	180	0.81	1.57		0.23	0.36	9.50	0.00	0.00	0.00	1.03	1.21		0.000	1.50	0.598
3.70	33.70	1240	1.86	3.45		0.21	0.07	9.50	0.00	0.00	0.00	2.00	3.38		0.000	1.70	0.646
3.80	33.60	2200	6.36	14.79		0.21	0.07	9.50	0.00	0.00	0.00	6.16	14.72		0.010	1.95	0.654
4.00	33.40	5890	9.90	31.55		0.21	0.07	9.50	0.00	0.00	0.00	9.04	31.48		0.029	2.15	0.674
4.30	33.10	9270	19.98	50.38		0.21	0.07	9.50	0.00	0.00	0.00	18.68	50.31		0.059	2.10	0.707
4.40	33.00	9310	21.15	51.52		0.21	0.07	9.50	0.00	0.00	0.00	19.86	51.45		0.069	2.10	0.718
4.60	32.80	9300	23.41	52.41		0.21	0.07	9.50	0.00	0.00	0.00	22.18	52.34		0.088	2.10	0.740

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)

In-Situ Soil Testing, L.C.

JOB FILE: US Route 301 Bridge over Four Hole Swamp

LOCATION: Orangeburg, SC

SNDG.BY : R. Failmezger

ANAL.BY : Roger Failmezger, P.E.

SNDG. NO. : DMT-2

Page 1b

FILE NO. :2014-68

SNDG. DATE: 12/9/14

ANAL. DATE: 12/9/14

ANALYSIS PARAMETERS: LO RANGE = 9.50 BARS ROD DIAM. = 3.6 CM BL.THICK. = 15.0 MM SU FACTOR = 1
 SURF.ELEV. = 37.4 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.4 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1
 WATER DEPTH = 3.7 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.5 KGF/M DELTA-A = 0.23 BARS OCR FACTOR = 1
 SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA / PHI = 0.5 DELTA-B = 0.36 BARS M FACTOR = 1
 MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
 UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	ELEV (M)	KD	ID	UD	ED (BAR)	K0	SU (BAR)	QD (BAR)	PHI (DEG)	SIGFF (BAR)	PHIO (DEG)	PC (BAR)	OCR	M (BAR)	SOIL TYPE
0.40	37.00	77.89	3.57		676									3003	SAND
0.60	36.80	61.41	2.91		678	7.12		132.5	47.2	0.19	43.8	33.57	307.3	2860	SILTY SAND
0.80	36.60	33.79	1.43		246	4.09		55.4	42.6	0.25	39.0	17.24	117.6	900	SANDY SILT
1.00	36.40	15.51	2.40		236	1.85		50.7	43.6	0.31	40.4	4.45	24.4	688	SILTY SAND
1.20	36.20	13.78	2.89		304	1.65		55.7	43.3	0.37	40.4	4.30	19.5	852	SILTY SAND
1.40	36.00	9.57	3.46		295	1.13		58.2	43.7	0.44	41.0	2.39	9.3	728	SAND
1.60	35.80	8.23	3.14		265	1.04		48.4	42.1	0.49	39.5	2.26	7.7	617	SILTY SAND
1.80	35.60	6.53	2.53		191	0.94		30.6	38.9	0.54	36.3	1.97	5.9	403	SILTY SAND
2.00	35.40	3.87	2.45		121	0.69		21.1	36.6	0.59	33.9	1.05	2.8	198	SILTY SAND
2.20	35.20	2.30	3.47		111	0.52		19.2	35.8	0.64	33.2	0.60	1.5	136	SAND
2.40	35.00	1.76	4.75		126	0.46		19.6	35.5	0.69	33.1	0.49	1.1	125	SAND
2.70	34.70	3.45	2.72		159	0.68		21.3	34.8	0.77	32.4	1.28	2.6	247	SILTY SAND
2.80	34.60	2.68	3.53		166	0.57		24.5	35.7	0.80	33.6	0.91	1.8	225	SAND
3.00	34.40	3.18	0.45		27	0.82	0.21					1.11	2.1	36	SILTY CLAY
3.20	34.20	1.93	0.25		9	0.53	0.12					0.54	0.9	8	MUD
3.40	34.00	1.72	0.17		6	0.47	0.11					0.47	0.8	5	MUD
3.70	33.70	3.11	0.69		48	0.81						1.28	2.0	62	CLAYEY SILT
3.80	33.60	9.41	1.39		297	1.31		62.5	38.3	1.06	36.7	7.65	11.7	725	SANDY SILT
4.00	33.40	13.37	2.49		779	1.58		197.0	43.8	1.14	42.5	12.10	17.9	2160	SILTY SAND
4.30	33.10	26.33	1.70		1097	3.17		283.7	43.1	1.19	41.9	49.98	70.7	3749	SANDY SILT
4.40	33.00	27.55	1.60		1096	3.33		279.5	42.7	1.21	41.6	56.20	78.3	3793	SANDY SILT
4.60	32.80	29.87	1.36		1046	3.64		267.3	42.1	1.24	40.9	69.73	94.3	3700	SANDY SILT

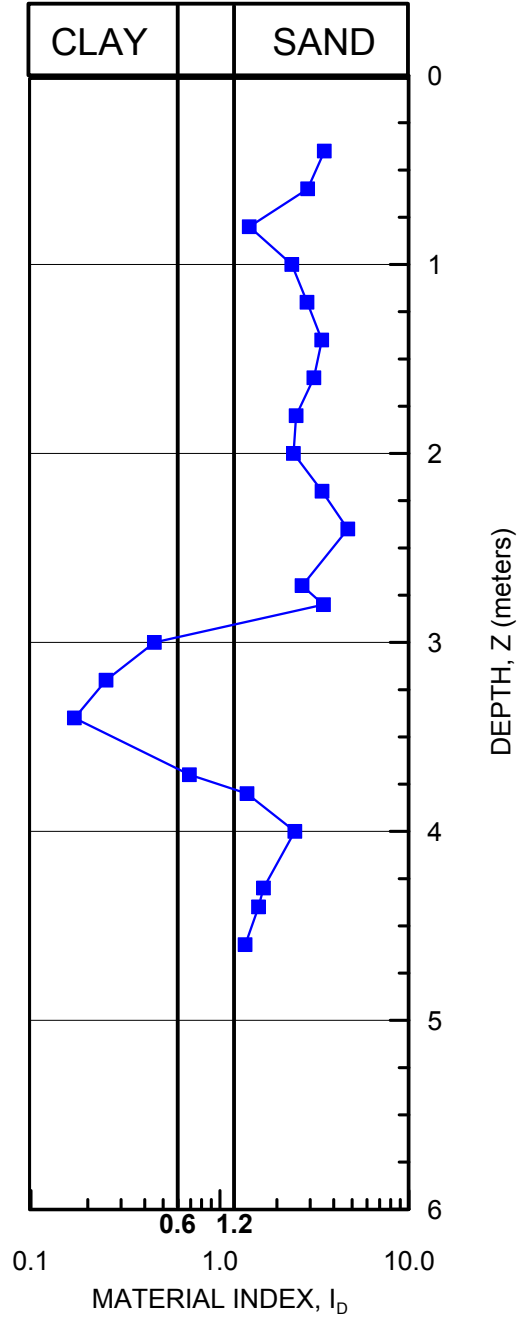
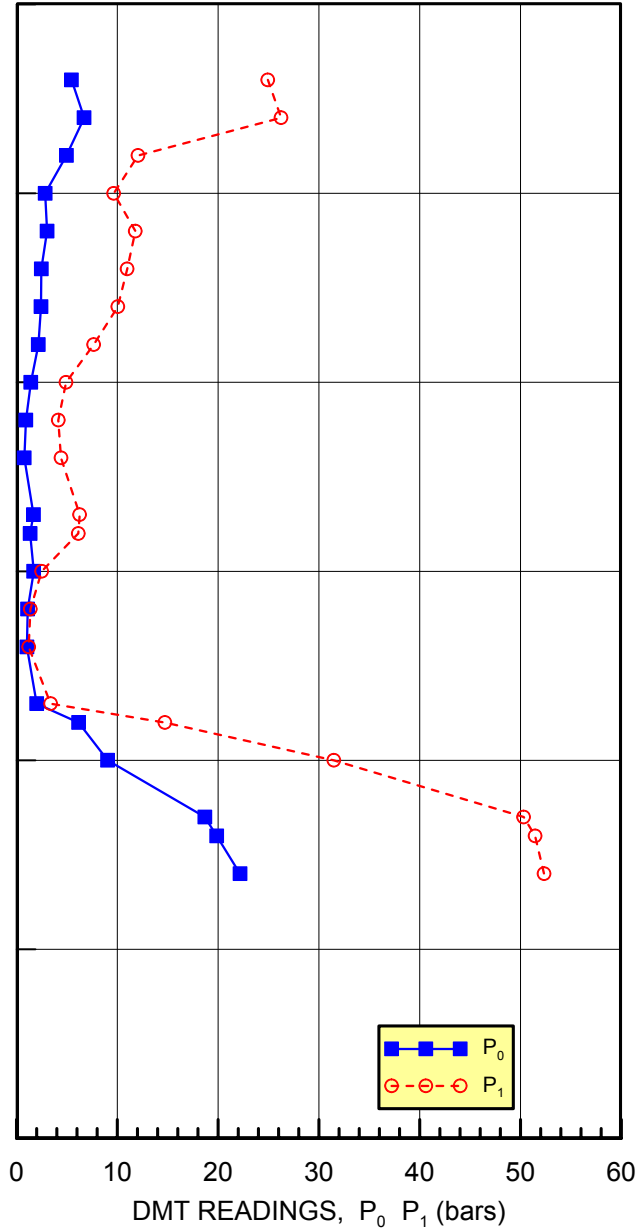
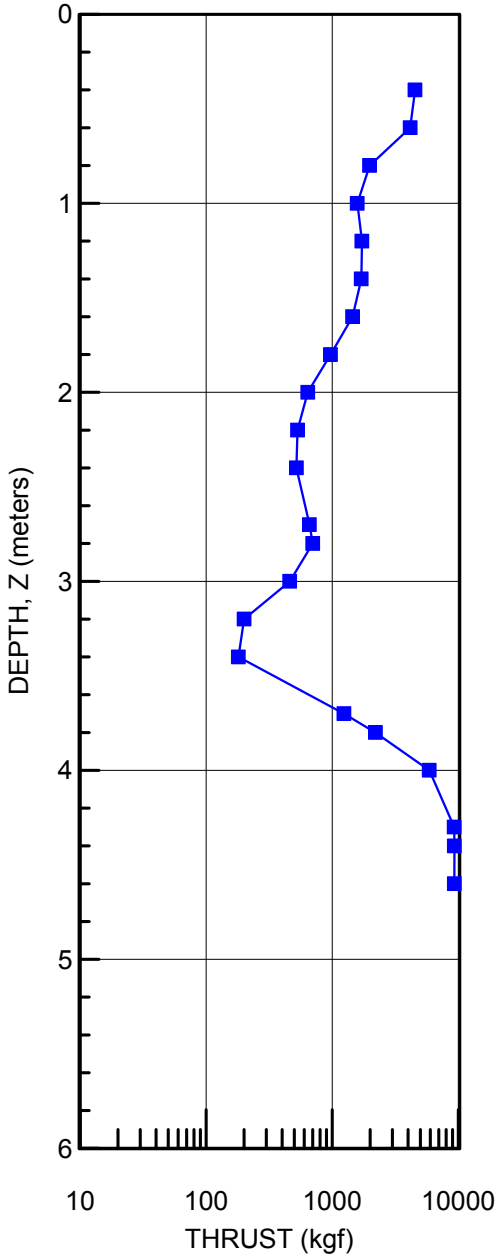
Ground Surface Elev.: ~37.4 m
Water Depth: ~3.7 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeizer
SOUNDING DATE: 12/9/14

DILATOMETER RESULTS

SOUNDING
DMT-2



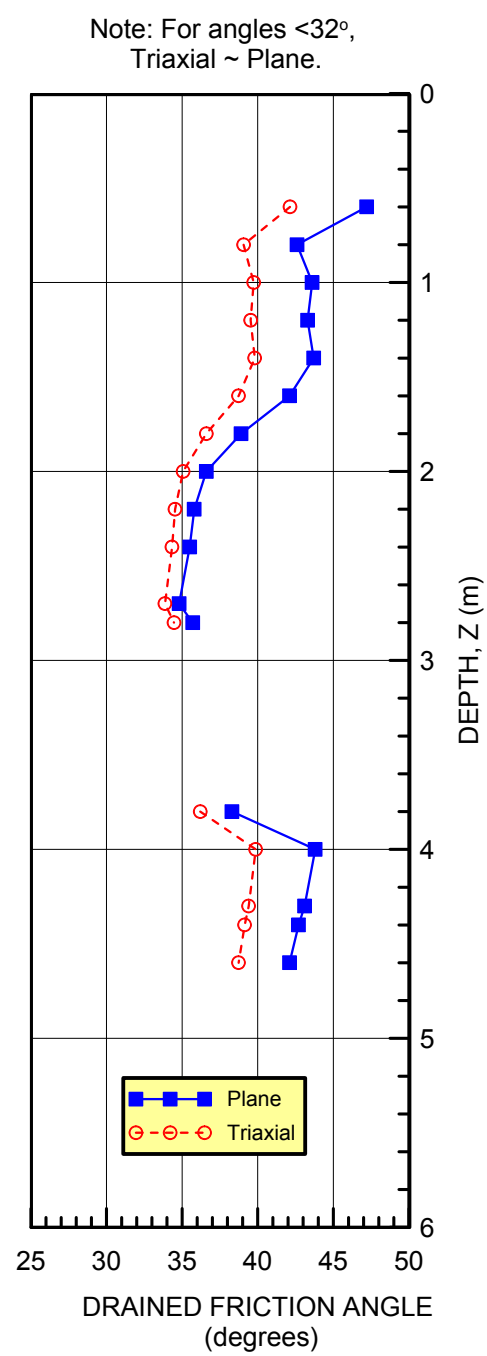
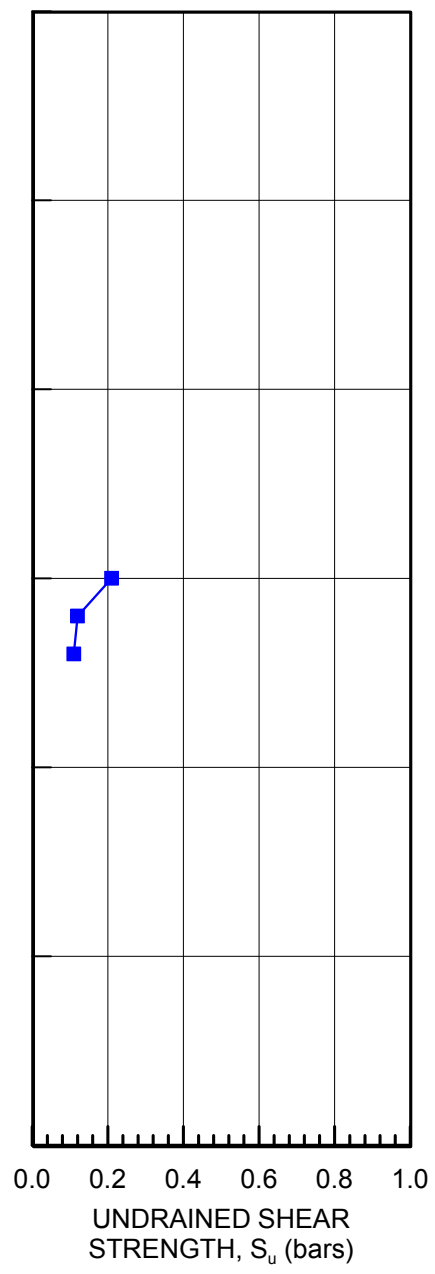
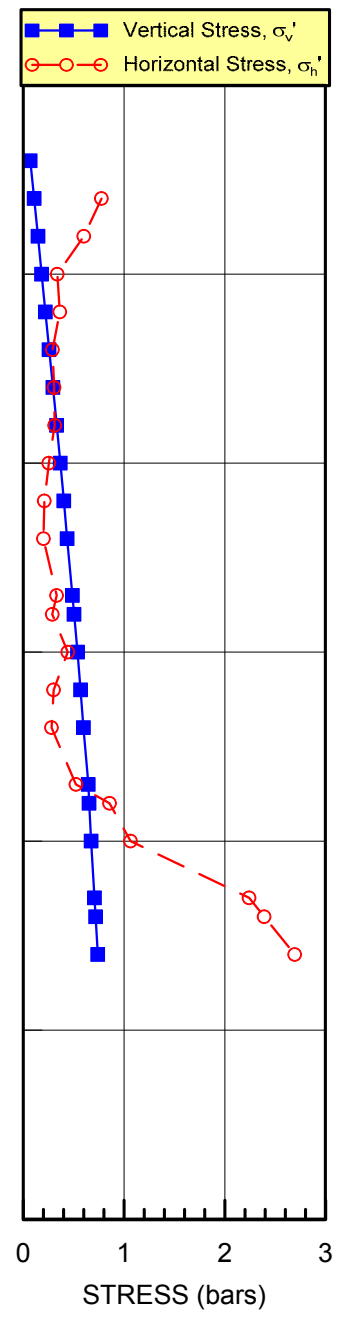
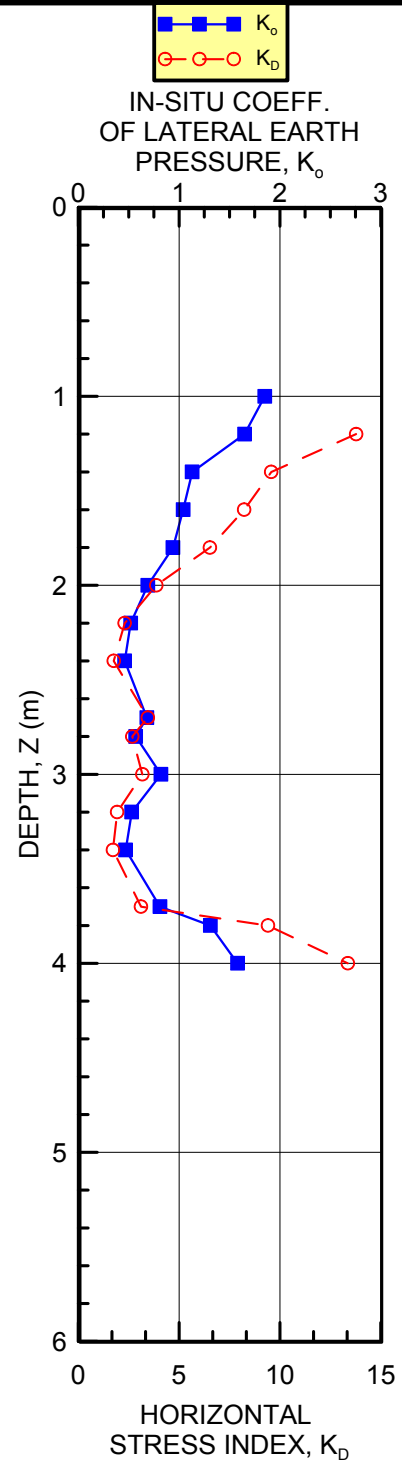
Ground Surface Elev: ~37.4 m
Water Depth: ~3.7 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeijer
SOUNDING DATE: 12/9/14

INTERPRETED DMT STRENGTH PARAMETERS

SOUNDING
DMT-2



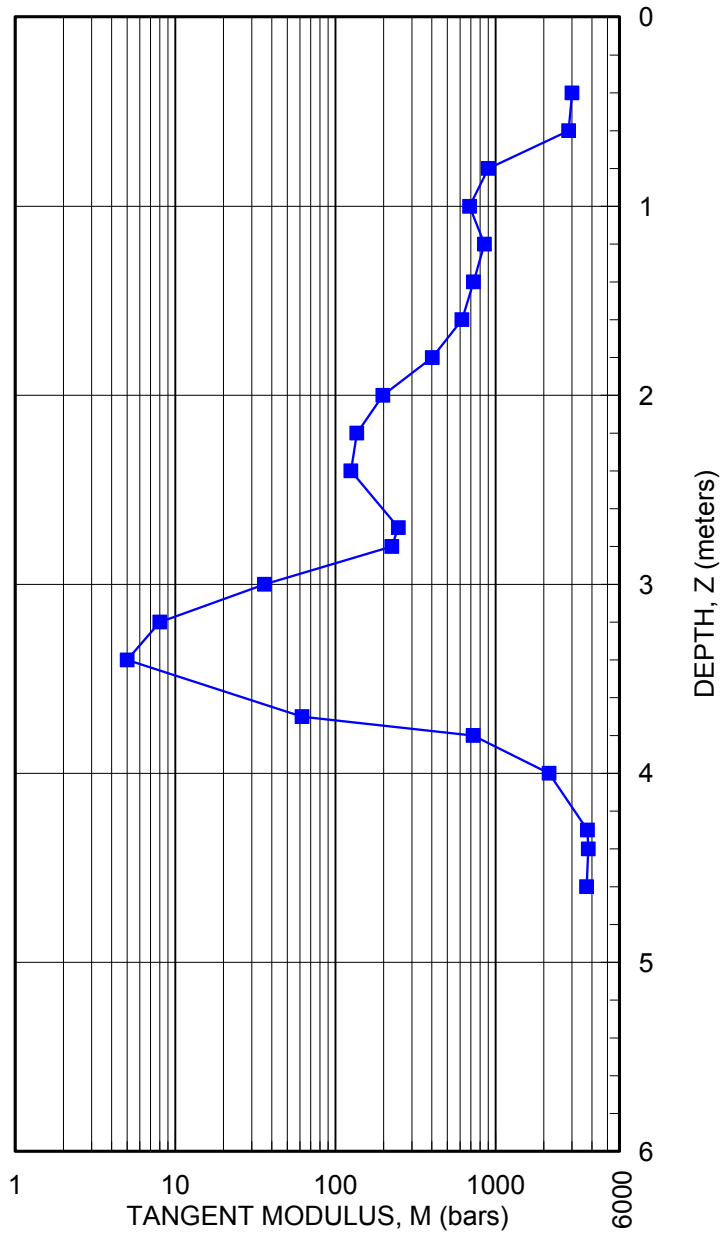
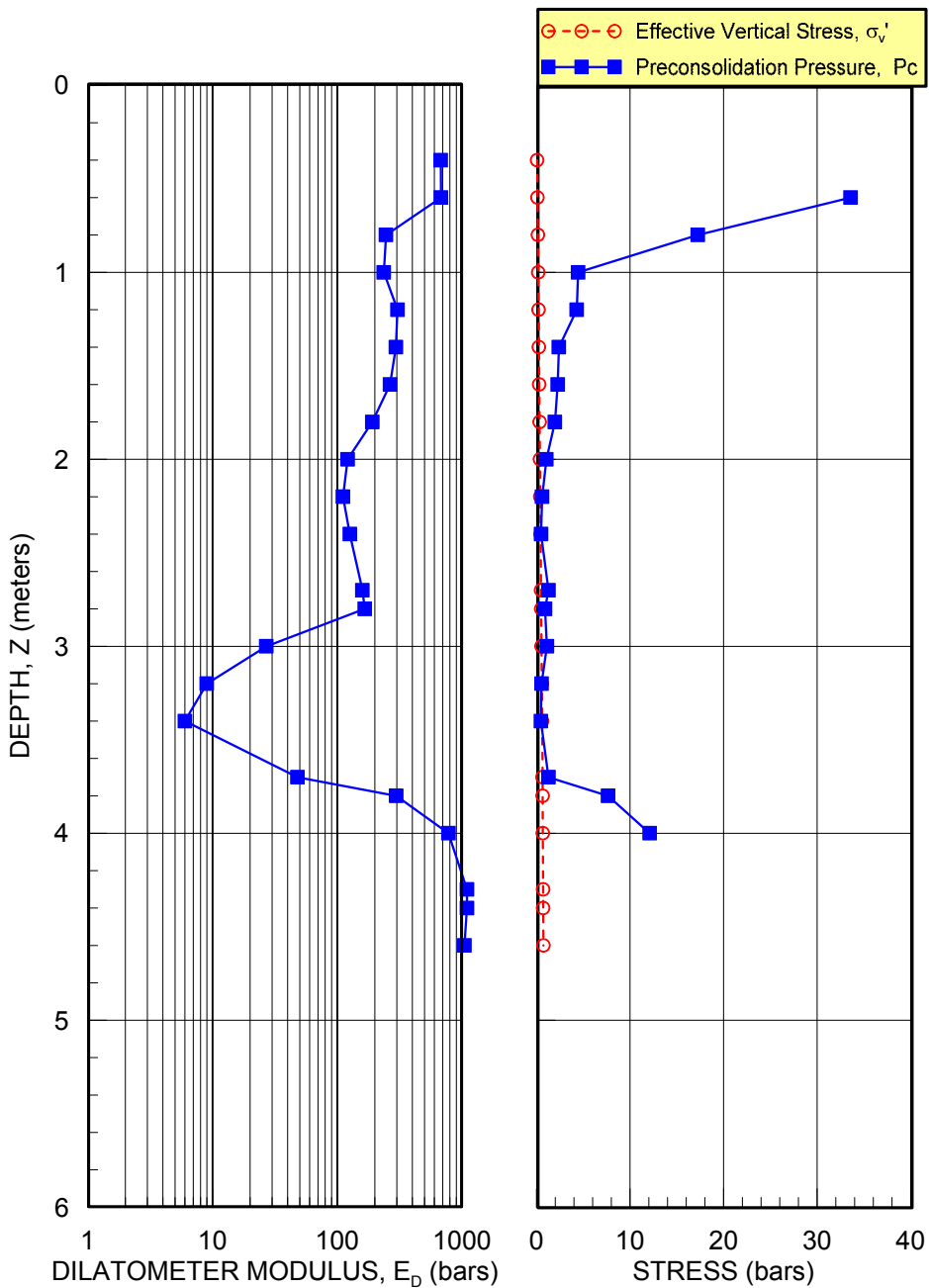
Ground Surface Elev.: ~37.4 m
Water Depth: ~3.7 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmeijer
SOUNDING DATE: 12/9/14

INTERPRETED DMT DEFORMATION PARAMETERS

SOUNDING
DMT-2



Pile Width/Diameter = 14 inches 36 cm

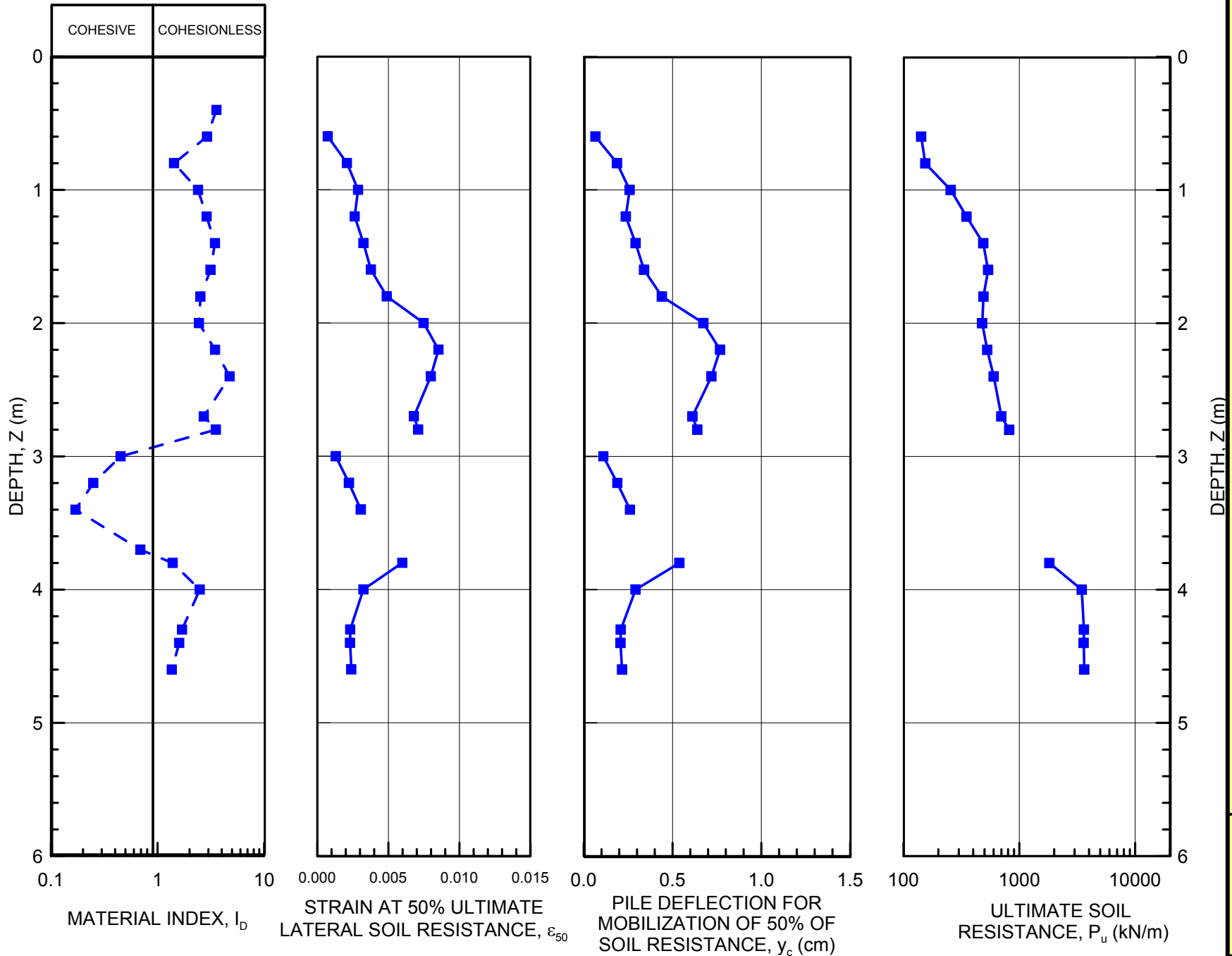
Ground Surface Elev: ~37.4 m
Water Depth: ~3.7 m

PROJECT: US Route 301 Bridge over Four Hole Swamp
LOCATION: Orangeburg, SC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmezzger
SOUNDING DATE: 12/9/14

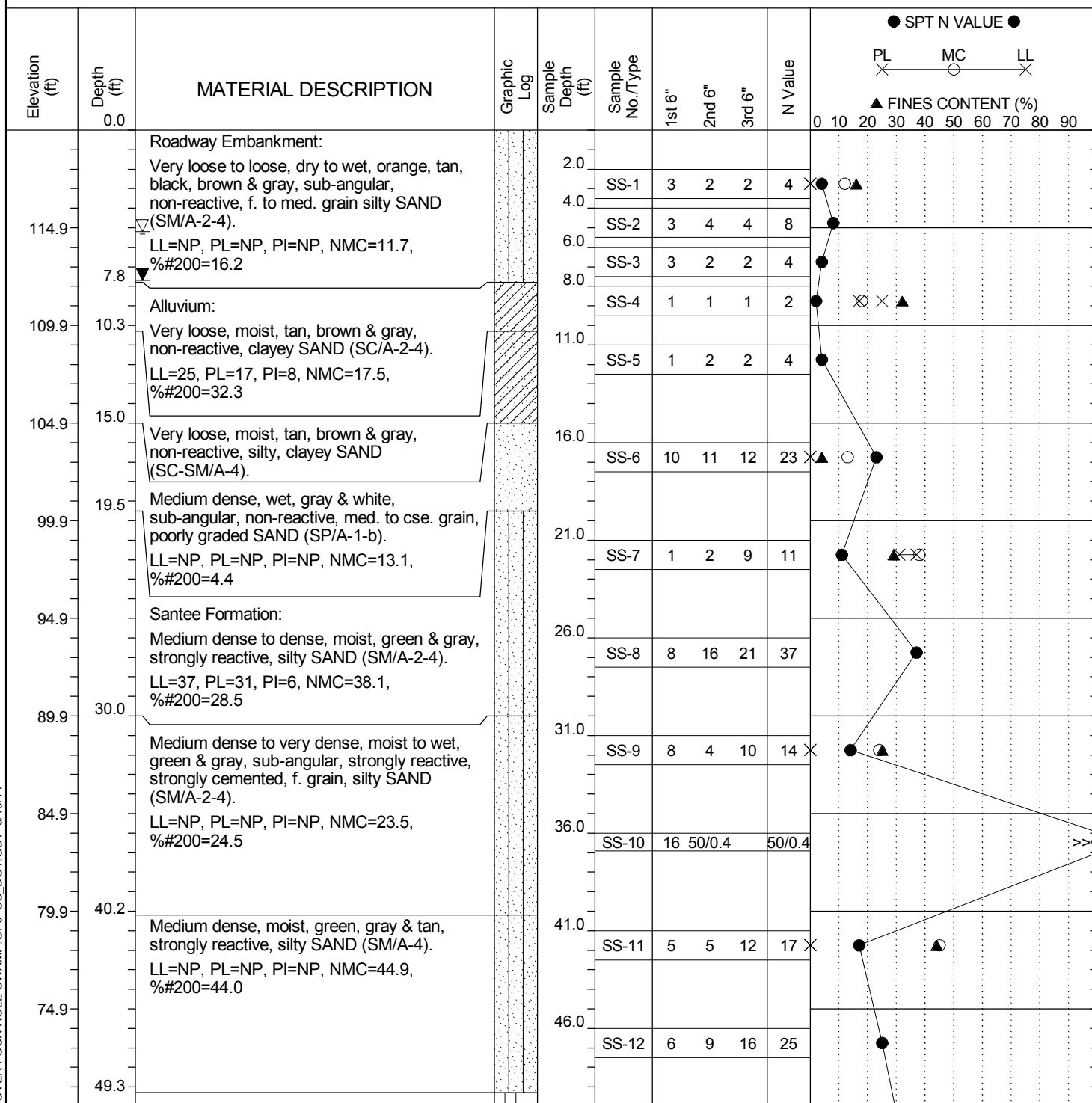
SOUNDING
DMT-2

INTERPRETED P-y PARAMETERS FOR LATERAL LOAD ANALYSES



SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-1	Boring Location: 5949+31	Offset: 13' Lt.	Alignment: US 301
Elev.: 119.9 ft	Latitude: 33.45753	Longitude: 80.64727	Date Started: 4/22/14
Total Depth: 102.5 ft	Soil Depth: 102.5 ft	Core Depth: ft	Date Completed: 4/23/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 5.2 ft	24HR: 7.7 ft



LEGEND

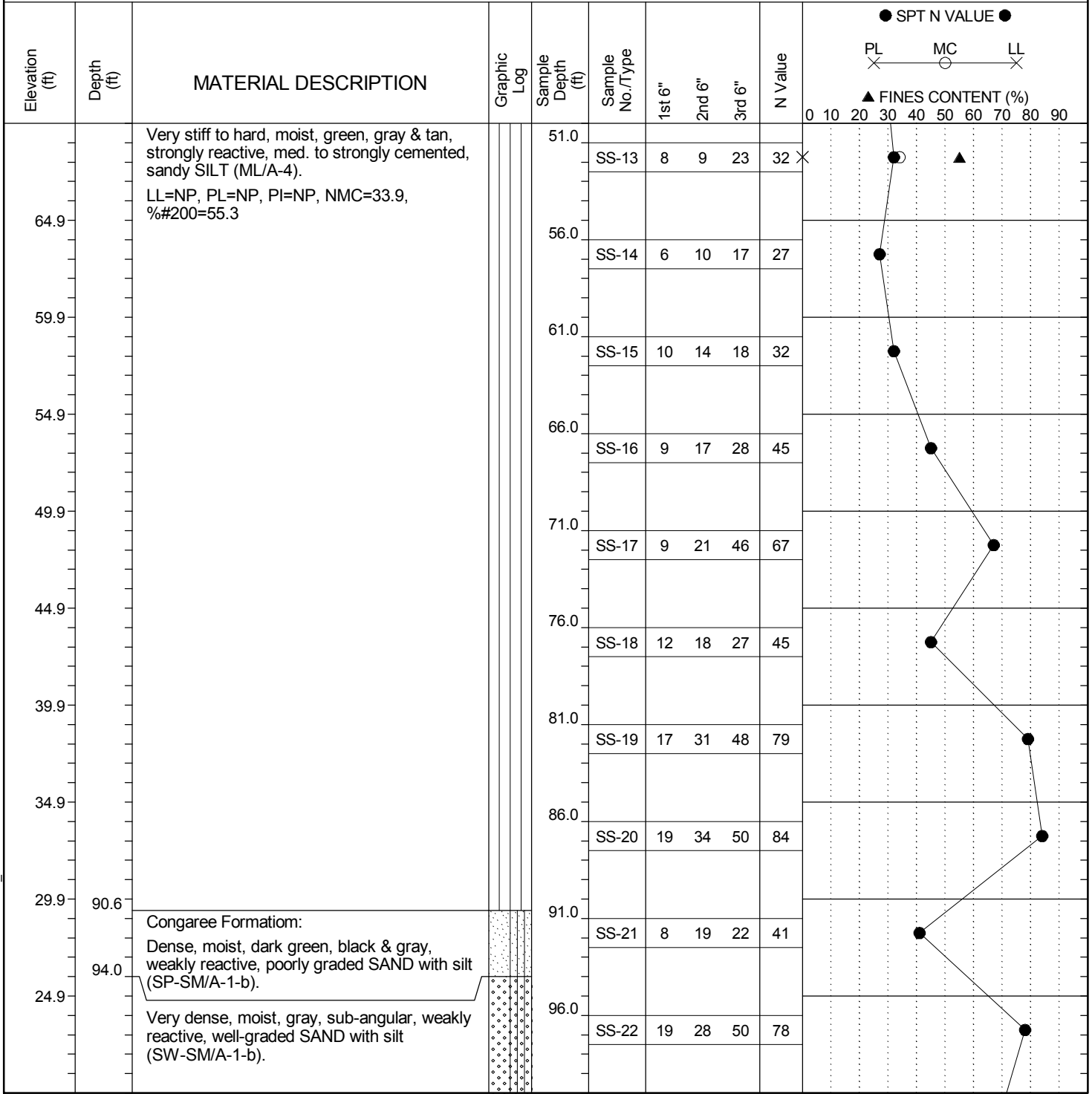
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
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Core Size: NA	Driller: M. Morgan	Groundwater: TOB 5.2 ft	24HR: 7.7 ft



LEGEND

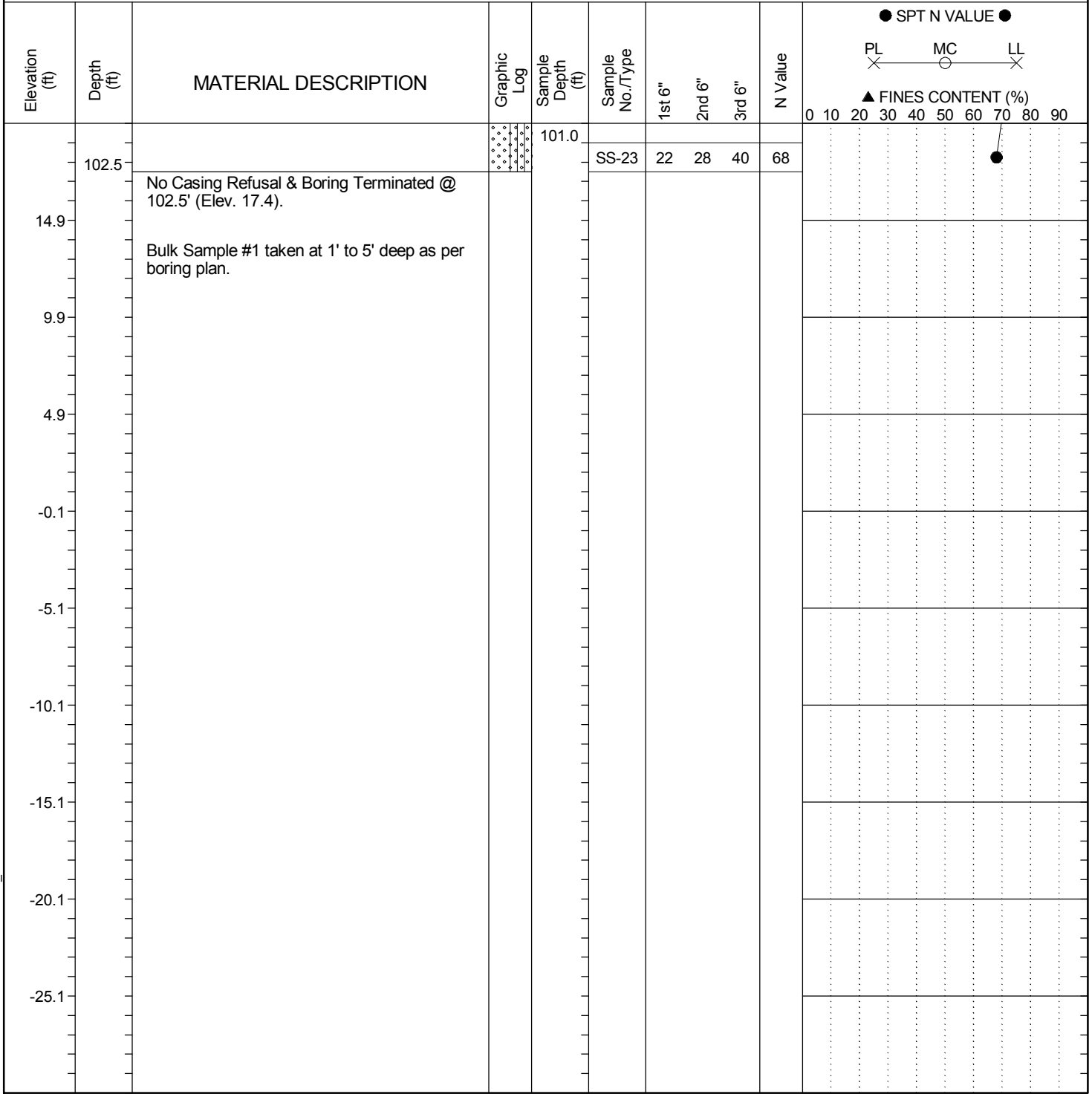
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
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Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 5.2 ft	24HR: 7.7 ft



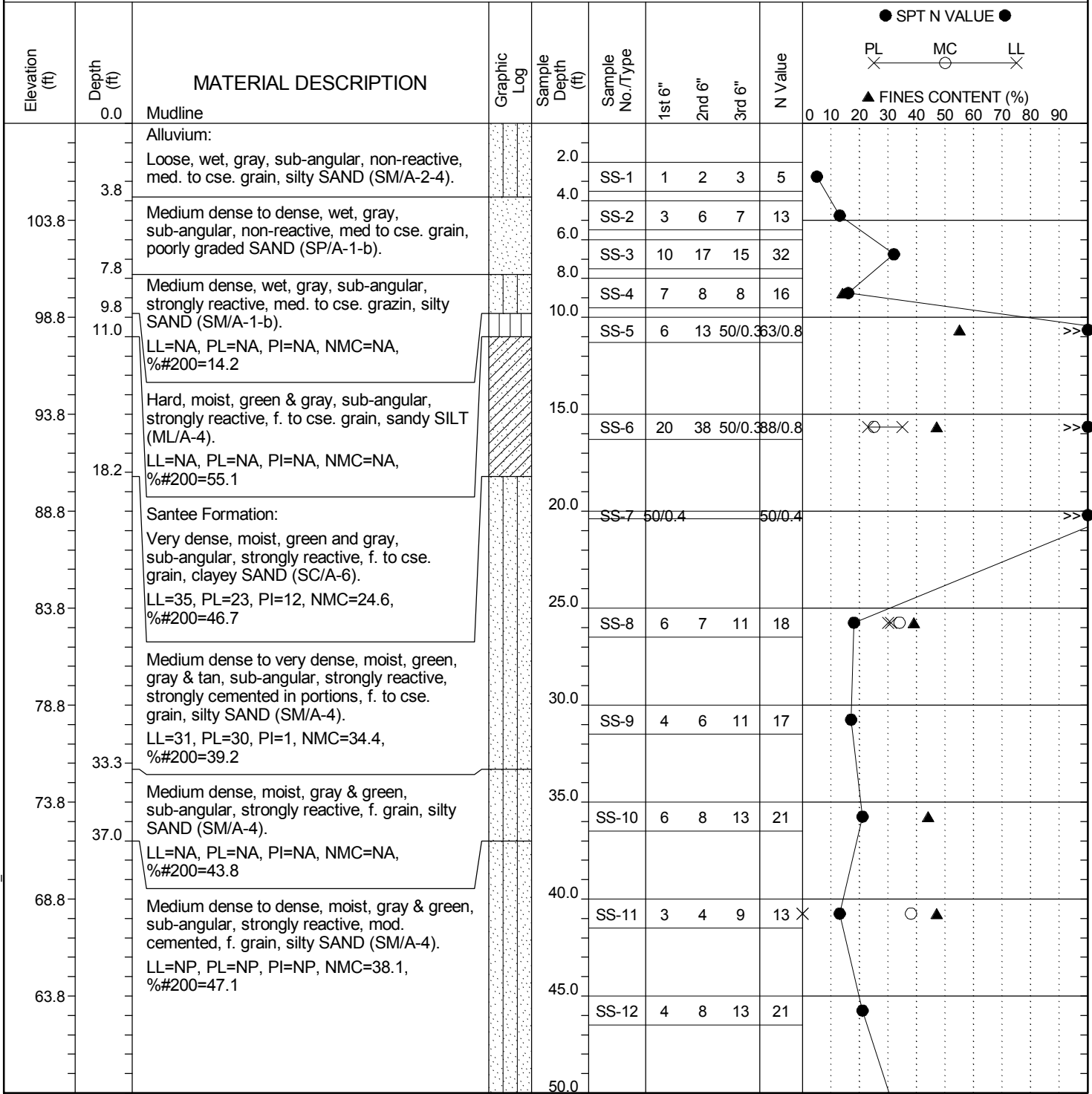
SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-2	Boring Location: 5949+65	Offset: 9' Rt.	Alignment: US 301
Elev.: 108.8 ft	Latitude: 33.45757	Longitude: 80.6474	Date Started: 4/3/2014
Total Depth: 111.5 ft	Soil Depth: 111.5 ft	Core Depth: ft	Date Completed: 4/5/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



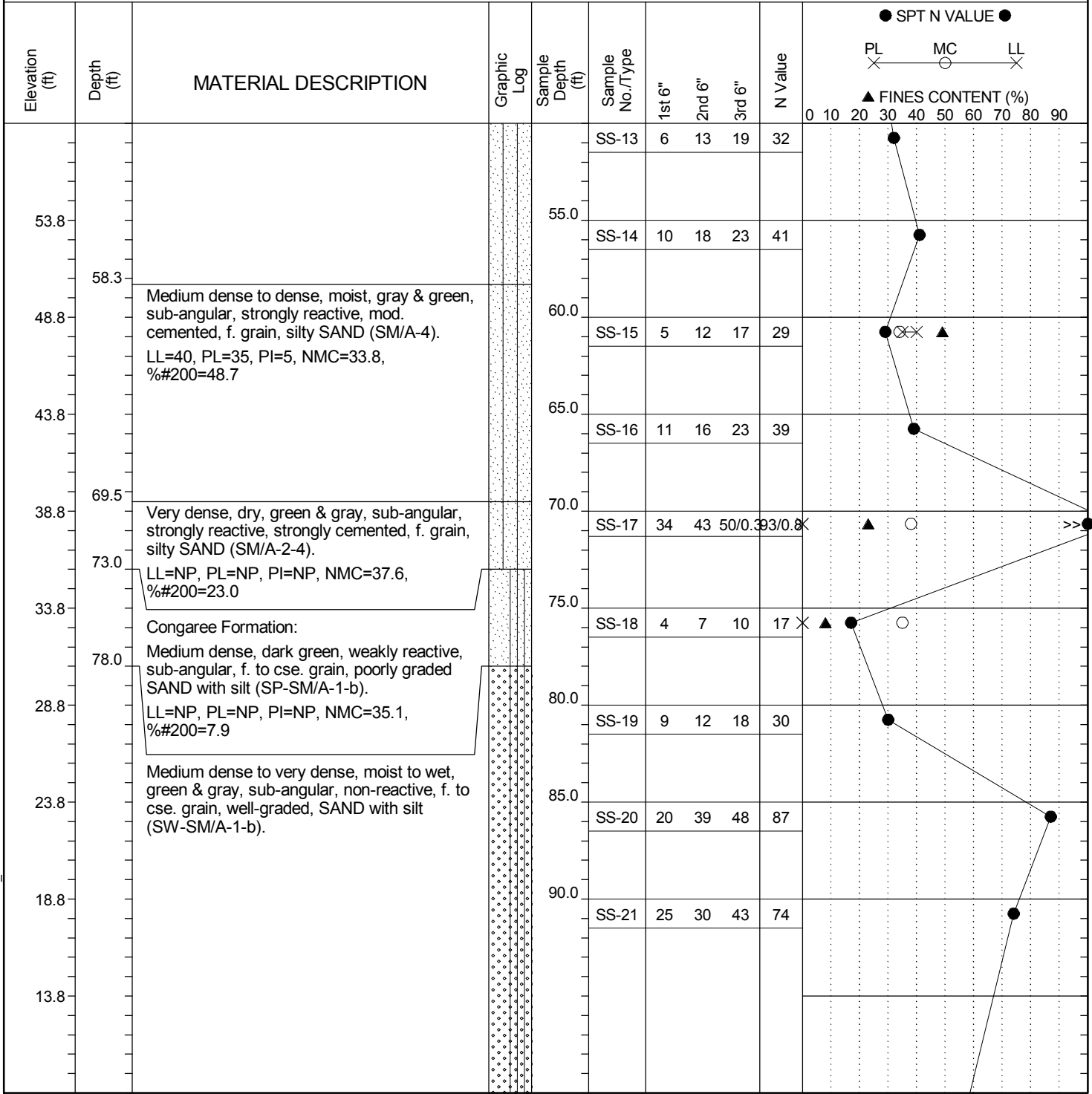
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
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Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



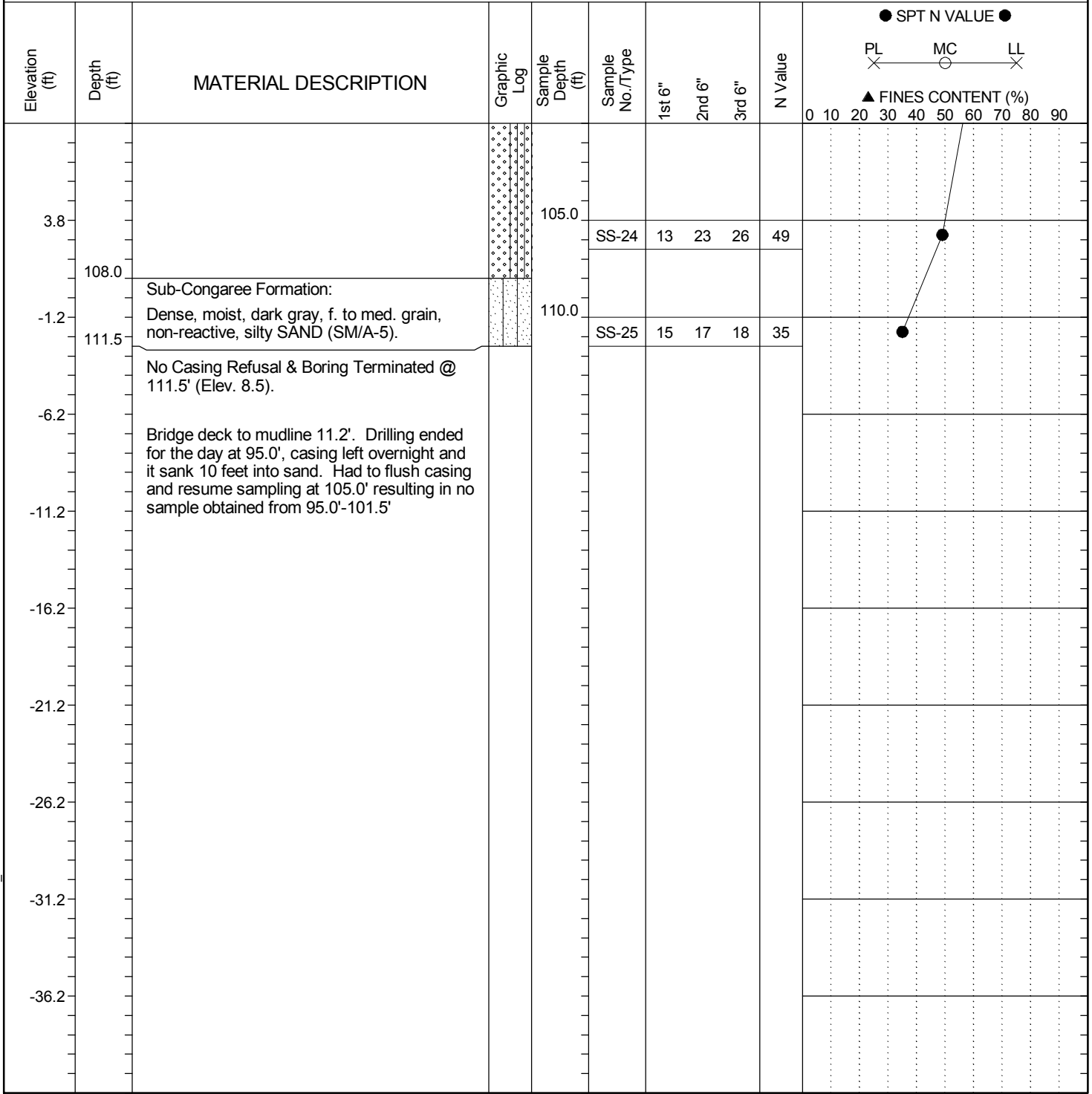
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
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Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



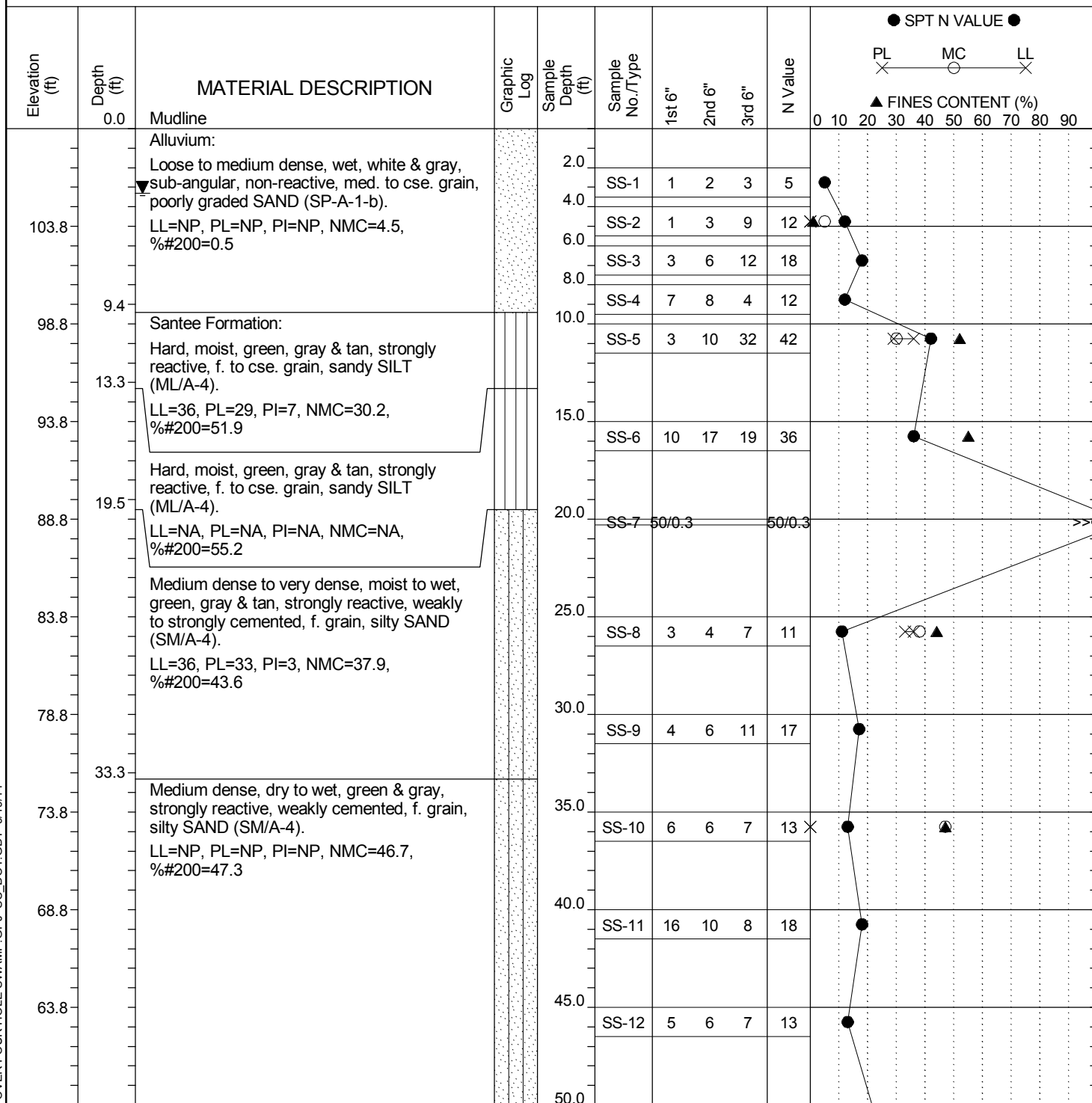
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-3	Boring Location: 5950+02	Offset: 3' Rt.	Alignment: US 301
Elev.: 108.8 ft	Latitude: 33.45751	Longitude: 80.64752	Date Started: 4/21/14
Total Depth: 101.5 ft	Soil Depth: 101.5 ft	Core Depth: ft	Date Completed: 4/22/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 3.3 ft	24HR: 3.3 ft



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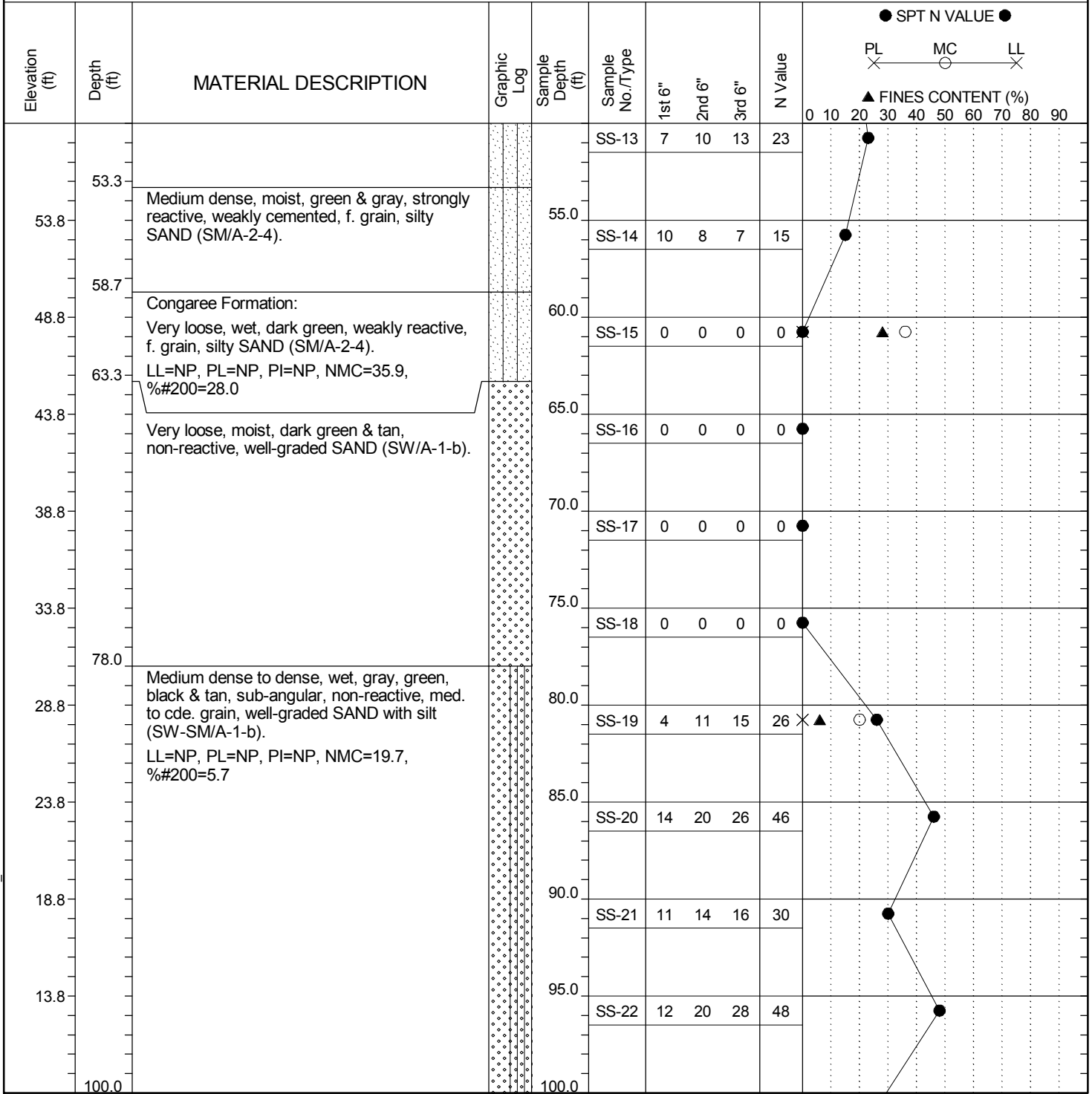
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-3	Boring Location: 5950+02	Offset: 3' Rt.	Alignment: US 301
Elev.: 108.8 ft	Latitude: 33.45751	Longitude: 80.64752	Date Started: 4/21/14
Total Depth: 101.5 ft	Soil Depth: 101.5 ft	Core Depth: ft	Date Completed: 4/22/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 3.3 ft	24HR: 3.3 ft



LEGEND

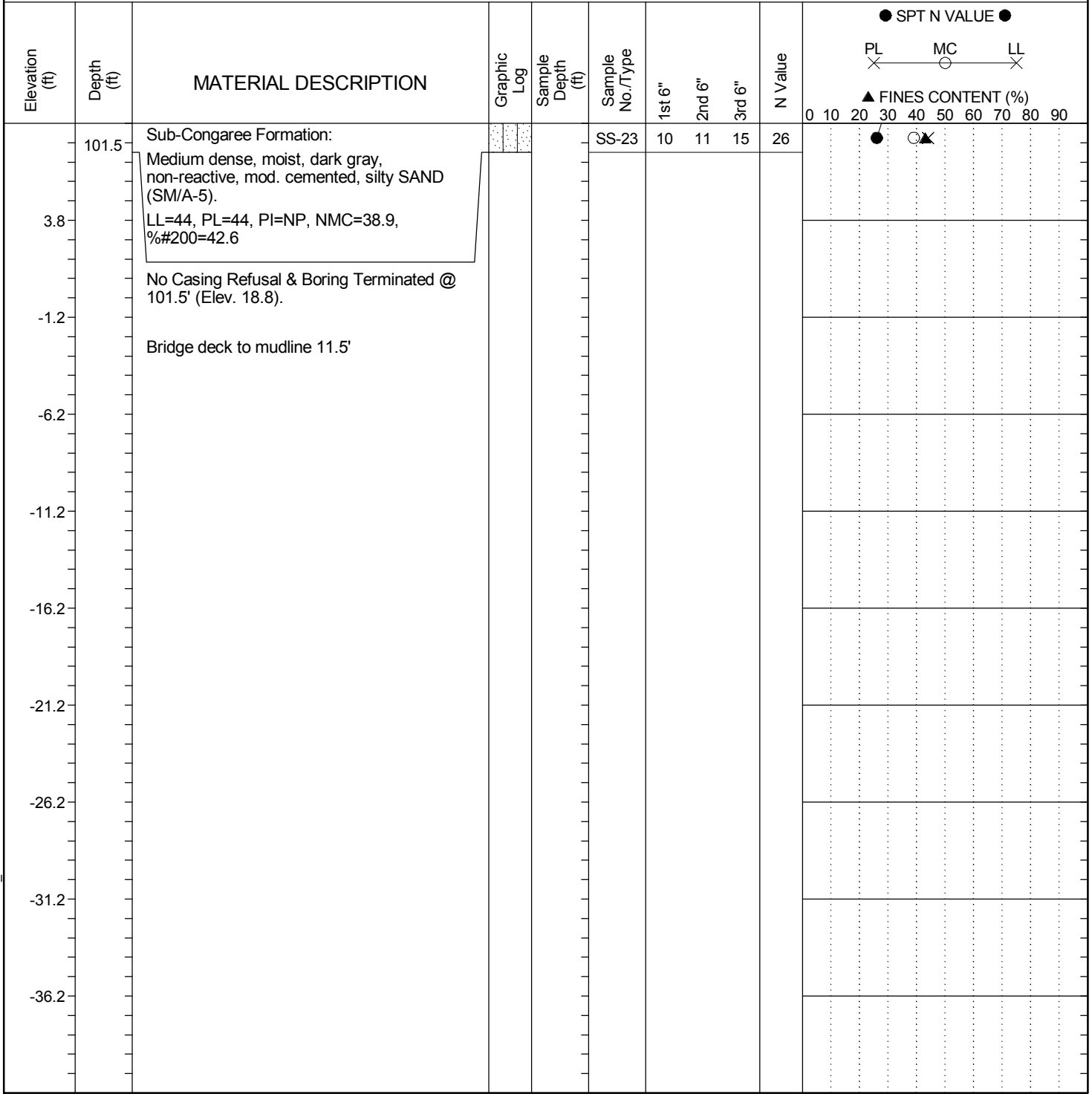
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
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Core Size: NA	Driller: M. Morgan	Groundwater: TOB 3.3 ft	24HR: 3.3 ft



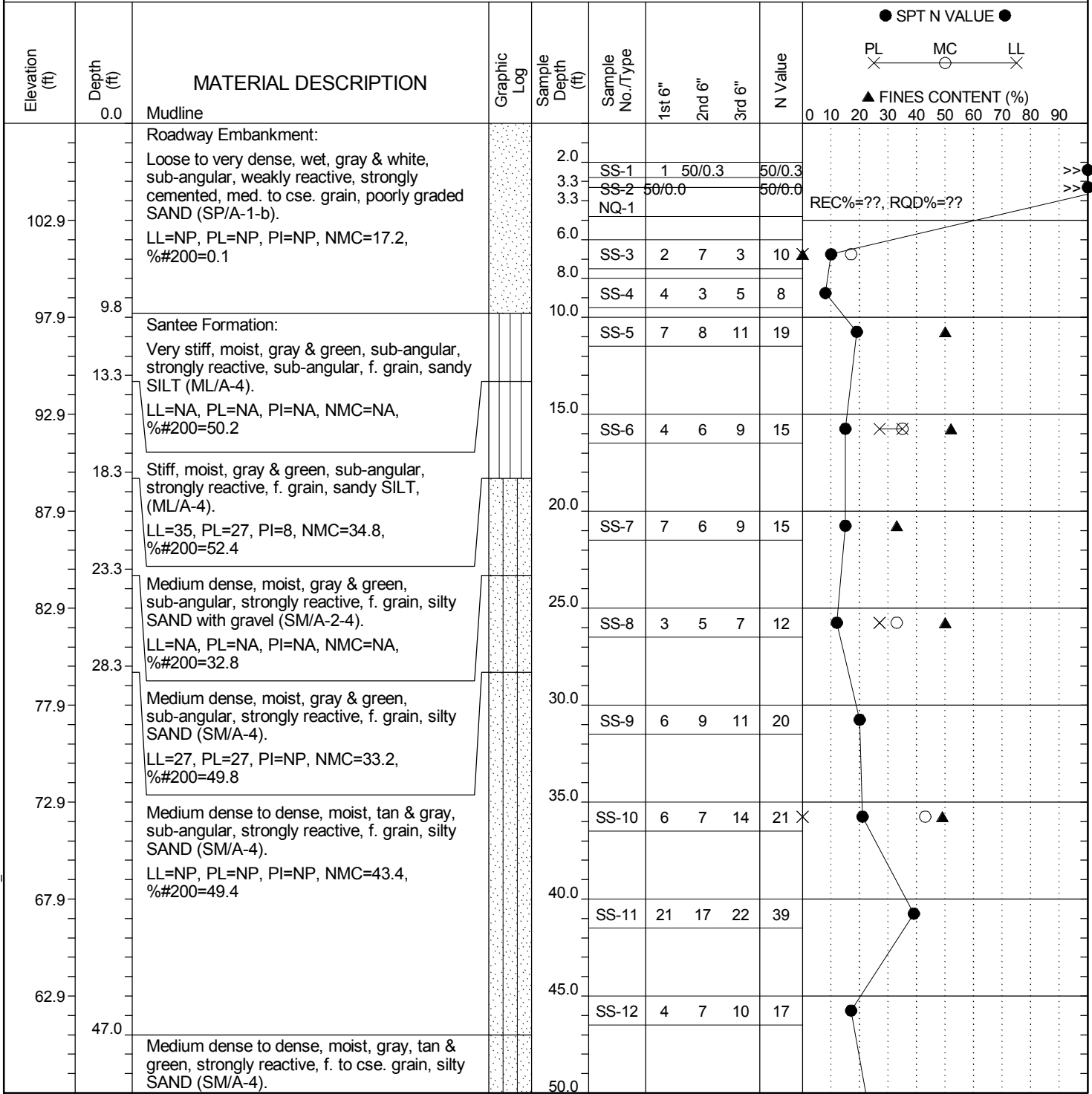
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SAMPLER TYPE		DRILLING METHOD	
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-4	Boring Location: 5950+42	Offset: 8' Rt.	Alignment: US 301
Elev.: 107.9 ft	Latitude: 33.45754	Longitude: 80.64764	Date Started: 4/5/2014
Total Depth: 101.5 ft	Soil Depth: 101.5 ft	Core Depth: ft	Date Completed: 4/6/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

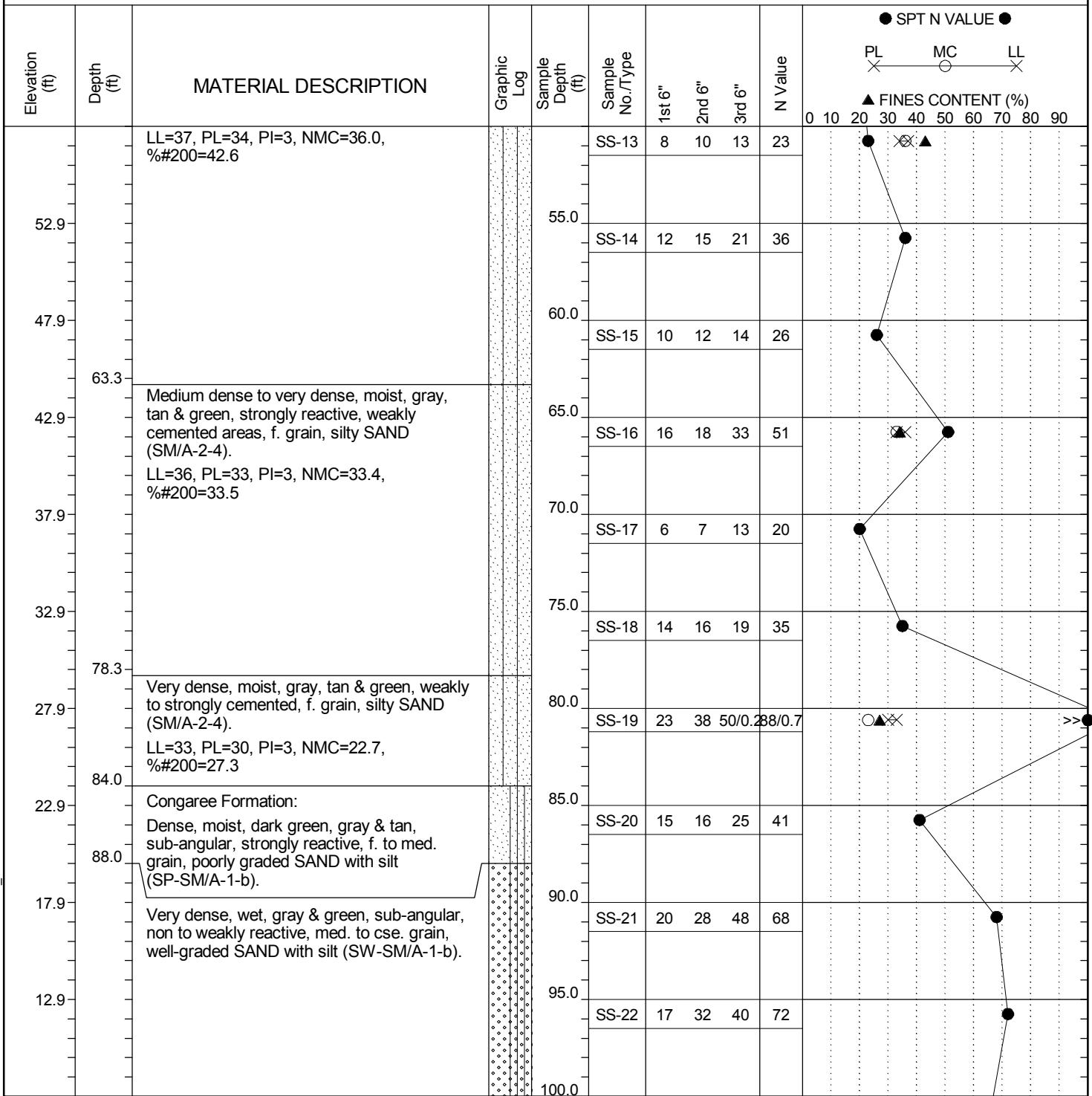
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
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Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

Continued Next Page

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
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SCDOT Soil Test Boring Log

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Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE									
										0	10	20	30	40	50	60	70	80	90
101.5		No Casing Refusal & Boring Terminated @ 101.5' (Elev. 18.7).			SS-23	16	31	35	66										
2.9		Bridge deck to mudline 12.3'.																	
-2.1																			
-7.1																			
-12.1																			
-17.1																			
-22.1																			
-27.1																			
-32.1																			
-37.1																			

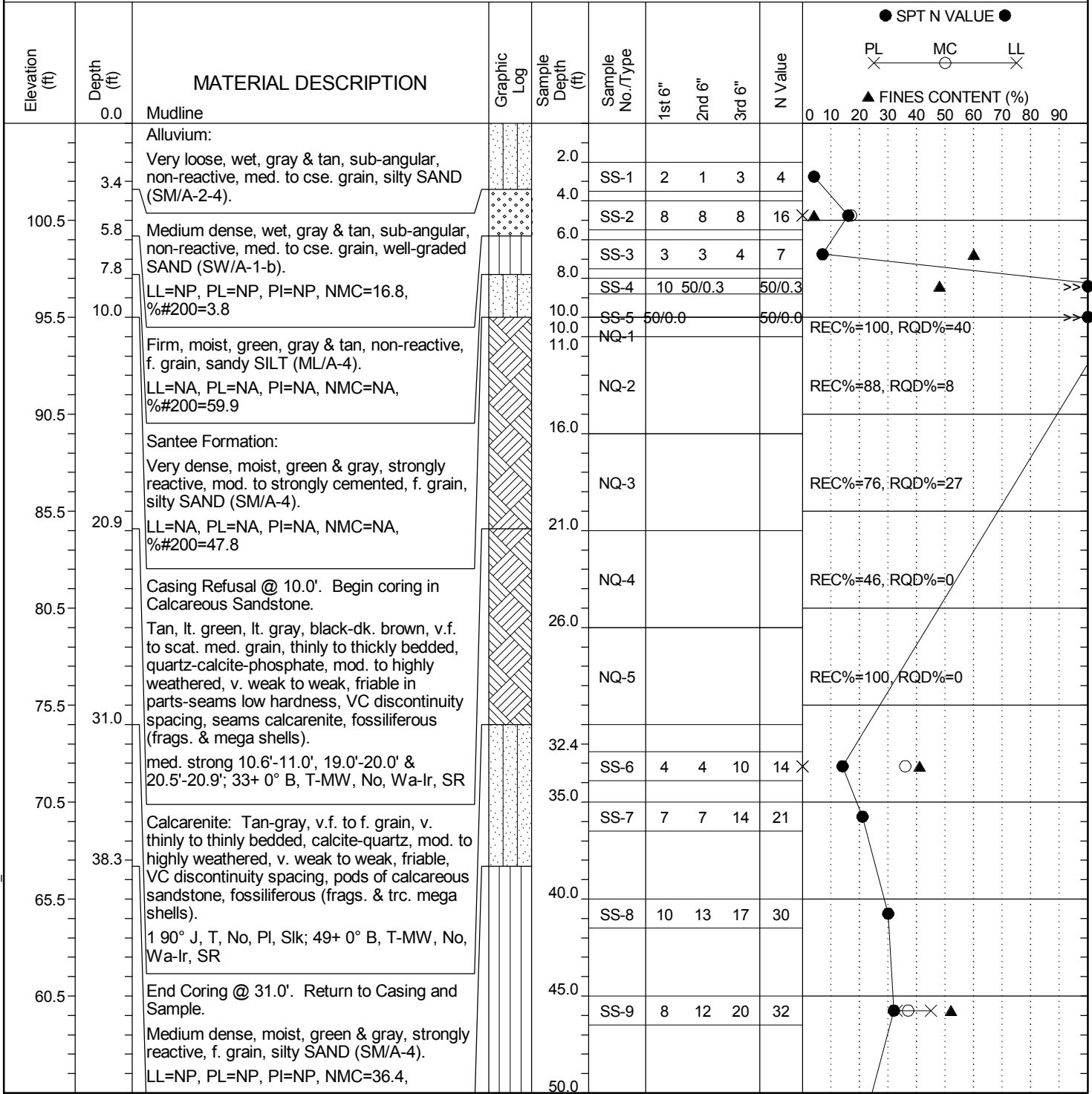
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-5	Boring Location: 5950+98	Offset: 8' Lt.	Alignment: US 301
Elev.: 105.5 ft	Latitude: 33.45747	Longitude: 80.64781	Date Started: 4/12/2014
Total Depth: 101.3 ft	Soil Depth: 80.3 ft	Core Depth: 21 ft	Date Completed: 4/13/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

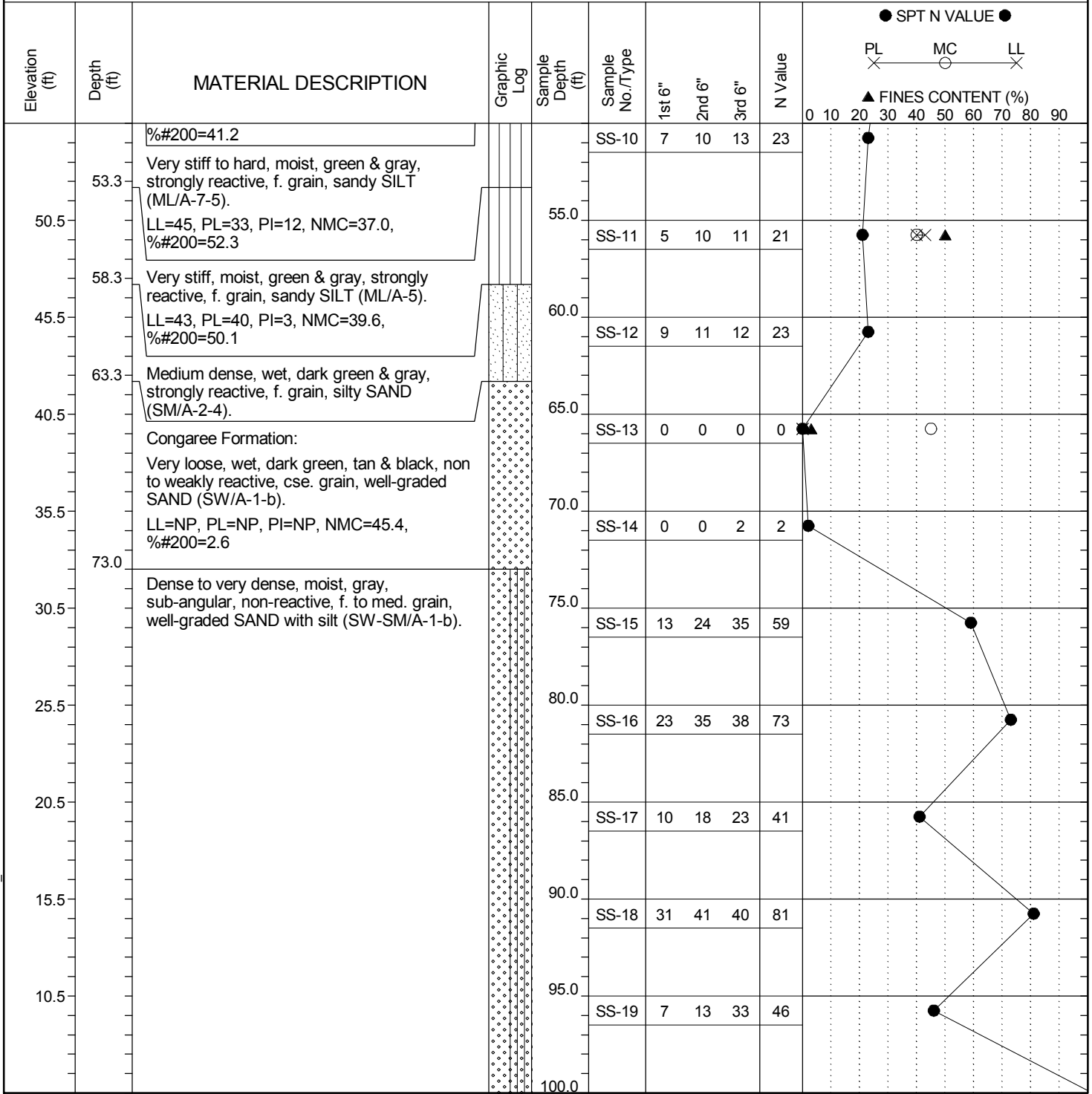
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-5	Boring Location: 5950+98	Offset: 8' Lt.	Alignment: US 301
Elev.: 105.5 ft	Latitude: 33.45747	Longitude: 80.64781	Date Started: 4/12/2014
Total Depth: 101.3 ft	Soil Depth: 80.3 ft	Core Depth: 21 ft	Date Completed: 4/13/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

Continued Next Page

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

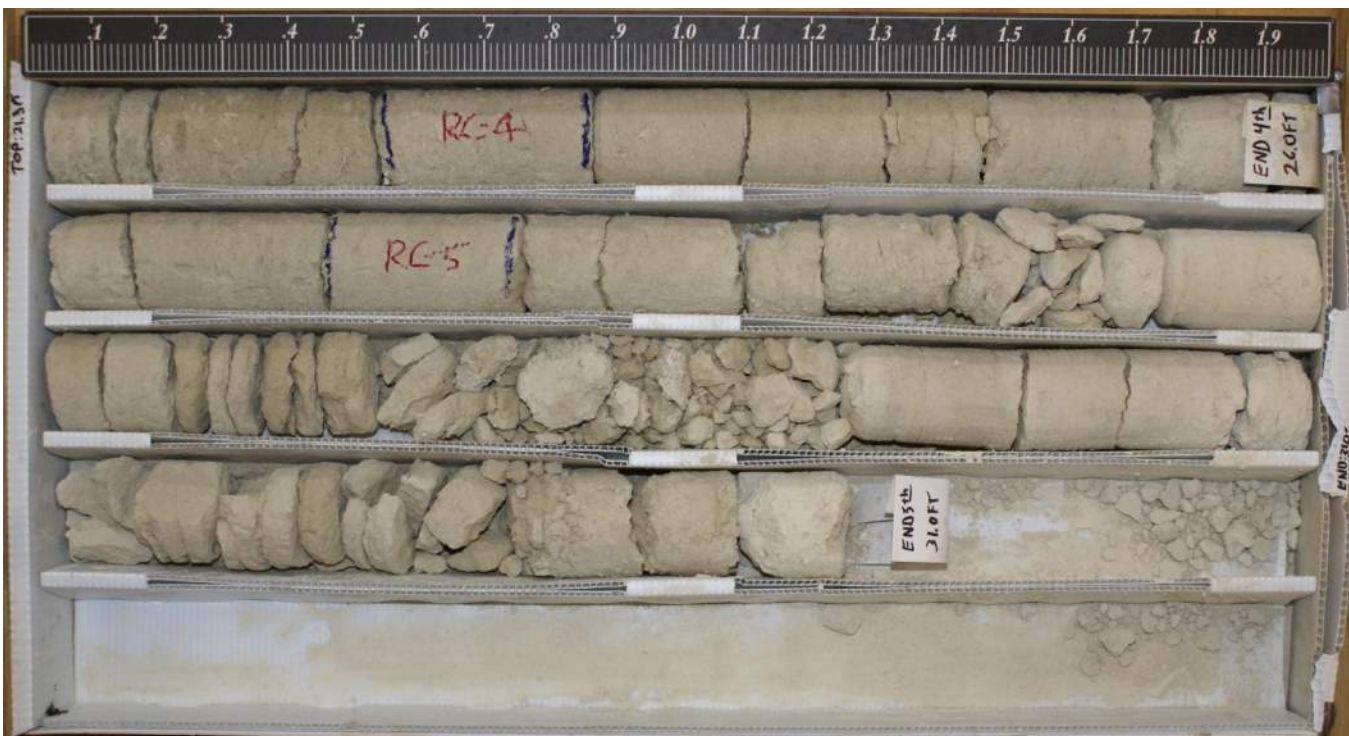
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

