S-42-31 (Cannons Campground Road) over Peters Creek Emergency Bridge Replacement

Spartanburg County, SC

Geotechnical Baseline Report

March 12, 2025 | SCDOT Project ID: P041165 Terracon Project No.: 8623P180

Prepared for:

HNTB Corporation 343 E. Six Forks Road, Suite 200 Raleigh, NC 27609



Nationwide Terracon.com Facilities

Environmental Geotechnical

Materials



72 Pointe Circle Greenville, SC 29615 P (864) 292-2901 Terracon.com

March 12, 2025

HNTB Corporation 343 E. Forks Road, Suite 200 Raleigh, NC 27609

- Attn: Mr. Spencer Franklin, PE, Senior Vice President P: 919-546-8997
- Re: Geotechnical Baseline Report S-42-31 over Peters Creek Emergency Bridge Replacement Spartanburg County, South Carolina SCDOT Project ID.: P041165 Terracon Project No.: 8623P180

Dear Mr. Franklin:

Terracon Consultants Inc. (Terracon) has completed the exploration, testing and limited engineering analysis services for the above-referenced project. The services were conducted in general accordance with our Task Order Number 001, dated May 25, 2023.

Introduction

HNTB Corporation (HNTB) has contracted Terracon to perform subsurface exploration, laboratory testing and limited preliminary engineering recommendations for the replacement of the S-42-31 Bridge over Peters Creek in Spartanburg County, South Carolina. The results of the subsurface exploration and laboratory testing have been separately presented in a Geotechnical Subsurface Data Report (GSDR). For convenience, those data are also provided here in this Geotechnical Baseline Report (GBR) along with a characterization of the subsurface conditions for the project. Limited preliminary geotechnical design and construction considerations associated with the requested scope of work are included in this GBR. This GBR was prepared in general accordance with the 2022 SCDOT Geotechnical Design Manual (GDM).

Project Description

The project site is located at the S-42-31 (Cannons Campground Road) crossing over Peters Creek in Spartanburg County, South Carolina. Site location and exploration plans are presented in Appendix A of this report. Based on the conceptual plans by HNTB dated



2/17/2025, the replacement bridge will be constructed on the same alignment as the current bridge. The current plan indicates the new bridge will be a 170-ft long multi-span bridge constructed with AASHTO Type III Prestressed Concrete Beams.

Geotechnical Testing

The geotechnical exploration for this project was performed between January 13 and February 6, 2025. The results of our field work and our associated laboratory testing are included in Appendices A and B.

Field Exploration

Our field exploration consisted of the following:

- Two (2) Standard Penetration Test (SPT) Borings (S-42-31-1 and S-42-31-2)
- Two (2) offset auger probes near S-42-31-2 for bulk sample collection
- One (1) Downhole Shear Wave Velocity Test (DHT-1) performed in casing installed within Boring S-42-31-2
- Two (2) Cone Penetration Test soundings (S-42-31-1C and S-42-31-2C).

The tests were performed at the approximate locations as approved by SCDOT. A description of our testing methods and graphical logs outlining the soil conditions at each test location are presented in Appendix A. The test locations were established in the field by Terracon and surveyed by Thomas & Hutton after completion.

Laboratory Testing

The following laboratory tests were performed on the soil samples collected at the site.

- Twenty-seven (27) Natural Moisture Content Tests
- Eight (8) Atterberg Limits Tests
- Nine (9) Grain Size Tests
- Four (4) Grain Size Tests with Hydrometer
- One (1) Remolded, Consolidated-Undrained (CU) Triaxial Compression Test with Pore Pressure Readings
- One (1) Standard Proctor Test
- One (1) Corrosivity Suite (pH, chloride content, sulfate content, and resistivity tests)
- Seven (7) Compressive Strength of Rock Cores

The general scope of the laboratory testing frequency was determined by SCDOT. The laboratory testing assignment was performed by our engineers. The laboratory procedures and results of the laboratory tests are presented in Appendix B.

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Subsurface Conditions

Regional Geology

The bridge site is located on route S-42-31 in Spartanburg County, South Carolina. The site lies generally within the Piedmont Physiographic Province. More specifically, the site is located within the Six Mile Thrust Sheet. According to regional geologic mapping and published geologic reports, the project area is mapped in an area with biotite gneiss interlayered with mica sillimanite schist. The bridge end bents and approach embankments contain existing fill above alluvial and/or residual soils, very dense residual soils classified as Intermediate Geomaterials (IGM) and bedrock.

Soil and Rock Stratification

Borings S-42-31-1 and S-42-31-2 encountered 7 to 8 inches of asphalt followed by 1 ½ to 3 inches of gravel. Beneath the existing roadway section, embankment fill soil consisting of very loose to loose silty/clayey sand and very soft to very stiff sandy silt/clay was encountered to approximately 8 to 16 feet below the existing ground surface. Under the fill soils, both borings encountered a layer of alluvial soil consisting of very loose to loose clayey sand and soft to firm sandy silt/clay to a depth of around 22 to 34 feet below the existing ground surface. Below the alluvium, residual soils consisting of loose to very dense silty/clayey sand were encountered and continued to between 33.5 to 38.5 feet below ground surface, with some residual soils characterized as being intermediate geomaterials (IGM) exhibiting SPT N values of more than 100 blows per foot (bpf), followed by bedrock. Bedrock was present to the maximum depth explored of 58.5 feet and 53.5 feet at borings S-42-31-1 and S-42-31-2, respectively.

Borings performed by F&ME in June 2024 (B-1, B-2, and B-3) and conducted through the existing bridge deck show 4 to 5 inches of asphalt and 5 to 9 inches of concrete followed by a 20.6 to 34.8-foot air gap to the mudline. Boring log B-1 shows approximately 5-foot-thick concrete above the bedrock and Boring log B-3 shows approximately 5-foot-thick concrete and approximately 3-foot-thick wood above the residuum. The F&ME Boring logs show top of rock at depths of 33 ½ to approximately 47 feet. Boring log B-2 by F&ME shows the creek level at a depth of 35.6 feet below the existing bridge deck.

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Geology ^{1, 4}	Approximate Elevation of Layer Bottom (ft, NAVD88)	USCS Soil Type	Measured Field N Value	Plasticity Index	Fines Content	REC / RQD
Ground Cover (Asphalt and Gravel)	716 to 720					
Fill	705 to 709	SM, SC, ML, CL	0 to 19	NP ³ to 14	25 to 54	
Alluvium	687 to 695	SC, ML, CL	1 to 6	NP ³ to 16	27 to 53	
Residuum	682 to 683	SM, SC	7 to 100+		24	
Rock	PMDE ²					18-100% / 0-68%

1. Geology is shown for Terracon Borings S-42-31-1 and S-42-31-2 only.

2. PMDE = Present to Maximum Depth Explored

3. NP = non-plastic

4. Concrete and wood debris were encountered in F&ME Borings B-1 and B-3 between Elevation 679 feet and 683 feet.

Seismic Conditions

According to SCDOT Seismic Design Specifications for Highway Bridges version 2.0, the proposed bridge will be an Operational Classification II (OC II). Per SCDOT GDM 2022, the proposed bridge shall be designed to meet the performance limits for an OC II bridge.

Acceleration Design Response Spectrum (ADRS)

The shear wave and compression wave velocity results, as measured at Boring S-42-31-2 using downhole seismic tests, were provided to SCDOT. SCDOT used these velocity measurements to develop Acceleration Design Response Spectrum (ADRS) curves by determining the seismic hazard and evaluating the local site effects on the response spectra.

SCDOT provided "3-Point Acceleration Design Response Spectrum" curves along with a table that included pseudo-spectral accelerations (PSA) for 5% critical damping and at selected frequencies, consistent with a Geologically Realistic (B-C Boundary) condition (shear wave velocity, Vs = 2,500 feet per second). PSA values were provided for the:

- Functional Evaluation Earthquake (FEE): 15% probability of exceedance in 75 years
- Safety Evaluation Earthquake (SEE): 3% probability of exceedance in 75 years

The table below provides the maximum considered earthquake peak ground acceleration (PGA), the short period acceleration (S_{DS}), and one-second period acceleration (S_{D1}) for the



FEE and SEE earthquakes at the ground surface. A copy of the "3-Point Acceleration Design Response Spectrum" provided by SCDOT is included in Appendix C.

Seismic Design Parameter	FEE	SEE
PGA	0.04	0.07
Sds	0.08	0.15
S _{D1}	0.01	0.02

Soil Shear Strength Loss (SSL) Analysis

A few feet of alluvium (soft sandy silt/clay and very loose silty/clayey sand) were encountered below the existing fill at the boring locations. Although the groundwater level encountered was at a lower elevation than the bottom of the alluvium, groundwater fluctuations are likely. Therefore, soil shear strength loss (SSL) screening should be performed to assess potential for liquefaction related settlement and stability impacts on the planned bridge foundations and embankment slopes. Additional soil and groundwater evaluation may be required.

Design and Construction Considerations

Foundations

Driven steel H-piles driven to practical refusal on rock or within IGM materials (i.e., >20 blows per inch [bpi] with appropriately sized hammer) are expected to be feasible for the proposed bridge end bents.

The elevation to the top of very dense residual soils (IGM) at End Bent 1 (Begin Bridge) is 685 feet and at End Bent 4 (End Bridge) is 695 feet, NAVD88. The IGM is about 4 ½ feet thick at Bent 1 overlying bedrock with a minimum RQD of 13% and about 11 ½ feet thick at Bent 4 overlying bedrock with a minimum RQD of 0% at the top of rock. Per section 16.3.1 of the GDM, reinforced pile tips will be needed to minimize potential pile damage while penetrating through IGM to the top of rock. Pile drivability using the wave equation should be performed as part of subsequent detailed geotechnical evaluations. Appropriate group effect should be considered as necessary per GDM Chapter 16.

According to the conceptual bridge plans by HNTB dated 2/17/2025, minimal fill is expected at the end bent embankments. Foundations should typically be installed after the approach embankment construction to reduce potential downdrag settlement issues. The pile design should account for drag loads, should new fill be placed after installing foundation piles.

Drilled shafts are anticipated to be feasible for the proposed bridge interior Bents 2 and 3. Assuming redundant drilled shafts, Table 9-4 GDM 2022 allows using a resistance factor of

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0.60 (both side resistance and end bearing) for a single redundant drilled shaft in rock. It is assumed that the drilled shaft will be cased to the top of rock and the side resistance along the casing length will not be considered in estimating axial resistance. Appropriate group effects should be considered as necessary per GDM Chapter 16.

We have observed variability in the top of rock and thickness of IGM, as seen in **Soil and Rock Stratification**. Therefore, we expect variability in tip elevations at each bent location. Resistance of piles driven to practical refusal in IGM or rock will be limited by their structural resistance. Therefore, likely reinforced pile tips will be required to penetrate to IGM and rock. Pile drivability using the wave equation should be performed along with estimating stresses during driving and, in general, verifying the ability of the Contractor's selected hammer to drive the piles to the desired penetration while preventing overstressing.

Corrosion and Deterioration

Corrosion testing was performed on a composite sample obtained from split spoons in the upper 2 to 30 feet. Corrosion testing included pH, resistivity, chlorides, and sulfates content as summarized in Table below. Corrosion test results are included in Appendix B.

Corrosion Test	Results Bent 1, Boring S-42-31-1 Composite Sample from 2 to 30 feet	Indication of Corrosivity ¹
рН	5.5	Less than 5.5
Resistivity	2,814 ohm-cm	Less than 2,000 ohm-cm
Chloride	130 ppm	Greater than 500 ppm
Sulfate	95 ppm	Greater than 1,000 ppm

1. AASHTO LRFD bridge design specifications, Ninth Edition 2020, Section 10.7.5.

Based on the criteria for electro-chemical properties in the GDM Section 7.18, the electrochemical classification of the project site is non-aggressive. Interpretation of these data should be communicated with the project's structural engineer.

Embankment Construction

Based on the conceptual plans by HNTB, minimal fill will be placed to meet the proposed grade with some embankment cut below the bridge and relatively short 2H:1V riprap lined slopes shown at the end abutment positions. Bulk samples were obtained near End Bent 4 (End Bridge) from the top 5 feet of existing embankment material. Per our scope, a bulk sample was tested for soil classification and was also remolded to about 95% of the Standard-effort Proctor prior to being tested for shear strength envelopes under CU Triaxial Compression with pore pressure readings. Test results are presented in Appendix B and summarized in the table below.

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			Sample	USCS	Compa	action	Shear Strength ¹		
Sample No.	Station	Offset (ft)	Depth (ft)	Soil Type	Optimum Moisture (%)	Max Dry Density (pcf)	Total	Effective	
S-42- 31-2 Offsets	180+32	7 R	1 - 5	SC	13.3	117.6	c=1.7 psi ø=26°	c'=1.3 psi ø'=33°	

1. Based on a maximum deviator stress failure criterion

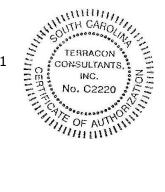
Closure

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

Maggie McKenney, EIT Senior Staff Engineer Abdul Q. Fekrat, PhD, PE Senior Engineer SC Registration No. 38531





Appendix A Field Exploration

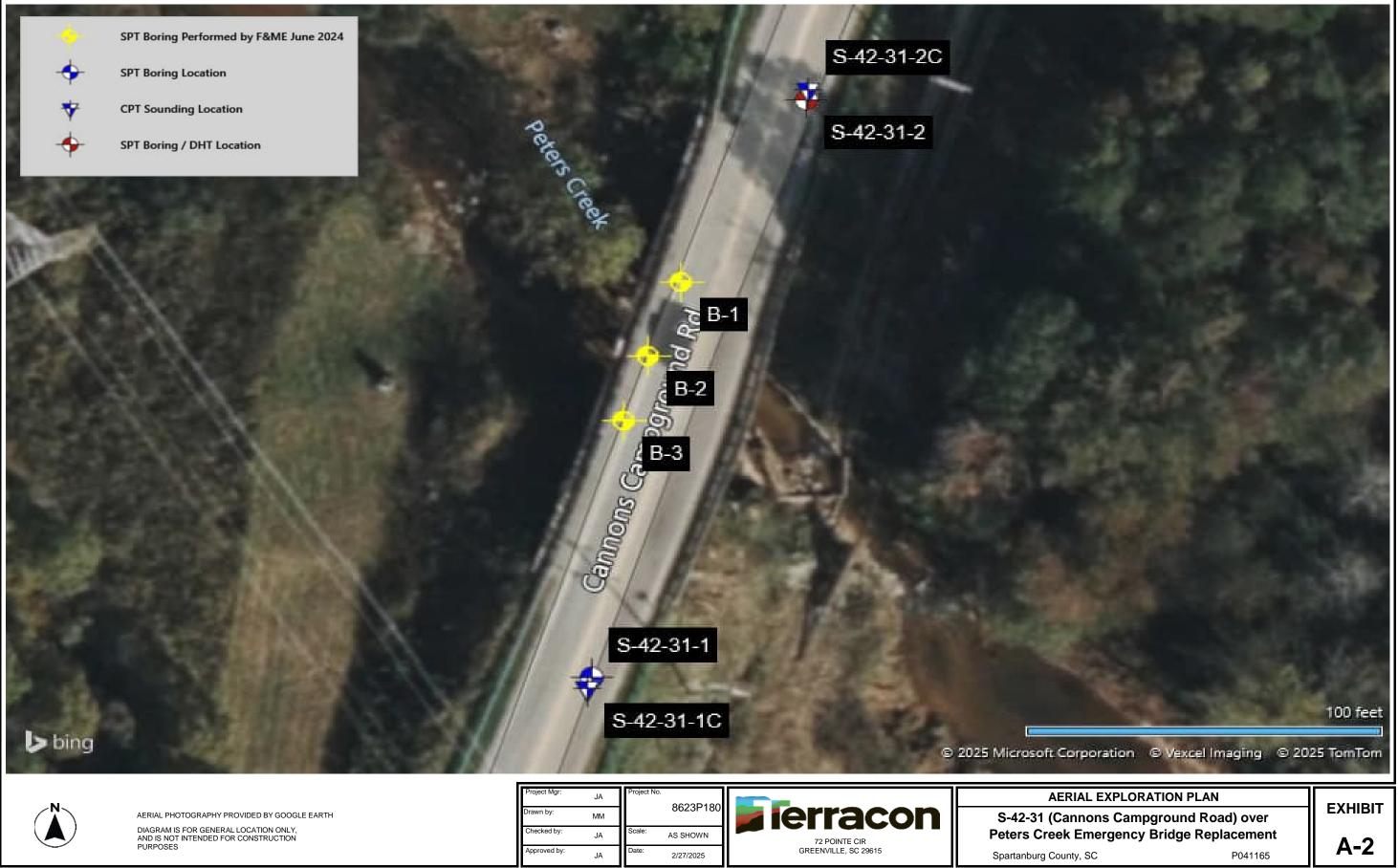
Exhibit A-1 – Site Location Map Exhibit A-2 – Aerial Exploration Plan Exhibit A-3 – Boring Location Diagram Exhibit A-4 – Field Testing Summary Exhibit A-5 – GeoScoping Form (2 Pages) Exhibit A-6 – Field Exploration Description (3 Pages) Exhibit A-7 – Soil Description Terms Exhibit A-8 – Soil/Rock Symbols Exhibit A-9 – Boring Logs (4 Pages) Exhibit A-10 – Grout Logs (4 Pages) Exhibit A-11 – Rock Core Photograph Logs (2 Pages) Exhibit A-12 – Geophysical Testing Results Exhibit A-13 – CPT Sounding Logs (2 Pages) Exhibit A-14 – Boring Logs Done by F&ME (4 Pages) Exhibit A-15 – Rock Core Photograph Logs Done by F&ME (3 Pages)

Note: All exhibits are one page unless noted above



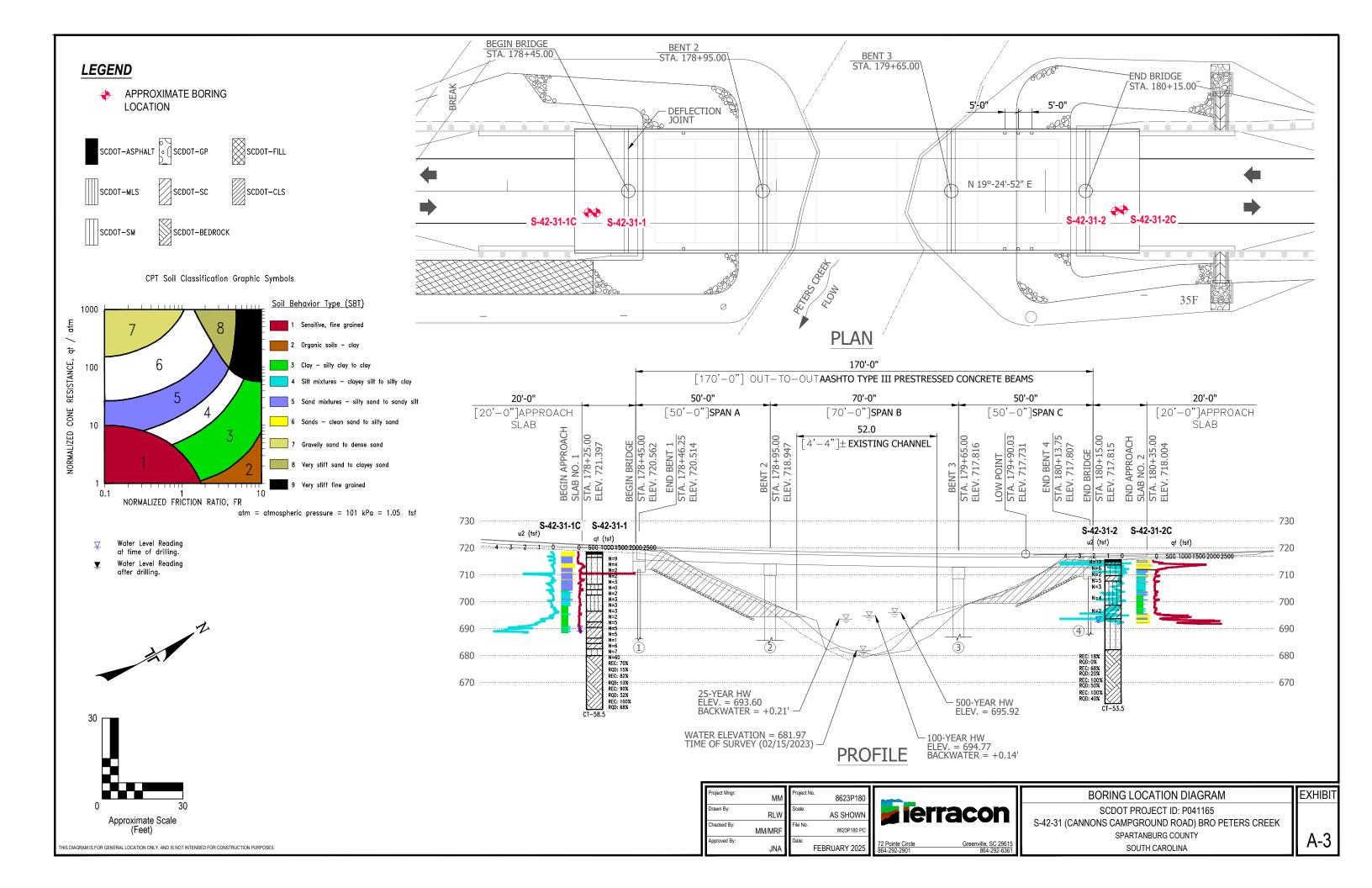


Project Mgr:	JA	Project N			Sľ
Drawn by:	MM		8623P180	erracon	S-42-31 (Cann
Checked by:	JA	Scale:	AS SHOWN	72 POINTE CIR	Peters Creek E
Approved by:	JA	Date:	2/27/2025	GREENVILLE, SC 29615	Spartanburg County, SC





Project Mgr:	JA	Project No.	8623P180		AERIA
Drawn by:	MM		00201 100	erracon	S-42-31 (Cann
Checked by:	JA	Scale:	AS SHOWN	72 POINTE CIR	Peters Creek Er
Approved by:	JA	Date:	2/27/2025	GREENVILLE, SC 29615	Spartanburg County,



Soil Testing Location Table - Exhibit A-4 S-42-31 over Peters Creek Emergency Bridge Replacement | Spartanburg County, SC Terracon Project No.: 8623P180 | SCDOT Project ID: P041165



Test Number	Туре	Test Hole Local	Northing	Easting	Latitude	Longitude	Station ¹	Offset ¹	Elevation ² (ft)	Depth (ft)
S-42-31-1	STB	Begin Bridge	1152580.06	1737390.87	34.99793	-81.87675	178+33	8.1-R	720.5	58.5
S-42-31-1C	CPT	Begin Bridge	1152576.65	1737389.59	34.99792	-81.87676	178+30	8-R	720.7	30.2
S-42-31-2	STB	End Bridge	1152762.25	1737452.90	34.99843	-81.87655	180+26	7.5-R	716.8	53.5
S-42-31-2C	CPT	End Bridge	1152765.44	1737453.40	34.99844	-81.87655	180+29	7-R	716.9	23.6

1. Stations and offsets were based on the state plane coordinates collected by Thomas & Hutton.

2. Elevations are based on NAVD 88.

3. A composite bulk sample was collected about 5.8 feet and 6.3 feet north of S-42-31-2.

Exhibit A-5 GeoScoping Form

PROJECT INFORMATION							
Project ID:	P041165	Date of Trip:	1/14/2025				
County:	Spartanburg	Location:	Spartanburg				
Rd/ Route:	S-42-31	Local Name:	Cannons				
Attendees:	M. McKenney		Campground Rd				

EXISTING BRIDGE INFORMATION							
Bridge Length: 150 ft Bridge Width: 38.5 ft							
Superstructure Type:	Concrete framing and decking	Substructure Type:	Timber Piles				
Begin Bridge Sta ¹ :	178+45	End Bridge Sta ¹ :	180+15				
Begin Bridge Embankment Sta ¹ :	177+45	End Bridge Embankment Sta ¹ :	181+15				
Structure Number:	04212	Posted Weight Limit:	20 tons				
Crossing:	Peters Creek	Skew:	N/A				
Latitude:	34.99820°	Longitude:	-81.87667°				
Existing Fill Height:	approx 8 to 16 ft	Approx Existing Slope Angle:	2H:1V				
1. Begin & End Bridge Embankment 100 ft down Sta. or up Sta., respectively. Sta. estimated from overlay of bridge plan provided by HNTB.							

	EXISTING ROADWAY EM	BANKMENT INFORMATION					
Begin Project Sta:	177+00Begin Bridge Embankment Sta:177+45						
Accessibility Issues:	None Observed						
Ground Cover:	Asphalt pavement and grassed shoulders						
Existing Fill Height:	16 feet, sloping	Approx Existing Slope Angle:	2H:1V				
Local Development:	developed - residential						
Topography:	graded slope to creek						
Traffic Control Necessary:	No, bridge closed for constru-	ction					
Surface Soils:	silty sand	Muck:	No				
Exposed Rock in Stream Bed:	Yes	Exposed Rock in banks:	Yes				
Wetlands on Site:	Yes	Wetland Adjacent:	Yes				
Depth FG to Water:	36 feet	Water Depth:	2 feet				
Depth to Existing Ground:	approximately 38 feet at center of bridge						
Scour Condition at EB:	Critical	Critical					
End Bridge Embankment Sta:	181+15	End Project Sta:	182+00				
Accessibility Issues:	None Observed						
Ground Cover:	Asphalt pavement and grasse	d shoulders					
Existing Fill Height:	8 feet, sloping	Approx Existing Slope Angle:	2H:1V				
Local Development:	developed - residential						
Topography:	graded slope to creek						
Traffic Control Necessary:	No, bridge closed for constru-	ction					
Surface Soils:	clayey sand	Muck:	No				
Exposed Rock in Stream Bed:	Yes	Exposed Rock in banks:	Yes				
Wetlands on Site:	Yes	Wetland Adjacent:	Yes				
Depth FG to Water:	36 feet	Water Depth:	2 feet				
Depth to Existing Ground:	approximately 38 feet at cent	er of bridge					
Scour Condition at EB:	Critical	Scour Condition at IB:	Critical				

Exhibit A-5 GeoScoping Form

	UTILITIES INFORMATION						
Attached:	A telephone conduit was observed to be attached along the west side of the bridge						
Above Ground:	Overhead power with attached AT&T cable was observed along the east side of the bridge. A Duke Power easement was observed crossing diagonally over the south end of the bridge. A 16-inch waterline and 8-inch ductile iron sewer line was observed above ground along the east side of the bridge.						
Underground:	A 42-inch underground waterline was observed along the west side of the bridge. An underground gas line was observed along the east side of the bridge. Underground sewer was observed crossing over the north end of the bridge.						

Comments:



Field Exploration Description Overview

The testing locations were determined by Terracon and submitted to SCDOT for approval. Terracon located the test locations in the field using handheld GPS and measurements from existing structures shown on the provided drawings. The borings were surveyed by Thomas & Hutton after testing and drilling was complete. The locations, as shown in the Exploration Plans, are shown to the scale indicated.

A field log of each test location was prepared by our engineer. The final boring logs included with this report represent the engineer's description of the encountered conditions modified as necessary based on laboratory test results of the individual samples.

Soil Test Borings (STB)

All boring and sampling operations were conducted in general accordance with the following procedures:

- SCDOT Geotechnical Design Manual 2022
- ASTM D5783, "Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geo-environmental Exploration"
- ASTM D6151, "Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling
- ASTM D1586 "Test Method for Penetration Test and Split-Barrel Sampling of Soils"
- ASTM D4220 "Standard Practices for Preserving and Transporting Soil"
- ASTM D2113 "Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration"
- ASTM D5079 "Standard Practices for Preserving and Transporting Rock Core Samples"

Each soil test boring was advanced using rotary wash drilling techniques. Soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-barrel sampler, also known as a standard split-spoon. The sampler is advanced into the soil a total of 18 to 24 inches by striking the drill rod using a 140-pound automatic hammer falling 30 inches. The number of blows required to advance the sampler for each of three to four, 6-inch increments is recorded. The sum of the number of blows for the second and third increments is called the "Standard Penetration Value", or N-value (N_{meas}, blows per foot). The N-value, when properly evaluated, is an index to the soil strength.

Soil classification provides a general guide to the engineering properties of various soil types and enables the engineer to apply his experience to current situations. In our exploration, samples obtained during drilling operations are examined and visually classified by a geotechnical engineer using the procedures outlined in ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System). Laboratory testing was also performed on select split-spoon samples to evaluate index properties for further classification. The soils are described according to color, texture, and relative density or Exhibit A-6 – Subsurface Exploration Description S-42-31 over Peters Creek Emergency Bridge Replacement | Spartanburg County, SC Terracon Project No. 8623P180 | SCDOT Project ID: P041165



consistency (based on standard penetration resistance). The designations shown on the logs are described in the 2022 SCDOT Geotechnical Design Manual, Chapter 6.