CORE PHOTOGRAPHIC RECORD

Bridge Replacement over Four Hole Swamp



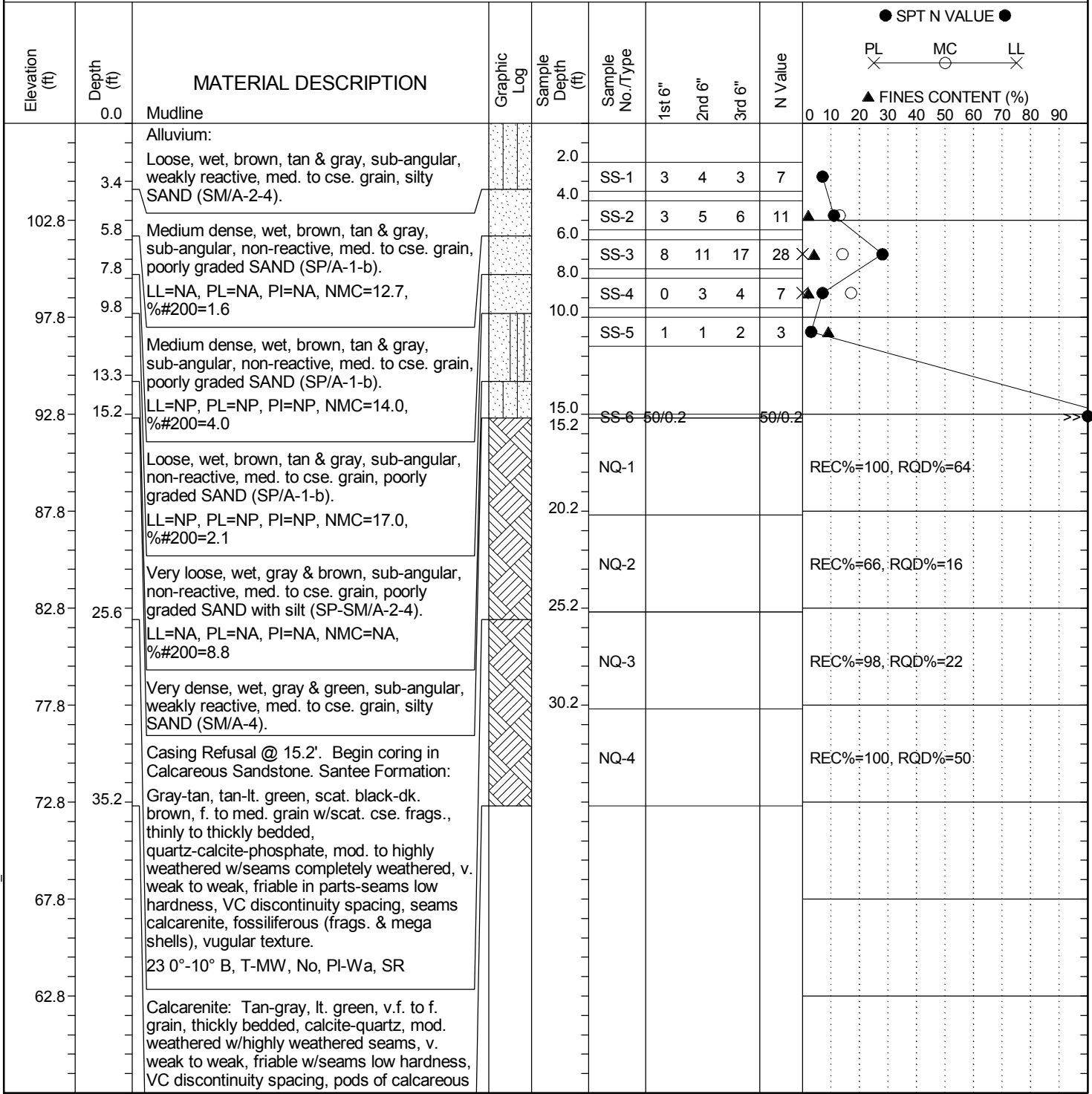
B5 – Box 1 of 2



B5 – Box 2 of 2

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-6	Boring Location: 5951+41	Offset: 8' Rt.	Alignment: US 301
Elev.: 107.8 ft	Latitude: 33.4575	Longitude: 80.64796	Date Started: 4/6/2014
Total Depth: 35.2 ft	Soil Depth: 15.2 ft	Core Depth: 20 ft	Date Completed: 4/8/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

Continued Next Page

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

CORE PHOTOGRAPHIC RECORD

Bridge Replacement over Four Hole Swamp



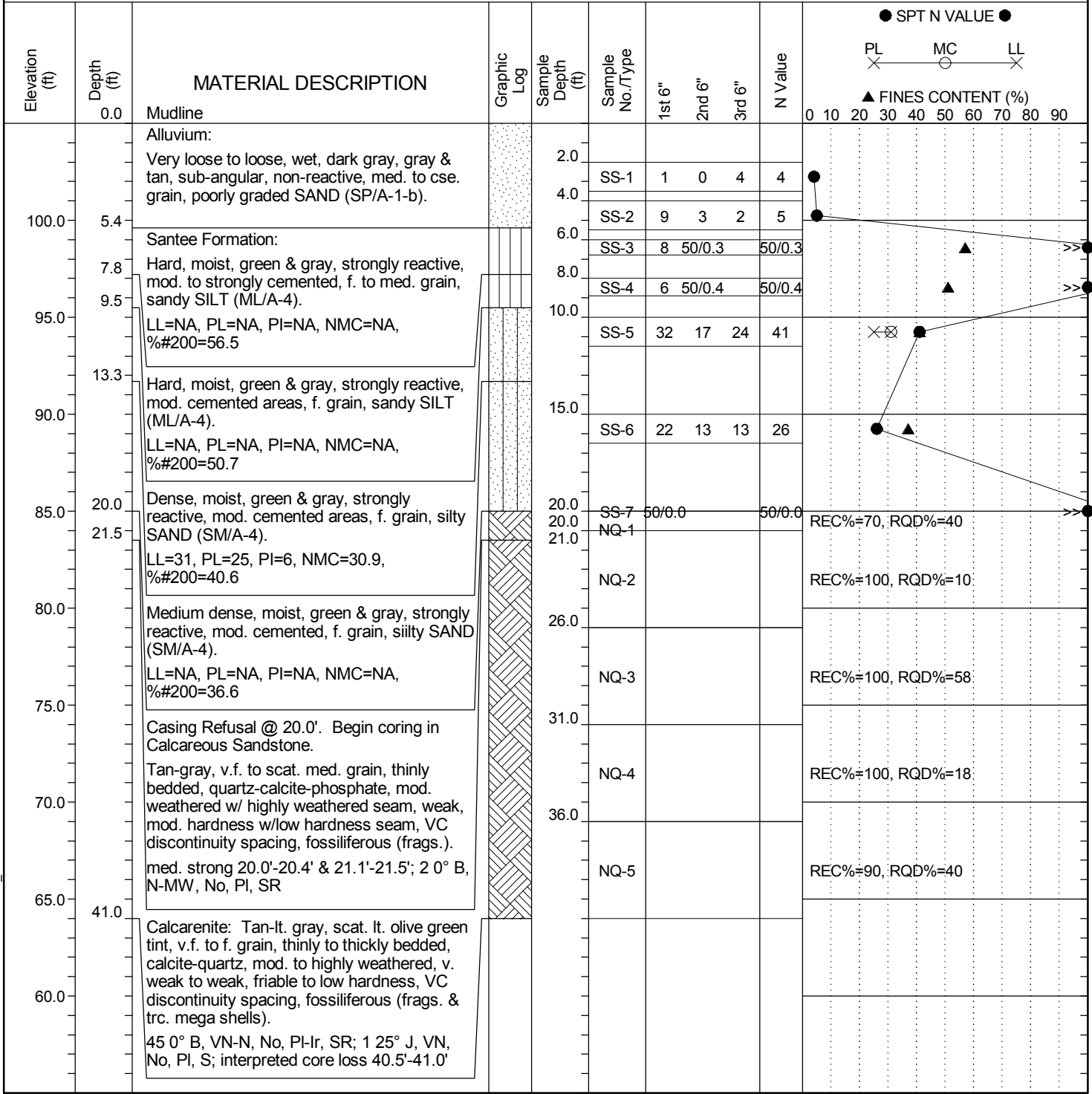
B6 – Box 1 of 2



B6 – Box 2 of 2

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-7	Boring Location: 5951+86	Offset: 8' Lt.	Alignment: US 301
Elev.: 105.0 ft	Latitude: 33.45744	Longitude: 80.6481	Date Started: 4/12/2014
Total Depth: 41 ft	Soil Depth: 20 ft	Core Depth: 21 ft	Date Completed: 4/12/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB NA	24HR: NA



LEGEND

Continued Next Page

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

CORE PHOTOGRAPHIC RECORD

Bridge Replacement over Four Hole Swamp



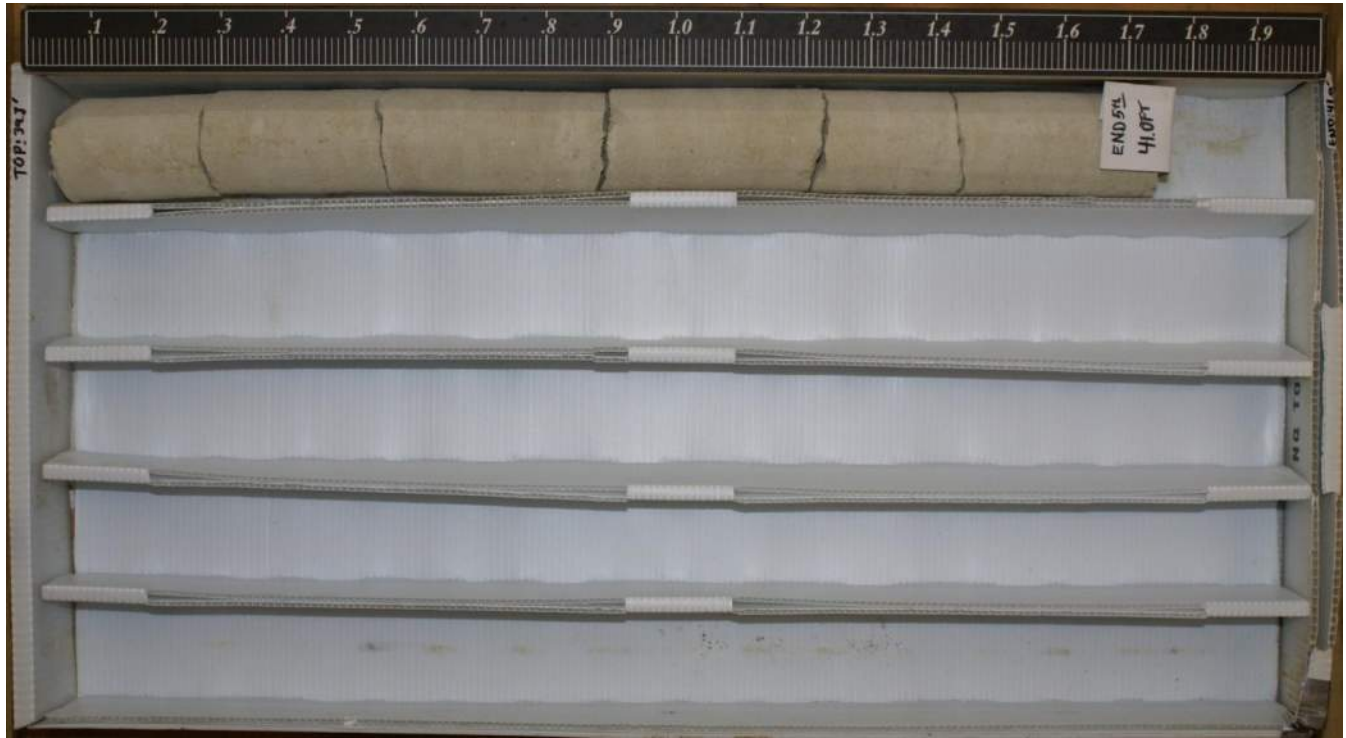
B7 – Box 1 of 3



B7 – Box 2 of 3

CORE PHOTOGRAPHIC RECORD

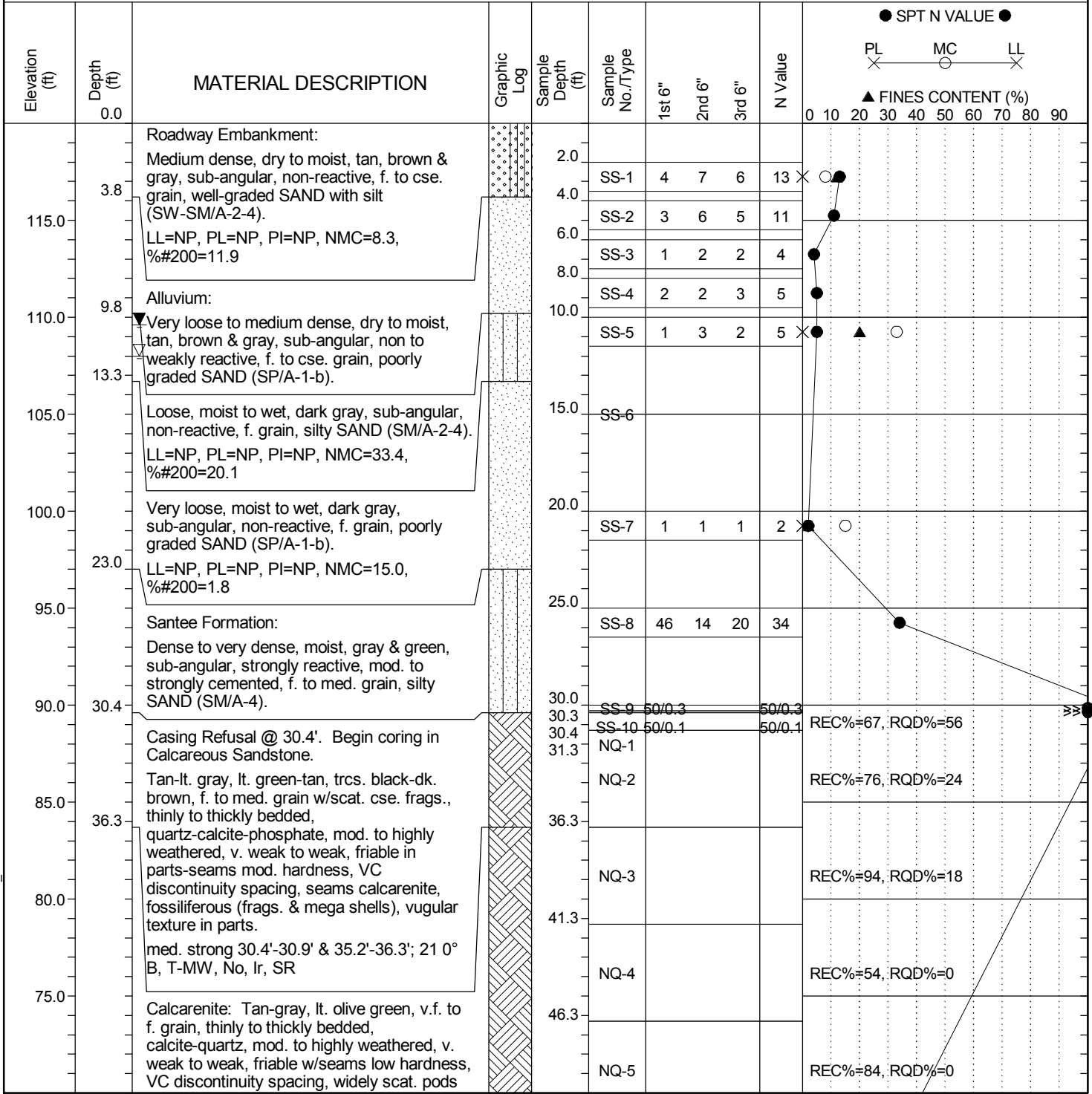
Bridge Replacement over Four Hole Swamp



B7 – Box 3 of 3

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-8	Boring Location: 5952+17	Offset: 8' Rt.	Alignment: US 301
Elev.: 120.0 ft	Latitude: 33.45747	Longitude: 80.64821	Date Started: 4/8/2014
Total Depth: 101.4 ft	Soil Depth: 80.5 ft	Core Depth: 20.9 ft	Date Completed: 4/9/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB 12 ft.	24HR: 10.4 ft.



LEGEND

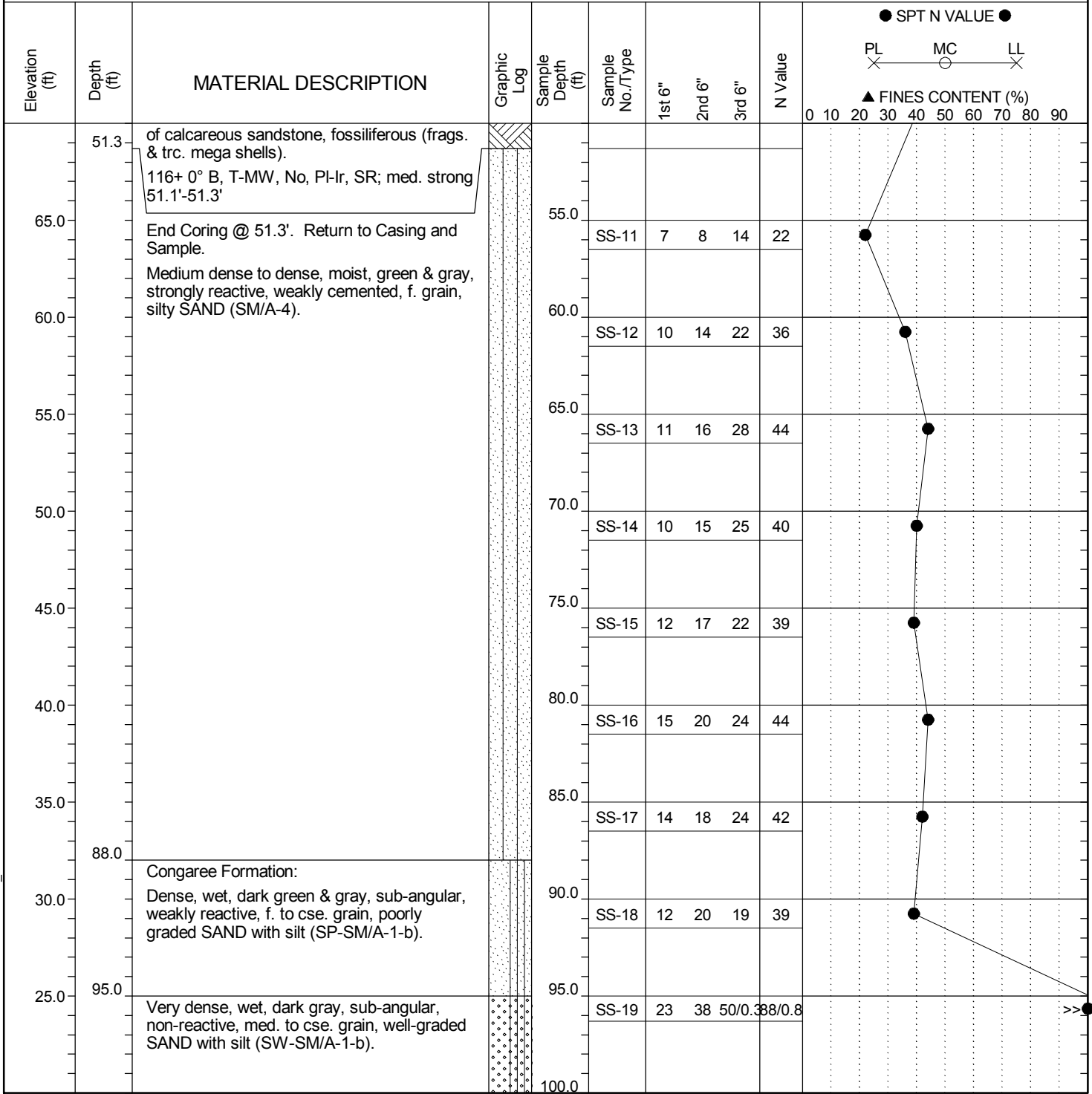
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-8	Boring Location: 5952+17	Offset: 8' Rt.	Alignment: US 301
Elev.: 120.0 ft	Latitude: 33.45747	Longitude: 80.64821	Date Started: 4/8/2014
Total Depth: 101.4 ft	Soil Depth: 80.5 ft	Core Depth: 20.9 ft	Date Completed: 4/9/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/RC/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NQ2	Driller: M. Morgan	Groundwater: TOB 12 ft.	24HR: 10.4 ft.



LEGEND

Continued Next Page

SC_DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

CORE PHOTOGRAPHIC RECORD

Bridge Replacement over Four Hole Swamp



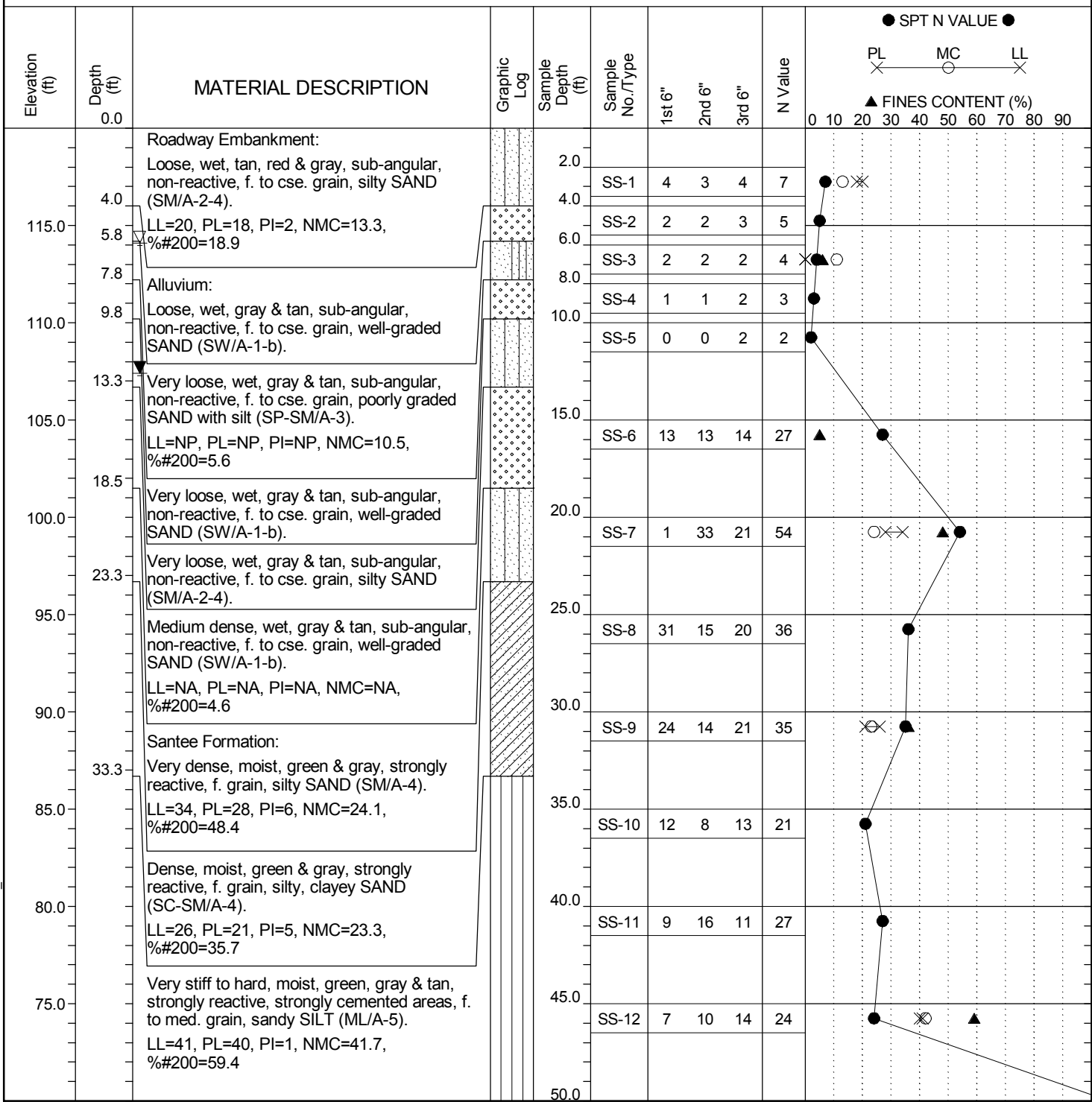
B8 - Box 1 of 2



B8 - Box 2 of 2

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-9	Boring Location: 5952+28	Offset: 8' Lt.	Alignment: US 301
Elev.: 120.0 ft	Latitude: 33.45742	Longitude: 80.64824	Date Started: 4/11/2014
Total Depth: 101.5 ft	Soil Depth: 101.5 ft	Core Depth: ft	Date Completed: 4/11/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 5.9 ft.	24HR: 12.6 ft.



LEGEND

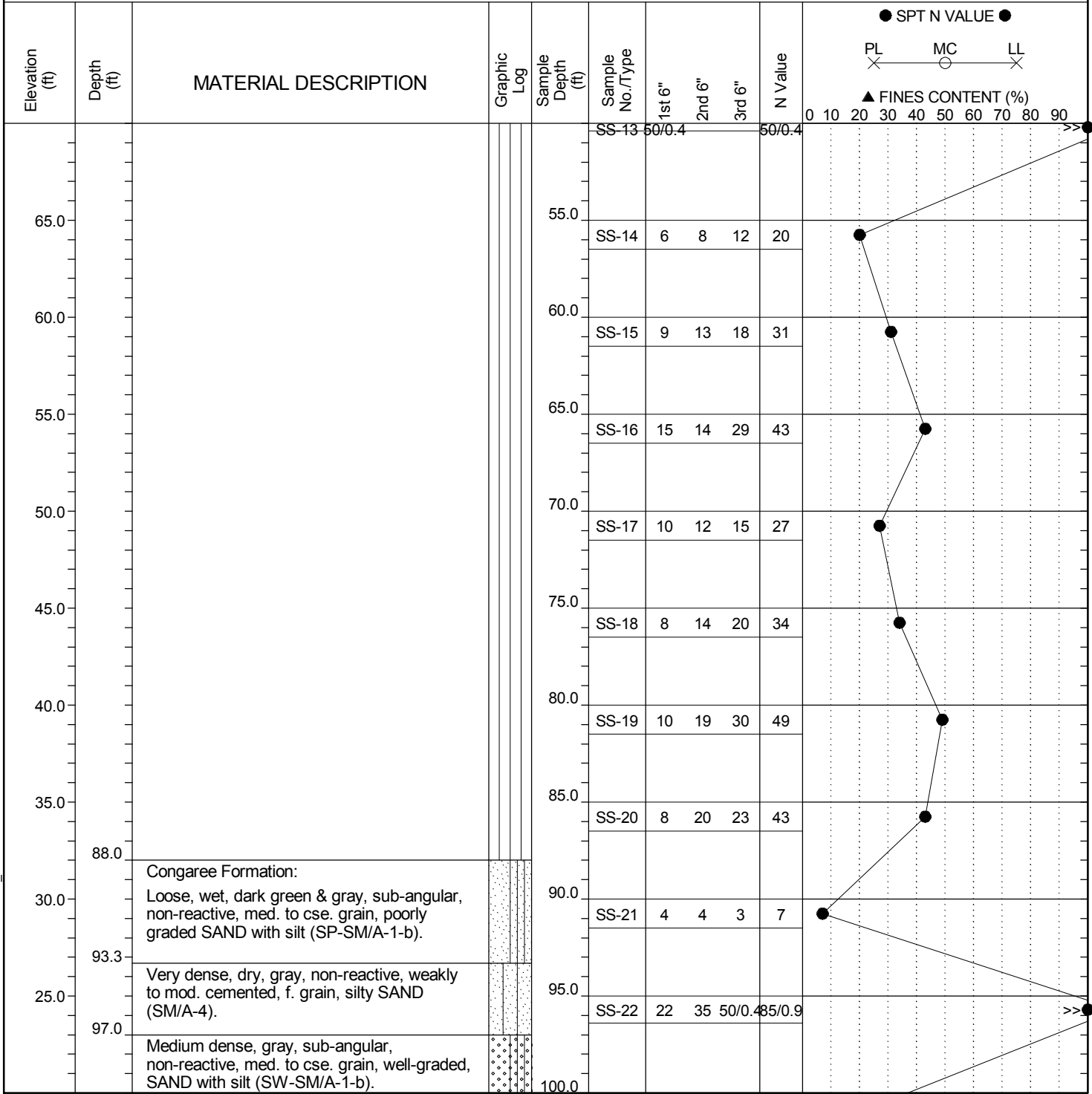
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: B-9	Boring Location: 5952+28	Offset: 8' Lt.	Alignment: US 301
Elev.: 120.0 ft	Latitude: 33.45742	Longitude: 80.64824	Date Started: 4/11/2014
Total Depth: 101.5 ft	Soil Depth: 101.5 ft	Core Depth: ft	Date Completed: 4/11/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 5.9 ft.	24HR: 12.6 ft.



LEGEND

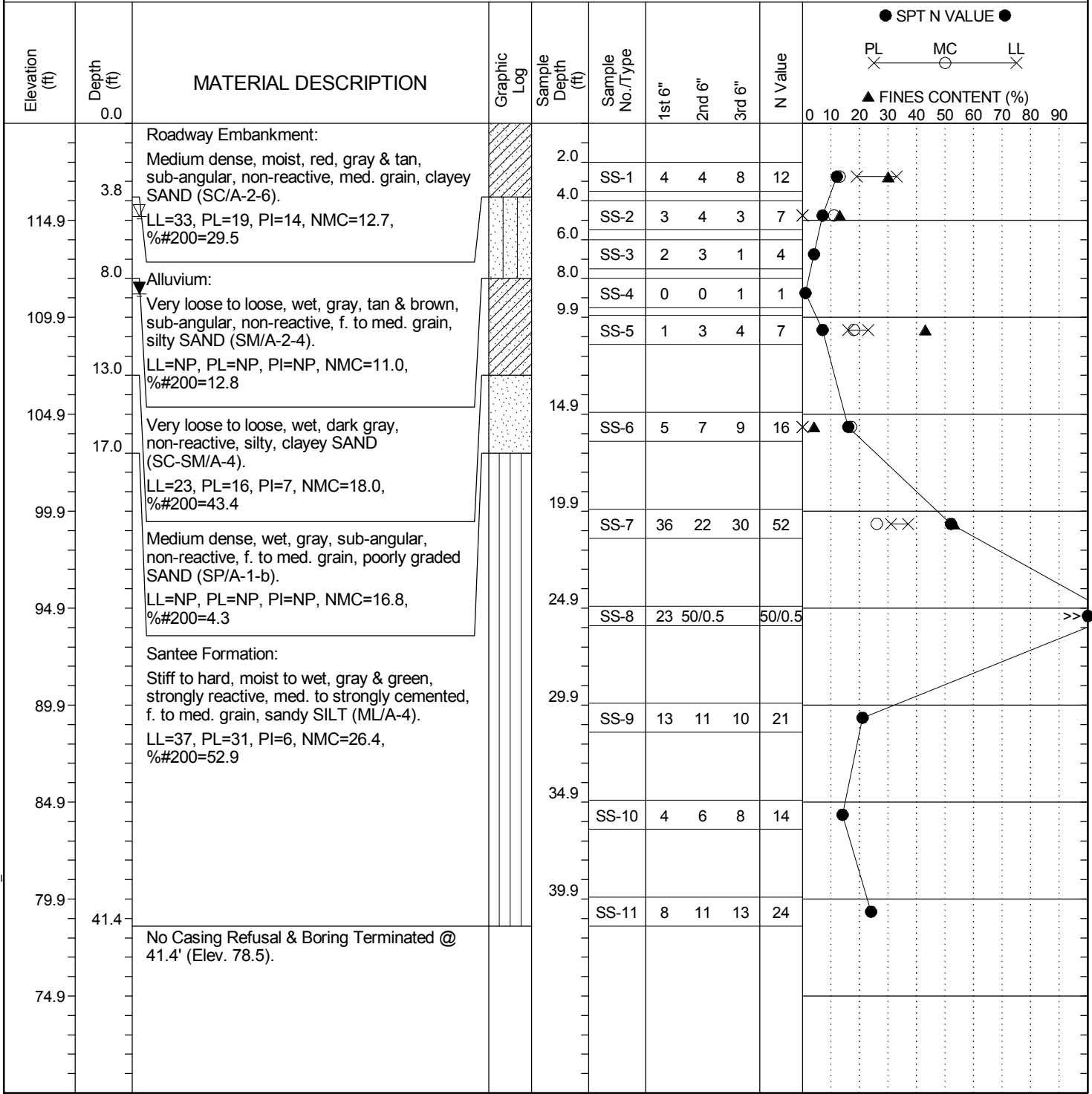
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SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-1	Boring Location: 5947+73	Offset: 20' Lt.	Alignment: US 301
Elev.: 119.9 ft	Latitude: 33.45758	Longitude: 80.64675	Date Started: 4/24/14
Total Depth: 41.4 ft	Soil Depth: 41.4 ft	Core Depth: ft	Date Completed: 4/24/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 4.8 ft	24HR: 8.8 ft



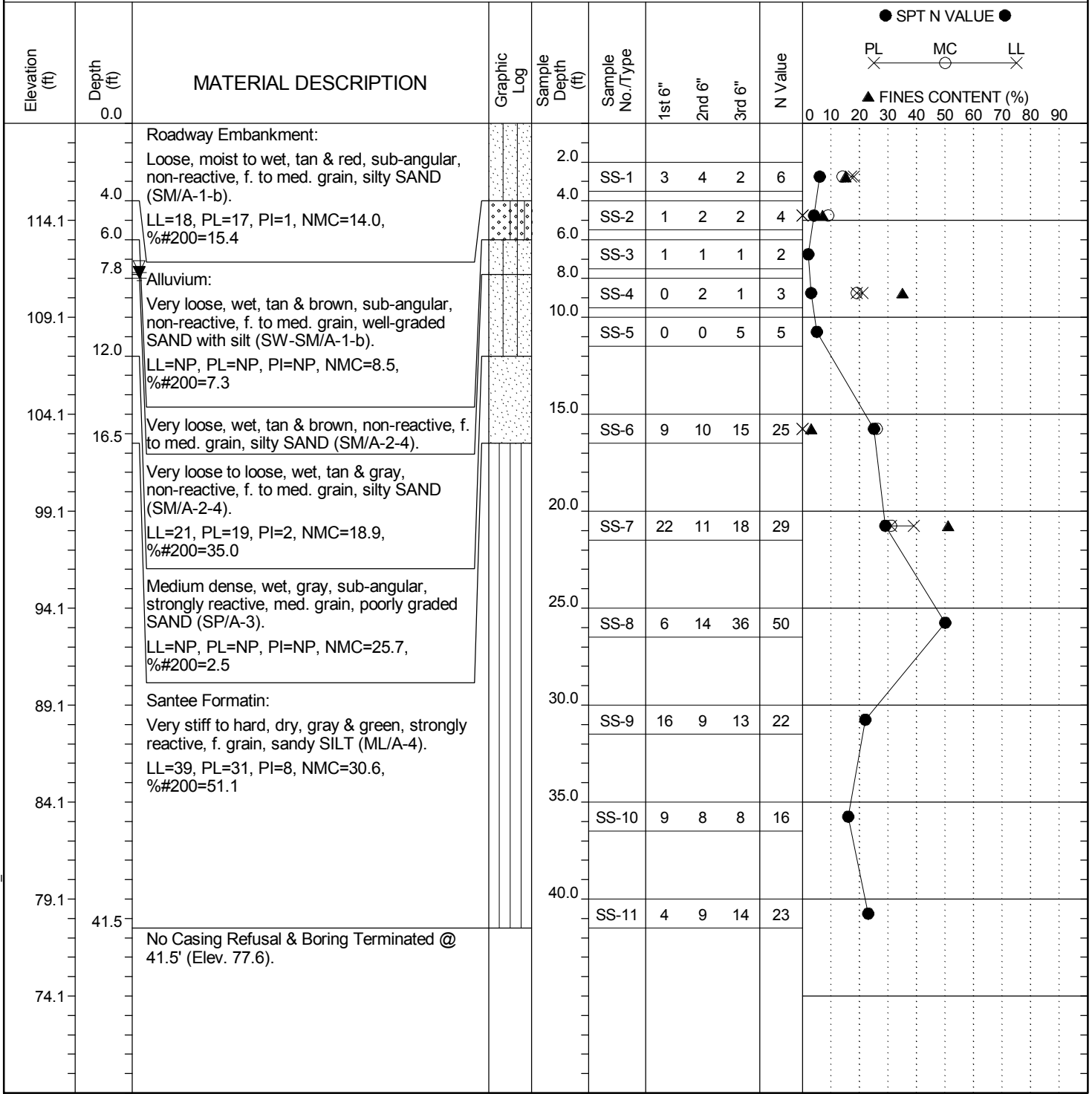
SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-2	Boring Location: 5948+38	Offset: 18' Rt.	Alignment: US 301
Elev.: 119.1 ft	Latitude: 33.45765	Longitude: 80.64698	Date Started: 4/24/14
Total Depth: 41.5 ft	Soil Depth: 41.5 ft	Core Depth: ft	Date Completed: 4/24/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 7.7 ft	24HR: 8.0 ft



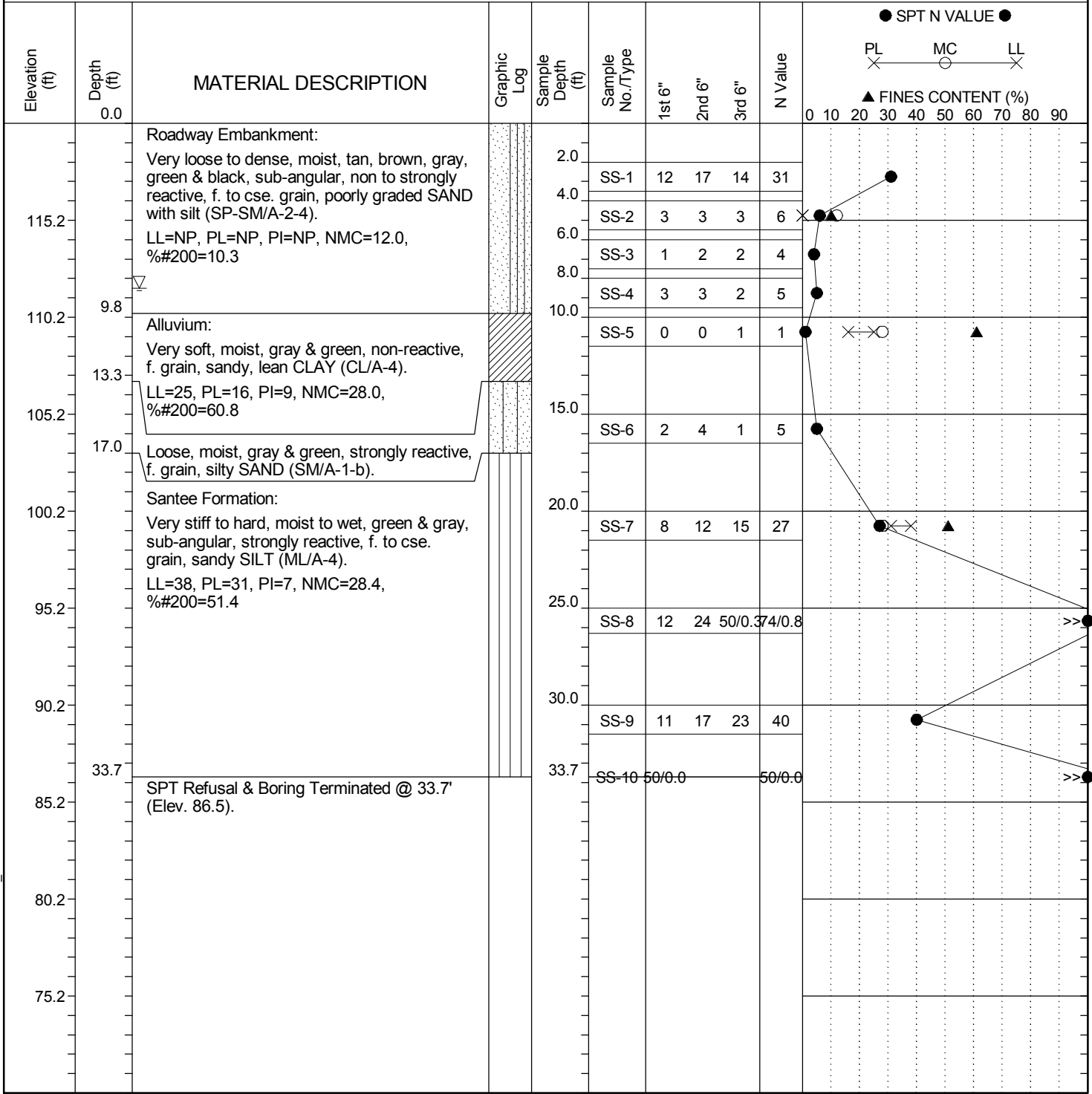
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-3	Boring Location: 5948+83	Offset: 13' Lt.	Alignment: US 301
Elev.: 120.2 ft	Latitude: 33.45753	Longitude: 80.64711	Date Started: 4/23/14
Total Depth: 33.7 ft	Soil Depth: 33.7 ft	Core Depth: ft	Date Completed: 4/23/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 8.5 ft	24HR



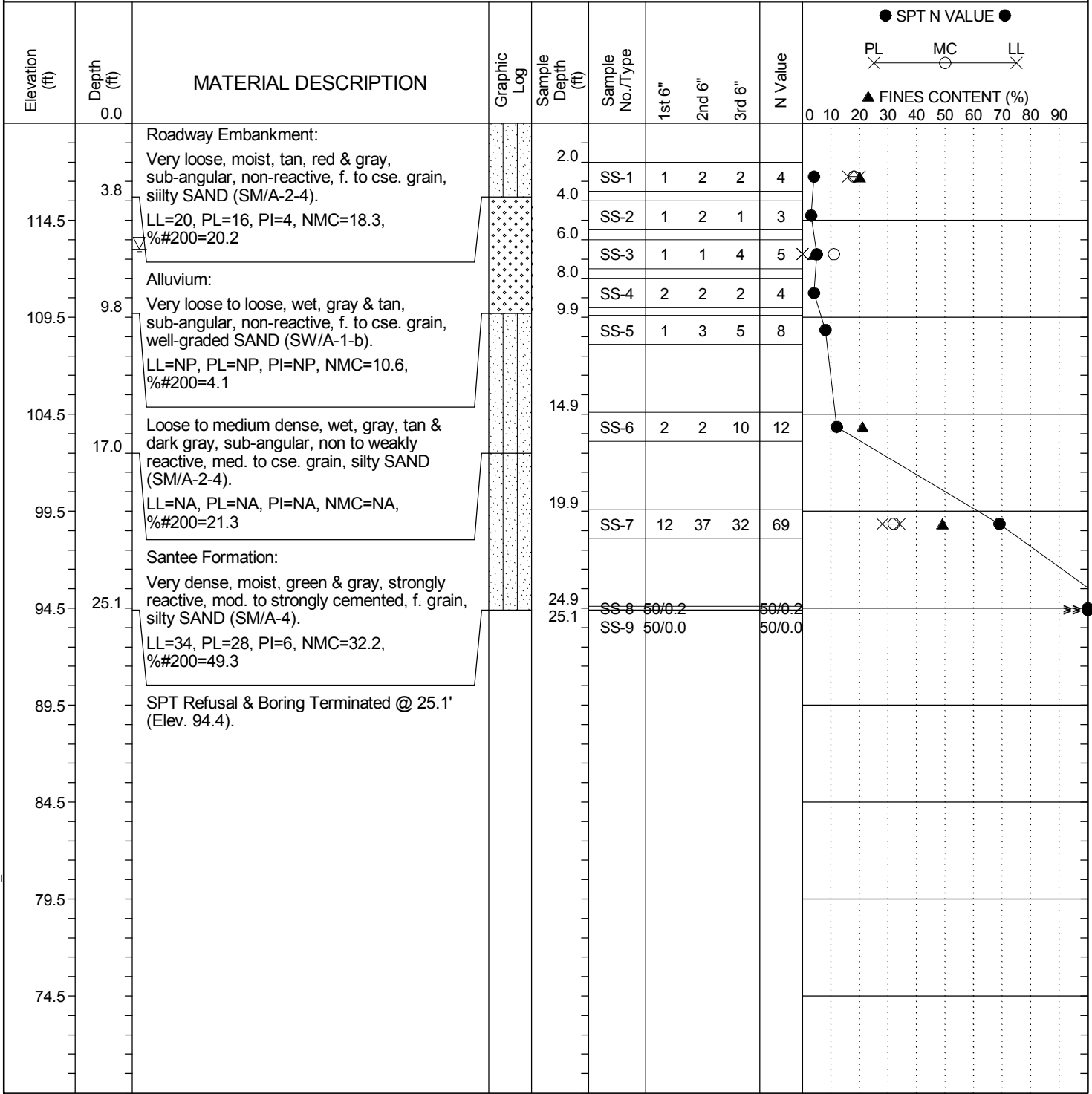
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 1/27/15

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-4	Boring Location: 5952+50	Offset: 20' Rt.	Alignment: US 301
Elev.: 119.5 ft	Latitude: 33.45749	Longitude: 80.64832	Date Started: 4/10/2014
Total Depth: 25.1 ft	Soil Depth: 25.1 ft	Core Depth: ft	Date Completed: 4/10/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 6.5 ft.	24HR: NA



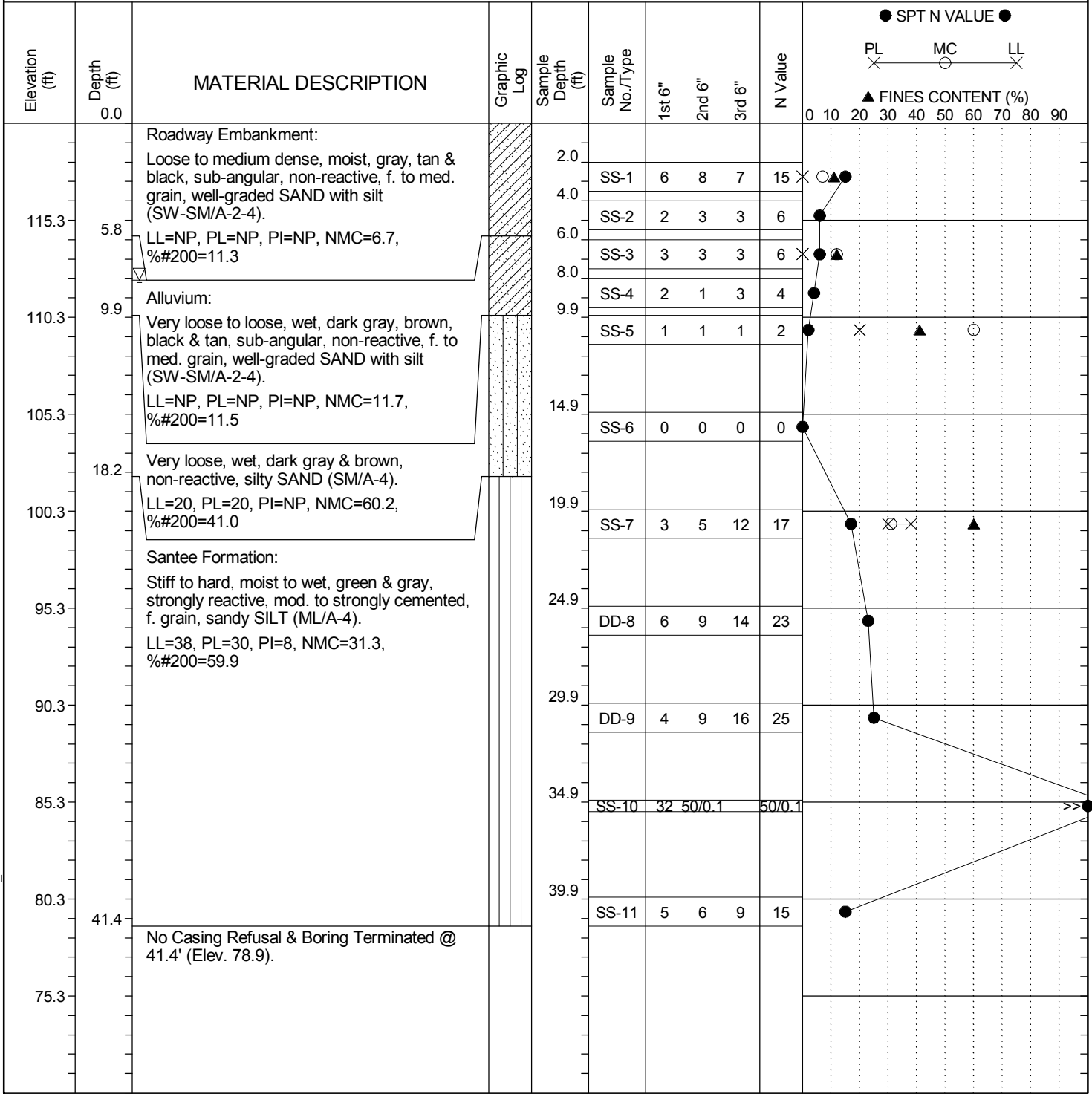
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-5	Boring Location: 5952+70	Offset: 10' Lt.	Alignment: US 301
Elev.: 120.3 ft	Latitude: 33.45736	Longitude: 80.64836	Date Started: 4/25/14
Total Depth: 41.4 ft	Soil Depth: 41.4 ft	Core Depth: ft	Date Completed: 4/25/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 8.1 ft	24HR



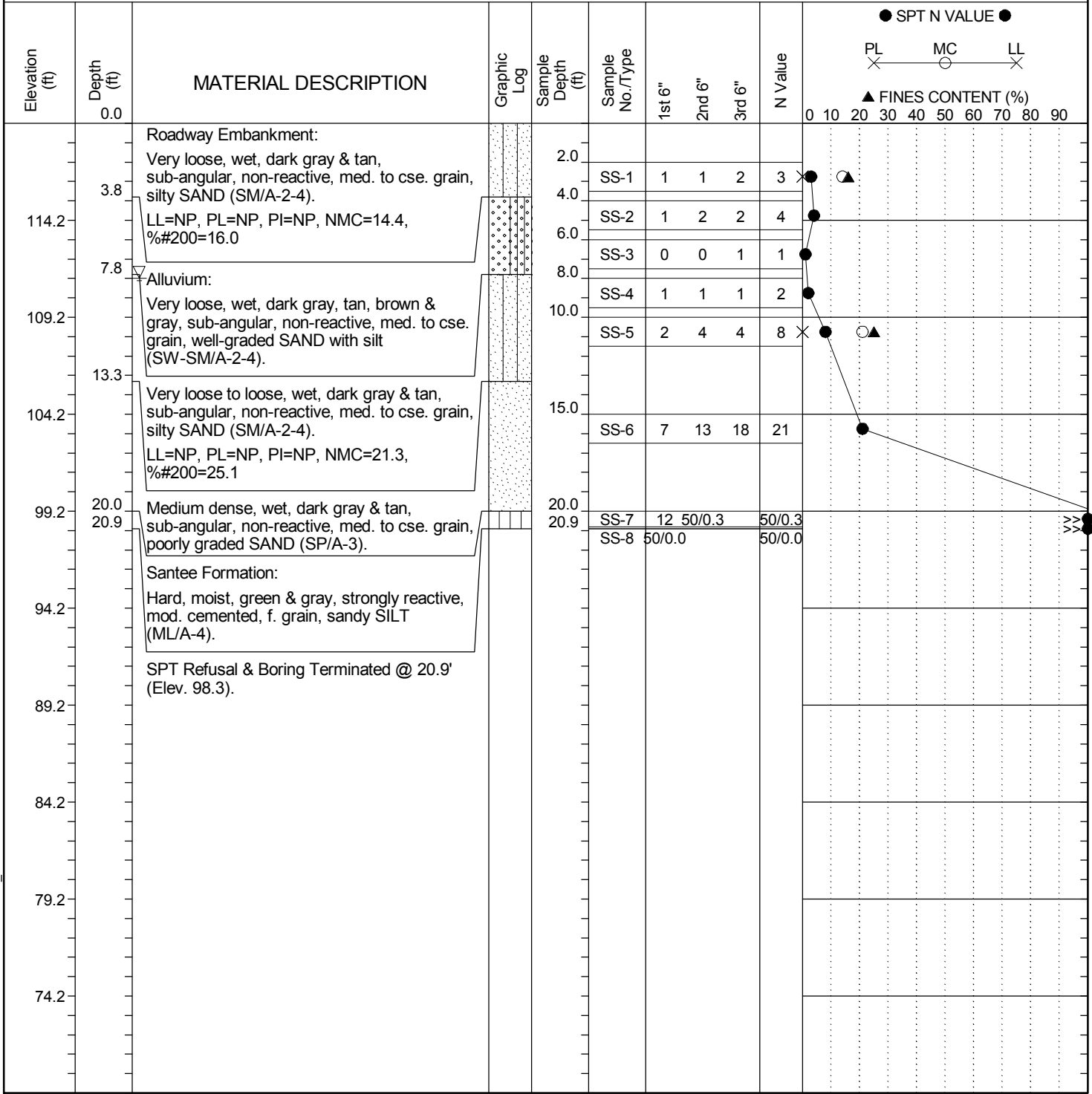
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 1/27/15

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-6	Boring Location: 5953+15	Offset: 22' Rt.	Alignment: US 301
Elev.: 119.2 ft	Latitude: 33.45746	Longitude: 80.64868	Date Started: 4/10/2014
Total Depth: 20.9 ft	Soil Depth: 20.9 ft	Core Depth: ft	Date Completed: 4/10/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 8.0 ft.	24HR: NA



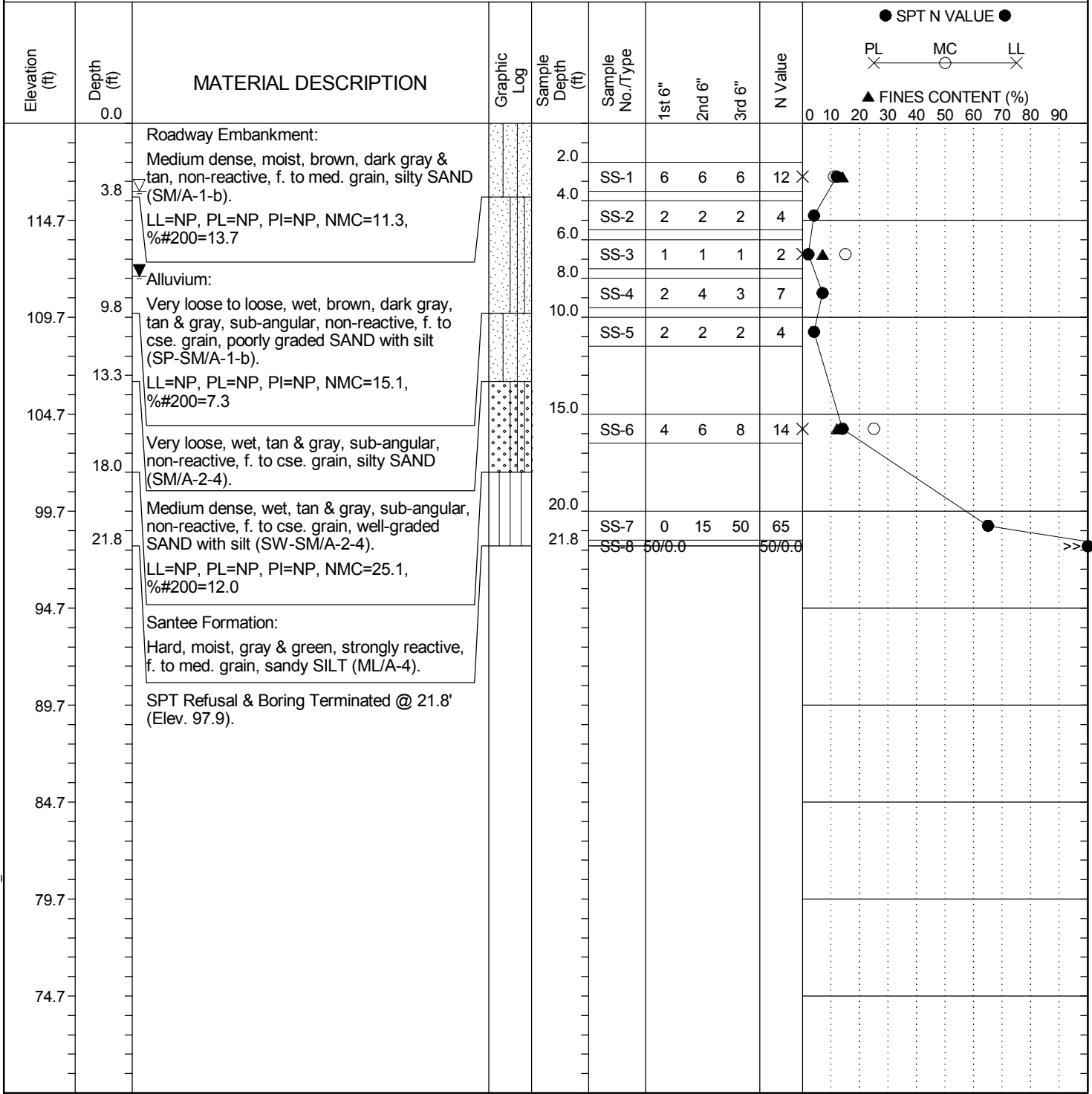
SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: RW-7	Boring Location: 5953+66	Offset: 20' Lt.	Alignment: US 301
Elev.: 119.7 ft	Latitude: 33.45733	Longitude: 80.64868	Date Started: 4/24/14
Total Depth: 21.8 ft	Soil Depth: 21.8 ft	Core Depth: ft	Date Completed: 4/24/2014
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 45C	Drill Method: RW/DC	Hammer Type: Automatic	Energy Ratio: 79%
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 3.5 ft	24HR: 7.9 ft



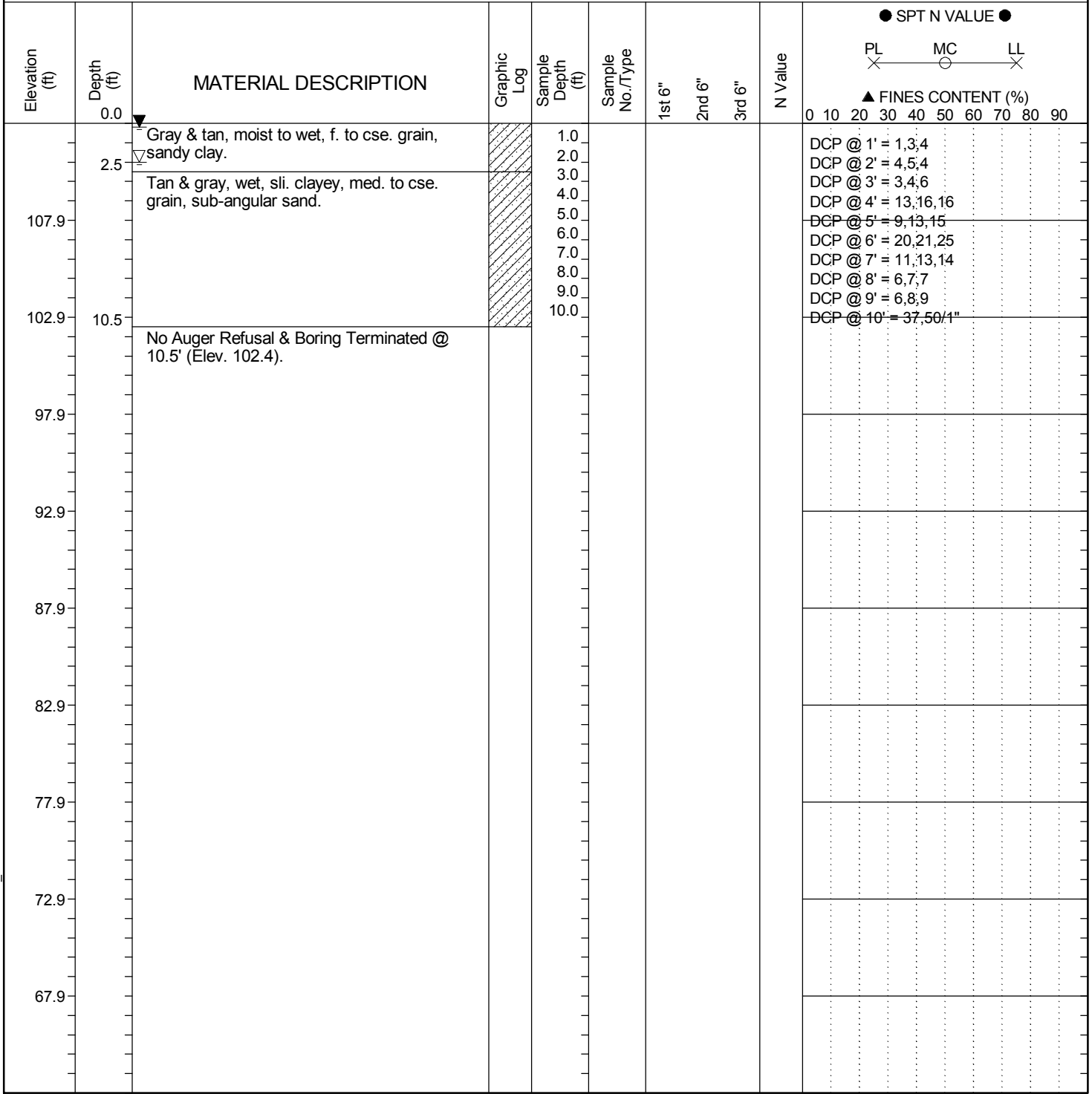
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC_DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: HA-1	Boring Location: 5948+00	Offset: 50' Rt.	Alignment: US 301
Elev.: 112.9 ft	Latitude: 33.45775	Longitude: 80.64687	Date Started: 4/4/2014
Total Depth: 10.5 ft	Soil Depth: 10.5 ft	Core Depth: ft	Date Completed: 4/4/2014
Bore Hole Diameter (in): NA	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: NA	Drill Method: Hand Auger	Hammer Type: NA	Energy Ratio:
Core Size: NA	Driller: M. Morgan	Groundwater: TOB 2 ft.	24HR: 0.2 ft.



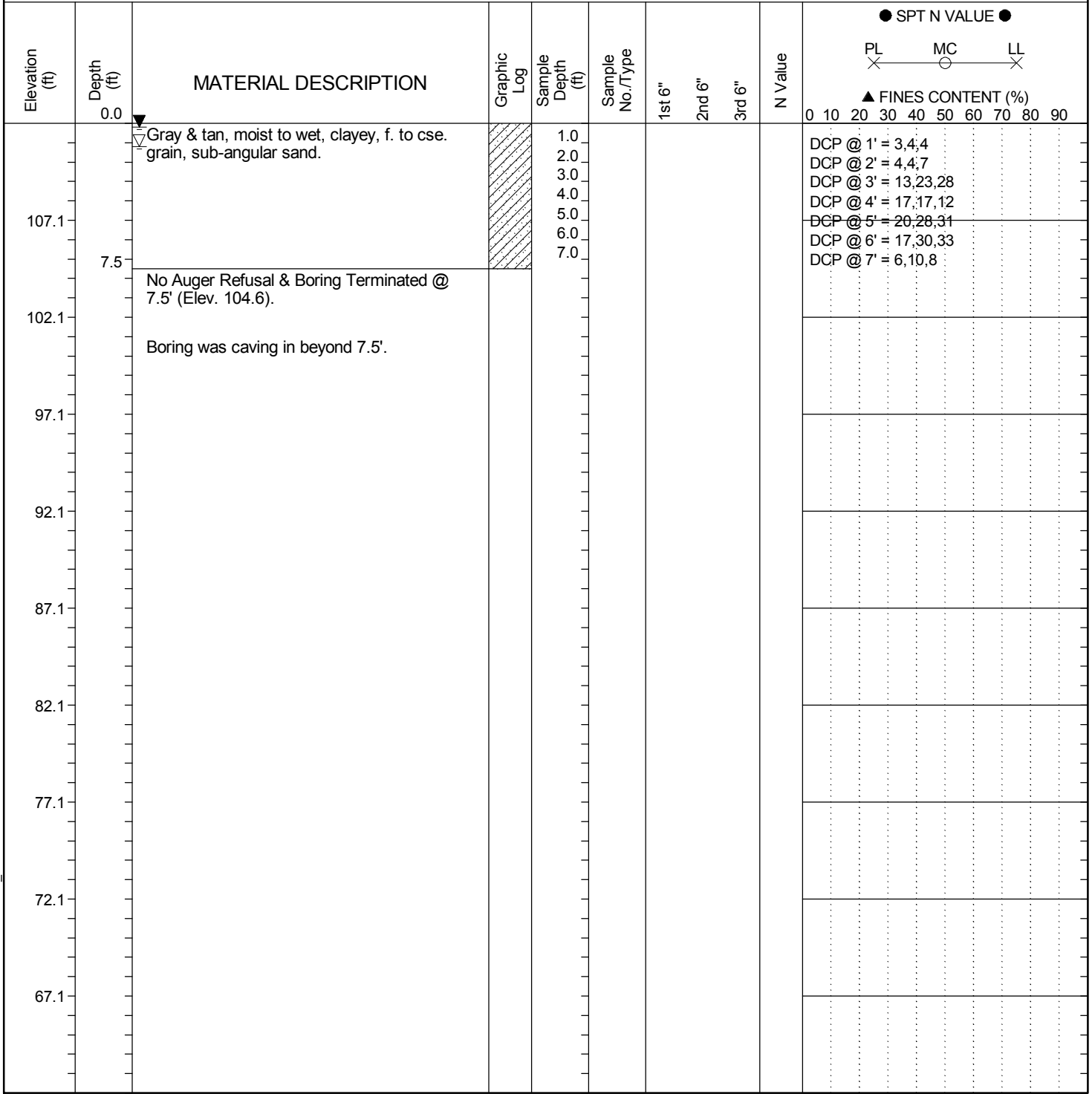
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: HA-2	Boring Location: 5949+00	Offset: 60' Rt.	Alignment: US 301
Elev.: 112.1 ft	Latitude: 33.45773	Longitude: 80.6472	Date Started: 4/4/2014
Total Depth: 7.5 ft	Soil Depth: 7.5 ft	Core Depth: ft	Date Completed: 4/4/2014
Bore Hole Diameter (in): NA	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: NA	Drill Method: Hand Auger	Hammer Type: NA	Energy Ratio:
Core Size: NA	Driller: M. Morgan	Groundwater: TOB	1.2 ft. 24HR 0.2 ft.



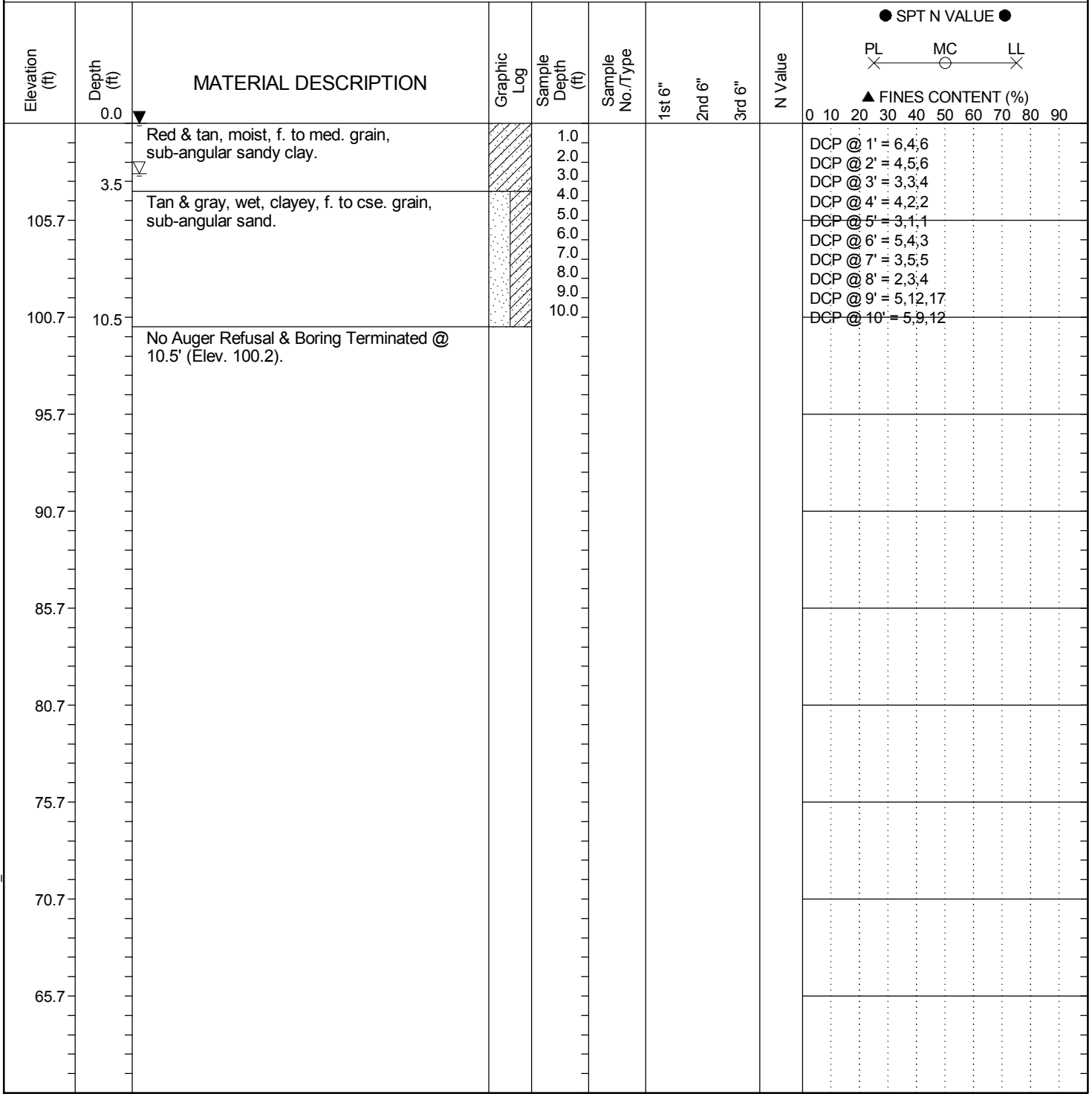
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: HA-3	Boring Location: 5952+23	Offset: 40' Rt.	Alignment: US 301
Elev.: 110.7 ft	Latitude: 33.45755	Longitude: 80.64824	Date Started: 4/4/2014
Total Depth: 10.5 ft	Soil Depth: 10.5 ft	Core Depth: ft	Date Completed: 4/4/2014
Bore Hole Diameter (in): NA	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: NA	Drill Method: Hand Auger	Hammer Type: NA	Energy Ratio:
Core Size: NA	Driller: M. Morgan	Groundwater: TOB	2.6 ft. 24HR 0 ft.



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

SCDOT Soil Test Boring Log

File No.: 38.040308	Project No. (PIN): BR38(019)	County: Orangeburg	Eng./Geo.: R. DeLost
Site Description: Bridge Replacement over Four Hole Swamp			Route: US 301
Boring No.: HA-4	Boring Location: 5952+54	Offset: 42' Rt.	Alignment: US 301
Elev.: 112.8 ft	Latitude: 33.45754	Longitude: 80.64834	Date Started: 4/4/2014
Total Depth: 3.5 ft	Soil Depth: 3.5 ft	Core Depth: ft	Date Completed: 4/4/2014
Bore Hole Diameter (in): NA	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: NA	Drill Method: Hand Auger	Hammer Type: NA	Energy Ratio:
Core Size: NA	Driller: M. Morgan	Groundwater: TOB	0.5 ft. 24HR 0 ft.

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE									
										PL	MC	LL	FINES CONTENT (%)						
107.8	0.0	Gray, tan & brown, wet, silty, clayey, med. to cse. grain, sub-angular sand.		1.0						0	10	20	30	40	50	60	70	80	90
107.8	3.5	No Auger Refusal & Boring Terminated @ 3.5' (Elev. 109.3).		2.0						DCP @ 1' = 4,2;2									
102.8		Boring was caving in beyond 3.5'.		3.0						DCP @ 2' = 5,9;6									
97.8										DCP @ 3' = 17,42,13									
92.8																			
87.8																			
82.8																			
77.8																			
72.8																			
67.8																			

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

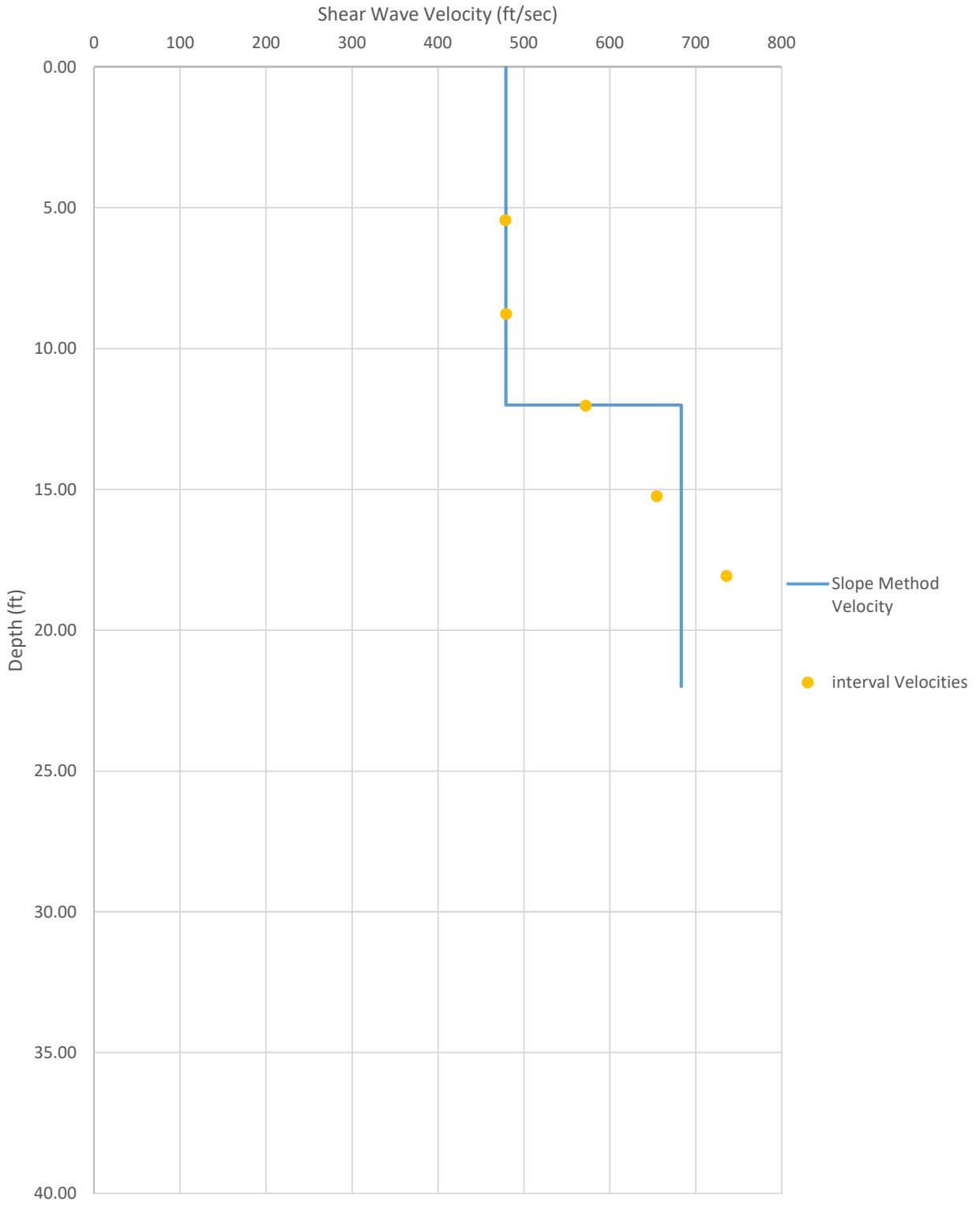
SC.DOT BRIDGE OVER FOUR HOLE SWAMP.GPJ SC.DOT.GDT 9/19/14

Appendix III

ESP Shear Wave Velocity Data and Profile

ICA Geophysical Testing Results

ADRS Curve

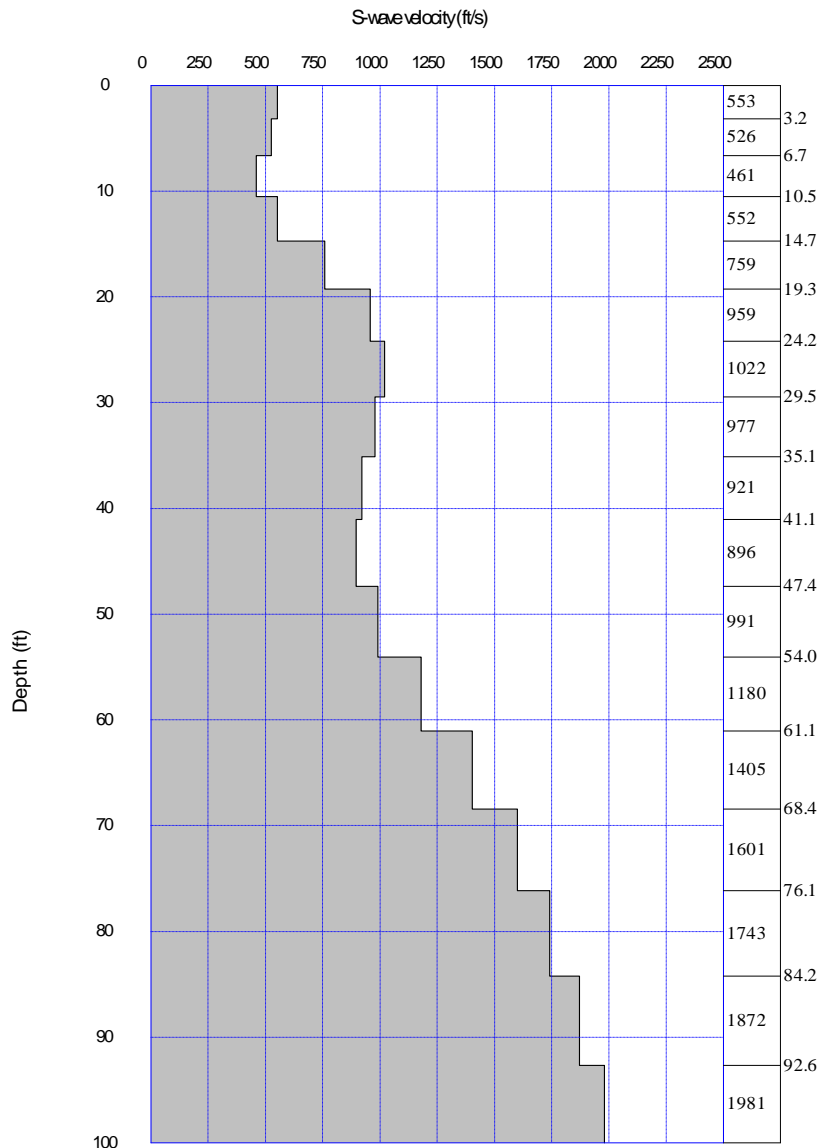


Scale : NTS
 Drawn By: ML
 Checked by: MSU
 Date: 2/25/22



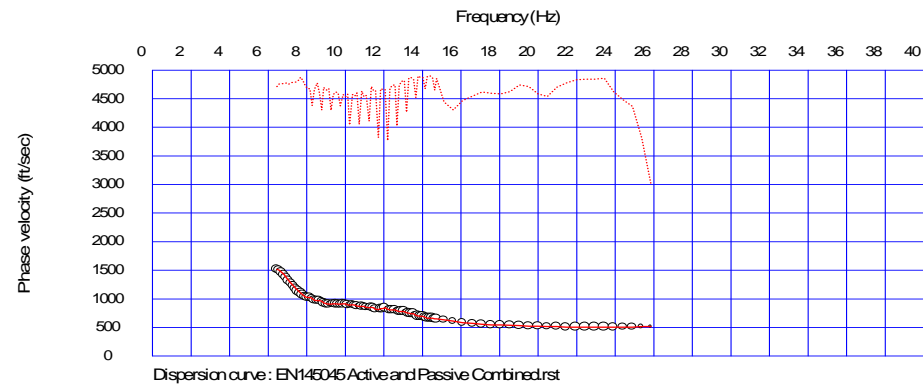
Shear Wave Velocity Profile
 US 301 over Four Hole Swamp
 Orangeburg, SC
 Proj. No. JN11.307 CPT-2

Fig. No.
 1



S-wave velocity model (inverted): EN145045 Active and Passive Combined.rst
 Average Vs 100ft = 1005.4 ft/sec

Testing Results	
Depth(ft)	S-wave velocity(ft/s)
0.0	553.1
3.2	526.7
6.7	461.6
10.5	552.7
14.7	759.5
19.3	959.8
24.2	1022.2
29.5	977.8
35.1	921.2
41.1	896.1
47.4	991.6
54.0	1180.6
61.1	1405.0
68.4	1601.4
76.1	1743.3
84.2	1872.3
92.6	1981.6



Project Mgr:	BTS
Prepared by:	BTS
Checked by:	BTS
Approved by:	BTS

Project No.	EN145045
Scale:	NA
Date:	4/18/2014

Terracon

1450 FIFTH STREET WEST NORTH CHARLESTON, SC
 PH: (843) 884-1234 Fax: (843) 884-9234

GEOPHYSICAL TESTING RESULTS
MASW SHEAR WAVE VELOCITY
 XXXXX
 Orangeburg County, South Carolina

TEST NO
X

3-Point Acceleration Design Response Spectrum

SCDOT v3.1 - 01/05/2021

Project ID: 40308	Latitude: 33.4570	
Route: US 301	County: 38 - Orangeburg	Longitude: 80.6470
Project: US 301 over Four Hole Swamp		

Designer: N. Harman - Support
Date: 3/10/2022

Design EQ	PGA	S _{DS}	S _{D1}	M _W	R	PGV	D _{a5-95}	T' _o
	g	g	g	-	km	inches/sec	sec	sec
FEE	0.21	0.38	0.15	7.30	63.97	5.56	28.79	0.07
SEE	0.47	0.90	0.48	7.30	62.40	18.31	28.56	0.21

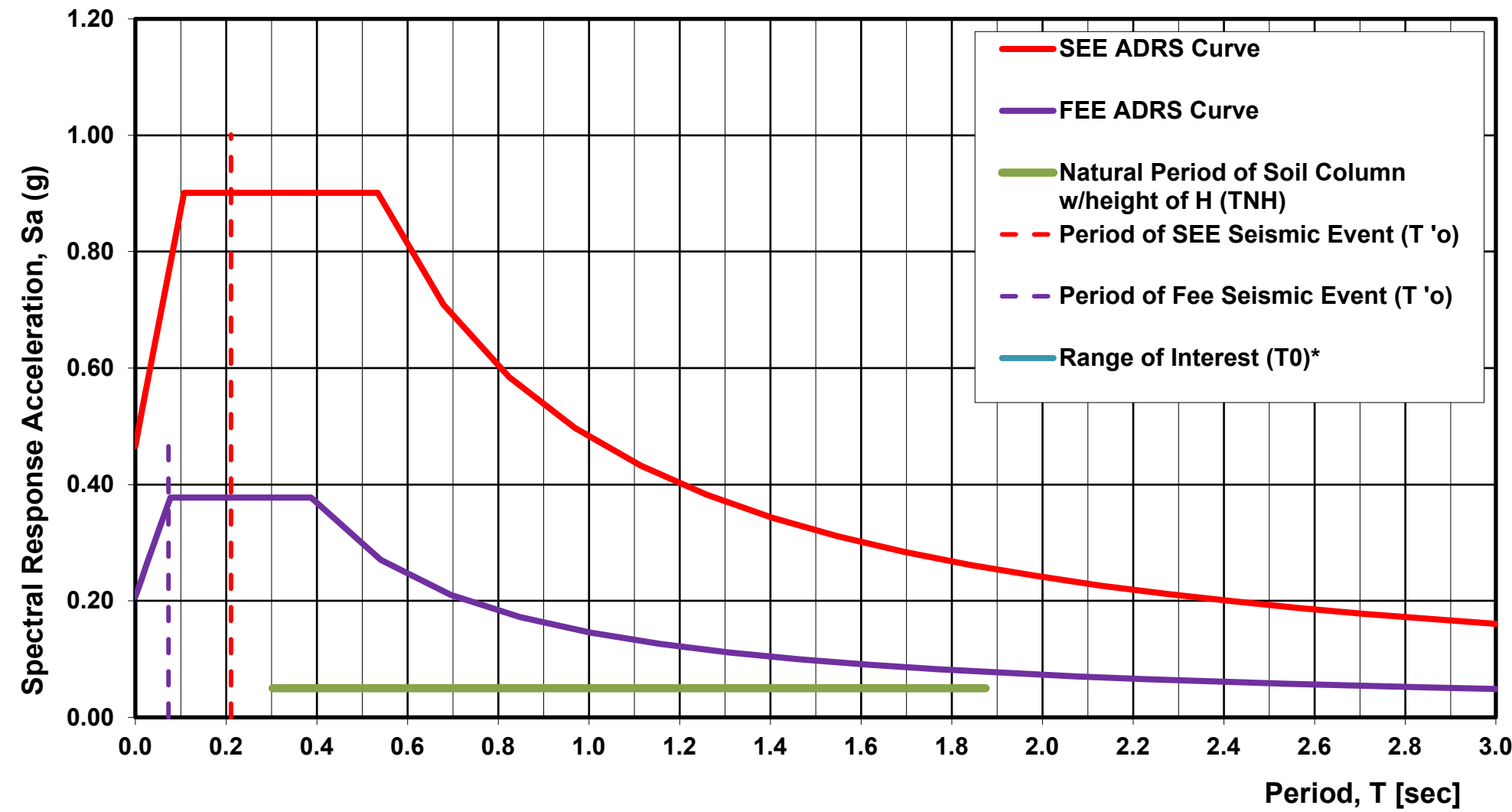
Damping: 5%
Geologic Condition: Geologically Realistic (Q = 100)*
ADRS Location within Soil Column: At Ground Surface

Fundamental Period of Structure, T _o [*]	Range of Interest		V _{s,H} [*]	H	T _{NH}	
	sec				sec	
sec	0.5*T _o	2.0*T _o	ft/sec	ft	(4*H)/V _{s,H} [*]	(6*H)/V _{s,H} [*]
0.00	0.00	0.00	1600.15	500.00	0.30	1.87
0.00	0.00	0.00				

H = B-C Boundary

South Carolina Coastal Plain
*Same Geologic Condition as used in SCENARIO_PC (2006)

SC Seismic ADRS Curve



FEE Data		SEE Data	
T	S _a	T	S _a
0.00	0.208	0.00	0.466
0.01	0.236	0.02	0.539
0.03	0.264	0.04	0.611
0.04	0.293	0.05	0.684
0.05	0.321	0.07	0.756
0.06	0.349	0.09	0.829
0.08	0.378	0.11	0.901
0.10	0.378	0.14	0.901
0.13	0.378	0.18	0.901
0.16	0.378	0.21	0.901
0.18	0.378	0.25	0.901
0.21	0.378	0.29	0.901
0.23	0.378	0.32	0.901
0.26	0.378	0.36	0.901
0.28	0.378	0.39	0.901
0.31	0.378	0.43	0.901
0.34	0.378	0.46	0.901
0.36	0.378	0.50	0.901
0.39	0.378	0.53	0.901
0.54	0.270	0.68	0.709
0.69	0.211	0.82	0.584
0.85	0.172	0.97	0.497
1.00	0.146	1.11	0.432
1.16	0.127	1.26	0.383
1.31	0.112	1.40	0.343
1.46	0.100	1.55	0.311
1.62	0.091	1.69	0.284
1.77	0.083	1.84	0.262
1.92	0.076	1.98	0.243
2.08	0.070	2.13	0.226
2.23	0.066	2.27	0.212
2.39	0.061	2.42	0.199
2.54	0.058	2.56	0.188
2.69	0.054	2.71	0.178
2.85	0.051	2.85	0.169
3.00	0.049	3.00	0.161

Appendix IV

ESP Laboratory Testing

PSI Laboratory Testing

ICA Laboratory Testing

ESP Standard Proctor Testing Summary									
Boring	Depth (ft)	Natural Moisture (%)	Atterberg Limits		Percent Fines (%)	Classification		Max Dry Density (pcf)	Opt. Moisture (%)
			LL	PL		AASHTO	USCS		
STB-01A	0-5	11.6	31	18	29	A-2-6	SC	123.6	10.9
STB-08A	0-5	12.9	23	15	25	A-2-4	SC	125.4	10.3
STB-10A	0-5	10.3	19	15	27	A-2-4	SC-SM	126.4	9.3

ESP Corrosion Series Testing Summary					
Boring	Depth (ft)	Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)	pH
STB-02	10-12	1325	< 10	21	6.09

ESP Moisture, Ash, and Organic Matter Testing Summary				
Boring	Depth (ft)	Moisture Content (%)	Ash Content (%)	Organic Content (%)
STB-08A	0-5	12.9	97.3	2.8

PSI Corrosion Series Testing Summary					
Boring	Depth (ft)	Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)	pH
B-1A	18.5-20	2600	-	-	3.90
B-1A	28.5-35	1500	555	5	7.65
B-3A	15.2-19.2	7600	111	2	7.45
B-5A	36.2-47.7	1800	396	4	7.60



SUMMARY OF LABORATORY RESULTS

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%-<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
STB-01	4.0	28	16	12				13.3			
STB-01	6.0	NP	NP	NP	0.075	15	SM	10.5			
STB-01	8.0	NP	NP	NP	4.75	22	SM	23.7			
STB-01	13.5	NP	NP	NP	4.75	24	SM	23.7			
STB-01	33.5	NP	NP	NP	0.075	26	SM				
STB-01	48.5	NP	NP	NP	0.075	20	SM				
STB-01	93.5	NP	NP	NP				32.1			
STB-01A	0.0	31	18	13	0.075	29	SC	11.6			
STB-02	0.0				0.075	21		12.3			
STB-02	2.0	32	13	19	4.75	29	SC	15.2			
STB-02	4.0							15.2			
STB-02	6.0	27	13	14	75	26	SC	15.4			
STB-02	8.0	NP	NP	NP	0.075	19	SM	22.5			
STB-02	10.0	42	17	25	0.075	65	CL	20.0			
STB-02	12.0	31	10	21	2	51	CL	19.3			
STB-02	14.0				0.075	5		22.9			
STB-02	16.0				0.075	5					
STB-02	18.0							16.8			
STB-02	36.0	NP	NP	NP				31.7			
STB-02	40.0	NP	NP	NP	4.75	67	ML	39.1			
STB-03	9.5							37.4			
STB-03	11.5	NP	NP	NP	75	39	SM				
STB-03	13.5	20	13	7				28.1			
STB-03	17.5	NP	NP	NP	0.075	5		16.6			
STB-03	23.0	32	24	8	0.075	44	SM				
STB-03	38.0	NP	NP	NP	0.075	51	ML	34.9			
STB-04	11.3							134.6			
STB-04	14.0							18.9			
STB-04	18.0							19.0			
STB-04	20.0				0.075	5		18.5			
STB-04	33.5	32	31	1	0.075	54	ML				
STB-04	38.5	NP	NP	NP	4.75	70	ML	37.7			
STB-04	108.5	45	41	4							
STB-05	10.0	29	13	16	4.75	49	SC	17.6			
STB-05	12.0	36	12	24							
STB-05	14.0							17.0			
STB-05	16.0				0.075	7					
STB-05	33.5	NP	NP	NP	4.75	61	ML	35.8			
STB-05	43.5	NP	NP	NP	0.075	46	SM				
STB-08A	0.0	23	15	8	0.075	25	SC	12.9			
STB-09	8.0	25	18	7							
STB-10A	0.0	19	15	4	0.075	27	SC-SM	10.3			

LAB SUMMARY US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22



INDEX PROPERTIES VERSUS DEPTH

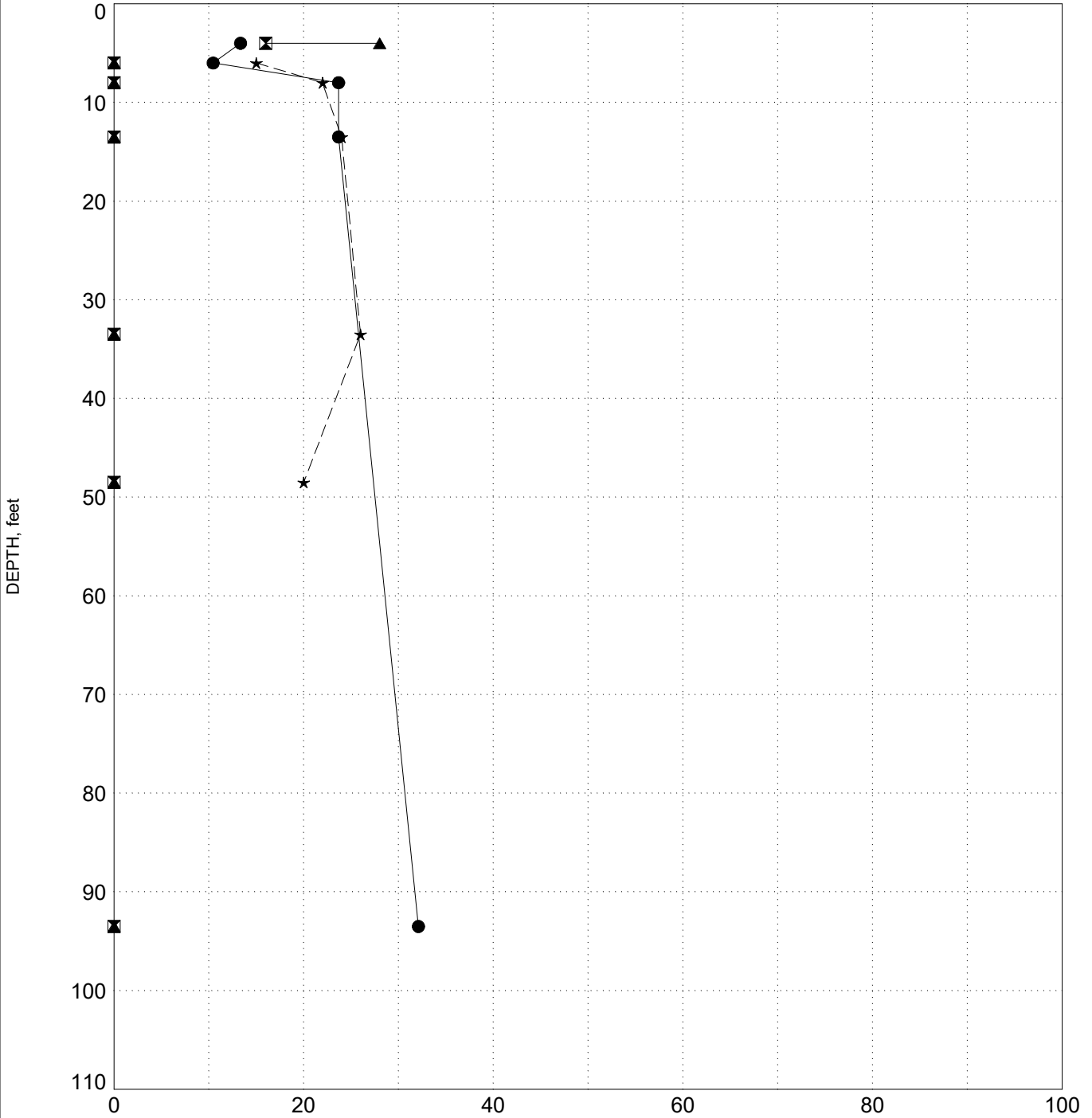
PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-01

SURFACE ELEVATION: 120.4



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines



INDEX PROPERTIES VERSUS DEPTH

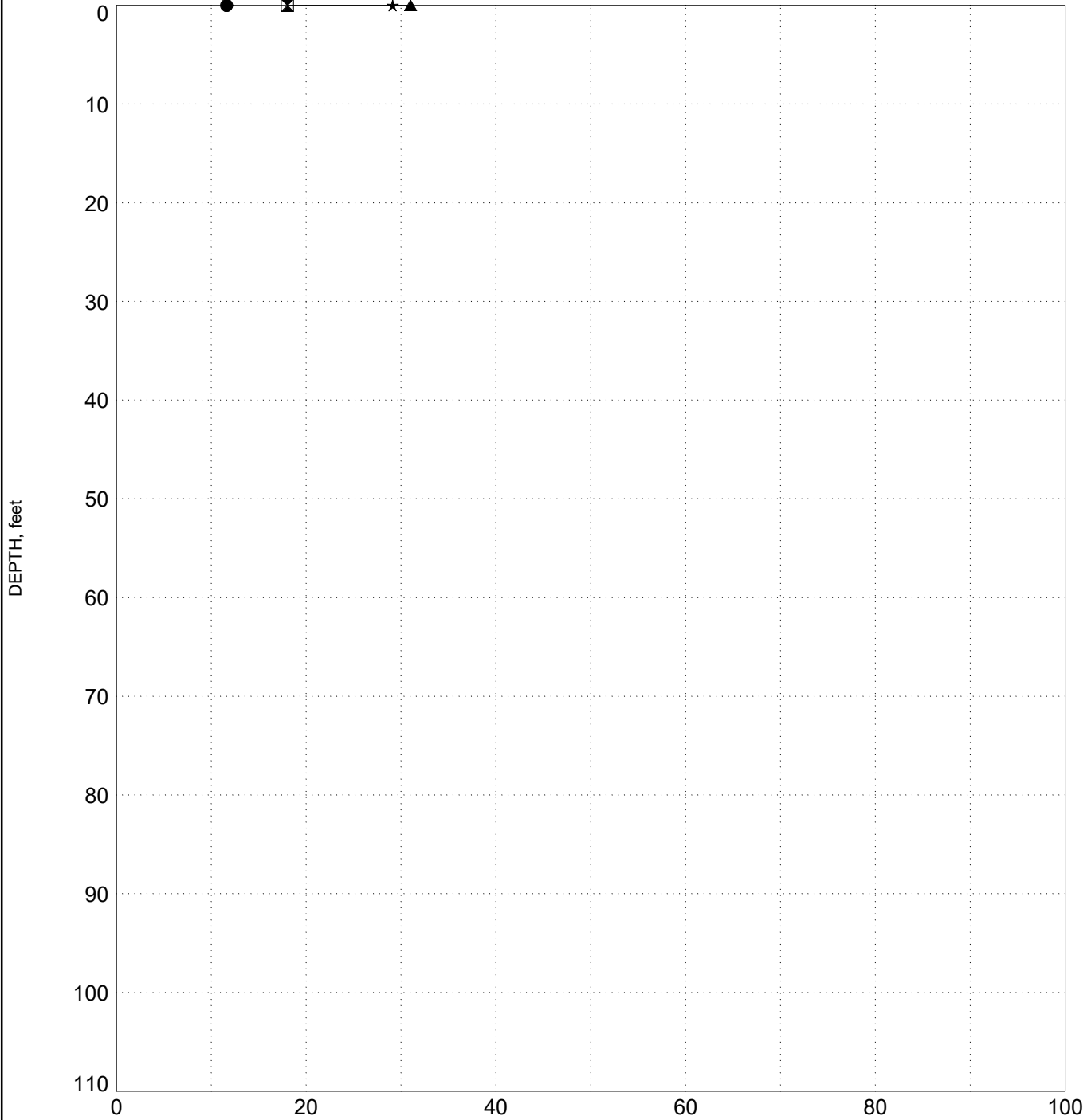
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-01A

SURFACE ELEVATION: 120.4



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines



INDEX PROPERTIES VERSUS DEPTH

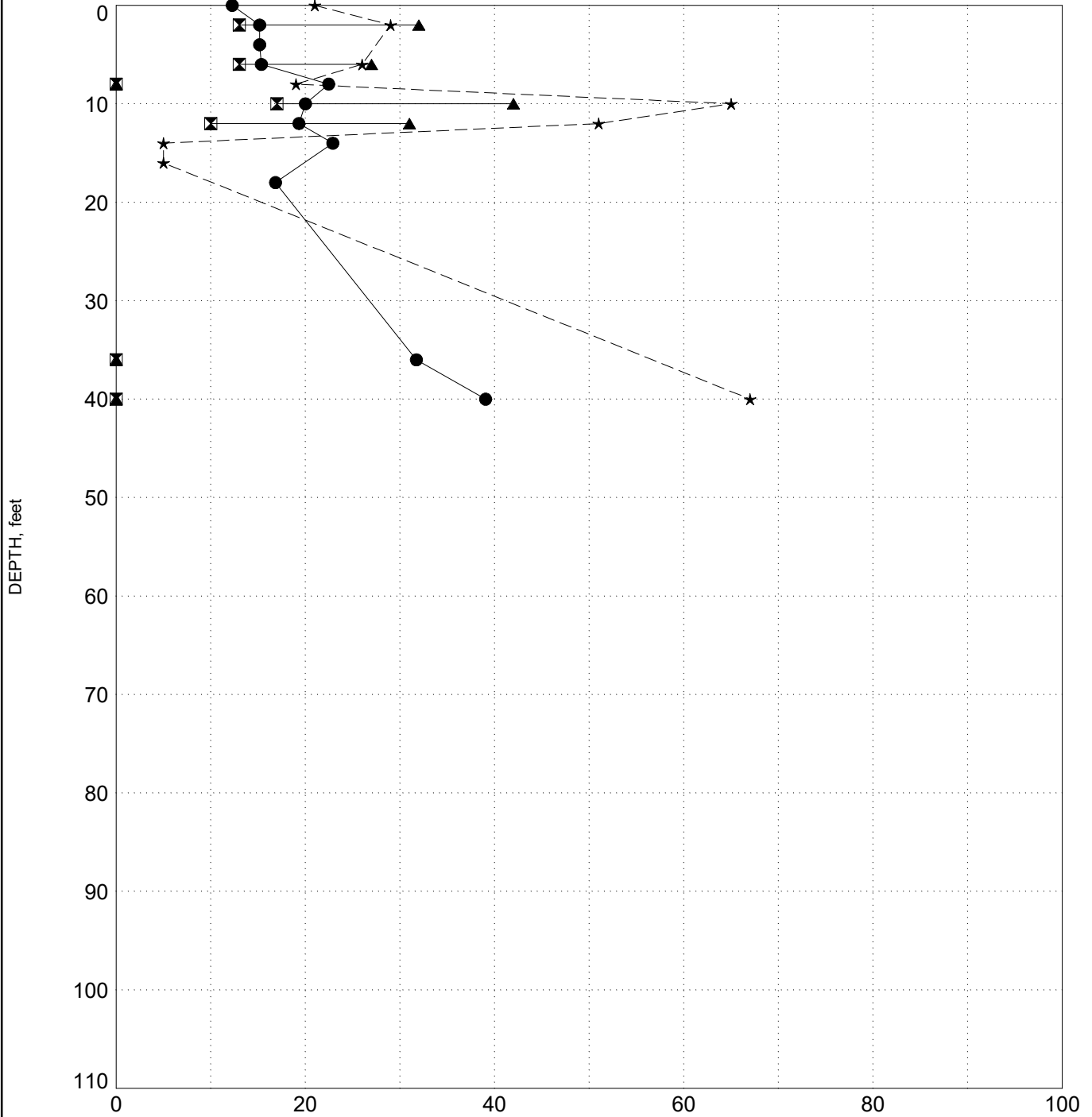
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-02

SURFACE ELEVATION: 120.6



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines

INDEX PROPS US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22



INDEX PROPERTIES VERSUS DEPTH

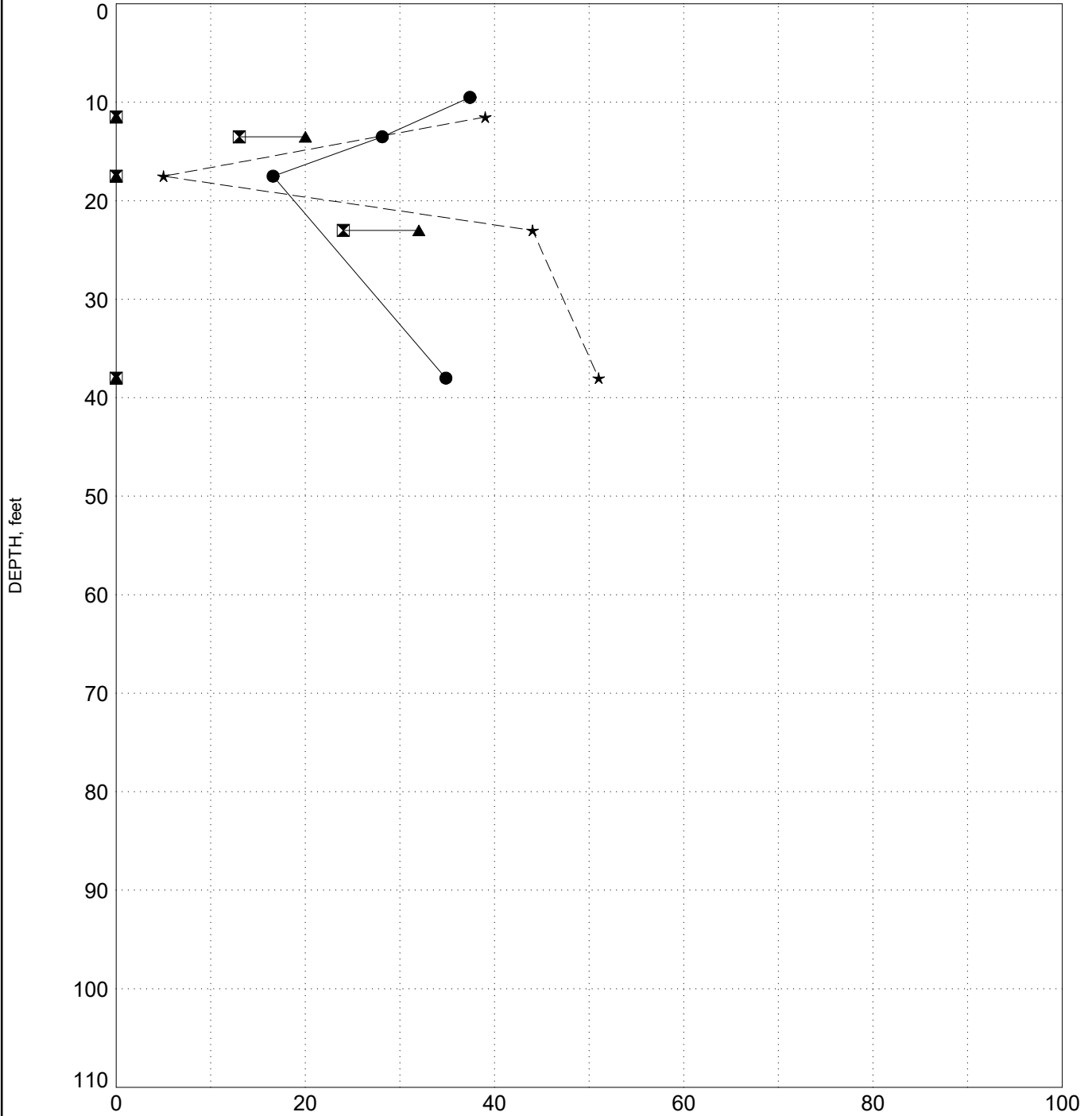
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-03

SURFACE ELEVATION: 120.5



LEGEND	
●	Water Content
☒	Plastic Limit
▲	Liquid Limit
★	Fines



INDEX PROPERTIES VERSUS DEPTH

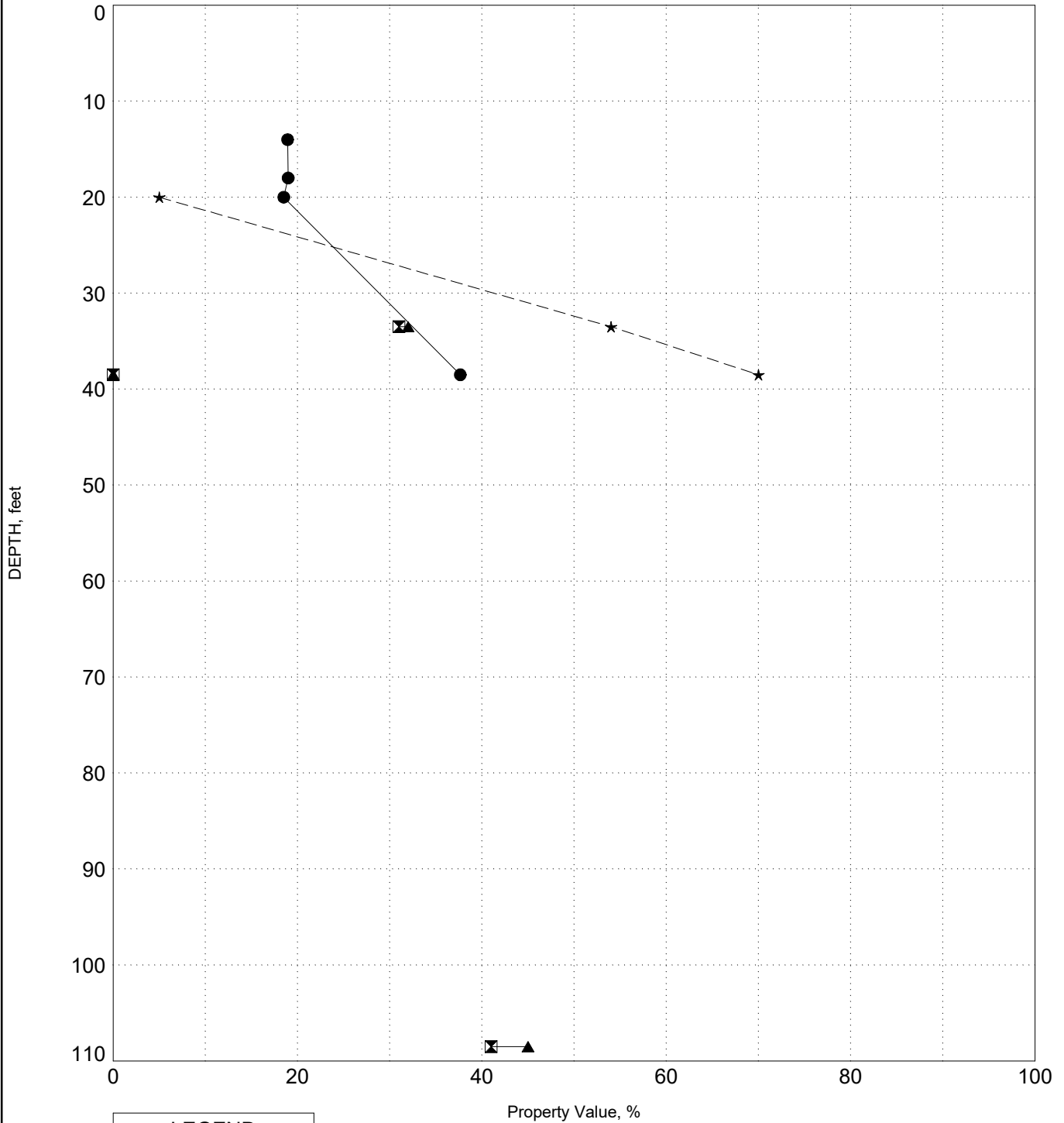
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-04

SURFACE ELEVATION: 120.5



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines



INDEX PROPERTIES VERSUS DEPTH

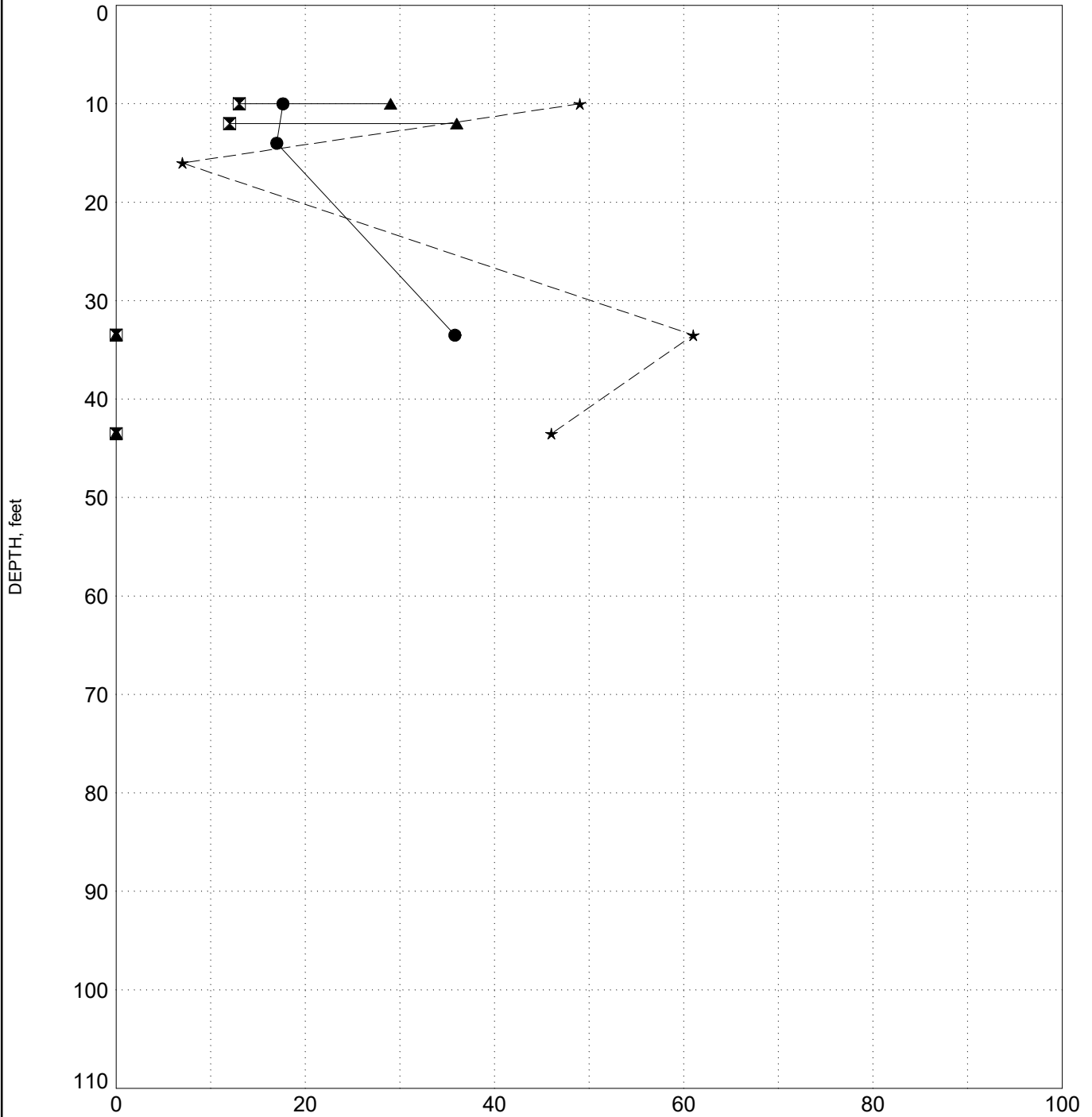
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-05

SURFACE ELEVATION: 120.5



LEGEND	
●	Water Content
☒	Plastic Limit
▲	Liquid Limit
★	Fines



INDEX PROPERTIES VERSUS DEPTH

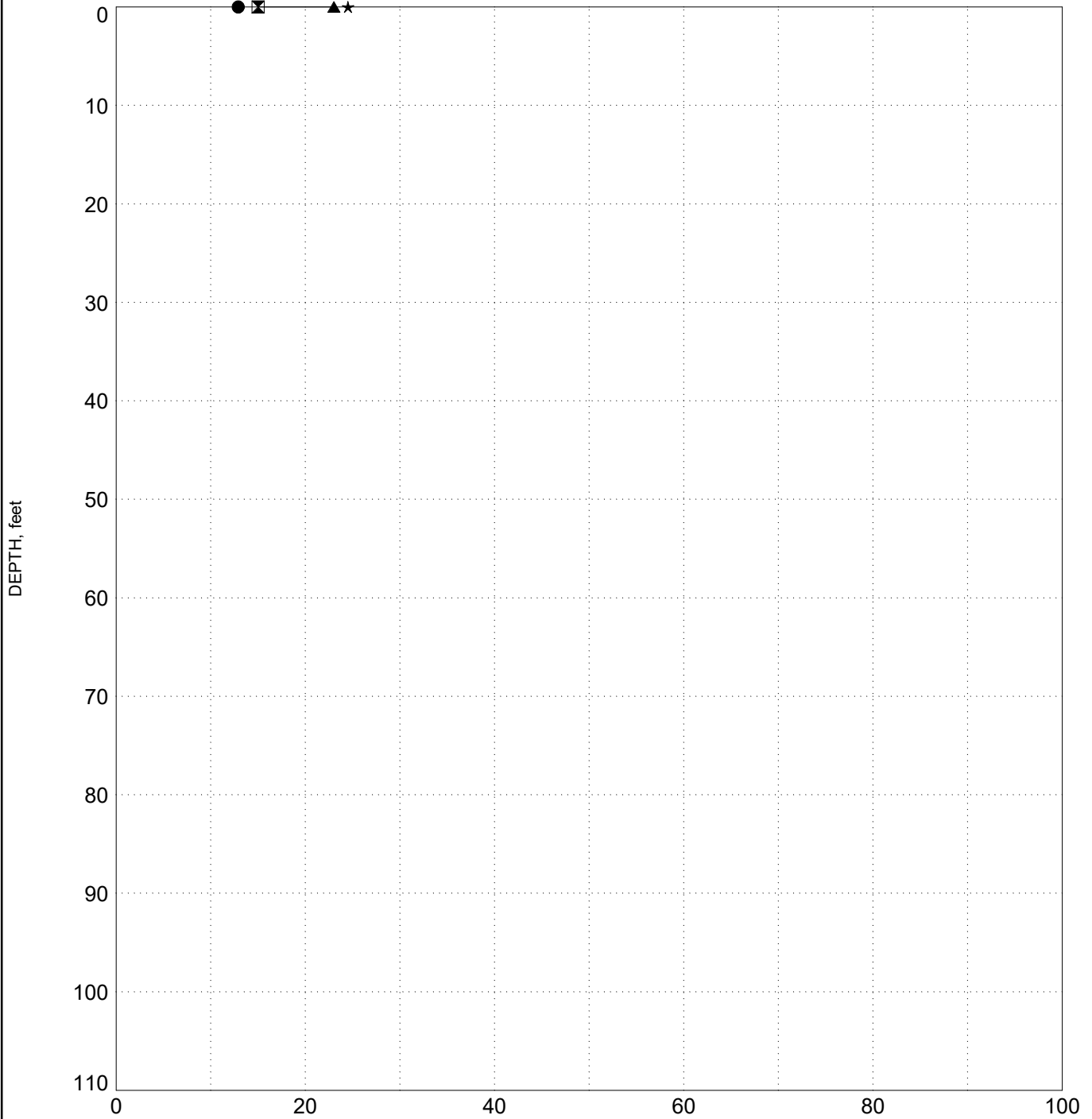
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PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-08A

SURFACE ELEVATION: 119.6



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines

INDEX PROPS US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22



INDEX PROPERTIES VERSUS DEPTH

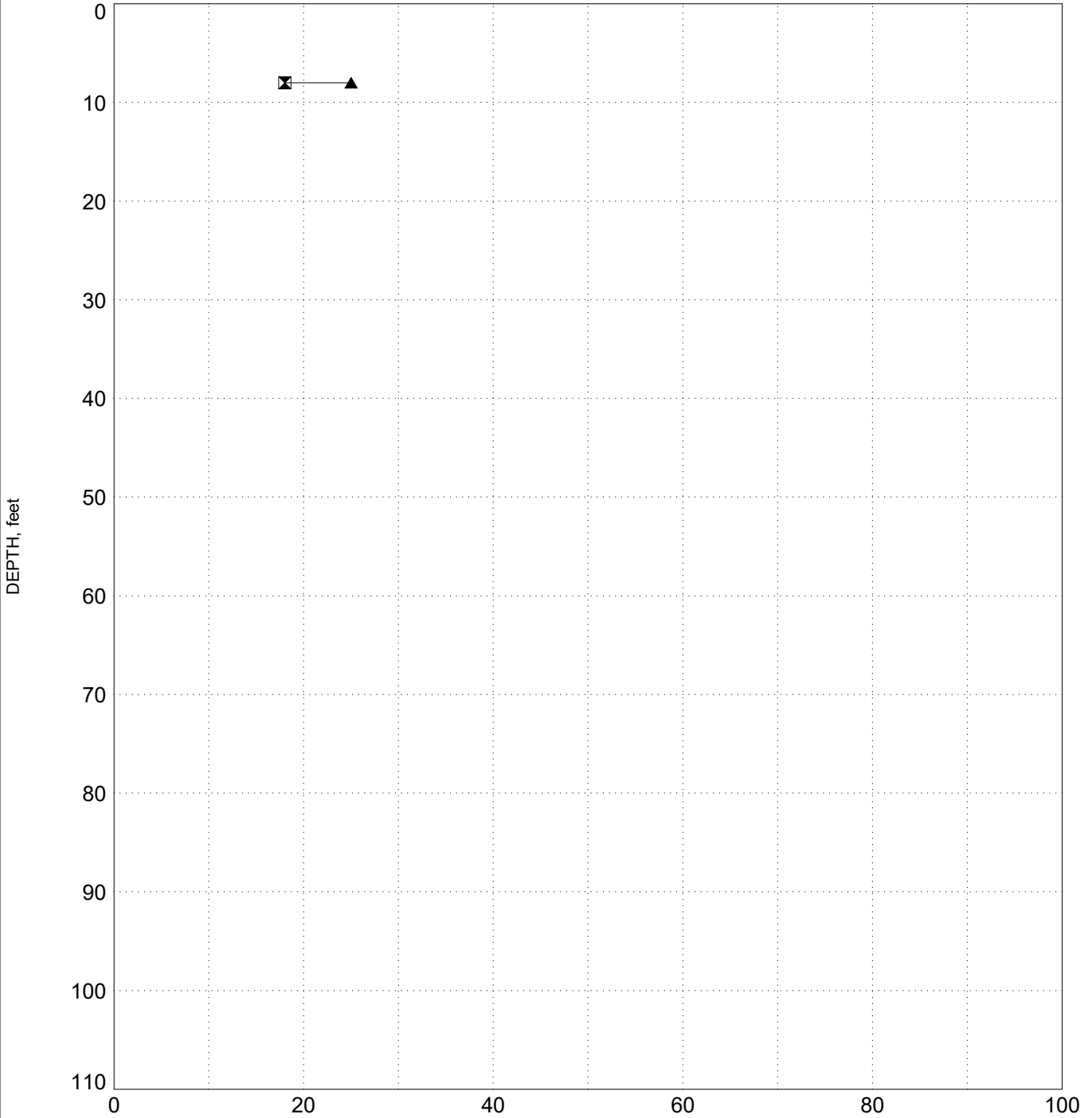
PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-09

SURFACE ELEVATION: 120.1



LEGEND	
●	Water Content
☒	Plastic Limit
▲	Liquid Limit
★	Fines

INDEX PROPS US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22



INDEX PROPERTIES VERSUS DEPTH

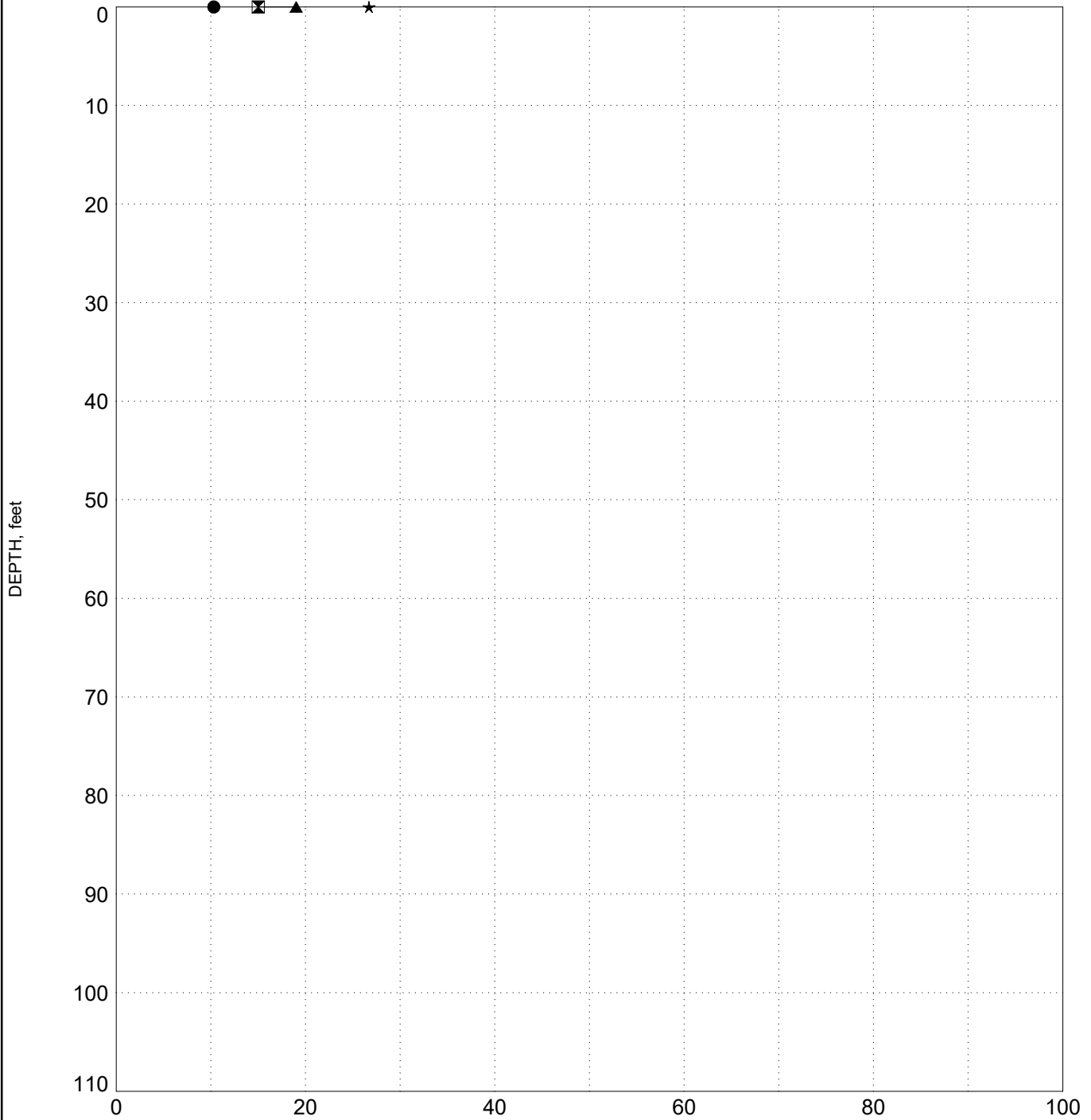
PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg

BORING STB-10A

SURFACE ELEVATION: 120.4



LEGEND	
●	Water Content
☒	Plastic Limit
▲	Liquid Limit
★	Fines

INDEX PROPS US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22

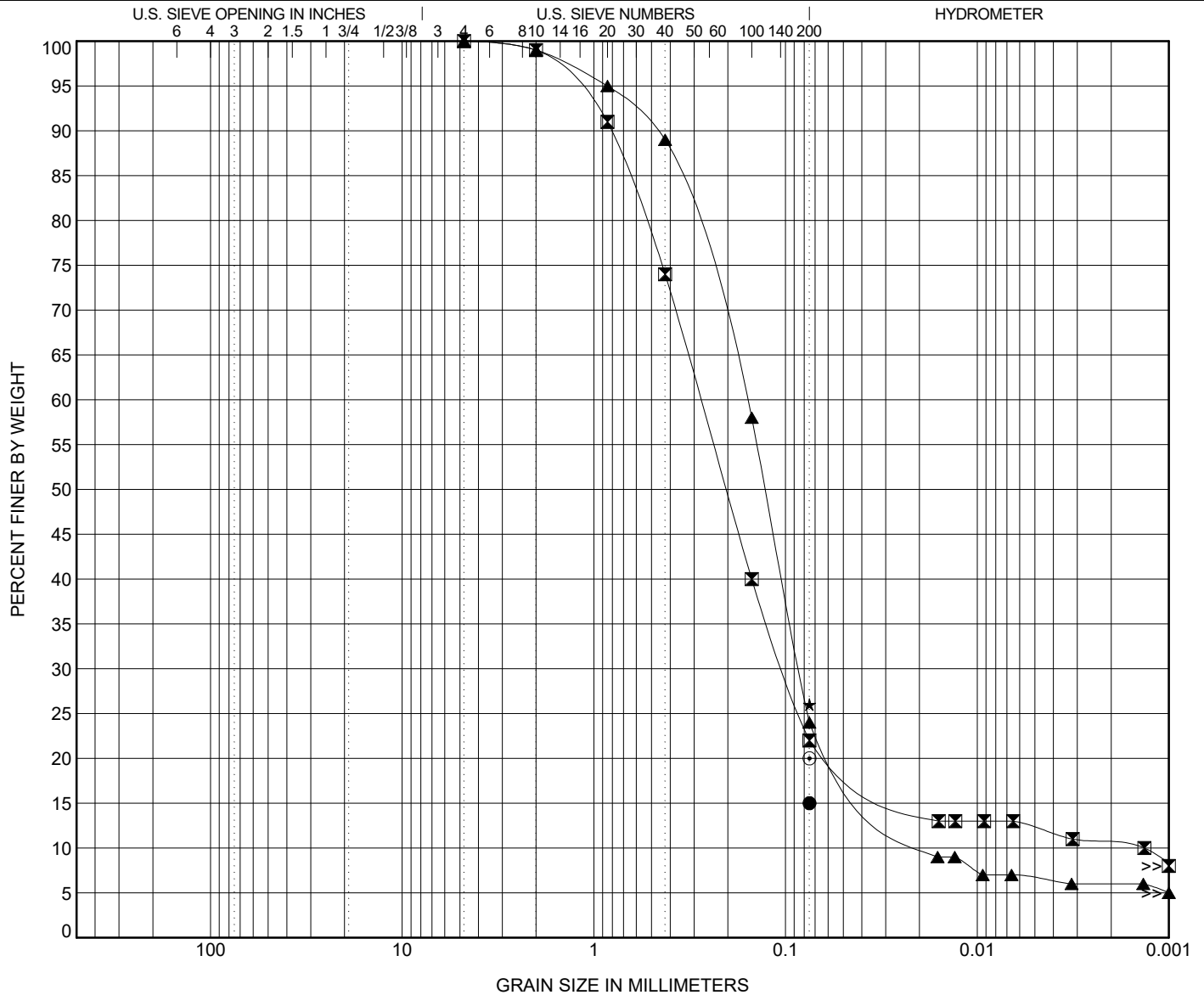


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● STB-01	6.0	SILTY SAND(SM)	NP	NP	NP		
☒ STB-01	8.0	SILTY SAND(SM)	NP	NP	NP	28.08	206.56
▲ STB-01	13.5	SILTY SAND(SM)	NP	NP	NP	2.51	8.99
★ STB-01	33.5	SILTY SAND(SM)	NP	NP	NP		
◎ STB-01	48.5	SILTY SAND(SM)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● STB-01	6.0	0.075							15.0
☒ STB-01	8.0	4.75	0.277	0.102	0.001	0.0	78.0	9.7	12.3
▲ STB-01	13.5	4.75	0.16	0.085	0.018	0.0	76.0	17.4	6.6
★ STB-01	33.5	0.075							26.0
◎ STB-01	48.5	0.075							20.0

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

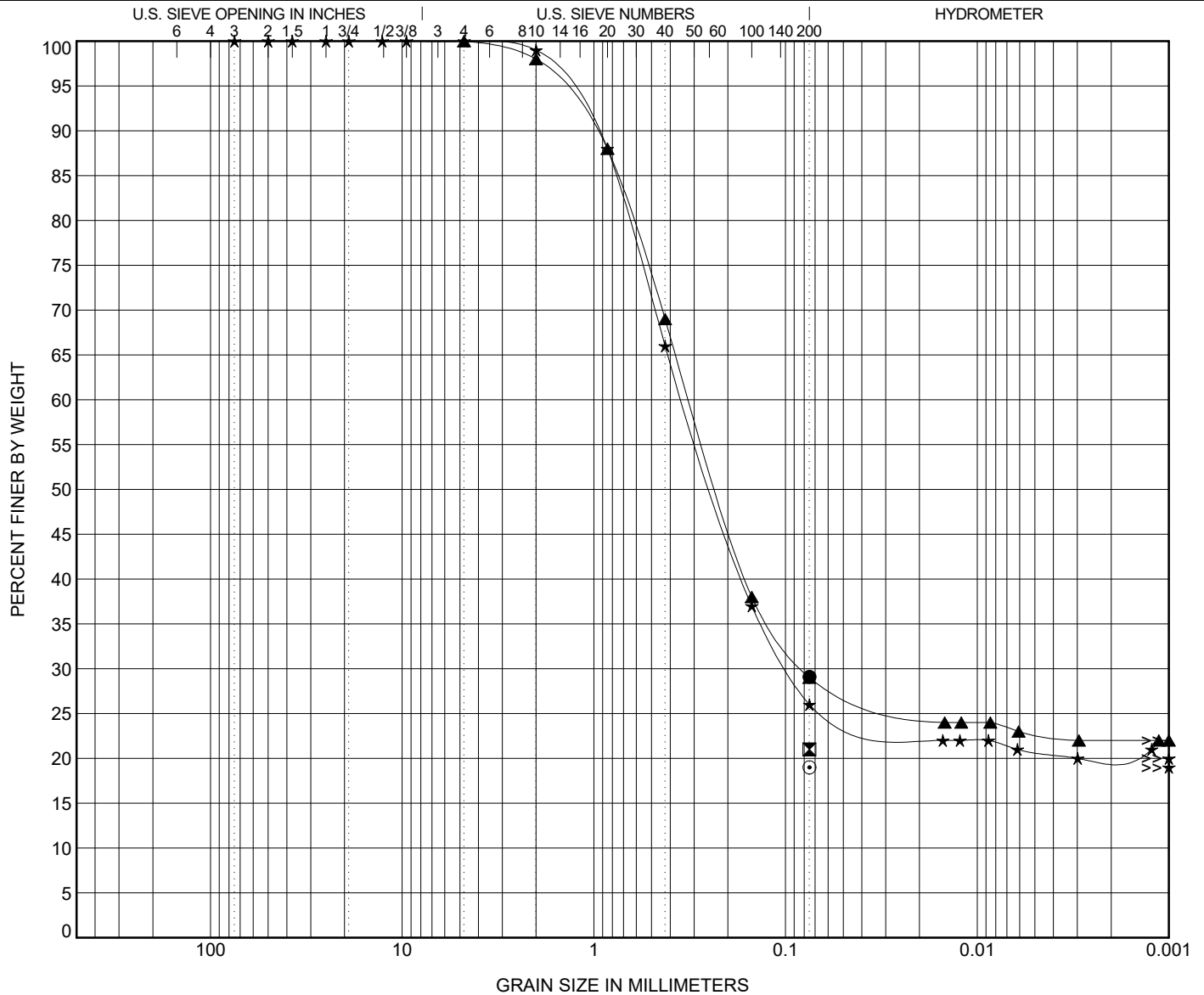


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● STB-01A	0.0	CLAYEY SAND(SC)	31	18	13		
☒ STB-02	0.0						
▲ STB-02	2.0	CLAYEY SAND(SC)	32	13	19		
★ STB-02	6.0	CLAYEY SAND(SC)	27	13	14		
⊙ STB-02	8.0	SILTY SAND(SM)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● STB-01A	0.0	0.075						29.1	
☒ STB-02	0.0	0.075						21.0	
▲ STB-02	2.0	4.75	0.314	0.081		0.0	71.0	6.3	22.7
★ STB-02	6.0	75	0.343	0.096		0.0	74.0	5.3	20.7
⊙ STB-02	8.0	0.075						19.0	

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

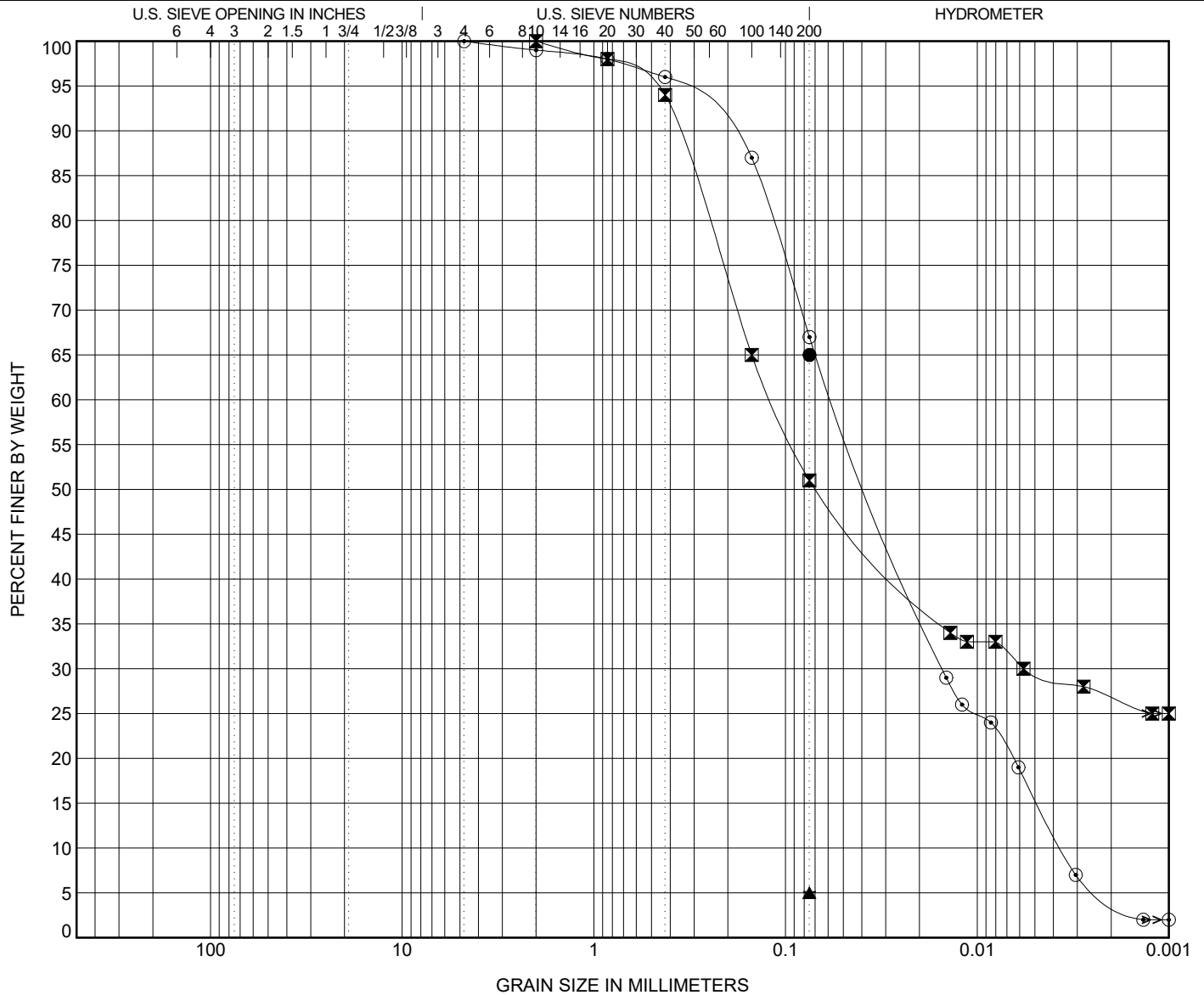


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● STB-02	10.0	SANDY LEAN CLAY(CL)					42	17	25		
☒ STB-02	12.0	SANDY LEAN CLAY(CL)					31	10	21		
▲ STB-02	14.0										
★ STB-02	16.0										
⊙ STB-02	40.0	SANDY SILT(ML)					NP	NP	NP	1.14	15.25
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● STB-02	10.0	0.075						65.0			
☒ STB-02	12.0	2	0.117	0.006		0.0	49.0	21.4	29.6		
▲ STB-02	14.0	0.075						5.0			
★ STB-02	16.0	0.075						5.0			
⊙ STB-02	40.0	4.75	0.055	0.015	0.004	0.0	33.0	51.4	15.6		

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

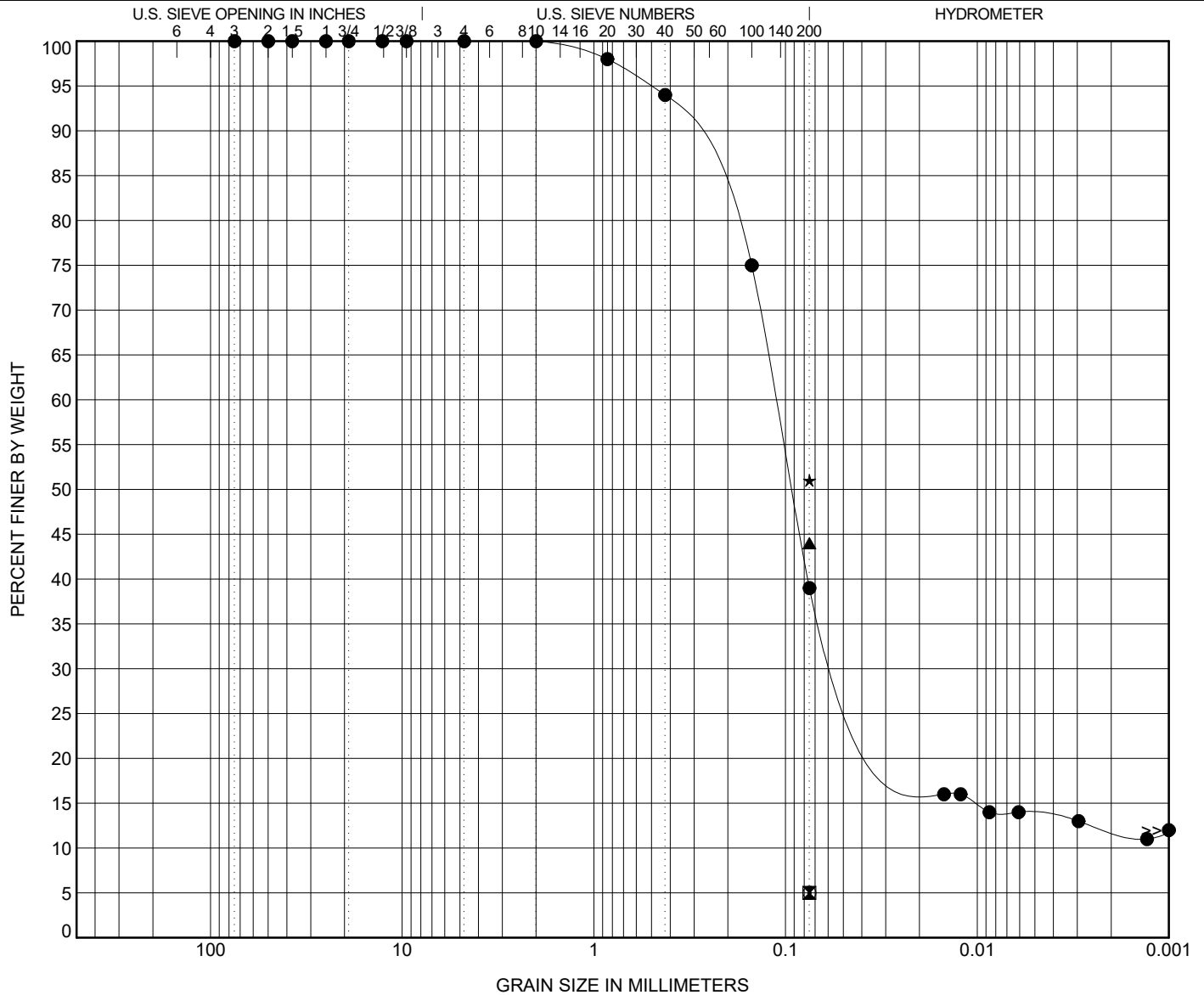


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● STB-03	11.5	SILTY SAND(SM)					NP	NP	NP		
☒ STB-03	17.5						NP	NP	NP		
▲ STB-03	23.0	SILTY SAND(SM)					32	24	8		
★ STB-03	38.0	SANDY SILT(ML)					NP	NP	NP		
◎ STB-04	20.0										
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● STB-03	11.5	75	0.112	0.04		0.0	61.0	25.3	13.7		
☒ STB-03	17.5	0.075							5.0		
▲ STB-03	23.0	0.075							44.0		
★ STB-03	38.0	0.075							51.0		
◎ STB-04	20.0	0.075							5.0		

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

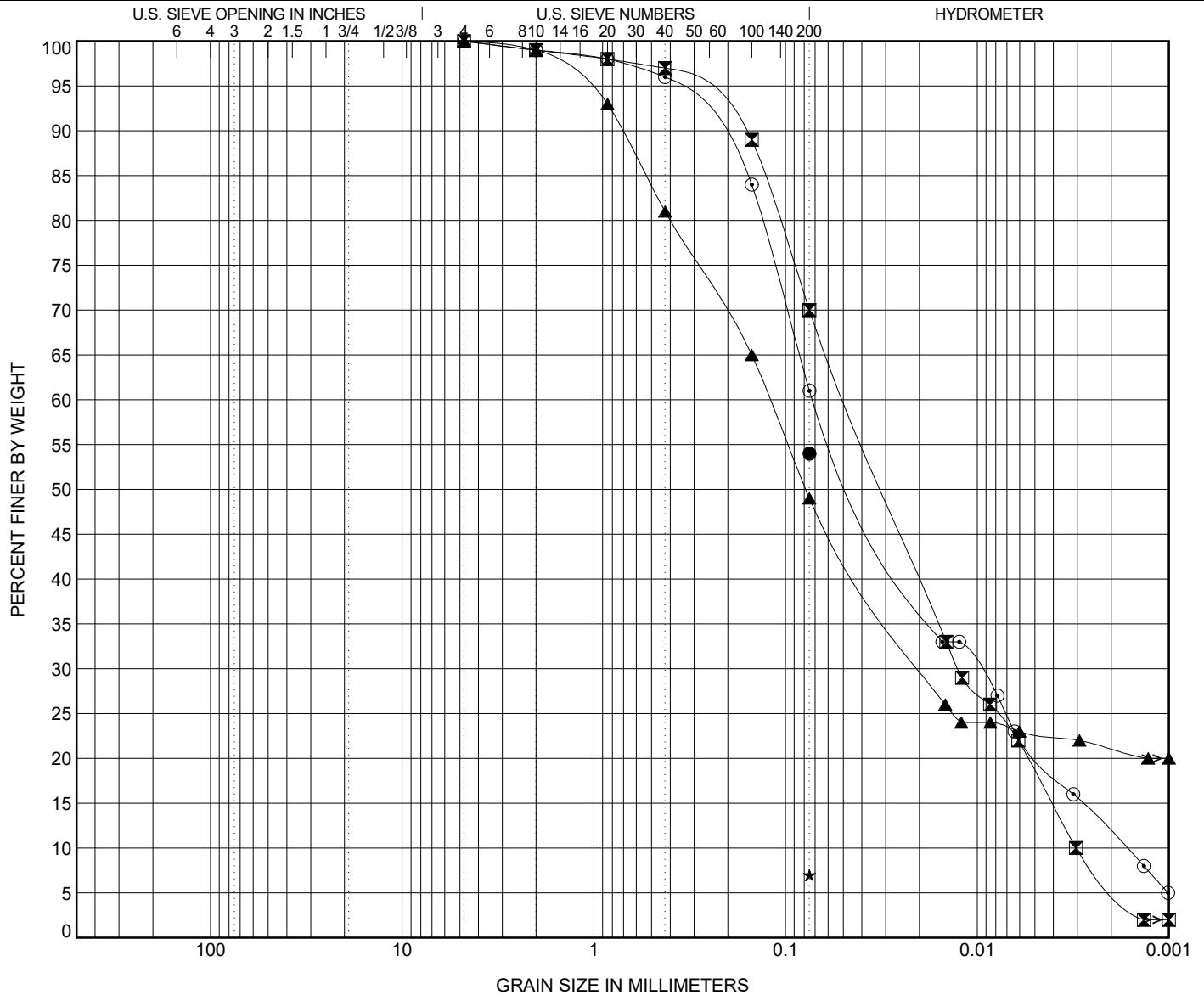


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● STB-04	33.5	SANDY SILT(ML)	32	31	1		
☒ STB-04	38.5	SANDY SILT(ML)	NP	NP	NP	1.08	15.77
▲ STB-05	10.0	CLAYEY SAND(SC)	29	13	16		
★ STB-05	16.0						
⊙ STB-05	33.5	SANDY SILT(ML)	NP	NP	NP	0.82	42.46

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● STB-04	33.5	0.075						54.0	
☒ STB-04	38.5	4.75	0.048	0.013	0.003	0.0	30.0	51.5	18.5
▲ STB-05	10.0	4.75	0.121	0.02		0.0	51.0	26.3	22.7
★ STB-05	16.0	0.075						7.0	
⊙ STB-05	33.5	4.75	0.071	0.01	0.002	0.0	39.0	40.4	20.6

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

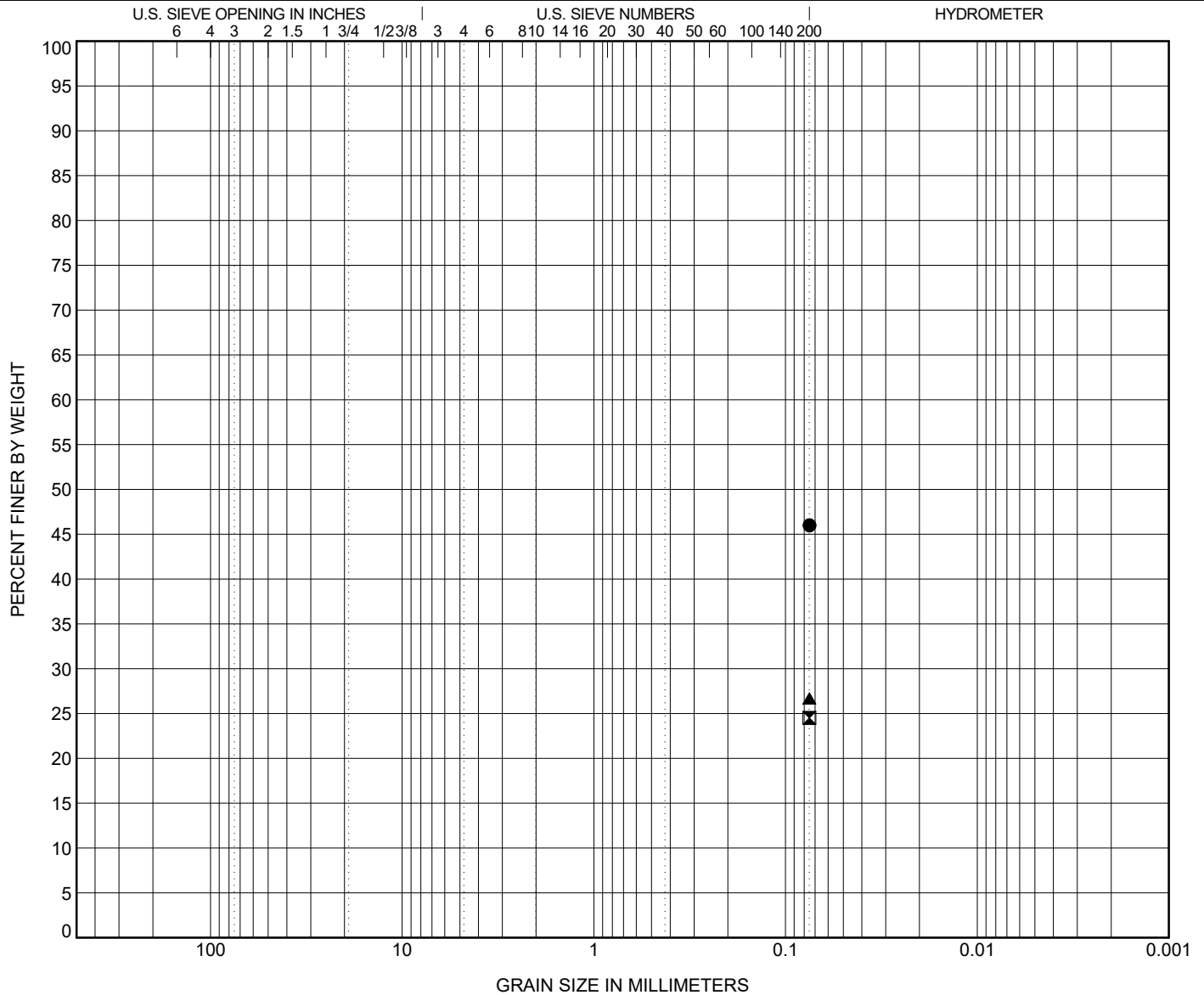


GRAIN SIZE DISTRIBUTION

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● STB-05	43.5	SILTY SAND(SM)					NP	NP	NP		
☒ STB-08A	0.0	CLAYEY SAND(SC)					23	15	8		
▲ STB-10A	0.0	SILTY, CLAYEY SAND(SC-SM)					19	15	4		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● STB-05	43.5	0.075							46.0
☒ STB-08A	0.0	0.075							24.5
▲ STB-10A	0.0	0.075							26.7

GRAIN SIZE US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 3/31/22

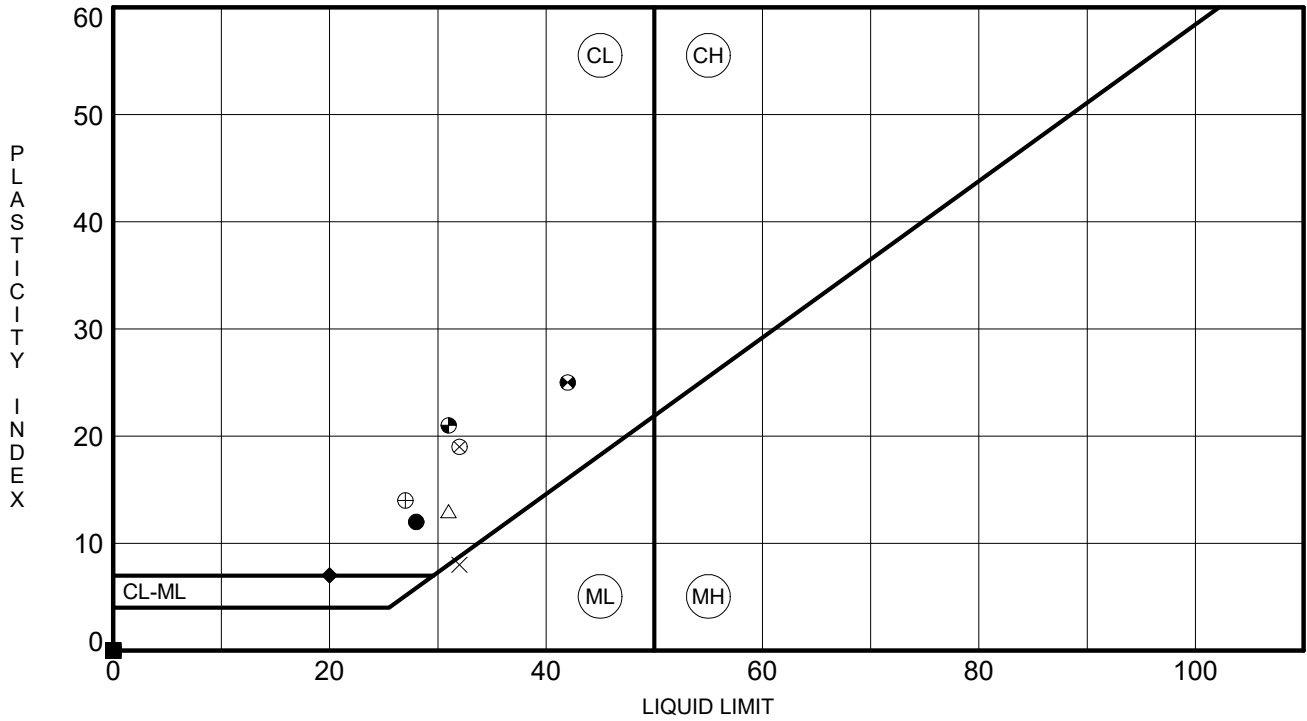


ATTERBERG LIMITS' RESULTS

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	STB-01	4.0	28	16	12		
⊠	STB-01	6.0	NP	NP	NP	15	SILTY SAND(SM)
▲	STB-01	8.0	NP	NP	NP	22	SILTY SAND(SM)
★	STB-01	13.5	NP	NP	NP	24	SILTY SAND(SM)
⊙	STB-01	33.5	NP	NP	NP	26	SILTY SAND(SM)
⊕	STB-01	48.5	NP	NP	NP	20	SILTY SAND(SM)
○	STB-01	93.5	NP	NP	NP		
△	STB-01A	0.0	31	18	13	29	CLAYEY SAND(SC)
⊗	STB-02	2.0	32	13	19	29	CLAYEY SAND(SC)
⊕	STB-02	6.0	27	13	14	26	CLAYEY SAND(SC)
□	STB-02	8.0	NP	NP	NP	19	SILTY SAND(SM)
⊕	STB-02	10.0	42	17	25	65	SANDY LEAN CLAY(CL)
⊕	STB-02	12.0	31	10	21	51	SANDY LEAN CLAY(CL)
★	STB-02	36.0	NP	NP	NP		
⊗	STB-02	40.0	NP	NP	NP	67	SANDY SILT(ML)
■	STB-03	11.5	NP	NP	NP	39	SILTY SAND(SM)
◆	STB-03	13.5	20	13	7		
◇	STB-03	17.5	NP	NP	NP	5	
×	STB-03	23.0	32	24	8	44	SILTY SAND(SM)
⊕	STB-03	38.0	NP	NP	NP	51	SANDY SILT(ML)

ATTERBERG LIMITS US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22

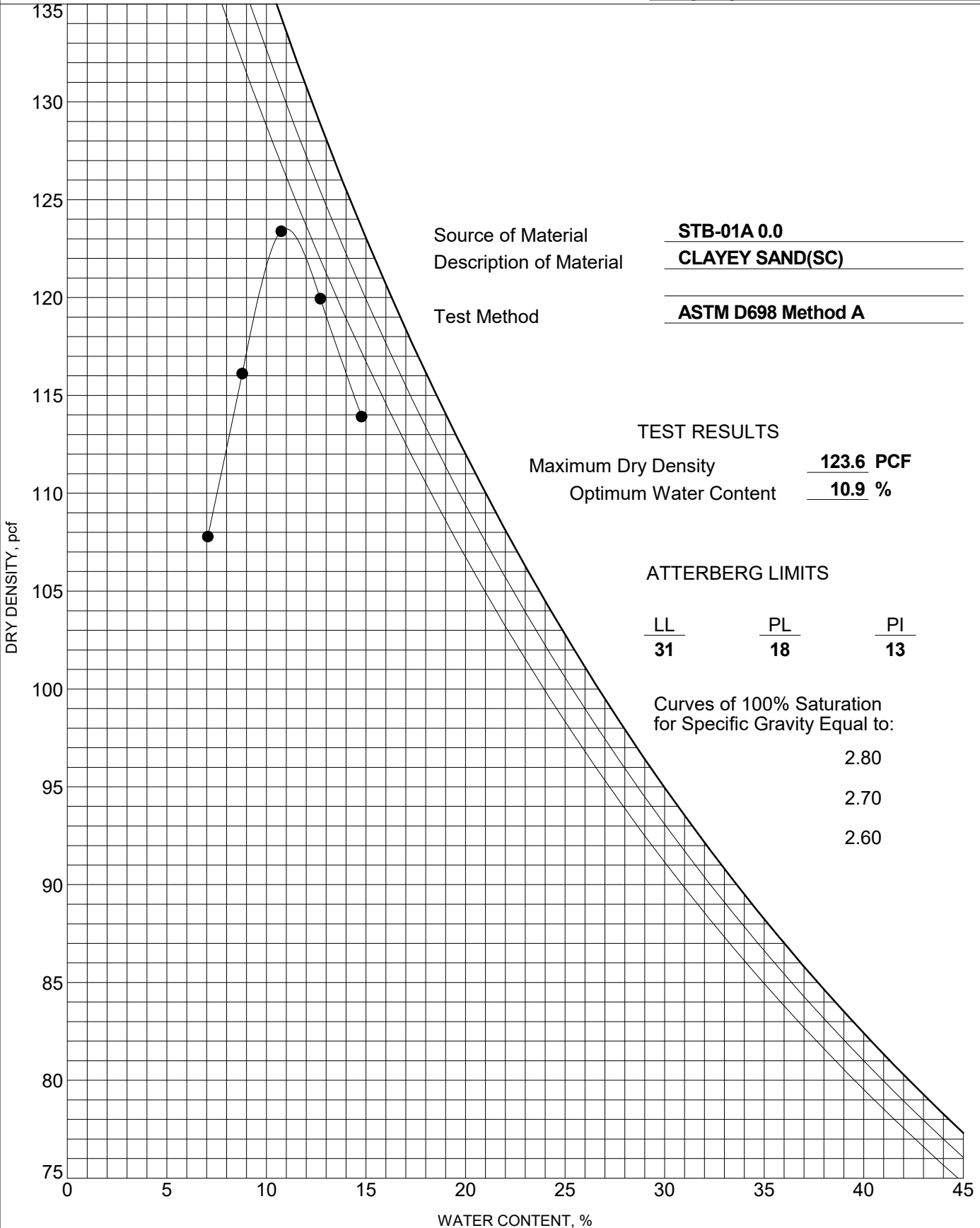


MOISTURE-DENSITY RELATIONSHIP

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



COMPACTION US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22

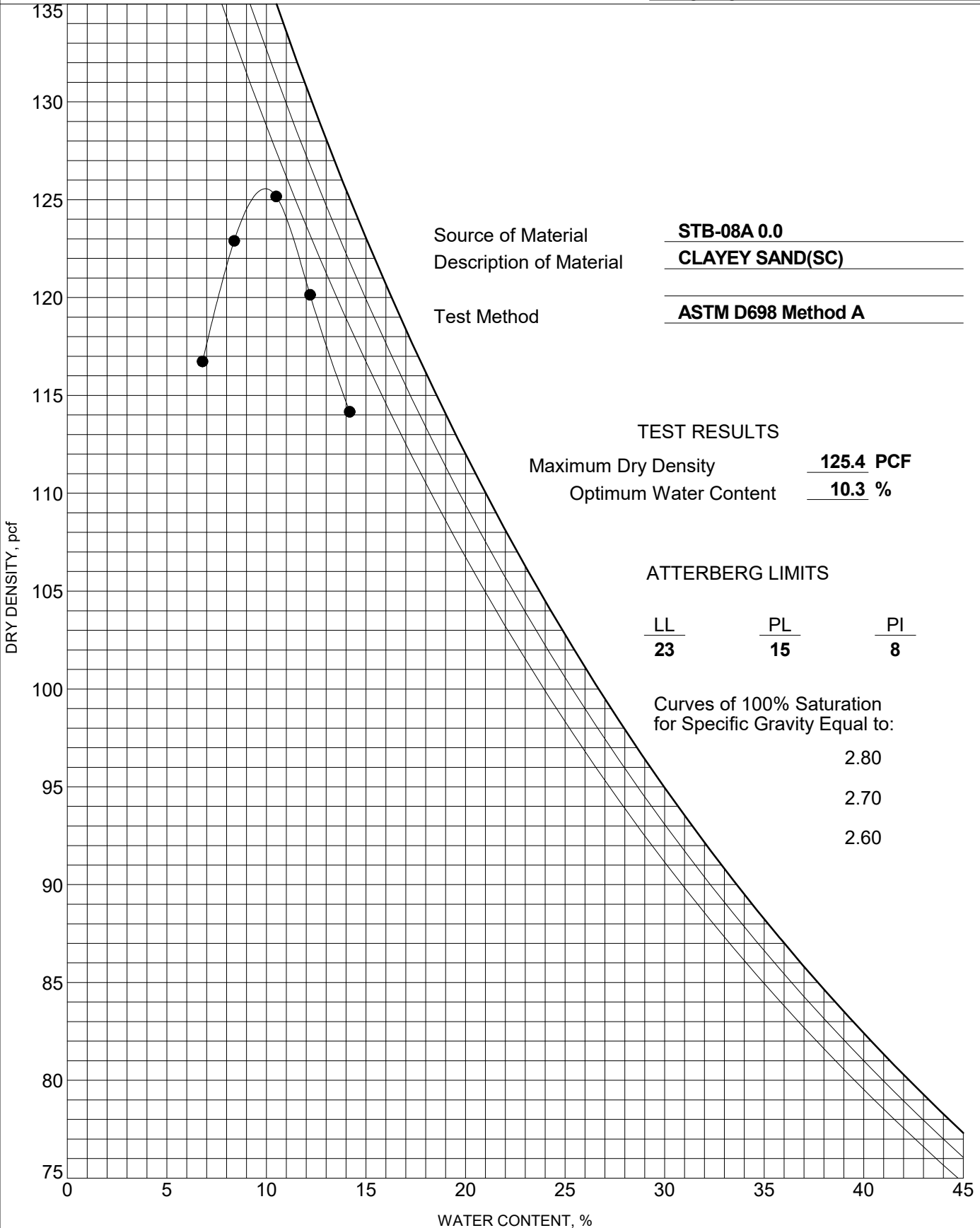


MOISTURE-DENSITY RELATIONSHIP

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



Source of Material STB-08A 0.0
Description of Material CLAYEY SAND(SC)
Test Method ASTM D698 Method A

TEST RESULTS

Maximum Dry Density 125.4 PCF
Optimum Water Content 10.3 %

ATTERBERG LIMITS

LL	PL	PI
<u>23</u>	<u>15</u>	<u>8</u>

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80
2.70
2.60

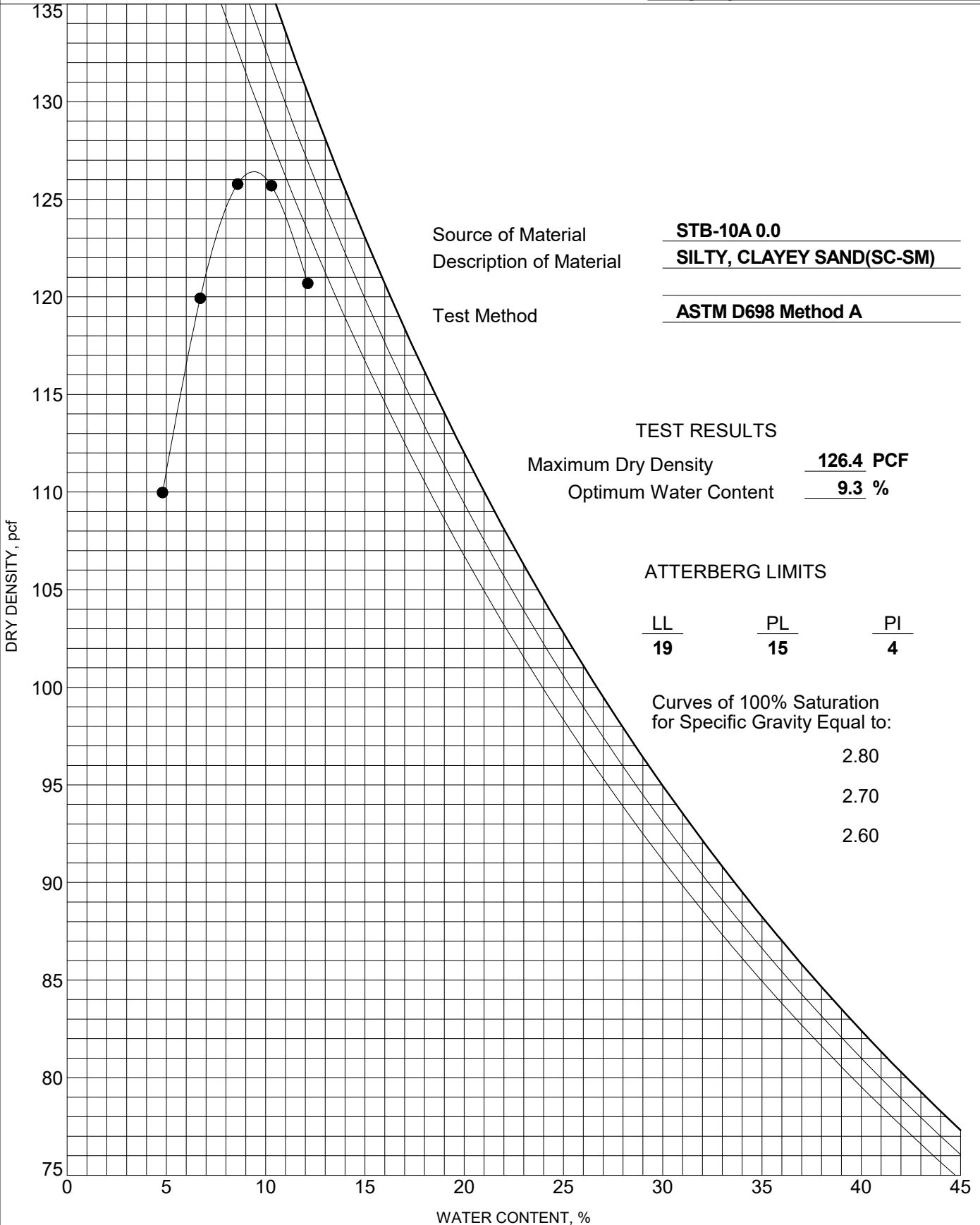


MOISTURE-DENSITY RELATIONSHIP

PROJECT ID 0040308

PROJECT NAME US-301 Over Four Hole Swamp

PROJECT COUNTY Orangeburg



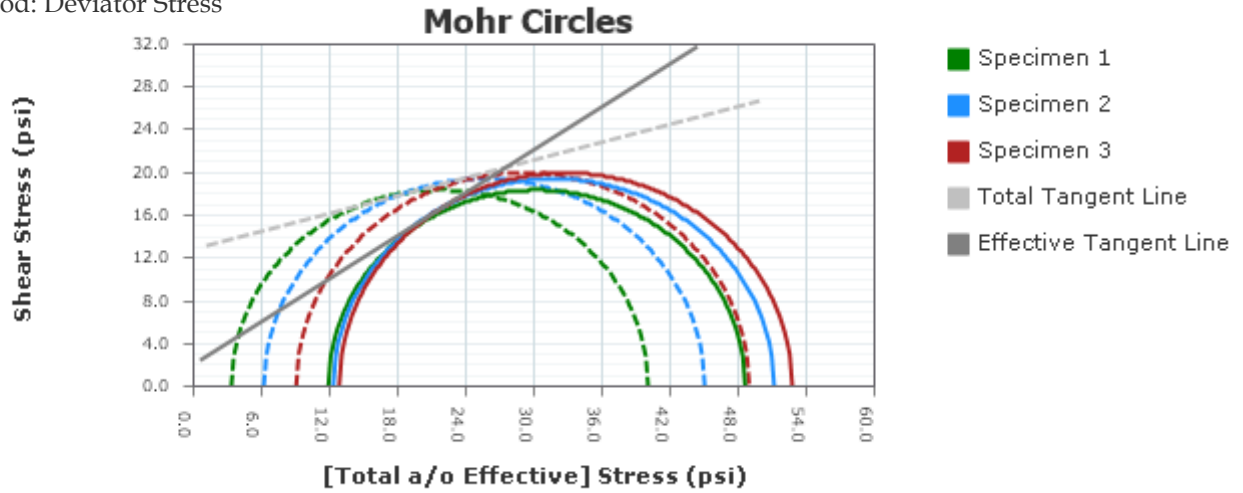
COMPACTION US301 OVER FOUR HOLE SWAMP.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 3/30/22



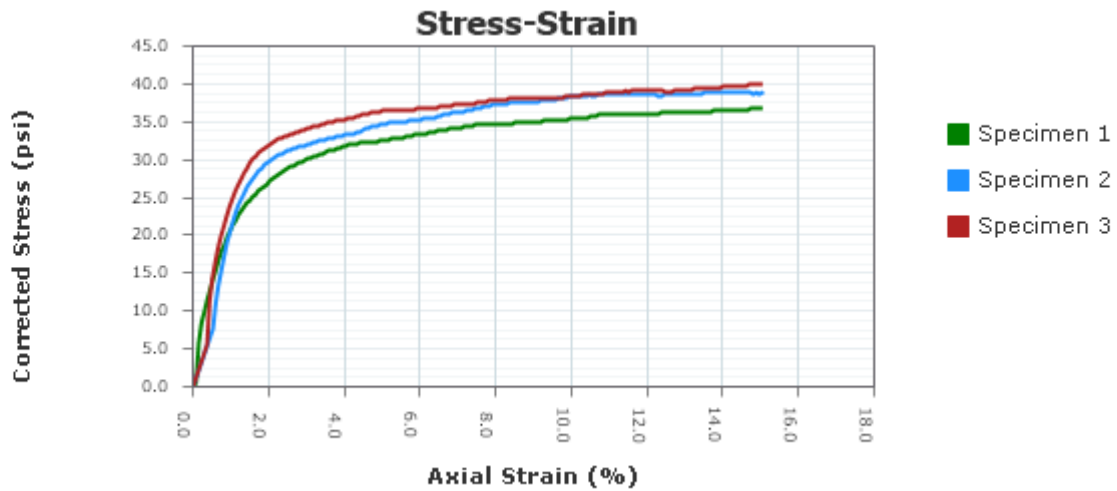
Consolidated Undrained Test

AASHTO T297

Calculation Method: Deviator Stress



Total Strength Intercept (psi):	12.8	Effective Strength Intercept (psi):	2.0
Total Friction Angle (°):	15.5	Effective Friction Angle (°):	33.9

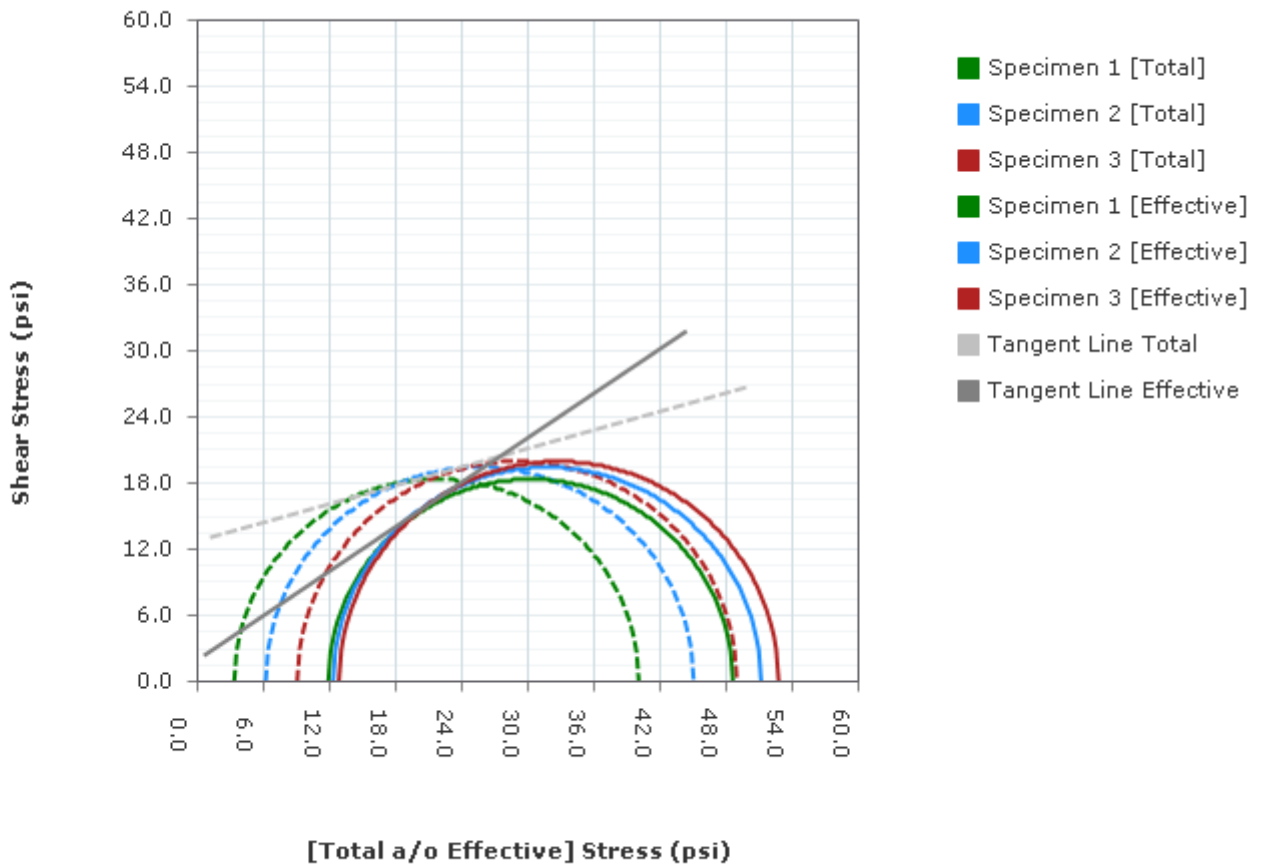


After Shear	Specimen Number							
	1	2	3	4	5	6	7	8
σ_1 at Failure (psi)	48.6	51.2	52.7					
σ_3 at Failure (psi)	11.9	12.3	12.8					
Project:	US-301 Over Four Hole Swamp							
Project Number:	JN11.307.008							
Sampling Date:								
Sample Number:	CU-1							
Sample Depth:	0-5 ft							
Location:	STB-01 CU-1 0-5 ft							
Remarks:	Remolded to 95% of MDD per AASHTO T99							



Graph - Mohr Circle

AASHTO T297

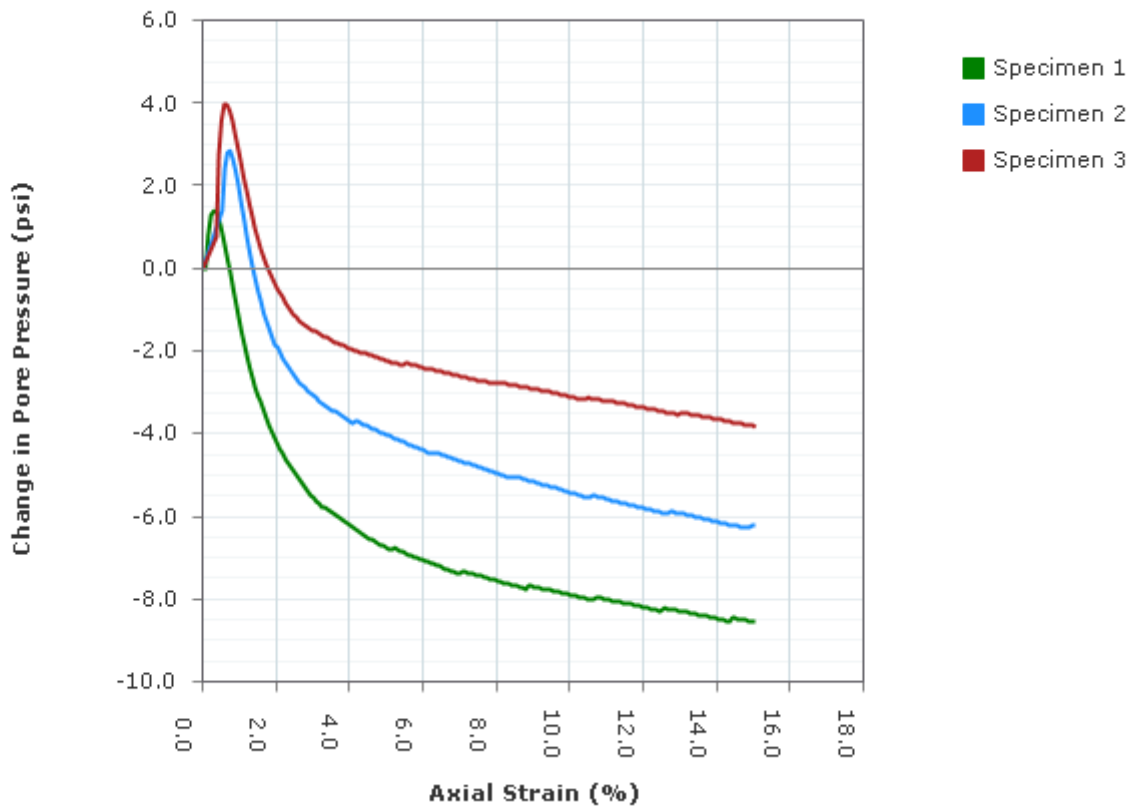


Tangent Line Results		
	TOTAL	EFFECTIVE
Strength Intercept (psi)	12.8	2.0
Friction Angle (°)	15.536	33.893
Calculation Method: Deviator Stress		



Pore Pressure Graph

AASHTO T297

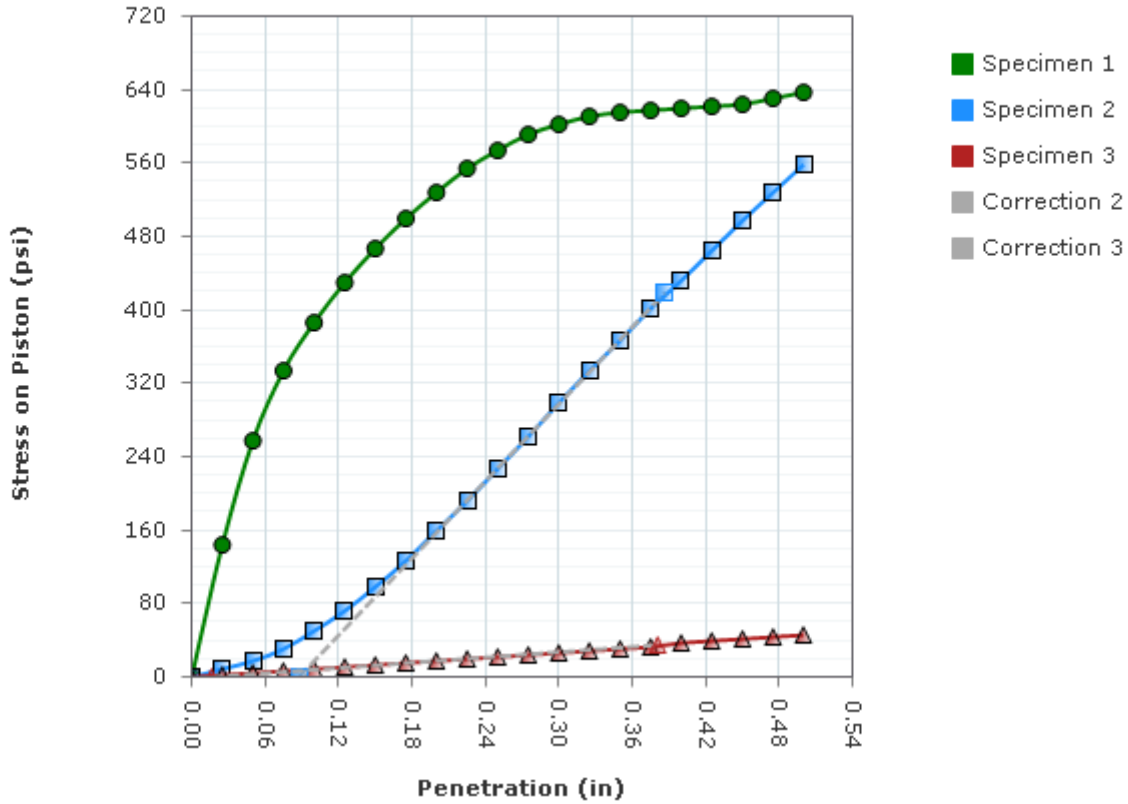




CBR Test Results

ASTM (D1883) / AASHTO (T193)

Load Penetration



CBR Results

Results	1	2	3	4	5	6	7	8
CBR @ 0.10 (in)	38.7	14.3	0.9					
CBR @ 0.20 (in)	35.2	18.7	1.2					

Project Information

Project:	US-301 Over Four Hole Swamp
Project Number:	JN11.307.008
Sampling Date:	
Sample Number:	CU-1
Sample Depth:	0-5 ft
Location:	STB-08 CU-1 (0-5 ft)
Client Name:	
Remarks:	Remolded to a minimum of 95% MDD at moisture contents 7.6%, 10.2% and 13.3%.