The borings were advanced either to the planned drilling depth at which they were terminated, or to refusal of the drilling equipment. Select borings were continued below this depth using diamond bit rock coring techniques. NQ2 sized cores were recovered from the borehole. The rock recovery ratios (REC, percentage of the total core run), Rock Quality Designation (RQD, percentage of the total core run of pieces greater than 4 inches) were recorded along with a description of the rock. An explanation of the rock descriptions shown on the logs is provided in the SCDOT GDM Chapter 6. Photos of the recovered rock core specimens are provided in the Rock Core Photograph Log.

Groundwater readings were collected from the soil test borings after 24 hours if site constraints allowed the borings to stay open. If collected, water levels are indicated on the boring logs. The borings were advanced using mud rotary drilling techniques, and time-of-drilling water levels may not be reliable. Due to active construction taking place on the bridge at the time of drilling, borings were immediately backfilled after completion.

At the conclusion of the work, the boreholes holes were backfilled with the drill cuttings and clean sand. The upper 20 feet of the tests in the existing roadways and embankments were grouted with a cement bentonite grout. Test locations performed in existing pavements were capped with cold-patch asphalt.

Cone Penetration Test (CPT) Soundings

Cone Penetration Test soundings were conducted in accordance with ASTM D5778 *Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils*.

Downhole Shear Wave Velocity Test (DHT)

One downhole seismic test was performed in a cased borehole drilled for this project. After the test boring was completed, the boring was filled with a fluid water/cement/bentonite grout and then a threaded PVC pipe casing (capped at the bottom end) was inserted into the borehole, providing a uniform bond between the soil and pipe exterior.

The downhole seismic test consisted of placing two downhole triaxial geophones at selected depth intervals in the borehole casing. The geophone was connected to a recording device (Seismic Source Daq Link 5 Seismograph) at the surface and clamped to the side of the casing at the selected test depth. The geophones are equipped with a spring-arm that is released at the bottom of the boring. The spring expands and forces the geophone against the casing wall. The interval between each geophone and each test depth was 3 feet for the entire depth of the cased borehole. An instrumented hammer was then used to strike a steel plate with cleats at the bottom (often called a shear wave golf shoe) that penetrated the ground and prevented sliding when struck. The steel plate was oriented to generate horizontal shear waves (SH) at the surface. An additional plate was also struck to better produce compression

Exhibit A-6 – Subsurface Exploration Description S-42-31 over Peters Creek Emergency Bridge Replacement | Spartanburg County, SC Terracon Project No. 8623P180 | SCDOT Project ID: P041165



waves. The horizontal distance was measured, and the plate was set exactly 10 feet from the borehole. The recorder was set to record the arrival times of the shear waves at the geophone locations. At least 15 blows (5 in each direction on the golf shoe, and 5 on the steel plate) were struck for each test depth to electronically stack and polarize the observed data, and to increase the signal-to-noise ratio. The data was stored on computer disks for processing and computation. The geophone was raised to the next depth interval and the process was repeated.

Shear Wave Velocity Test Results shows the downhole shear wave velocity and compressive wave velocity test results. The data was evaluated using the Fixed Interval method. S-wave arrival times using the Interval method were picked based on the onset of the signal (first break) as observed in the software package TomTime by GeoTom.

SOIL DESCRIPTION TERMS

Relative Density/Consistency Terms <u>Relative Density¹</u>				Consistency ²		c	0.07			
Descriptive Term	Relativ Densit		SPT Blow Count	Descriptive Term			SPT Blow Count (tsf)			
Very Loose Loose Medium Dense Dense Very Dense	16 to 35% e 36 to 65% 66 to 85%		4 and less 5 to 10 11 to 30 31 to 50 51 and more	Very Soft Soft Firm Stiff Very Stiff Hard	0.26 to 0.51 to 1.01 to 2.01 to	o 1.00 o 2.00	3 to 5 to 9 to 16 to	8 15		
Moisture Con <u>Descriptive Te</u> Dry Moist Wet	Damp bu	t no visible wate	sty, dry to the to er y in coarse-grai		s below the wa	ater ta	ıble			
Color Describe the s	ample c	olor whil	e sample is still	moist.						
Angularity ¹ <u>Descriptive Te</u> Angular Subangular Subrounded Rounded	rm	Particle Particle	es have sharp ea es are similar to es have nearly p	dges and relative angular descrip lane sides but h y curved sides a	tion but ave wel	have rounded I-rounded cori	i edge	es.		
HCI Reaction <u>Descriptive Te</u> None Reactive Weakly Reactiv Strongly Reactiv	r <u>m</u> ve	Some r	ble reaction reaction, with bu	ubbles forming s bubbles forming		ately				
Cementation <u>Descriptive Te</u> Weakly Cemer Cemented Strongly Ceme	rm nted	Crumb	les or breaks wi les or breaks wi	th handling or li th considerable eak with finger p	finger pi		lodera	itely		
<u>Gravel</u> Diam Fine 4.76	Fine4.76 to 19.1Coarse19.1 to 76.2		Sieve Size #4 to ¾ inch ¾ inch to 3 inc	<u>Sand</u> Fine ch Mediur Coarse		Diameter, m 0.074 to 0.4 0.42 to 2.00 4.00 to 4.76	2)	Sieve Size #200 to #40 #40 to #10 #10 to #4		
•	• •		nown in all capit	al letters.						
	USCS Soil Designation Indicate USCS soil designation as defined in ASTM D-2487 and D-2488									
AASHTO Soil Designation Indicate AASHTO soil designation as defined in AASHTO M-145 and ASTM D-3282										
	grained so		¹ Applies to coarse-grained soils (major portion retained on No. 200 sieve) ² Applies to fine-grained soils (major portion passing No. 200 sieve)							

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$\begin{array}{c} \text{SW-SC} \\ \text{SW-SC} \\ \text{SW-SM} \\ \text{TILL} \\ \text{TOPSOIL} \\ \text{SW-M} \\ S$	Abbreviations N.E. = Not Encountered N.M. = Not Measured
Project No. MEM Project No. Drawn by: KJZ Checked by: SG File Name: Soil – Rock – Log Date: Jul 2023 PH. (864) 292-2901 FAX. (864) 292-6361	SOIL AND ROCK SYMBOLS Exhibit A-8

SCDET Soil Test Log

Project	: ID: P	<u>04116</u> 5	5							Co	ounty:	S	part	tanb	urg			Во	ring	g No	.: S	-42	31-1	
ite De	scripti	on:	S-42	2-31	(Canr	ons (Camp	groun	d Roa	d) BF	RO Pete	ers (Cree	k					R	oute	: S	-42	-31	
ng./G	eo.: S	. Greab	er		Bo	ring	Locat	ion: 1	78+3	3		Off	set:		8.′	IR		Ali	gnr	men	t:	Exis	sting	
lev.:	720.5	ft	Latitu	ude:							-8	1.87	675	;	Da	ite	Star		_		_		<u> </u>	
otal D	epth:	58.5	ft	So	il Dep	th:	38					2	0 ft		Da	ite	Con	nple	etec	1:	1/1	4/2	025	
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														_		-								-
	Description: S-42-31 Cannons Campground Road) BRO Peters Creek R Alignment: Exating guides: y: 720.5 ft Latitude: 34.99793 Longitude: -81.87675 Date Completed: 1/14/2025 tal Depth: 58.5 ft Solid Depth: 38.5 ft Core Depth: 20.1 Date Completed: 1/14/2025 tal Depth: ISB.5 ft Solid Depth: ISB.5 ft Solid Depth: ISB.5 ft Core Depth: 20.1 Date Completed: 1/14/2025 tel Notification: DR#1327 Drill Method: RW/RC Hammer Type Automatic Energy Ratic 92.6% 0.0 Existing Routway Solid Depth: B.Burnette Groundwater: 708 N.M. Zuter Methods 0.0 Existing Routway Solid Depth: Soli																							
roject ID: P041185 County: Spartanburg Boring No:: S-42:31 (Cannons Campground Road) BRO Peters Creek Route: Sector Igit Jose J. S. (reaber Boring Location: 178-33 Offset: 81.R Allignment: Existing Iev:: 720.5 ft Latitude: 34.99703 Longitude: -91.87675 Date Completed: 1/14/2025 Ioro El Depti: 35.6 ft Core Depti: 25.6 ft Solid Depti: 25.6 ft Solid Depti: 26.6 Location: 1/14/2025 Ioro El Depti: 25.6 ft Fill Method:: Fil																								
Project ID: P041165 County: Spartanburg Boring No: S-42-31 Site Description: S-42-31 (Cannons Campground Read) BRO Peters Creek Route: State Status Route: State Status Elev.: 720.5 ft Latitude: 34.99733 Longitude: I.18 R Alignment: Existing Bore Hole Diameter (in: 4 Sampler Configuration Liner Required: Y (b) Liner Vacol Y (b) Bore Hole Diameter (in: 4 Sampler Configuration Liner Required: Th442025 Bore Hole Diameter (in: 4 Bumpler Configuration Liner Required: Th42025 Core Size: NQ2 Drilleer: B. Bumetiz Groundwater: TOB NM. Energy Ratio S2.26%: Core Size: NQ2 Drilleer: B. Bumetiz Groundwater: TOB NM. Energy Ratio S2.26%: Core Size: NQ2 Drilleer: B. Bumetiz Groundwater: TOB NM. Energy Ratio S2.26%: Core Size: NQ2 Size 6 4 5 4 9 Size 6 4 5 4 9																								
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		Asphal	t (8-incl	hes)						0.5	SS-1	50/4			5	0/4"		:	÷	÷		:		
-		Aggreg	ate Bas	se Co	urse (1	.5-inc	hes)	/									:			÷	÷	:		÷
-	2.0_	No reco	overy, s	spoon	blocke	d by a	Iggrega	ite /		2.0	/									:		:		-
-	-	<u> </u>		·				/			- SS-2	6	4	5	4	9	ė	· :	÷					:
Project ID: P041165 County: Spartanburg Boring No.: S.42-31-' Site Description: S-42-31 (Cannons Campground Road) BRO Peters Creek Route: Route: S-42-31-' Fig.Geo: S creaber Boring Location 178-33 Offset 8.18.7675 Dets Started: I/14/2025 Foral Dopth: BS 51 Solid Dopth: SS 51 Completed: 1/14/2025 Bore Hole Diameter (In): 4 Sampler Configuration Liner Required: Y Y Energy Ratio: 92-0 Core Size: NOZ Driller: B. Burnette Groundwater: TOB N.M. 24HR N.M. View Core Size: NATERIAL DESCRIPTION SS 51 SS 51 Social Dopth: 20 Applied (Binches) Applied (Binchches) Applied (Binches)					-																			
Project ID: PO41185 County: Spartanburg Boring No: S.42-31-1 Site Description: S-42-31 (Cannons Campground Road) BRO Peters Creek Route: I-Alignment: Existing Eng/Goc: S. Greaber Boring No: S-42-31-1 Alignment: Existing Elev: 720-5 ft Latitude: 34.99793 Longitude: I-Alignment: Existing Drill Machine: Dirk Halton: Staft of Campleted: 1/14/2025 Bore Hole Diameter (in): 4 Sasting Completed: 1/14/2025 Drill Machine: Dirkline: Dirkline: Remote Sasting Energy Ratio 2.41720 Drill Machine: Dirkline: Dirkline: Remote Sasting Energy Ratio 2.41720 Sasting Readway: 0.02 Sasting Readway: 0.03 Sasting Readway: 0.03 Sasting Readway: 0.1 Applatition Readway: 0.1 Sasting Readway: 0.1 Sast																								
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-	Pott ID: P041165 Description: S-42-31 (Cannons C //Geo.: S. Greaber Boring L : 720.5 ft Latitude: 34.99 IDepth: 58.5 ft Soil Depth: Hole Diameter (in): 4 Samp Machine: DR#1327 Drill Method Size: NQ2 Driller: 0.0 Existing Roadway 0.7 Asphalt (8-inches) 0.8 Aggregate Base Course (1.5-inchr. 0.0 Existing Roadway 0.7 0.8 Aggregate Base Course (1.5-inchr. 0.9 Rocvery, spoon blocked by ag FILL - Loose, dry, reddish brown, subangular, none reactive, weakly fine to medium, Silty SAND (SM) (2.5YR 5/3, NMC=10.7 Very loose, moist, moderately cern some clay and mica, NMC=17.0 weakly cemented, with mica, NMC 9 WMC=23.0 9 NMC=23.0 9 Wery loose, moist, red with brown, reactive, Sandy SILT (ML) (A-4), 2 9 Wery loose, moist, red with brown, subangular, none reactive, moderately cernented, fine, Silty SAND (SM) (2.5YR 5/6 with 7.5YR 4/6, NMC=31.4 9 Very loose, moist, weak red, suba none reactive, Sandy SILT (ML) (A-4),					-		8.0)	-			+						-	-		:		
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/10.5-		NMC=2	27.7																					:
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-	_	P041165 County: Spartanburg Boring No.: S-42-31 S. Greaber Boring Location 17943 Offset: 8.1R Alignment: Existing 0.5 T Latitude: 34.99733 Longitude: -81.87675 Date Started: 1/1/4/2025 1: 58.5 ft Soll Depth: 38.5 ft Core Depth: 20.ft Date Completed: 1/1/4/2025 Inc: DR#1327 Drill Method: RW/RC Harmer Type / Automatic Energy Ratic/3.20 Energy Ratic/3.20				-																		
	14.0	with 7.8	5YR 4/3							14.0											:	:		:
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SCEFT Soil Test Log