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

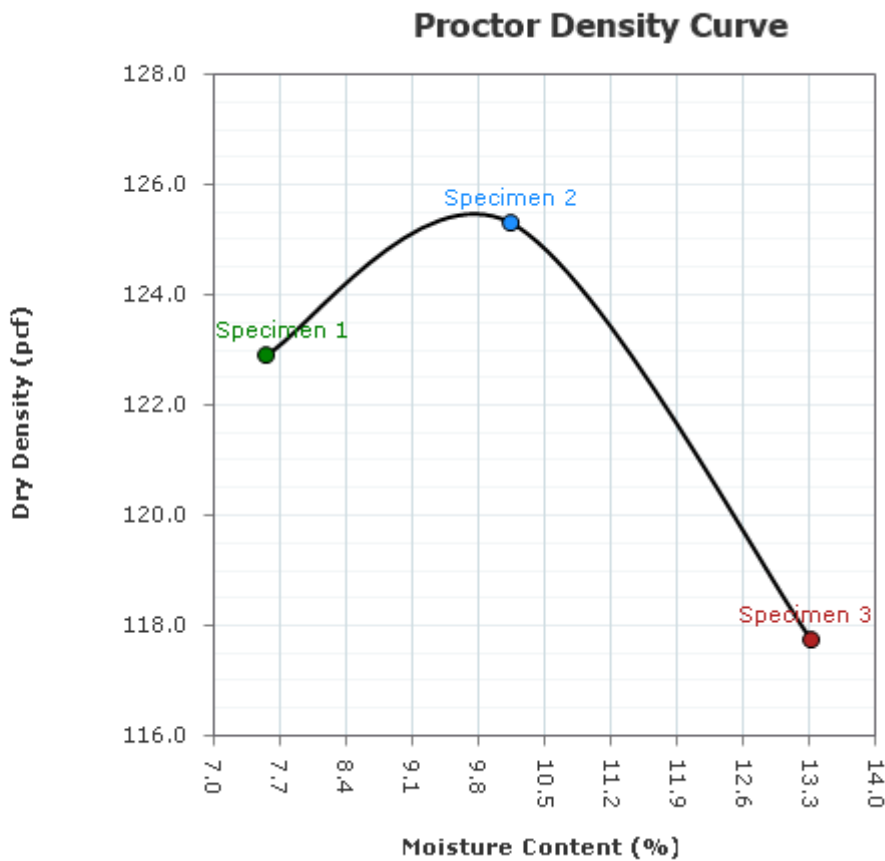
Checked By: _____

Date: _____



CBR Proctor Density Curve

ASTM (D1883) / AASHTO (T193)



CBR Proctor Density Curve	
Maximum Dry Density (pcf)	125.3
Optimum Moisture Content (%)	10.1

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

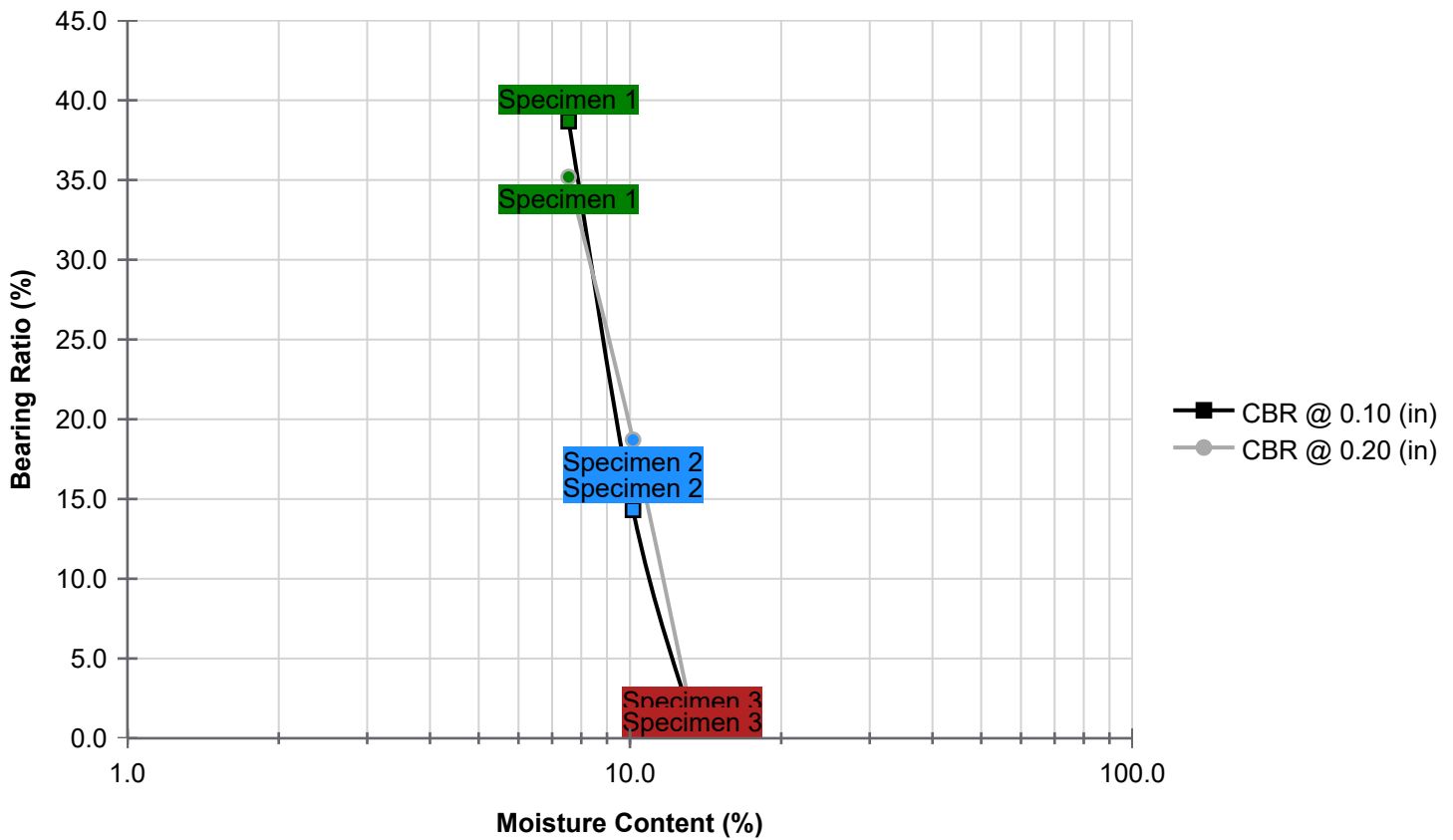
Checked By: _____

Date: _____



CBR Bearing Ratio

ASTM (D1883) / AASHTO (T193)



CBR Results	
CBR @ 0.10 (in)	38.7
CBR @ 0.20 (in)	35.2
Moisture Content (%)	13.3

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

Checked By: _____

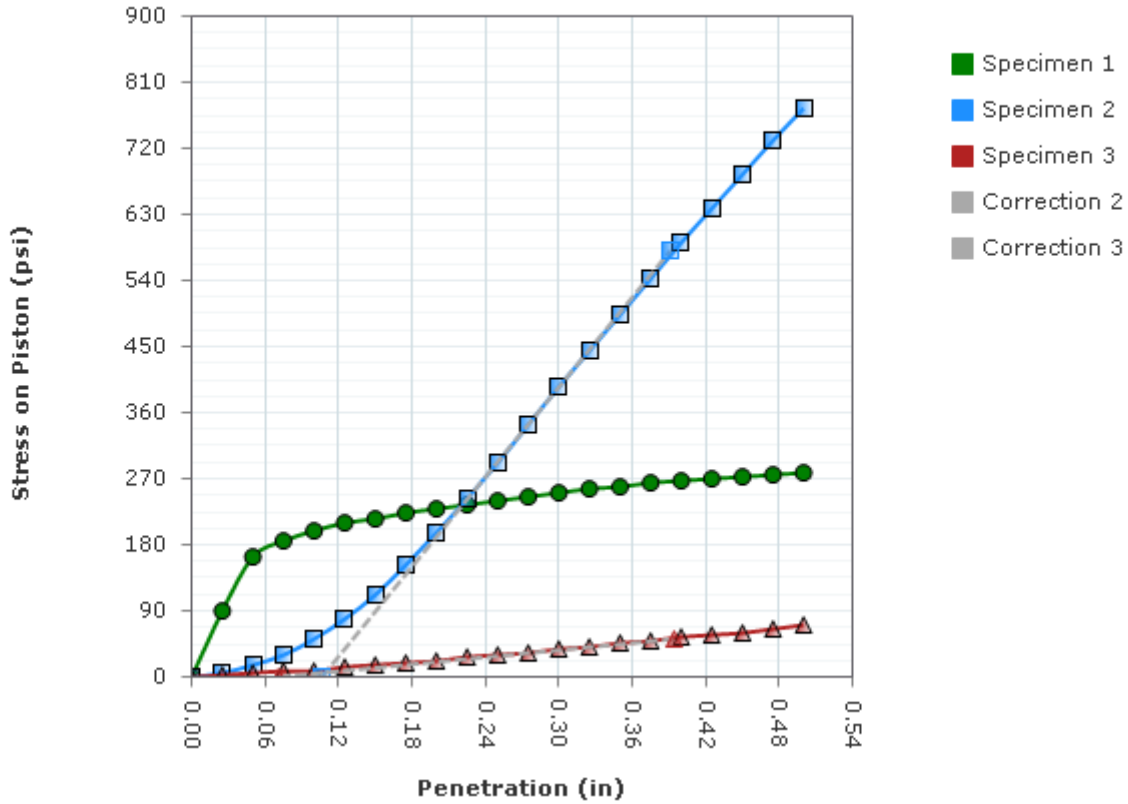
Date: _____



CBR Test Results

ASTM (D1883) / AASHTO (T193)

Load Penetration



CBR Results

Results	1	2	3	4	5	6	7	8
CBR @ 0.10 (in)	19.9	20.8	1.9					
CBR @ 0.20 (in)	15.3	27.2	2.2					

Project Information

Project:	US-301 Over Four Hole Swamp
Project Number:	JN11.307.008
Sampling Date:	
Sample Number:	CU-1
Sample Depth:	0-5 ft
Location:	STB-10 CU-1 (0-5 ft)
Client Name:	
Remarks:	Remolded to a minimum of 95% MDD at moisture contents 5.5%, 9.4% and 12.2%.

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

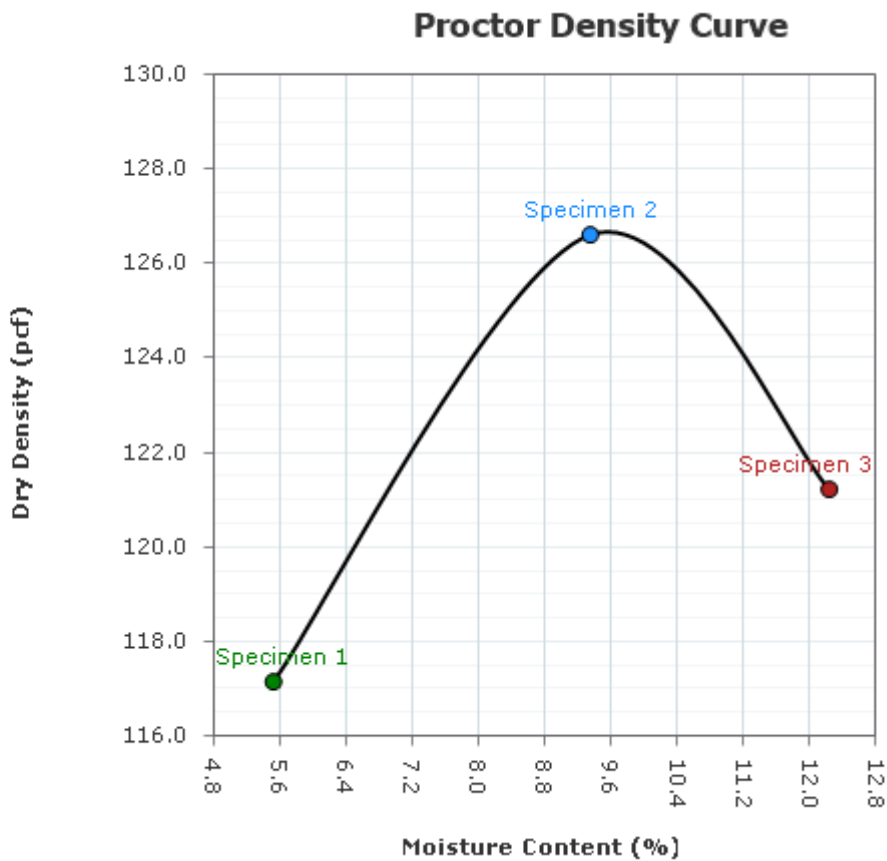
Checked By: _____

Date: _____



CBR Proctor Density Curve

ASTM (D1883) / AASHTO (T193)



CBR Proctor Density Curve	
Maximum Dry Density (pcf)	126.6
Optimum Moisture Content (%)	9.4

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

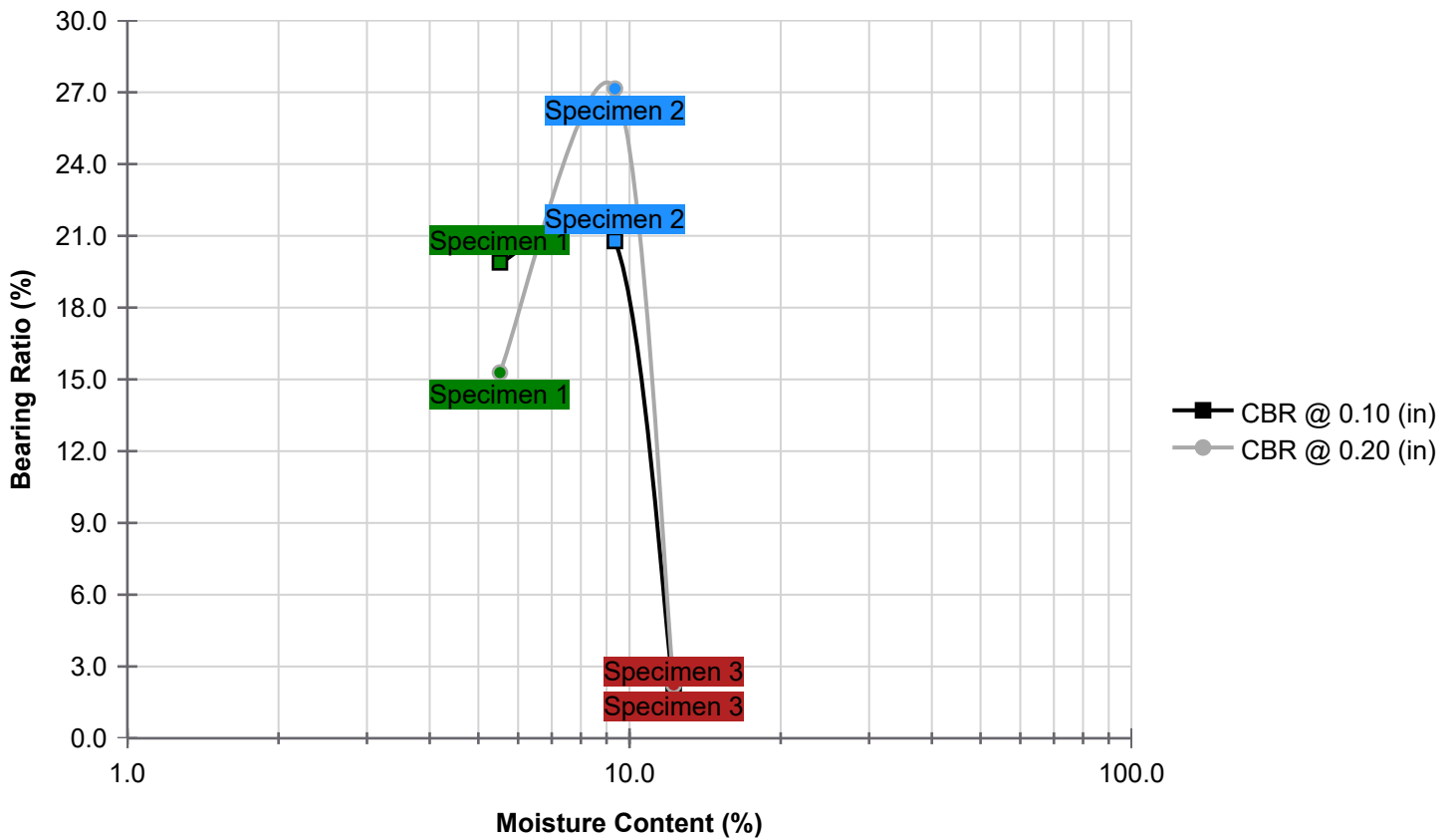
Checked By: _____

Date: _____



CBR Bearing Ratio

ASTM (D1883) / AASHTO (T193)



CBR Results	
CBR @ 0.10 (in)	20.8
CBR @ 0.20 (in)	27.2
Moisture Content (%)	12.2

Project Name: US-301 Over Four Hole Swamp Project Number: JN11.307.008

Tested By: _____

Date: _____

Checked By: _____

Date: _____



Client:	ESP Associates, Inc.		
Project:	US-301 Over Four Hole Swamp		
Location:	Orangeburg County, SC	Project No:	GTX-315181
Boring ID:	STB-02	Sample Type:	bag
Sample ID:	SS-06	Test Date:	03/22/22
Depth :	10-12 ft	Test Id:	330988
Test Comment:	---		
Visual Description:	Moist, yellowish brown and blue sandy clay		
Sample Comment:	---		

Amount of Material Passing #200 Sieve - ASTM D1140

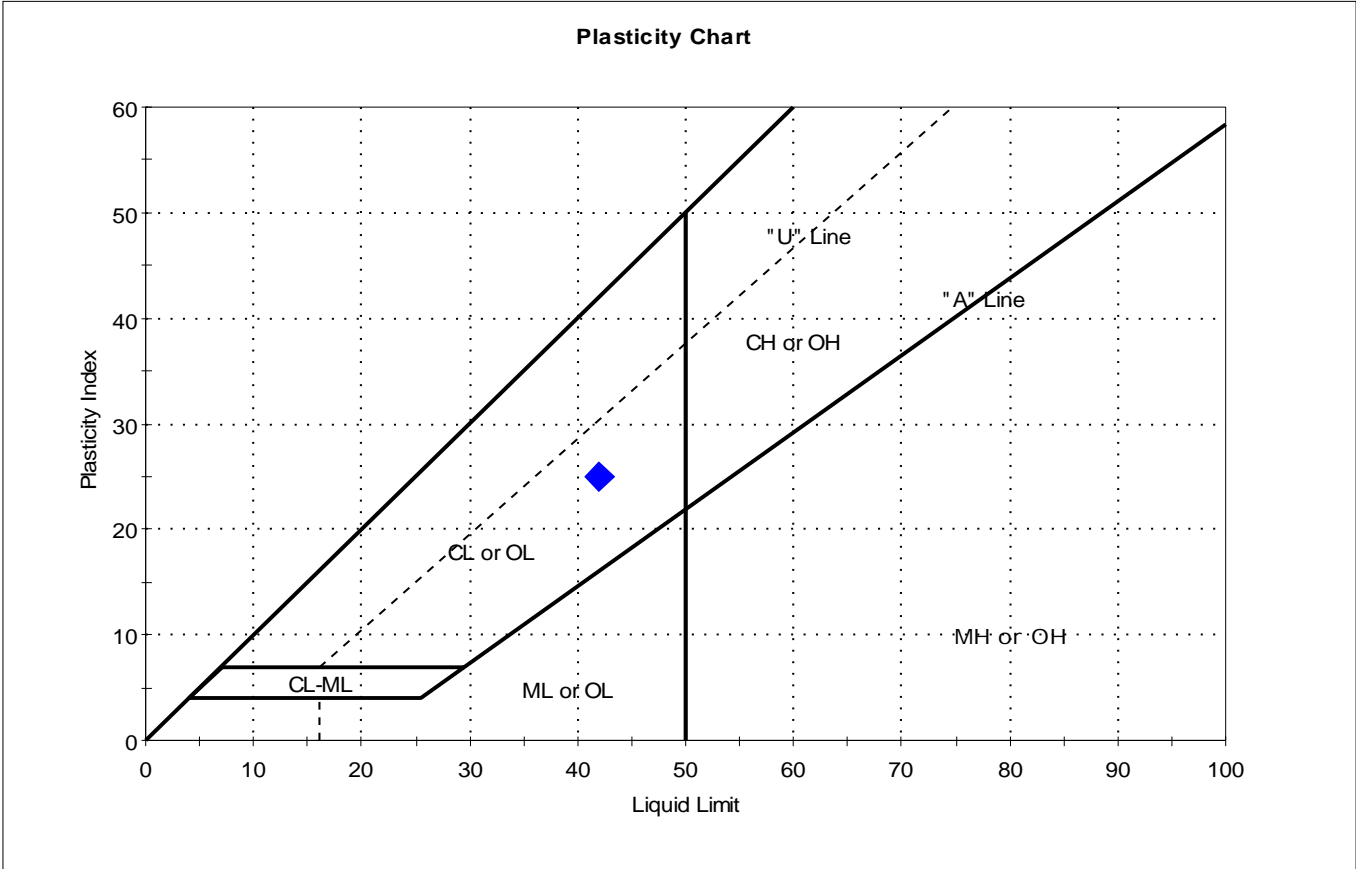
Boring ID	Sample ID	Depth	Visual Description	Fines, %
STB-02	SS-06	10-12 ft	Moist, yellowish brown and blue sandy clay	64.6

Notes: Tests performed using Method B - washing using a wetting agent
Dry mass of test specimen was determined directly



Client:	ESP Associates, Inc.		
Project:	US-301 Over Four Hole Swamp		
Location:	Orangeburg County, SC	Project No:	GTX-315181
Boring ID:	STB-02	Sample Type:	bag
Sample ID:	SS-06	Test Date:	03/18/22
Depth :	10-12 ft	Test Id:	331037
Test Comment:	---		
Visual Description:	Moist, yellowish brown and blue sandy clay		
Sample Comment:	---		

Atterberg Limits - AASHTO T 89 and T 90



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-06	STB-02	10-12 ft	20	42	17	25	0.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
 Dilatancy: NONE
 Toughness: MEDIUM



Client:	ESP Associates, Inc.
Project Name:	US-301 Over Four Hole Swamp
Project Location:	Orangeburg County, SC
GTX #:	315181
Test Date:	03/25/22
Tested By:	jm
Checked By:	MCM

pH by AASHTO T 289

Boring ID	Sample ID	Depth, ft	Description	pH
STB-02	SS-06	10-12	Moist, yellowish brown and blue sandy clay	6.09

Notes:



Client:	ESP Associates, Inc.
Project Name:	US-301 Over Four Hole Swamp
Project Location:	Orangeburg County, SC
GTX#:	315181
Test Date:	03/24/22
Tested By:	jm
Checked By:	MCM

**Minimum Laboratory Soil Resistivity
by AASHTO T 288**

Boring ID	Sample ID	Depth, ft	Sample Description	Minimum Soil Resistivity, ohm-cm
STB-02	SS-06	10-12 ft	Moist, yellowish brown and blue sandy clay	1,325

Notes: Test Equipment: Nilsson Model 400 Soil Resistance Meter, MC Miller Soil Box
Test conducted in standard laboratory atmosphere: 68-73 F



PO Box 572455 / Salt Lake City UT 84157-2455 / USA
 TEL +1 801 262 2448 · FAX +1 801 262 9870 · www.TEI-TS.com

GEOTESTING EXPRESS INCORPORATED
 2358 PERIMETER PARK DRIVE
 SUITE 320
 ATLANTA GA 30341-1315
 USA

Analysis No. TS-A2210203
 Report Date 21 March 2022
 Date Sampled 15 March 2022
 Date Received 17 March 2022
 Where Sampled Atlanta, GA USA
 Sampled By Client

This is to attest that we have examined: Soil: Project: US-301 Over Four Hole Swamp; Site Location: Orangeburg, South Carolina; Job Number: GTX-315181

When examined to the applicable requirements of:

AASHTO T-291-18 "Standard Method of Test for Determining Water-Soluble Chloride Ion Content in Soil" Method B
 AASHTO T 290-20 "Standard Method of Test for Determining Water-Soluble Sulfate Ion Content in Soil"

Results:

AASHTO T 291 - Chloride Method B

Sample		Results		Detection Limit
		ppm (mg/kg)	% ¹	
STB-02		21.	0.0021	10.
SS-06	10 – 12'			

NOTE: ¹Percent by weight after drying and prepared as per the Standard.

AASHTO T 290 – Sulfates (Soluble)

Sample		Results		Detection Limit
		ppm (mg/kg)	% ¹	
STB-02		< 10.	< 0.0010	10.
SS-06	10 – 12'			

NOTE: ¹Percent by weight after drying and prepared as per the Standard.

END OF ANALYSIS

USEPA Laboratory ID UT00930

Merrill Gee P.E. – Engineer in Charge

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PSI Laboratory Testing

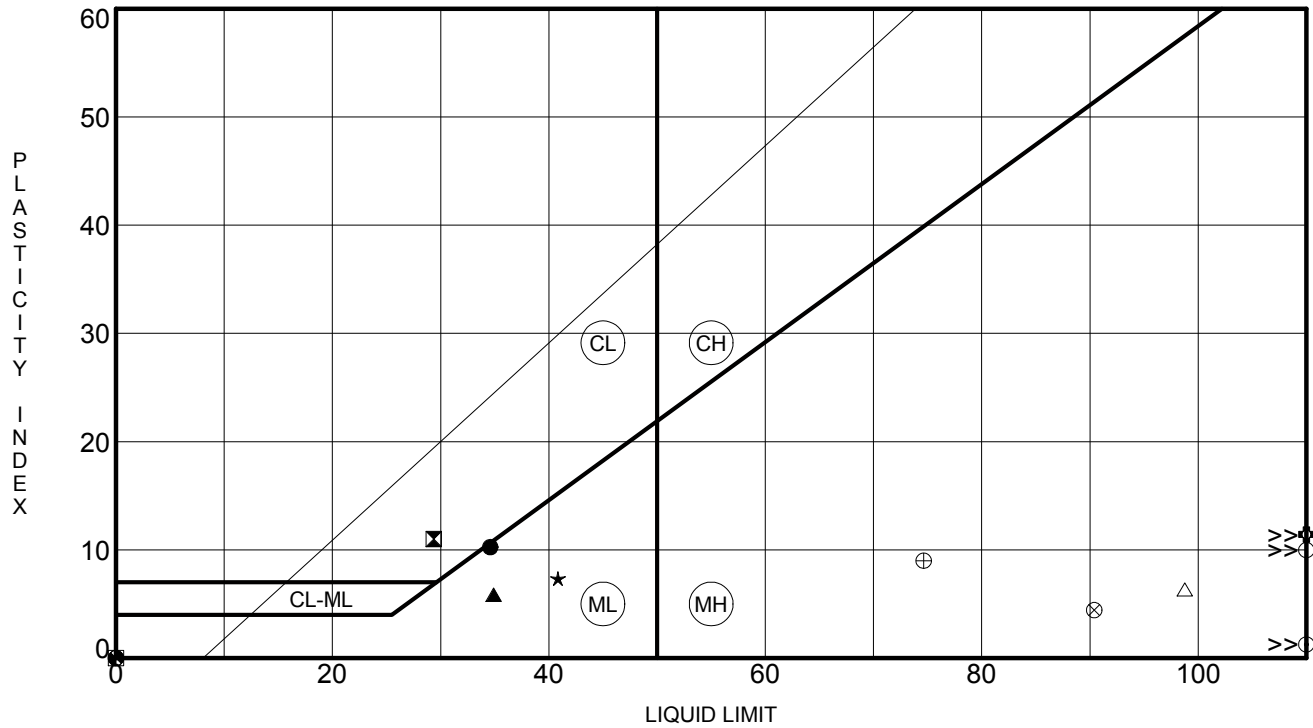
Moisture Content

SC File #38-40308.2

Bridge Replacement over Four Hole Swamp

Orangeburg County

Boring		Depth (ft.)	Moisture Content
B-1A	SS-5	8.7	24.5%
B-1A	SS-6	13.5	20.5%
B-1A	SS-11	38.5	37.0%
B-1A	SS-12	43.5	46.0%
B-1A	SS-13	48.5	35.3%
B-1A	SS-14	53.5	36.7%
B-1A	SS-17	68.5	32.7%
B-3A	SS-6	24.7	33.3%
B-3A	SS-7	31.2	29.6%
B-3A	SS-12	54.7	43.6%
B-3A	SS-14	61.7	39.6%
B-3A	SS-19	71.2	316.1%
B-3A	SS-21	75.2	376.9%
B-3A	SS-22	77.2	336.3%
B-3A	SS-23	79.2	316.1%
B-3A	SS-24	81.2	305.5%
B-3A	SS-25	83.2	266.5%
B-3A	SS-27	87.2	42.6%
B-3A	SS-28	89.2	25.0%
B-3A	SS-34	120.7	30.3%
B-5A	SS-7	31.2	31.8%
B-5A	SS-9	41.2	35.3%
B-5A	SS-11	51.2	36.8%
B-5A	SS-13	61.2	34.9%
B-5A	SS-16	72.7	35.3%
B-5A	SS-24	88.7	32.8%
B-5A	SS-26	96.2	32.4%
B-5A	SS-30	116.2	48.2%
B-5A	SS-33	132.7	66.0%
B-6A	SS-8	35.2	27.4%
B-6A	SS-11	50.2	34.1%
B-6A	SS-12	55.2	39.9%
B-6A	SS-15	70.2	41.2%
B-6A	SS-19	77.7	32.0%
B-6A	SS-25	89.7	31.5%
B-6A	SS-28	105.2	29.1%
B-6A	SS-30	115.2	40.1%
B-6A	SS-32	125.2	38.0%
B-7A	SS-3	16.0	20.3%
B-7A	SS-4	18.0	19.9%
B-7A	SS-7	30.5	33.6%
B-7A	SS-9	40.5	42.8%
B-7A	SS-10	45.5	36.2%
B-7A	SS-13	60.5	43.3%
B-7A	SS-17	74.0	44.7%
B-7A	SS-22	84.0	55.9%
B-7A	SS-25	90.0	36.1%
B-7A	SS-28	105.5	26.7%



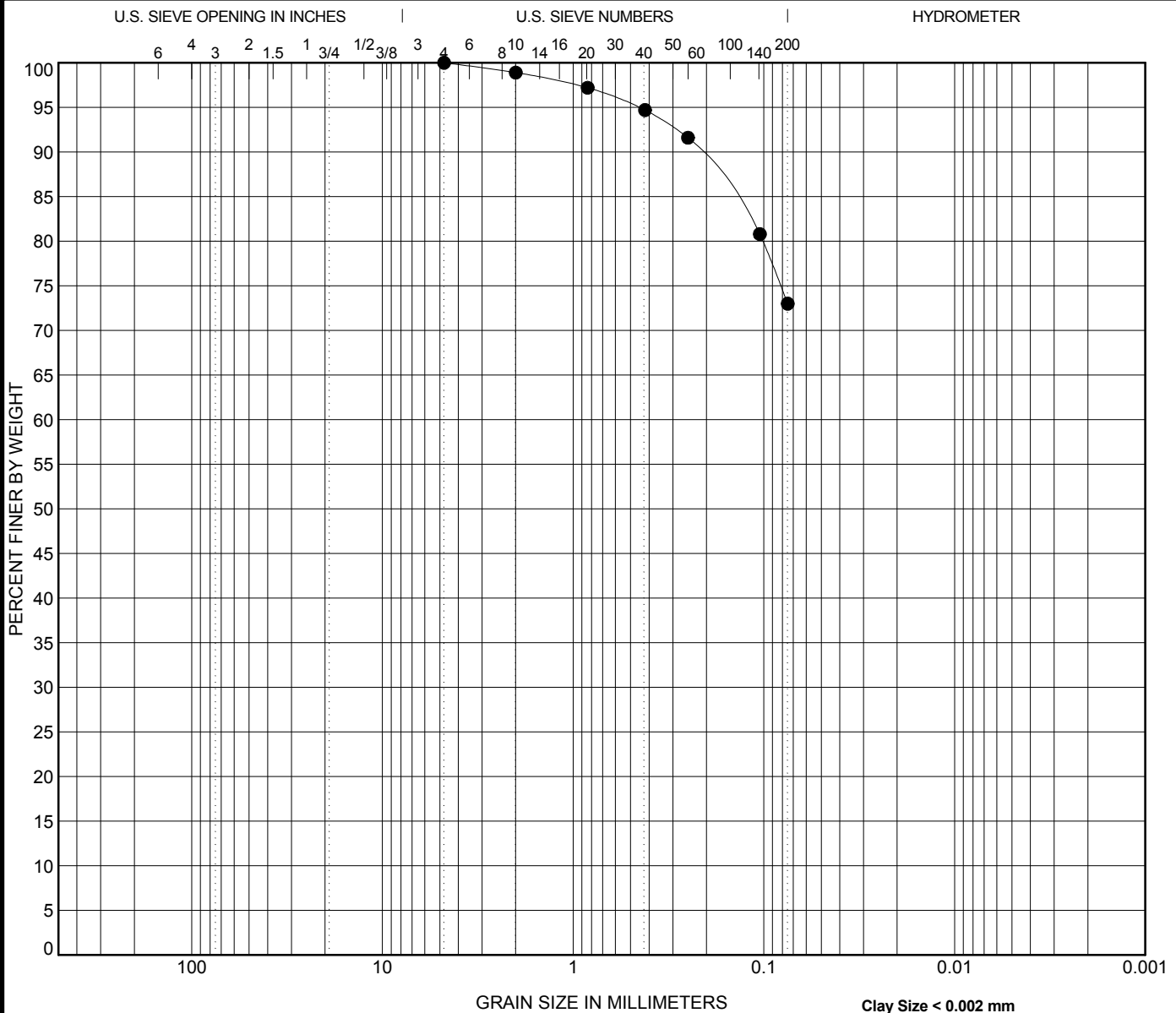
Boring	Depth (ft)	LL	PL	PI	Fines	Classification (*Visual)
● B-3A SS-6	24.7	35	24	11	53.1	Hard green gray Sandy SILT (ML)
⊠ B-3A SS-7	29.7	29	18	11	42.8	Very dense green gray fine to medium grained Clayey SAND (SC)
▲ B-3A SS-12	54.7	35	29	6	63.3	Very stiff to very hard green gray Sandy SILT (ML)
★ B-3A SS-14	61.7	41	33	8	68.3	Very stiff to very hard green gray Sandy SILT (ML)
⊙ B-3A SS-19	71.2	135	133	2	60.1	Very soft to soft dark green Sandy Elastic SILT (MH)
⊕ B-3A SS-21	75.2	113	102	11	64.0	Very soft to soft dark green Sandy Elastic SILT (MH)
○ B-3A SS-22	77.2	111	101	10	62.8	Very soft to soft dark green Sandy Elastic SILT (MH)
△ B-3A SS-23	79.2	99	92	7	41.0	Very soft to soft dark green fine to medium grained Silty SAND (SM)
⊗ B-3A SS-24	81.2	90	86	4	39.7	Very soft to soft dark green fine to medium grained Silty SAND (SM)
⊕ B-3A SS-25	83.2	75	66	9	32.8	Very soft to soft dark green fine to medium grained Silty SAND (SM)
□ B-3A SS-27	87.2	NP	NP	NP	10.4	Med. dense-loose dk. green f-c well graded SAND w/silt (SW-SM)
⊕ B-3A SS-28	89.2	NP	NP	NP	19.9	Dense dark green fine to coarse grained Silty SAND (SM)
⊕ B-3A SS-34	120.7	NP	NP	NP	5.0	Very dense dark gray f-m grained poorly graded SAND w/silt (SP-SM)



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ATTERBERG LIMIT RESULTS

PSI Job No.: 0451644
 Project: US301 Over Four Hole Swamp
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1A SS-5 9.7	Soft gray Lean CLAY with sand (CL)	34	14	20		

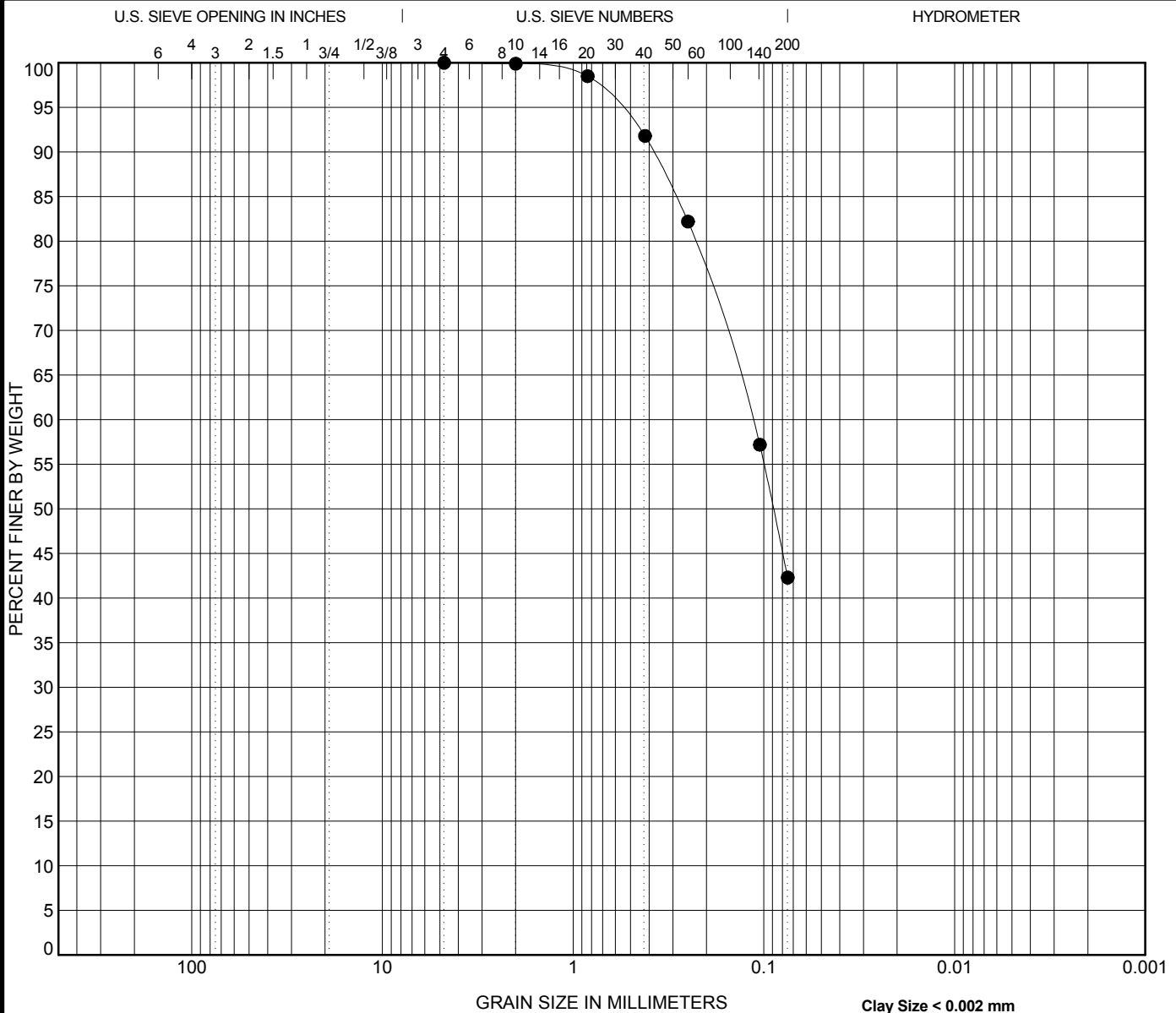
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-5 9.7	4.75				0.0	27.0	73.0	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1A SS-6 13.5	Loose gray fine to medium grained Clayey SAND (SC)	25	13	12		

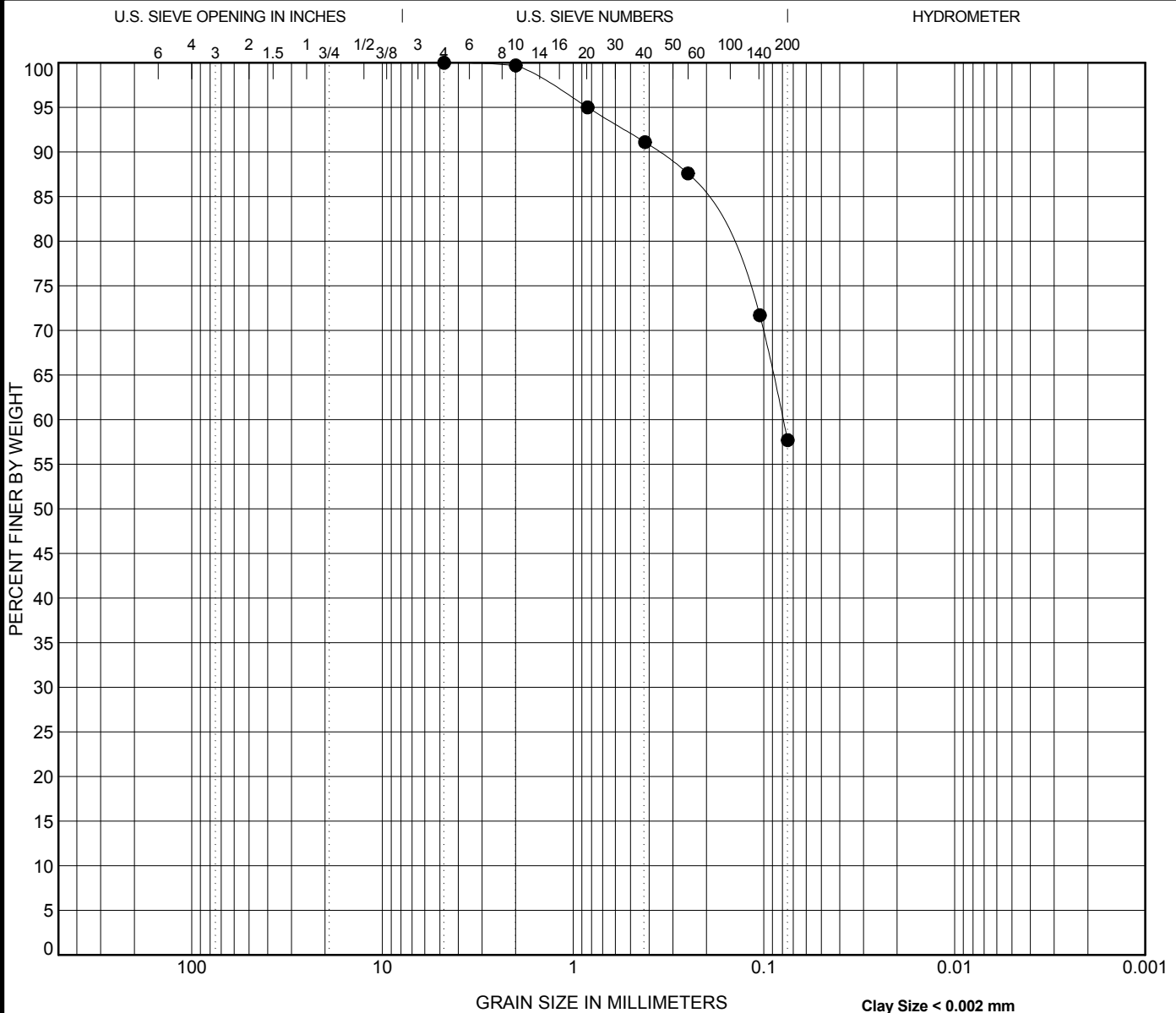
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-6 13.5	4.75	0.116			0.0	57.7	42.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1A SS-11 38.5	Very stiff green gray Sandy SILT (ML)	28	26	2		

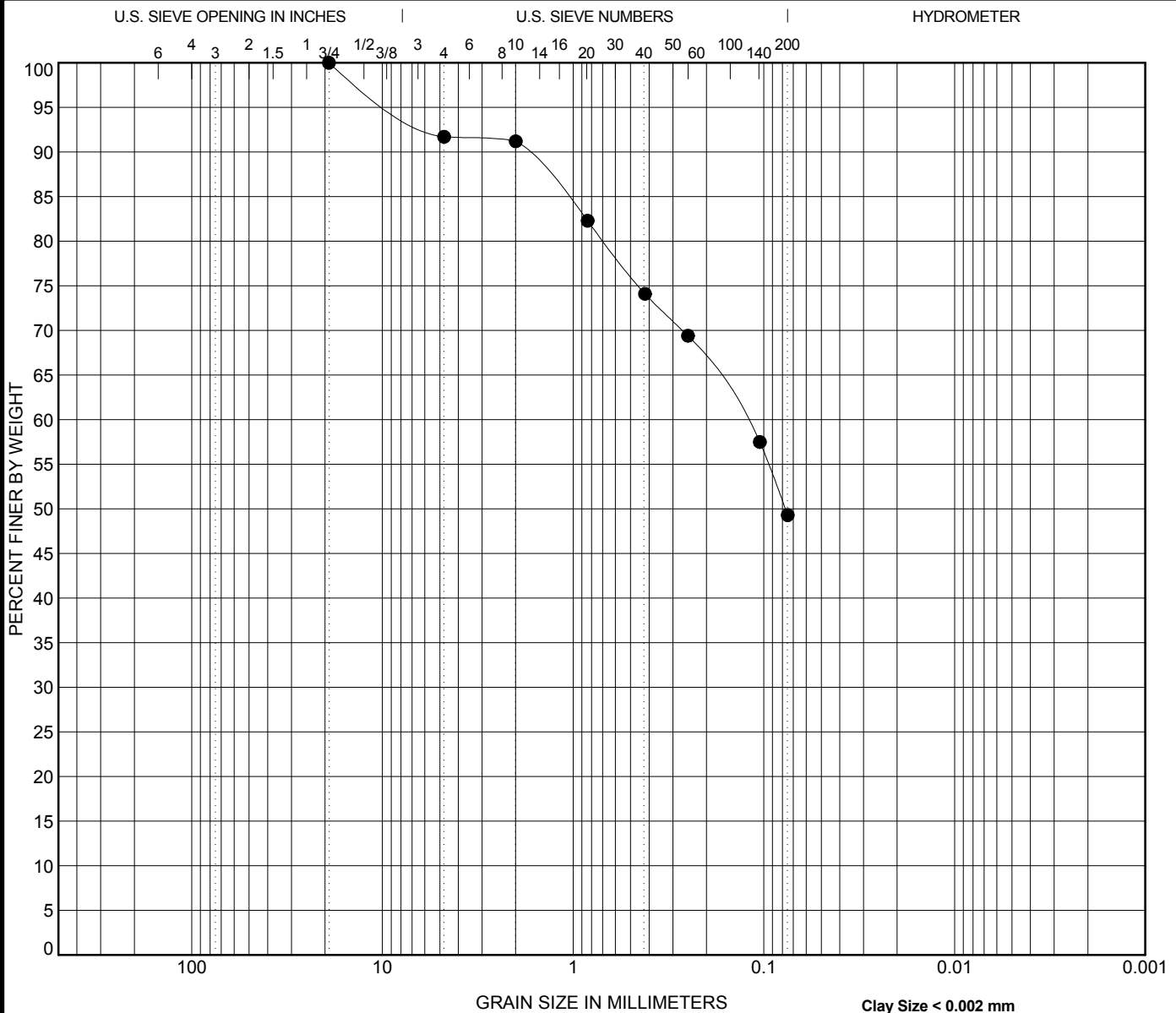
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-11 38.5	4.75	0.079			0.0	42.3	57.7	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-1A SS-12 43.5	Very dense green gray fine to coarse grained Silty SAND (SM)					40	38	2		

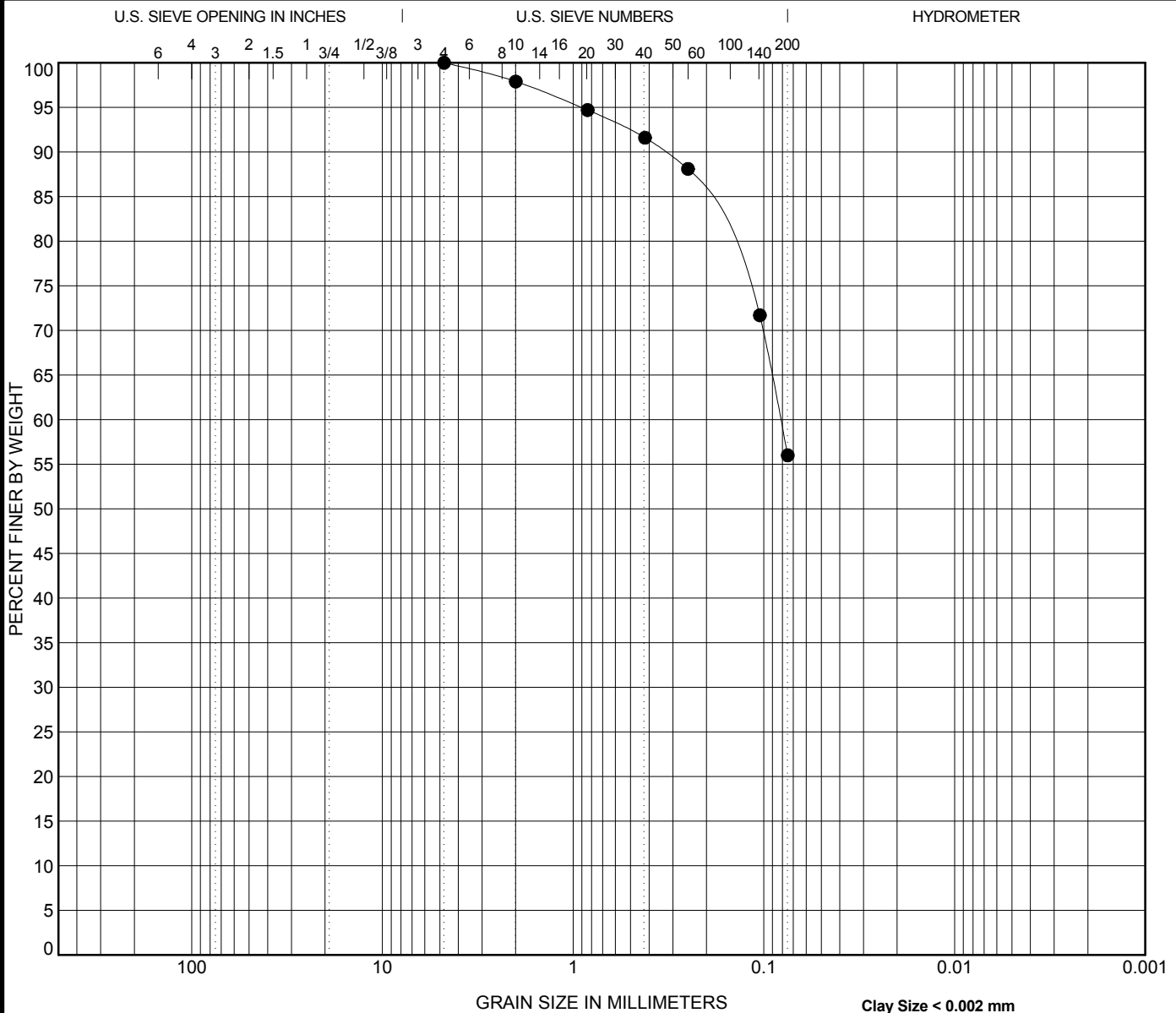
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-12 43.5	19.1	0.126			8.3	42.4	49.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1A SS-13 48.5	Very stiff to hard green gray Sandy SILT (ML)	29	27	2		

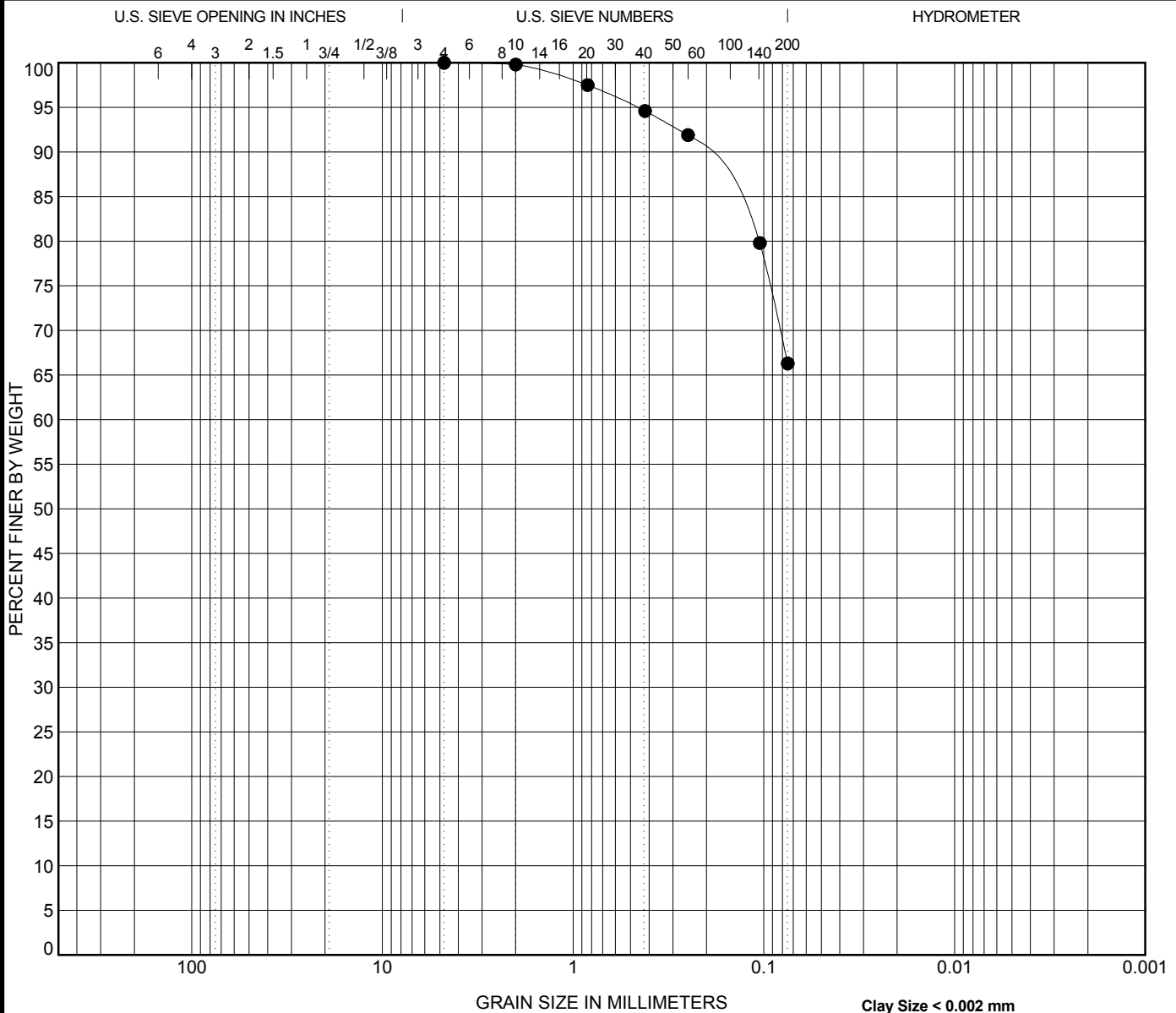
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-13 48.5	4.75	0.082			0.0	44.0	56.0	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-1A SS-14 53.5	Very stiff to hard green gray Sandy SILT (ML)					32	31	1		

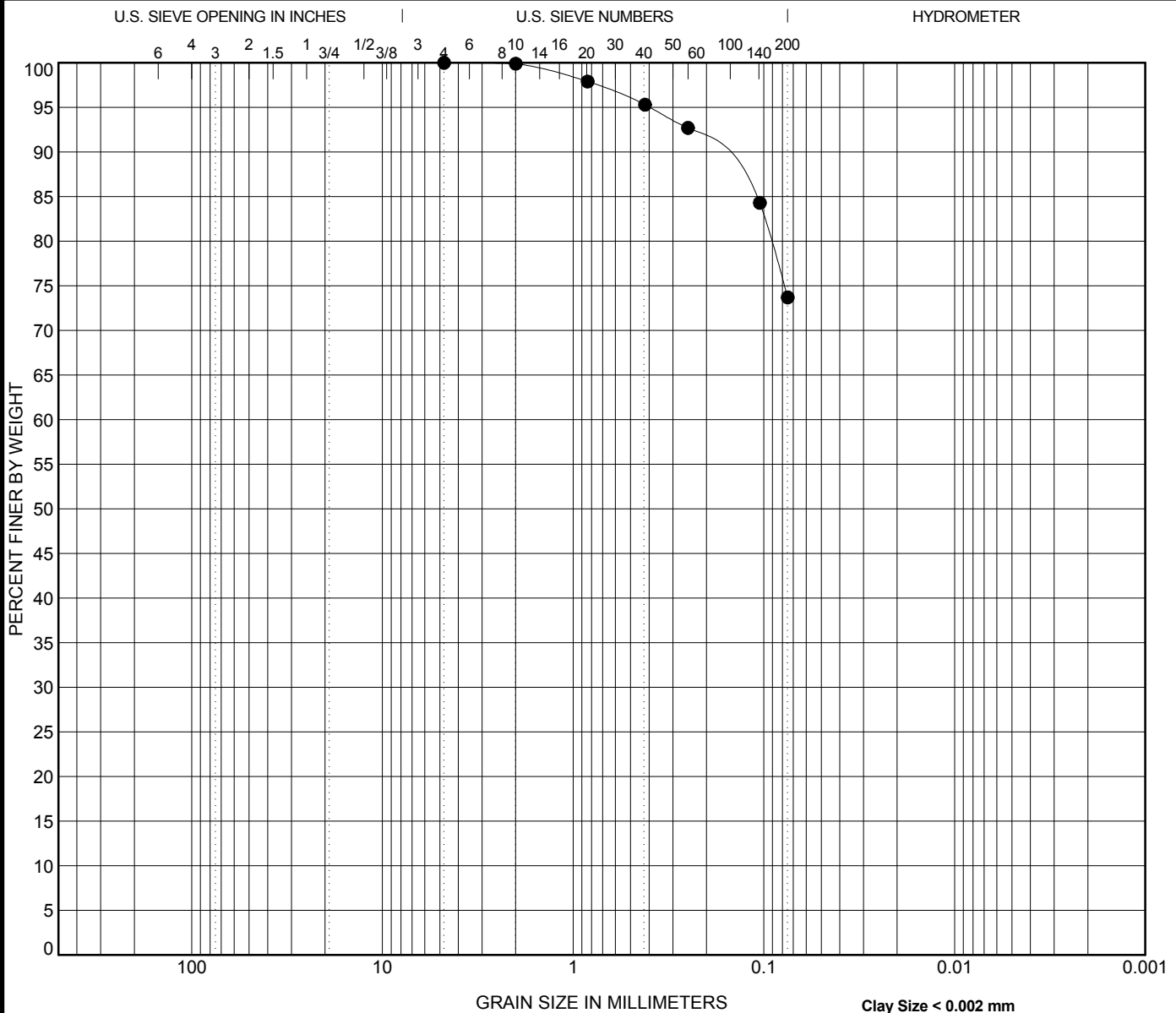
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-14 53.5	4.75				0.0	33.7	66.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1A SS-17 68.5	Hard to very hard green gray SILT with sand (ML)	36	30	6		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1A SS-17 68.5	4.75				0.0	26.3	73.7	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Web: www.test-llc.com



Tested By

AV

Date

01/07/15

Checked By

LB

Client Pr. #	0451644	Lab. PR. #	1541-01-1
Pr. Name	SCDOT US 301 Five Chop Rd - Orangeburg	S. Type	Bag
Sample ID	19241/B-1A SS-7	Depth/Elev.	18.5-20'
Location	-	Add. Info	-

ASTM G 57/G187/AASHTO T 288

Standard Test Method for Determining Minimum Laboratory Soil Resistivity

Determination of Resistivity at as-received moisture content

As-received Moisture Content

Mass of Wet Sample & Tare, g	
Mass of Dry Sample & Tare, g	
Mass of Tare, g	
Moisture Content, %	NA

Remarks

TEST DATA

Mass of Soil Box, g	-	Meter Dial Reading, ohms	-
Mass of Soil Box + Soil, g	-	Reading of Meter Range Multiplier	-
Mass of Soil, g	-	Measured Resistance, ohms	-
Calibrated Volume of Soil Box, ft ³	0.0027	Calibrated Soil Box Multiplier, cm	1.0
Wet Density of as-placed Soil, pcf	-		
Dry Density of as-placed Soil, pcf	-		

Reported Soil Resistivity, ohms-cm NA

Determination of Minimum Soil Resistivity

TEST DATA

Trials at Various Moisture Content

TRIAL #	1	2	3	4	5	6	7	8	9
Meter Dial Reading, ohms	4.00	2.60	2.60						
Reading of Meter Range Multiplier	1000	1000	1000						
Measured Resistance, ohms	4000	2600	2600						
Calibrated Soil Box Multiplier, cm	1.0	1.0	1.0						
Measured Resistivity, ohms-cm	4000	2600	2600						

Reported Soil Minimum Resistivity, ohms-cm 2600

Note: Material passed # 10 sieve used for testing

Oven ID #	12/13/14/15
Balance ID #	1/2/6
Soil Box ID #	112
Resistivity Meter ID #	111/396

Description

NA

USCS (D2487; D2488)	NA
AASHTO (M145)	NA



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Tested By

AV

Date

01/07/15

Checked By

LB

Client Pr. #	0451644	Lab. PR. #	1541-01-1
Pr. Name	SCDOT US 301 Five Chop Rd - Orangeburg	S. Type	Bulk
Sample ID	19242/B-1A SS-9/SS-10	Depth/Elev.	28.5-35'
Location	-	Add. Info	-

ASTM G 57/G187/AASHTO T 288

Standard Test Method for Determining Minimum Laboratory Soil Resistivity

Determination of Resistivity at as-received moisture content

As-received Moisture Content

Mass of Wet Sample & Tare, g	
Mass of Dry Sample & Tare, g	
Mass of Tare, g	
Moisture Content, %	NA

Remarks

TEST DATA

Mass of Soil Box, g	-	Meter Dial Reading, ohms	-
Mass of Soil Box + Soil, g	-	Reading of Meter Range Multiplier	-
Mass of Soil, g	-	Measured Resistance, ohms	-
Calibrated Volume of Soil Box, ft ³	0.0027	Calibrated Soil Box Multiplier, cm	1.0
Wet Density of as-placed Soil, pcf	-		
Dry Density of as-placed Soil, pcf	-		

Reported Soil Resistivity, ohms-cm NA

Determination of Minimum Soil Resistivity

TEST DATA

Trials at Various Moisture Content

TRIAL #	1	2	3	4	5	6	7	8	9
Meter Dial Reading, ohms	1.60	1.50	1.50						
Reading of Meter Range Multiplier	1000	1000	1000						
Measured Resistance, ohms	1600	1500	1500						
Calibrated Soil Box Multiplier, cm	1.0	1.0	1.0						
Measured Resistivity, ohms-cm	1600	1500	1500						

Reported Soil Minimum Resistivity, ohms-cm 1500

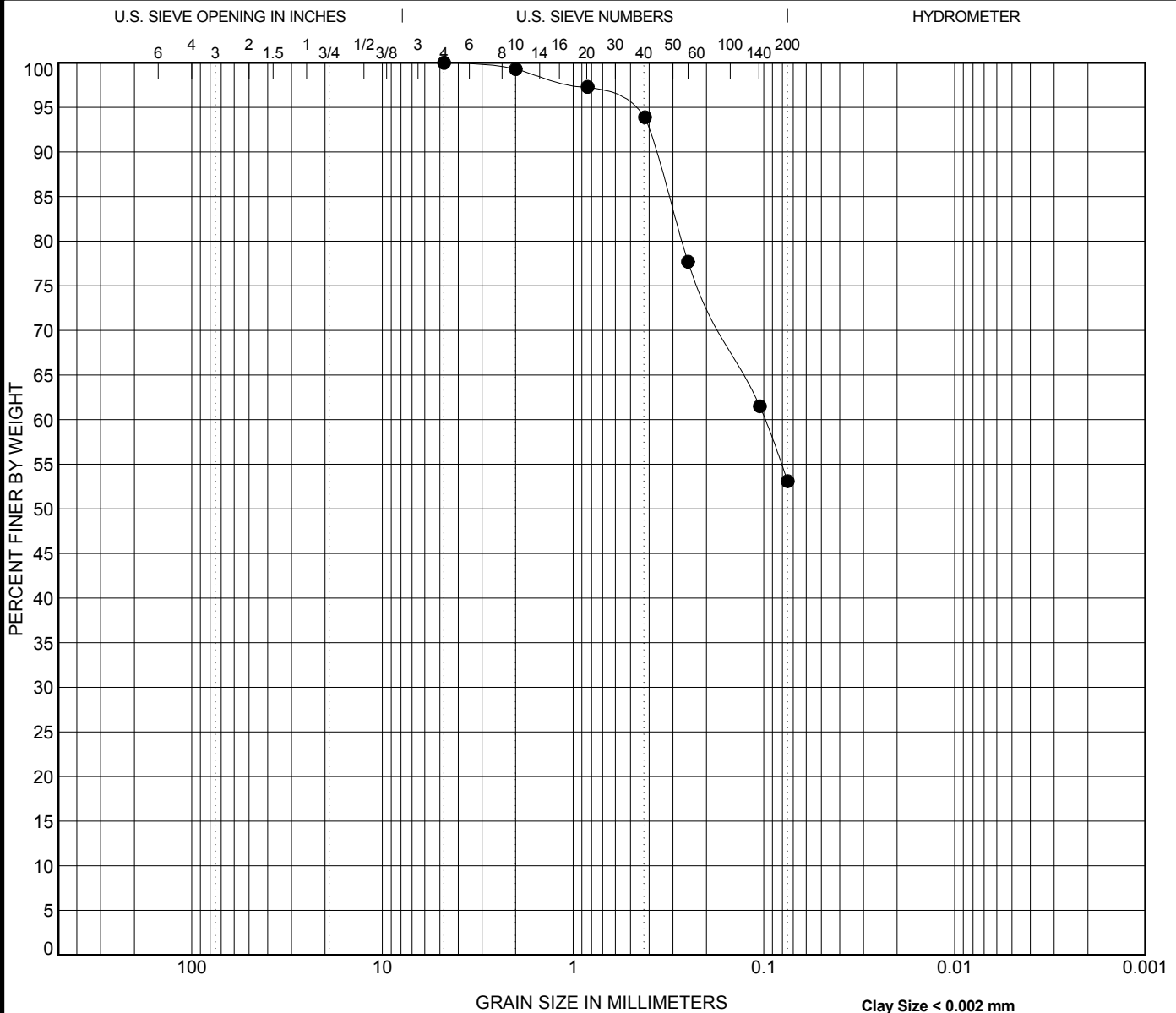
Note: Material passed # 10 sieve used for testing

Oven ID #	12/13/14/15
Balance ID #	1/2/6
Soil Box ID #	112
Resistivity Meter ID #	111/396

Description

NA

USCS (D2487; D2488)	NA
AASHTO (M145)	NA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-6 24.7	Hard green gray Sandy SILT (ML)	35	24	11		

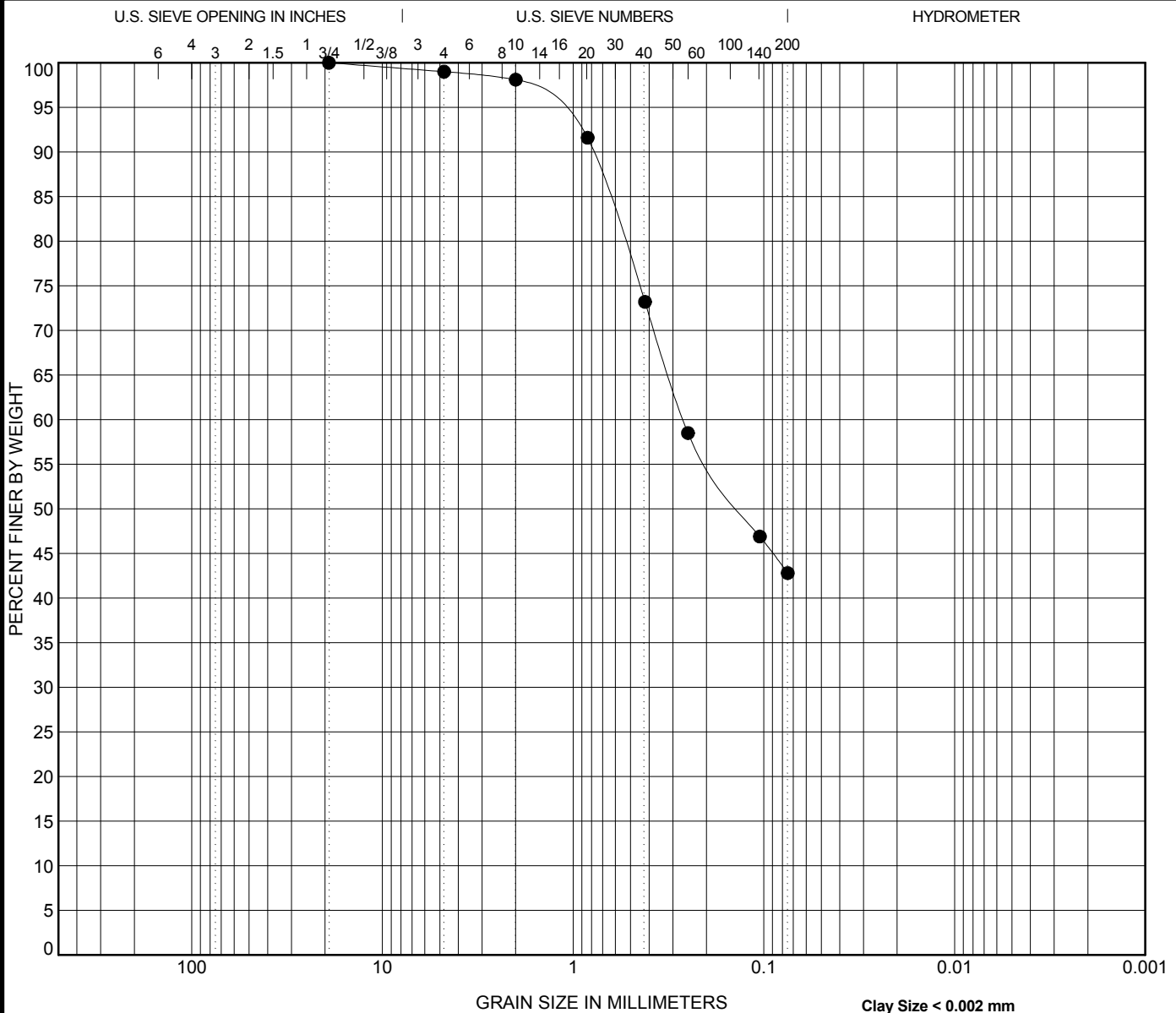
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-6 24.7	4.75	0.099			0.0	46.9	53.1	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-7 29.7	Very dense green gray fine to medium grained Clayey SAND (SC)	29	18	11		

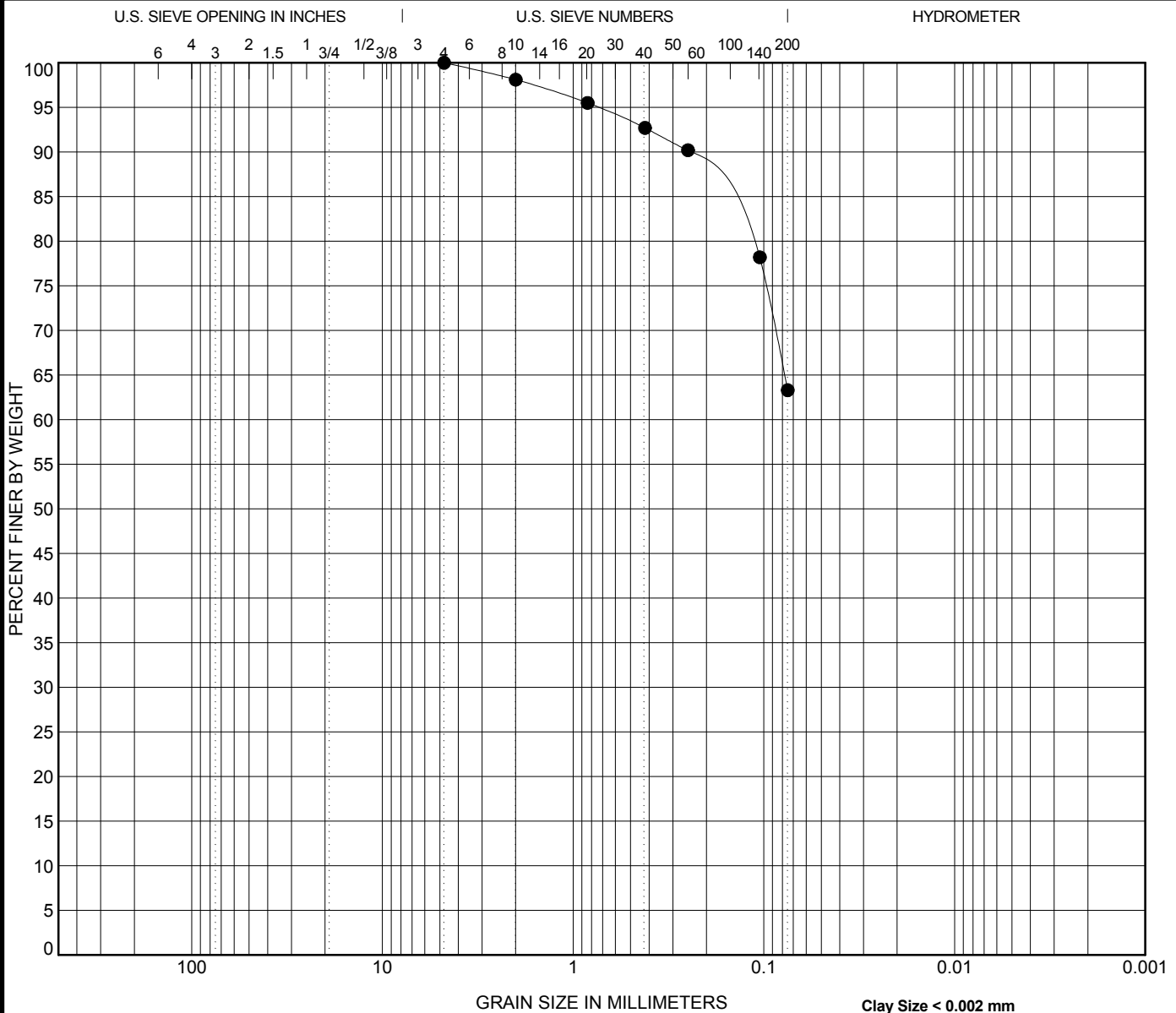
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-7 29.7	19.1	0.264			1.0	56.2	42.8	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-12 54.7	Very stiff to very hard green gray Sandy SILT (ML)	35	29	6		

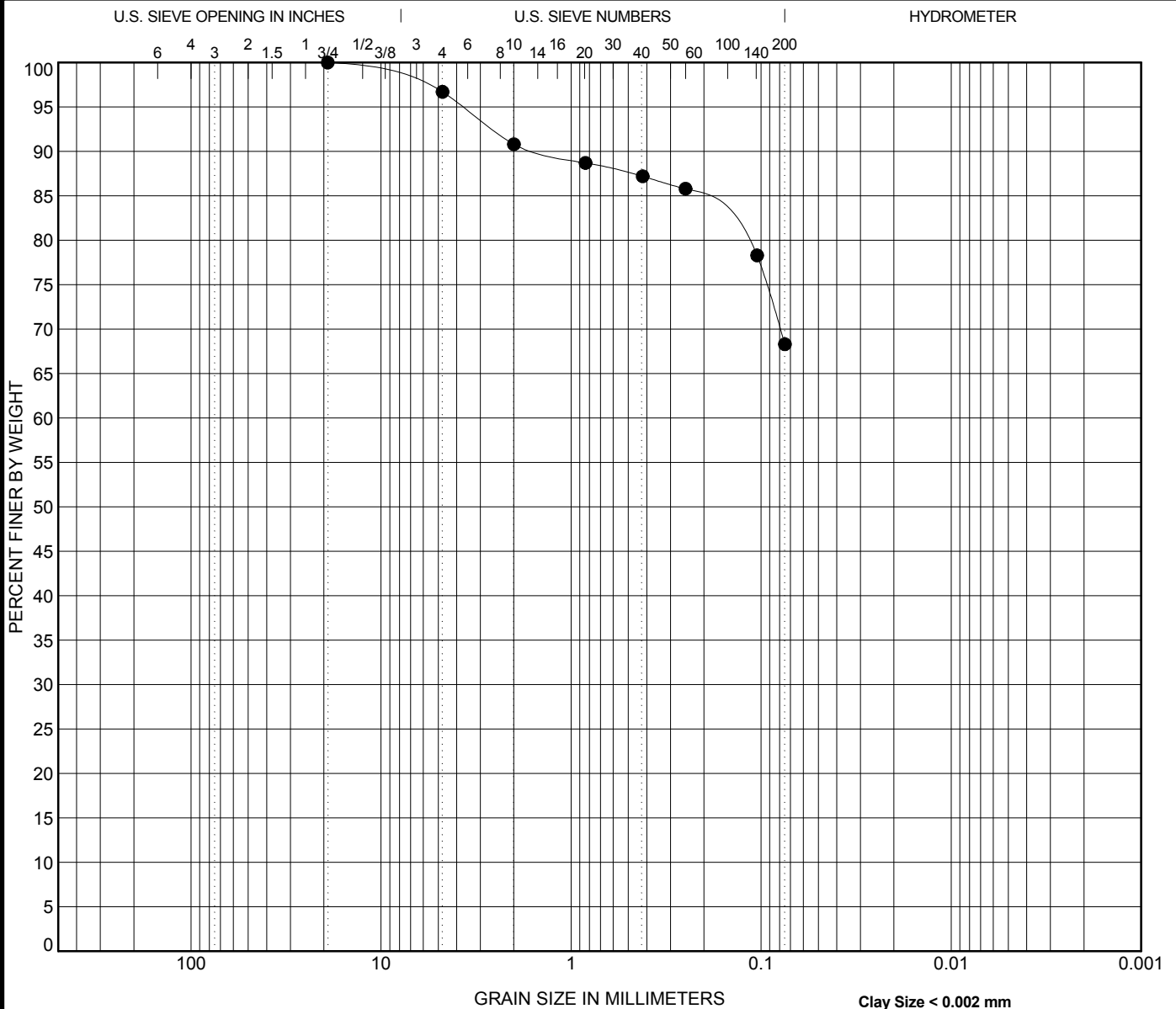
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-12 54.7	4.75				0.0	36.7	63.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-3A SS-14 61.7	Very stiff to very hard green gray Sandy SILT (ML)					41	33	8		

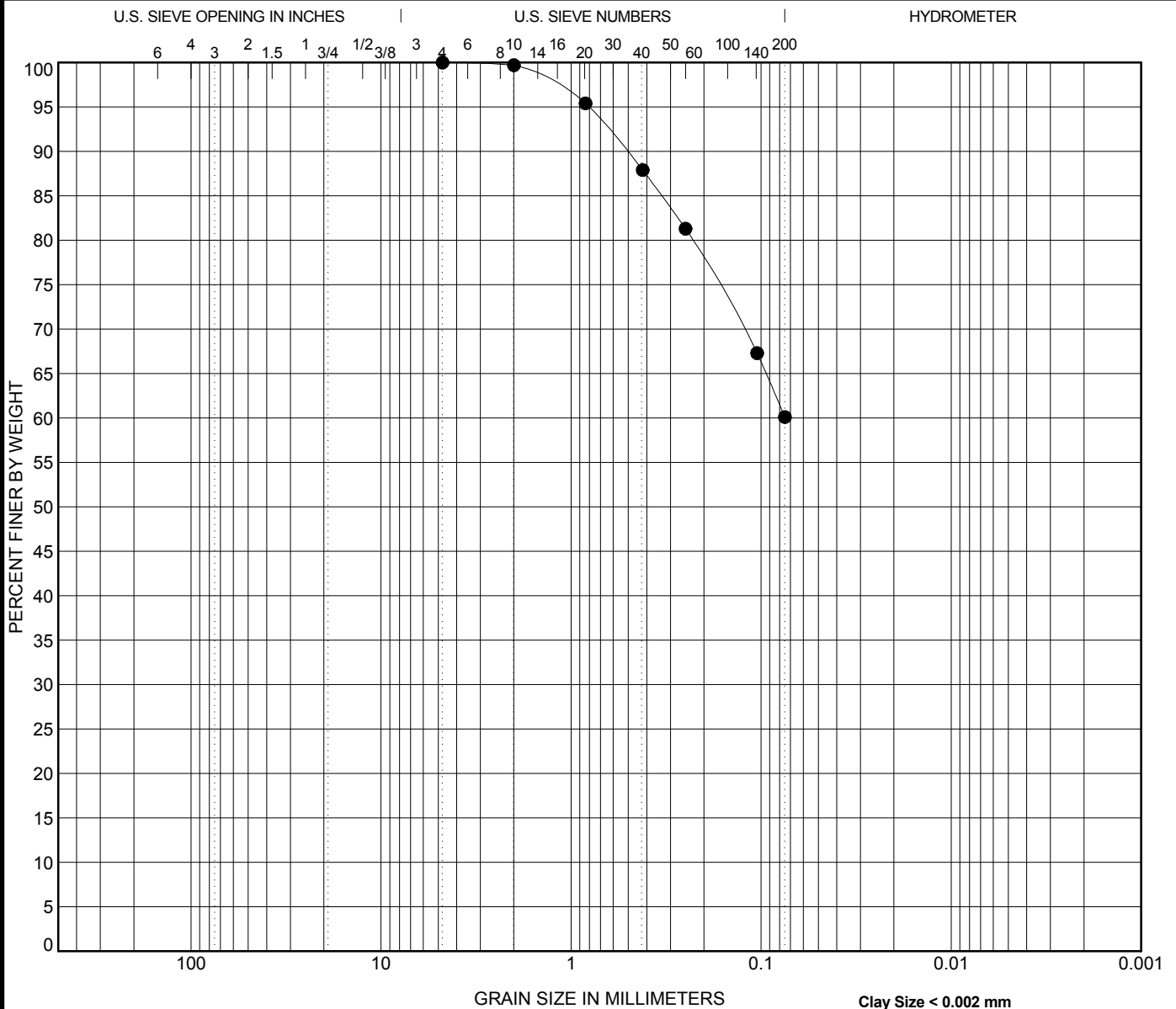
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-14 61.7	19.1				3.3	28.4	68.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-19 71.2	Very soft to soft dark green Sandy Elastic SILT (MH)	135	133	2		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-19 71.2	4.75				0.0	39.9	60.1	



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GRAIN SIZE DISTRIBUTION

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 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Material Test Report

Report No: MAT:0451644-1-S1

Issue No: 2

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

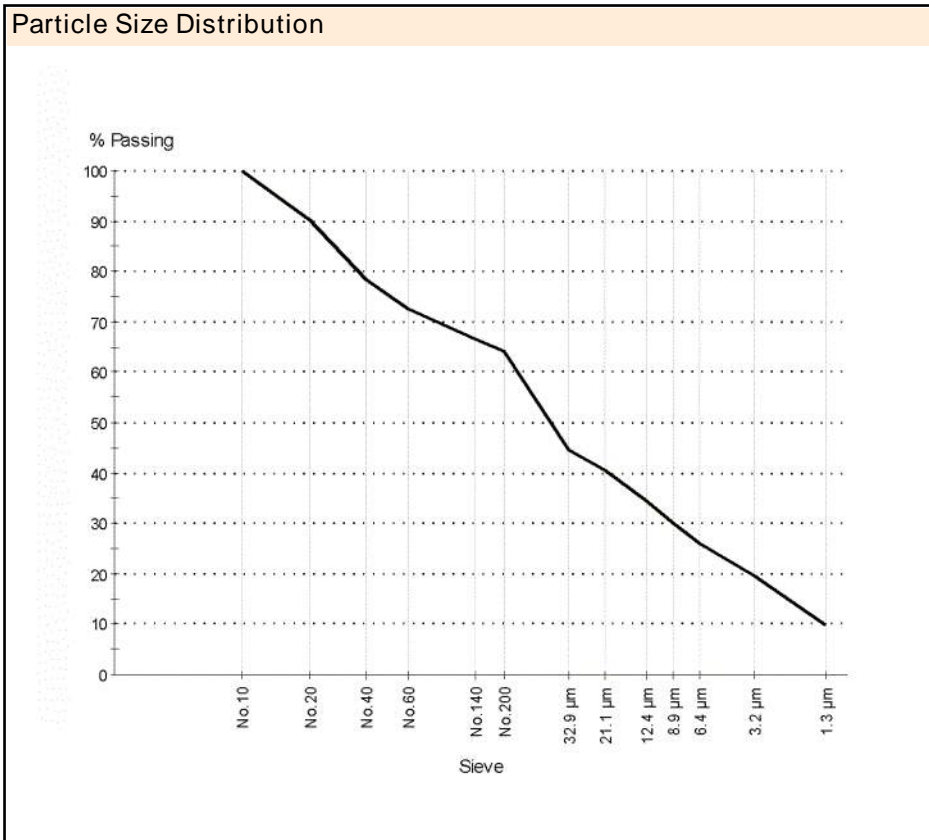
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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S1
Client Sample ID:
Date Sampled: 12/08/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Dark Green Sandy Elastic SILT (MH)
Sampling Method: (none)
General Location: Boring # 3A SS-21
Location: 75.2' - 77.2'

Sample Description:



Grading: ASTM D 422

Drying by: Oven
Date Tested: 12/29/2014

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	90	
No.40 (425µm)	78	
No.60 (250µm)	72	
No.140 (106µm)	67	
No.200 (75µm)	64	
32.9 µm	44.7	
21.1 µm	40.6	
12.4 µm	34.4	
8.9 µm	30.0	
6.4 µm	25.9	
3.2 µm	19.7	
1.3 µm	9.7	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (21.8%)	Fine (13.9%)	Silt (41.1%)	Clay (23.2%)

D85: 0.6320 D60: 0.0625 D50: 0.0411
D30: 0.0089 D15: 0.0021 D10: 0.0013
Cu: 46.83 Cc: 0.95



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Material Test Report

Report No: MAT:0451644-1-S1

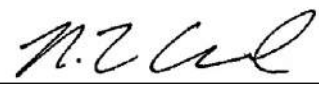
Issue No: 2

Client: SC DEPARTMENT OF TRANSPORTATION
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COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S1
Client Sample ID:
Date Sampled: 12/08/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

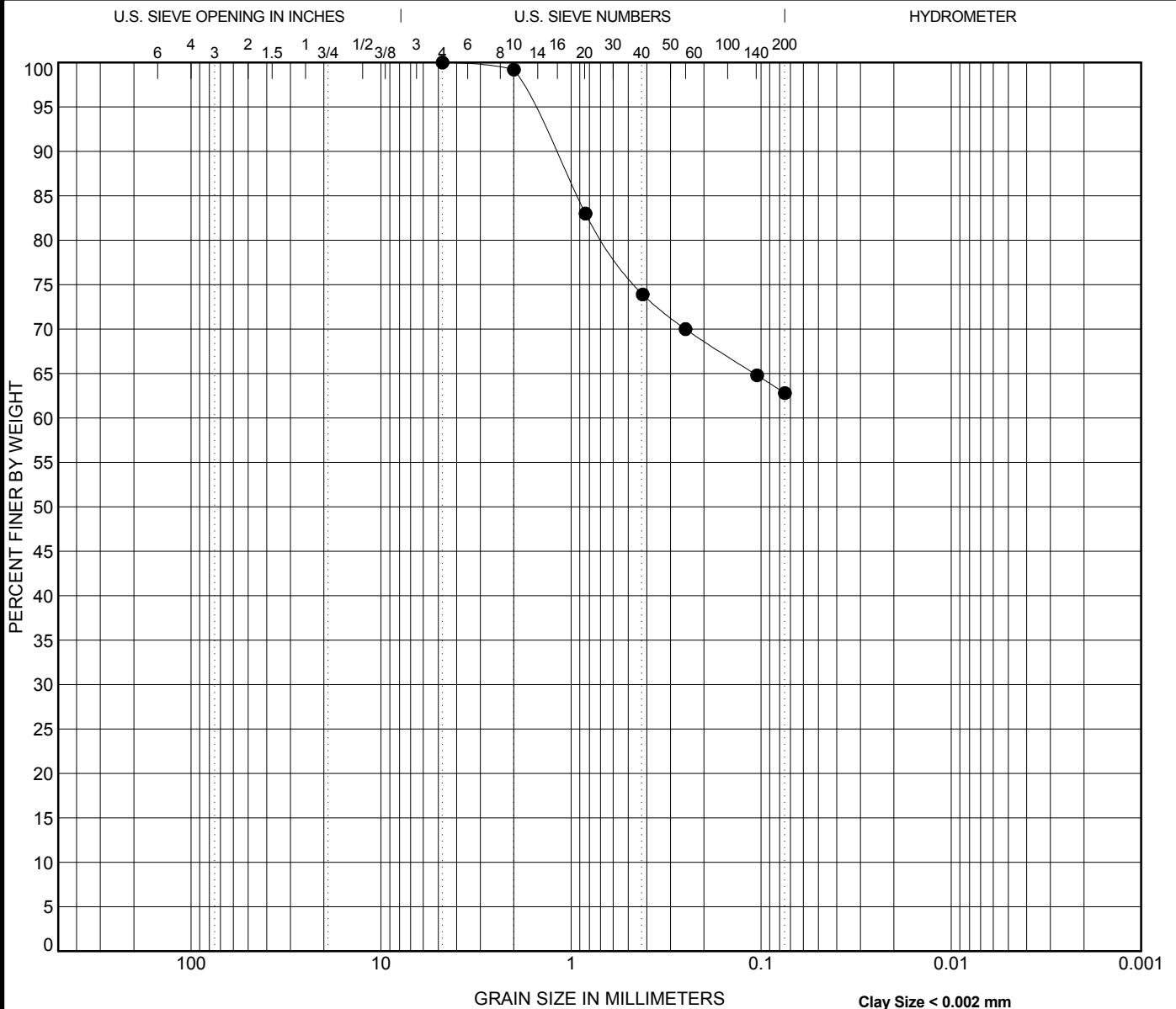
Supplier:
Source:
Material: Dark Green Sandy Elastic SILT (MH)
Sampling Method: (none)
General Location: Boring # 3A SS-21
Location: 75.2' - 77.2'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		Bennett Livingston	

Comments

N/A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-22 77.2	Very soft to soft dark green Sandy Elastic SILT (MH)	111	101	10		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-22 77.2	4.75				0.0	37.2	62.8	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Material Test Report

Report No: MAT:0451644-1-S2

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

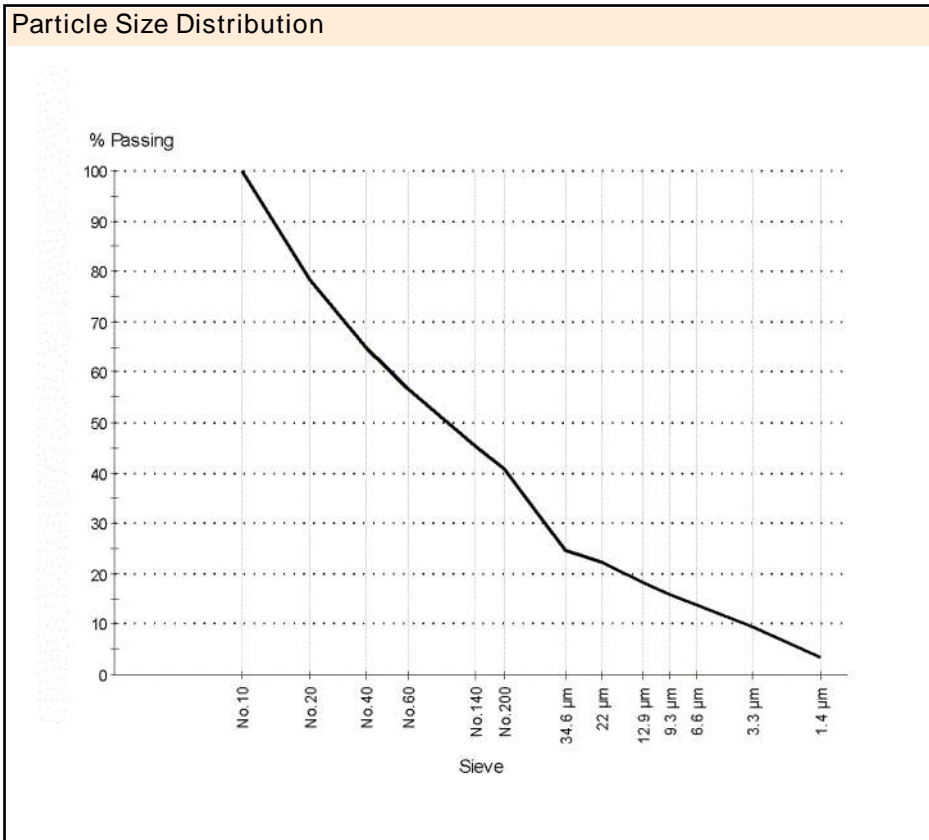
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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S2
Client Sample ID:
Date Sampled: 12/08/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Dark Green Fine to Medium Grained Silty SAND (SM)
Sampling Method: (none)
General Location: Boring #3A SS-23
Location: 79.2' -81.2'

Sample Description:



Grading: ASTM D 422

Date Tested:

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	78	
No.40 (425µm)	65	
No.60 (250µm)	57	
No.140 (106µm)	45	
No.200 (75µm)	41	
34.6 µm	24.5	
22.0 µm	22.4	
12.9 µm	18.3	
9.3 µm	16.0	
6.6 µm	13.7	
3.3 µm	9.3	
1.4 µm	3.5	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (35.2%)	Fine (23.8%)	Silt (29.4%)	Clay (11.6%)

D85: 1.1031 D60: 0.3086 D50: 0.1494
D30: 0.0448 D15: 0.0080 D10: 0.0037
Cu: 83.75 Cc: 1.76



Professional Service Industries, Inc.
534 St. Andrews Road, Suite C
Columbia, SC 29210

Phone: (803) 776-6050
Fax: (803) 772-2803

Material Test Report

Report No: MAT:0451644-1-S2
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.

[Signature]

Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S2
Client Sample ID:
Date Sampled: 12/08/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

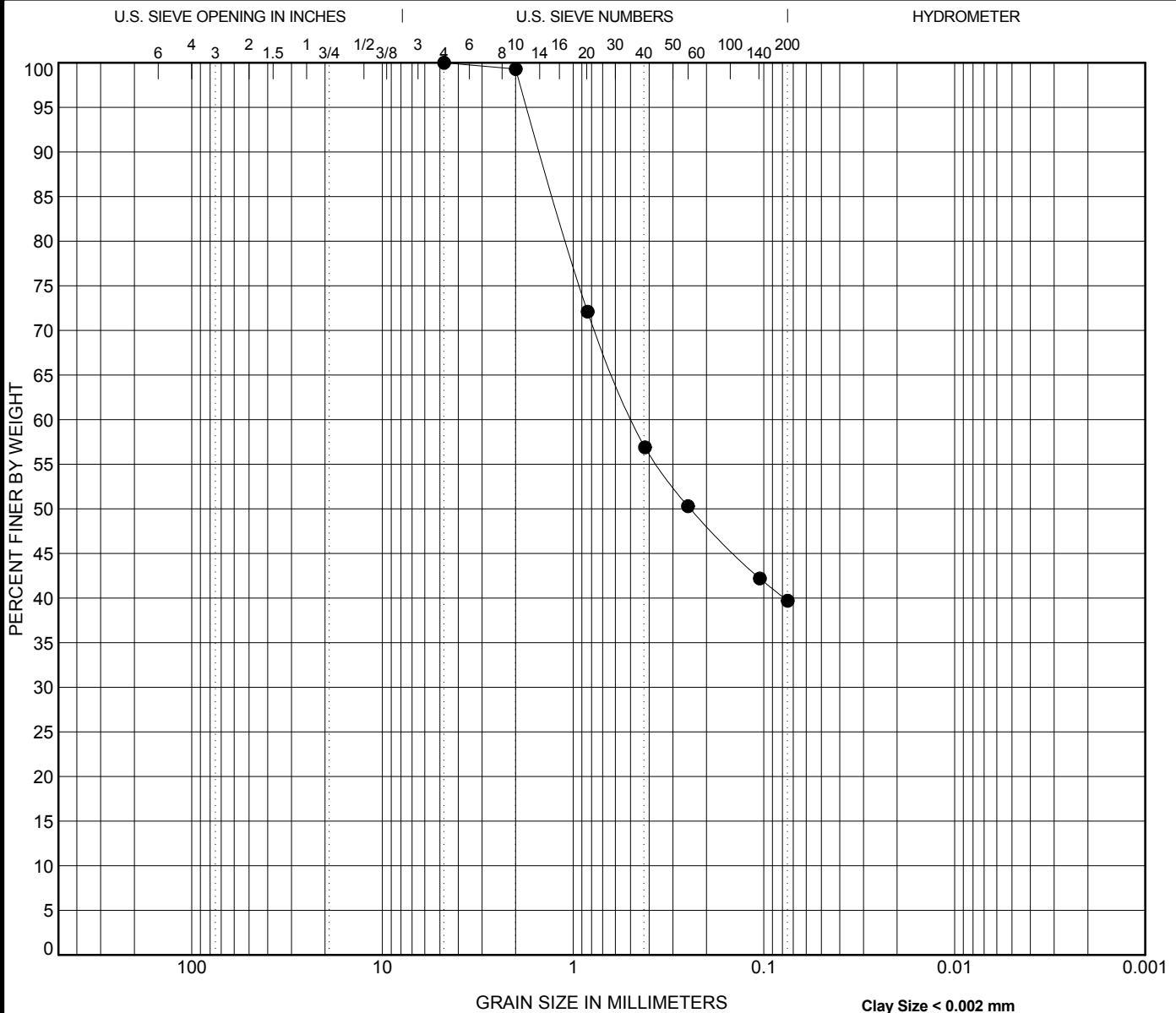
Supplier:
Source:
Material: Dark Green Fine to Medium Grained Silty SAND
Sampling Method: (none)
General Location: Boring #3A SS-23
Location: 79.2' -81.2'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-24 81.2	Very soft to soft dark green fine to medium grained Silty SAND (SM)	90	86	4		

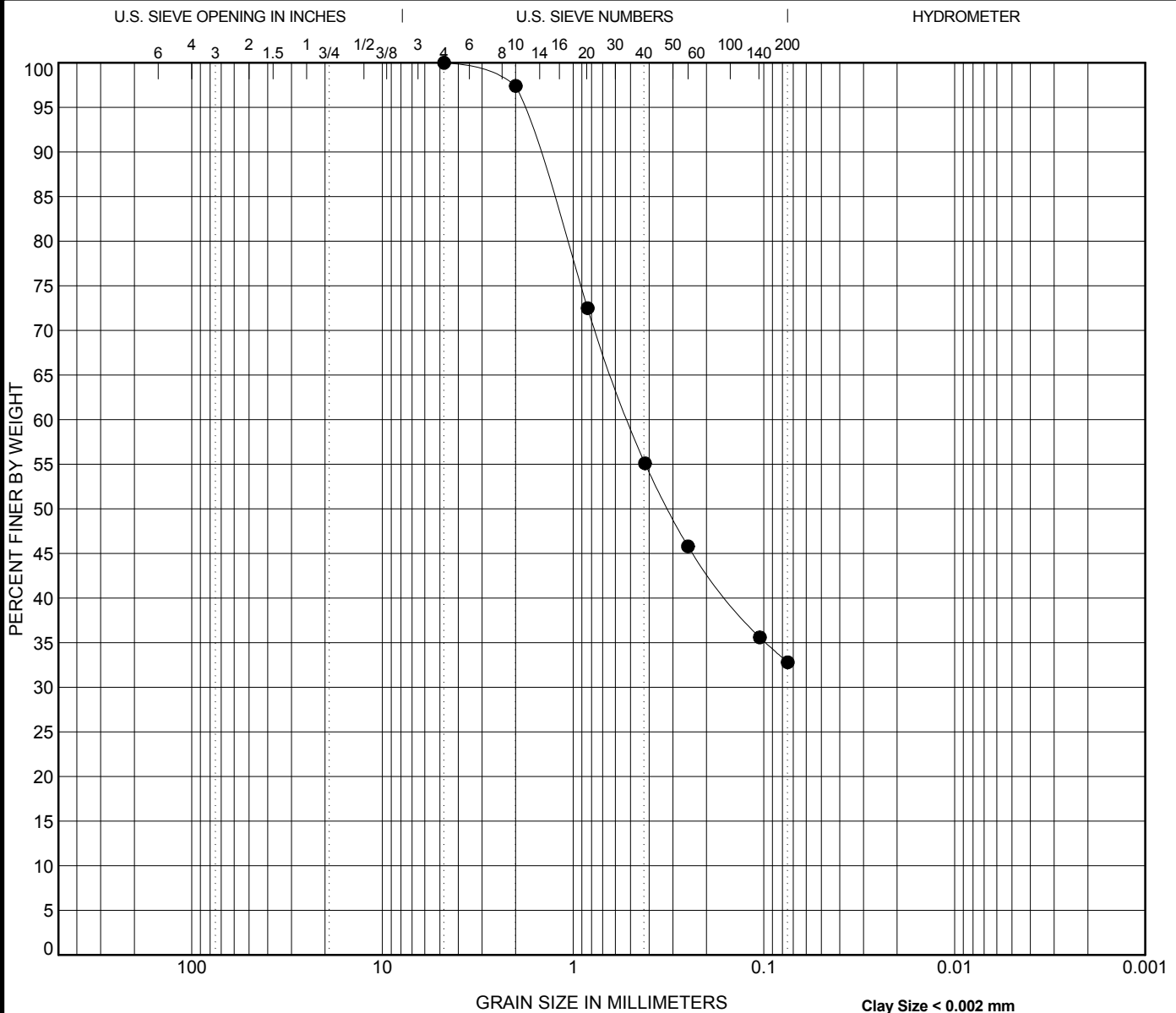
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-24 81.2	4.75	0.484			0.0	60.3	39.7	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-25 83.2	Very soft to soft dark green fine to medium grained Silty SAND (SM)	75	66	9		

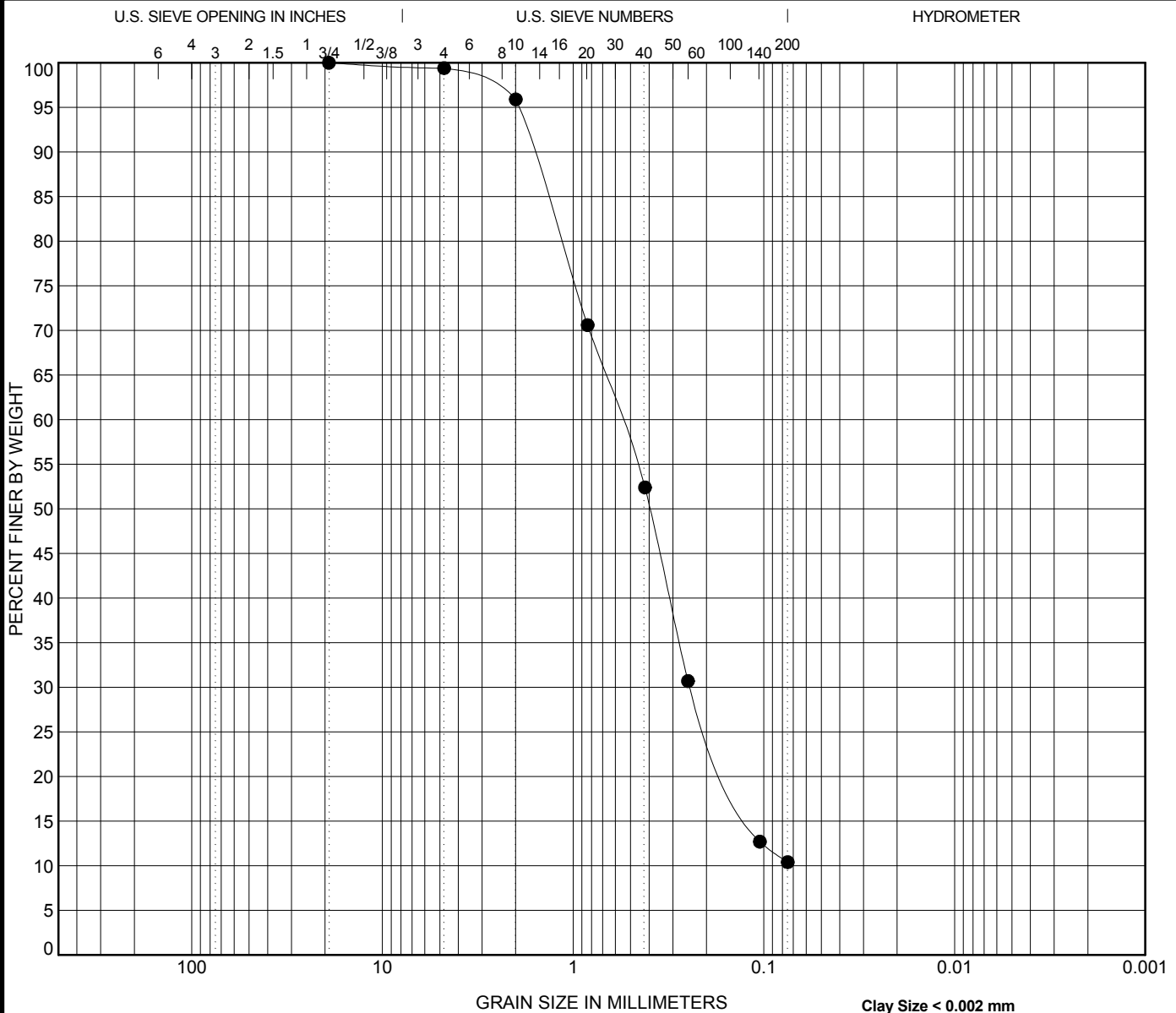
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-25 83.2	4.75	0.511			0.0	67.2	32.8	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-27 87.2	Med. dense-loose dk. green f-c well graded SAND w/silt (SW-SM)	NP	NP	NP	1.47	7.93

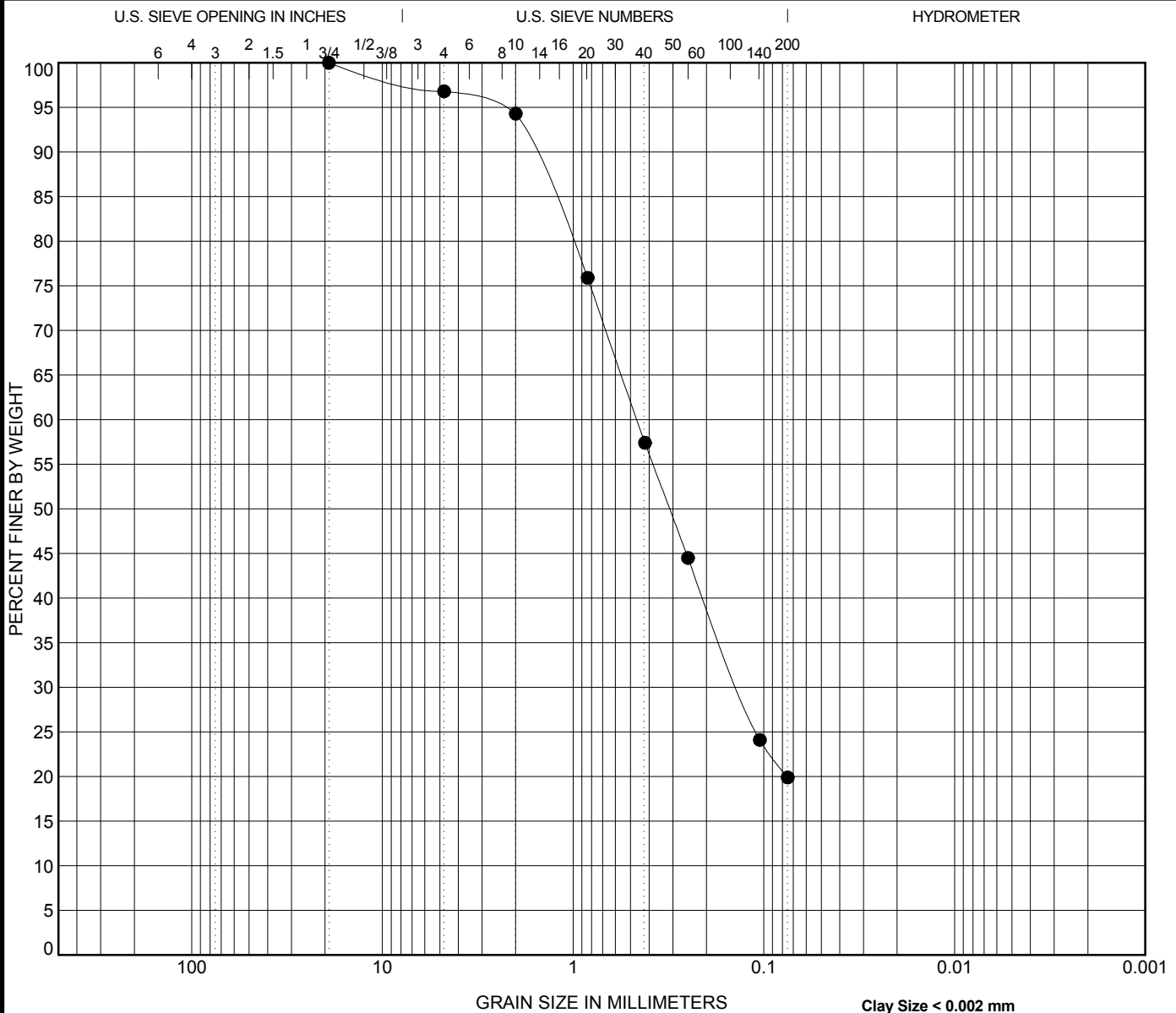
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-27 87.2	19.1	0.561	0.242		0.6	89.0	10.4	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-3A SS-28 89.2	Dense dark green fine to coarse grained Silty SAND (SM)					NP	NP	NP		

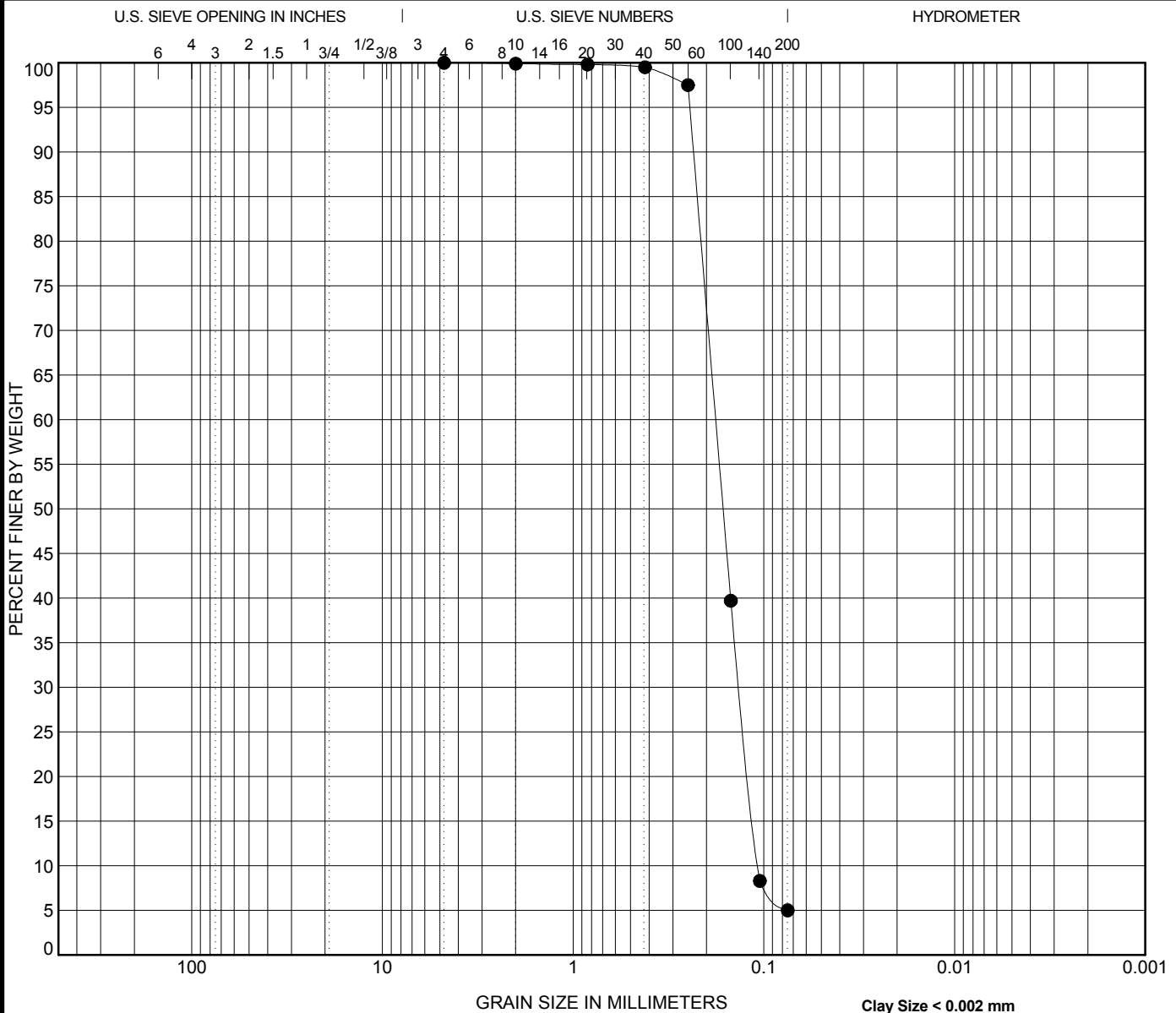
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-28 89.2	19.1	0.463	0.135		3.2	76.9	19.9	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3A SS-34 120.7	Very dense dark gray f-m grained poorly graded SAND w/silt (SP-SM)	NP	NP	NP	0.94	1.67

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3A SS-34 120.7	4.75	0.179	0.134	0.107	0.0	95.0	5.0	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



**TIMELY
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1874 Forge Street Tucker, GA 30084

Phone: 770-938-8233

Fax: 770-923-8973

Web: www.test-llc.com



Tested By

AV

Date

01/07/15

Checked By

LB

Client Pr. #	0451644	Lab. PR. #	1541-01-1
Pr. Name	SCDOT US 301 Five Chop Rd - Orangeburg	S. Type	Bulk
Sample ID	19243/B-3A SS-3/SS-4	Depth/Elev.	15.2-19.2'
Location	-	Add. Info	-

ASTM G 57/G187/AASHTO T 288

Standard Test Method for Determining Minimum Laboratory Soil Resistivity

Determination of Resistivity at as-received moisture content

As-received Moisture Content

Mass of Wet Sample & Tare, g	
Mass of Dry Sample & Tare, g	
Mass of Tare, g	
Moisture Content, %	NA

Remarks

TEST DATA

Mass of Soil Box, g	-	Meter Dial Reading, ohms	-
Mass of Soil Box + Soil, g	-	Reading of Meter Range Multiplier	-
Mass of Soil, g	-	Measured Resistance, ohms	-
Calibrated Volume of Soil Box, ft ³	0.0027	Calibrated Soil Box Multiplier, cm	1.0
Wet Density of as-placed Soil, pcf	-		
Dry Density of as-placed Soil, pcf	-		
Reported Soil Resistivity, ohms-cm	NA		

Determination of Minimum Soil Resistivity

TEST DATA

Trials at Various Moisture Content

TRIAL #	1	2	3	4	5	6	7	8	9
Meter Dial Reading, ohms	10.60	7.60	7.60						
Reading of Meter Range Multiplier	1000	1000	1000						
Measured Resistance, ohms	10600	7600	7600						
Calibrated Soil Box Multiplier, cm	1.0	1.0	1.0						
Measured Resistivity, ohms-cm	10600	7600	7600						

Reported Soil Minimum Resistivity, ohms-cm **7600**

Note: Material passed # 10 sieve used for testing

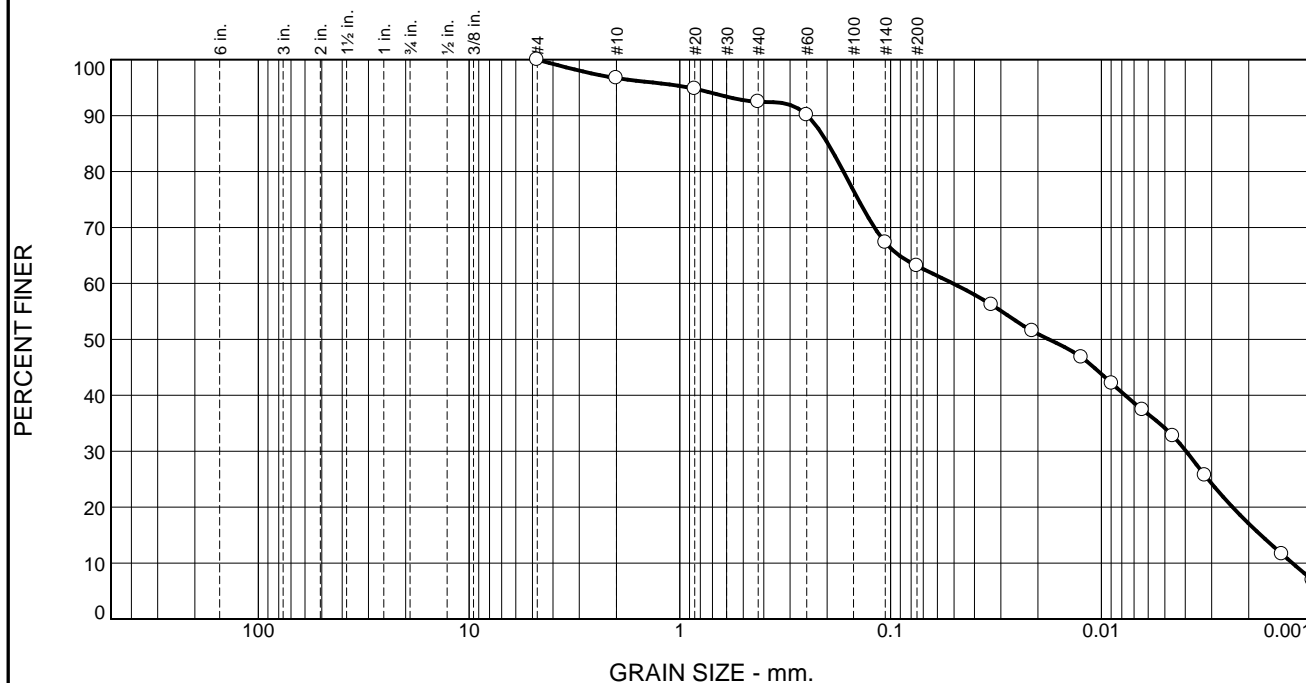
Oven ID #	12/13/14/15
Balance ID #	1/2/6
Soil Box ID #	112
Resistivity Meter ID #	111/396

Description

NA

USCS (D2487; D2488)	NA
AASHTO (M145)	NA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.3	4.2	29.4	29.0	34.1

Test Results (D422 & D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	96.7		
#20	94.8		
#40	92.5		
#60	90.1		
#140	67.3		
#200	63.1		
0.0332 mm.	56.2		
0.0213 mm.	51.5		
0.0125 mm.	46.8		
0.0089 mm.	42.1		
0.0064 mm.	37.4		
0.0046 mm.	32.7		
0.0032 mm.	25.7		
0.0014 mm.	11.6		
0.0010 mm.	6.9		

* (no specification provided)

Material Description

Grey Sandy Lean Clay

Atterberg Limits (ASTM D 4318)

PL= 15 LL= 35 PI= 20

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-6(10)

Coefficients

D₉₀= 0.2483 D₈₅= 0.1983 D₆₀= 0.0507
D₅₀= 0.0178 D₃₀= 0.0040 D₁₅= 0.0018
D₁₀= 0.0012 C_u= 40.85 C_c= 0.25

Remarks

Natural Moisture Content: 30.8

Date Received: 2/5/15 Date Tested: 2/9/15

Tested By: Steven Putnam

Checked By: Tom Cannarella

Title: Branch Manager

Source of Sample: Boring B-3A
Sample Number: ST-1

Depth: 9.00' - 11.00'

Date Sampled:

Professional Service Industries, Inc.
5021 W. W.T. Harris Blvd.
Charlotte, NC

Client: SCDOT
Project: Orangburg County
US 301 Five Chop Road
Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

2/18/2015

Client: SCDOT

Project: Orangburg County
 US 301 Five Chop Road
 Over Four Hole Swamp
 Project ID 0040308

Location: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1

Material Description: Grey Sandy Lean Clay

Date Received: 2/5/15 **PL:** 15

LL: 35 **PI:** 20

USCS Classification: CL

AASHTO Classification: A-6(10)

Grain Size Test Method: D422

#200 Wash Method: D1140

Testing Remarks: Natural Moisture Content: 30.8

Tested By: Steven Putnam

Test Date: 2/9/15

Checked By: Tom Cannarella

Title: Branch Manager

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 15.27

Tare Wt. = 0.00

Minus #200 from wash = 63.1%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
41.34	0.00	0.00	#4	0.00	100.0
			#10	1.36	96.7
			#20	2.15	94.8
			#40	3.12	92.5
			#60	4.09	90.1
			#140	13.51	67.3
			#200	15.24	63.1

Hydrometer Test Data

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 96.7

Weight of hydrometer sample = 54.17

Hygroscopic moisture correction:

Moist weight and tare = 141.95

Dry weight and tare = 129.21

Tare weight = 87.78

Hygroscopic moisture = 30.8%

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -6

Meniscus correction only = -2.0

Specific gravity of solids = 2.630

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	30.0	24.0	0.0137	28.0	11.7	0.0332	56.2
5.00	20.0	28.0	22.0	0.0137	26.0	12.0	0.0213	51.5
15.00	20.0	26.0	20.0	0.0137	24.0	12.4	0.0125	46.8
30.00	20.0	24.0	18.0	0.0137	22.0	12.7	0.0089	42.1
60.00	20.0	22.0	16.0	0.0137	20.0	13.0	0.0064	37.4
120.00	20.0	20.0	14.0	0.0137	18.0	13.3	0.0046	32.7
250.00	20.0	17.0	11.0	0.0137	15.0	13.8	0.0032	25.7
1440.00	20.0	11.0	5.0	0.0137	9.0	14.8	0.0014	11.6
2880.00	20.0	9.0	3.0	0.0137	7.0	15.1	0.0010	6.9

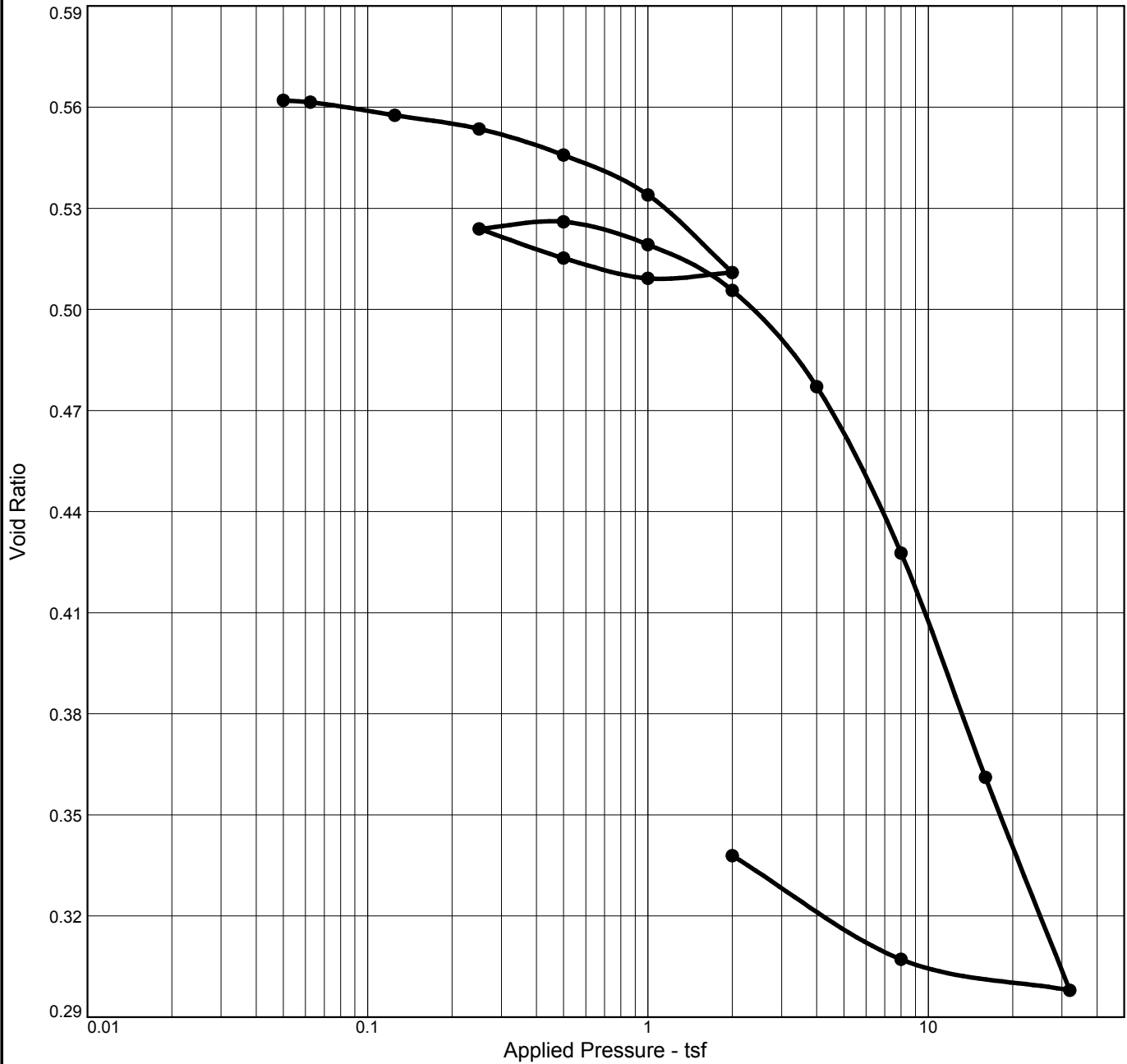
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	3.3	4.2	29.4	36.9	29.0	34.1	63.1

D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
0.0012	0.0018	0.0024	0.0040	0.0178	0.0507	0.1674	0.1983	0.2483	0.9031

Fineness Modulus	C _u	C _c
0.45	40.85	0.25

CONSOLIDATION TEST REPORT



Natural	Dry Dens.	LL	PI	Sp. Gr.	Overburden	P _c	C _c	C _r	Swell Press.	Swell %	e ₀
Sat.	Moist.	(pcf)			(tsf)	(tsf)			(tsf)		
90.7 %	19.3 %	105.3	35	20	2.630	.05	3.22	0.23	0.04		0.560

MATERIAL DESCRIPTION	USCS	AASHTO
Grey Sandy Lean Clay	CL	A-6(10)

Project No. _____ Client: SCDOT Project: Orangburg County US 301 Five Chop Road Source: Boring B-3A Depth: 9.00' - 11.00' Sample No.: ST-1	Remarks: Date Tested: 2/9/15 Percent Finer: 63.1%
Professional Service Industries, Inc. 5021 W. W.T. Harris Blvd. Charlotte, NC	

Figure 01

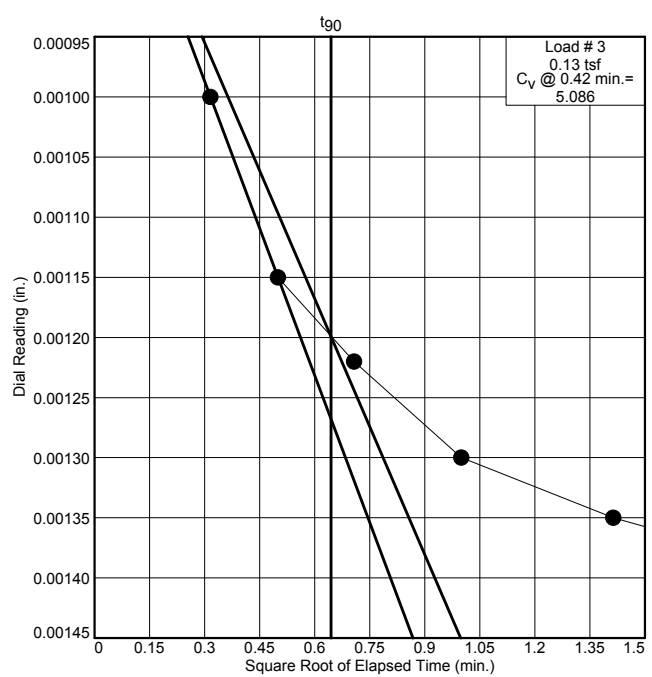
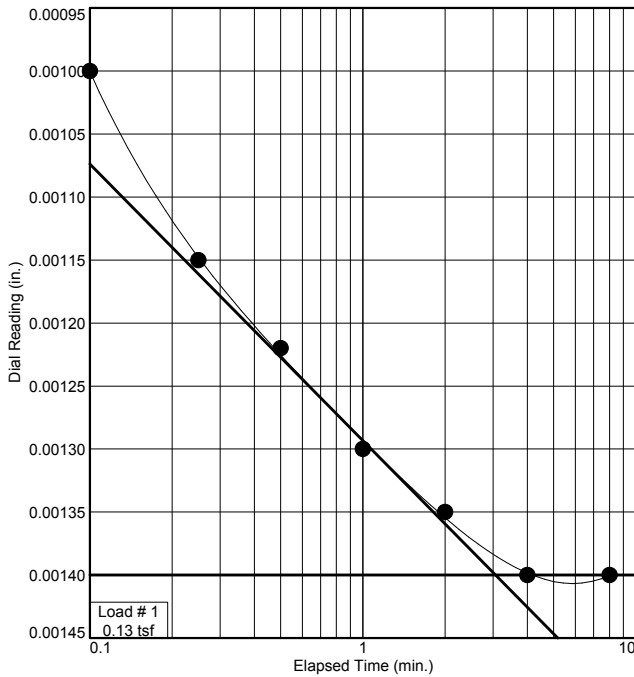
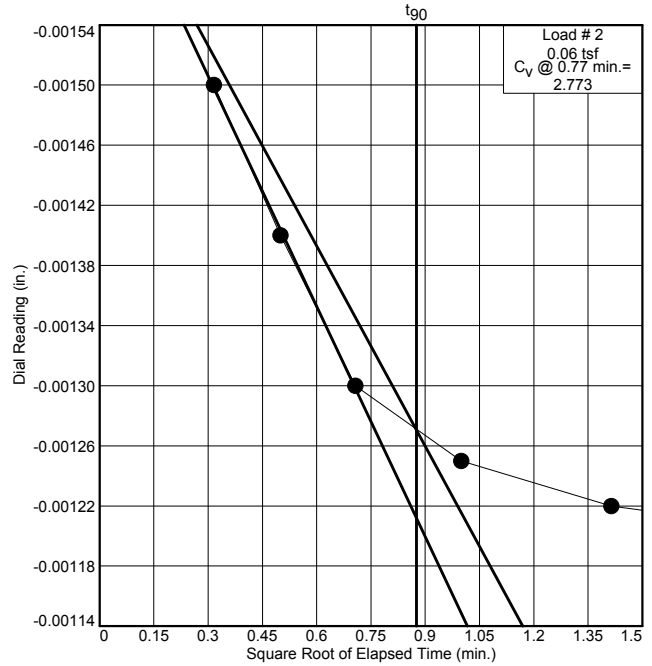
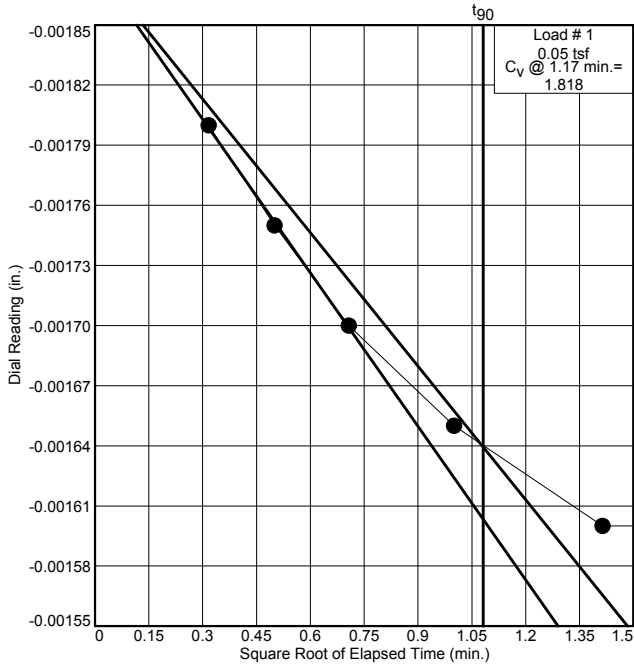
Checked By: Tom Cannarelle

Dial Reading vs. Time

Project No.:
 Project: Orangburg County
 US 301 Five Chop Road
 Source of Sample: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1



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 5021 W. W.T. Harris Blvd.
 Charlotte, NC

Figure 2

Dial Reading vs. Time

Project No.:

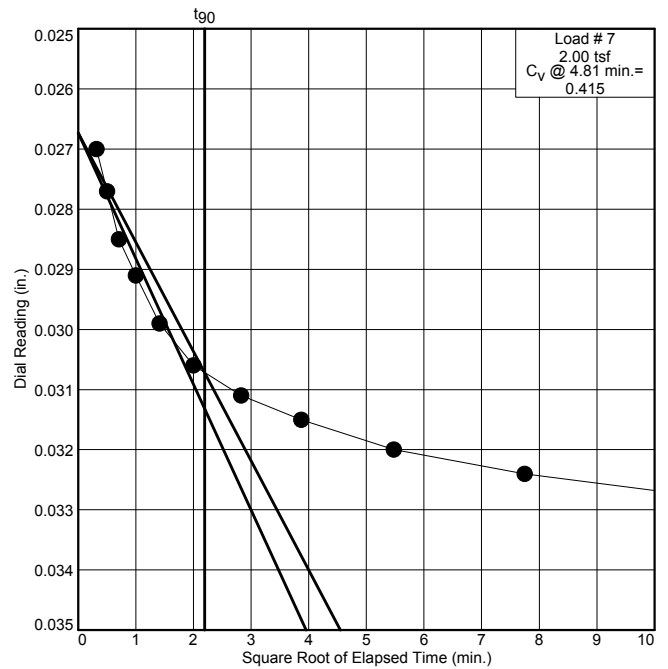
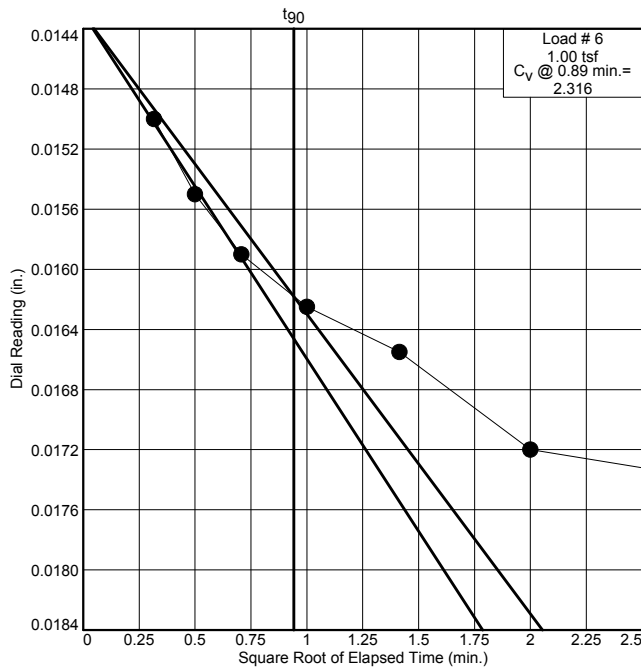
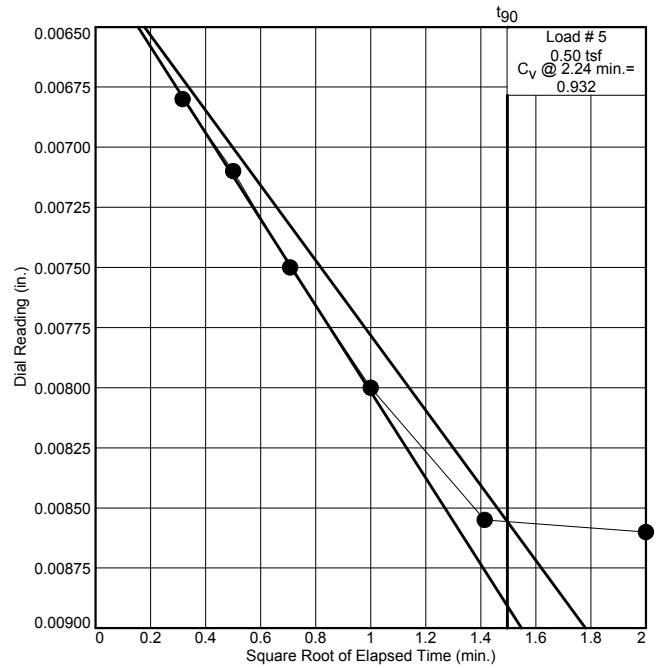
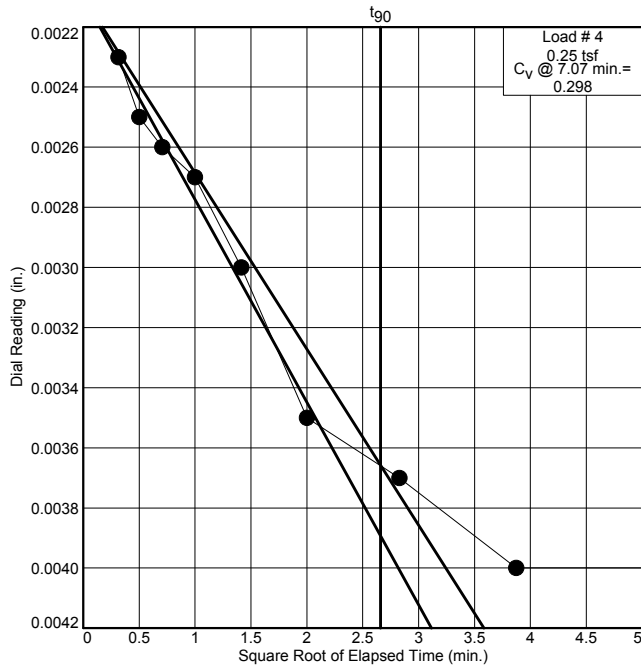
Project: Orangburg County

US 301 Five Chop Road

Source of Sample: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1



Professional Service Industries, Inc.
5021 W. W.T. Harris Blvd.
Charlotte, NC

Figure 3

Dial Reading vs. Time

Project No.:

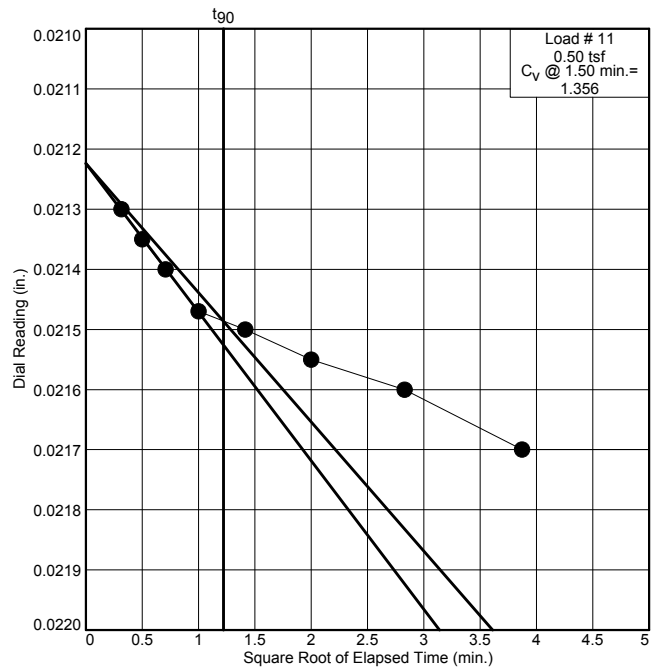
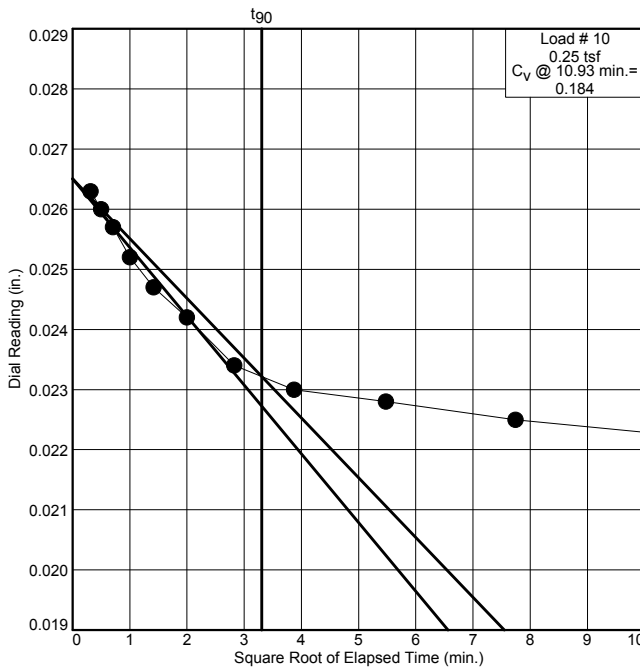
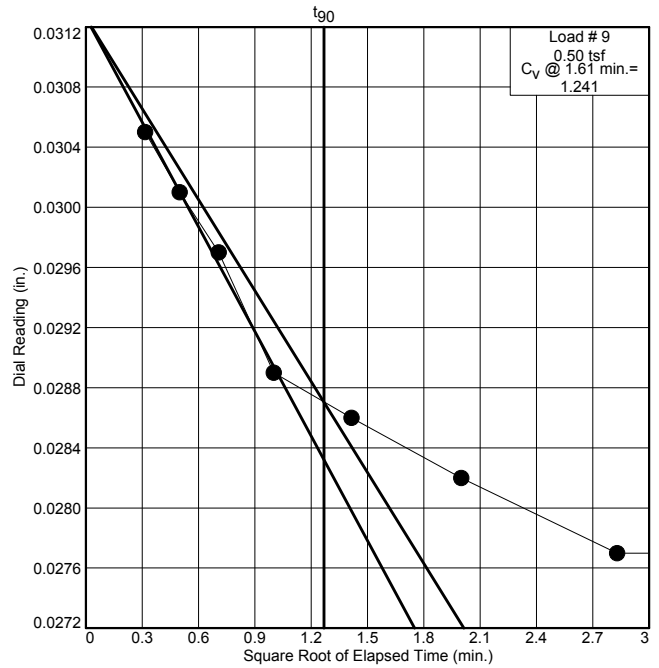
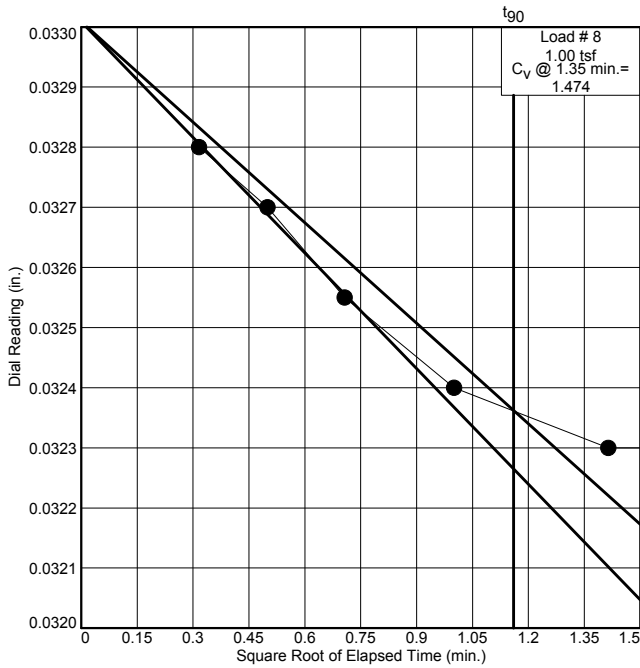
Project: Orangburg County

US 301 Five Chop Road

Source of Sample: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1



Professional Service Industries, Inc.
5021 W. W.T. Harris Blvd.
Charlotte, NC

Figure 4

Dial Reading vs. Time

Project No.:

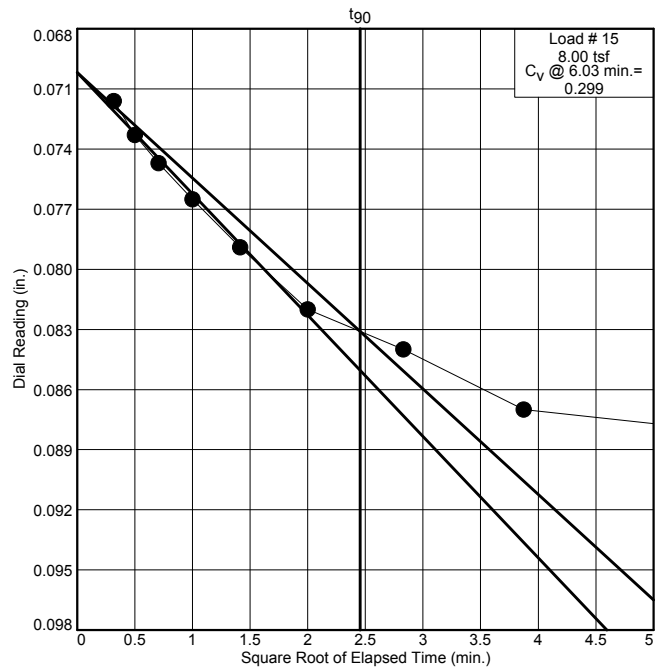
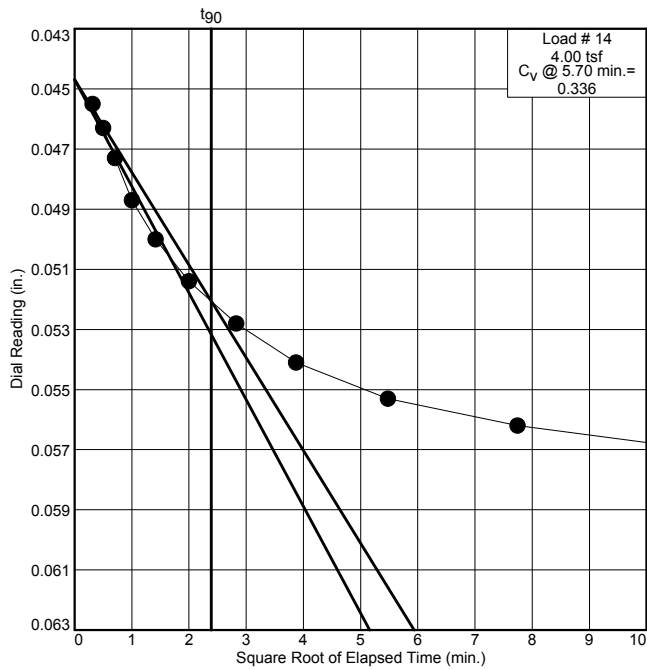
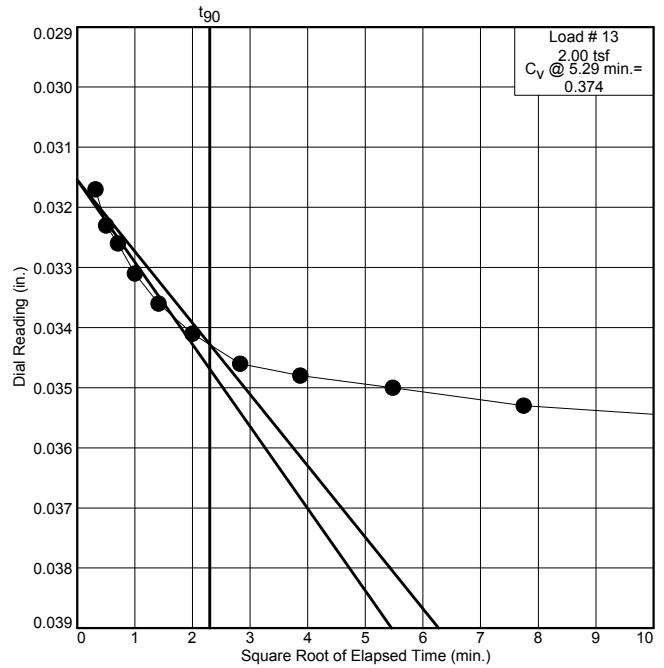
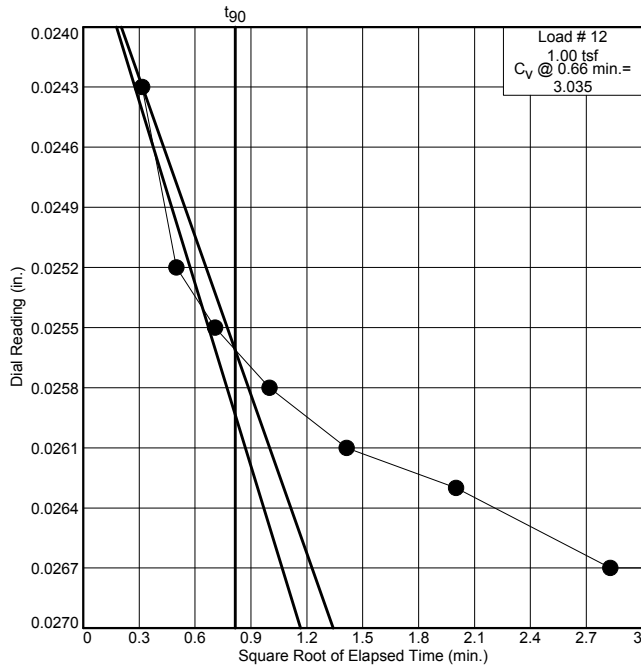
Project: Orangburg County

US 301 Five Chop Road

Source of Sample: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1



Professional Service Industries, Inc.
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Charlotte, NC

Figure 5

Dial Reading vs. Time

Project No.:

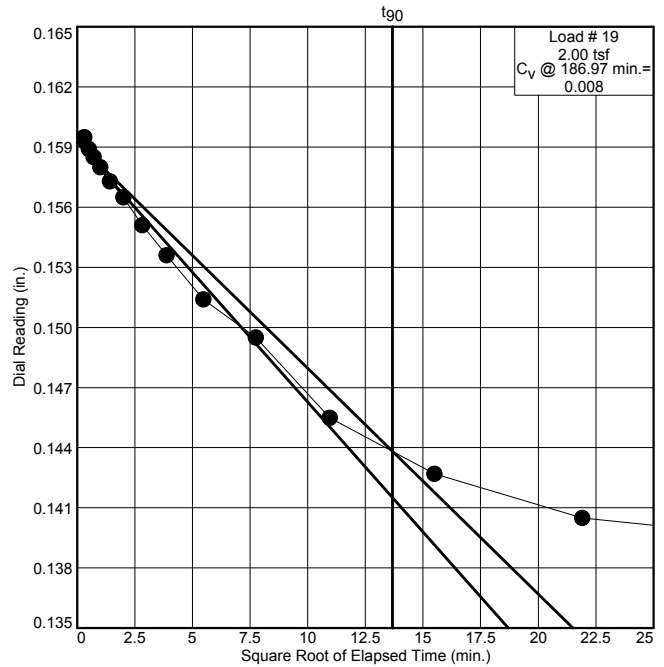
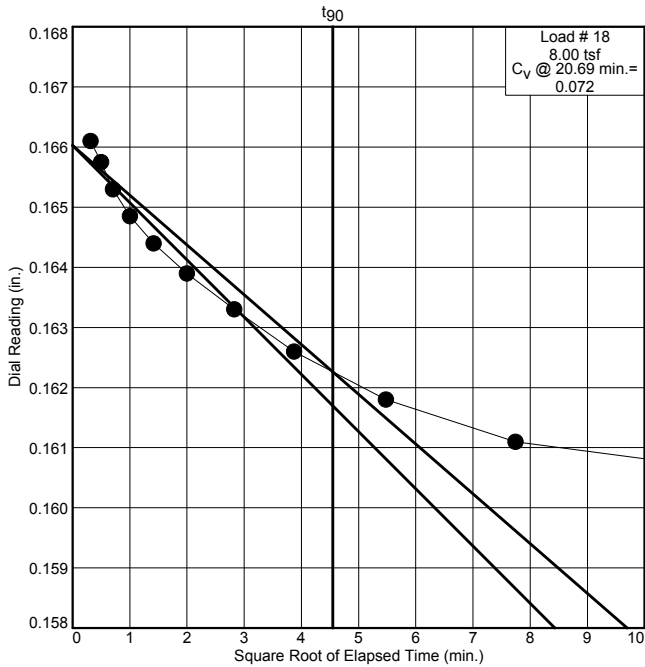
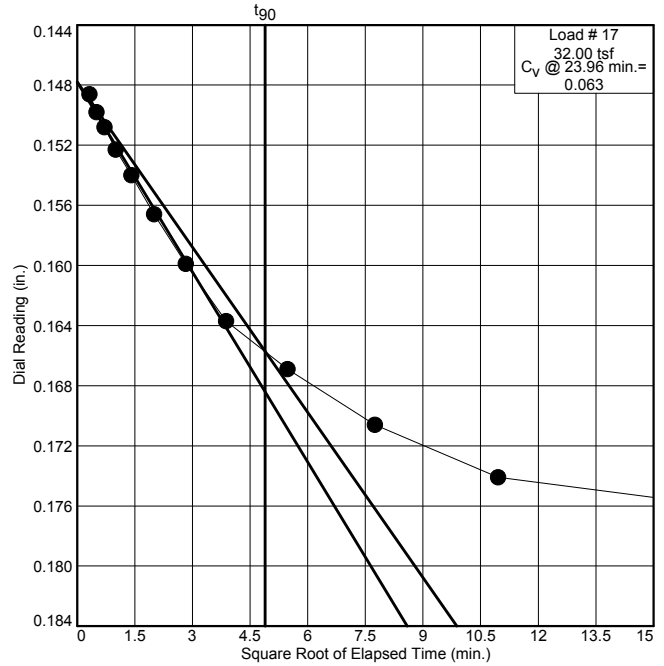
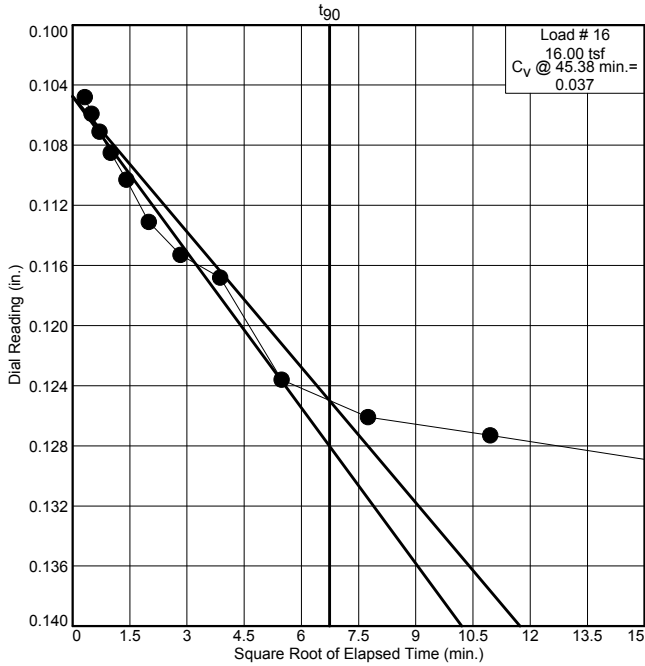
Project: Orangburg County

US 301 Five Chop Road

Source of Sample: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1



Professional Service Industries, Inc.
5021 W. W.T. Harris Blvd.
Charlotte, NC

Figure 6

CONSOLIDATION TEST DATA

2/18/2015

Client: SCDOT

Project: Orangburg County
 US 301 Five Chop Road
 Over Four Hole Swamp
 Project ID 0040308

Location: Boring B-3A

Depth: 9.00' - 11.00'

Sample Number: ST-1

Material Description: Grey Sandy Lean Clay

Liquid Limit: 35

Plasticity Index: 20

USCS: CL

AASHTO: A-6(10)

Figure No.: 01

Testing Remarks: Date Tested: 2/9/15
 Percent Finer: 63.1%

Tested by: Steven Putnam

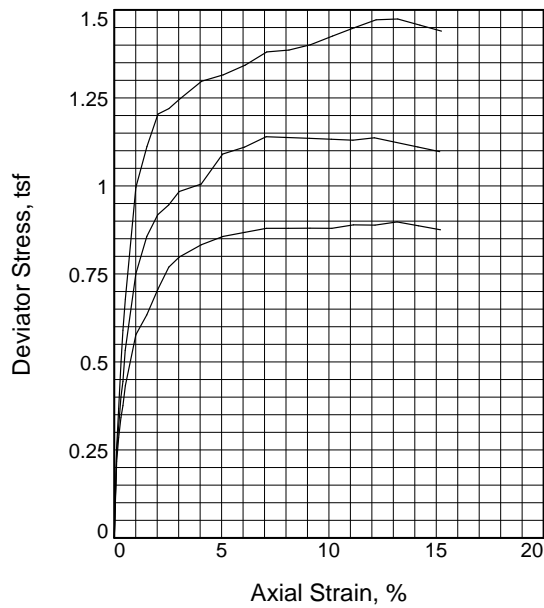
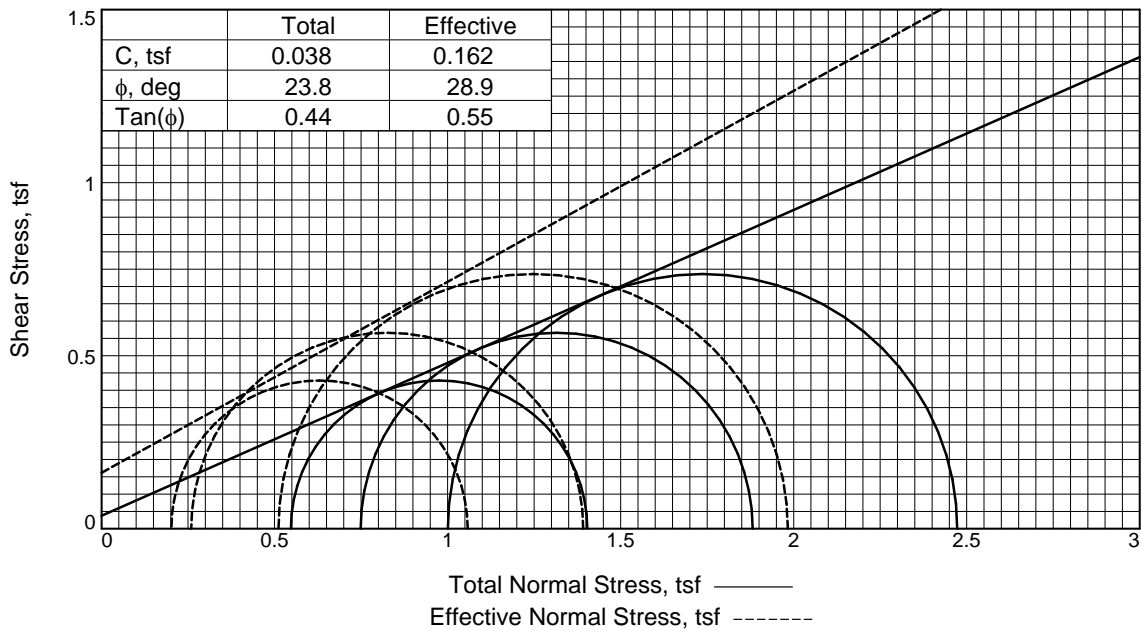
Checked by: Tom Cannarella

Test Specimen Data

NATURAL MOISTURE	VOID RATIO	AFTER TEST
Wet w+t = 210.48 g.	Spec. Gr. = 2.630	Wet w+t = 244.42 g.
Dry w+t = 190.90 g.	Est. Ht. Solids = 0.641 in.	Dry w+t = 221.56 g.
Tare Wt. = 89.43 g.	Init. V.R. = 0.560	Tare Wt. = 88.13 g.
Moisture = 19.3 %	Init. Sat. = 90.7 %	Moisture = 17.1 %
 UNIT WEIGHT	 TEST START	 Dry Wt. = 133.43 g.
Height = 1.000 in.	Height = 1.000 in.	
Diameter = 2.500 in.	Diameter = 2.500 in.	
Weight = 161.83 g.		
Dry Dens. = 105.3 pcf		

End-Of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	Deformation (in.)	C _v (ft. ² /day)	C _α	Void Ratio	% Strain
start	0.00000		0.00000			0.560	
0.05	0.00030	0.00190	-0.00161*	1.818		0.562	0.2 Swell
0.06	0.00070	0.00190	-0.00123*	2.773		0.561	0.1 Swell
0.13	0.00140	0.00000	0.00125*	5.086		0.558	0.1 Compr.
0.25	0.00420	0.00020	0.00383*	0.298		0.554	0.4 Compr.
0.50	0.00920	0.00040	0.00882*	0.932		0.546	0.9 Compr.
1.00	0.01840	0.00070	0.01639*	2.316		0.534	1.6 Compr.
2.00	0.03440	0.00100	0.03116*	0.415		0.511	3.1 Compr.
1.00	0.03360	0.00130	0.03229*	1.474		0.509	3.2 Compr.
0.50	0.02900	0.00130	0.02842*	1.241		0.515	2.8 Compr.
0.25	0.02280	0.00130	0.02285*	0.184		0.524	2.3 Compr.
0.50	0.02360	0.00190	0.02152*	1.356		0.526	2.2 Compr.
1.00	0.02860	0.00190	0.02585*	3.035		0.519	2.6 Compr.
2.00	0.03730	0.00130	0.03459*	0.374		0.506	3.5 Compr.
4.00	0.06070	0.00120	0.05287*	0.336		0.477	5.3 Compr.
8.00	0.09600	0.00150	0.08453*	0.299		0.428	8.5 Compr.



	1	2	3	
Sample No.	1	2	3	
Initial	Water Content, %	30.8	19.5	25.5
	Dry Density, pcf	91.3	109.7	97.1
	Saturation, %	101.4	103.5	97.1
	Void Ratio	0.7976	0.4961	0.6906
	Diameter, in.	2.80	2.81	2.80
	Height, in.	5.54	4.55	5.56
At Test	Water Content, %	30.8	20.1	28.4
	Dry Density, pcf	90.7	107.3	93.9
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.8109	0.5296	0.7480
	Diameter, in.	2.83	2.86	2.87
	Height, in.	5.47	4.47	5.49
Strain rate, in./min.	0.02	0.02	0.02	
Eff. Cell Pressure, psi	7.60	13.90	10.40	
Fail. Stress, tsf	0.86	1.47	1.13	
Total Pore Pr., tsf	1.43	1.57	1.57	
Strain, %	5.1	12.2	10.1	
Ult. Stress, tsf	0.86	1.47	1.13	
Total Pore Pr., tsf	1.43	1.57	1.57	
Strain, %	5.1	12.2	10.1	
$\bar{\sigma}_1$ Failure, tsf	1.06	1.98	1.39	
$\bar{\sigma}_3$ Failure, tsf	0.20	0.51	0.26	

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed Shelby Tube

Description: Grey Sandy Lean Clay

LL= 35 PL= 15 PI= 20

Specific Gravity= 2.630

Remarks: Date Tested: 2/6/15 Percent Finer: 63.2

Client: SCDOT

Project: Orangburg County
US 301 Five Chop Road

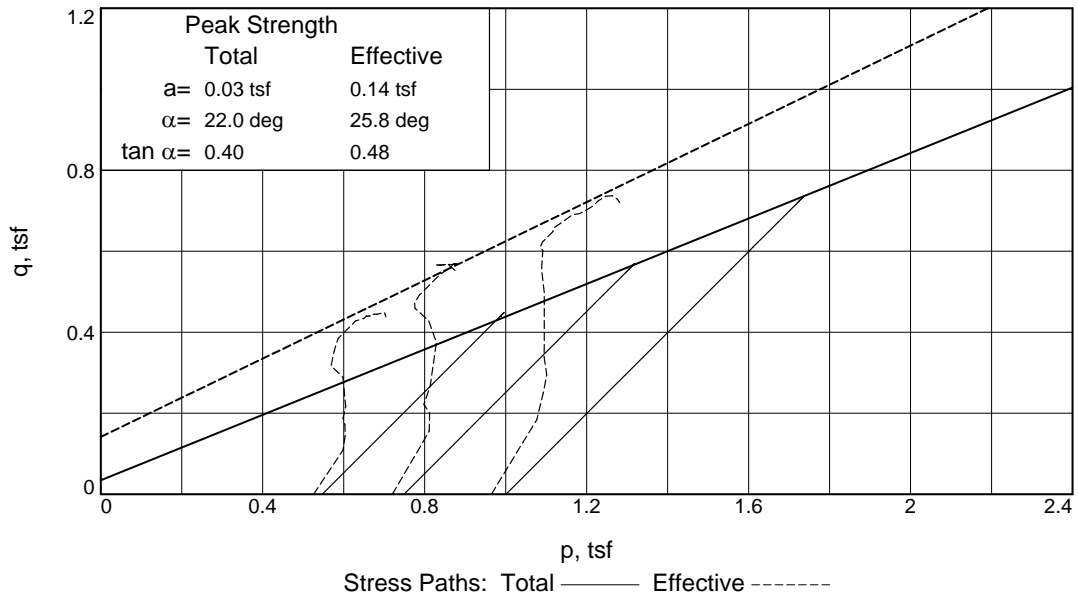
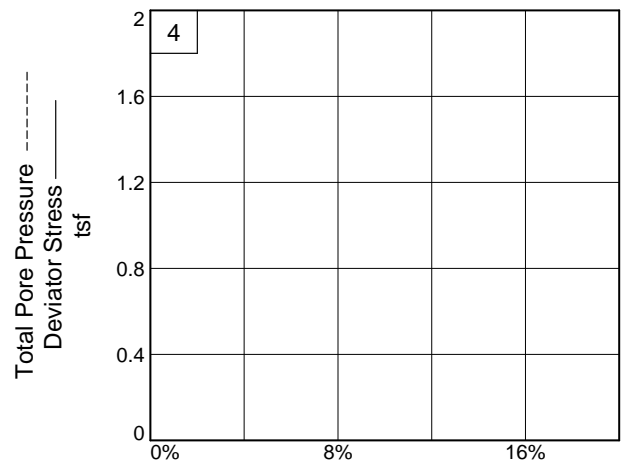
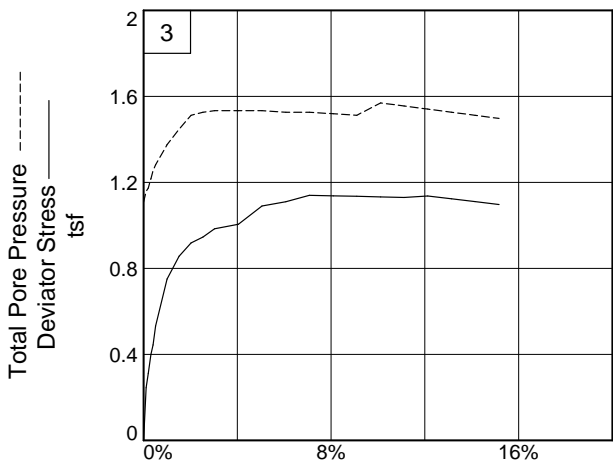
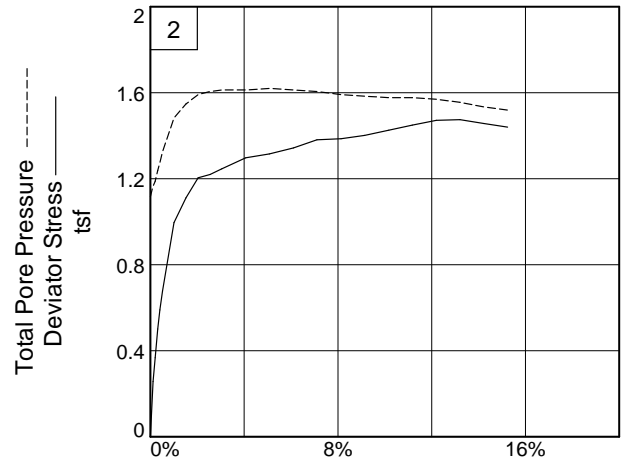
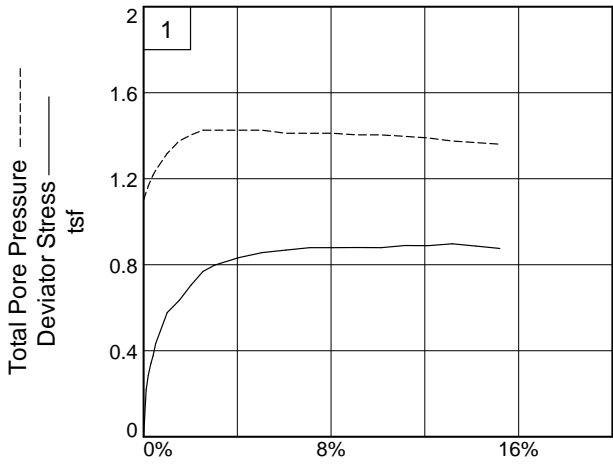
Source of Sample: Boring B-3A **Depth:** 9.00' - 11.00'

Sample Number: ST-1

Proj. No.: **Date Sampled:**

TRIAxIAL SHEAR TEST REPORT
 Professional Service Industries, Inc.
 5021 W. W.T. Harris Blvd.