			n Log																		
Project									unty:		Spart		urg			Bo			_	2-31-	1
Site De			-31 (Car						O Pete	ers (Cree	k						oute	_	12-31	
		Greaber		oring L							set:		8.1				-	nent		xisting)
Elev.:				34.99				tude:		_	675		-	te S						/2025	
Total D		58.5 ft	Soil De		38.5			ore De	-		20 ft		_	te C			1			/2025	
		imeter (in):	4		pler C						Requ	_		Y	N	-			Jsed	_	N
Drill Ma				II Metho		RW/F			Hamm			_				E	ner			92.6	
Core S	ize:	NQ2	Dri	ller:	B. Bı	urnet	te		Groun	dwa	ater	T	ЭВ	N.	М.			24ŀ	IR	N.M.	
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Elevation (ft)	Depth (ft)		RIAL DE				Graphic Log	Sample Depth	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	10	O	RQD	(%)	F F	NT (%) REC (%) 70 80	
-		Loose, moist, r subangular, no cemented, fine \gravel (SC) (A-	ne reactive to coarse	e, modera , Clayey S	ately SAND v			34.0	- SS-17	2	3	3	6	6	•	Ö					
685.5-	36.0	\NMC=19.4, %# RESIDUUM - L	#200=26.8 _oose, mo	ist, reddis	sh brow			36.0	- SS-18	2	3	4	1	7 -	•	0					
_		and gray, suba moderately cen SAND with gra	nented, fin vel (SC) (<i>i</i>	ie to coar A-2-6), 5	se, Clay YR 5/3			38.0			30	30 3		30	C			•	¢		
- 680.5-	38.5	5YR 5/1, NMC Very Dense, dr subangular, no fine to coarse, rock fragments	y, reddish ne reactive Silty SANI	brown a e, weakly D (SM) (A	nd gray cemen 4-2-4), v	ted,		38.5	-	50/2	<u>,</u>)/2"		-					>
-		NMC=13.0 REFUSAL AT AND BEGIN C	38.5 FEET ORING	r - Set C	CASING			43.5	- NQ-1 - -							0		- - - - - - - - - - - - - - - - - - -			
- 675.5 - -	· -	PARA GNEISS red, laminated subangular, hig rock, 5-60° dip to M, SR, 5YR	foliation, c phly weath , J, N to N 5/1, 5YR	oarse gra ered, me IW, Pa, F 8/1, and	ained, dium sti Fe, Pl, V 5YR 4/6	rong /C			- - - NQ-2						•	,					
- - 670.5		NQ-1: RQD=1 RMR=40, qu=5 strong rock, 0 NQ-2: RQD=1 RMR=43, qu=1	5,449 psi 40° dip 3, %REC=	:82, GSI=				48.5] 							• • • • • • • • • • • • •		•			
- - -		moderately wea 0-40° dip, J, N SR NQ-3: RQD=32	athered, m to MW, N	iedium st lo, No, Pl	, VČ to	ck, C,			- NQ-3							•	•				
- - 665.5 -	 	RMR=50, qu=3 Gray and white VC to M, 5YR NQ-4: RQD=68 RMR=65, qu=5	3,838 psi e, slightly v 5/1 and 5\ 8, %REC=	veathered (R 8/1	d, 0-30°	-		53.5	- - - - NQ-4											o	
-	58.5	CORING TER	VINATED	AT 58.5	FEET				-									•			
660.5- - -									-							, , , , , , , , , , , , , , , , , , ,					
							LE	GENE)												
UD - U	Split Spoo Undisturb Rock Core	on ed Sample	CU -	E Rock Cor Cuttings Continuo				CF	A - Hollo A - Cont C - Drivi	tinuo	us Fli			LING	R	- W	· Rot	ary W ck Co			

SCEFT Soil Test Log

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Elev.:	716.8		34.9	9843	Longi	tude:	-81	.876	55]	Date	Star	ted			1/13/	2025	
fotal D	epth:	53.5 ft So	il Depth:	33.5 ft	Co	ore D	epth:	20	ft]	Date	Con	nple	ted:		1/13/	2025	
Bore H	ole Dia	meter (in): 4	Sam	pler Conf	figurati	on	Line	er Re	quir	ed:	Y	(Ñ)	Lin	er l	Jsed:	Y	(N
Drill Ma	chine	DR#1327	Drill Meth	od: RW	//RC		Hamm	er T\	pe:	Auto	omati	ic	E	nero	av R	atio:	92.6	%
Core Si	Secreption: S-42-31 (Cannons Campground Road) BRO Peters Creek Route: S-4 Alignment: Existin ieo: S. Greaber Boring Location: 180+26 Offset: 7.5R Alignment: Existin 1716.8 ft Latitude: 34.99843 Longitude: -81.87655 Date Completed: 1/13/2022 Depth: 53.5 ft Soil Depth: 33.5 ft Core Depth: 20 ft Date Completed: 1/13/2022 Dible Diameter (in): 4 Sample Configuration Liner Recurrent: Energy Ratio: 92.0 ize: NQ2 Driller: B.Burnette Groundwater: TOB N.M. 24HR N.M 0.0 Existing Roadway 0.5 Ss-1 4 8 11 19 - - - - - N.M. 20.40 50.00 70.5 0.5 Ss-1 4 8 11 19 - - - - - N.M. - N.M. - N.M. - N.M. - N.M. - N.M. <td< td=""><td></td><td></td></td<>																	
					Ind Road) BRO Peters Creek Route: S-42-31 180+26 Offset: 7.5R Alignment: Existing Longitude: -81.87655 Date Started: 1/13/2025 iguration Liner Required: Y N. Liner Used: Y iguration Liner Required: Y N.M. Energy Ratio: 92.6% ette Groundwater: TOB N.M. 24HR N.M. 9 <t< td=""><td></td></t<>													
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tion	Ę	P041165 County: Spartanburg Boring No:: S.42-31 S. Greaber Boring Location: 180+26 Offset: 7.5R Alignment: Existing S. ft Latitude: 34.99843 Longitude: -61.87655 Date Complete: 1/13/2025 S. ft Sampler Configuration Liner Required: Y W Liner Used: Y NO2 Drill Method: RW/RC Hammer Type Automatic Energy Ratio: 92.6 NO2 Driller: B. Burnette Groundwater: TOB N.M. 24HR N.M Existing Readway Saphaft (7-inches)																
evat (ff)	de (#	MATERIAL	DESCRIP	TION	Loc)ep (Route:S-42-3'7.5RAlignment:ExistirDate Started: $1/13/202$ uired:YNLiner Used:YeAutomaticEnergy Ratio:92.TOBN.M.24HRN.M 11 19 3 3 6 0 11 19 3 3 6 0 1 2 2 3 5 0 2 3 4 0 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 0 4 0 1 2 4 0 1 2 4 0 1 2 4 0 1 2 4 0 1 2 4 0 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 </td <td>• •</td> <td></td>			• •					
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-	ct ID: PO41165 County: Spartanburg Boring No. Description: S-42-31 (Cannons Campground Road) ERO Peters Creek Route: Route: <td< td=""><td>: :</td><td>: :</td><td>÷</td></td<>				: :	: :	÷											
-	-	D2 PO41165 County: Spartanburg Boring No:: S.42-31 Cannons Campground Road) BRO Peters Creek Route: S.44:31 Route: S.44:31 Stressen Boring Location: 180-26 Offset: J.5R Alignment: S.44:31 Stressen Boring Location: 180-26 Offset: J.5R Alignment: S.4:1 Stressen Darite (init): 4 Sampler Configuration Liner Required: Y 68 Liner Used: Y 68 Y 68 Y 78 Alignment: Dia 20 30 40 50 60 Alignment: Dia 20 30 40 50 60<			: :	i												
711.8-	_	DI: P041165 County: Spartanburg Boring No.: S.42.3 csrdption: S-42.31 (Cannons Campground Road) BRO Peters Creek 7.88 Rdut: S42.93 col: Screaded Stread (Second Stread) BRO Peters Creek 7.88 Rdut: S42.94 col: Screaded Stread (Second Stread) BRO Peters Creek 7.88 Rdut: S42.94 col: Screaded Stread (Second Stread) BRO Peters Creek 7.88 Alignment: Existing Roadway col: Drill Method: 33.5 ft Core Depth: 20 ft Date Completed: 1/13/20 chine: DR#1327 Drill Method: RV/RC Harmer Type Automatic Energenetics 24HR N.M. col: NO2 Driller: B. Burnette Groundwater: TOB N.M. 24HR N.M. col: Screaded Stread (Second Stread) Screaded (Second Stread)																
-	act ID: P041165 Description: S-42-31 (Cannons Campground //Geo.: S. Greaber Boring Location: 14 i: 716.8 ft Latitude: 34.99843 Luit IDepth: 53.5 ft Soil Depth: 33.5 ft Hole Diameter (in): 4 Sampler Config Machine: DR#1327 Drill Method: RW/R Size: NQ2 Driller: B. Burnett Size: NQ2 Driller: B. Burnett - 0.6 Asphal (7-inches) Aggregate Base Course (3-inches) - 0.6 Asphal (7-inches) Aggregate Base Course (3-inches) - 2.0 FILL - Very Stiff, moist, red with brown, none reactive, sandy lean CLAY (CL) (A-6), 2.5YR 5/6 with 7.5YR 4/6, LL=34, PL=20, PI=14, NMC=17.8, %#200=52.0 - Loose, moist, reddish brown, subangular, none reactive, moderately cemented, fine to coarse, clayey SAND (SC) (A-2-6), 2.5YR 4/6, NMC=18.2 - NCSC (A-2-6), 2.5YR 4/6, NMC=18.2 - ALLUVIUM - Soft, moist, red with brown, subangular, none reactive, moderately cemented, fine to coarse, Clayey SAND (SC) (A-2-6), 2.5YR 4/6, NMC=18.0 - - ALLUVIUM - Soft, moist, red with brown, subangular, none r				6.0	-						:		ł			i	
	Get ID: P041165 County: Spartanburg Boring 0 Description: IS-42-31 (Cannons Campground Road) BRO Peters Creek R 9/Geo: Screaber Boring Location: 180-16 Core Depth: 20 ft Set: 7.5 R Alignmetry v: 716.8 ft Latitude: 34.99843 Longitude: -81.87655 Date Started: al Depth: 53.5 ft Soil Depth: 33.5 ft Core Depth: 20 ft Date Complete re Hole Diameter (in): Liner Required: v (%) U (%) (%) U II Machine: DR#1327 Drill Method: RW/RC Hammer Type: Automatic Ene 6.0 10 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1 20 0.1				•													
-	-	D: P041165 cription: S-42-31 (Cannometric S. Greaber D: S. Greaber Bor '16.8 ft Latitude: pth: 53.5 ft Soil Dept le Diameter (in): 4 e: DR#1327 Drill N e: NQ2 Drille 0.0 Existing Roadway 0.6 0.8 Aggregate Base Course (3- 0.0 FILL - Very Stiff, moist, red 0.1 Pl=14, NMC=17.8, %#200= 10.2 Loose, moist, reddish brown 10.4 Pl=14, NMC=17.8, %#200= 10.5 Loose, moist, reddish brown 10.6 Aggregate Sase Course, s 10.7 Very loose, fine to coarse, s 10.8 Pl=14, NMC=17.8, %#200= 10.0 Loose, moist, red, subangul moderately cemented, fine to SAND (SC) (A-2-6), 2.5YR 11.0 Very loose, moist, red with N 12.0 Sandy SILT (ML) (A-7-6), 2 13.0 Very loose, moist, red with N 14.1 Sandy SILT (ML) (A-7-6), 2 15.3 Very loose, moist, red with N <td></td> <td></td> <td></td> <td></td> <td> 1</td> <td>32</td> <td>3</td> <td>5</td> <td></td> <td>O:</td> <td></td> <td></td> <td></td> <td></td> <td></td>						1	32	3	5		O:					
-	LD: P041165 County: Spartanburg Boring No:: S.4.31 (Cannons Campground Road) BRO Peters Creek Rotte: S.4.231 (Cannons Campground Road) BRO Peters Creek Date Completed: 1/133 Depth: 53.5 ft Soil Depth: 33.5 ft Core Depth: 20.8 (Date Completed: 1/133 Depth: Date Completed: Date Completed: 1/133 Date Completed: 1/133 Depth: Date Completed: Date Completed: 1/133 Date Completed: 1/133 Depth: Date Completed: Date Completed: MATERIAL DESCRIPTION Sectore Gend Sectore Completed: 2/14 Completed: AFREESCOMPE Oa Existing Readway Matterial Cannons Sectore Sectore Sectore Sectore Sectore			: :														
_		P041165 County: Spartanburg Boring No.: S.42-31 Screaber Boring No.: S.42-31 County: Spartanburg Boring No.: S.42-3 S Greaber Boring Location: 180-26 Offset: 7.5R Alignment: Existing Status 8 ft Latitude: 34.99843 Longitude: -81.87655 Date Started: 1/13/202 Immetri (Ini: Is Soft Participe Configuration Liner Required: Y %) Liner Used: Fillsone Status Participe Sta																
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706.8-	-											1			:			
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_	_	Sandy SILT (ML) (A	4-7-6), 2.5YR	4/6,			_					:	÷		-			÷
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7	7		16 1140-00	2		13.5	5 					-		:	÷			
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701.8-	-						-						÷		÷			;
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	17.0													-	-			÷
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-	-					18.5	;							:	÷			
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696.8-		LL=37, PL=23, PI=							1					`;7	.			
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-	22.0		dense moist	vellowich			-							÷	-			÷
_	_	red and brown, sub	angular, none	reactive,		0.0	. –								:			i
		weakly cemented, f	ine to medium	i, Silty		23.5						1	_	÷	÷			÷
	7			5YR 5/6 and	1		SS-8	22 2	24 50/4		50/4"		0:	÷	÷	: :		:
691.8-	-	7.51 K 4/0, INIVIC=1	1.1				-					Ti	÷	÷	÷			÷
-	-						-								-			÷
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-	-					28.5		50/2"			50/2"	1	\sim	÷	÷	: :		:
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686.8-	_						_					⊢ ÷			<u>.</u>		<u> </u>	:
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		SAMPLER	R TYPE				-			D	RILLIN	NG MF	ETHC		2011			
		on	NQ - Rock Co							ər		F	RW -	Rota				
		eu Samnie	LUL - CUttings			- I (:F	-A - LONTI	NUOUS	- Hught	ALIA	ers	- F	ct : .	. Rocl	r i or	<u>د</u>		