Figure 01



Client: SCDOT
Project: Orangburg County
Source of Sample: Boring B-3A **Depth:** 9.00' - 11.00' **Sample Number:** ST-1
Project No.: **Figure 02** **Professional Service Industries, Inc.**

Tested By: Steven Putnam **Checked By:** Tom Cannarella

TRIAxIAL COMPRESSION TEST
CU with Pore Pressures

2/18/2015
8:27 AM

Date:
Client: SCDOT
Project: Orangburg County
US 301 Five Chop Road
Over Four Hole Swamp
Project ID 0040308

Project No.:
Location: Boring B-3A
Depth: 9.00' - 11.00' **Sample Number:** ST-1
Description: Grey Sandy Lean Clay
Remarks: Date Tested: 2/6/15 Percent Finer: 63.2
Type of Sample: Undisturbed Shelby Tube
Specific Gravity=2.630 **LL**=35 **PL**=15 **PI**=20
Test Method: ASTM D 4767 Method B w/ saturation est.

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	141.950			1158.280
Moisture content: Dry soil+tare, gms.	129.210			906.390
Moisture content: Tare, gms.	87.780			89.480
Moisture, %	30.8		30.8	30.8
Moist specimen weight, gms.	1072.6			
Diameter, in.	2.80		2.83	
Area, in. ²	6.17		6.30	
Height, in.	5.54		5.47	
Net decrease in height, in.		0.03	0.04	
Net decrease in water volume, cc.			6.00	
Wet density, pcf	119.4		118.6	
Dry density, pcf	91.3		90.7	
Void ratio	0.7976		0.8109	
Saturation, %	101.4		100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Filter paper coefficient = 0.001926 kN/cm
Filter paper coverage = 50%
Consolidation cell pressure = 22.60 psi (1.627 tsf)
Consolidation back pressure = 15.00 psi (1.080 tsf)
Consolidation effective confining stress = 0.547 tsf
Strain rate, in./min. = 0.02
Fail. Stress = 0.856 tsf at reading no. 12
Ult. Stress = 0.856 tsf at reading no. 12

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0000	0.000	0.0	0.0	0.000	0.526	0.526	1.00	15.30	0.526	0.000
1	0.0060	19.000	19.0	0.1	0.217	0.490	0.707	1.44	15.80	0.598	0.108
2	0.0110	25.000	25.0	0.2	0.285	0.461	0.746	1.62	16.20	0.603	0.143
3	0.0170	30.000	30.0	0.3	0.342	0.432	0.774	1.79	16.60	0.603	0.171
4	0.0220	33.000	33.0	0.4	0.376	0.410	0.786	1.92	16.90	0.598	0.188
5	0.0280	38.000	38.0	0.5	0.432	0.389	0.821	2.11	17.20	0.605	0.216
6	0.0550	51.000	51.0	1.0	0.577	0.310	0.887	2.86	18.30	0.598	0.289
7	0.0830	60.000	60.0	1.5	0.634	0.252	0.886	3.51	19.10	0.569	0.317
8	0.1110	68.000	68.0	2.0	0.706	0.223	0.930	4.16	19.50	0.576	0.353
9	0.1390	74.000	74.0	2.5	0.769	0.202	0.971	4.82	19.80	0.586	0.385
10	0.1660	77.000	77.0	3.0	0.798	0.202	1.000	4.96	19.80	0.601	0.399
11	0.2220	81.000	81.0	4.1	0.833	0.202	1.035	5.13	19.80	0.618	0.417
12	0.2770	84.000	84.0	5.1	0.856	0.202	1.058	5.25	19.80	0.630	0.428
13	0.3330	86.000	86.0	6.1	0.868	0.216	1.084	5.02	19.60	0.650	0.434
14	0.3880	88.000	88.0	7.1	0.879	0.216	1.095	5.07	19.60	0.656	0.440
15	0.4440	89.000	89.0	8.1	0.880	0.216	1.096	5.07	19.60	0.656	0.440
16	0.4990	90.000	90.0	9.1	0.880	0.223	1.103	4.94	19.50	0.663	0.440
17	0.5550	91.000	91.0	10.1	0.880	0.223	1.103	4.94	19.50	0.663	0.440
18	0.6100	93.000	93.0	11.1	0.889	0.230	1.120	4.86	19.40	0.675	0.445
19	0.6650	94.000	94.0	12.1	0.889	0.238	1.126	4.74	19.30	0.682	0.444
20	0.7210	96.000	96.0	13.2	0.898	0.252	1.150	4.56	19.10	0.701	0.449
21	0.7760	96.000	96.0	14.2	0.887	0.259	1.146	4.42	19.00	0.703	0.443
22	0.8320	96.000	96.0	15.2	0.875	0.266	1.142	4.29	18.90	0.704	0.438

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	140.180			1057.070
Moisture content: Dry soil+tare, gms.	131.910			894.600
Moisture content: Tare, gms.	89.540			87.780
Moisture, %	19.5		20.1	20.1
Moist specimen weight, gms.	970.9			
Diameter, in.	2.81		2.86	
Area, in. ²	6.20		6.44	
Height, in.	4.55		4.47	
Net decrease in height, in.		0.03	0.05	
Net decrease in water volume, cc.			9.90	
Wet density, pcf	131.2		129.0	
Dry density, pcf	109.7		107.3	
Void ratio	0.4961		0.5296	
Saturation, %	103.5		100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²

Membrane thickness = 0.02 cm

Filter paper coefficient = 0.001926 kN/cm

Filter paper coverage = 50%

Consolidation cell pressure = 28.90 psi (2.081 tsf)

Consolidation back pressure = 15.00 psi (1.080 tsf)

Consolidation effective confining stress = 1.001 tsf

Strain rate, in./min. = 0.02

Fail. Stress = 1.472 tsf at reading no. 19

Ult. Stress = 1.472 tsf at reading no. 19

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0000	0.000	0.0	0.0	0.000	0.965	0.965	1.00	15.50	0.965	0.000
1	0.0050	23.000	23.0	0.1	0.257	0.914	1.171	1.28	16.20	1.043	0.128
2	0.0090	33.000	33.0	0.2	0.368	0.893	1.261	1.41	16.50	1.077	0.184
3	0.0140	45.000	45.0	0.3	0.501	0.842	1.344	1.60	17.20	1.093	0.251
4	0.0180	53.000	53.0	0.4	0.590	0.806	1.396	1.73	17.70	1.101	0.295
5	0.0230	61.000	61.0	0.5	0.678	0.756	1.434	1.90	18.40	1.095	0.339
6	0.0450	90.000	90.0	1.0	0.996	0.598	1.593	2.67	20.60	1.095	0.498
7	0.0680	101.000	101.0	1.5	1.112	0.533	1.644	3.09	21.50	1.089	0.556
8	0.0910	110.000	110.0	2.0	1.204	0.490	1.694	3.46	22.10	1.092	0.602
9	0.1140	112.000	112.0	2.5	1.220	0.475	1.695	3.57	22.30	1.085	0.610
10	0.1360	115.000	115.0	3.0	1.246	0.468	1.714	3.66	22.40	1.091	0.623
11	0.1820	121.000	121.0	4.1	1.297	0.468	1.765	3.77	22.40	1.117	0.649
12	0.2270	124.000	124.0	5.1	1.316	0.461	1.776	3.85	22.50	1.119	0.658
13	0.2730	128.000	128.0	6.1	1.343	0.468	1.811	3.87	22.40	1.140	0.672
14	0.3180	133.000	133.0	7.1	1.381	0.475	1.856	3.91	22.30	1.166	0.690
15	0.3640	135.000	135.0	8.1	1.386	0.490	1.876	3.83	22.10	1.183	0.693
16	0.4090	138.000	138.0	9.1	1.401	0.497	1.898	3.82	22.00	1.197	0.701
17	0.4550	142.000	142.0	10.2	1.426	0.504	1.930	3.83	21.90	1.217	0.713
18	0.5000	146.000	146.0	11.2	1.449	0.504	1.953	3.88	21.90	1.229	0.725
19	0.5460	150.000	150.0	12.2	1.472	0.511	1.983	3.88	21.80	1.247	0.736
20	0.5910	152.000	152.0	13.2	1.474	0.526	2.000	3.81	21.60	1.263	0.737

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
21	0.6370	152.000	152.0	14.2	1.457	0.547	2.004	3.66	21.30	1.276	0.728
22	0.6820	152.000	152.0	15.2	1.440	0.562	2.001	3.56	21.10	1.282	0.720

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	140.250			1183.750
Moisture content: Dry soil+tare, gms.	129.760			941.260
Moisture content: Tare, gms.	88.620			88.630
Moisture, %	25.5		28.4	28.4
Moist specimen weight, gms.	1096.3			
Diameter, in.	2.80		2.87	
Area, in. ²	6.17		6.46	
Height, in.	5.56		5.49	
Net decrease in height, in.		0.02	0.05	
Net decrease in water volume, cc.			8.10	
Wet density, pcf	121.9		120.6	
Dry density, pcf	97.1		93.9	
Void ratio	0.6906		0.7480	
Saturation, %	97.1		100.0	

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²

Membrane thickness = 0.02 cm

Filter paper coefficient = 0.001926 kN/cm

Filter paper coverage = 50%

Consolidation cell pressure = 25.40 psi (1.829 tsf)

Consolidation back pressure = 15.00 psi (1.080 tsf)

Consolidation effective confining stress = 0.749 tsf

Strain rate, in./min. = 0.02

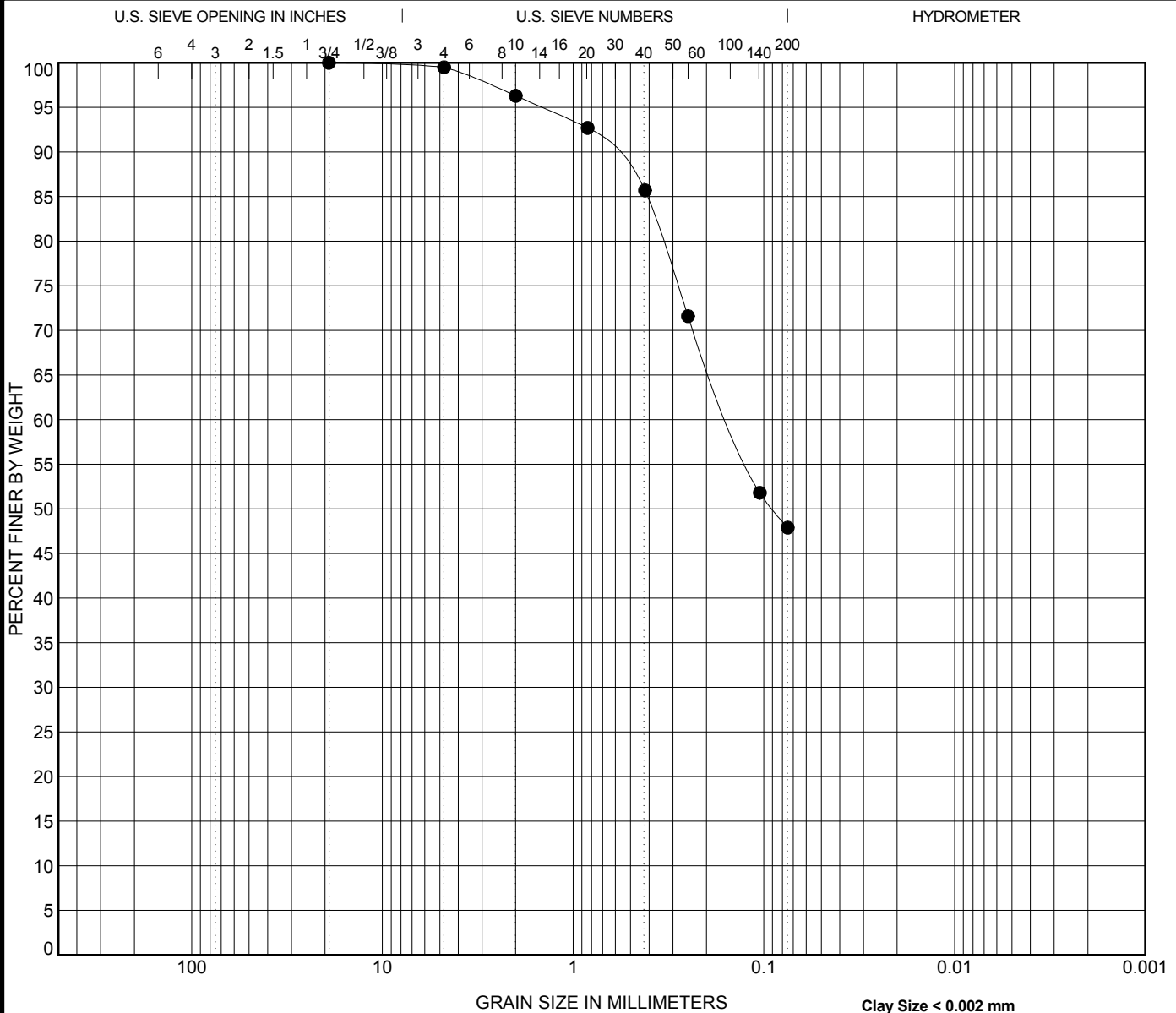
Fail. Stress = 1.133 tsf at reading no. 17

Ult. Stress = 1.133 tsf at reading no. 17

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0000	0.000	0.0	0.0	0.000	0.720	0.720	1.00	15.40	0.720	0.000
1	0.0060	22.000	22.0	0.1	0.245	0.670	0.915	1.37	16.10	0.792	0.123
2	0.0110	28.000	28.0	0.2	0.312	0.655	0.967	1.48	16.30	0.811	0.156
3	0.0170	36.000	36.0	0.3	0.400	0.612	1.012	1.65	16.90	0.812	0.200
4	0.0220	40.000	40.0	0.4	0.444	0.576	1.020	1.77	17.40	0.798	0.222
5	0.0280	48.000	48.0	0.5	0.533	0.547	1.080	1.97	17.80	0.813	0.266
6	0.0550	68.000	68.0	1.0	0.751	0.454	1.204	2.65	19.10	0.829	0.375
7	0.0830	78.000	78.0	1.5	0.857	0.382	1.238	3.24	20.10	0.810	0.428
8	0.1110	89.000	89.0	2.0	0.918	0.317	1.235	3.90	21.00	0.776	0.459
9	0.1390	92.000	92.0	2.5	0.946	0.302	1.248	4.13	21.20	0.775	0.473
10	0.1660	96.000	96.0	3.0	0.984	0.295	1.279	4.33	21.30	0.787	0.492
11	0.2220	99.000	99.0	4.0	1.005	0.295	1.301	4.41	21.30	0.798	0.503
12	0.2770	103.000	103.0	5.0	1.091	0.295	1.386	4.69	21.30	0.840	0.545
13	0.3330	106.000	106.0	6.1	1.110	0.302	1.413	4.67	21.20	0.858	0.555
14	0.3880	110.000	110.0	7.1	1.140	0.302	1.442	4.77	21.20	0.872	0.570

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
15	0.4440	111.000	111.0	8.1	1.138	0.310	1.447	4.67	21.10	0.878	0.569
16	0.4990	112.000	112.0	9.1	1.135	0.317	1.452	4.58	21.00	0.884	0.568
17	0.5550	113.000	113.0	10.1	1.133	0.259	1.392	5.37	21.80	0.826	0.566
18	0.6100	114.000	114.0	11.1	1.130	0.274	1.403	5.13	21.60	0.839	0.565
19	0.6650	116.000	116.0	12.1	1.137	0.288	1.425	4.95	21.40	0.856	0.568
20	0.7210	116.000	116.0	13.1	1.124	0.302	1.426	4.72	21.20	0.864	0.562
21	0.7760	116.000	116.0	14.1	1.111	0.317	1.427	4.51	21.00	0.872	0.555
22	0.8320	116.000	116.0	15.2	1.097	0.331	1.429	4.31	20.80	0.880	0.549



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-5A SS-7 31.2	Very dense to dense green gray fine grained Silty SAND (SM)					29	23	6		

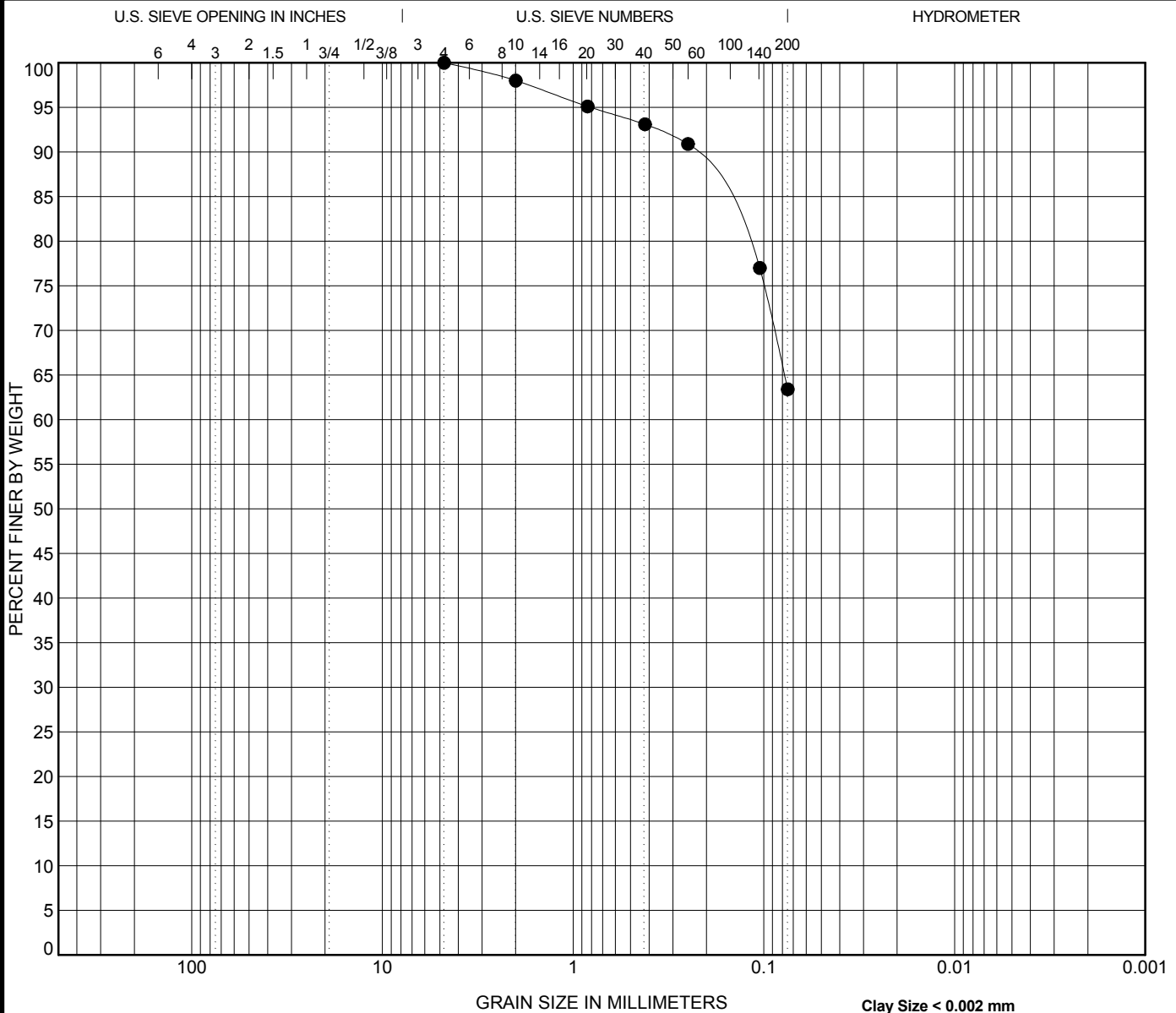
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-7 31.2	19.1	0.15			0.5	51.6	47.9	



Professional Service Industries, Inc.
 534 St. Andrews Road, Suite C
 Columbia, SC 29210
 Telephone: (803) 776-6050
 Fax: (803) 772-2803

GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-9 41.2	Very stiff to very hard green gray Sandy SILT (ML)	32	28	4		

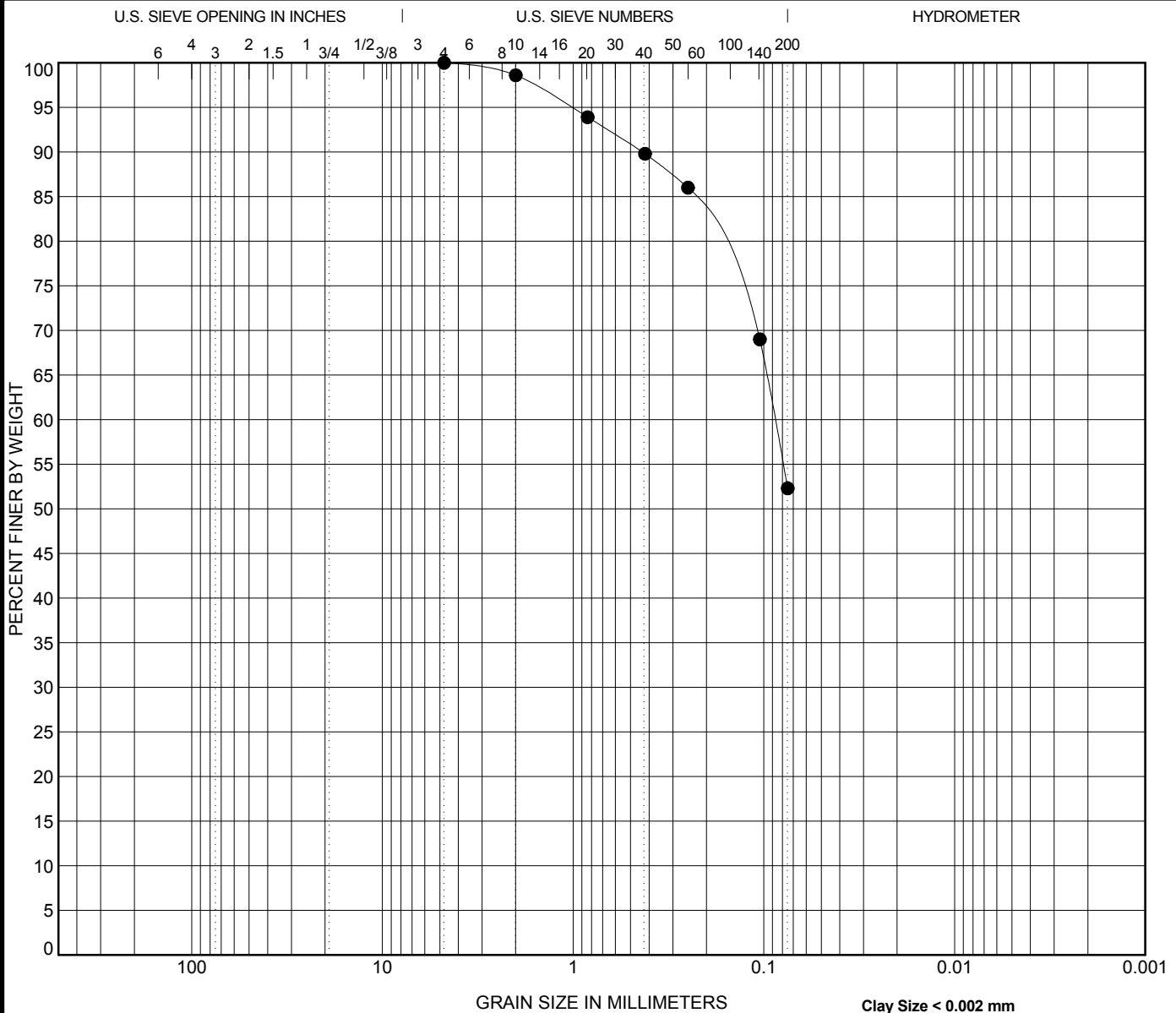
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-9 41.2	4.75				0.0	36.6	63.4	



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 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-11 51.2	Very stiff to very hard green gray Sandy SILT (ML)	28	25	3		

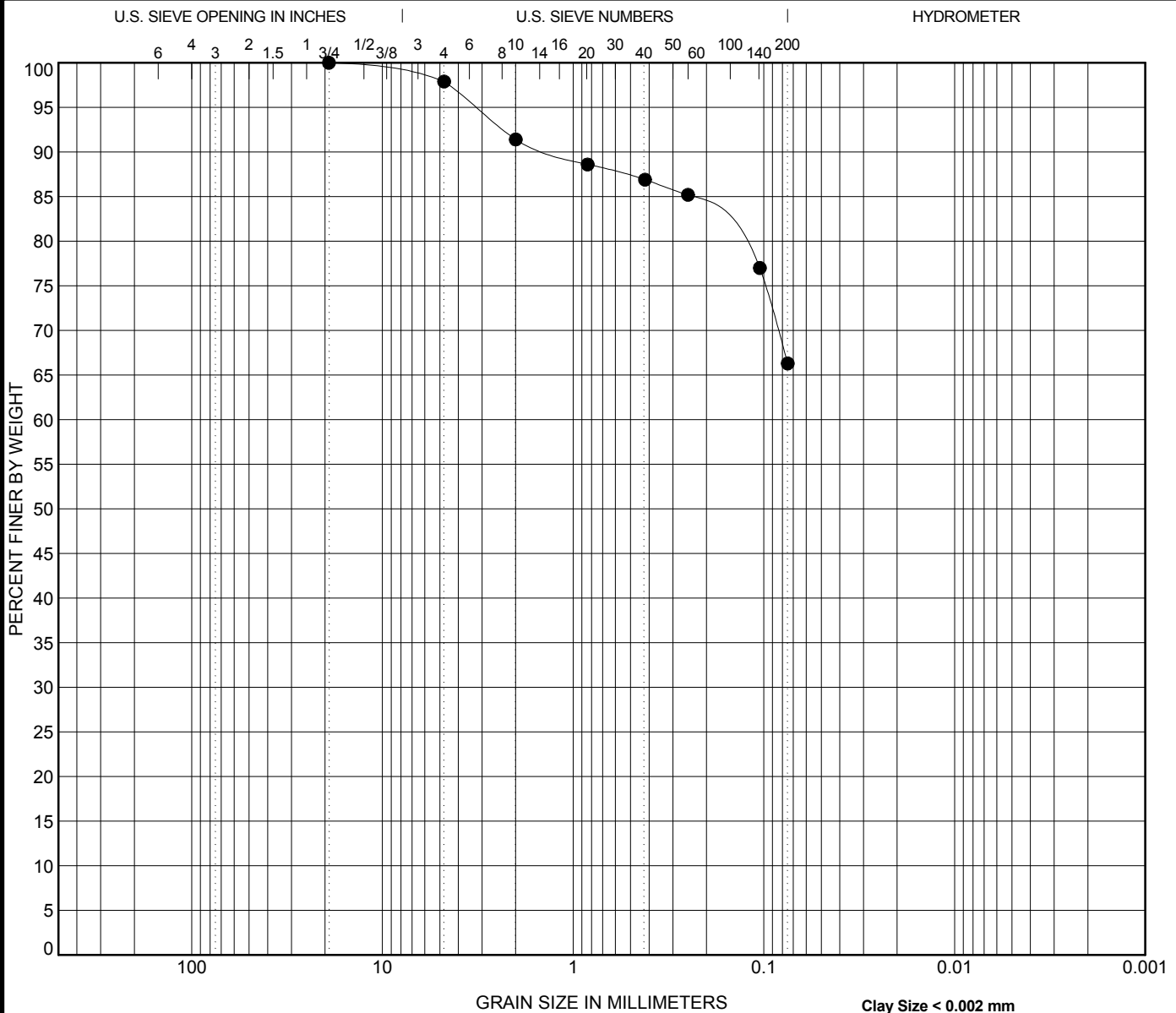
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-11 51.2	4.75	0.088			0.0	47.7	52.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-13 61.2	Very stiff to very hard green gray Sandy SILT (ML)	35	30	5		

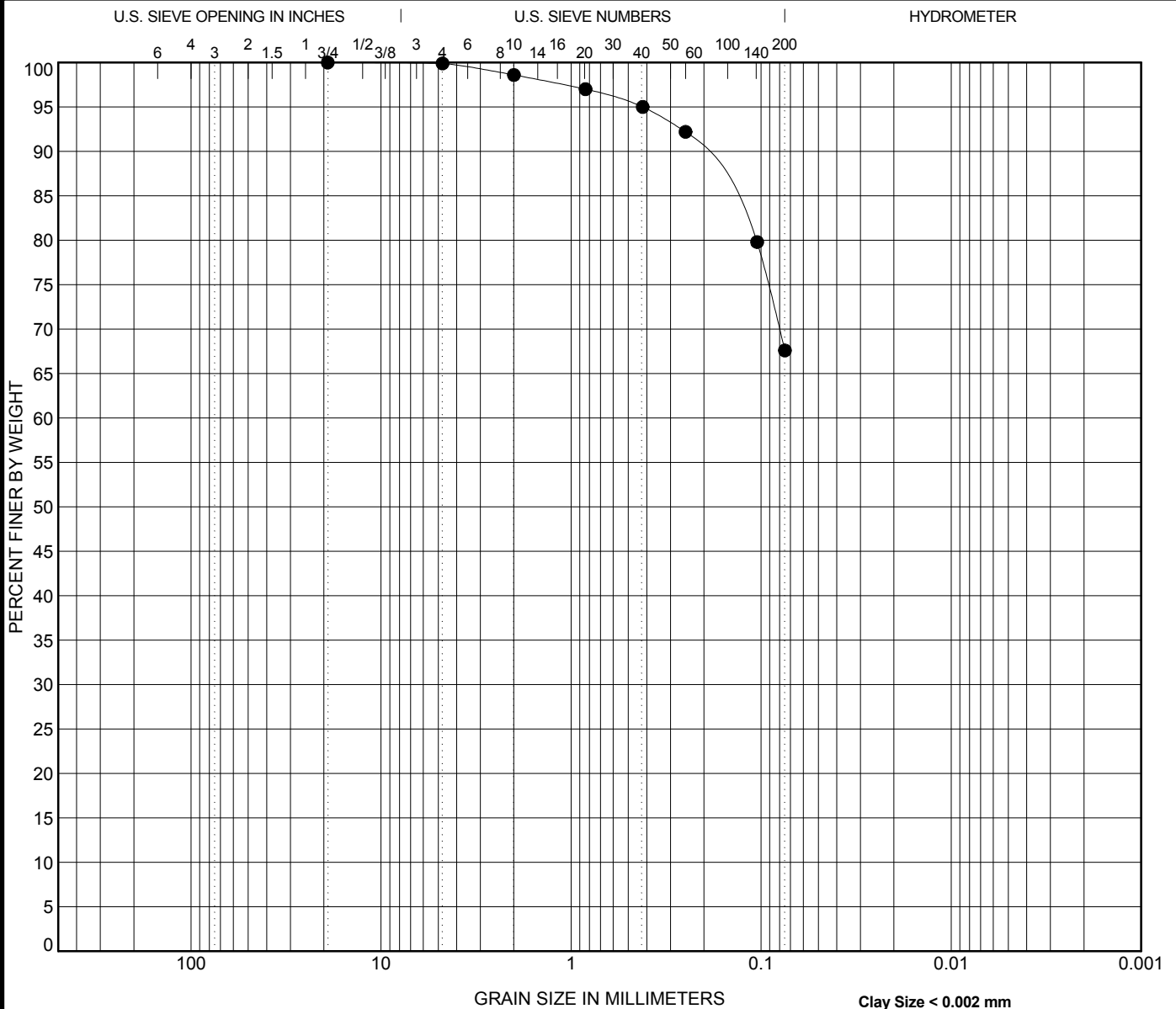
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-13 61.2	19.1				2.1	31.6	66.3	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-16 72.7	Very stiff to very hard green gray Sandy SILT (ML)	34	28	6		

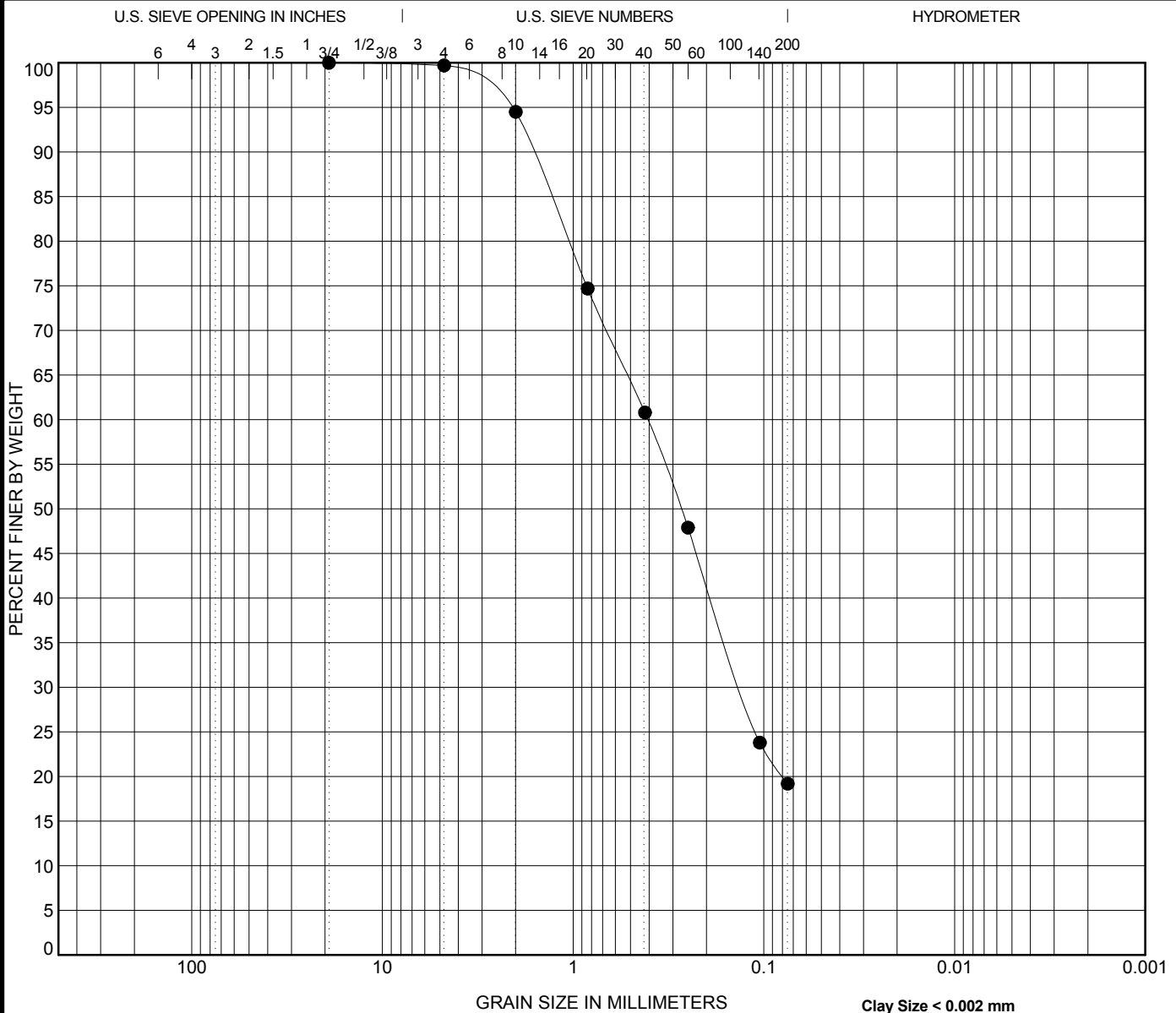
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-16 72.7	19.1				0.1	32.3	67.6	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-24 88.7	Dense dark green fine to medium grained Silty SAND (SM)	NP	NP	NP		

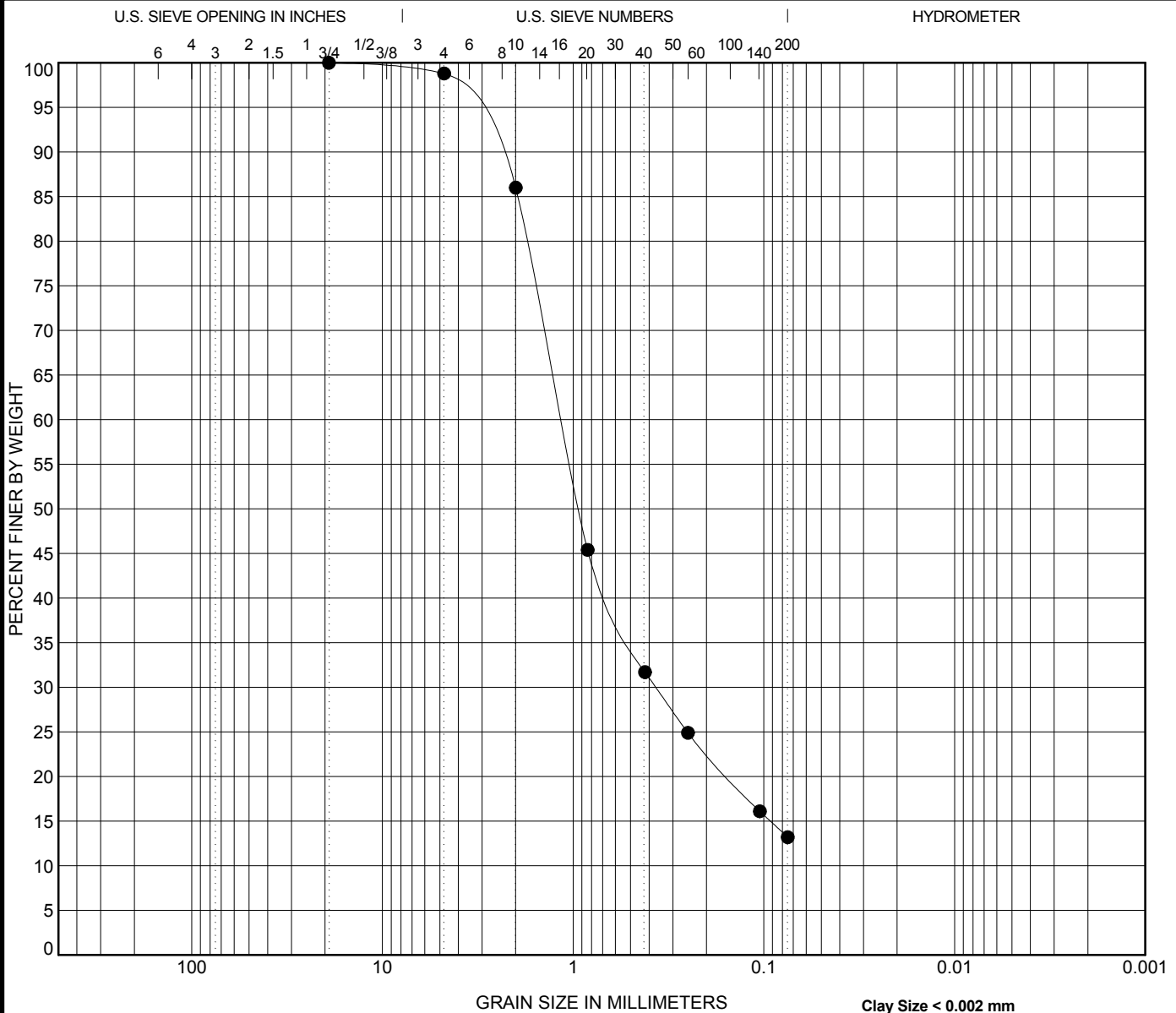
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-24 88.7	19.1	0.407	0.131		0.3	80.5	19.2	



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Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-5A SS-26 96.2	Very dense gray fine to coarse grained Clayey SAND (SC)	61	17	44		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5A SS-26 96.2	19.1	1.148	0.369		1.2	85.6	13.2	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Material Test Report

Report No: MAT:0451644-1-S3

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

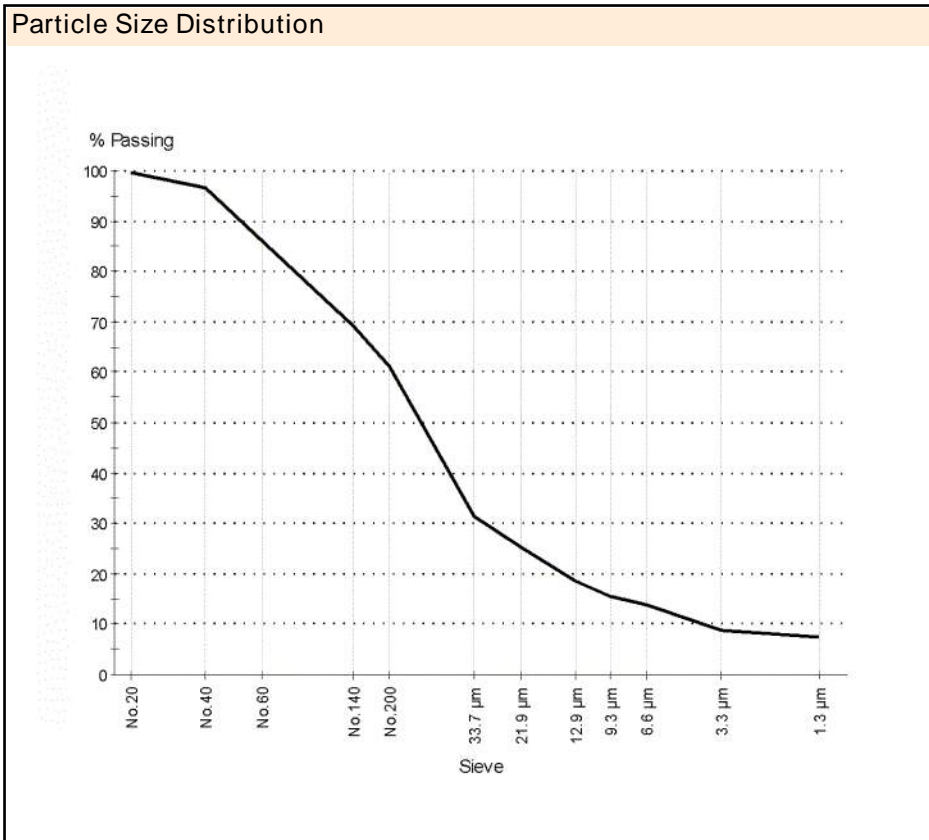
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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S3
Client Sample ID:
Date Sampled: 12/05/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Black Sandy Fat CLAY (CH)
Sampling Method: (none)
General Location: Boring #5A SS-30
Location: 116.2' - 117.7'

Sample Description:



Grading: ASTM D 422

Drying by: Oven
Date Tested:

Sieve Size	% Passing	Limits
No.20 (850µm)	99	
No.40 (425µm)	97	
No.60 (250µm)	86	
No.140 (106µm)	69	
No.200 (75µm)	61	
33.7 µm	31.5	
21.9 µm	25.2	
12.9 µm	18.7	
9.3 µm	15.4	
6.6 µm	13.8	
3.3 µm	8.9	
1.3 µm	7.6	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (3.5%)	Fine (35.4%)	Silt (49.7%)	Clay (11.4%)

D85: 0.2359 D60: 0.0728 D50: 0.0556
D30: 0.0304 D15: 0.0085 D10: 0.0039
Cu: 18.88 Cc: 3.30



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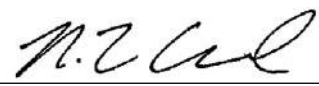
Material Test Report

Report No: MAT:0451644-1-S3
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S3
Client Sample ID:
Date Sampled: 12/05/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

Supplier:
Source:
Material: Black Sandy Fat CLAY (CH)
Sampling Method: (none)
General Location: Boring #5A SS-30
Location: 116.2' - 117.7'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



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Material Test Report

Report No: MAT:0451644-1-S4
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

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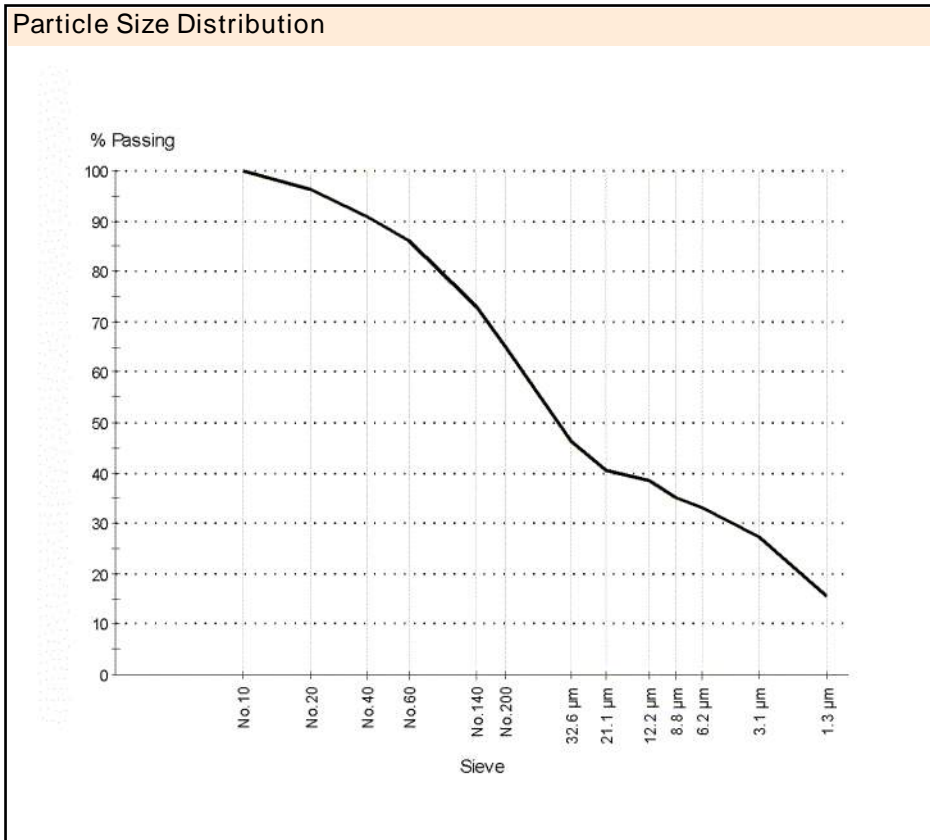
[Signature]

Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S4
Client Sample ID:
Date Sampled: 12/05/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Black Sandy Elastic SILT (MH)
Sampling Method: (none)
General Location: Boring #5A SS-33
Location: 131.2' - 132.7'

Sample Description:



Grading: ASTM D 422

Drying by: Oven
Date Tested:

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	96	
No.40 (425µm)	91	
No.60 (250µm)	86	
No.140 (106µm)	73	
No.200 (75µm)	65	
32.6 µm	46.4	
21.1 µm	40.7	
12.2 µm	38.6	
8.8 µm	35.0	
6.2 µm	33.2	
3.1 µm	27.5	
1.3 µm	15.7	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (9.2%)	Fine (25.8%)	Silt (34.1%)	Clay (31.0%)

D85: 0.2320 D60: 0.0599 D50: 0.0383
D30: 0.0042 D15: N/A D10: N/A



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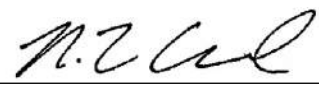
Material Test Report

Report No: MAT:0451644-1-S4
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S4
Client Sample ID:
Date Sampled: 12/05/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

Supplier:
Source:
Material: Black Sandy Elastic SILT (MH)
Sampling Method: (none)
General Location: Boring #5A SS-33
Location: 131.2' - 132.7'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



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Fax: 770-923-8973

Web: www.test-llc.com



Tested By

AV

Date

01/07/15

Checked By

LB

Client Pr. #	0451644	Lab. PR. #	1541-01-1
Pr. Name	SCDOT US 301 Five Chop Rd - Orangeburg	S. Type	Bulk
Sample ID	19244/B-5A SS-8/SS-9/SS-10	Depth/Elev.	36.2-47.7'
Location	-	Add. Info	-

ASTM G 57/G187/AASHTO T 288

Standard Test Method for Determining Minimum Laboratory Soil Resistivity

Determination of Resistivity at as-received moisture content

As-received Moisture Content

Mass of Wet Sample & Tare, g	
Mass of Dry Sample & Tare, g	
Mass of Tare, g	
Moisture Content, %	NA

Remarks

TEST DATA

Mass of Soil Box, g	-	Meter Dial Reading, ohms	-
Mass of Soil Box + Soil, g	-	Reading of Meter Range Multiplier	-
Mass of Soil, g	-	Measured Resistance, ohms	-
Calibrated Volume of Soil Box, ft ³	0.0027	Calibrated Soil Box Multiplier, cm	1.0
Wet Density of as-placed Soil, pcf	-		
Dry Density of as-placed Soil, pcf	-		
Reported Soil Resistivity, ohms-cm		NA	

Determination of Minimum Soil Resistivity

TEST DATA

Trials at Various Moisture Content

TRIAL #	1	2	3	4	5	6	7	8	9
Meter Dial Reading, ohms	3.00	2.00	1.80	1.80					
Reading of Meter Range Multiplier	1000	1000	1000	1000					
Measured Resistance, ohms	3000	2000	1800	1800					
Calibrated Soil Box Multiplier, cm	1.0	1.0	1.0	1.0					
Measured Resistivity, ohms-cm	3000	2000	1800	1800					

Reported Soil Minimum Resistivity, ohms-cm

1800

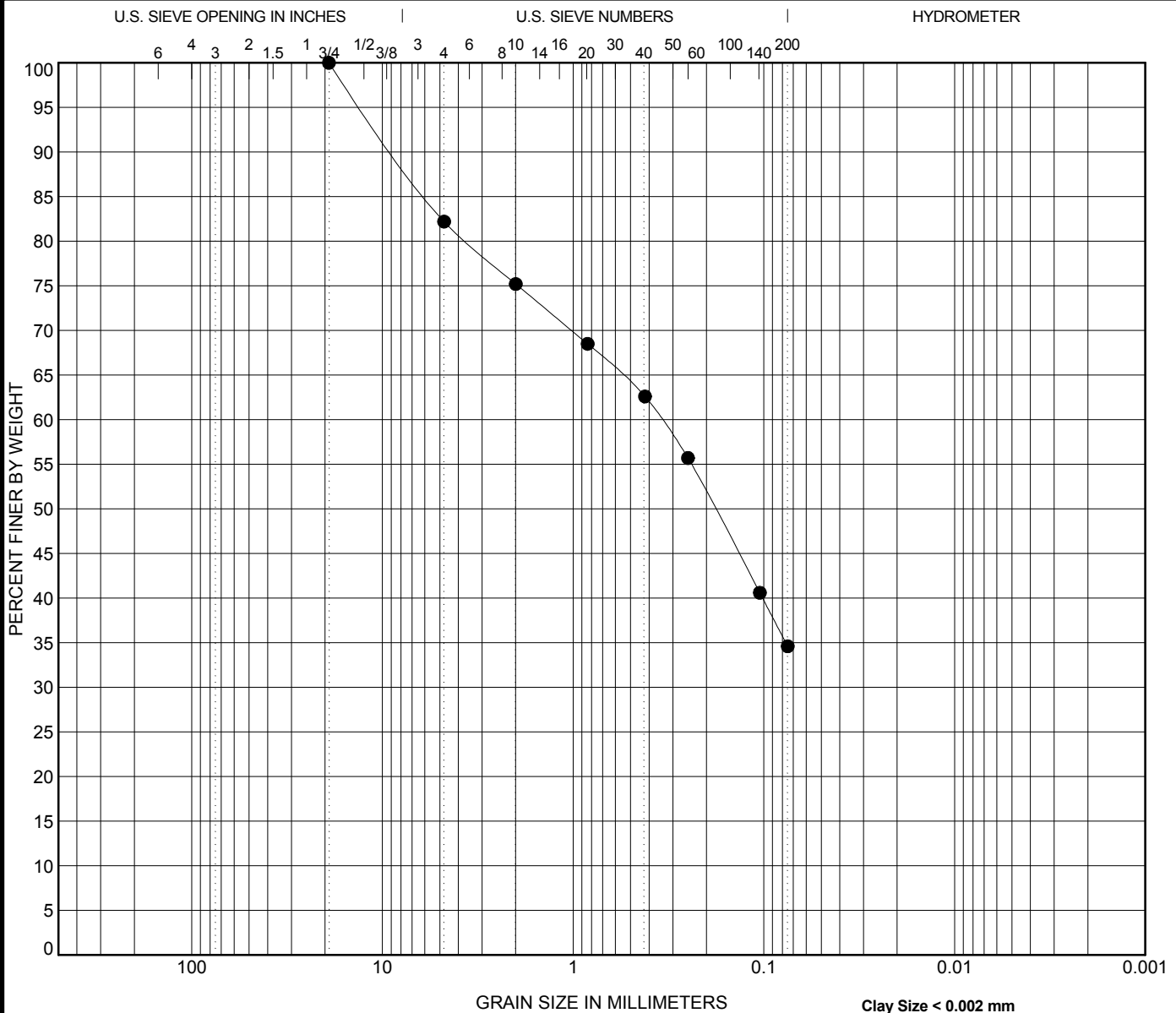
Note: Material passed # 10 sieve used for testing

Oven ID #	12/13/14/15
Balance ID #	1/2/6
Soil Box ID #	112
Resistivity Meter ID #	111/396

Description

NA

USCS (D2487; D2488)	NA
AASHTO (M145)	NA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-6A SS-8 35.2	Very dense green gray fine grained Silty SAND (SM)					24	22	2		

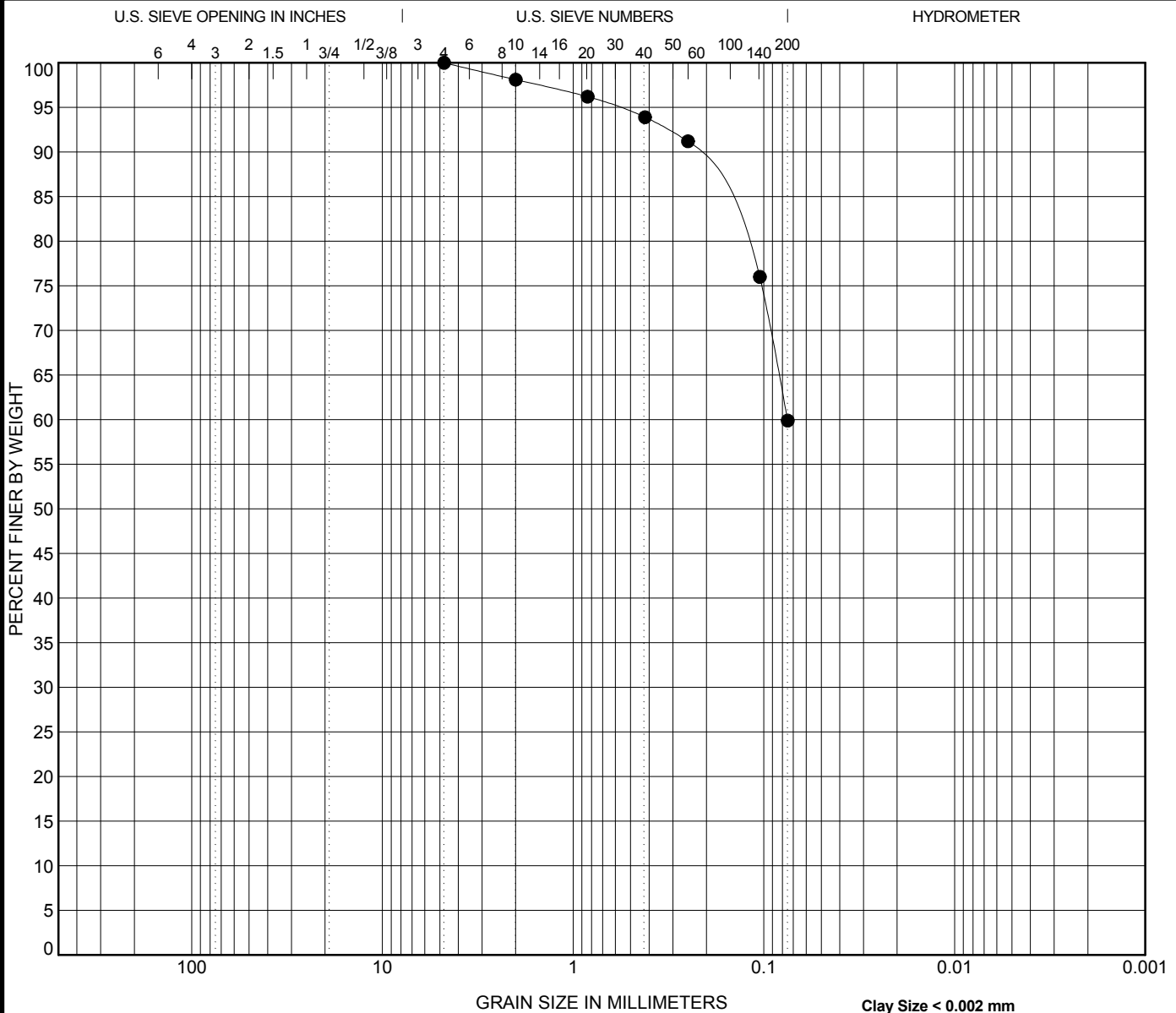
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-8 35.2	19.1	0.345			17.8	47.6	34.6	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-6A SS-11 50.2	Very stiff to very hard green gray Sandy SILT (ML)	31	28	3		

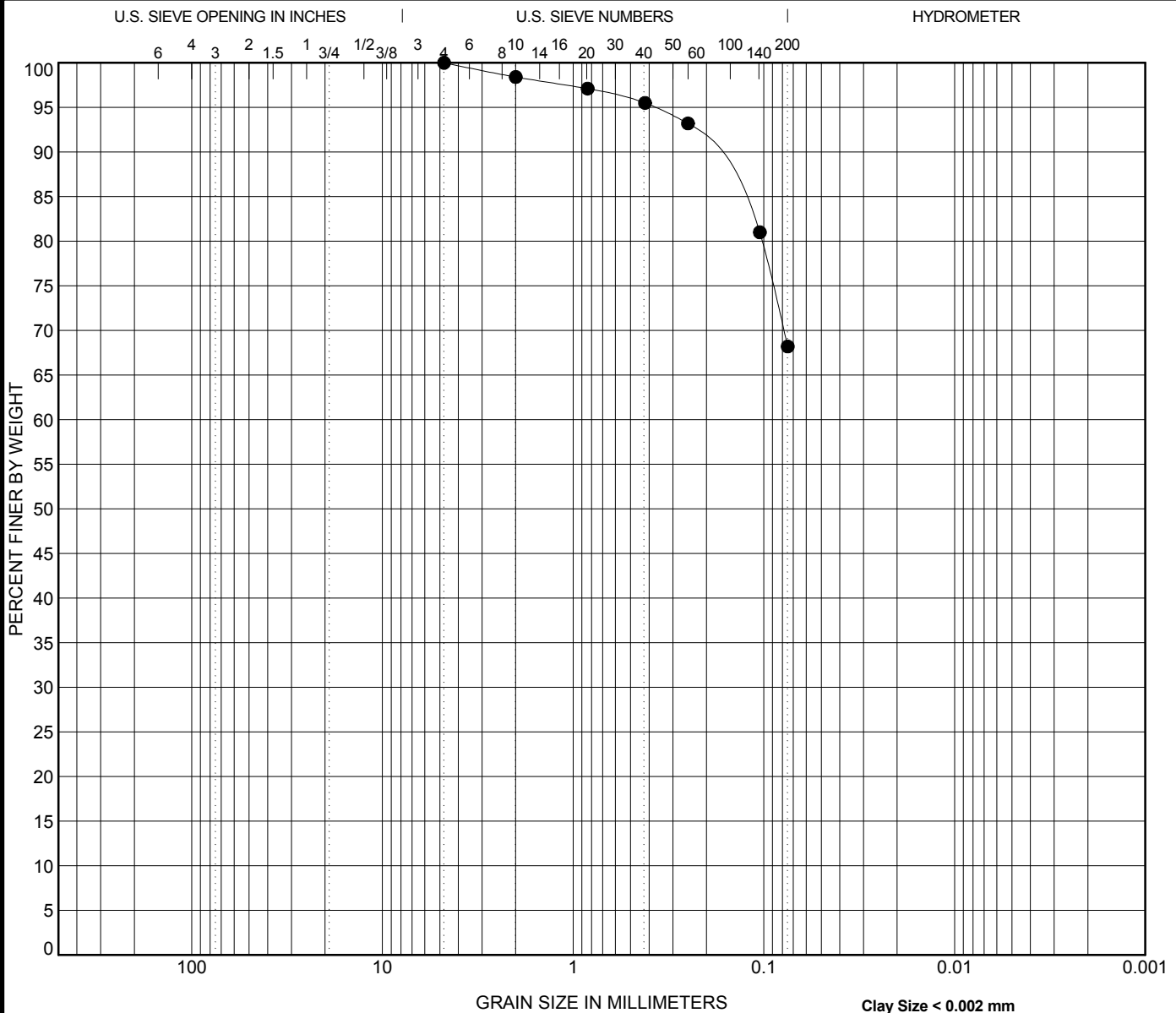
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-11 50.2	4.75	0.075			0.0	40.1	59.9	



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GRAIN SIZE DISTRIBUTION

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 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-6A SS-12 55.2	Very stiff to very hard green gray Sandy SILT (ML)	32	31	1		

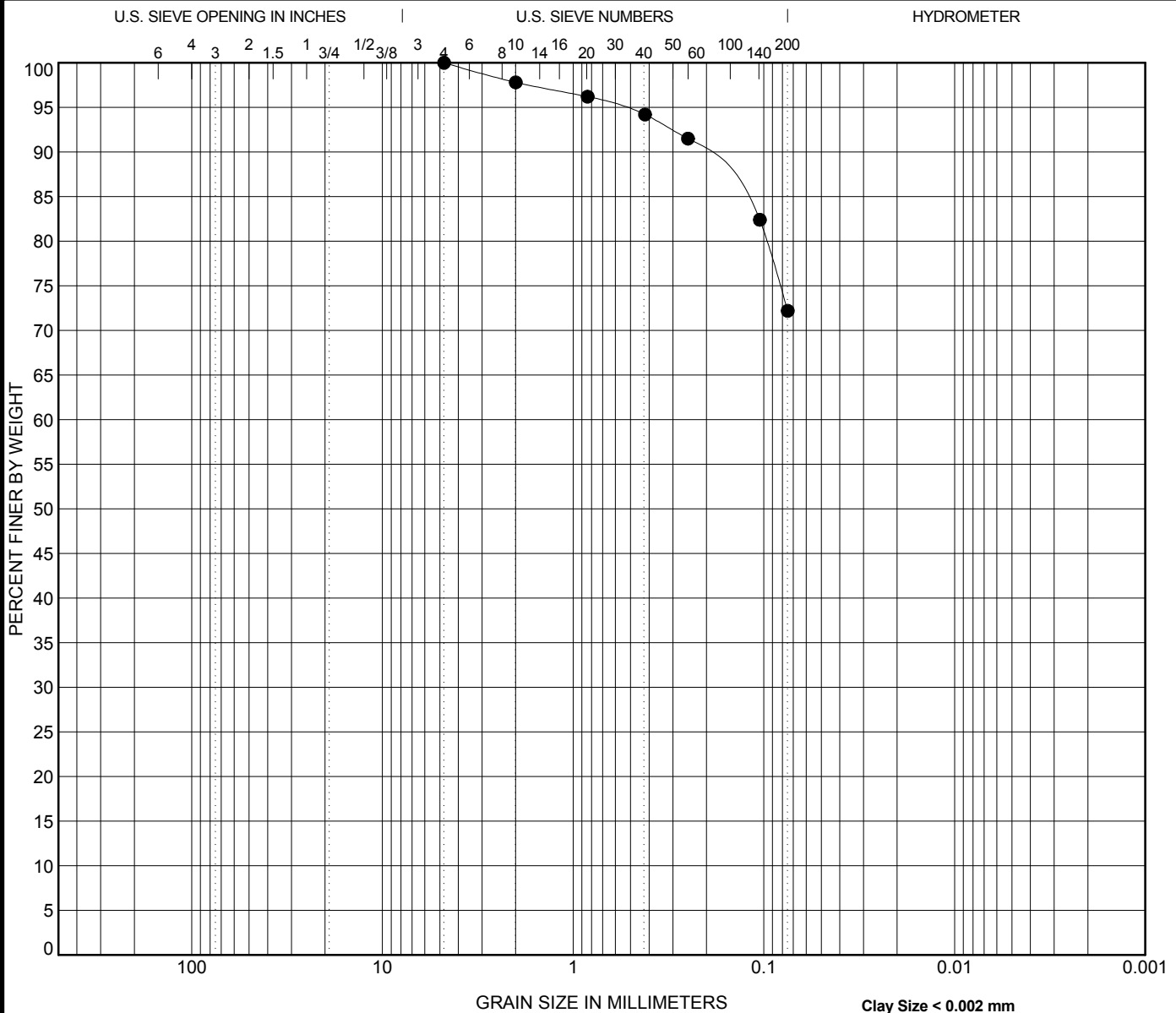
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-12 55.2	4.75				0.0	31.8	68.2	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-6A SS-15 70.2	Hard to very hard green gray SILT with sand (ML)	38	29	9		

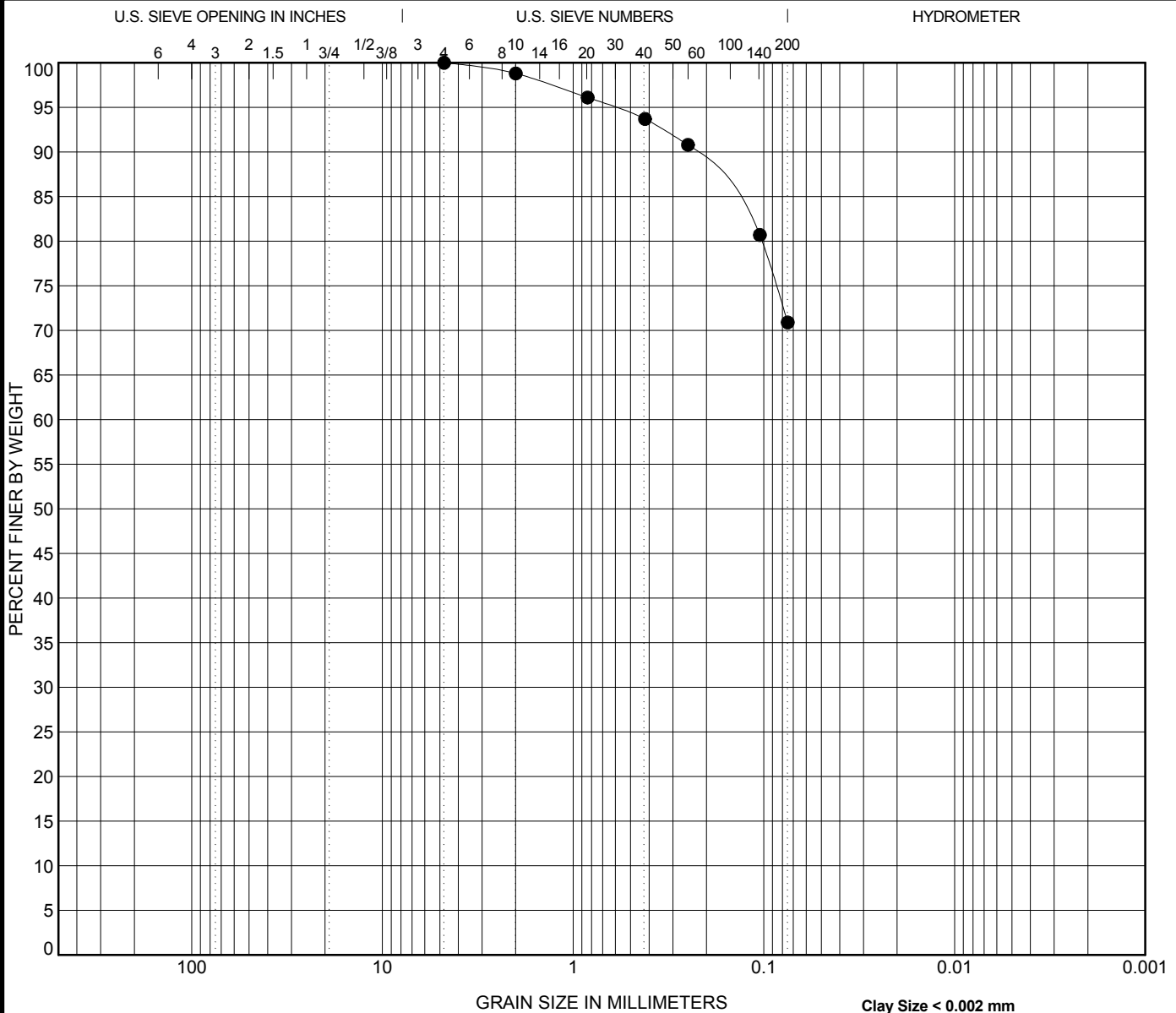
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-15 70.2	4.75				0.0	27.8	72.2	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-6A SS-19 77.7	Hard to very hard green gray SILT with sand (ML)	35	23	12		

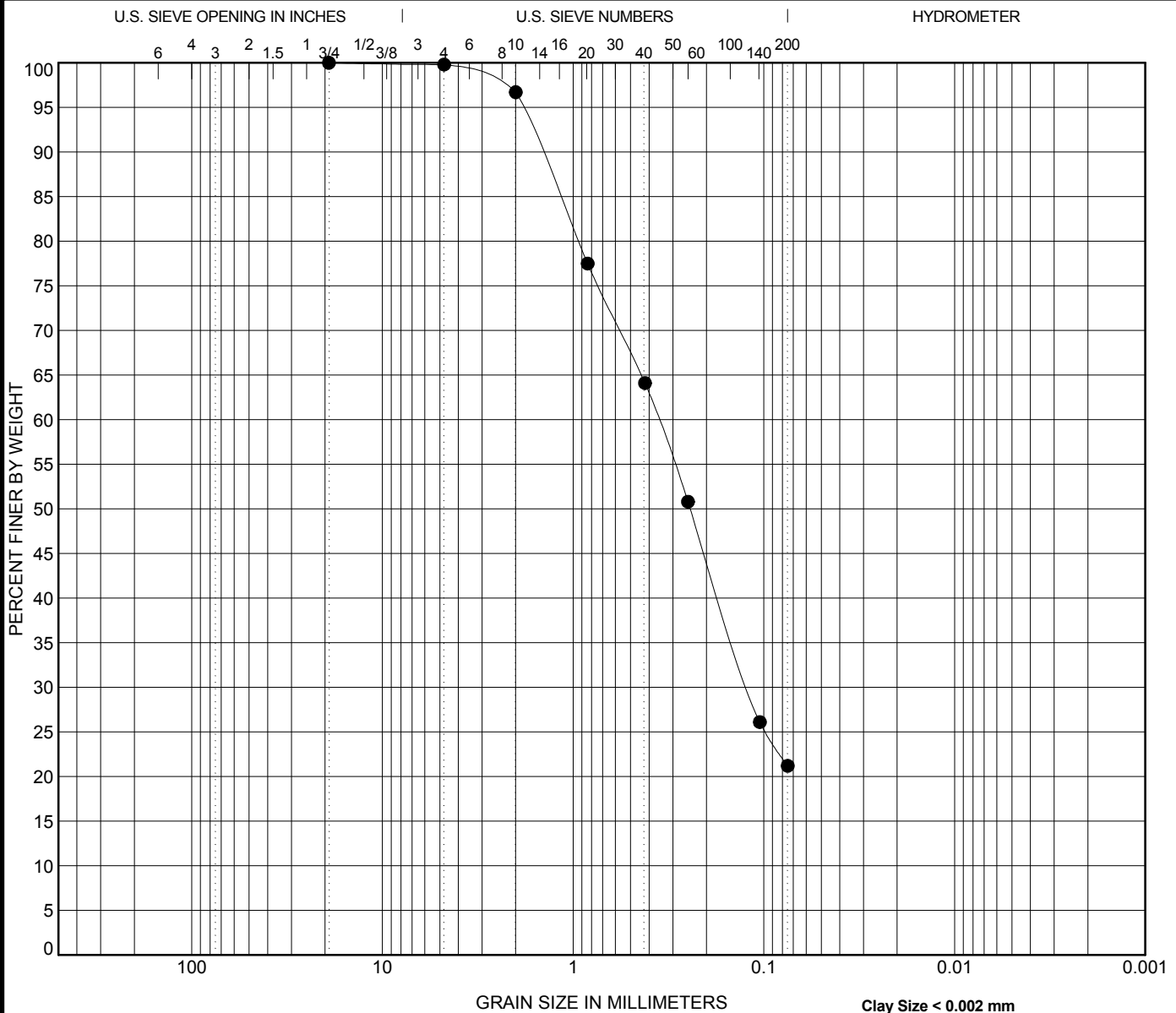
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-19 77.7	4.75				0.0	29.1	70.9	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-6A SS-25 89.7	Medium dense dark green fine to medium grained Clayey SAND (SC)					49	22	27		

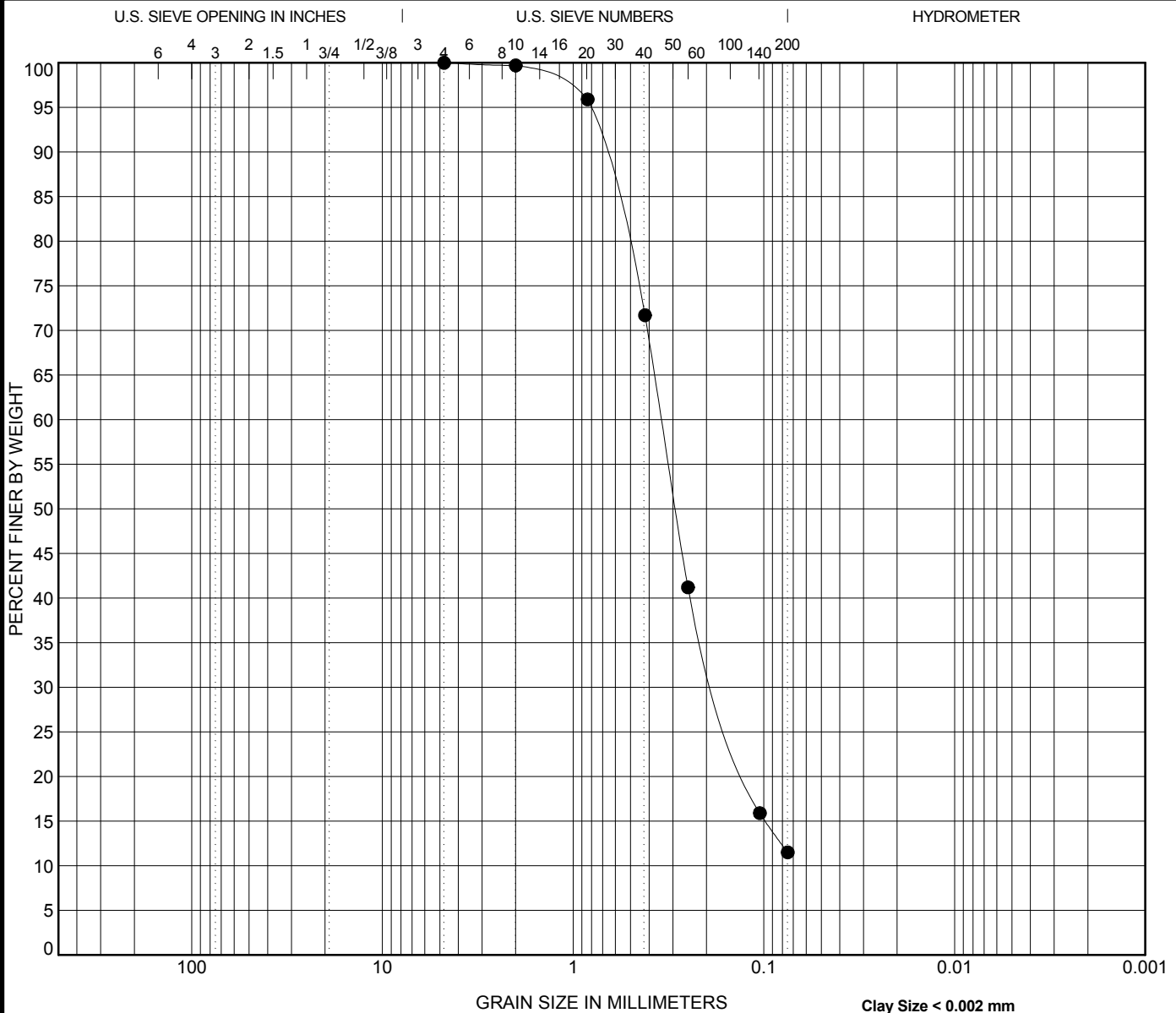
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-25 89.7	19.1	0.358	0.12		0.2	78.6	21.2	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-6A SS-28 105.2	Very dense gray & black f-m poorly graded SAND w/silt (SP-SM)	NP	NP	NP	1.26	5.15

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-28 105.2	4.75	0.344	0.17		0.0	88.5	11.5	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Phone: (803) 776-6050
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Material Test Report

Report No: MAT:0451644-1-S5

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

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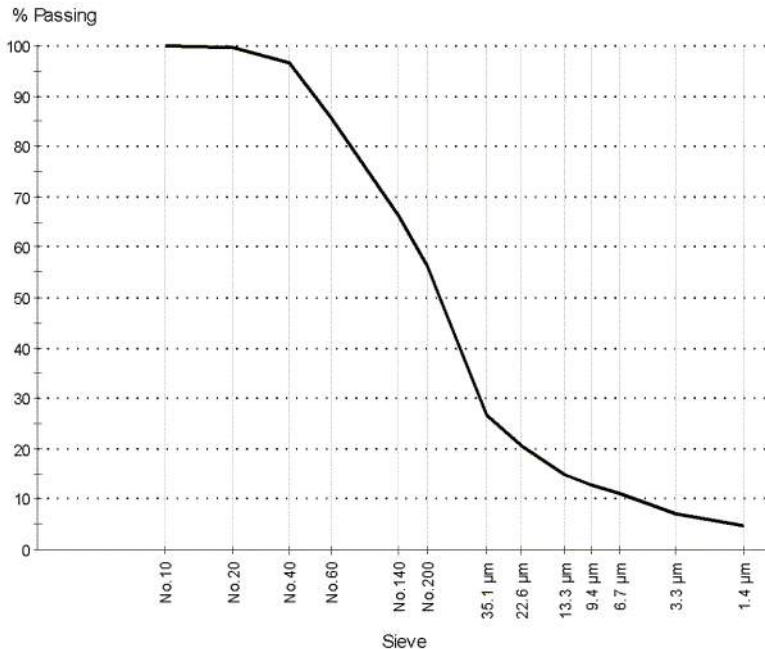
Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S5
Client Sample ID:
Date Sampled: 12/07/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Black Sandy Lean CLAY (CL)
Sampling Method: (none)
General Location: Boring #6A SS-30
Location: 115.2' - 116.7'

Sample Description:

Particle Size Distribution



Grading: ASTM D 422

Drying by: Oven
Date Tested:

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	97	
No.60 (250µm)	86	
No.140 (106µm)	66	
No.200 (75µm)	56	
35.1 µm	26.7	
22.6 µm	20.7	
13.3 µm	14.8	
9.4 µm	12.8	
6.7 µm	11.0	
3.3 µm	7.0	
1.4 µm	4.6	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (3.3%)	Fine (40.3%)	Silt (47.4%)	Clay (9.0%)

D85: 0.2412 D60: 0.0852 D50: 0.0637
D30: 0.0382 D15: 0.0135 D10: 0.0056
Cu: 15.17 Cc: 3.05



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Material Test Report

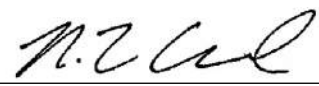
Report No: MAT:0451644-1-S5

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S5
Client Sample ID:
Date Sampled: 12/07/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

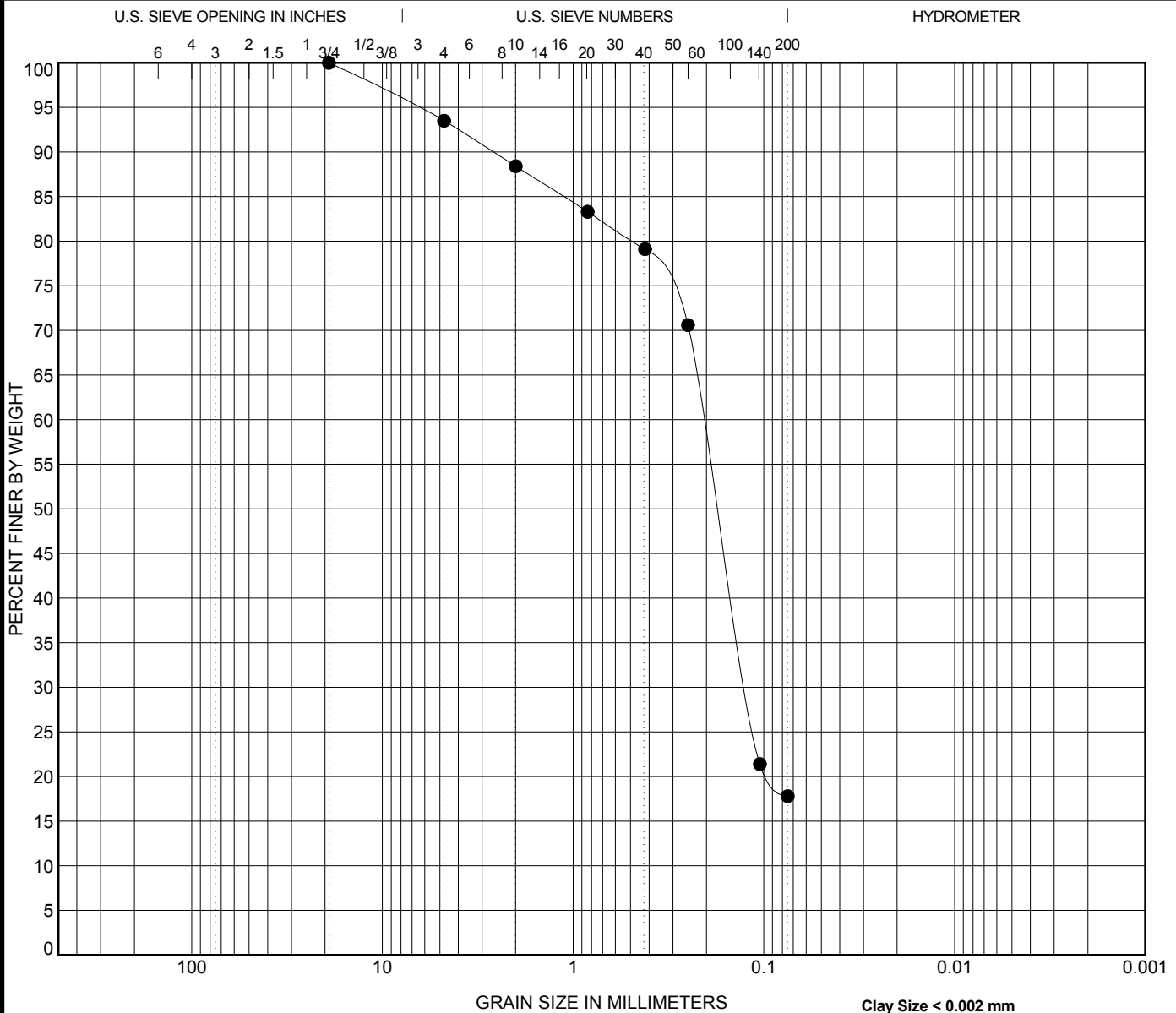
Supplier:
Source:
Material: Black Sandy Lean CLAY (CL)
Sampling Method: (none)
General Location: Boring #6A SS-30
Location: 115.2' - 116.7'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-6A SS-32 125.2	Very dense dark gray fine to medium grained Silty SAND (SM)					NP	NP	NP		

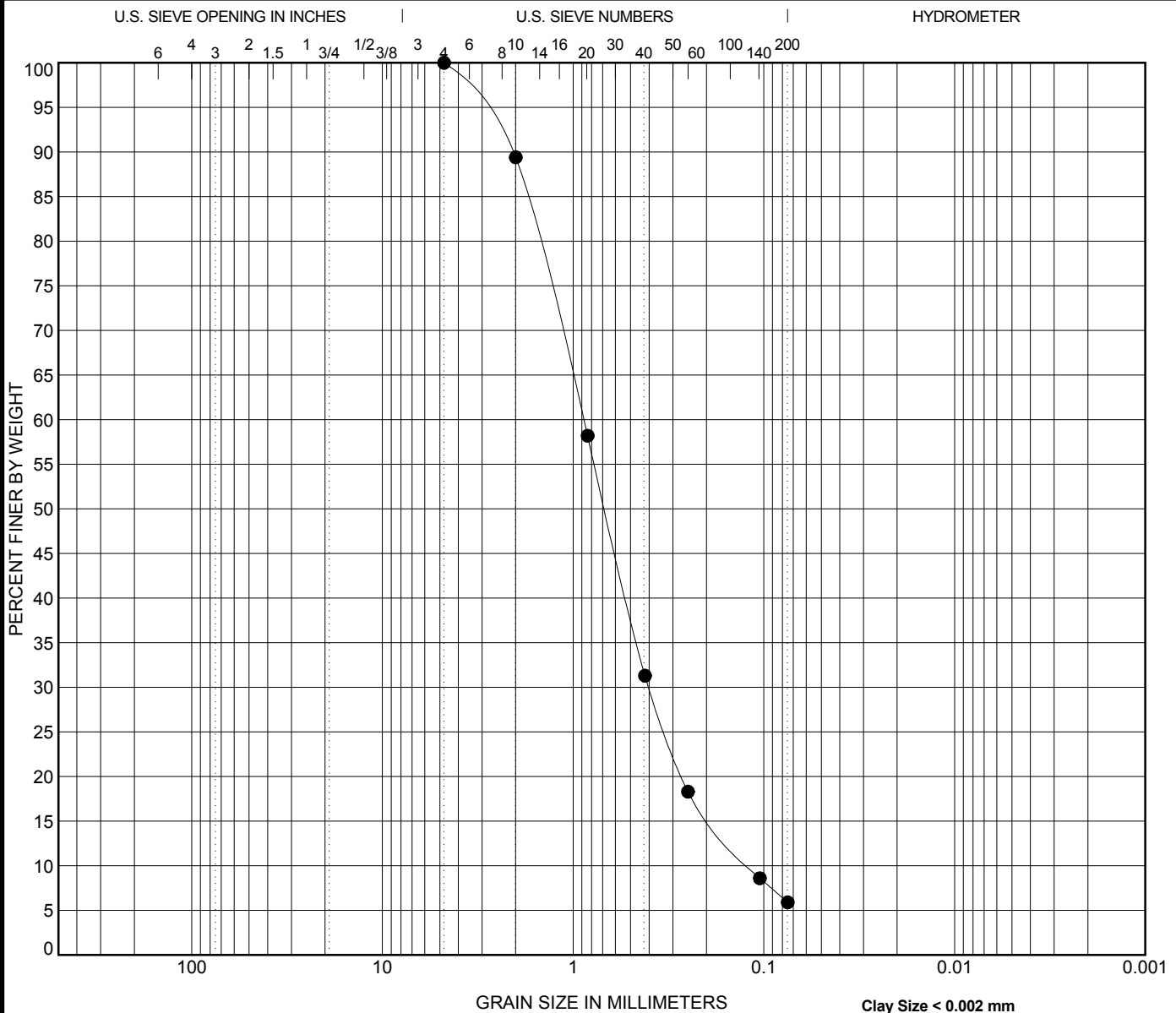
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6A SS-32 125.2	19.1	0.207	0.122		6.5	75.7	17.8	



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 Fax: (803) 772-2803

GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-3 16.0	Very loose to loose gray m-c poorly graded SAND w/silt (SP-SM)					NP	NP	NP	1.51	7.42

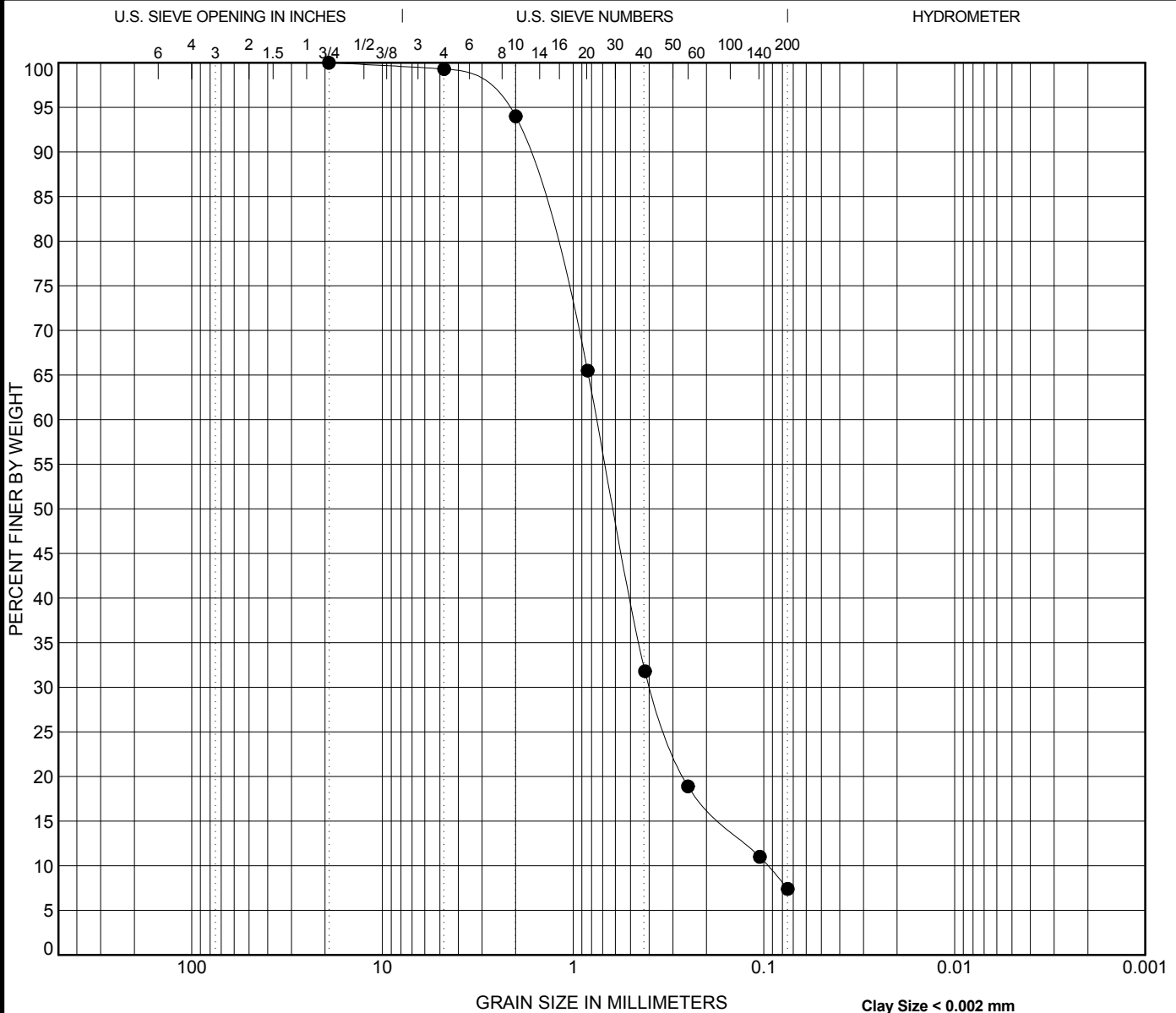
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-3 16.0	4.75	0.883	0.399	0.119	0.0	94.1	5.9	



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 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-4 18.0	Very loose to loose gray m-c poorly graded SAND w/silt (SP-SM)					NP	NP	NP	2.13	7.84

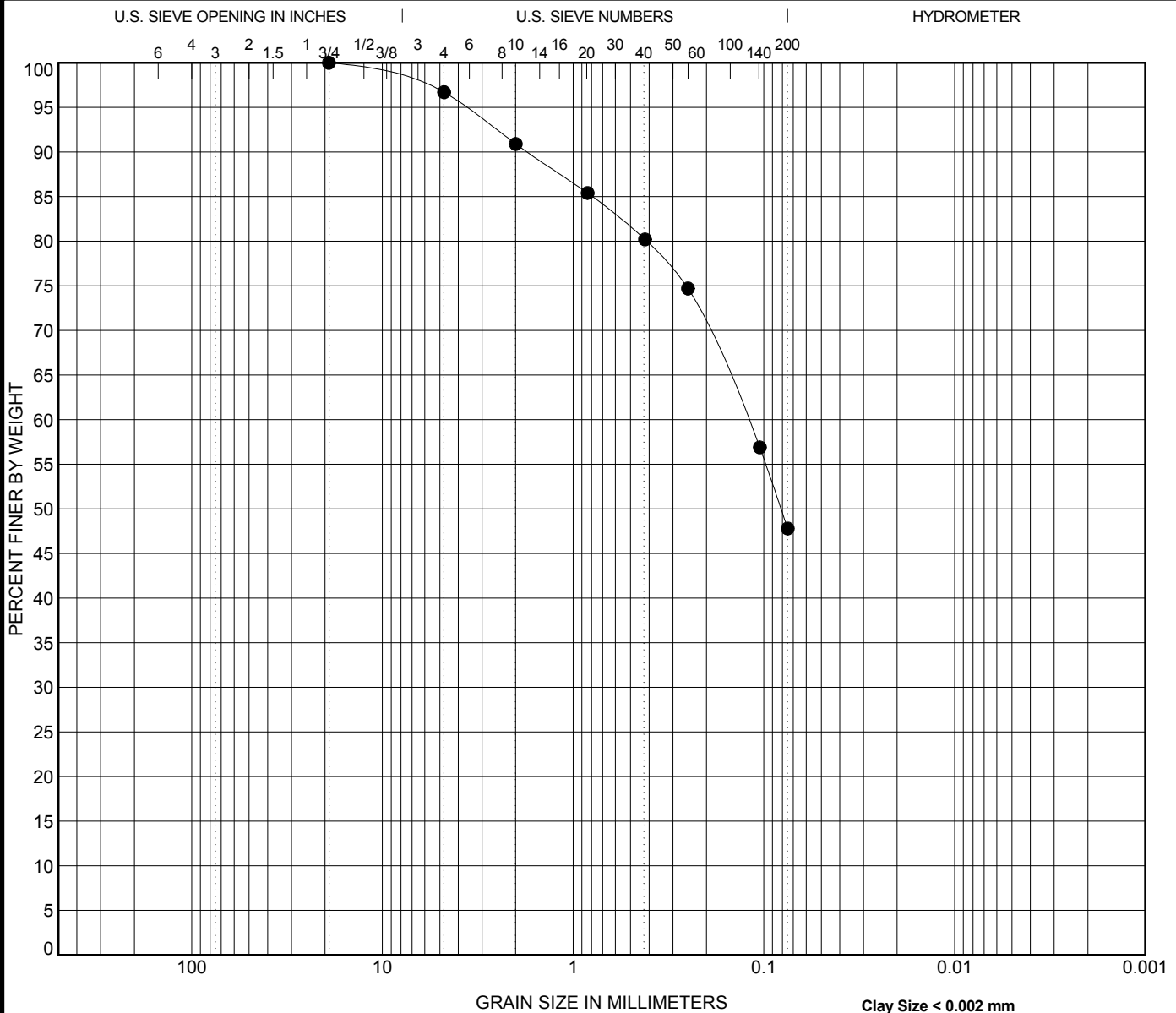
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-4 18.0	19.1	0.75	0.391	0.096	0.7	91.9	7.4	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-7 30.5	Dense to very dense green gray fine grained Silty SAND (SM)					25	22	3		

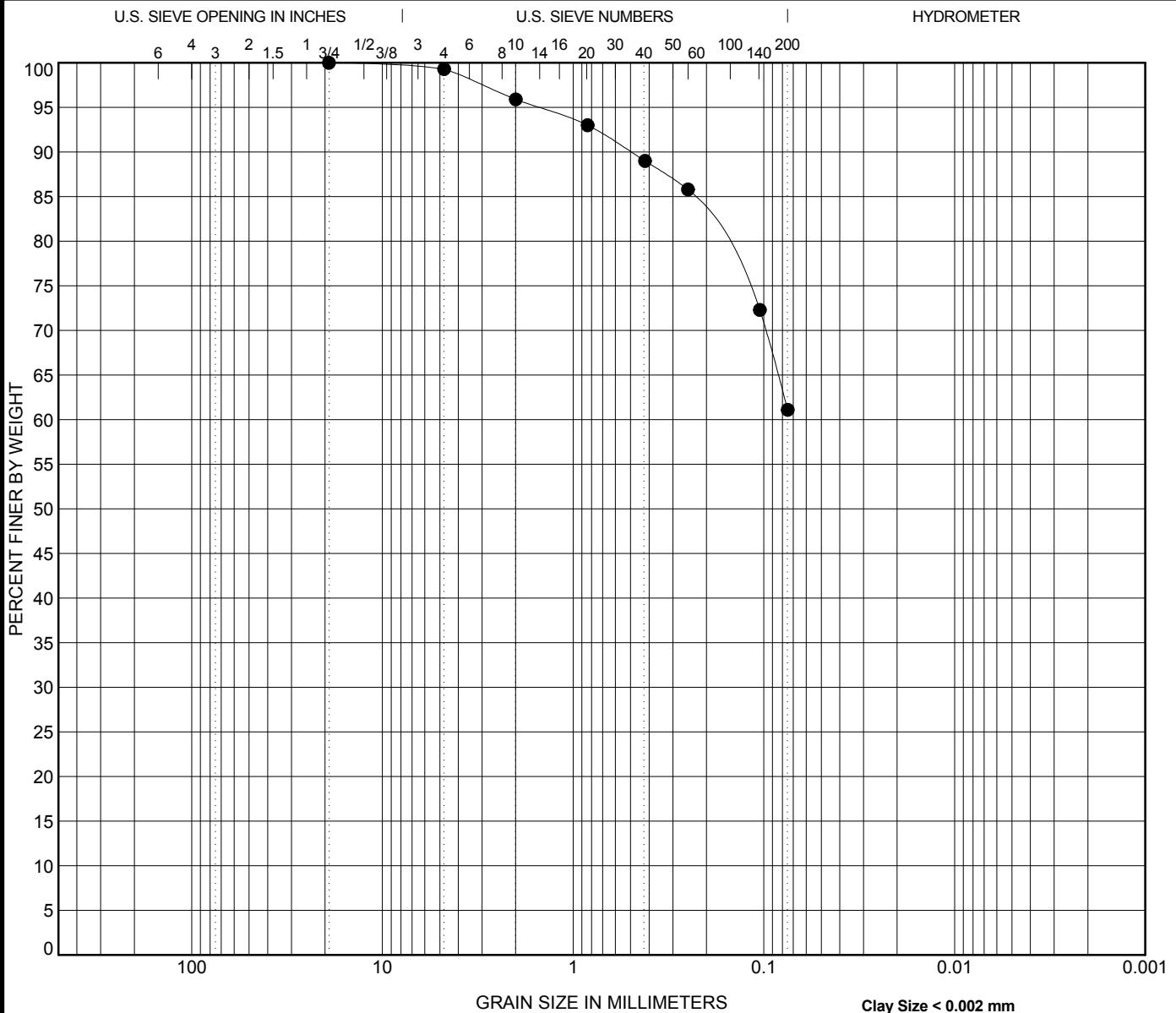
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-7 30.5	19.1	0.122			3.3	48.9	47.8	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-9 40.5	Very stiff to hard green gray Sandy SILT (ML)					36	35	1		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-9 40.5	19.1				0.7	38.2	61.1	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



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Fax: (803) 772-2803

Material Test Report

Report No: MAT:0451644-1-S6

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

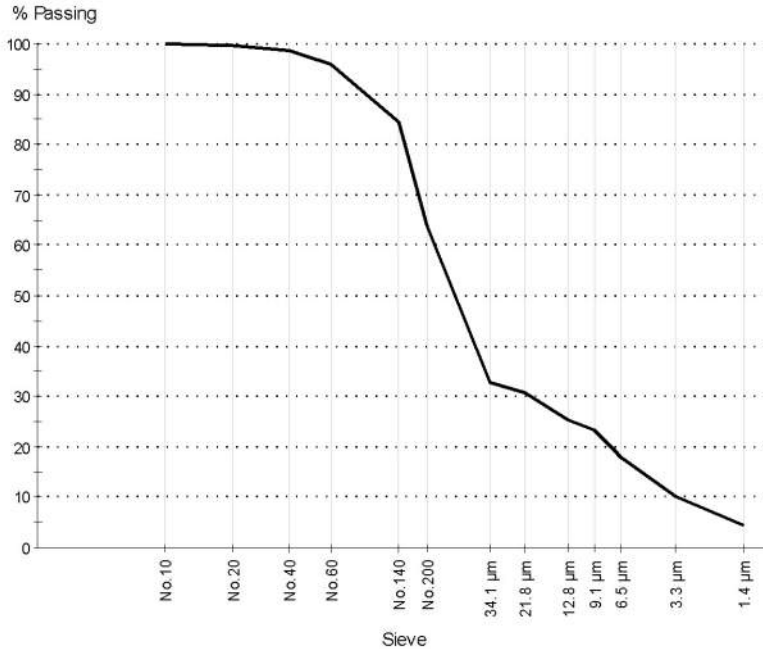
Sample ID: 0451644-1-S6
Client Sample ID:
Date Sampled: 12/06/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Green Gray Sandy SILT (ML)
Sampling Method: (none)
General Location: Boring #7A SS-10
Location: 45.5' - 47'

Sample Description:

Grading: ASTM D 422

Date Tested:

Particle Size Distribution



Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	99	
No.60 (250µm)	96	
No.140 (106µm)	84	
No.200 (75µm)	64	
34.1 µm	32.7	
21.8 µm	30.8	
12.8 µm	25.2	
9.1 µm	23.4	
6.5 µm	17.8	
3.3 µm	10.3	
1.4 µm	4.5	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (1.4%)	Fine (34.7%)	Silt (49.6%)	Clay (14.3%)

D85: 0.1112 D60: 0.0681 D50: 0.0528
D30: 0.0202 D15: 0.0050 D10: 0.0032
Cu: 21.56 Cc: 1.90



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Material Test Report

Report No: MAT:0451644-1-S6
 Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
 POST OFFICE BOX 191
 COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
 ORANGEBURG, SC

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[Signature]

Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
 Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S6
 Client Sample ID:
 Date Sampled: 12/06/14
 Sampled By: Bennett Livingston
 Specification: D422/T88 Part. Size Analysis (Set #1)

Supplier:
 Source:
 Material: Green Gray Sandy SILT (ML)
 Sampling Method: (none)
 General Location: Boring #7A SS-10
 Location: 45.5' - 47'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



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Material Test Report

Report No: MAT:0451644-1-S7

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

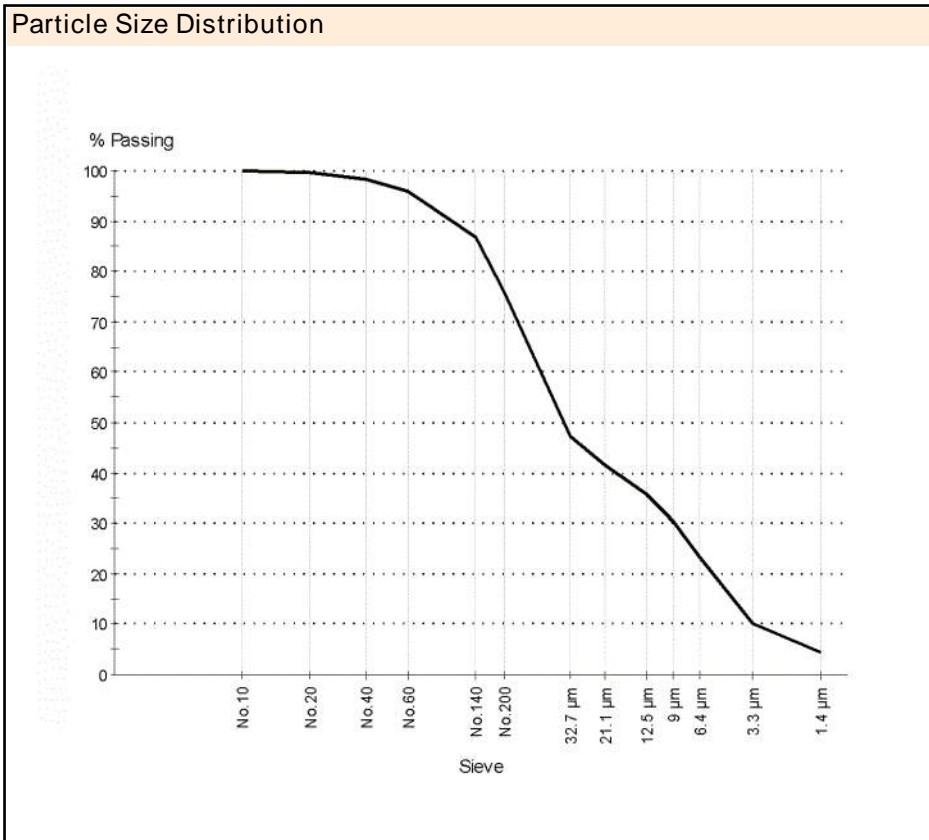
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Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S7
Client Sample ID:
Date Sampled: 12/06/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Green Gray SILT with Sand (ML)
Sampling Method: (none)
General Location: Boring #7A SS-13
Location: 60.5' - 62'

Sample Description:



Grading: ASTM D 422

Drying by: Oven
Date Tested:

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	98	
No.60 (250µm)	96	
No.140 (106µm)	87	
No.200 (75µm)	76	
32.7 µm	47.4	
21.1 µm	41.7	
12.5 µm	35.9	
9.0 µm	30.5	
6.4 µm	23.2	
3.3 µm	10.3	
1.4 µm	4.5	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (1.9%)	Fine (22.0%)	Silt (58.8%)	Clay (17.4%)

D85: 0.0995 D60: 0.0471 D50: 0.0353
D30: 0.0088 D15: 0.0042 D10: 0.0032
Cu: 14.91 Cc: 0.52



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Material Test Report

Report No: MAT:0451644-1-S7
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

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[Signature]

Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/23/2015

Sample Details

Sample ID: 0451644-1-S7
Client Sample ID:
Date Sampled: 12/06/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

Supplier:
Source:
Material: Green Gray SILT with Sand (ML)
Sampling Method: (none)
General Location: Boring #7A SS-13
Location: 60.5' - 62'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



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Material Test Report

Report No: MAT:0451644-1-S8

Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
POST OFFICE BOX 191
COLUMBIA, SC 29202

Project: SC FILE #38-40308.2
ORANGEBURG, SC

CC:

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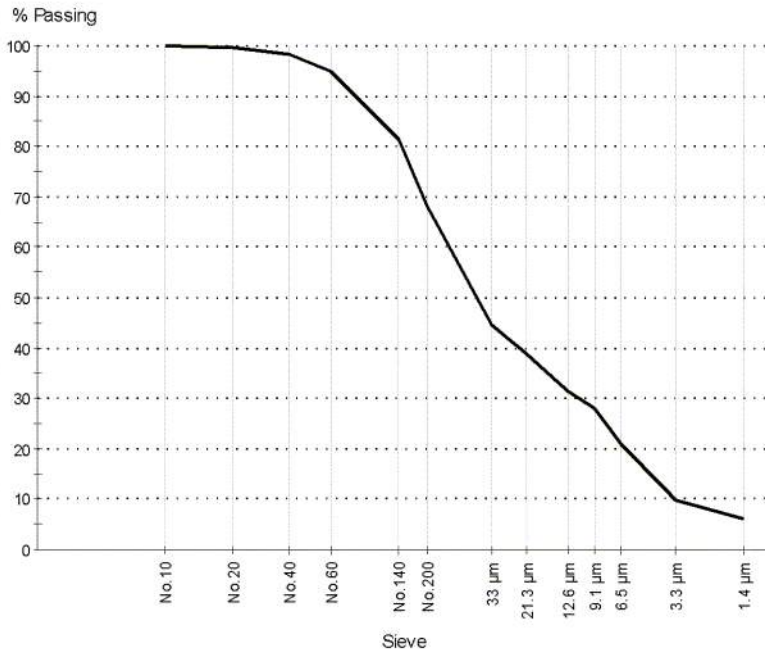
Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/16/2015

Sample Details

Sample ID: 0451644-1-S8
Client Sample ID:
Date Sampled: 12/06/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)
Supplier:
Source:
Material: Green Gray Sandy SILT (ML)
Sampling Method: (none)
General Location: Boring #7A
Location: 74' - 76'

Sample Description:

Particle Size Distribution



Grading: ASTM D 422

Drying by: Oven
Date Tested:

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	98	
No.60 (250µm)	95	
No.140 (106µm)	81	
No.200 (75µm)	68	
33.0 µm	44.5	
21.3 µm	39.0	
12.6 µm	31.5	
9.1 µm	28.0	
6.5 µm	20.9	
3.3 µm	9.9	
1.4 µm	6.2	

COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (1.8%)	Fine (29.9%)	Silt (52.6%)	Clay (15.7%)

D85: 0.1339 D60: 0.0563 D50: 0.0399
D30: 0.0110 D15: 0.0045 D10: 0.0033
Cu: 16.96 Cc: 0.64



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Material Test Report

Report No: MAT:0451644-1-S8
Issue No: 1

Client: SC DEPARTMENT OF TRANSPORTATION
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Project: SC FILE #38-40308.2
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[Signature]

Approved Signatory: Tom Cannarella, P.E. (Branch Manager)
Date of Issue: 1/16/2015

Sample Details

Sample ID: 0451644-1-S8
Client Sample ID:
Date Sampled: 12/06/14
Sampled By: Bennett Livingston
Specification: D422/T88 Part. Size Analysis (Set #1)

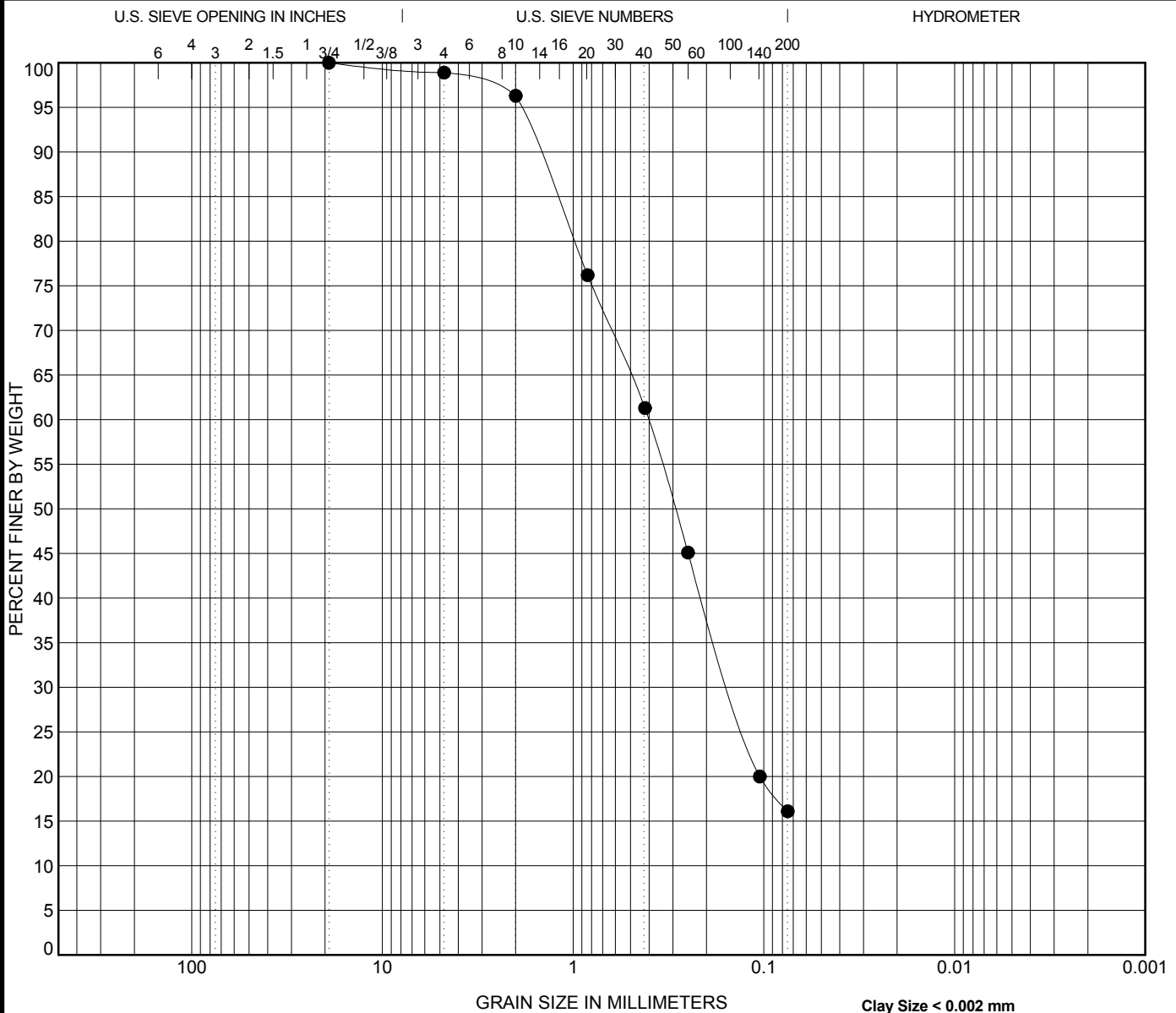
Supplier:
Source:
Material: Green Gray Sandy SILT (ML)
Sampling Method: (none)
General Location: Boring #7A
Location: 74' - 76'

Other Test Results

Description	Method	Result	Limits
Group Symbol	ASTM D 2487		
Group Name			
Tested By		(unknown)	
Group Symbol (based on visual-manual procedures)	ASTM D 2488		
Group Name			
Tested By		(unknown)	
Dispersion device	ASTM D 422		
Dispersion time (min)			
Shape			
Hardness			
Tested By		(unknown)	

Comments

N/A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-22 84.0	Loose dark green fine grained Silty SAND (SM)					NP	NP	NP		

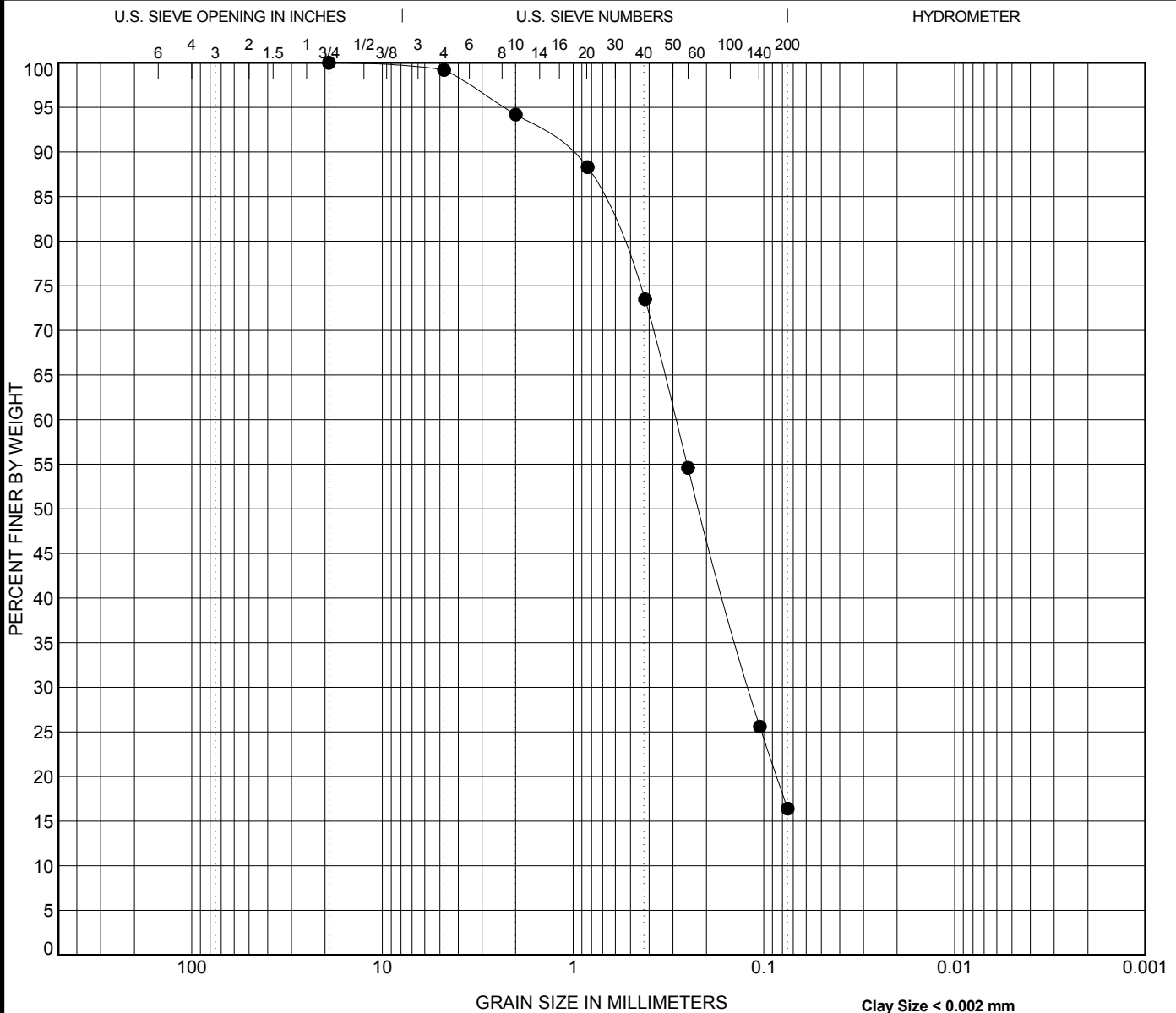
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-22 84.0	19.1	0.403	0.148		1.1	82.8	16.1	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-7A SS-25 90.0	Very dense gray fine to coarse grained Silty SAND (SM)	NP	NP	NP		

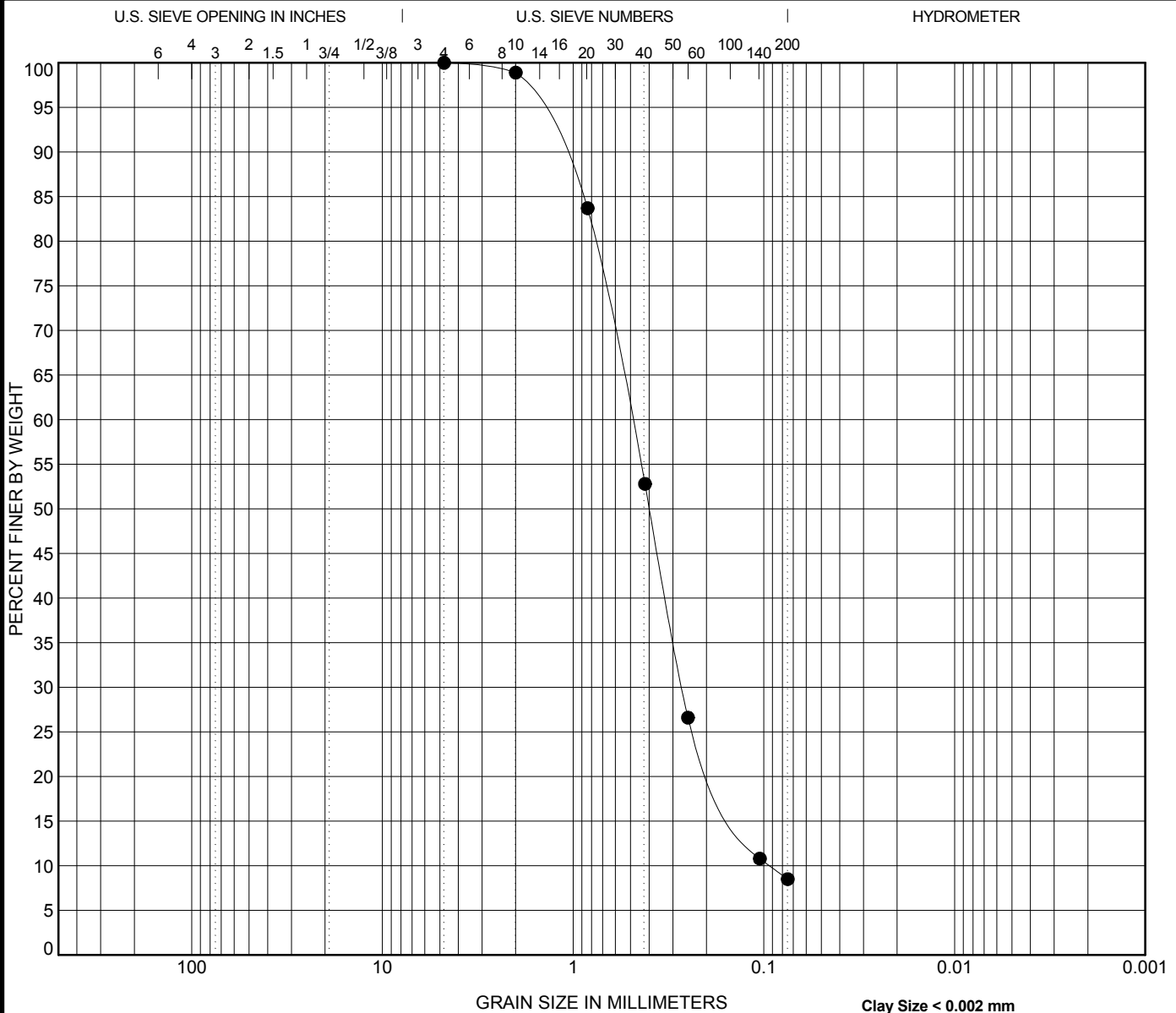
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-25 90.0	19.1	0.29	0.12		0.8	82.8	16.4	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● B-7A SS-28 105.5	Very dense black f-m grained poorly graded SAND w/silt (SP-SM)					NP	NP	NP	1.55	5.28

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7A SS-28 105.5	4.75	0.494	0.267	0.093	0.0	91.5	8.5	



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GRAIN SIZE DISTRIBUTION

Project: US301 Over Four Hole Swamp
 PSI Job No.: 0451644
 Location: Orangeburg County, SC

ICA Laboratory Testing



Project Name : Bridge Replacement over Four Hole Swamp
 Location : Orangeburg County, South Carolina
 Job Number : 11200-10

Soil Classifications Summary

Soil No.	Boring No.	Sample No.	Depth (ft)	Grain Size Data					Hydrometer Test Data							Atterberg			Classification		Direct Shear		Rock Core		
				Natural Moisture (%)	%< #4 Sieve	%< #10 Sieve	%< #40 Sieve	%< #200 Sieve	%< #1 Hyd. Rd.	%< #2 Hyd. Rd.	%< #3 Hyd. Rd.	%< #4 Hyd. Rd.	%< #5 Hyd. Rd.	%< #6 Hyd. Rd.	%< #7 Hyd. Rd.	LL	PL	PI	ASTM	AASHTO	Phi Angle	Cohesion (psi)	Unconfined Compressive Strength (psi)		
1	B-1	SS-1	2-3.5	11.7	99.7	97.7	60.1	16.2										NP	NP	NP	SM	A-2-4 (0)			
2	B-1	SS-4	8-9.5	17.5	99.6	97.8	79.3	32.3										25	17	8	SC	A-2-4 (0)			
3	B-1	SS-6	16-17.5	13.1	100	98.5	41.9	4.4										NP	NP	NP	SP	A-1-b (0)			
4	B-1	SS-7	21-22.5	38.1	100	99.4	80.9	28.5										37	31	6	SM	A-2-4 (0)			
5	B-1	SS-9	31-32.5	23.5	93.7	83.9	24.5											NP	NP	NP	SM	A-2-4 (0)			
6	B-1	SS-11	41-42.5	44.9	100	100	83.7	44										NP	NP	NP	SM	A-4 (0)			
7	B-1	SS-13	51-52.5	33.9	98.3	92.9	87.5	55.3										NP	NP	NP	ML	A-4 (0)			
8	B-2	SS-4	8-9.5	N/A	99	96.1	37.4	14.2	11.2	10.2	9.1	8.2	5.3	4.1	2.7		NA	NA	NA	SM	A-1-b (0)				
9	B-2	SS-5	10-11.3	N/A	100	100	95.2	55.1	46.3	42.4	38.2	33.2	29.2	17	8.6		NA	NA	NA	ML	A-4 (0)				
10	B-2	SS-6	15-16.5	24.6	100	100	76.7	46.7	41.8	40.7	32.8	28.8	23.9	15	7.1		35	23	12	SC	A-6 (3)				
11	B-2	SS-8	25-26.5	34.4	100	100	87.1	39.2									31	30	1	SM	A-4 (0)				
12	B-2	SS-10	35-36.5	N/A	100	99.9	82.4	43.8									NA	NA	NA	SM	A-4 (0)				
13	B-2	SS-11	40-41.5	38.1	100	99.2	87	47.1									NP	NP	NP	SM	A-4 (0)				
14	B-2	SS-15	60-61.5	33.8	100	99.6	81.9	48.7									40	35	5	SM	A-4 (1)				
15	B-2	SS-17	70-71.5	37.6	100	99.7	64.2	23									NP	NP	NP	SM	A-2-4 (0)				
16	B-2	SS-18	75-76.5	35.1	95.8	84.3	42	7.9									NP	NP	NP	SP-SM	A-1-b (0)				
17	B-3	SS-2	4-5.5	4.5	98.6	74.9	8	0.5									NP	NP	NP	SP	A-1-b (0)				
18	B-3	SS-5	10-11.5	30.2	99.5	97	85.2	51.9	44.9	40.1	38.1	32.2	27.5	15.6	8.3		36	29	7	ML	A-4 (2)				
19	B-3	SS-6	15-16.5	N/A	100	99.7	93.1	55.2	49.2	44.2	41.2	34.4	25.5	15.5	6		NA	NA	NA	ML	A-4 (0)				
20	B-3	SS-8	25-26.5	37.9	100	100	84.5	43.6									36	33	3	SM	A-4 (0)				
21	B-3	SS-10	35-36.5	46.7	100	99.4	82.5	47.3									NP	NP	NP	SM	A-4 (0)				
22	B-3	SS-15	60-61.5	35.9	99.8	93.5	63.7	28									NP	NP	NP	SM	A-2-4 (0)				
23	B-3	SS-19	80-81.5	19.7	100	95.5	17.1	5.7									NP	NP	NP	SW-SM	A-1-b (0)				
24	B-3	SS-23	100-101.5	38.9	100	97.7	82.9	42.6									NP	NP	NP	SM	A-5 (0)				
25	B-4	SS-3	6-7.5	17.2	92.3	83.5	7.2	0.1									NP	NP	NP	SP	A-1-b (0)				
26	B-4	SS-5	10.0-11.5	N/A	98.9	96.3	87.1	50.2	43.5	39.7	36	33.1	27.1	16.7	9.4		NA	NA	NA	ML	A-4(0)				
27	B-4	SS-6	15-16.5	34.8	100	100	92	52.4	45	41	37	32.9	28.8	17	9.2		35	27	8	ML	A-4 (2)				
28	B-4	SS-7	20-21.5	N/A	85	80	61.7	32.8	29.5	27.9	23.2	20.1	16	8.1	3		NA	NA	NA	SM	A-2-4 (0)				
29	B-4	SS-8	25-26.5	33.2	100	99.8	88	49.8									NP	NP	NP	SM	A-4 (0)				
30	B-4	SS-10	35-36.5	43.4	98.2	91.7	80	49.4									NP	NP	NP	SM	A-4 (0)				
31	B-4	SS-13	50-51.5	36.0	100	100	83.6	42.6									37	34	3	SM	A-4 (0)				
32	B-4	SS-16	65-66.5	33.4	100	99.3	82.6	33.5									36	33	3	SM	A-2-4 (0)				
33	B-4	SS-19	80-81.5	22.7	100	99.9	68.1	27.3									33	30	3	SM	A-2-4 (0)				
34	B-5	SS-2	4-5.5	16.8	96.9	85.4	29.2	3.8									NP	NP	NP	SW	A-1-b (0)				
35	B-5	SS-3	6-7.5	N/A	100	99.9	96.1	59.9	52.8	47.9	44.1	40.2	33.4	20.5	10.6		NA	NA	NA	ML	A-4 (0)				
36	B-5	SS-4	8-9.5	N/A	95.7	93.4	82.4	47.8	39.4	35.8	31.2	27.5	20	12.2	7		NA	NA	NA	SM	A-4 (0)				
37	B-5	SS-6	32.4-33.9	36.4	100	99.8	83.6	41.2									NP	NP	NP	SM	A-4 (0)				
38	B-5	SS-9	45-46.5	37.0	100	99.9	82.9	52.3									45	33	12	ML	A-7-5 (5)				
39	B-5	SS-11	55-56.5	39.6	100	100	84.1	50.1									43	40	3	ML	A-5 (1)				
40	B-5	SS-13	65-66.5	45.4	99.7	85.2	23.5	2.6									NP	NP	NP	SW	A-1-b (0)				
41	B-6	SS-2	4-5.5	12.7	100	88.2	11.9	1.6									NA	NA	NA	SP	A-1-b (0)				
42	B-6	SS-3	6-7.5	14.0	100	97.8	43.7	4									NP	NP	NP	SP	A-1-b (0)				
43	B-6	SS-4	8-9.5	17.0	96.7	92.2	37.7	2.1									NP	NP	NP	SP	A-1-b (0)				
44	B-6	SS-5	10-11.5	N/A	99.6	99.2	86.4	8.8	4.8	4.8	3.9	3.8	3.8	3.6	2.9		NA	NA	NA	SP-SM	A-2-4 (0)				
45	B-7	SS-3	6-7.5	N/A	100	99.9	93.1	56.5	46.8	44.9	39.9	35.1	27.3	17.7	8.8		NA	NA	NA	ML	A-4 (0)				
46	B-7	SS-4	8-9.5	N/A	100	100	93	50.7	42.2	40	36.8	34.6	28	17.2	9.9		NA	NA	NA	ML	A-4 (0)				
47	B-7	SS-5	10-11.5	30.9	99.8	97.5	86.9	40.6									31	25	6	SM	A-4 (0)				
48	B-7	SS-6	15-16.5	N/A	98	93	87.1	64.2	30.4	29.5	26.9	22.7	17.6	9.3	4.2		NA	NA	NA	SM	A-4 (0)				
49	B-8	SS-1	2-3.5	8.3	99.8	97.4	54.2	11.9									NP	NP	NP	SW-SM	A-2-4 (0)				
50	B-8	SS-5	10-11.5	33.4	100	98.9	90.2	20.1									NP	NP	NP	SM	A-2-4 (0)				
51	B-8	SS-7	20-21.5	15.0	100	95.2	16.9	1.8									NP	NP	NP	SP	A-1-b (0)				
52	B-9	SS-1	2-3.5	13.3	96.6	93.5	57.7	18.9									20	18	2	SM	A-2-4 (0)				
53	B-9	SS-3	6-7.5	10.5	100	98.1	51.9	5.6									NP	NP	NP	SP-SM	A-3 (0)				
54	B-9	SS-6	15-16.5	N/A	100	98.2	38.7	4.6									NA	NA	NA	SW	A-1-b (0)				
55	B-9	SS-7	20-21.5	24.1	94.6	88.7	78.8	48.4									34	28	6	SM	A-4 (1)				
56	B-9	SS-9	30-31.5	23.3	93.7	87.3	66.8	35.7									26	21	5	SC-SM	A-4 (0)				
57	B-9	SS-12	45-46.5	41.7	97.8	92.5	83.5	59.4									41	40	1	ML	A-5 (1)				
58	RW-1	SS-1	2-3.5	12.7	100	98.7	64.6	29.5									33	19	14	SC	A-2-6 (1)				
59	RW-1	SS-2	4-5.5	11.0	100	98.7	58.9	12.8									NP	NP	NP	SM	A-2-4 (0)				
60	RW-1	SS-5	9.9-11.4	18.0	99.2	98.3	84.4	43.4									23	16	7	SC-SM	A-4 (0)				
61	RW-1	SS-6	14.9-16.4	16.8	100	98.7	39.3	4.3									NP	NP	NP	SP	A-1-b (0)				
62	RW-1	SS-7	19.9-21.4	26.4	99.6	97.8	92	52.9									37	31	6	ML	A-4 (2)				
63	RW-2	SS-1	2-3.5	14.0	97.3	93.7	49.5	15.4									18	17	1	SM	A-1-b (0)				
64	RW-2	SS-2	4-5.5	8.5	98.8	97.2	38.7	7.3									NP	NP	NP	SW-SM	A-1-b (0)				
65	RW-2	SS-4	8-9.5	18.9	98	95.7	71.2	35									21	19	2	SM	A-2-4 (0)				



Project Name : Bridge Replacement over Four Hole Swamp
Location : Orangeburg County, South Carolina
Job Number : 11200-10
Project Job No. : 11200-10

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	HCL	Natural Moisture Content (%)
1	B-1		SS-1	2.0	3.5	Orange, Tan & Black Silty Sand	N	11.7
1			SS-2	4.0	5.5	Orange, Tan & Black Silty Sand	N	
1			SS-3	6.0	7.5	Tan, Brown & Gray Silty Sand	N	
2			SS-4	8.0	9.5	Tan, Brown & Gray Clayey Sand	N	17.5
60			SS-5	11.0	12.5	Tan, Brown & Gray Silty, Clayey Sand	N	
3			SS-6	16.0	17.5	Gray & White Poorly Graded Sand	N	13.1
4			SS-7	21.0	22.5	Green & Gray Silty Sand	S	38.1
4			SS-8	26.0	27.5	Green & Gray Silty Sand	S	
5			SS-9	31.0	32.5	Green & Gray Silty Sand	S	23.5
5			SS-10	36.0	36.9	Green & Gray Silty Sand	S	
6			SS-11	41.0	42.5	Green, Gray & Tan Silty Sand	S	44.9
6			SS-12	46.0	47.5	Green, Gray & Tan Silty Sand	S	
7			SS-13	51.0	52.5	Green, Gray & Tan Sandy Silt	S	33.9
7			SS-14	56.0	57.5	Green, Gray & Tan Sandy Silt	S	
7			SS-15	61.0	62.5	Green, Gray & Tan Sandy Silt	S	
7			SS-16	66.0	67.5	Green, Gray & Tan Sandy Silt	S	
7			SS-17	71.0	72.5	Green, Gray & Tan Sandy Silt	S	
7			SS-18	76.0	77.5	Green, Gray & Tan Sandy Silt	S	
7			SS-19	81.0	82.5	Green, Gray & Tan Sandy Silt	S	
7			SS-20	86.0	87.5	Green, Gray & Tan Sandy Silt	S	
16			SS-21	91.0	92.5	Dark Green, Black & Gray Poorly Graded Sand with Silt	W	
23			SS-22	96.0	97.5	Gray Well-Graded Sand with Silt	W	
23			SS-23	101.0	102.5	Gray Well-Graded Sand with Silt	W	
84			Bulk-1	0.0	5.0	Orange, Tan & Black Silty Sand	N	
1	B-2		SS-1	2.0	3.5	Gray Silty Sand	N	
3			SS-2	4.0	5.5	Gray Poorly Graded Sand	N	
			SS-3	6.0	7.5	No Recovery		
8			SS-4	8.0	9.5	Gray Silty Sand	S	
9			SS-5	10.0	11.5	Green & Gray Sandy Silt	S	
10			SS-6	15.0	16.3	Green & Gray Clayey Sand	S	24.6
11			SS-7	20.0	20.4	Green, Gray & Tan Silty Sand	S	
11			SS-8	25.0	26.5	Gray & Green Silty Sand	S	34.4
11			SS-9	30.0	31.5	Gray & Green Silty Sand	S	
12			SS-10	35.0	36.5	Gray & Green Silty Sand	S	
13			SS-11	40.0	41.5	Gray & Green Silty Sand	S	38.1
13			SS-12	45.0	46.5	Gray & Green Silty Sand	S	
13			SS-13	50.0	51.5	Gray & Green Silty Sand	S	
13			SS-14	55.0	56.5	Gray & Green Silty Sand	S	
14			SS-15	60.0	61.5	Gray & Green Silty Sand	S	33.8
14			SS-16	65.0	66.5	Green & Gray Silty Sand	S	
15			SS-17	70.0	71.5	Green & Gray Silty Sand	S	37.6
16			SS-18	75.0	76.5	Dark Green Poorly Graded Sand with Silt	W	35.1
23			SS-19	80.0	81.5	Green & Gray Well-Graded Sand with Silt	N	
23			SS-20	85.0	86.5	Gray Well-Graded Sand with Silt	N	
23			SS-21	90.0	91.5	Gray Well-Graded Sand with Silt	N	
			SS-22	95.0	96.5	No Recovery		
			SS-23	100.0	101.5	No Recovery		
23			SS-24	105.0	106.5	Gray Well-Graded Sand with Silt	N	
24			SS-25	110.0	111.5	Dark Gray Silty Sand	N	
	B-3		SS-1	2.0	3.5	No Recovery		
17			SS-2	4.0	5.5	White & Gray Poorly Graded Sand	N	4.5
17			SS-3	6.0	7.5	White & Gray Poorly Graded Sand	N	
17			SS-4	8.0	9.5	White & Gray Poorly Graded Sand	N	
18			SS-5	10.0	11.5	Green, Gray & Tan Sandy Silt	S	30.2
19			SS-6	15.0	16.5	Green, Gray & Tan Sandy Silt	S	

Strengthening America's Infrastructure®

Project Name : Bridge Replacement over Four Hole Swamp

Location : Orangeburg County, South Carolina

Job Number : 11200-10

Project Job No. : 11200-10

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Natural
Moisture
Content

Soil No.	Boring No.	Station & Offset	Sample No.	Depth	Description of Soil	HCL	Natural Moisture Content (%)
20			SS-7	20.0	20.3	Green, Gray & Tan Silty Sand	S
20			SS-8	25.0	26.5	Green & Gray Silty Sand	S
20			SS-9	30.0	31.5	Green & Gray Silty Sand	S
21			SS-10	35.0	36.5	Green & Gray Silty Sand	S
21			SS-11	40.0	41.5	Green & Gray Silty Sand	S
21			SS-12	45.0	46.5	Green & Gray Silty Sand	S
21			SS-13	50.0	51.5	Green & Gray Silty Sand	S
15			SS-14	55.0	56.5	Green & Gray Silty Sand	S
22			SS-15	60.0	61.5	Dark Green Silty Sand	W
40			SS-16	65.0	66.5	Dark Green & Tan Well-Graded Sand	W
40			SS-17	70.0	71.5	Dark Green & Tan Well-Graded Sand	N
40			SS-18	75.0	76.5	Dark Green & Tan Well-Graded Sand	N
23			SS-19	80.0	81.5	Gray, Green, Black & Tan Well-Graded Sand with Silt	N
23			SS-20	85.0	86.5	Gray Well-Graded Sand with Silt	N
23			SS-21	90.0	91.5	Gray Well-Graded Sand with Silt	N
23			SS-22	95.0	96.5	Gray Well-Graded Sand with Silt	N
24			SS-23	100.0	101.5	Dark Gray Silty Sand	N
25	B-4		SS-1	2.0	2.8	Gray & White Poorly Graded Sand	W
			SS-2	3.3	3.3	No Recovery	
25			SS-3	6.0	7.5	Gray Poorly Graded Sand	W
			SS-4	8.0	9.5	No Recovery	17.2
26			SS-5	10.0	11.5	Gray & Green Sandy Silt	S
27			SS-6	15.0	16.5	Gray & Green Sandy Silt	S
28			SS-7	20.0	21.5	Gray & Green Silty Sand with Gravel	S
29			SS-8	25.0	26.5	Gray & Green Silty Sand	S
30			SS-9	30.0	31.5	Tan & Gray Silty Sand	S
30			SS-10	35.0	36.5	Tan & Gray Silty Sand	S
30			SS-11	40.0	41.5	Tan & Gray Silty Sand	S
30			SS-12	45.0	46.5	Tan & Gray Silty Sand	S
31			SS-13	50.0	51.5	Gray, Tan & Green Silty Sand	S
31			SS-14	55.0	56.5	Gray, Tan & Green Silty Sand	S
31			SS-15	60.0	61.5	Gray, Tan & Green Silty Sand	S
32			SS-16	65.0	66.5	Gray, Tan & Green Silty Sand	S
32			SS-17	70.0	71.5	Gray, Tan & Green Silty Sand	S
32			SS-18	75.0	76.5	Gray, Tan & Green Silty Sand	S
33			SS-19	80.0	81.5	Gray, Tan & Green Silty Sand	S
16			SS-20	85.0	86.5	Dark Green, Gray & Tan Poorly Graded Sand with Silt	S
23			SS-21	90.0	91.5	Gray & Green Well-Graded Sand with Silt	W
23			SS-22	95.0	96.5	Gray & Green Well-Graded Sand with Silt	N
23			SS-23	100.0	101.5	Gray & Green Well-Graded Sand with Silt	N
1	B-5		SS-1	2.0	2.8	Gray & Tan Silty Sand	N
34			SS-2	4.0	5.5	Gray & Tan Well-Graded Sand	N
35			SS-3	6.0	7.5	Green, Gray & Tan Sandy Silt	N
36			SS-4	8.0	9.5	Green & Gray Silty Sand	S
			SS-5	10.0	10.0	No Recovery	
37			SS-6	32.4	33.9	Green & Gray Silty Sand	S
37			SS-7	35.0	36.5	Green & Gray Silty Sand	S
38			SS-8	40.0	41.5	Green & Gray Sandy Silt	S
38			SS-9	45.0	46.5	Green & Gray Sandy Silt	S
38			SS-10	50.0	51.5	Green & Gray Sandy Silt	S
39			SS-11	55.0	56.5	Green & Gray Sandy Silt	S
22			SS-12	60.0	61.5	Dark Green & Gray Silty Sand	S
40			SS-13	65.0	66.5	Dark Green, Tan & Black Well-Graded Sand	W
40			SS-14	70.0	71.5	Dark Green, Tan & Black Well-Graded Sand	N
23			SS-15	75.0	76.5	Gray Well-Graded Sand with Silt	N
23			SS-16	80.0	81.5	Gray Well-Graded Sand with Silt	N
23			SS-17	85.0	86.5	Gray Well-Graded Sand with Silt	N
23			SS-18	90.0	91.5	Gray Well-Graded Sand with Silt	N
23			SS-19	95.0	96.5	Gray Well-Graded Sand with Silt	N
23			SS-20	100.0	101.3	Gray Well-Graded Sand with Silt	N

Strengthening America's Infrastructure®

Project Name : Bridge Replacement over Four Hole Swamp

Location : Orangeburg County, South Carolina

Job Number : 11200-10

Project Job No. : 11200-10

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Natural
Moisture
Content

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	HCL	(%)
1	B-6		SS-1	2.0	2.8	Brown, Tan & Gray Silty Sand	W	
41			SS-2	4.0	5.5	Brown, Tan & Gray Poorly Graded Sand	N	12.7
42			SS-3	6.0	7.5	Brown, Tan & Gray Poorly Graded Sand	N	14.0
43			SS-4	8.0	9.5	Brown, Tan & Gray Poorly Graded Sand	N	17.0
44			SS-5	10.0	11.5	Gray & Brown Poorly Graded Sand with Silt	N	
48			SS-6	15.0	15.2	Gray & Green Silty Sand	W	
42	B-7		SS-1	2.0	3.5	Dark Gray Poorly Graded Sand	N	
42			SS-2	4.0	5.5	Gray & Tan Poorly Graded Sand	N	
45			SS-3	6.0	7.5	Green & Gray Sandy Silt	S	
46			SS-4	8.0	9.5	Green & Gray Sandy Silt	S	
47			SS-5	10.0	11.5	Green & Gray Silty Sand	S	30.9
48			SS-6	15.0	16.5	Green & Gray Silty Sand	S	
49	B-8		SS-1	2.0	3.5	Tan, Brown & Gray Well-Graded Sand with Silt	N	8.3
42			SS-2	4.0	5.5	Tan, Brown & Gray Poorly Graded Sand	N	
42			SS-3	6.0	7.5	Tan, Brown & Gray Poorly Graded Sand	W	
42			SS-4	8.0	9.5	Tan, Brown & Gray Poorly Graded Sand	W	
50			SS-5	10.0	11.5	Dark Gray Silty Sand	N	33.4
			SS-6	15.0	15.0	No Recovery	N	
51			SS-7	20.0	21.5	Dark Gray Poorly Graded Sand	N	15.0
47			SS-8	25.0	26.5	Gray & Green Silty Sand	S	
47			SS-9	30.0	30.3	Gray & Green Silty Sand	S	
			SS-10	30.3	30.4	No Recovery	S	
48			SS-11	55.0	56.5	Green & Gray Silty Sand	S	
48			SS-12	60.0	61.5	Green & Gray Silty Sand	S	
48			SS-13	65.0	66.5	Green & Gray Silty Sand	S	
48			SS-14	70.0	71.5	Green & Gray Silty Sand	S	
48			SS-15	75.0	76.5	Green & Gray Silty Sand	S	
48			SS-16	80.0	81.5	Green & Gray Silty Sand	S	
48			SS-17	85.0	86.5	Green & Gray Silty Sand	S	
16			SS-18	90.0	91.5	Dark Green & Gray Poorly Graded Sand with Silt	W	
23			SS-19	95.0	96.3	Dark Gray Well-Graded Sand with Silt	N	
23			SS-20	100.0	101.4	Dark Gray Well-Graded Sand with Silt	N	
85			Bulk-2	0.0	5.0	Tan, Brown & Gray Silty Sand	N	
52	B-9		SS-1	2.0	3.5	Tan, Red & Gray Silty Sand	N	13.3
54			SS-2	4.0	5.5	Gray & Tan Well-Graded Sand	N	
53			SS-3	6.0	7.5	Gray & Tan Poorly Graded Sand with Silt	N	10.5
54			SS-4	8.0	9.5	Gray & Tan Well-Graded Sand	N	
50			SS-5	10.0	11.5	Gray & Tan Silty Sand	N	
54			SS-6	15.0	16.5	Gray & Tan Well-Graded Sand	N	
55			SS-7	20.0	21.5	Green & Gray Silty Sand	S	24.1
56			SS-8	25.0	26.5	Green & Gray Silty, Clayey Sand	S	
56			SS-9	30.0	31.5	Green & Gray Silty, Clayey Sand	S	23.3
			SS-10	35.0	36.5	No Recovery		
57			SS-11	40.0	41.5	Green & Gray Sandy Silt	S	
57			SS-12	45.0	46.5	Green & Gray Sandy Silt	S	41.7
57			SS-13	50.0	51.5	Green & Gray Sandy Silt	S	
57			SS-14	55.0	56.5	Green & Gray Sandy Silt	S	
57			SS-15	60.0	61.5	Green & Gray Sandy Silt	S	
57			SS-16	65.0	66.5	Green, Gray & Tan Sandy Silt	S	
57			SS-17	70.0	71.5	Green, Gray & Tan Sandy Silt	S	
57			SS-18	75.0	76.5	Green, Gray & Tan Sandy Silt	S	
57			SS-19	80.0	81.5	Green, Gray & Tan Sandy Silt	S	
57			SS-20	85.0	86.5	Green, Gray & Tan Sandy Silt	S	
16			SS-21	90.0	91.5	Dark Green & Gray Poorly Graded Sand with Silt	N	
48			SS-22	95.0	96.5	Gray Silty Sand	N	
23			SS-23	100.0	101.5	Gray Well-Graded Sand with Silt	N	
58	RW-1		SS-1	2.0	3.5	Red, Gray & Tan Clayey Sand	N	12.7

Strengthening America's Infrastructure®

Project Name : Bridge Replacement over Four Hole Swamp**Location : Orangeburg County, South Carolina****Job Number : 11200-10****Project Job No. : 11200-10****Moisture Data**

(AASHTO T255-T265 / ASTM C566-D2216)

Natural
Moisture
Content

Soil No.	Boring No.	Station & Offset	Sample No.	Depth	Description of Soil	HCL	Natural Moisture Content (%)	
59			SS-2	4.0	5.5	Gray, Tan & Brown Silty Sand	N	11.0
59			SS-3	6.0	7.5	Gray, Tan & Brown Silty Sand	N	
60			SS-4	8.0	9.5	Dark Gray Silty, Clayey Sand	N	
60			SS-5	9.9	11.4	Dark Gray Silty, Clayey Sand	N	18.0
61			SS-6	14.9	16.4	Gray Poorly Graded Sand	N	16.8
62			SS-7	19.9	21.4	Gray & Green Sandy Silt	S	26.4
62			SS-8	24.9	25.9	Gray & Green Sandy Silt	S	
62			SS-9	29.9	31.4	Green & Gray Sandy Silt	S	
62			SS-10	34.9	36.4	Green & Gray Sandy Silt	S	
62			SS-11	39.9	41.4	Green & Gray Sandy Silt	S	
63	RW-2		SS-1	2.0	3.5	Tan & Red Silty Sand	N	14.0
64			SS-2	4.0	5.5	Tan & Brown Well-Graded Sand with Silt	N	8.5
52			SS-3	6.0	7.5	Tan & Brown Silty Sand	N	
65			SS-4	8.0	9.5	Tan & Gray Silty Sand	N	18.9
65			SS-5	10.0	11.5	Tan & Gray Silty Sand	N	
66			SS-6	15.0	16.5	Gray Poorly Graded Sand	S	25.7
67			SS-7	20.0	21.5	Gray & Green Sandy Silt	S	30.6
67			SS-8	25.0	26.5	Gray & Green Sandy Silt	S	
67			SS-9	30.0	31.5	Gray & Green Sandy Silt	S	
67			SS-10	35.0	36.5	Gray & Green Sandy Silt	S	
67			SS-11	40.0	41.5	Gray & Green Sandy Silt	S	
68	RW-3		SS-1	2.0	3.5	Tan, Brown & Gray Poorly Graded Sand with Silt	N	
68			SS-2	4.0	5.5	Tan, Brown & Gray Poorly Graded Sand with Silt	N	12.0
68			SS-3	6.0	7.5	Tan, Brown & Gray Poorly Graded Sand with Silt	N	
68			SS-4	8.0	9.5	Gray, Green & Black Poorly Graded Sand with Silt	S	
69			SS-5	10.0	11.5	Gray & Green Sandy Lean Clay	N	28.0
8			SS-6	15.0	16.5	Gray & Green Silty Sand	S	
70			SS-7	20.0	21.5	Green & Gray Sandy Silt	S	28.4
70			SS-8	25.0	26.3	Green & Gray Sandy Silt	S	
70			SS-9	30.0	31.5	Green & Gray Sandy Silt	S	
			SS-10	33.7	33.7	No Recovery		
71	RW-4		SS-1	2.0	3.5	Tan, Red & Gray Silty Sand	N	18.3
72			SS-2	4.0	5.5	Gray & Tan Well-Graded Sand	N	
72			SS-3	6.0	7.5	Gray & Tan Well-Graded Sand	N	10.6
72			SS-4	8.0	9.5	Gray & Tan Well-Graded Sand	N	
73			SS-5	9.9	11.4	Gray & Tan Silty Sand	W	
73			SS-6	14.9	16.4	Dark Gray & Tan Silty Sand	N	
74			SS-7	19.9	21.4	Green & Gray Silty Sand	S	32.2
74			SS-8	24.9	25.1	Green & Gray Silty Sand	S	
			SS-9	25.1	25.1	No Recovery		
75	RW-5		SS-1	2.0	3.5	Gray & Tan Well-Graded Sand with Silt	N	6.7
75			SS-2	4.0	5.5	Gray, Tan & Black Well-Graded Sand with Silt	N	
76			SS-3	6.0	7.5	Dark Gray, Brown, Black & Tan Well-Graded Sand with Silt	N	11.7
76			SS-4	8.0	9.5	Dark Gray, Brown, Black & Tan Well-Graded Sand with Silt	N	
77			SS-5	9.9	11.4	Dark Gray & Brown Silty Sand	N	60.2
77			SS-6	14.9	16.4	Dark Gray & Brown Silty Sand	N	
78			SS-7	19.9	21.4	Green & Gray Sandy Silt	S	31.3
78			SS-8	24.9	26.4	Green & Gray Sandy Silt	S	
78			SS-9	29.9	31.4	Green & Gray Sandy Silt	S	
78			SS-10	34.9	35.5	Green & Gray Sandy Silt	S	
78			SS-11	39.9	41.4	Green & Gray Sandy Silt	S	
79	RW-6		SS-1	2.0	3.5	Dark Gray & Tan Silty Sand	N	14.4
75			SS-2	4.0	5.5	Dark Gray & Tan Well-Graded Sand with Silt	N	
75			SS-3	6.0	7.5	Tan, Brown & Gray Well-Graded Sand with Silt	N	
80			SS-4	8.0	9.5	Dark Gray & Tan Silty Sand	N	
80			SS-5	10.0	11.5	Dark Gray & Tan Silty Sand	N	21.3
66			SS-6	15.0	16.5	Dark Gray & Tan Poorly Graded Sand	N	

Project Name : Bridge Replacement over Four Hole Swamp

Location : Orangeburg County, South Carolina

Job Number : 11200-10

Project Job No. : 11200-10

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Natural
Moisture
Content

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	HCL	(%)
78			SS-7	20.0	20.8	Green & Gray Sandy Silt	S	
			SS-8	20.9	20.9	No Recovery		
81	RW-7		SS-1	2.0	3.5	Brown, Dark Gray & Tan Silty Sand	N	11.3
82			SS-2	4.0	5.5	Brown, Dark Gray & Tan Poorly Graded Sand with Silt	N	
82			SS-3	6.0	7.5	Tan & Gray Poorly Graded Sand with Silt	N	15.1
82			SS-4	8.0	9.5	Tan & Gray Poorly Graded Sand with Silt	N	
80			SS-5	10.0	11.5	Tan & Gray Silty Sand	N	
83			SS-6	15.0	16.5	Tan & Gray Well-Graded Sand with Silt	N	25.1
78			SS-7	20.0	21.5	Gray & Green Sandy Silt	S	
			SS-8	21.8	21.8	No Recovery		

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Orange, Tan & Black Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.7
No.6		3.35	mm		
No.10		2	mm		97.7

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		60.1
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		16.2
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.2851 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 11.7
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 2.3
 Coarse Sand (-No.10 + No.40) : 37.6
 Fine Sand (-No.40 + No.200) : 43.9
 Silt + Clay (-No.200) : 16.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.3
 Coarse Sand (-No.4 + No.10) : 2.0
 Medium Sand (-No.10 + No.40) : 37.6
 Fine Sand (-No.40 + No.200) : 43.9
 Silt + Clay (-No.200) : 16.2

Approved By : J.S.

Soil No. 1

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Tan, Brown & Gray Clayey Sand	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.6
No.6		3.35	mm	
No.10		2	mm	97.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1441 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 17.5
 Liquid Limit (AASHTO T89) : 25
 Plastic Limit (AASHTO T90) : 17
 Plasticity Index : 8
 Liquidity Index : 0.01
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 2.2
 Coarse Sand (-No.10 + No.40) : 18.5
 Fine Sand (-No.40 + No.200) : 47.0
 Silt + Clay (-No.200) : 32.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.4
 Coarse Sand (-No.4 + No.10) : 1.8
 Medium Sand (-No.10 + No.40) : 18.5
 Fine Sand (-No.40 + No.200) : 47.0
 Silt + Clay (-No.200) : 32.3

Approved By : J.S.

Soil No. 2

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 16.0' to 17.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Gray & White Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	41.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.5305 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 1.5</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 56.6</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 37.5</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 4.4</p>	<p>Natural Moisture (%) (AASHTO T265) : 13.1</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SP</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.5

Medium Sand (-No.10 + No.40) : 56.6

Fine Sand (-No.40 + No.200) : 37.5

Silt + Clay (-No.200) : 4.4

Approved By : J.S.

Soil No. 3

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 21.0' to 22.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		99.4

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		80.9
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		28.5
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.1528 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.6</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 18.5</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 52.4</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 28.5</p>	<p>Natural Moisture (%) (AASHTO T265) : 38.1</p> <p>Liquid Limit (AASHTO T89) : 37</p> <p>Plastic Limit (AASHTO T90) : 31</p> <p style="padding-left: 20px;">Plasticity Index : 6</p> <p style="padding-left: 20px;">Liquidity Index : 1.17</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.6

Medium Sand (-No.10 + No.40) : 18.5

Fine Sand (-No.40 + No.200) : 52.4

Silt + Clay (-No.200) : 28.5

Approved By : J.S.

Soil No. 4

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-9
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 31.0' to 32.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		93.7
No.6		3.35	mm		
No.10		2	mm		83.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		59.5
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		24.5
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.2654 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 23.5
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 16.1
 Coarse Sand (-No.10 + No.40) : 24.4
 Fine Sand (-No.40 + No.200) : 35.0
 Silt + Clay (-No.200) : 24.5

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 6.3
 Coarse Sand (-No.4 + No.10) : 9.8
 Medium Sand (-No.10 + No.40) : 24.4
 Fine Sand (-No.40 + No.200) : 35.0
 Silt + Clay (-No.200) : 24.5

Approved By : J.S.

Soil No. 5

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-11
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 41.0' to 42.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Green, Gray & Tan Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0975 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.0</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 16.3</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 39.7</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 44.0</p>	<p>Natural Moisture (%) (AASHTO T265) : 44.9</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.0

Medium Sand (-No.10 + No.40) : 16.3

Fine Sand (-No.40 + No.200) : 39.7

Silt + Clay (-No.200) : 44.0

Approved By : J.S.

Soil No. 6

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-13
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 51.0' to 52.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green, Gray & Tan Sandy Silt	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.3
No.6		3.35	mm	
No.10		2	mm	92.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.0398 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 33.9
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (0)
 ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 7.1
 Coarse Sand (-No.10 + No.40) : 5.4
 Fine Sand (-No.40 + No.200) : 32.2
 Silt + Clay (-No.200) : 55.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 1.7
 Coarse Sand (-No.4 + No.10) : 5.4
 Medium Sand (-No.10 + No.40) : 5.4
 Fine Sand (-No.40 + No.200) : 32.2
 Silt + Clay (-No.200) : 55.3

Approved By : J.S.

Soil No. 7

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.0
No.6		3.35	mm	
No.10		2	mm	96.1

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	37.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	14.2
No.270		0.053	mm	
Hyd. Rd. # 1		0.0366	mm	11.2
Hyd. Rd. # 2		0.0233	mm	10.2
Hyd. Rd. # 3		0.0135	mm	9.1
Hyd. Rd. # 4		0.0095	mm	8.2
Hyd. Rd. # 5		0.0068	mm	5.3
Hyd. Rd. # 6		0.0034	mm	4.1
Hyd. Rd. # 7		0.0014	mm	2.7

$D_{50} = 0.5926 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.655
 AASHTO Classification: M145 : A-1-b (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 3.9
 Coarse Sand (-No.10 + No.40) : 58.7
 Fine Sand (-No.40 + No.200) : 23.2
 Silt (-No.200 + 0.002mm) : 10.9
 Clay (-0.002mm + 0.001mm) : 0.9
 Colloids (-0.001mm) : 2.4

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 1.0
 Coarse Sand (-No.4 + No.10) : 2.9
 Medium Sand (-No.10 + No.40) : 58.7
 Fine Sand (-No.40 + No.200) : 23.2
 Silt (-No.200 + 0.005mm) : 9.4
 Clay (-0.005mm + 0.001mm) : 2.4
 Colloids (-0.001mm) : 2.4

Approved By : J.S.

Soil No. 8

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 10.0' to 11.3'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.1
No.270		0.053	mm	
Hyd. Rd. # 1		0.0319	mm	46.3
Hyd. Rd. # 2		0.0204	mm	42.4
Hyd. Rd. # 3		0.0120	mm	38.2
Hyd. Rd. # 4		0.0086	mm	33.2
Hyd. Rd. # 5		0.0062	mm	29.2
Hyd. Rd. # 6		0.0032	mm	17.0
Hyd. Rd. # 7		0.0014	mm	8.6

D₅₀ = 0.0457 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.758
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 0.0
 Coarse Sand (-No.10 + No.40) : 4.8
 Fine Sand (-No.40 + No.200) : 40.1
 Silt (-No.200 + 0.002mm) : 42.7
 Clay (-0.002mm + 0.001mm) : 4.8
 Colloids (-0.001mm) : 7.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 4.8
 Fine Sand (-No.40 + No.200) : 40.1
 Silt (-No.200 + 0.005mm) : 29.8
 Clay (-0.005mm + 0.001mm) : 17.7
 Colloids (-0.001mm) : 7.6

Approved By : J.S.

Soil No. 9

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Clayey Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	46.7
No.270		0.053	mm	
Hyd. Rd. # 1		0.0330	mm	41.8
Hyd. Rd. # 2		0.0210	mm	40.7
Hyd. Rd. # 3		0.0124	mm	32.8
Hyd. Rd. # 4		0.0089	mm	28.8
Hyd. Rd. # 5		0.0064	mm	23.9
Hyd. Rd. # 6		0.0032	mm	15.0
Hyd. Rd. # 7		0.0014	mm	7.1

$D_{50} = 0.0908 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 24.6
 Liquid Limit (AASHTO T89) : 35
 Plastic Limit (AASHTO T90) : 23
 Plasticity Index : 12
 Liquidity Index : 0.11
 Activity : 1.13
 Sp. Gr. (AASHTO T100) : 2.718
 AASHTO Classification: M145 : A-6 (3)
 ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.0
 Coarse Sand (-No.10 + No.40) : 23.3
 Fine Sand (-No.40 + No.200) : 30.0
 Silt (-No.200 + 0.002mm) : 36.0
 Clay (-0.002mm + 0.001mm) : 4.4
 Colloids (-0.001mm) : 6.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 23.3
 Fine Sand (-No.40 + No.200) : 30.0
 Silt (-No.200 + 0.005mm) : 26.0
 Clay (-0.005mm + 0.001mm) : 14.5
 Colloids (-0.001mm) : 6.3

Approved By : J.S.

Soil No. 10

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-8
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 25.0' to 26.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	39.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1109 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 34.4
 Liquid Limit (AASHTO T89) : 31
 Plastic Limit (AASHTO T90) : 30
 Plasticity Index : 1
 Liquidity Index : 4.80
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.0
 Coarse Sand (-No.10 + No.40) : 12.9
 Fine Sand (-No.40 + No.200) : 47.9
 Silt + Clay (-No.200) : 39.2

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 12.9
 Fine Sand (-No.40 + No.200) : 47.9
 Silt + Clay (-No.200) : 39.2

Approved By : J.S.

Soil No. 11

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-10
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 35.0' to 36.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0991 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.1
 Coarse Sand (-No.10 + No.40) : 17.5
 Fine Sand (-No.40 + No.200) : 38.6
 Silt + Clay (-No.200) : 43.8

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.1
 Medium Sand (-No.10 + No.40) : 17.5
 Fine Sand (-No.40 + No.200) : 38.6
 Silt + Clay (-No.200) : 43.8

Approved By : J.S.

Soil No. 12

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-11
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 40.0' to 41.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0851 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 0.8 Coarse Sand (-No.10 + No.40) : 12.2 Fine Sand (-No.40 + No.200) : 39.9 Silt + Clay (-No.200) : 47.1	Natural Moisture (%) (AASHTO T265) : 38.1 Liquid Limit (AASHTO T89) : NP Plastic Limit (AASHTO T90) : NP Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.8
 Medium Sand (-No.10 + No.40) : 12.2
 Fine Sand (-No.40 + No.200) : 39.9
 Silt + Clay (-No.200) : 47.1

Approved By : J.S.

Soil No. 13

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-15
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 60.0' to 61.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		99.6

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		81.9
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		48.7
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.0803 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 0.4 Coarse Sand (-No.10 + No.40) : 17.7 Fine Sand (-No.40 + No.200) : 33.2 Silt + Clay (-No.200) : 48.7	Natural Moisture (%) (AASHTO T265) : 33.8 Liquid Limit (AASHTO T89) : 40 Plastic Limit (AASHTO T90) : 35 Plasticity Index : 5 Liquidity Index : -0.27 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (1) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.4
 Medium Sand (-No.10 + No.40) : 17.7
 Fine Sand (-No.40 + No.200) : 33.2
 Silt + Clay (-No.200) : 48.7

Approved By : J.S.

Soil No. 14

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-17
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 70.0' to 71.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	64.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.2337 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.3</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 35.5</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 41.2</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 23.0</p>	<p>Natural Moisture (%) (AASHTO T265) : 37.6</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.3

Medium Sand (-No.10 + No.40) : 35.5

Fine Sand (-No.40 + No.200) : 41.2

Silt + Clay (-No.200) : 23.0

Approved By : J.S.

Soil No. 15

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-18
Project No. : 11200-10	Sample Loc. : Boring No. B-2
Project County : Orangeburg	Sample Depth : 75.0' to 76.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Green Poorly Graded Sand with Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm	100.0	
1/2	in.	12.5	mm		
3/8	in.	9.5	mm	99.6	
1/4		6.3	mm		
No.4		4.75	mm	95.8	
No.6		3.35	mm		
No.10		2	mm	84.3	

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm	42.0	
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm	7.9	
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.5696 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 35.1
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SP-SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 15.7
 Coarse Sand (-No.10 + No.40) : 42.3
 Fine Sand (-No.40 + No.200) : 34.1
 Silt + Clay (-No.200) : 7.9

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 4.2
 Coarse Sand (-No.4 + No.10) : 11.5
 Medium Sand (-No.10 + No.40) : 42.3
 Fine Sand (-No.40 + No.200) : 34.1
 Silt + Clay (-No.200) : 7.9

Approved By : J.S.

Soil No. 16

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : White & Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.6
No.6		3.35	mm	
No.10		2	mm	74.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	8.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	0.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 1.1238 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 25.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 66.9</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 7.5</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 0.5</p>	<p>Natural Moisture (%) (AASHTO T265) : 4.5</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SP</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 1.4

Coarse Sand (-No.4 + No.10) : 23.7

Medium Sand (-No.10 + No.40) : 66.9

Fine Sand (-No.40 + No.200) : 7.5

Silt + Clay (-No.200) : 0.5

Approved By : J.S.

Soil No. 17

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/16/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green, Gray & Tan Sandy Silt	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.5
No.6		3.35	mm	
No.10		2	mm	97.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	85.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.9
No.270		0.053	mm	
Hyd. Rd. # 1		0.0320	mm	44.9
Hyd. Rd. # 2		0.0206	mm	40.1
Hyd. Rd. # 3		0.0120	mm	38.1
Hyd. Rd. # 4		0.0087	mm	32.2
Hyd. Rd. # 5		0.0062	mm	27.5
Hyd. Rd. # 6		0.0032	mm	15.6
Hyd. Rd. # 7		0.0014	mm	8.3

$D_{50} = 0.0596 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 30.2
 Liquid Limit (AASHTO T89) : 36
 Plastic Limit (AASHTO T90) : 29
 Plasticity Index : 7
 Liquidity Index : 0.17
 Activity : 0.60
 Sp. Gr. (AASHTO T100) : 2.729
 AASHTO Classification: M145 : A-4 (2)
 ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 3.0
 Coarse Sand (-No.10 + No.40) : 11.8
 Fine Sand (-No.40 + No.200) : 33.3
 Silt (-No.200 + 0.002mm) : 40.3
 Clay (-0.002mm + 0.001mm) : 4.3
 Colloids (-0.001mm) : 7.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.5
 Coarse Sand (-No.4 + No.10) : 2.5
 Medium Sand (-No.10 + No.40) : 11.8
 Fine Sand (-No.40 + No.200) : 33.3
 Silt (-No.200 + 0.005mm) : 28.3
 Clay (-0.005mm + 0.001mm) : 16.3
 Colloids (-0.001mm) : 7.3

Approved By : J.S.

Soil No. 18

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/17/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green, Gray & Tan Sandy Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		99.7

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		93.1
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		55.2
No.270		0.053	mm		
Hyd. Rd. # 1		0.0323	mm		49.2
Hyd. Rd. # 2		0.0208	mm		44.2
Hyd. Rd. # 3		0.0121	mm		41.2
Hyd. Rd. # 4		0.0088	mm		34.4
Hyd. Rd. # 5		0.0064	mm		25.5
Hyd. Rd. # 6		0.0032	mm		15.5
Hyd. Rd. # 7		0.0014	mm		6.0

D₅₀ = 0.0361 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.697
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 0.3
 Coarse Sand (-No.10 + No.40) : 6.6
 Fine Sand (-No.40 + No.200) : 37.9
 Silt (-No.200 + 0.002mm) : 45.1
 Clay (-0.002mm + 0.001mm) : 4.9
 Colloids (-0.001mm) : 5.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.3
 Medium Sand (-No.10 + No.40) : 6.6
 Fine Sand (-No.40 + No.200) : 37.9
 Silt (-No.200 + 0.005mm) : 33.3
 Clay (-0.005mm + 0.001mm) : 16.6
 Colloids (-0.001mm) : 5.2

Approved By : J.S.

Soil No. 19

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-8
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 25.0' to 26.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		100.0

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		84.5
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		43.6
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.0984 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 0.0 Coarse Sand (-No.10 + No.40) : 15.5 Fine Sand (-No.40 + No.200) : 40.9 Silt + Clay (-No.200) : 43.6	Natural Moisture (%) (AASHTO T265) : 37.9 Liquid Limit (AASHTO T89) : 36 Plastic Limit (AASHTO T90) : 33 Plasticity Index : 3 Liquidity Index : 1.67 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 15.5
 Fine Sand (-No.40 + No.200) : 40.9
 Silt + Clay (-No.200) : 43.6

Approved By : J.S.

Soil No. 20

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-10
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 35.0' to 36.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.4

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0857 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 0.6 Coarse Sand (-No.10 + No.40) : 16.9 Fine Sand (-No.40 + No.200) : 35.2 Silt + Clay (-No.200) : 47.3	Natural Moisture (%) (AASHTO T265) : 46.7 Liquid Limit (AASHTO T89) : NP Plastic Limit (AASHTO T90) : NP Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.6
 Medium Sand (-No.10 + No.40) : 16.9
 Fine Sand (-No.40 + No.200) : 35.2
 Silt + Clay (-No.200) : 47.3

Approved By : J.S.

Soil No. 21

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-15
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 60.0' to 61.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Dark Green Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.8
No.6		3.35	mm		
No.10		2	mm		93.5

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		63.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		28.0
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.2184 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 6.5</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 29.8</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 35.7</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 28.0</p>	<p>Natural Moisture (%) (AASHTO T265) : 35.9</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.2

Coarse Sand (-No.4 + No.10) : 6.3

Medium Sand (-No.10 + No.40) : 29.8

Fine Sand (-No.40 + No.200) : 35.7

Silt + Clay (-No.200) : 28.0

Approved By : J.S.

Soil No. 22

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-19
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 80.0' to 81.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Gray, Green, Black & Tan Well-Graded Sand with Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	95.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	17.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	5.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.8141 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.7
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SW-SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 4.5
 Coarse Sand (-No.10 + No.40) : 78.4
 Fine Sand (-No.40 + No.200) : 11.4
 Silt + Clay (-No.200) : 5.7

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 4.5
 Medium Sand (-No.10 + No.40) : 78.4
 Fine Sand (-No.40 + No.200) : 11.4
 Silt + Clay (-No.200) : 5.7

Approved By : J.S.

Soil No. 23

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-23
Project No. : 11200-10	Sample Loc. : Boring No. B-3
Project County : Orangeburg	Sample Depth : 100.0' to 101.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	97.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1031 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 2.3 Coarse Sand (-No.10 + No.40) : 14.8 Fine Sand (-No.40 + No.200) : 40.3 Silt + Clay (-No.200) : 42.6	Natural Moisture (%) (AASHTO T265) : 38.9 Liquid Limit (AASHTO T89) : 44 Plastic Limit (AASHTO T90) : 44 Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-5 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 2.3
 Medium Sand (-No.10 + No.40) : 14.8
 Fine Sand (-No.40 + No.200) : 40.3
 Silt + Clay (-No.200) : 42.6

Approved By : J.S.

Soil No. 24

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	93.4
1/4		6.3	mm	
No.4		4.75	mm	92.3
No.6		3.35	mm	
No.10		2	mm	83.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	7.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	0.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 1.0132 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 17.2
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SP

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 16.5
 Coarse Sand (-No.10 + No.40) : 76.3
 Fine Sand (-No.40 + No.200) : 7.1
 Silt + Clay (-No.200) : 0.1

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 7.7
 Coarse Sand (-No.4 + No.10) : 8.8
 Medium Sand (-No.10 + No.40) : 76.3
 Fine Sand (-No.40 + No.200) : 7.1
 Silt + Clay (-No.200) : 0.1

Approved By : J.S.