SCEFT Soil Test Log

Drojact				5					untra	Spart	anhu	ra		Borin			2-31-2	<u> </u>
Project Site De				1 (Can	none (Campgrou			ounty:			rg			Route	_	2-31-4 2-31	2
Eng./G				<u>``</u>		Location:				Offset:		7.5R			ment	_	xisting	
Elev.:			Latitud			9843	Longi			.87655			Star		IIIIEIII		/2025	
Total D		53.5		Soil De		33.5 ft			epth:	20 ft				ieu. iplete	d		2025	
Bore H				4	•	npler Con				er Requ				-	_iner			(N)
Drill Ma			#1327		I Meth		V/RC		Hamm		_		$\overline{}$				92.69	\sim
Core Si		NQ2			ler:	B. Burr			Groun		_		N.M.		24		N.M.	
_														PL		I VALU MC	E ● LL →	
Elevation (ft)	Depth (ft)	ſ	MATERI	AL DE	SCRIP	TION	Graphic Log	Sample Depth	(II) Sample No./Type	1st 6" 2nd 6"	3rd 6" 4th 6"	N Value		O RC	INES C QD (%)	ONTER	NT (%) REC (%)	
ш								:	~ ~	1s 2n	9 4	+	0 10	20 3	0 40	50 60	70 80	90
-	33.5							33.5										
_	- 33.5		SAL AT 33		- SET	CASING		33.0					1 :					
681.8-	_		EGIN CO						_									
001.0		red lan	GNEISS - ninated fol	Gray, w liation c	/hite, an oarse d	d yellowish												
		subang	jular, highl	ly weath	ered, 0-	15° dip, J, I	v 🔣	X	- NQ-1				Ť					-
-			, Pa, Fe, F 1, and 5Y		C, SR,	5YR 5/1,			_							: :		
-	_		RQD=0, %		8, GSI=	=10-20,		38.5	5				-					
-	_	RMR=2						Š	_								÷	
676.8-	_		ock, 0-30°	•	~~ ~~				_					:				
-			RQD=20, 22, qu=3,2		68, GS	I=35-50,		1	- NQ-2					¢				-
-			- <u>-</u> , qu 0,2	200 001				X	_									
_	_							40.5										÷
_	_	Gray ar	nd white, r	moderate	edly wea	athered,		43.5	·				1					
671.8-		mediun	n strong ro	ock, 0-30	D° dip, F	Pa, CL (43.7	'											
071.0-			ft), VC to RQD=50,										:	:		<u>.</u> :	: :	:
-			55, qu=5,7		100, 00	51-00-70,		<pre>X</pre>	- NQ-3							•		
-	_								-									
-	_							48.5	5									
-	_		lip, Pa, CL	-		-			-									
666.8-	_		RQD=40, 39, qu=3,7		100, G	SI=50-60,			_							+ +		
-	-		- , -,						- NQ-4						ø	: :		-
-	_							à	_									
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_	53.5				AT 53.8	5 FEET AND	- <u>*///</u>	4	_				1 :	÷				
661.8-		DHT C	ASING SE	ET				1										-
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-								1	-									
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656.8-	-							1	-									:
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							LE	GEN	D									
SS - 5	Split Spo	on	SAMPL	ER TYPE. NQ -		ore, 1-7/8"		н	SA - Hollo	w Stem Δ		DRILLI	NG ME	ETHOD	Rotary W	/ash		
UD - L	Jndisturk	ed Sampl	е	CU -	Cuttings	6		CF	A - Cont	inuous Fli	ght Au	gers			lock Co			
AWG - F	≺ock Cor	e, 1-1/8"		CT -	Continu	ous Tube		D(C - Drivir	ng Casing								



Project N Project I Consulta	D:		S-42-31 BRO Pet P041165 Terracon Consulta				Test Hole No.: Station:	<u>S-42-31-1</u> 178+33
Grouted Notes:		-	Burnette Mix design: 1 pou pound bentonite,	nd cement mix, 1	Date	1/14/25	_Offset:	8.1R
				Grout Curv	e			
	0							
	4							
	8							
Depth (ft)	12							
	16							
	20							
	24		1 2	1	and (#3)	4	5	6
Ni	umber	of Bags On-Site		Grout Volume Pla	ea.			
De	epth of	f Test Hole Groute	ed	20	ft.			
		er of Test Hole Test Hole		<u>0.33</u> 0.09	ft. ft ²			
		of Test Hole		1.74	ft ³			
		of Casing (If appli cal Volume of Tes		- 1.74	ft ³ ft ³			
N	umber	of Bags Used		2.5	ea.			
Vo	olume	Placed		2	ft ³			



Project I Project I Consulta Grouted Notes:	D: ant Firi		S-42-31 BRO Pet P041165 Terracon Consult Burnette Mix design: 1 pou pound bentonite,	ants, Inc. Ind cement mix, 1	_ Date	1/13/2025	Test Hole No.: Station: Offset:	S-42-31-2 180+26 7.5R
	_			Grout Curve				
	0							
	10							
Danáh	20							
Depth (ft)	30							
	40							
	50							
	60		1 2		1 ((12)	4	5	6
Di Di Ai Vi Vi Tř	epth of iameter rea of T olume o olume o heoretio	of Bags On-Site Test Hole Grou r of Test Hole Fest Hole of Test Hole of Casing (If app cal Volume of Te of Bags Used Placed	ted blicable)	Grout Volume Place 20 53.5 0.33 0.09 4.6 1.7 2.9 5 3	ed (ft ³) ea. ft. ft ² ft ³ ft ³ ea. ft ³			



Project N Project II Consulta Grouted Notes:	D: nt Fir		S-42-31 P041165 Terracon Burnette Mix desig pound be	Consulta	ants, Inc	c. ent mix, ²	Date		2025	Test Hold Station: Offset:	e No.:	S-42-31 Bulk 1 180+32 7R	-2
						Grout C	urve						
	0												
	2												
	4												
Depth (ft)	6												
	8												_
	10												
	12		1	2	Grout	3 t Volume I	Placed (ft ³)	4		5		6	6
De Dia Are Vo Vo Th Nu	epth of amete ea of lume lume eoreti imber	of Bags On-Site f Test Hole Grou r of Test Hole Test Hole of Test Hole of Casing (If app cal Volume of Te of Bags Used Placed	ted licable)			20 5 0.5 0.20 1.0 - 1.0 2 1.0	ea. ft. ft. ft ² ft ³ ft ³ ea. ft ³						

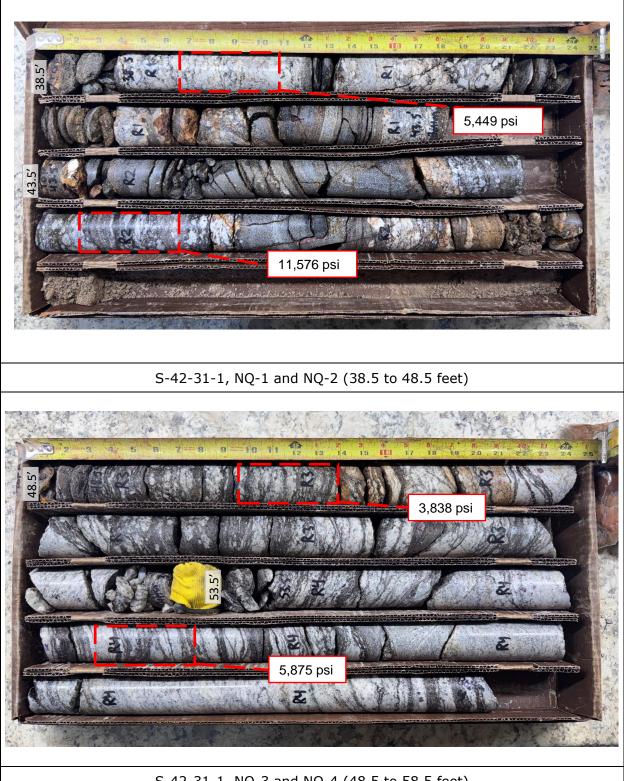


Project Name: Project ID: Consultant Firr Grouted By: Notes:	m: <u>T</u> B M	6-42-31 BRO Pete 2041165 Ferracon Consulta Surnette fix design: 1 pou ound bentonite, 6	ants, Inc. nd cement mix, 7	Date	1/13/2025	_Test Hole No.: Station: _Offset:	S-42-31-2 Bulk 2 180+32 7R
			Grout C	urve			
0							
2							
4 Depth							
(ft) 6							
8							
10							
12	1	2	3 Grout Volume I		4	5	6
Depth of Diameter Area of T Volume o Volume o Theoretic	of Test Hole of Casing (If applica cal Volume of Test of Bags Used	able)	20 5 0.5 0.20 1.0 - 1.0 2 1.0	ea. ft. ft. ft ² ft ³ ft ³ ft ³ ea. ft ³			

Rock Core Photograph Logs - Exhibit A-11

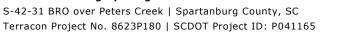


S-42-31 BRO over Peters Creek | Spartanburg County, SC Terracon Project No. 8623P180 | SCDOT Project ID: P041165



S-42-31-1, NQ-3 and NQ-4 (48.5 to 58.5 feet)

Rock Core Photograph Logs - Exhibit A-11



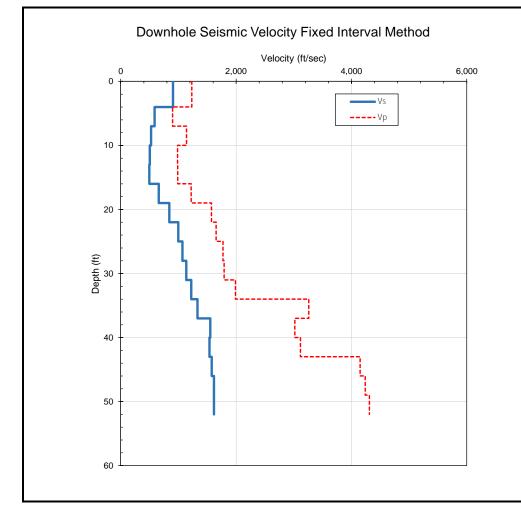




S-42-31-2, NQ-4 (48.5 to 53.5 feet)



3,783 psi



(ft)	Vp (ft/sec)	Vs (ft/sec)	∆i (ft)	∆t (sec)	Est. In-Situ Unit Wt (pcf)
3	1233	904	3	0.00332	(201)
6	900	585	3	0.00513	
9	1140	524	3	0.00573	_
12	985	502	3	0.00598	100
15	989	496	3	0.00605	
18	1221	659	3	0.00455	
21	1573	840	3	0.00357	-
24	1654	997	3	0.00301	
27	1772	1068	3	0.00281	-
30	1792	1134	3	0.00265	130
33	1989	1221	3	0.00246	-
36	3260	1329	3	0.00226	
39	3019	1550	3	0.00194	
42	3117	1536	3	0.00195	405
45	4151	1576	3	0.00190	165
48	4240	1615	3	0.00186	
51	4312	1616	3	0.00186	
nit Weight (ed from SPT re		ompression tests	
-			51		

Project Mgr: MN	F	Project No.			GEOPHYSICAL TESTING RESULTS	TEST NO.
Prepared by: MN		8623P180	je 📕	rracon	DOWNHOLE SEISMIC TEST	S-42-31-2
Checked by: SG	S	Scale: NA	Consulting	Engineers and Scientists	S-42-31 (Cannons Campground Road) Bridge Replacement over Peters Creek	
Approved by:	C	Date:			SPARTANBURG COUNTY, SOUTH CAROLINA	EXHIBIT
			72 Pointe Circle	Greenville, South Carolina	P041165	A-12
		3/4/2025	Ph: (864) 292-2901	Fax. (864) 292-6361	C041100	

S-42-31 (Cannons Campground Road) BRO Peters Creek SCDOT Project ID: P041165 | Spartanburg County, SC Terracon Project No. 8623P180

CPT Sounding ID S-42-31-1C

Latitude: 34.99792° Longitude: -81.87676°



CPT Completed: 2/6/2025

Elev.

(ft)

-720

715

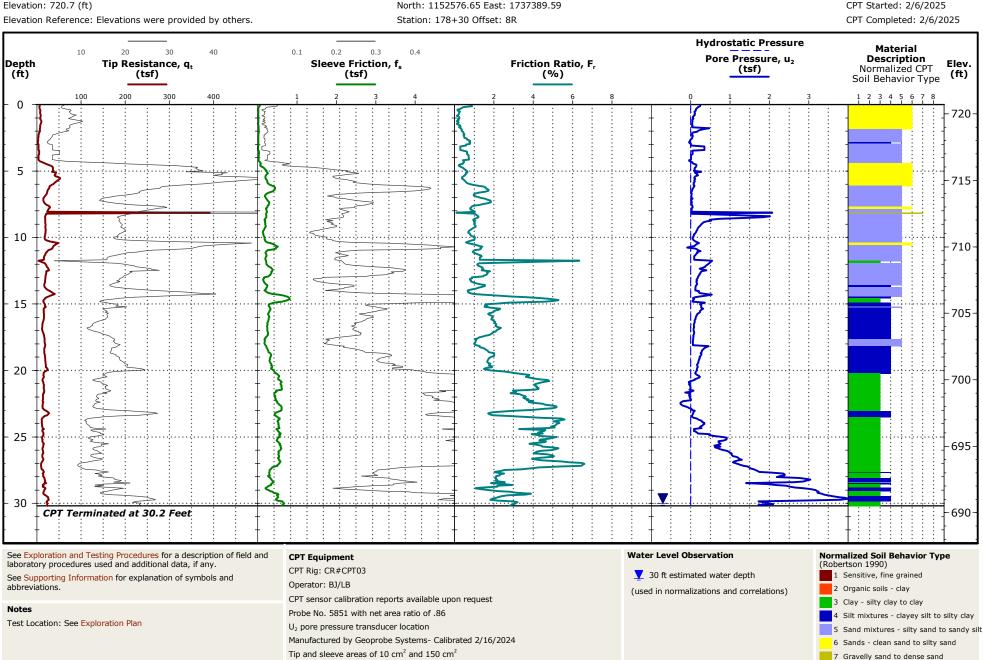
710

705

700

695

690



Ring friction reducer with O.D. of 2 in

8 Very stiff sand to clayey sand 9 Very stiff fine grained

S-42-31 (Cannons Campground Road) BRO Peters Creek SCDOT Project ID: P041165 | Spartanburg County, SC Terracon Project No. 8623P180

CPT Sounding ID S-42-31-2C



CPT Started: 1/17/2025

Material

Description

Normalized CPT

Soil Behavior Type

234567

Hydrostatic Pressure

Pore Pressure, u₂

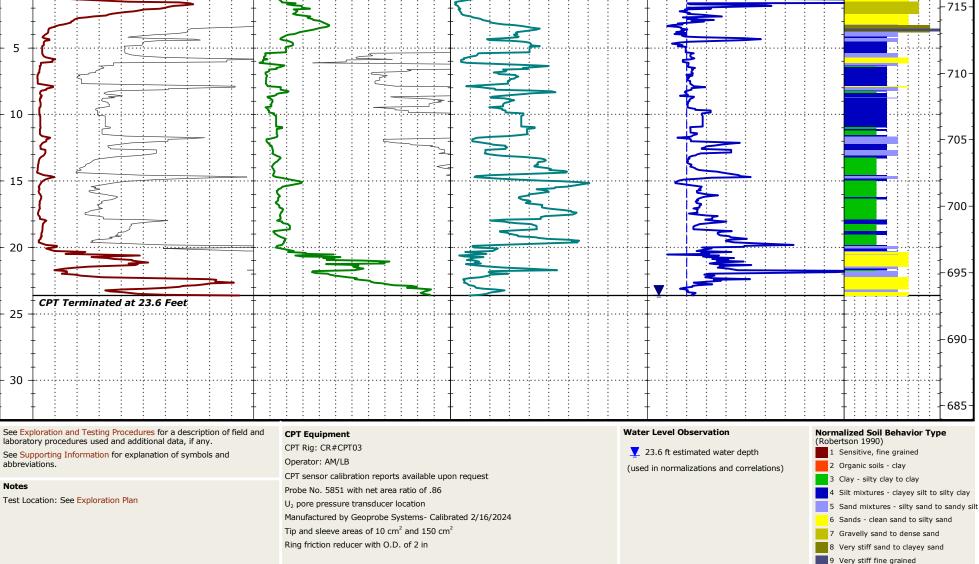
(tsf)

CPT Completed: 1/17/2025

Elev.