Soil No. 25

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Sandy Silt	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.9
No.6		3.35	mm	
No.10		2	mm	96.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.2
No.270		0.053	mm	
Hyd. Rd. # 1		0.0324	mm	43.5
Hyd. Rd. # 2		0.0208	mm	39.7
Hyd. Rd. # 3		0.0121	mm	36.0
Hyd. Rd. # 4		0.0087	mm	33.1
Hyd. Rd. # 5		0.0063	mm	27.1
Hyd. Rd. # 6		0.0032	mm	16.7
Hyd. Rd. # 7		0.0014	mm	9.4

D₅₀ = 0.0731 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.714
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 3.7
 Coarse Sand (-No.10 + No.40) : 9.2
 Fine Sand (-No.40 + No.200) : 36.9
 Silt (-No.200 + 0.002mm) : 37.5
 Clay (-0.002mm + 0.001mm) : 4.4
 Colloids (-0.001mm) : 8.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 1.1
 Coarse Sand (-No.4 + No.10) : 2.6
 Medium Sand (-No.10 + No.40) : 9.2
 Fine Sand (-No.40 + No.200) : 36.9
 Silt (-No.200 + 0.005mm) : 26.6
 Clay (-0.005mm + 0.001mm) : 15.3
 Colloids (-0.001mm) : 8.3

Approved By : J.S.

Soil No. 26

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	92.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.4
No.270		0.053	mm	
Hyd. Rd. # 1		0.0326	mm	45.0
Hyd. Rd. # 2		0.0209	mm	41.0
Hyd. Rd. # 3		0.0122	mm	37.0
Hyd. Rd. # 4		0.0088	mm	32.9
Hyd. Rd. # 5		0.0063	mm	28.8
Hyd. Rd. # 6		0.0032	mm	17.0
Hyd. Rd. # 7		0.0014	mm	9.2

$D_{50} = 0.0573 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 34.8
 Liquid Limit (AASHTO T89) : 35
 Plastic Limit (AASHTO T90) : 27
 Plasticity Index : 8
 Liquidity Index : 0.94
 Activity : 0.63
 Sp. Gr. (AASHTO T100) : 2.718
 AASHTO Classification: M145 : A-4 (2)
 ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.0
 Coarse Sand (-No.10 + No.40) : 8.0
 Fine Sand (-No.40 + No.200) : 39.6
 Silt (-No.200 + 0.002mm) : 39.6
 Clay (-0.002mm + 0.001mm) : 4.6
 Colloids (-0.001mm) : 8.2

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 8.0
 Fine Sand (-No.40 + No.200) : 39.6
 Silt (-No.200 + 0.005mm) : 27.6
 Clay (-0.005mm + 0.001mm) : 16.7
 Colloids (-0.001mm) : 8.2

Approved By : J.S.

Soil No. 27

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 20.0' to 21.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand with Gravel	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		100.0
3/4	in.	19	mm		97.4
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		90.2
1/4		6.3	mm		
No.4		4.75	mm		85.0
No.6		3.35	mm		
No.10		2	mm		80.0

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		61.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		32.8
No.270		0.053	mm		
Hyd. Rd. # 1		0.0335	mm		29.5
Hyd. Rd. # 2		0.0213	mm		27.9
Hyd. Rd. # 3		0.0125	mm		23.2
Hyd. Rd. # 4		0.0090	mm		20.1
Hyd. Rd. # 5		0.0064	mm		16.0
Hyd. Rd. # 6		0.0033	mm		8.1
Hyd. Rd. # 7		0.0014	mm		3.0

D₅₀ = 0.2106 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.711
 AASHTO Classification: M145 : A-2-4 (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 20.0
 Coarse Sand (-No.10 + No.40) : 18.3
 Fine Sand (-No.40 + No.200) : 28.9
 Silt (-No.200 + 0.002mm) : 27.6
 Clay (-0.002mm + 0.001mm) : 2.6
 Colloids (-0.001mm) : 2.6

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 2.6
 Fine Gravel (-3/4in. + No.4) : 12.4
 Coarse Sand (-No.4 + No.10) : 5.0
 Medium Sand (-No.10 + No.40) : 18.3
 Fine Sand (-No.40 + No.200) : 28.9
 Silt (-No.200 + 0.005mm) : 19.7
 Clay (-0.005mm + 0.001mm) : 10.5
 Colloids (-0.001mm) : 2.6

Approved By : J.S.

Soil No. 28

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-8
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 25.0' to 26.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	88.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0757 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.2</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 11.8</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 38.2</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 49.8</p>	<p>Natural Moisture (%) (AASHTO T265) : 33.2</p> <p>Liquid Limit (AASHTO T89) : 27</p> <p>Plastic Limit (AASHTO T90) : 27</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.2

Medium Sand (-No.10 + No.40) : 11.8

Fine Sand (-No.40 + No.200) : 38.2

Silt + Clay (-No.200) : 49.8

Approved By : J.S.

Soil No. 29

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-10
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 35.0' to 36.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.2
No.6		3.35	mm	
No.10		2	mm	91.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.0776 \text{ mm}$

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 8.3</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 11.7</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 30.6</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 49.4</p>	<p>Natural Moisture (%) (AASHTO T265) : 43.4</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 1.8

Coarse Sand (-No.4 + No.10) : 6.5

Medium Sand (-No.10 + No.40) : 11.7

Fine Sand (-No.40 + No.200) : 30.6

Silt + Clay (-No.200) : 49.4

Approved By : J.S.

Soil No. 30

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-13
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 50.0' to 51.5'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/23/14
Submitted By : ICA Engineering	
Soil Type : Gray, Tan & Green Silty Sand	

AASHTO T27 :

% Passing			
4	in.	101.6	mm
3.5	in.	88.9	mm
3	in.	76.2	mm
2.5	in.	63.5	mm
2	in.	50.8	mm
1 3/4	in.	45	mm
1 1/2	in.	38.1	mm
1 1/4	in.	31.5	mm
1	in.	25	mm
3/4	in.	19	mm
1/2	in.	12.5	mm
3/8	in.	9.5	mm
1/4		6.3	mm
No.4		4.75	mm
No.6		3.35	mm
No.10		2	mm

% Passing			
No.16		1.18	mm
No.30		0.6	mm
No.40		0.425	mm
No.50		0.3	mm
No.60		0.25	mm
No.80		0.18	mm
No.100		0.15	mm
No.200		0.075	mm
No.270		0.053	mm
Hyd. Rd. # 1			mm
Hyd. Rd. # 2			mm
Hyd. Rd. # 3			mm
Hyd. Rd. # 4			mm
Hyd. Rd. # 5			mm
Hyd. Rd. # 6			mm
Hyd. Rd. # 7			mm

D₅₀ = 0.1026 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.0</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 16.4</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 41.0</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 42.6</p>	<p>Natural Moisture (%) (AASHTO T265) : 36</p> <p>Liquid Limit (AASHTO T89) : 37</p> <p>Plastic Limit (AASHTO T90) : 34</p> <p style="padding-left: 20px;">Plasticity Index : 3</p> <p style="padding-left: 20px;">Liquidity Index : 0.76</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.0

Medium Sand (-No.10 + No.40) : 16.4

Fine Sand (-No.40 + No.200) : 41.0

Silt + Clay (-No.200) : 42.6

Approved By : J.S.

Soil No. 31

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-16
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 65.0' to 66.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray, Tan & Green Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1343 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.7</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 16.7</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 49.1</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 33.5</p>	<p>Natural Moisture (%) (AASHTO T265) : 33.4</p> <p>Liquid Limit (AASHTO T89) : 36</p> <p>Plastic Limit (AASHTO T90) : 33</p> <p style="padding-left: 20px;">Plasticity Index : 3</p> <p style="padding-left: 20px;">Liquidity Index : 0.17</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.7

Medium Sand (-No.10 + No.40) : 16.7

Fine Sand (-No.40 + No.200) : 49.1

Silt + Clay (-No.200) : 33.5

Approved By : J.S.

Soil No. 32

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-19
Project No. : 11200-10	Sample Loc. : Boring No. B-4
Project County : Orangeburg	Sample Depth : 80.0' to 81.2'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/23/14
Submitted By : ICA Engineering	
Soil Type : Gray, Tan & Green Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		99.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		68.1
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		27.3
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.1969 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 0.1 Coarse Sand (-No.10 + No.40) : 31.8 Fine Sand (-No.40 + No.200) : 40.8 Silt + Clay (-No.200) : 27.3	Natural Moisture (%) (AASHTO T265) : 22.7 Liquid Limit (AASHTO T89) : 33 Plastic Limit (AASHTO T90) : 30 Plasticity Index : 3 Liquidity Index : -2.43 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-2-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.1
 Medium Sand (-No.10 + No.40) : 31.8
 Fine Sand (-No.40 + No.200) : 40.8
 Silt + Clay (-No.200) : 27.3

Approved By : J.S.

Soil No. 33

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Tan Well-Graded Sand	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	96.9
No.6		3.35	mm	
No.10		2	mm	85.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	3.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.7539 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 16.8
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SW

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 14.6
 Coarse Sand (-No.10 + No.40) : 56.2
 Fine Sand (-No.40 + No.200) : 25.4
 Silt + Clay (-No.200) : 3.8

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 3.1
 Coarse Sand (-No.4 + No.10) : 11.5
 Medium Sand (-No.10 + No.40) : 56.2
 Fine Sand (-No.40 + No.200) : 25.4
 Silt + Clay (-No.200) : 3.8

Approved By : J.S.

Soil No. 34

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green, Gray & Tan Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	96.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.9
No.270		0.053	mm	
Hyd. Rd. # 1		0.0316	mm	52.8
Hyd. Rd. # 2		0.0204	mm	47.9
Hyd. Rd. # 3		0.0119	mm	44.1
Hyd. Rd. # 4		0.0085	mm	40.2
Hyd. Rd. # 5		0.0062	mm	33.4
Hyd. Rd. # 6		0.0031	mm	20.5
Hyd. Rd. # 7		0.0014	mm	10.6

D₅₀ = 0.0246 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.728
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.1
 Coarse Sand (-No.10 + No.40) : 3.8
 Fine Sand (-No.40 + No.200) : 36.2
 Silt (-No.200 + 0.002mm) : 44.7
 Clay (-0.002mm + 0.001mm) : 5.8
 Colloids (-0.001mm) : 9.4

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.1
 Medium Sand (-No.10 + No.40) : 3.8
 Fine Sand (-No.40 + No.200) : 36.2
 Silt (-No.200 + 0.005mm) : 30.6
 Clay (-0.005mm + 0.001mm) : 19.9
 Colloids (-0.001mm) : 9.4

Approved By : J.S.

Soil No. 35

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/16/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.9
1/4		6.3	mm	
No.4		4.75	mm	95.7
No.6		3.35	mm	
No.10		2	mm	93.4

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.8
No.270		0.053	mm	
Hyd. Rd. # 1		0.0327	mm	39.4
Hyd. Rd. # 2		0.0210	mm	35.8
Hyd. Rd. # 3		0.0123	mm	31.2
Hyd. Rd. # 4		0.0088	mm	27.5
Hyd. Rd. # 5		0.0064	mm	20.0
Hyd. Rd. # 6		0.0032	mm	12.2
Hyd. Rd. # 7		0.0014	mm	7.0

D₅₀ = 0.0837 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.716
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 6.6
 Coarse Sand (-No.10 + No.40) : 11.0
 Fine Sand (-No.40 + No.200) : 34.6
 Silt (-No.200 + 0.002mm) : 38.5
 Clay (-0.002mm + 0.001mm) : 3.1
 Colloids (-0.001mm) : 6.2

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 4.3
 Coarse Sand (-No.4 + No.10) : 2.3
 Medium Sand (-No.10 + No.40) : 11.0
 Fine Sand (-No.40 + No.200) : 34.6
 Silt (-No.200 + 0.005mm) : 30.6
 Clay (-0.005mm + 0.001mm) : 11.0
 Colloids (-0.001mm) : 6.2

Approved By : J.S.

Soil No. 36

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 32.4' to 33.9'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1075 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.2</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 16.2</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 42.4</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 41.2</p>	<p>Natural Moisture (%) (AASHTO T265) : 36.4</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.2

Medium Sand (-No.10 + No.40) : 16.2

Fine Sand (-No.40 + No.200) : 42.4

Silt + Clay (-No.200) : 41.2

Approved By : J.S.

Soil No. 37

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-9
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 45.0' to 46.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0561 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 17.0</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 30.6</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 52.3</p>	<p>Natural Moisture (%) (AASHTO T265) : 37</p> <p>Liquid Limit (AASHTO T89) : 45</p> <p>Plastic Limit (AASHTO T90) : 33</p> <p style="padding-left: 20px;">Plasticity Index : 12</p> <p style="padding-left: 20px;">Liquidity Index : 0.31</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-7-5 (5)</p> <p>ASTM Classification: D2487 : ML</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.1

Medium Sand (-No.10 + No.40) : 17.0

Fine Sand (-No.40 + No.200) : 30.6

Silt + Clay (-No.200) : 52.3

Approved By : J.S.

Soil No. 38

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-11
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 55.0' to 56.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	84.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.074 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.0</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 15.9</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 34.0</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 50.1</p>	<p>Natural Moisture (%) (AASHTO T265) : 39.6</p> <p>Liquid Limit (AASHTO T89) : 43</p> <p>Plastic Limit (AASHTO T90) : 40</p> <p style="padding-left: 20px;">Plasticity Index : 3</p> <p style="padding-left: 20px;">Liquidity Index : -0.19</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-5 (1)</p> <p>ASTM Classification: D2487 : ML</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.0

Medium Sand (-No.10 + No.40) : 15.9

Fine Sand (-No.40 + No.200) : 34.0

Silt + Clay (-No.200) : 50.1

Approved By : J.S.

Soil No. 39

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-13
Project No. : 11200-10	Sample Loc. : Boring No. B-5
Project County : Orangeburg	Sample Depth : 65.0' to 66.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Green, Tan & Black Well-Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.7
No.6		3.35	mm	
No.10		2	mm	85.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	23.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	2.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.8266 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 14.8</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 61.7</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 20.9</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 2.6</p>	<p>Natural Moisture (%) (AASHTO T265) : 45.4</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SW</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.3

Coarse Sand (-No.4 + No.10) : 14.5

Medium Sand (-No.10 + No.40) : 61.7

Fine Sand (-No.40 + No.200) : 20.9

Silt + Clay (-No.200) : 2.6

Approved By : J.S.

Soil No. 40

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. B-6
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/22/14
Laboratory No. : 11200-10	Date Reported : 07/25/14
Submitted By : ICA Engineering	
Soil Type : Brown, Tan & Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	88.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	11.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	1.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.921 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 12.7
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SP

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 11.8
 Coarse Sand (-No.10 + No.40) : 76.3
 Fine Sand (-No.40 + No.200) : 10.3
 Silt + Clay (-No.200) : 1.6

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 11.8
 Medium Sand (-No.10 + No.40) : 76.3
 Fine Sand (-No.40 + No.200) : 10.3
 Silt + Clay (-No.200) : 1.6

Approved By : J.S.

Soil No. 41

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. B-6
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Brown, Tan & Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	97.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.509 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SP

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 2.2
 Coarse Sand (-No.10 + No.40) : 54.1
 Fine Sand (-No.40 + No.200) : 39.7
 Silt + Clay (-No.200) : 4.0

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 2.2
 Medium Sand (-No.10 + No.40) : 54.1
 Fine Sand (-No.40 + No.200) : 39.7
 Silt + Clay (-No.200) : 4.0

Approved By : J.S.

Soil No. 42

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. B-6
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Brown, Tan & Gray Poorly Graded Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		97.5
1/4		6.3	mm		
No.4		4.75	mm		96.7
No.6		3.35	mm		
No.10		2	mm		92.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		37.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		2.1
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.6028 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 7.8</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 54.5</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 35.6</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 2.1</p>	<p>Natural Moisture (%) (AASHTO T265) : 17</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SP</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 3.3

Coarse Sand (-No.4 + No.10) : 4.5

Medium Sand (-No.10 + No.40) : 54.5

Fine Sand (-No.40 + No.200) : 35.6

Silt + Clay (-No.200) : 2.1

Approved By : J.S.

Soil No. 43

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-6
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/17/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Brown Poorly Graded Sand with Silt	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.6
No.6		3.35	mm	
No.10		2	mm	99.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	86.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	8.8
No.270		0.053	mm	
Hyd. Rd. # 1		0.0377	mm	4.8
Hyd. Rd. # 2		0.0238	mm	4.8
Hyd. Rd. # 3		0.0137	mm	3.9
Hyd. Rd. # 4		0.0097	mm	3.8
Hyd. Rd. # 5		0.0069	mm	3.8
Hyd. Rd. # 6		0.0034	mm	3.6
Hyd. Rd. # 7		0.0014	mm	2.9

D₅₀ = 0.1884 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.672
 AASHTO Classification: M145 : A-2-4 (0) *
 ASTM Classification: D2487 : SP-SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.8
 Coarse Sand (-No.10 + No.40) : 12.8
 Fine Sand (-No.40 + No.200) : 77.6
 Silt (-No.200 + 0.002mm) : 5.6
 Clay (-0.002mm + 0.001mm) : 0.7
 Colloids (-0.001mm) : 2.5

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.4
 Coarse Sand (-No.4 + No.10) : 0.4
 Medium Sand (-No.10 + No.40) : 12.8
 Fine Sand (-No.40 + No.200) : 77.6
 Silt (-No.200 + 0.005mm) : 5.1
 Clay (-0.005mm + 0.001mm) : 1.2
 Colloids (-0.001mm) : 2.5

Approved By : J.S.

Soil No. 44

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. B-7
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/16/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	93.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.5
No.270		0.053	mm	
Hyd. Rd. # 1		0.0324	mm	46.8
Hyd. Rd. # 2		0.0206	mm	44.9
Hyd. Rd. # 3		0.0121	mm	39.9
Hyd. Rd. # 4		0.0087	mm	35.1
Hyd. Rd. # 5		0.0063	mm	27.3
Hyd. Rd. # 6		0.0032	mm	17.7
Hyd. Rd. # 7		0.0014	mm	8.8

D₅₀ = 0.0427 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.713
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.1
 Coarse Sand (-No.10 + No.40) : 6.8
 Fine Sand (-No.40 + No.200) : 36.6
 Silt (-No.200 + 0.002mm) : 43.7
 Clay (-0.002mm + 0.001mm) : 5.0
 Colloids (-0.001mm) : 7.7

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.1
 Medium Sand (-No.10 + No.40) : 6.8
 Fine Sand (-No.40 + No.200) : 36.6
 Silt (-No.200 + 0.005mm) : 32.5
 Clay (-0.005mm + 0.001mm) : 16.3
 Colloids (-0.001mm) : 7.7

Approved By : J.S.

Soil No. 45

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. B-7
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	93.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.7
No.270		0.053	mm	
Hyd. Rd. # 1		0.0334	mm	42.2
Hyd. Rd. # 2		0.0212	mm	40.0
Hyd. Rd. # 3		0.0124	mm	36.8
Hyd. Rd. # 4		0.0088	mm	34.6
Hyd. Rd. # 5		0.0064	mm	28.0
Hyd. Rd. # 6		0.0032	mm	17.2
Hyd. Rd. # 7		0.0014	mm	9.9

D₅₀ = 0.0702 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.715
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : ML *
 * Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 0.0
 Coarse Sand (-No.10 + No.40) : 7.0
 Fine Sand (-No.40 + No.200) : 42.3
 Silt (-No.200 + 0.002mm) : 37.5
 Clay (-0.002mm + 0.001mm) : 4.4
 Colloids (-0.001mm) : 8.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.0
 Medium Sand (-No.10 + No.40) : 7.0
 Fine Sand (-No.40 + No.200) : 42.3
 Silt (-No.200 + 0.005mm) : 26.5
 Clay (-0.005mm + 0.001mm) : 15.5
 Colloids (-0.001mm) : 8.8

Approved By : J.S.

Soil No. 46

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-7
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.8
No.6		3.35	mm	
No.10		2	mm	97.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	86.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1067 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 30.9
 Liquid Limit (AASHTO T89) : 31
 Plastic Limit (AASHTO T90) : 25
 Plasticity Index : 6
 Liquidity Index : 1.04
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 2.5
 Coarse Sand (-No.10 + No.40) : 10.6
 Fine Sand (-No.40 + No.200) : 46.3
 Silt + Clay (-No.200) : 40.6

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.2
 Coarse Sand (-No.4 + No.10) : 2.3
 Medium Sand (-No.10 + No.40) : 10.6
 Fine Sand (-No.40 + No.200) : 46.3
 Silt + Clay (-No.200) : 40.6

Approved By : J.S.

Soil No. 47

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-7
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/16/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		98.0
1/4		6.3	mm		
No.4		4.75	mm		93.0
No.6		3.35	mm		
No.10		2	mm		87.1

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		64.2
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		36.6
No.270		0.053	mm		
Hyd. Rd. # 1		0.0339	mm		30.4
Hyd. Rd. # 2		0.0216	mm		29.5
Hyd. Rd. # 3		0.0126	mm		26.9
Hyd. Rd. # 4		0.0090	mm		22.7
Hyd. Rd. # 5		0.0065	mm		17.6
Hyd. Rd. # 6		0.0033	mm		9.3
Hyd. Rd. # 7		0.0014	mm		4.2

$D_{50} = 0.1741 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : 2.714
 AASHTO Classification: M145 : A-4 (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 12.9
 Coarse Sand (-No.10 + No.40) : 22.9
 Fine Sand (-No.40 + No.200) : 27.6
 Silt (-No.200 + 0.002mm) : 30.2
 Clay (-0.002mm + 0.001mm) : 2.7
 Colloids (-0.001mm) : 3.7

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 7.0
 Coarse Sand (-No.4 + No.10) : 5.9
 Medium Sand (-No.10 + No.40) : 22.9
 Fine Sand (-No.40 + No.200) : 27.6
 Silt (-No.200 + 0.005mm) : 22.2
 Clay (-0.005mm + 0.001mm) : 10.8
 Colloids (-0.001mm) : 3.7

Approved By : J.S.

Soil No. 48

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. B-8
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan, Brown & Gray Well-Graded Sand with Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.8
No.6		3.35	mm		
No.10		2	mm		97.4

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		54.2
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		11.9
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.3578 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 2.6 Coarse Sand (-No.10 + No.40) : 43.2 Fine Sand (-No.40 + No.200) : 42.3 Silt + Clay (-No.200) : 11.9	Natural Moisture (%) (AASHTO T265) : 8.3 Liquid Limit (AASHTO T89) : NP Plastic Limit (AASHTO T90) : NP Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-2-4 (0) ASTM Classification: D2487 : SW-SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.2
Coarse Sand (-No.4 + No.10) : 2.4
Medium Sand (-No.10 + No.40) : 43.2
Fine Sand (-No.40 + No.200) : 42.3
Silt + Clay (-No.200) : 11.9

Approved By : J.S.

Soil No. 49

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. B-8
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		98.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		90.2
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		20.1
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.1572 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 33.4
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 1.1
 Coarse Sand (-No.10 + No.40) : 8.7
 Fine Sand (-No.40 + No.200) : 70.1
 Silt + Clay (-No.200) : 20.1

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 1.1
 Medium Sand (-No.10 + No.40) : 8.7
 Fine Sand (-No.40 + No.200) : 70.1
 Silt + Clay (-No.200) : 20.1

Approved By : J.S.

Soil No. 50

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. B-8
Project County : Orangeburg	Sample Depth : 20.0' to 21.5'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/23/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray Poorly Graded Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		95.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		16.9
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		1.8
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.818 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 4.8 Coarse Sand (-No.10 + No.40) : 78.3 Fine Sand (-No.40 + No.200) : 15.1 Silt + Clay (-No.200) : 1.8	Natural Moisture (%) (AASHTO T265) : 15 Liquid Limit (AASHTO T89) : NP Plastic Limit (AASHTO T90) : NP Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-1-b (0) ASTM Classification: D2487 : SP
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 4.8
 Medium Sand (-No.10 + No.40) : 78.3
 Fine Sand (-No.40 + No.200) : 15.1
 Silt + Clay (-No.200) : 1.8

Approved By : J.S.

Soil No. 51

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan, Red & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		97.7
1/4		6.3	mm		
No.4		4.75	mm		96.6
No.6		3.35	mm		
No.10		2	mm		93.5

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		57.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		18.9
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.3012 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 13.3
 Liquid Limit (AASHTO T89) : 20
 Plastic Limit (AASHTO T90) : 18
 Plasticity Index : 2
 Liquidity Index : -2.28
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 6.5
 Coarse Sand (-No.10 + No.40) : 35.8
 Fine Sand (-No.40 + No.200) : 38.8
 Silt + Clay (-No.200) : 18.9

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 3.4
 Coarse Sand (-No.4 + No.10) : 3.1
 Medium Sand (-No.10 + No.40) : 35.8
 Fine Sand (-No.40 + No.200) : 38.8
 Silt + Clay (-No.200) : 18.9

Approved By : J.S.

Soil No. 52

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/21/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Tan Poorly Graded Sand with Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.1

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	51.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	5.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.3958 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 1.9</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 46.2</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 46.3</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 5.6</p>	<p>Natural Moisture (%) (AASHTO T265) : 10.5</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-3 (0)</p> <p>ASTM Classification: D2487 : SP-SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.9

Medium Sand (-No.10 + No.40) : 46.2

Fine Sand (-No.40 + No.200) : 46.3

Silt + Clay (-No.200) : 5.6

Approved By : J.S.

Soil No. 53

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Tan Well-Graded Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		98.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		38.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		4.6
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.5703 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 1.8 Coarse Sand (-No.10 + No.40) : 59.5 Fine Sand (-No.40 + No.200) : 34.1 Silt + Clay (-No.200) : 4.6	Natural Moisture (%) (AASHTO T265) : NA Liquid Limit (AASHTO T89) : NA Plastic Limit (AASHTO T90) : NA Plasticity Index : NA Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-1-b (0) ASTM Classification: D2487 : SW
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 1.8
 Medium Sand (-No.10 + No.40) : 59.5
 Fine Sand (-No.40 + No.200) : 34.1
 Silt + Clay (-No.200) : 4.6

Approved By : J.S.

Soil No. 54

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 20.0' to 21.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.8
1/4		6.3	mm	
No.4		4.75	mm	94.6
No.6		3.35	mm	
No.10		2	mm	88.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	48.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0822 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 24.1
 Liquid Limit (AASHTO T89) : 34
 Plastic Limit (AASHTO T90) : 28
 Plasticity Index : 6
 Liquidity Index : -0.70
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (1)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 11.3
 Coarse Sand (-No.10 + No.40) : 9.9
 Fine Sand (-No.40 + No.200) : 30.4
 Silt + Clay (-No.200) : 48.4

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 5.4
 Coarse Sand (-No.4 + No.10) : 5.9
 Medium Sand (-No.10 + No.40) : 9.9
 Fine Sand (-No.40 + No.200) : 30.4
 Silt + Clay (-No.200) : 48.4

Approved By : J.S.

Soil No. 55

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-9
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 30.0' to 31.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty, Clayey Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm	100.0	
1/2	in.	12.5	mm		
3/8	in.	9.5	mm	99.5	
1/4		6.3	mm		
No.4		4.75	mm	93.7	
No.6		3.35	mm		
No.10		2	mm	87.3	

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm	66.8	
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm	35.7	
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.1665 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 12.7 Coarse Sand (-No.10 + No.40) : 20.5 Fine Sand (-No.40 + No.200) : 31.1 Silt + Clay (-No.200) : 35.7	Natural Moisture (%) (AASHTO T265) : 23.3 Liquid Limit (AASHTO T89) : 26 Plastic Limit (AASHTO T90) : 21 Plasticity Index : 5 Liquidity Index : 0.42 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (0) ASTM Classification: D2487 : SC-SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 6.3
 Coarse Sand (-No.4 + No.10) : 6.4
 Medium Sand (-No.10 + No.40) : 20.5
 Fine Sand (-No.40 + No.200) : 31.1
 Silt + Clay (-No.200) : 35.7

Approved By : J.S.

Soil No. 56

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-12
Project No. : 11200-10	Sample Loc. : Boring No. B-9
Project County : Orangeburg	Sample Depth : 45.0' to 46.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		97.8
No.6		3.35	mm		
No.10		2	mm		92.5

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		83.5
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		59.4
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.0263 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 7.5 Coarse Sand (-No.10 + No.40) : 9.0 Fine Sand (-No.40 + No.200) : 24.1 Silt + Clay (-No.200) : 59.4	Natural Moisture (%) (AASHTO T265) : 41.7 Liquid Limit (AASHTO T89) : 41 Plastic Limit (AASHTO T90) : 40 Plasticity Index : 1 Liquidity Index : 1.70 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-5 (1) ASTM Classification: D2487 : ML
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 2.2
 Coarse Sand (-No.4 + No.10) : 5.3
 Medium Sand (-No.10 + No.40) : 9.0
 Fine Sand (-No.40 + No.200) : 24.1
 Silt + Clay (-No.200) : 59.4

Approved By : J.S.

Soil No. 57

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-1
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/15/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Red, Gray & Tan Clayey Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	64.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	29.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.2066 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 1.3</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 34.1</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 35.1</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 29.5</p>	<p>Natural Moisture (%) (AASHTO T265) : 12.7</p> <p>Liquid Limit (AASHTO T89) : 33</p> <p>Plastic Limit (AASHTO T90) : 19</p> <p style="padding-left: 20px;">Plasticity Index : 14</p> <p style="padding-left: 20px;">Liquidity Index : -0.46</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-6 (1)</p> <p>ASTM Classification: D2487 : SC</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.3

Medium Sand (-No.10 + No.40) : 34.1

Fine Sand (-No.40 + No.200) : 35.1

Silt + Clay (-No.200) : 29.5

Approved By : J.S.

Soil No. 58

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. RW-1
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray, Tan & Brown Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	12.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.3041 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 1.3 Coarse Sand (-No.10 + No.40) : 39.8 Fine Sand (-No.40 + No.200) : 46.1 Silt + Clay (-No.200) : 12.8	Natural Moisture (%) (AASHTO T265) : 11 Liquid Limit (AASHTO T89) : NP Plastic Limit (AASHTO T90) : NP Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-2-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 1.3
 Medium Sand (-No.10 + No.40) : 39.8
 Fine Sand (-No.40 + No.200) : 46.1
 Silt + Clay (-No.200) : 12.8

Approved By : J.S.

Soil No. 59

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. RW-1
Project County : Orangeburg	Sample Depth : 9.9' to 11.4'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray Silty, Clayey Sand	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.2
No.6		3.35	mm	
No.10		2	mm	98.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	84.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0992 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 18
 Liquid Limit (AASHTO T89) : 23
 Plastic Limit (AASHTO T90) : 16
 Plasticity Index : 7
 Liquidity Index : 0.35
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (0)
 ASTM Classification: D2487 : SC-SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 1.7
 Coarse Sand (-No.10 + No.40) : 13.9
 Fine Sand (-No.40 + No.200) : 41.0
 Silt + Clay (-No.200) : 43.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.8
 Coarse Sand (-No.4 + No.10) : 0.9
 Medium Sand (-No.10 + No.40) : 13.9
 Fine Sand (-No.40 + No.200) : 41.0
 Silt + Clay (-No.200) : 43.4

Approved By : J.S.

Soil No. 60

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. RW-1
Project County : Orangeburg	Sample Depth : 14.9' to 16.4'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.5618 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 1.3</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 59.4</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 35.0</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 4.3</p>	<p>Natural Moisture (%) (AASHTO T265) : 16.8</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SP</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.3

Medium Sand (-No.10 + No.40) : 59.4

Fine Sand (-No.40 + No.200) : 35.0

Silt + Clay (-No.200) : 4.3

Approved By : J.S.

Soil No. 61

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp
 Project No. : 11200-10
 Project County : Orangeburg
 Project State : South Carolina
 Laboratory No. : 11200-10
 Submitted By : ICA Engineering
 Soil Type : Gray & Green Sandy Silt

Sample No. : SS-7
 Sample Loc. : Boring No. RW-1
 Sample Depth : 19.9' to 21.4'
 Date Tested : 07/14/14
 Date Reported : 07/22/14

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.6
No.6		3.35	mm		
No.10		2	mm		97.8

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		92.0
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		52.9
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.0522 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 26.4
 Liquid Limit (AASHTO T89) : 37
 Plastic Limit (AASHTO T90) : 31
 Plasticity Index : 6
 Liquidity Index : -0.72
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (2)
 ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 2.2
 Coarse Sand (-No.10 + No.40) : 5.8
 Fine Sand (-No.40 + No.200) : 39.1
 Silt + Clay (-No.200) : 52.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.4
 Coarse Sand (-No.4 + No.10) : 1.8
 Medium Sand (-No.10 + No.40) : 5.8
 Fine Sand (-No.40 + No.200) : 39.1
 Silt + Clay (-No.200) : 52.9

Approved By : J.S.

Soil No. 62

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-2
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan & Red Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.7
1/4		6.3	mm	
No.4		4.75	mm	97.3
No.6		3.35	mm	
No.10		2	mm	93.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	49.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.4325 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14
 Liquid Limit (AASHTO T89) : 18
 Plastic Limit (AASHTO T90) : 17
 Plasticity Index : 1
 Liquidity Index : -3.07
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 6.3
 Coarse Sand (-No.10 + No.40) : 44.2
 Fine Sand (-No.40 + No.200) : 34.1
 Silt + Clay (-No.200) : 15.4

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 2.7
 Coarse Sand (-No.4 + No.10) : 3.6
 Medium Sand (-No.10 + No.40) : 44.2
 Fine Sand (-No.40 + No.200) : 34.1
 Silt + Clay (-No.200) : 15.4

Approved By : J.S.

Soil No. 63

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. RW-2
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan & Brown Well-Graded Sand with Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		98.8
No.6		3.35	mm		
No.10		2	mm		97.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		38.7
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		7.3
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.5732 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 8.5
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SW-SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 2.8
 Coarse Sand (-No.10 + No.40) : 58.5
 Fine Sand (-No.40 + No.200) : 31.4
 Silt + Clay (-No.200) : 7.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 1.2
 Coarse Sand (-No.4 + No.10) : 1.6
 Medium Sand (-No.10 + No.40) : 58.5
 Fine Sand (-No.40 + No.200) : 31.4
 Silt + Clay (-No.200) : 7.3

Approved By : J.S.

Soil No. 64

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-4
Project No. : 11200-10	Sample Loc. : Boring No. RW-2
Project County : Orangeburg	Sample Depth : 8.0' to 9.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		98.0
No.6		3.35	mm		
No.10		2	mm		95.7

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		71.2
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		35.0
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

$D_{50} = 0.1539 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 18.9
 Liquid Limit (AASHTO T89) : 21
 Plastic Limit (AASHTO T90) : 19
 Plasticity Index : 2
 Liquidity Index : 0.06
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 4.3
 Coarse Sand (-No.10 + No.40) : 24.5
 Fine Sand (-No.40 + No.200) : 36.2
 Silt + Clay (-No.200) : 35.0

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 2.0
 Coarse Sand (-No.4 + No.10) : 2.3
 Medium Sand (-No.10 + No.40) : 24.5
 Fine Sand (-No.40 + No.200) : 36.2
 Silt + Clay (-No.200) : 35.0

Approved By : J.S.

Soil No. 65

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. RW-2
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray Poorly Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	57.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	2.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.3373 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 0.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 42.6</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 54.8</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 2.5</p>	<p>Natural Moisture (%) (AASHTO T265) : 25.7</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-3 (0)</p> <p>ASTM Classification: D2487 : SP</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 0.1

Medium Sand (-No.10 + No.40) : 42.6

Fine Sand (-No.40 + No.200) : 54.8

Silt + Clay (-No.200) : 2.5

Approved By : J.S.

Soil No. 66

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. RW-2
Project County : Orangeburg	Sample Depth : 20.0' to 21.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Sandy Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.8
1/4		6.3	mm	
No.4		4.75	mm	99.2
No.6		3.35	mm	
No.10		2	mm	96.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	89.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.065 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 3.2</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 6.9</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 38.8</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 51.1</p>	<p>Natural Moisture (%) (AASHTO T265) : 30.6</p> <p>Liquid Limit (AASHTO T89) : 39</p> <p>Plastic Limit (AASHTO T90) : 31</p> <p style="padding-left: 20px;">Plasticity Index : 8</p> <p style="padding-left: 20px;">Liquidity Index : -0.07</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (2)</p> <p>ASTM Classification: D2487 : ML</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.8

Coarse Sand (-No.4 + No.10) : 2.4

Medium Sand (-No.10 + No.40) : 6.9

Fine Sand (-No.40 + No.200) : 38.8

Silt + Clay (-No.200) : 51.1

Approved By : J.S.

Soil No. 67

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-2
Project No. : 11200-10	Sample Loc. : Boring No. RW-3
Project County : Orangeburg	Sample Depth : 4.0' to 5.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan, Brown & Gray Poorly Graded Sand with Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	10.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.3158 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 12
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SP-SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 0.7
 Coarse Sand (-No.10 + No.40) : 41.1
 Fine Sand (-No.40 + No.200) : 47.9
 Silt + Clay (-No.200) : 10.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.7
 Medium Sand (-No.10 + No.40) : 41.1
 Fine Sand (-No.40 + No.200) : 47.9
 Silt + Clay (-No.200) : 10.3

Approved By : J.S.

Soil No. 68

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. RW-3
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Green Sandy Lean Clay	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.6
No.6		3.35	mm	
No.10		2	mm	99.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	60.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.0231 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 28
 Liquid Limit (AASHTO T89) : 25
 Plastic Limit (AASHTO T90) : 16
 Plasticity Index : 9
 Liquidity Index : 1.31
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-4 (3)
 ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 1.0
 Coarse Sand (-No.10 + No.40) : 3.2
 Fine Sand (-No.40 + No.200) : 35.0
 Silt + Clay (-No.200) : 60.8

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.4
 Coarse Sand (-No.4 + No.10) : 0.6
 Medium Sand (-No.10 + No.40) : 3.2
 Fine Sand (-No.40 + No.200) : 35.0
 Silt + Clay (-No.200) : 60.8

Approved By : J.S.

Soil No. 69

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. RW-3
Project County : Orangeburg	Sample Depth : 20.0' to 21.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Sandy Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.6
No.6		3.35	mm		
No.10		2	mm		97.1

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		91.6
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		51.4
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.0626 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 2.9</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 5.5</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 40.2</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 51.4</p>	<p>Natural Moisture (%) (AASHTO T265) : 28.4</p> <p>Liquid Limit (AASHTO T89) : 38</p> <p>Plastic Limit (AASHTO T90) : 31</p> <p style="padding-left: 20px;">Plasticity Index : 7</p> <p style="padding-left: 20px;">Liquidity Index : -0.34</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-4 (2)</p> <p>ASTM Classification: D2487 : ML</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.4

Coarse Sand (-No.4 + No.10) : 2.5

Medium Sand (-No.10 + No.40) : 5.5

Fine Sand (-No.40 + No.200) : 40.2

Silt + Clay (-No.200) : 51.4

Approved By : J.S.

Soil No. 70

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-4
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Tan, Red & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		97.5
1/4		6.3	mm		
No.4		4.75	mm		97.3
No.6		3.35	mm		
No.10		2	mm		94.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		64.8
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		20.2
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.239 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 5.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 30.1</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 44.6</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 20.2</p>	<p>Natural Moisture (%) (AASHTO T265) : 18.3</p> <p>Liquid Limit (AASHTO T89) : 20</p> <p>Plastic Limit (AASHTO T90) : 16</p> <p style="padding-left: 20px;">Plasticity Index : 4</p> <p style="padding-left: 20px;">Liquidity Index : 0.62</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 2.7

Coarse Sand (-No.4 + No.10) : 2.4

Medium Sand (-No.10 + No.40) : 30.1

Fine Sand (-No.40 + No.200) : 44.6

Silt + Clay (-No.200) : 20.2

Approved By : J.S.

Soil No. 71

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. RW-4
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Gray & Tan Well-Graded Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	95.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	17.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.8105 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 4.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 78.7</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 13.1</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 4.1</p>	<p>Natural Moisture (%) (AASHTO T265) : 10.6</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SW</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 4.1

Medium Sand (-No.10 + No.40) : 78.7

Fine Sand (-No.40 + No.200) : 13.1

Silt + Clay (-No.200) : 4.1

Approved By : J.S.

Soil No. 72

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. RW-4
Project County : Orangeburg	Sample Depth : 14.9' to 16.4'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray & Tan Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	96.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.1957 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : NA
 Liquid Limit (AASHTO T89) : NA
 Plastic Limit (AASHTO T90) : NA
 Plasticity Index : NA
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0) *
 ASTM Classification: D2487 : SM *
 * Visual Classification

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 3.3
 Coarse Sand (-No.10 + No.40) : 23.5
 Fine Sand (-No.40 + No.200) : 51.9
 Silt + Clay (-No.200) : 21.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 3.3
 Medium Sand (-No.10 + No.40) : 23.5
 Fine Sand (-No.40 + No.200) : 51.9
 Silt + Clay (-No.200) : 21.3

Approved By : J.S.

Soil No. 73

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-7
Project No. : 11200-10	Sample Loc. : Boring No. RW-4
Project County : Orangeburg	Sample Depth : 19.9' to 21.4'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Green & Gray Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.6
1/4		6.3	mm	
No.4		4.75	mm	96.2
No.6		3.35	mm	
No.10		2	mm	91.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.078 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 9.0 Coarse Sand (-No.10 + No.40) : 10.6 Fine Sand (-No.40 + No.200) : 31.1 Silt + Clay (-No.200) : 49.3	Natural Moisture (%) (AASHTO T265) : 32.2 Liquid Limit (AASHTO T89) : 34 Plastic Limit (AASHTO T90) : 28 Plasticity Index : 6 Liquidity Index : 0.70 Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (1) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 3.8
 Coarse Sand (-No.4 + No.10) : 5.2
 Medium Sand (-No.10 + No.40) : 10.6
 Fine Sand (-No.40 + No.200) : 31.1
 Silt + Clay (-No.200) : 49.3

Approved By : J.S.

Soil No. 74

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-5
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Gray & Tan Well-Graded Sand with Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		
1/4		6.3	mm		
No.4		4.75	mm		100.0
No.6		3.35	mm		
No.10		2	mm		96.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		89.0
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		11.3
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

$D_{50} = 0.1779$ mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 6.7
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SW-SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 3.8
 Coarse Sand (-No.10 + No.40) : 7.2
 Fine Sand (-No.40 + No.200) : 77.7
 Silt + Clay (-No.200) : 11.3

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 3.8
 Medium Sand (-No.10 + No.40) : 7.2
 Fine Sand (-No.40 + No.200) : 77.7
 Silt + Clay (-No.200) : 11.3

Approved By : J.S.

Soil No. 75

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. RW-5
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray, Brown, Black & Tan Well-Graded Sand with Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	11.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.3457 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 11.7
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SW-SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 2.0
 Coarse Sand (-No.10 + No.40) : 42.8
 Fine Sand (-No.40 + No.200) : 43.7
 Silt + Clay (-No.200) : 11.5

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 2.0
 Medium Sand (-No.10 + No.40) : 42.8
 Fine Sand (-No.40 + No.200) : 43.7
 Silt + Clay (-No.200) : 11.5

Approved By : J.S.

Soil No. 76

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. RW-5
Project County : Orangeburg	Sample Depth : 9.9' to 11.4'
Project State : South Carolina	Date Tested : 07/19/14
Laboratory No. : 11200-10	Date Reported : 07/24/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray & Brown Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	94.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.105 mm

CBR : NA Dry Dens. : NA Opt. Moist. : NA AASHTO Composition of Total Sample: M145 Gravel (3in. + No.10) : 5.2 Coarse Sand (-No.10 + No.40) : 7.4 Fine Sand (-No.40 + No.200) : 46.4 Silt + Clay (-No.200) : 41.0	Natural Moisture (%) (AASHTO T265) : 60.2 Liquid Limit (AASHTO T89) : 20 Plastic Limit (AASHTO T90) : 20 Plasticity Index : NP Liquidity Index : NA Activity : NA Sp. Gr. (AASHTO T100) : NA AASHTO Classification: M145 : A-4 (0) ASTM Classification: D2487 : SM
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 5.2
 Medium Sand (-No.10 + No.40) : 7.4
 Fine Sand (-No.40 + No.200) : 46.4
 Silt + Clay (-No.200) : 41.0

Approved By : J.S.

Soil No. 77

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp
 Project No. : 11200-10
 Project County : Orangeburg
 Project State : South Carolina
 Laboratory No. : 11200-10
 Submitted By : ICA Engineering
 Soil Type : Green & Gray Sandy Silt

Sample No. : SS-7
 Sample Loc. : Boring No. RW-5
 Sample Depth : 19.9' to 21.4'
 Date Tested : 07/14/14
 Date Reported : 07/22/14

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	94.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.9
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.0251 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 31.3

Liquid Limit (AASHTO T89) : 38

Plastic Limit (AASHTO T90) : 30

Plasticity Index : 8

Liquidity Index : 0.11

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-4 (4)

ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 0.5
 Coarse Sand (-No.10 + No.40) : 4.7
 Fine Sand (-No.40 + No.200) : 34.9
 Silt + Clay (-No.200) : 59.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.0
 Coarse Sand (-No.4 + No.10) : 0.5
 Medium Sand (-No.10 + No.40) : 4.7
 Fine Sand (-No.40 + No.200) : 34.9
 Silt + Clay (-No.200) : 59.9

Approved By : J.S.

Soil No. 78

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-6
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray & Tan Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		97.6
1/4		6.3	mm		
No.4		4.75	mm		96.8
No.6		3.35	mm		
No.10		2	mm		95.2

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		61.8
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		16.0
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.2718 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 4.8</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 33.4</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 45.8</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 16.0</p>	<p>Natural Moisture (%) (AASHTO T265) : 14.4</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 3.2

Coarse Sand (-No.4 + No.10) : 1.6

Medium Sand (-No.10 + No.40) : 33.4

Fine Sand (-No.40 + No.200) : 45.8

Silt + Clay (-No.200) : 16.0

Approved By : J.S.

Soil No. 79

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-5
Project No. : 11200-10	Sample Loc. : Boring No. RW-6
Project County : Orangeburg	Sample Depth : 10.0' to 11.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Dark Gray & Tan Silty Sand	

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.10		2	mm	97.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.1689 \text{ mm}$

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.3
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-2-4 (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 2.2
 Coarse Sand (-No.10 + No.40) : 19.5
 Fine Sand (-No.40 + No.200) : 53.2
 Silt + Clay (-No.200) : 25.1

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 0.1
 Coarse Sand (-No.4 + No.10) : 2.1
 Medium Sand (-No.10 + No.40) : 19.5
 Fine Sand (-No.40 + No.200) : 53.2
 Silt + Clay (-No.200) : 25.1

Approved By : J.S.

Soil No. 80

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-1
Project No. : 11200-10	Sample Loc. : Boring No. RW-7
Project County : Orangeburg	Sample Depth : 2.0' to 3.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Brown, Dark Gray & Tan Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.4
1/4		6.3	mm	
No.4		4.75	mm	92.5
No.6		3.35	mm	
No.10		2	mm	88.4

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	45.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	13.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.4984 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 11.3
 Liquid Limit (AASHTO T89) : NP
 Plastic Limit (AASHTO T90) : NP
 Plasticity Index : NP
 Liquidity Index : NA
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-1-b (0)
 ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
 Gravel (3in. + No.10) : 11.6
 Coarse Sand (-No.10 + No.40) : 42.8
 Fine Sand (-No.40 + No.200) : 31.9
 Silt + Clay (-No.200) : 13.7

ASTM Composition of Total Sample: D2487
 Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 7.5
 Coarse Sand (-No.4 + No.10) : 4.1
 Medium Sand (-No.10 + No.40) : 42.8
 Fine Sand (-No.40 + No.200) : 31.9
 Silt + Clay (-No.200) : 13.7

Approved By : J.S.

Soil No. 81

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-3
Project No. : 11200-10	Sample Loc. : Boring No. RW-7
Project County : Orangeburg	Sample Depth : 6.0' to 7.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan & Gray Poorly Graded Sand with Silt	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.4
1/4		6.3	mm	
No.4		4.75	mm	96.1
No.6		3.35	mm	
No.10		2	mm	90.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	7.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

D₅₀ = 0.532 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 9.3</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 47.6</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 35.8</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 7.3</p>	<p>Natural Moisture (%) (AASHTO T265) : 15.1</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-1-b (0)</p> <p>ASTM Classification: D2487 : SP-SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 3.9

Coarse Sand (-No.4 + No.10) : 5.4

Medium Sand (-No.10 + No.40) : 47.6

Fine Sand (-No.40 + No.200) : 35.8

Silt + Clay (-No.200) : 7.3

Approved By : J.S.

Soil No. 82

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : SS-6
Project No. : 11200-10	Sample Loc. : Boring No. RW-7
Project County : Orangeburg	Sample Depth : 15.0' to 16.5'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan & Gray Well-Graded Sand with Silt	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		100.0
1/4		6.3	mm		
No.4		4.75	mm		99.9
No.6		3.35	mm		
No.10		2	mm		97.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		81.5
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		12.0
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.1936 mm

<p style="text-align: right;">CBR : NA</p> <p style="text-align: right;">Dry Dens. : NA</p> <p style="text-align: right;">Opt. Moist. : NA</p> <p>AASHTO Composition of Total Sample: M145</p> <p style="padding-left: 20px;">Gravel (3in. + No.10) : 2.1</p> <p style="padding-left: 20px;">Coarse Sand (-No.10 + No.40) : 16.4</p> <p style="padding-left: 20px;">Fine Sand (-No.40 + No.200) : 69.5</p> <p style="padding-left: 20px;">Silt + Clay (-No.200) : 12.0</p>	<p>Natural Moisture (%) (AASHTO T265) : 25.1</p> <p>Liquid Limit (AASHTO T89) : NP</p> <p>Plastic Limit (AASHTO T90) : NP</p> <p style="padding-left: 20px;">Plasticity Index : NP</p> <p style="padding-left: 20px;">Liquidity Index : NA</p> <p style="padding-left: 20px;">Activity : NA</p> <p style="padding-left: 20px;">Sp. Gr. (AASHTO T100) : NA</p> <p>AASHTO Classification: M145 : A-2-4 (0)</p> <p>ASTM Classification: D2487 : SW-SM</p>
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ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.1

Coarse Sand (-No.4 + No.10) : 2.0

Medium Sand (-No.10 + No.40) : 16.4

Fine Sand (-No.40 + No.200) : 69.5

Silt + Clay (-No.200) : 12.0

Approved By : J.S.

Soil No. 83

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : Bulk-1
Project No. : 11200-10	Sample Loc. : Boring No. B-1
Project County : Orangeburg	Sample Depth : 0.0' to 5.0'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Orange, Tan & Black Silty Sand	

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.3
No.6		3.35	mm	
No.10		2	mm	95.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	45.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

$D_{50} = 0.4944 \text{ mm}$

CBR (AASHTO: T-193) : NA	Natural Moisture (%) (AASHTO T265) : NA
Dry Dens. (AASHTO: T-99; Method (C)) : 125.2 pcf	Liquid Limit (AASHTO T89) : NP
Opt. Moist. (AASHTO: T-99; Method (C)) : 9.3 %	Plastic Limit (AASHTO T90) : NP
	Plasticity Index : NP
AASHTO Composition of Total Sample: M145	Liquidity Index : NA
Gravel (3in. + No.10) : 4.7	Activity : NA
Coarse Sand (-No.10 + No.40) : 50.2	Sp. Gr. (AASHTO T100) : NA
Fine Sand (-No.40 + No.200) : 29.6	AASHTO Classification: M145 : A-1-b (0)
Silt + Clay (-No.200) : 15.5	ASTM Classification: D2487 : SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.7
Coarse Sand (-No.4 + No.10) : 4.0
Medium Sand (-No.10 + No.40) : 50.2
Fine Sand (-No.40 + No.200) : 29.6
Silt + Clay (-No.200) : 15.5

Approved By : J.S.

Soil No. 84

SOIL CLASSIFICATION

Project Name : Bridge Replacement over Four Hole Swamp	Sample No. : Bulk-2
Project No. : 11200-10	Sample Loc. : Boring No. B-8
Project County : Orangeburg	Sample Depth : 0.0' to 5.0'
Project State : South Carolina	Date Tested : 07/14/14
Laboratory No. : 11200-10	Date Reported : 07/22/14
Submitted By : ICA Engineering	
Soil Type : Tan, Brown & Gray Silty Sand	

AASHTO T27 :

				% Passing	
4	in.	101.6	mm		
3.5	in.	88.9	mm		
3	in.	76.2	mm		
2.5	in.	63.5	mm		
2	in.	50.8	mm		
1 3/4	in.	45	mm		
1 1/2	in.	38.1	mm		
1 1/4	in.	31.5	mm		
1	in.	25	mm		
3/4	in.	19	mm		100.0
1/2	in.	12.5	mm		
3/8	in.	9.5	mm		99.7
1/4		6.3	mm		
No.4		4.75	mm		96.6
No.6		3.35	mm		
No.10		2	mm		92.9

				% Passing	
No.16		1.18	mm		
No.30		0.6	mm		
No.40		0.425	mm		62.6
No.50		0.3	mm		
No.60		0.25	mm		
No.80		0.18	mm		
No.100		0.15	mm		
No.200		0.075	mm		17.0
No.270		0.053	mm		
Hyd. Rd. # 1			mm		
Hyd. Rd. # 2			mm		
Hyd. Rd. # 3			mm		
Hyd. Rd. # 4			mm		
Hyd. Rd. # 5			mm		
Hyd. Rd. # 6			mm		
Hyd. Rd. # 7			mm		

D₅₀ = 0.2632 mm

CBR (AASHTO: T-193) : NA	Natural Moisture (%) (AASHTO T265) : NA
Dry Dens. (AASHTO: T-99; Method (C)) : 124.1 pcf	Liquid Limit (AASHTO T89) : NP
Opt. Moist. (AASHTO: T-99; Method (C)) : 8.5 %	Plastic Limit (AASHTO T90) : NP
	Plasticity Index : NP
AASHTO Composition of Total Sample: M145	Liquidity Index : NA
Gravel (3in. + No.10) : 7.1	Activity : NA
Coarse Sand (-No.10 + No.40) : 30.3	Sp. Gr. (AASHTO T100) : NA
Fine Sand (-No.40 + No.200) : 45.6	AASHTO Classification: M145 : A-2-4 (0)
Silt + Clay (-No.200) : 17.0	ASTM Classification: D2487 : SM

ASTM Composition of Total Sample: D2487

- Coarse Gravel (3in. + 3/4in.) : 0.0
- Fine Gravel (-3/4in. + No.4) : 3.4
- Coarse Sand (-No.4 + No.10) : 3.7
- Medium Sand (-No.10 + No.40) : 30.3
- Fine Sand (-No.40 + No.200) : 45.6
- Silt + Clay (-No.200) : 17.0

Approved By : J.S.

Soil No. 85



**DIRECT SHEAR TEST
ASTM D 3080-72**

PROJECT NAME : Bridge Replacement over Four Hole Swamp
 PROJECT # : 11200-10
 PROJECT COUNTY : Orangeburg
 PROJECT STATE : South Carolina
 LABORATORY # :
 SUBMITTED BY : ICA Engineering Inc.

SAMPLE # : B-1
 SAMPLE LOC. : Bulk 1
 SAMPLE DEPTH : 0.0' to 5.0'
 DATE TESTED : 7-23-14
 DATE REPORTED : 7-23-14

SOIL TYPE : Silty Sand
 TYPE OF SPECIMEN : Remolded

Specimen No.1	Specimen No.2	Specimen No.3
INIT. HT. : 1.001 in	INIT. HT. : 1.001 in	INIT. HT. : 1.001 in
INIT. DIA. : 2.490 in	INIT. DIA. : 2.490 in	INIT. DIA. : 2.490 in
WET DEN. : 130.0 pcf	WET DEN. : 130.0 pcf	WET DEN. : 130.0 pcf
DRY DEN. : 118.9 pcf	DRY DEN. : 118.9 pcf	DRY DEN. : 118.9 pcf
MOISTURE : 9.4 %	MOIST. : 9.4 %	MOIST. : 9.4 %
VOID RATIO : -1.000	VOID RATIO : -1.000	VOID RATIO : -1.000

Specimen No.1					Specimen No.2					Specimen No.3				
#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi	#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi	#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi
1	0.000	0.0000	0.00	0.00	1	0.000	0.0000	0.00	0.00	1	0.000	0.0000	0.000	0.00
2	0.005	0.0002	8.40	1.73	2	0.005	0.0000	16.28	3.34	2	0.005	0.0000	25.56	5.25
3	0.010	0.0004	9.00	1.85	3	0.010	0.0001	20.44	4.20	3	0.010	0.0000	29.40	6.04
4	0.015	0.0005	9.30	1.91	4	0.015	0.0002	23.96	4.92	4	0.015	0.0000	32.60	6.69
5	0.020	0.0006	9.60	1.97	5	0.020	0.0002	26.20	5.38	5	0.020	0.0000	35.48	7.29
6	0.025	0.0008	9.60	1.97	6	0.025	0.0003	28.12	5.77	6	0.025	0.0001	35.80	7.35
7	0.030	0.0009	9.60	1.97	7	0.030	0.0003	28.76	5.91	7	0.030	0.0001	36.12	7.42
8	0.035	0.0011	9.60	1.97	8	0.035	0.0004	29.08	5.97	8	0.035	0.0001	36.12	7.42
9	0.040	0.0012	9.30	1.91	9	0.040	0.0005	29.08	5.97	9	0.040	0.0002	37.08	7.61
10	0.045	0.0013	9.00	1.85	10	0.045	0.0006	30.04	6.17	10	0.045	0.0004	37.72	7.75
11	0.050	0.0014	8.70	1.79	11	0.050	0.0007	29.72	6.10	11	0.050	0.0005	38.68	7.94
12	0.055	0.0015	8.40	1.73	12	0.055	0.0008	29.08	5.97	12	0.055	0.0006	38.68	7.94
13	0.060	0.0016	8.40	1.73	13	0.060	0.0009	28.44	5.84	13	0.060	0.0006	39.00	8.01
14	0.065	0.0016	8.40	1.73	14	0.065	0.0010	28.12	5.77	14	0.065	0.0008	38.68	7.94
15	0.070	0.0017	8.40	1.73	15	0.070	0.0010	28.12	5.77	15	0.070	0.0008	39.00	8.01
16	0.075	0.0017	8.40	1.73	16	0.075	0.0011	27.80	5.71	16	0.075	0.0008	39.00	8.01
17	0.080	0.0017	8.40	1.73	17	0.080	0.0011	26.52	5.45	17	0.080	0.0008	39.96	8.21
18	0.085	0.0017	8.40	1.73	18	0.085	0.0011	26.20	5.38	18	0.085	0.0009	39.96	8.21
19	0.090	0.0017	8.40	1.73	19	0.090	0.0011	26.20	5.38	19	0.090	0.0009	39.96	8.21
20	0.095	0.0017	8.40	1.73	20	0.095	0.0011	26.20	5.38	20	0.095	0.0009	39.00	8.01
21	0.100	0.0017	8.40	1.73	21	0.100	0.0011	26.20	5.38	21	0.100	0.0009	38.68	7.94
22	0.105	0.0017	8.40	1.73	22	0.105	0.0011	26.20	5.38	22	0.105	0.0009	37.72	7.75
23	0.110	0.0017	8.40	1.73	23	0.110	0.0011	26.20	5.38	23	0.110	0.0009	36.76	7.55
24	0.115	0.0017	8.40	1.73	24	0.115	0.0011	26.20	5.38	24	0.115	0.0009	36.76	7.55
25	0.120	0.0017	8.40	1.73	25	0.120	0.0011	26.20	5.38	25	0.120	0.0009	36.76	7.55
26	0.125	0.0017	8.40	1.73	26	0.125	0.0011	26.20	5.38	26	0.125	0.0009	36.76	7.55
27	0.130	0.0017	8.40	1.73	27	0.130	0.0011	26.20	5.38	27	0.130	0.0009	36.76	7.55
28	0.135	0.0017	8.40	1.73	28	0.135	0.0011	26.20	5.38	28	0.135	0.0009	36.76	7.55
29	0.140	0.0017	8.40	1.73	29	0.140	0.0011	26.20	5.38	29	0.140	0.0009	36.76	7.55
30	0.145	0.0017	8.40	1.73	30	0.145	0.0011	26.20	5.38	30	0.145	0.0009	36.76	7.55
31	0.150	0.0017	8.40	1.73	31	0.150	0.0011	26.20	5.38	31	0.150	0.0009	36.76	7.55
32	0.155	0.0017	8.40	1.73	32	0.155	0.0011	26.20	5.38	32	0.155	0.0009	36.76	7.55
33	0.160	0.0017	8.40	1.73	33	0.160	0.0011	26.20	5.38	33	0.160	0.0009	36.76	7.55

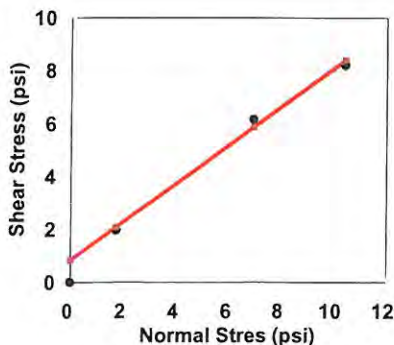
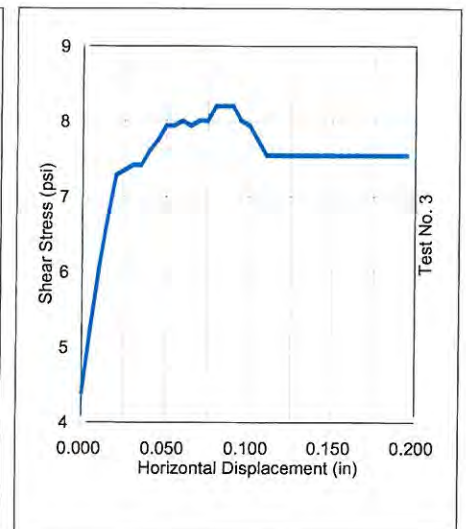
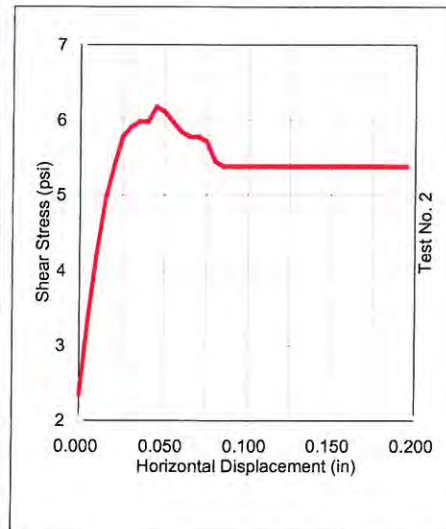
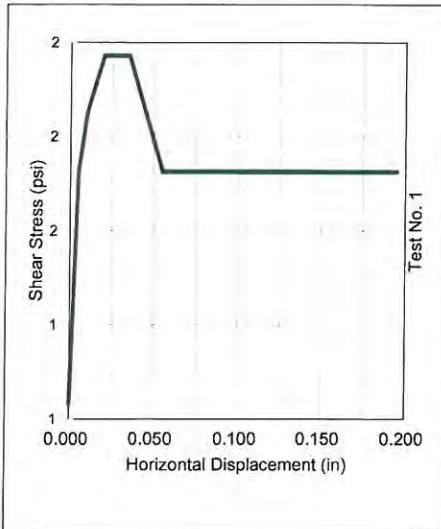
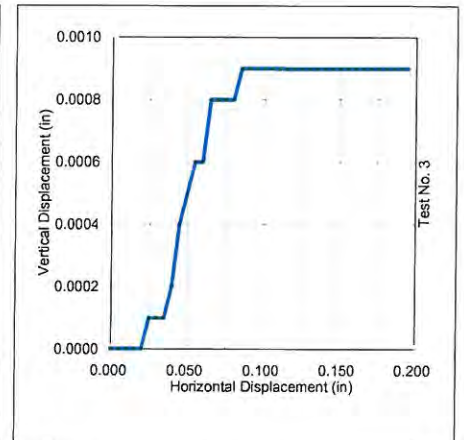
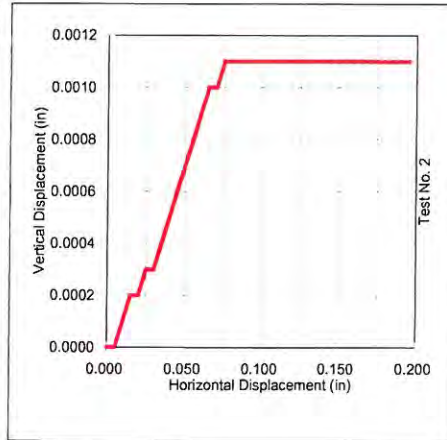
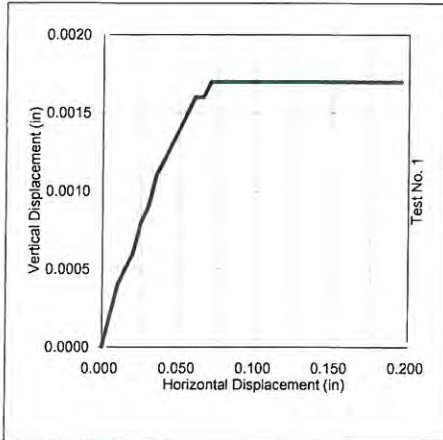
PROJECT NAME : Bridge Replacement over Four Hole Swamp
 PROJECT # : 11200-10
 PROJECT COUNTY : Orangeburg
 PROJECT STATE : South Carolina
 LABORATORY # :
 SUBMITTED BY : ICA Engineering Inc.

SAMPLE # : B-1
 SAMPLE LOC. : Bulk 1
 SAMPLE DEPTH : 0.0' to 5.0'
 DATE TESTED : 7-23-14
 DATE REPORTED : 7-23-14

Specimen No.1

Specimen No.2

Specimen No.3



Summary of Results:

	Specimen		
	No. 1	No. 2	No. 3
Normal Stress (psi)	1.74	6.94	10.41
Maximum Shear Stress (psi)	1.97	6.17	8.21

**Phi Angle = 35.96°
Cohesion = 0.83 psi**

Legend	
	Specimen No. 1
	Specimen No. 2
	Specimen No. 3
	Tangent Line

APPROVED BY: *Maguel Mansfield*



**DIRECT SHEAR TEST
ASTM D 3080-72**

PROJECT NAME : Bridge Replacement over Four Hole Swamp
 PROJECT # : 11200-01
 PROJECT COUNTY : Orangeburg
 PROJECT STATE : South Carolina
 LABORATORY # : 100
 SUBMITTED BY : ICA Engineering Inc.

SAMPLE # : B-8
 SAMPLE LOC. : Bulk 1
 SAMPLE DEPTH : 0.0' to 5.0'
 DATE TESTED : 7-23-14
 DATE REPORTED : 7-23-14

SOIL TYPE : Silty Sand
 TYPE OF SPECIMEN : Remolded

Specimen No.1 INIT. HT. : 1.001 in INIT. DIA. : 2.490 in WET DEN. : 128.0 pcf DRY DEN. : 118.0 pcf MOISTURE : 8.4 % VOID RATIO : -1.000	Specimen No.2 INIT. HT. : 1.001 in INIT. DIA. : 2.490 in WET DEN. : 128.0 pcf DRY DEN. : 118.0 pcf MOIST. : 8.4 % VOID RATIO : -1.000	Specimen No.3 INIT. HT. : 1.001 in INIT. DIA. : 2.490 in WET DEN. : 128.0 pcf DRY DEN. : 118.0 pcf MOIST. : 8.4 % VOID RATIO : -1.000
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Specimen No.1					Specimen No.2					Specimen No.3				
#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi	#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi	#	Horiz. Dsp. in.	Vert. Dsp. in.	Shear Force lbs.	Shear Stress psi
1	0.000	0.0000	0.00	0.00	1	0.000	0.0000	0.00	0.00	1	0.000	0.0000	0.000	0.00
2	0.005	0.0004	3.90	0.80	2	0.005	0.0000	13.80	2.83	2	0.005	0.0000	22.36	4.59
3	0.010	0.0005	4.50	0.92	3	0.010	0.0000	16.28	3.34	3	0.010	0.0000	27.16	5.58
4	0.015	0.0006	5.40	1.11	4	0.015	0.0000	17.88	3.67	4	0.015	0.0000	28.44	5.84
5	0.020	0.0006	5.70	1.17	5	0.020	0.0000	19.16	3.93	5	0.020	0.0000	29.72	6.10
6	0.025	0.0007	5.70	1.17	6	0.025	0.0000	19.80	4.07	6	0.025	0.0001	31.00	6.37
7	0.030	0.0007	5.70	1.17	7	0.030	0.0000	20.44	4.20	7	0.030	0.0001	31.32	6.43
8	0.035	0.0007	5.70	1.17	8	0.035	0.0000	20.44	4.20	8	0.035	0.0003	31.64	6.50
9	0.040	0.0008	5.70	1.17	9	0.040	0.0000	20.44	4.20	9	0.040	0.0003	31.00	6.37
10	0.045	0.0008	5.70	1.17	10	0.045	0.0000	20.44	4.20	10	0.045	0.0003	30.36	6.23
11	0.050	0.0010	6.00	1.23	11	0.050	0.0000	20.44	4.20	11	0.050	0.0003	30.68	6.30
12	0.055	0.0010	6.00	1.23	12	0.055	0.0000	19.48	4.00	12	0.055	0.0003	30.36	6.23
13	0.060	0.0010	6.00	1.23	13	0.060	0.0001	19.16	3.93	13	0.060	0.0003	29.72	6.10
14	0.065	0.0010	6.30	1.29	14	0.065	0.0001	19.16	3.93	14	0.065	0.0003	29.72	6.10
15	0.070	0.0010	6.30	1.29	15	0.070	0.0002	18.84	3.87	15	0.070	0.0003	29.40	6.04
16	0.075	0.0010	6.60	1.36	16	0.075	0.0002	18.52	3.80	16	0.075	0.0003	29.40	6.04
17	0.080	0.0010	6.60	1.36	17	0.080	0.0002	18.52	3.80	17	0.080	0.0003	29.40	6.04
18	0.085	0.0010	6.60	1.36	18	0.085	0.0002	18.52	3.80	18	0.085	0.0003	29.72	6.10
19	0.090	0.0010	6.60	1.36	19	0.090	0.0002	19.16	3.93	19	0.090	0.0003	29.72	6.10
20	0.095	0.0010	6.60	1.36	20	0.095	0.0003	18.84	3.87	20	0.095	0.0003	30.04	6.17
21	0.100	0.0010	6.60	1.36	21	0.100	0.0004	19.16	3.93	21	0.100	0.0003	30.04	6.17
22	0.105	0.0010	6.60	1.36	22	0.105	0.0004	19.16	3.93	22	0.105	0.0003	29.72	6.10
23	0.110	0.0010	6.60	1.36	23	0.110	0.0005	19.80	4.07	23	0.110	0.0003	29.72	6.10
24	0.115	0.0011	6.60	1.36	24	0.115	0.0005	20.44	4.20	24	0.115	0.0003	29.72	6.10
25	0.120	0.0011	6.60	1.36	25	0.120	0.0005	20.44	4.20	25	0.120	0.0003	29.72	6.10
26	0.125	0.0011	6.60	1.36	26	0.125	0.0006	20.44	4.20	26	0.125	0.0002	29.72	6.10
27	0.130	0.0011	6.30	1.29	27	0.130	0.0006	20.44	4.20	27	0.130	0.0002	29.72	6.10
28	0.135	0.0011	6.30	1.29	28	0.135	0.0006	20.76	4.26	28	0.135	0.0002	29.72	6.10
29	0.140	0.0012	6.30	1.29	29	0.140	0.0007	21.08	4.33	29	0.140	0.0002	29.72	6.10
30	0.145	0.0012	6.30	1.29	30	0.145	0.0007	21.08	4.33	30	0.145	0.0002	29.40	6.04
31	0.150	0.0012	6.30	1.29	31	0.150	0.0007	21.08	4.33	31	0.150	0.0001	29.40	6.04
32	0.155	0.0012	6.30	1.29	32	0.155	0.0007	21.08	4.33	32	0.155	0.0001	29.40	6.04
33	0.160	0.0012	6.30	1.29	33	0.160	0.0007	21.08	4.33	33	0.160	0.0001	29.40	6.04

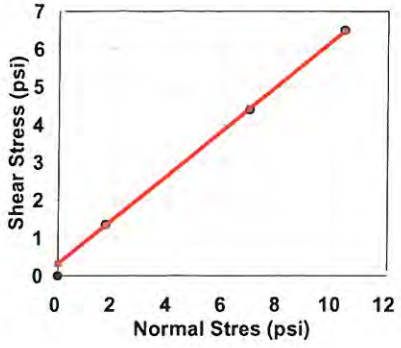
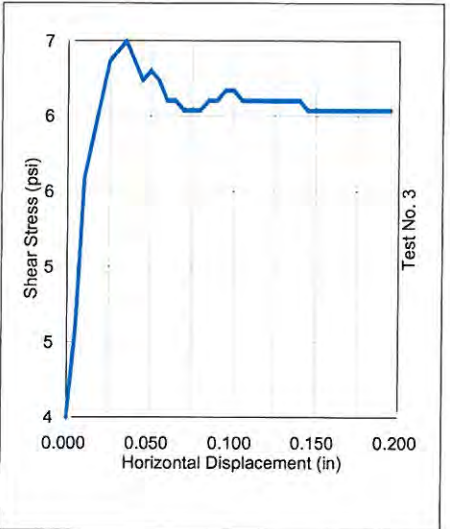
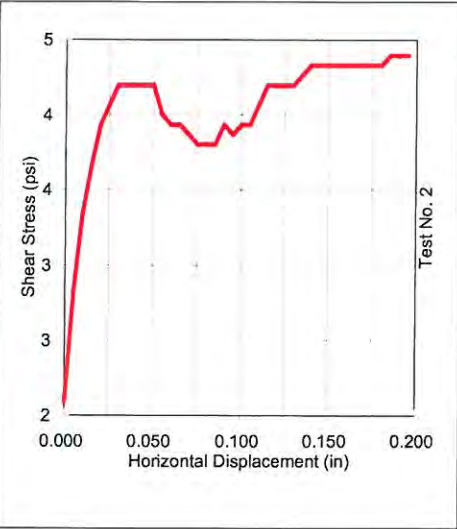
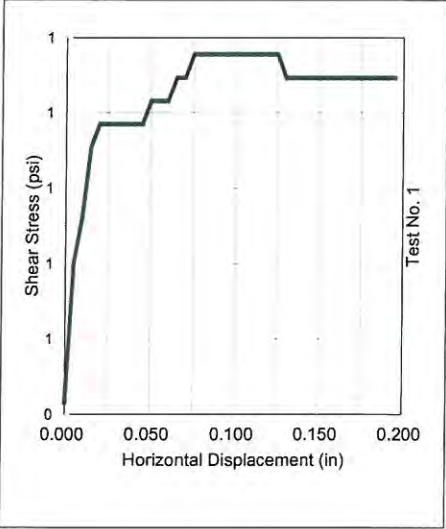
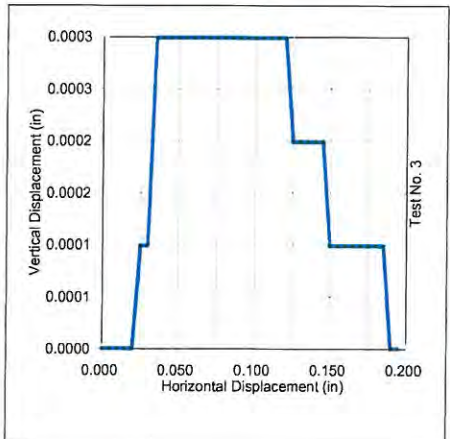
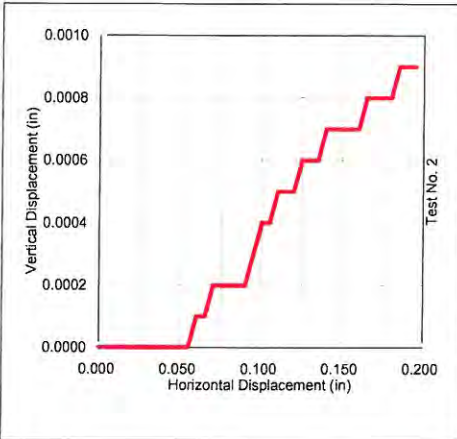
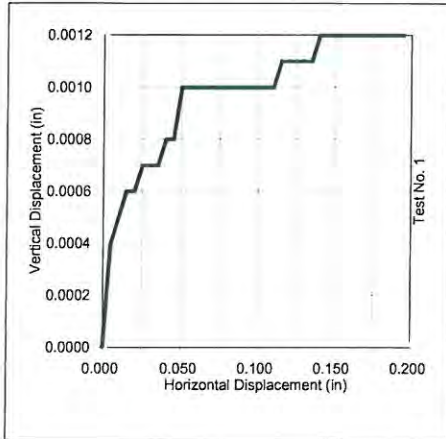
PROJECT NAME : Bridge Replacement over Four Hole Swamp
 PROJECT # : 11200-01
 PROJECT COUNTY : Orangeburg
 PROJECT STATE : South Carolina
 LABORATORY # : 100
 SUBMITTED BY : ICA Engineering Inc.

SAMPLE # : B-8
 SAMPLE LOC. : Bulk 1
 SAMPLE DEPTH : 0.0' to 5.0'
 DATE TESTED : 7-23-14
 DATE REPORTED : 7-23-14

Specimen No.1

Specimen No.2

Specimen No.3



Summary of Results:

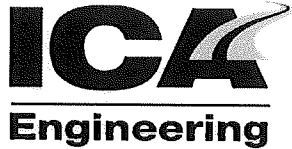
	Specimen		
	No. 1	No. 2	No. 3
Normal Stress (psi)	1.74	6.94	10.41
Maximum Shear Stress (psi)	1.36	4.39	6.50

**Phi Angle = 30.62°
Cohesion = 0.32 psi**

Legend

- Specimen No. 1
- Specimen No. 2
- Specimen No. 3
- Tangent Line

APPROVED BY: *Mugard H. Claxfield*



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-3
SAMPLE LOC. : B-5
SAMPLE DEPTH : 19.5' to 19.9'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

ROCK DESCRIPTION : v.f. to scat. med. grain fossiliferous, calcareous Sandstone, mod. withd.

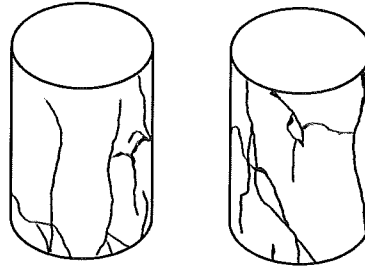
Diameter : 1.98 in
Height : 4.21 in

Area : 3.09 in²
Volume : 0.00752 ft³

RESULTS :

Moisture Air-Dry : NA
Air-Dry Density : 137.08 lbs/ft.³

Maximum Stress : 1722 psi
Elapsed Time : 7:21 min.
Rate of Loading : 30 lb/sec



Comments :

Approved By :

Strengthening America's Infrastructure®



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-4
SAMPLE LOC. : B-5
SAMPLE DEPTH : 24.6' to 24.9'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

ROCK DESCRIPTION : v.f. to f. grain, fossiliferous Calcarenite, mod. to highly wthd.

Diameter : 1.95 in

Area : 2.99 in²

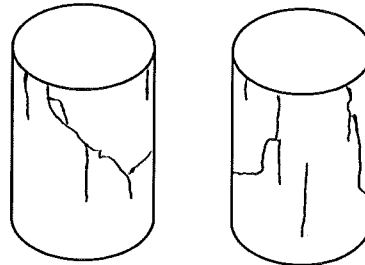
Height : 3.76 in

Volume : 0.00652 ft³

RESULTS :

Moisture Air-Dry : NA
Air-Dry Density : 97.59 lbs/ft.³

Maximum Stress : 299 psi
Elapsed Time : 2:49 min.
Rate of Loading : 10 lb/sec



Comments :

Approved By :

Strengthening America's Infrastructure®



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-6
SAMPLE LOC. : B-6
SAMPLE DEPTH : 15.3' to 15.7'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

ROCK DESCRIPTION : f. to med. grain w/ scat. cse. frags., fossiliferous, calcareous Sandstone, mod. to highly wthd.

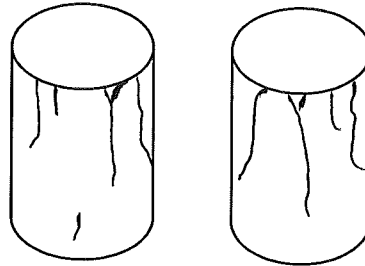
Diameter : 1.99 in
Height : 4.22 in

Area : 3.10 in²
Volume : 0.00756 ft³

RESULTS :

Moisture Air-Dry : NA
Air-Dry Density : 120.13 lbs/ft.³

Maximum Stress : 297 psi
Elapsed Time : 3:00 min.
Rate of Loading : 10 lb/sec



Comments :

Approved By :

Strengthening America's Infrastructure®



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-7
SAMPLE LOC. : B-6
SAMPLE DEPTH : 23.9' to 24.3'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

ROCK DESCRIPTION : f. to med. grain w/ scat. cse. frags., fossiliferous, calcareous Sandstone, mod. to highly withd.

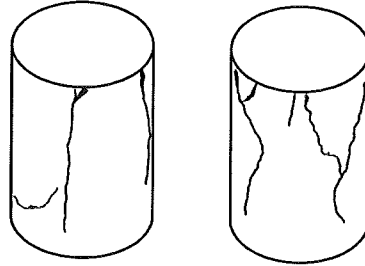
Diameter : 1.92 in
Height : 4.10 in

Area : 2.91 in²
Volume : 0.0069 ft³

RESULTS :

Moisture Air-Dry : NA
Air-Dry Density : 99.35 lbs/ft.³

Maximum Stress : 275 psi
Elapsed Time : 2:32 min.
Rate of Loading : 10 lb/sec



Comments :

Approved By :

Strengthening America's Infrastructure®



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-8
SAMPLE LOC. : B-6
SAMPLE DEPTH : 26.7' to 27.1'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

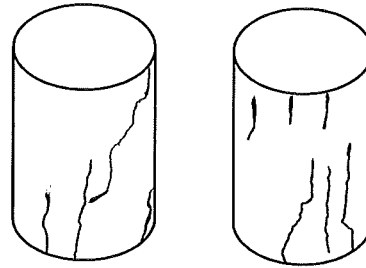
ROCK DESCRIPTION : v.f. to f. grain, fossiliferous Calcarenite, mod. withd.

Diameter : 1.98 in
Height : 4.08 in

Area : 3.07 in²
Volume : 0.00725 ft³

RESULTS :

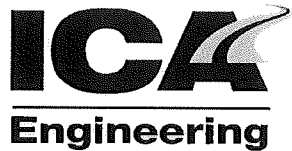
Moisture Air-Dry : NA
Air-Dry Density : 101.93 lbs/ft.³
Maximum Stress : 459 psi
Elapsed Time : 3:02 min.
Rate of Loading : 10 lb/sec



Comments :

Approved By :

Strengthening America's Infrastructure®



UNCONFINED COMPRESSION TEST (ROCK CORE)

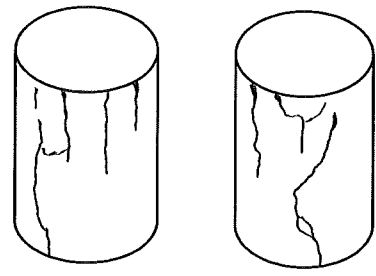
PROJECT NAME : Bridge Replacement over Four Hole Swamp	
PROJECT NO. : 11200-10	SAMPLE NO. : RC-9
PROJECT COUNTY : Orangeburg	SAMPLE LOC. : B-6
PROJECT STATE : South Carolina	SAMPLE DEPTH : 30.6' to 31.0'
LABORATORY NO. : 11200-10	DATE TESTED : 07/22/14
SUBMITTED BY : ICA Engineering Inc.	DATE REPORTED : 07/24/14

ROCK DESCRIPTION : v.f. to f. grain, fossiliferous Calcarenite, mod. withd.

Diameter : 1.94 in	Area : 2.95 in ²
Height : 4.19 in	Volume : 0.00715 ft ³

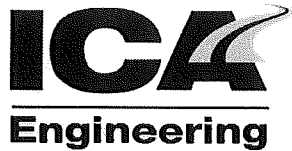
RESULTS :

Moisture Air-Dry :	NA
Air-Dry Density :	98.09 lbs/ft. ³
Maximum Stress :	295 psi
Elapsed Time :	1:30 min.
Rate of Loading :	10 lb/sec



Comments :

Approved By : 



UNCONFINED COMPRESSION TEST (ROCK CORE)

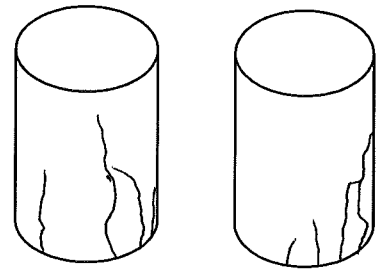
PROJECT NAME : Bridge Replacement over Four Hole Swamp	
PROJECT NO. : 11200-10	SAMPLE NO. : RC-13
PROJECT COUNTY : Orangeburg	SAMPLE LOC. : B-7
PROJECT STATE : South Carolina	SAMPLE DEPTH : 31.5' to 31.9'
LABORATORY NO. : 11200-10	DATE TESTED : 07/22/14
SUBMITTED BY : ICA Engineering Inc.	DATE REPORTED : 07/24/14

ROCK DESCRIPTION : v.f. to f. grain, fossiliferous Calcarenite, mod. to highly withd.

Diameter : 1.97 in	Area : 3.05 in ²
Height : 4.20 in	Volume : 0.00742 ft ³

RESULTS :

Moisture Air-Dry :	NA
Air-Dry Density :	83.78 lbs/ft. ³
Maximum Stress :	314 psi
Elapsed Time :	4:05 min.
Rate of Loading :	10 lb/sec



Comments :

Approved By : 



UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Bridge Replacement over Four Hole Swamp
PROJECT NO. : 11200-10
PROJECT COUNTY : Orangeburg
PROJECT STATE : South Carolina
LABORATORY NO. : 11200-10
SUBMITTED BY : ICA Engineering Inc.

SAMPLE NO. : RC-17
SAMPLE LOC. : B-8
SAMPLE DEPTH : 39.0' to 39.4'
DATE TESTED : 07/22/14
DATE REPORTED : 07/24/14

ROCK DESCRIPTION : v.f. to f. grain, fossiliferous Calcarenite w/ pods, calcareous Sandstone, mod. to highly wthd.

Diameter : 1.97 in

Area : 3.05 in²

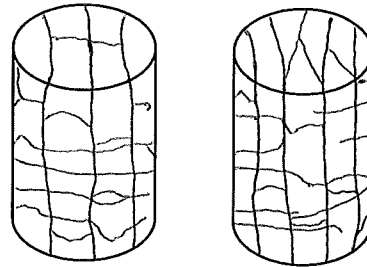
Height : 4.18 in

Volume : 0.00738 ft³


RESULTS :

Moisture Air-Dry : NA
Air-Dry Density : 105.77 lbs/ft.³

Maximum Stress : 203 psi
Elapsed Time : 2:30 min.
Rate of Loading : 10 lb/sec



Comments :

Approved By : 

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