(ft)

Latitude: 34.99844° Longitude: -81.87655° Elevation: 716.9 (ft) North: 1152765.44 East: 1737453.4 Elevation Reference: Elevations were provided by others. Station: 180+29 Offset: 7R 10 0.1 0.2 0.3 0.4 20 30 40 Depth Tip Resistance, q_t Sleeve Friction, f_s Friction Ratio, Fr (ft) (tsf) (%) (tsf) 100 200 0 5 10 15 20



SCORT Soil Test Log

			-												_					
		6950.002 - Ta						Co	unty:	S	parta	anbu	ırg		B			.: В-		
Site De			-31 ove												_		loute	_	42-31	
		. Peterson		Boring						Offs					_	<u> </u>	men			
Elev.:							Longit			_		346	Date					-	2024	
Total D		58.5 ft	Soil De		6.7			ore De			5 ft		Date			-			2024	
		meter (in):	3.0	_			gurati	on	Line				_		\mathbb{N}_{-}			Used		\mathbb{N}
Drill Ma				ill Meth	_	RW			Hamm										: 86.4	
Core S	ize:	NQ	Dr	iller:	D. I	Harri	s		Groun	dwa	ter:	ТО	B	Not N	leas	ured	24	HR	33.3 (Ca	/e at 59,3
							_		-	-			-	_		-	CDT I	N VAL		
																PL		MC		
Elevation (ft)	ء						<u>.</u>	ے بے	b e				e			×		0	\rightarrow	
(ft)	Depth (ft)	MATEF	RIAL DE	SCRIF	PTION		Log	Sample Depth	(III) Sample No./Type	.9	.0	ي م	N Value						ENT (%) REC (%	、 、
Ĕ	0.0						U	log L	N N N	1st	2nd 6"	ard 4th	z	0.					0 70 80	
	0.4	ASPHALT RO	ADWAY	(S-42-3	<u>1)</u> (5.0-i	n)														
-	1.2-	CONCRETE E	BRIDGE I	<u>DECK</u> (9	9.0 - in)				-						1	1				
_		AIR GAP (20.6	6-FT)												1					
									1						1	1				
-									-											
_									1											
712.1-	1 -								1							1				
-									4						1	1				
																1				
-	1 -								1						1	11				
_									-											
															1	1				
-	1 1								1											
707.1-									-											
															1	1				
-	1 1								1						1					
-									-						1	1	1			1
																1				
-	1 1								1						1	1		1		
-									-											
702.1-																				
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-									-											÷
	21.8							21.8	·							1				
-	1 1	ALLUVIUM		_			\////		1								-			
-		Soft, Moist, Re Medium Sandy	ed, Mediu / Lean	um Plasti	icity, Fi	ne to			SS-1	1	1	2 2	3	₽		×	÷	▲		
	23.8	2.5YR4/6, Mic			<u></u>	1,	, <i>UII</i>	23.8	·	_			_	4						
-	1 1	LL=44, PL=2		NMC=2	23.3%,		14//		1											
692.1-		\%200= 52.9%					1		SS-2	1	2	2 1	4	₽		•	×Å			
	<u> </u>	1					<u> </u>	GENI	<u>ר</u>	-					-		Cor	tinue	d Next	Par
		SAMF	PLER TY	PE								[DRILLI	NG	ИЕТ	HOD			a non	, ug
	Split Spo	on	NQ ·	 Rock C 		78"			SA - Hollo			uger			RW	/ - R		Wash		
		oed Sample	CU.	 Cutting: 	2				A - Cont	inuo	us Fli	ht A	Indere		RC	- P	ock C	ore		

SCDOT Soil Test Log

Project					4212					Co	ounty:		Spa	artar	nbur	g		Bor	ring					_
Site De				-31 c	_		Cree					_			_					ute:	_	42-3	1	
Eng./Ge					Bo	<u> </u>	ocatic						fset	_					gnm					
Elev.:		_	Latitu				98272									Date				_		2024		
Total D		58.5			Dept		6.7				epth:		25 f			Date			-			2024		
Bore Ho		_		3.0			pler C		juratio	on			Rec	•		Y	C			ier L		_		Ŋ
	chine:		1E 45B			Metho		RW			Ham											: 86.		
Core Si	ze:	NQ			Drille	er:	D. H	arris			Grou	ndv	vate	r:	TOF	3	lot Me	easure	əd	24H	IR	33 . 3 (C	ave at	59.
Elevation (ft)	Depth (ft)	٢	MATEF	RIAL	DES	CRIP	TION		Graphic Log	Sample Depth	(II) Sample	adk i /m	1st 6" 2nd 6"	3rd 6"	4th 6"	N Value		01	PL FINE RQD	N ES CO (%)	IC Э ONTE	JE 🖶 LL ENT (% REC (%	6)	
-	25.8	Soft, M Fine to Micace	loist, Re Mediur eous,	ed, Me n <u>SAN</u>	edium ND (SC	Plastic C/A-6),	ity, Cla 2.5YR	yey / 4/6, 	Ø	25.8	3		1 1		-	2	• 10	<u>20</u>	30	40 5	0 60	0 70	<u>30 S</u>	0
-	27.8 28.5		33, PL=1 = 40.9%	9, P I ⊧	=14, N	MC=2	1 . 2%,	 , !	M I	27.8 28.5		4	50/1.	.75"		100+								>>
- 687.1 - -	-	Siltý C (SC-SI %NM	oose, M layey Fi <u>M/A-2-6</u> IC=18.4 Dense, M	ne to), 2.51 %, %2	Mediu YR4/6 200=2:	m <u>SAN</u> 2.5% ———	<u>1D</u>				- - - C-*									•	•		-	
-	33.5	Fine to (SP/A- CONC	Mediur 3) with (RETE	n, Poo	orly Gi	aded §	SAND	suc,		33.5	- ;;;-													
- 682.1-	-	_	1: %RE0				3.8 min	/ft			-													
-	-	Metarr Graine Moder	OCK (PA norphic, ed, Lami ately Wo iered, U	Black nated	/White , Felds red to	, Fine spar/M	ica/Qua				- NQ-	1					•					-		
677.1-	-	60°, J/ Pl/lr, V	Fo, M/N (C, S/SF	/VN, \$ 2, %F	ous Joint , Su/Pa, REC=8	a, CI/Fe/ 80, %R0 ass V, 2 om 5° to 3, %RQ	o from 0° e/Qz/Sd RQD=0, 2.2 min/			38.5	; - -													
-	-	Nume Fe/H, I	-2: With erous Jo R/SR/S, 5-35, RI	ints D °%RI)ip froi EC=53		2D=8,				- NQ-	2					0				-			
- 672.1-	_	Weath 45°, J/ %RQE	-3: Mode ered, Ni Fo, Sp,)=10, GS n/ft. q, =4	umerc CI/H/F SI=25	ous Jo Py/Sd, -35, R	ints Dip %RE0 MR=18	p from 8 C=87, 3, Class	5° to s V,		43.5	-												_	
-	-	Rock					5			48.5	- NQ-	3												
- 667.1-	_	Numer %REC RMR=	-4: Mode rous Joir =97, %I 31, Clas edium S	nts Dij RQD= is I V,	p from 57, G 3.0 mi	⊨5° to 6 SI=30-	60°,Sp, 40,				-										•			
	Split Spo Jndisturb	ed Sam		N	NQ - R CU - C	uttings	re, 1-7/8		LE	CF	D SA - Ho FA - Co C - Dr	ontinu	uous	Fligh	ger	RILLIN gers	NG M F F	ETHO RW - RC -				d Ne:	a Pa	∃g

SCORT Soil Test Log

Project ID: E6950.002 - Task 04212 County: Spartanburg Boring No.: B-1 Site Description: S-42-31 over Peters Creek Route: S-42 Eng./Geo.: T. Peterson Boring Location: Offset: Alignment: Elev.: 717.1 ft Latitude: 34.99827268 Longitude: -81.87666846 Date Started: 6/5/20	-31
Eng./Geo.: T. Peterson Boring Location: Offset: Alignment:	-31
Elev.: 717.1 ft Latitude: 34.99827268 Longitude: -81.87666846 Date Started: 6/5/20	
	24
Total Depth: 58.5 ft Soil Depth: 6.7 ft Core Depth: 25 ft Date Completed: 6/5/20	24
Bore Hole Diameter (in): 3.0 Sampler Configuration Liner Required: Y N Liner Used:	Y (N)
Drill Machine: CME 45B Drill Method: RW Hammer Type: Automatic Energy Ratio: 8	36.4%
	.3 (Cave at 59
	-
SPT N VALUE	
	LL —X
- ミモ 夏モ MATERIAL DESCRIPTION 夏ゴ 居夏モ 長 版 ゆ 版 ジ APOD (%) ■ PE	
NQ-4	
@NQ-5: Numerous Joints Dip from 5° to 70°, N/VN, Sp/Fi, S/SR/R, %REC=93,	
% POD-78 CSI-35 45 PMP-43 Class III 1 2 2	
662.1 - 3.2 min/ft, q,=8,420 psi, Strong Rock -	
NQ-5	•
	- T
Boring Terminated 58.5-ft. Below the Existing Bridge Deck Surface. Boring	
Achieved Target Depth	
657.1	
652.1	
647.1	
642.1	
SAMPLER TYPE DRILLING METHOD	
SS - Split Spoon NQ - Rock Core, 1-7/8" HSA - Hollow Stem Auger RW - Rotary Wash	

SCDOT Soil Test Log

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Project										Co	ount	ty:	S	oarta	anbi	urg			во	ring					
Site De			S-42	2-31 0																_	oute		5-42	2-31	
Eng./Ge					Boi		.ocati						Offs			-				gnr	nen				
Elev.:			Latitu						ongit						914			Star				-	6/20		
Total D		66.		_	Dept			.1 ft		ore De	ept) ft				Com					6/20	-	
Bore Ho				3.0					gurati	on		Line					Y	N				Use		Y	\mathbb{N}
Drill Ma			/IE 45B			Meth		RW				mme								ner				86.4	
Core Si	ze:	NQ			Drille	er:	D.	Harris	;		Gr	ounc	lwa	ter:	ТС	DВ	3	35.6	ft		24	HR		35.6	ft
																				● 5 >L ×		N VA MC	LUE	e LL	
Elevation (ft)	÷								.e _	e e		/pe					e					-0-	TEN		
(£)	Depth (ft)		MATEF	RIAL	DES	CRIP	TION		Loc	Sample Depth	E	Sample No./Type	.0	.0	<u>ة</u> و		N Value							T (%) C (%)	
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	0.3		ALT RO	ADWA	AY (S-	42-31) (4.0-	in.) ,	(1 2/2/20		1					1			-				-		
]	0.8	CON	RETE E	BRIDG	E DE	CK (5.	0-in.)		(]							-							
_	_	-	AP (34.8			<u></u> (•,				_														
-	-	<u>AIX C</u>	(04.0	<u></u>]							-								÷	÷	÷	÷	1	1	÷
712.4-	-										+														
-	-										+												1	1	
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707.4-											4								1	-				11	
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702.4-	-										1									1			1	11	
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697.4-	-										-														
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692.4 -]														
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-	-										-														
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687.4-	-										1										-	1	-	1	
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_	-										-													11	
-	-										+													1	
682.4-	35.6	<u>v</u>									-									-					
-	36.8	Water	<u>(Peter's</u>	s Cree	<u>k)</u> (1.2	2-ft.)			m	36.8	۶L								-	-	-	1			
]		ALLU] .	SS-1	8	3	4 4	4	7	•							-
]	38.8	_ @SS	6 - 1: No F	Recove	əry				केला	38.8	°⊥`		-	-		_	•		÷	÷	÷	÷	1	1	÷
677.4-	_		, Wet, B	lrown	Non-F	Plastic	Poor			40.0	_	SS-2	1	2	3 2	2	5 >	kəà	O,		-				
-	-	Grade	d <u>SANE</u>) (SP-	SM/A	<u>-1-b)</u> v	vith Sil	t and	下租	40.8		SS-3	5	250	// ="	- ا	52+>	< 🕰						11	
-	-	Grave	I, 7.5YR	5/4						42.8		53-3	э	200/	4.5		JZ+7	μ Δ		÷	÷		1		
-	-		6-2: LL=1				Ρ,		下出	72.0	í-ts	SS-4	435	0/4"		1	00+	÷							>>
-	44.8	%NM	C=17.9%	o, %20	JU=11.	.5%				44.8	31														
									LE	GENI	D										Cor	ntinu	ied	Next	Pag
			SAM	PLER	TYPE	ock C-	ore, 1-7	r/o"			2 ^	Hollo			uce	DRI	LLIN	IG M	ETH	OD	tor	W/~-			
ee -						UUK UC	л с , I-/	10		1 113	JM -	1010	w 30	em A	uuer			- F	\VV	- r<0	uary	vvas			
SS - S UD - L	Split Spo Jndisturl	bed Sam	ple			uttings				CF	- A	Conti	nuou				ers	F	RC	- Ro	ck C	Was ore			

SCDOT Soil Test Log

					-					-		-					_					
Project							_			Co	ounty:	Spa	artar	nbur	g		Во	_		B-2		
Site De				-31 ov			S Cree										_		ute:	_	12-31	
Eng./G							.ocatio					Offse						gnm				
Elev.:	717.4	ft	Latitue	de:		34.9	98208	42 L	ongi	tude:	-8	1.876	6991	4	Date	Star	ted:			6/6/2	2024	
Total D	epth:	66.4	ft	Soil I	Dept	h:	10.	1 ft	Co	ore De	epth:	20	ft	1	Date	Com	nple	ted:		6/6/2	2024	
Bore H	ole Dia	meter ((in):	3.0		Sam	pler C	onfig	jurati	on	Lir	er Re	quire	ed:	Y	\mathbb{N})	Lin	er L	lsed:	Y	\mathbb{N}
Drill Ma	achine:	CM	IE 45B	C	Drill N	Netho	od:	RW			Hamn	er Ty	be:	Auto	omat	ic	E	nerg	jy R	atio:	86.4	%
Core Si	ize:	NQ		C	Drille	r:	D. H	larris			Grour	dwate	er: '	TOE	3 3	35.6	ft		24H	R	35.6	ft
																				VALL		
_																	Ę	า∟ Ж——			LL X	
Elevation (ft)	Depth (ft)						TION		Graphic Log	Sample Depth	(II) Sample No./Type	-			N Value			FINE	s co	- ONTE	NT (%)	
(f	De J	N	<i>I</i> ATER		JESC	RIP	HON		L a	De	lo.	1st 6"	3rd 6"	4th 6"							EC (%	
	_	0.00	0.1/								- SS-5	4050	<u>, 6</u>	4tl	100+	0 10	20	30	40 5	0 60	70 80	90
_	_		-3: Very					j			_	4050	12		100+							~~
_	46.9	∣ LL=N 1%200=	P, PL=N	IP, PI=	•NP, %	%NMC	J=15.0%	%, 	111	46.9	'	-					-	-	-			
-	-	6					-	- i			-											-
-	-		ense, M lastic, Fi					n, j	K		- NQ-1						-	÷		b 🗄	1	
667.4-	-	(SP-SM	<u>//A-3)</u> w	ith Silt	t and "	Trace	of Grav	vel, i	\otimes		1											- 1
		10YR4						4		51.4	']—	+					- 1	1	1			1
	_	RESID							\mathbb{X}		4								1			
-		Very D	ense, M	loist, B	sown,	Non-	Plastic,	,		1	- NQ-2							4	Di l			
662.4-	-	7.5YR	Medium 5/3	Silly	SAINL	J (31VI)	/ //~ 2-4)	'	\mathbb{K}		+						-		-			
-	-					_ \			\otimes	56.4	۲ 	-							÷			
	-		OCK (PA			,		-]							-				
		to Med	iorphic, E lium Coa	arse Gr	rainec	I. Lam	ninated.] NQ-3						0		1		- i 🛓	1 :]
657.4-	-	Quartz	/Feldspa	ar/Mica	a/Garr	net, M	oderate	ely			-										1	-
			ered, Ult				_		K	61.4	H								1			-
-	-		-1: Num Fo, M/N/				from 0°	to			-						-		1			-
-	-	CI/H/N	o/Py/Qz/	/Sd, Pl	I/Ir, V0	C, S/S	SR/R,				1,00						-		-			
652.4 -	1	%REC	=89, %R	RQD=5	50, GS	5=40-	-50,		$\langle \rangle \rangle$		_ NQ-4							-	1	Υ.		1
052.4	66.4		26, Class edium St			n/ft.q _u	,=3,810				1								1			
		1							1,772	1	-					1		÷	1			
-	-	@NQ	-2: Num b/Pa/Fi, 9	erous	Joints	S Dip f	from 5°	to			-							-				-
	-	GSI=3	5-45, RM	/R=26	i, Clas	ssIV,∶	2.5 min	ı∕ft.			1							÷	1			÷ -
647.4-	-		90 psi, N			-					1						-		1			
]]	1	Weather								1						-	-	1			1
		@NQ	-3: Num a/Fi/No, '	erous	Joints	S Dip f	from 0°	to			-						-		1			
-		GSI=4	a/FI/NO, ` 0-50, RM	/0REC	, Clas	rkQi sIV.∶	ں۔ 2.8 min	/ft.			-							÷	1			÷ -
642.4-		q_=4,29	90 psi%,	, Mediu	um St	rong F	Rock,				+						1	-				
-	-		Core Stud			Core E	Barrel,				1								1			-
						- Di 1	from: 00	to			1											1
]			I-4: Num No/Py/G					10]											
637.4-		%RQD	=55, GS	SI=40-5	50, RM	/R=26	6, Class	s IV,			-							-	1			-
-		2.0 mir	n/ft. q _u =2	2,950 p	osi, W	eak R	lock				+						-		-			-
-			Termina								+								1			
-	-		ng Bridge ed Targe			ace. B	soring				1							-	1			
6224	-		sa raigi								1								1			1
632.4-]											
	-										-							-				-
-											-							-	1			÷ -
-	-										-											-
									LE	GENI	D											
	2-14-0		SAMP	LER T				0"							RILLIN					/h		
	Split Spo Jndisturl	ion bed Samp	ple		Q - Ro U - Cu		ore, 1-7/	0.			SA - Holl FA - Cor				gers			- Rota - Roc				
AWG-F		re, 1-1/8"					ous Tub	e			C Driv											

SCDOT Soil Test Log

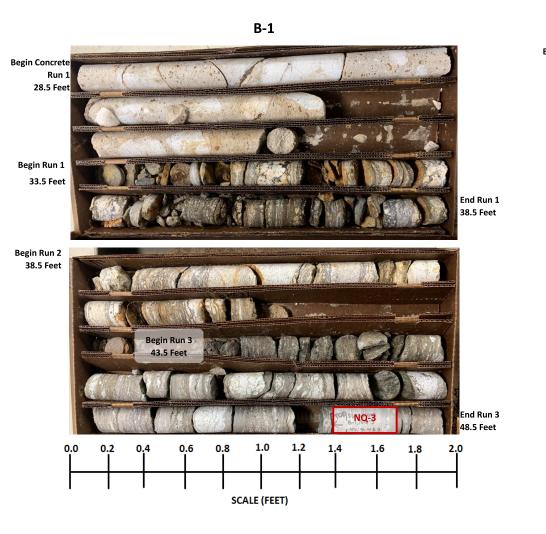
		6950.002 - Ta					Co	unty:	Sp	artar	nbur	g		Во			B-3		
Site De	scripti	on: S-42	-31 over	Peters	Creek										Ro	ute:	S-4	2-31	
Eng./Ge	eo.: T	rey Peterson	Bo	oring Lo	cation:				Offse	et:				Ali	gnm	ent:			
Elev.:	717.9	ft Latitu	ide:	34.99	815213	Longit	ude:	-81	.876	7218	35 I	Date	Star	ted			6/6/2	024	
Total D		62.8 ft	Soil Dep		8.2 ft		ore De			9 ft		Date					6/7/2		
		meter (in):	3.0		ler Conf			•	er Re			Y			-		Ised:	Y	(N)
Drill Ma				Metho		<u> </u>		Hamm				_	~		_			86.4	
Core Si		NQ	Drill		Don Ha			Ground			TOE				at 52)				70 easured
Core Si	ze.	NQ	Dhi	er.		IIIIS		Ground	uwau	er.	100	ין כ	0.7 (0	ave	at 52)	240	IR	NOLIVI	easured
									1			1	1		A CT		VALU		
														ŗ	् or भ				
5	_					2	_ ہ	9 8				e e			×—			—X	
ff) (ati	Depth (ft)	MATER	RIAL DES	CRIPT	ION	hde	Sample Depth	티 토턴	. ;			alu					ONTEN		
Elevation (ft)						Graphic Log	Sa)	Sample No./Type	1st 6"	2nd 6" 3rd 6"	4th 6"	N Valu						EC (%	
	0.0			40.04	(4.0 in)				÷ ¢	<u>ה ה</u>	4		0 10	20	30	<u>40 5</u>	0 60	70 80	90
	0.6	ASPHALT RO				P 8 8									1	1			1
-	1.3	CONCRETE E	BRIDGE DE	<u>ECK</u> (5.0-	-in.)			1							-	-		1	
-	-	AIRGAP (21.4	-ft.)					-											
													1		-				
-	-							1							-				
_	_							1						- 1		1		1	1.
														- 1	-	1		1	
712.9-	-							1						-	-	1			
								1						1	-	1			-
-	-							-											
														1	÷	1		11	
								1						1	-	1		11	
-	-							-						1	1	1			
707.9-																			
/0/.9-	1							1								1			
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702.9-	-							-						- 1	1	1			- ÷ -
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697.9-	-							1						1	-	1			
_	_							4							-	1			
																1			
-	22.7						22.7	.1							÷	ł			
_		ALLUVIUM				ातन	22.1	-				1	1 :	- 1		1			
		Very Loose, M	loist, Reddi	ish Brow	n, Low	一個形		SS-1	1	12	2	3		0	××	Å			
-	-	Plasticity, Silty	Fine to Me				24.7	-	·	-	_		I			Ē			
692.9-	_	(<u>SM/A-2-4)</u> , 51				一個形	24./	1					1		÷	1			÷.
		LL=33, PL=2 %200=35%	7, P I =6, %I	NMC=16	.0%,			SS-2	2	12	2	3		0	Å	÷			1
-	-	%200=35%				一個的		- 00-2	2	. 2	2	ľ		Ĩ	T	-		1	÷
						LE	GENI	D							C	ont	inued	Next	Pade
		SAMF	PLER TYPE								D	RILLI	NG M	ETH	OD				~9
	Split Spo	on oed Sample	NQ - F	Rock Core Cuttings	e, 1 - 7/8"			SA - Hollo A - Cont			ger		ļ	RW	 Rota Rocl 	ary W	/ash		
AWG-F				Continuou	is Tube			C - Drivi			n Au	yers		.0	- NUCI	n U0			
									0 - 4	3									

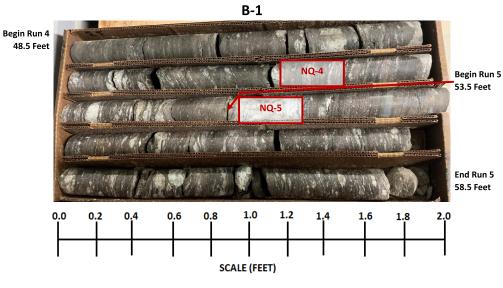
SCDOT Soil Test Log

Project ID: E6950.002 - Task 04212										County: Spartanburg					Boring No.: B-3							
Site De							Creel		County: Spananburg			ng		Route: S-42-31								
Eng./G				-31			ocatic					Offs	ot.				•		men	_	42-3	
Elev.:			Latitu	do.	ВО		98152		onai	tudo:				185	Date	Star	_	<u> </u>	nen	_	2024	
Total D		62.8		_	il Dep		8.2			ore De		_	1.9 f		Date					-	2024	
Bore H				_	.0		pler C						lequi		_	<u>انانی</u> ۱۸		-		Used		(N)
Drill Ma			1E 45B	_		Metho		RW	urau		Hamm						<u> </u>	_			: 86.4	
Core Si		NQ			Drill			Harr	is		Groun								24			neasured
0010 01	20.	NG					Don	nan	15		oroun			10					1		11001	louburbu
																		•	SPTI	N VALI	JE 🖨	
~																		PL		MC		
Elevation (ft)	(ft) (ft)				DF0	0010	TION		g pic	Sample Depth	Sample No./Type		-		N Value				IES (0	ENT (%)
(f	Del (f	r	MATEF	RIAL	. DES	CRIP	HON		L'al	Del	lo.∩	lst 6"	2nd 6"				0	RQI	D (%)		REC (%	6)
ш		0.00	0.0.1	12.1	D	0.51/5			-		_	10	2	3rd 4th	-	0 1	0 2	0 30	40	50 60	<u>70 8</u>	30 90
-		-	-2: Red IP, PL=1					,		26.7	1											
-			1P, PL-1 =31.9%	NP, F	n−n₽,	70INIVIC	-10.07	0,			SS-3	1	2	2 1	4	•	ç	⊃×≱				
		കടട	-3: Red	dish	Brown	2 5YR	5/4			28.7	· 🛌				-							
-	-	-	2, PL=2								SS-4	3	1 50)/2"	51+3	* 4		0				>>(
687.9-	-		-30.8%	-,	5, 70				關於		1	+			-							
_	30.7 30.9-		-4: Very					f		30.7 30.9		+	50/2"		100+							>>
			<u>-1-b)</u> wii					. 1	14	1								-				
-	1 1		IP, PL=N =14.7%	νP, F	'I=NP,	%NMC	:=27.3%	6,			1							-				
-	-								1.4		-											
			ense, N						114		C-1							2				•
			ine to Coarse <u>SAND (SP/A-3)</u> with Gravel 5YR7/1						114		1						-	÷	1	1		
682.9-		CONC	RETE								-											
-	36.2-	Ultra #	8 Bit						44	36.1	-											
		🕸 @ис	λ− 1: %R	EC=8	84, %R	QD=32	2, 2 . 4 m	in/ft /														
_		WOOT		,							C-2											
-		WOOL) (3.1-ft)																		
-	39.3-									39.3	4											
677.9-	00.0	ALLU\	/IUM						600	1		0.5						-	_			
677.9-			, Wet, C				n-Plasti	с,		1	- SS-6	25	22	6	38				•			
-	41.2-		o Coarse <u>A-1-a)</u> , 1			AVEL		,-	PO C	41.2		10	5 5()/3"	55+							>>(
-		RESID						'			-											
	42.8)ense, N	loist	Gravi	sh Brow	vn	-	kan	42.8	-	_						-				
	1	Non-P	astic, F	ine te	o Coar			A-3)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1							-	-			
-	-	with G	ravel, 10	JYR	o/2				\otimes	1	1							-				
672.9-	-	BEDR	OCK (P	ARA	GNE	SS)			\gg		-							-			_	
			orphic,				Fine to		\otimes		NQ-1						•					
	1		e Graine ar/Mica				ghly		K]											
-			ered to	Mod	erately	Weath	ered, L	ltra	\otimes		1							-				
-	_	#8 Bit)-1: Nun	are	ie loin	te Din f	rom 0°	to	\otimes	47.8	' 	+										÷ .
		85°, J/	Fo, M/N	I/VN,	So/Su	/Pa, C	/Fe/Py,		$\langle \rangle \rangle$	1												
	1	PI/Ir, V GSI=2	Ir, VC, SR/R, %REC=72, %RQD=15, I=25-35, RMR=27, Class IV, 2.1 min/ft.					/ft)))))									-			1	
667.9-	-		840 psi,						\otimes		NQ-2										ō	: i i
-	_	Moder	ately W	ooth	arad to	Slight			$\langle \rangle \rangle$		-											
		Weath		ault	อาซิน เป	Jight	у		K	1												
	1 1	NQ-2	2: Nume	rous	Joints	Dip fro	om 0° to)	\mathbb{X}	52.8	1											
										GENI					1				Con	tinuo	i d Nov	t Page
			SAM		TYPE				LC						RILLI			IOD				aye
	Split Spo	oon bed Sam			NQ - F		re, 1-7/8	3"			SA - Holle A - Con			uger		1	RW	- Ro	otary ' ock C	Wash		
		re, 1-1/8					ous Tub	e			C - Driv				ugera			- 10				

SCORT Soil Test Log

Site De			2-31 over							4.				oute:	S-42	-31	
	eo.: 1 717.9	rey Petersor			ocation:		41		Offset		D-4		Alignn			0.4	
⊡ev.: Γotal D		62.8 ft	ude: Soil De	_	9815213 8.2 ft		tuae: ore De		31.9	72185			iea: pleted:		6/6/20: 6/7/20:		
			3.0		_∣o.∠ π pler Confi					guired		Y (N		ner U			(N)
	achine:	meter (in): CME 45		Metho		gurau	on	Hamme					· · · ·		atio: 8		\sim
Core Si		NQ	Dril		Don Ha	rio		Ground					ave at 52)			ot Mea	
Jore 3	ze.	NQ		ier.		115		Ground	iwate	#. IC	<i>л</i> о	50.7 (0	ave at 52)	240		ot mea	sure
													e s	PT N V	ALUE		
u	_					0	•_	• e			0		×	C		LL -X	
Elevation (ft)	Depth (ft)	MATE	RIAL DE	SCRIP	TION	de lo	Sample Depth	Sample No./Type		0 0	N Value				NTENT		
Ele	ō-					5	NG .	No.	1st 6" 2nd 6"	3rd 6	; ź	0.10	• RQD 20 30				00
	-	75°, Su/Sp/F	i/No Ee/H/I	No/Pv/Q	z R/SR/S	×///		-	- 0	1 00 1	1	0 10	20 30	40 50	3 60 7	080	90
_		%REC=100,	%RQD=72	GSI=40)-50,											-	1
		RMR=39, Cla			=4,540												1
662.9-	-	psi, Medium		ĸ				NQ-3							0		1
_		Moderately V NQ-3: Num		Din free	m 0° to			1									1
		70°, Sp, No/F	۹/Qz/Sd, ۹	5,													
-	-	%RQD=62, 0	GSI=30-40,	9, Class IV,		1	1								-		
_	-	2.4 min/ft. q _u Rock	=ю,940 psi,	Medium	Strong	K	57.8				-	-					
				- Dia 6	0° +-		1										÷
-	-	NQ-4: Num 25°, %REC=					5	1									1
657.9-	_	RMR=43, Cla	ass III, 2.8 r	nin/ft. q	=4,980,			-								1	1
		Medium Stro	ng Rock	10				NQ-4								•	1
-	-							1						1			
-	-							-									
	62.8						3										
-	-	Boring Termi Existing Brid						1									1
-	-	Achieved Ta	rget Deck Su	nace. Do	Jing			-									
050.0														1			1
652.9-								1									
-	-							-						1		1	
_																	
-	-							-						1		-	
_	_							1									
													1				÷
647.9-	-							1									÷
-	-							-									
-								1									
-	-							-									
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642.9-	-							1									÷
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-	-							1									
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-	-							1									-
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ss - s	Split Spo	SAN	IPLER TYP	E Book Co	re, 1-7/8"		Lie	SA - Hollo	w Stor	n Augor	DRILL	ING M	ETHOD RW - Rol	on M	ach		
	Juni OPO	on oed Sample		Cuttings	10, 1-1/0			A - Hollo				- F	RC - RO	ary W	uən 9		





S-31 Peters Creek – Geotechnical Subsurface Data Report SCDOT Project ID P041458; F&ME Project No. E6950.002

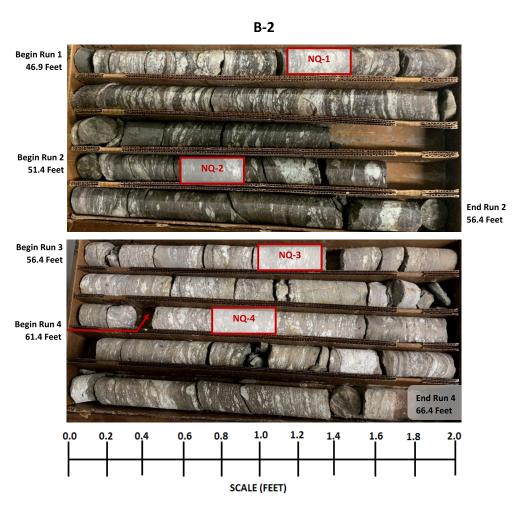


S-31 Peters Creek – Geotechnical Subsurface Data Report SCDOT Project ID P041458; F&ME Project No. E6950.002



Rock Core Photos by F&ME

Exhibit A-15



Begin Concrete Run 1 30.9 Feet **Begin Concrete** Run 2 36.1 Feet **End Concrete** Run 4 39.3 Feet Begin Run 1 42.8 Feet NQ-1 Begin Run 2 47.8 Feet NO-2 End Run 2 52.8 Feet 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 SCALE (FEET)

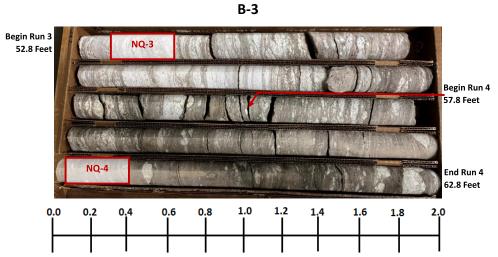
B-3

S-31 Peters Creek – Geotechnical Subsurface Data Report SCDOT Project ID P041458; F&ME Project No. E6950.002



S-31 Peters Creek – Geotechnical Subsurface Data Report SCDOT Project ID P041458; F&ME Project No. E6950.002





SCALE (FEET)

S-31 Peters Creek – Geotechnical Subsurface Data Report SCDOT Project ID P041458; F&ME Project No. E6950.002





Appendix B Laboratory Testing

Exhibit B-1 – Laboratory Testing Description Summary of Laboratory Data (2 Pages) Laboratory Data Sheets (25 Pages)

Note: All exhibits are one page unless noted above.



Laboratory Testing Description

The samples collected during the field exploration were taken to our laboratory for additional testing. The laboratory testing scope was developed by the SCDOT and laboratory assignment was performed by Terracon. The laboratory tests were conducted on selected soil samples from the borings and the bulk sample locations. The test results are presented in this appendix.

The laboratory test results were used to confirm the soil descriptions presented on the boring logs in Appendix A. Laboratory tests were performed in general accordance with the applicable ASTM, AASHTO, SCDOT or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Moisture Content
- Atterberg Limits
- Proctor (Standard effort)
- Triaxial Shear CU w/ PP
- Grain Size Distribution
- Hydrometer
- Compressive Strength of Rock Cores
- Corrosion Series

AASHTO T265/(ASTM D2216) AASHTO T89/T90(ASTM D4318) AASHTO T99/ (ASTM D698) AASHTO T297/(ASTM D4767) ASTM D6913 ASTM D7928 ASTM D7012 AASHTO D422 AASHTO T289/ASTM G51 AASHTO T290/ASTM C1580 AASHTO T291



Summary of Laboratory Results

Boring ID	Depth (Ft.)	Soil Classification USCS & AASHTO	Liquid Limit	Plastic Limit	Plasticity Index	% Gravel	% Sand	% Fines	% Silt	% Clay	Water Content (%)	Proctor Dry Density (pcf)/Opt. Moisture (%)
S-42-31-1	2-4	SILTY SAND(SM) / A-2-4 **									10.7	
S-42-31-1	4-6	SILTY SAND(SM) / A-2-4 **									17.0	
S-42-31-1	6-8	SILTY SAND(SM) / A-2-4 **				1.6	66.4	32.0			25.6	
S-42-31-1	8-10	SILTY SAND(SM) / A-2-4 **									23.8	
S-42-31-1	10-12	SILTY SAND(SM) / A-2-4 **									27.7	
S-42-31-1	12-14	SANDY SILT(ML) / A-4 (0)	NP	NP	NP	1.1	45.0	53.9			36.3	
S-42-31-1	14-16	SILTY SAND(SM) / A-2-4 **									28.3	
S-42-31-1	16-18	SANDY SILT(ML) / A-4 (0)	NP	NP	NP	3.5	43.7	52.8			31.8	
S-42-31-1	18-20	SANDY SILT(ML) / A-4 **									31.4	
S-42-31-1	20-22	SANDY SILT(ML) / A-4 **									32.7	
S-42-31-1	22-24	CLAYEY SAND(SC) / A-6 (3)	35	23	12	4.9	46.4	48.7	48.4	0.3	23.9	
S-42-31-1	24-26	CLAYEY SAND(SC) / A-6 **									24.4	
S-42-31-1	26-28	SANDY LEAN CLAY(CL) / A-6 **				5.5	43.2	51.3			22.9	
S-42-31-1	28-30	SANDY LEAN CLAY(CL) / A-4 (3)	33	23	10	7.0	42.4	50.6	32.9	17.7	28.2	
S-42-31-1	32-34	CLAYEY SAND WITH GRAVEL(SC) / A-2-6 **				28.3	44.9	26.8	19.3	7.4	19.4	
S-42-31-1	34-36	CLAYEY SAND WITH GRAVEL(SC) / A-2-6 **				34.0	41.8	24.2			16.8	
S-42-31-1	36-38	SILTY SAND(SM) / A-2-4 **									13.0	
S-42-31-2	0.5-2	SANDY LEAN CLAY(CL) / A-6 (4)	34	20	14	2.2	45.8	52.0			17.8	
S-42-31-2	2-4	SILTY SAND(SM) / A-2-4 **									18.2	

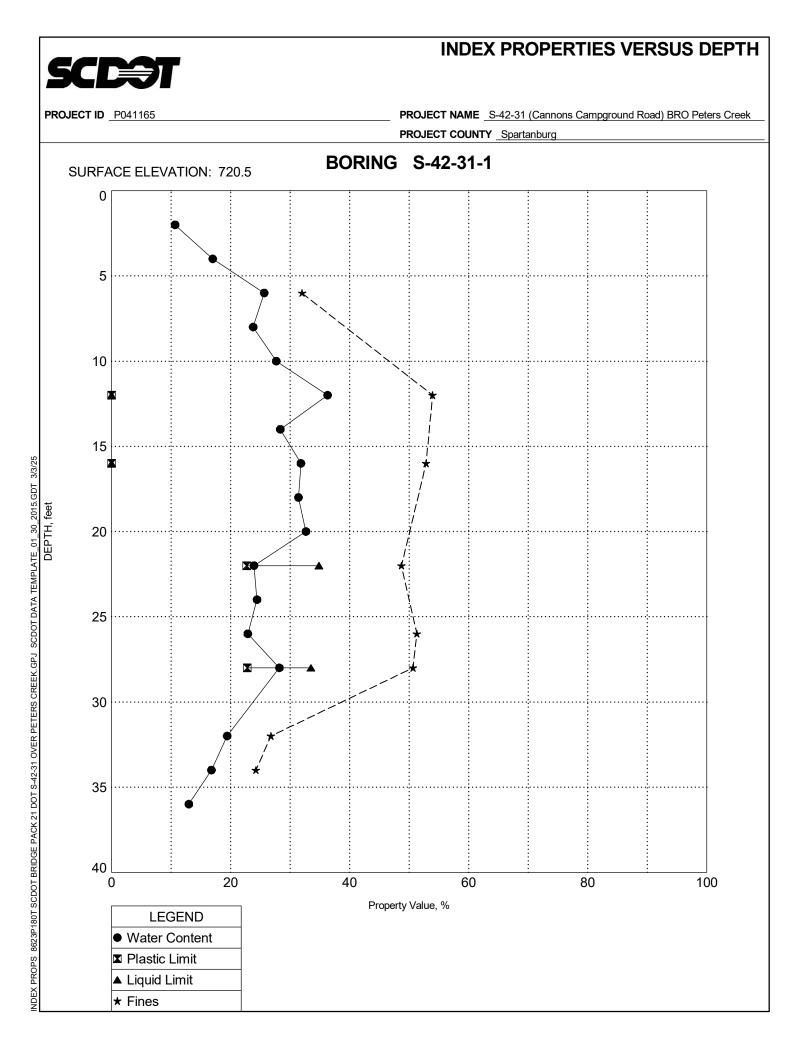
** Where index test was not conclusive, soil was classified per ASTM D2488 - Visual-Manual Procedure

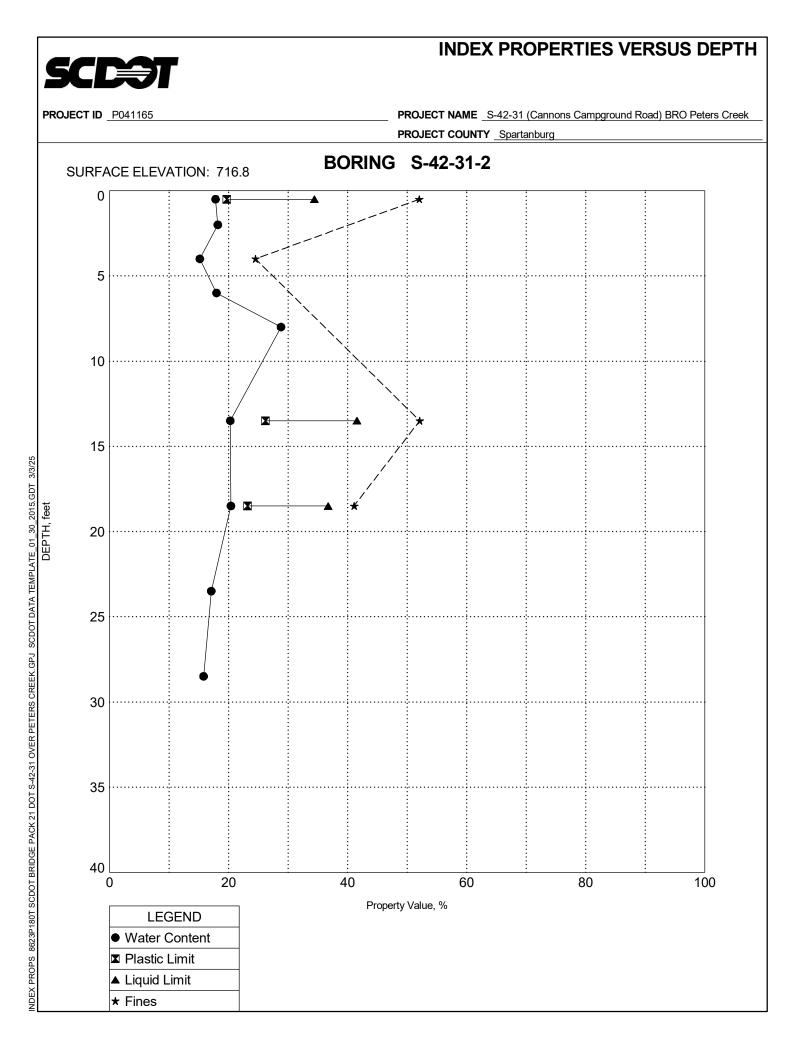


Summary of Laboratory Results

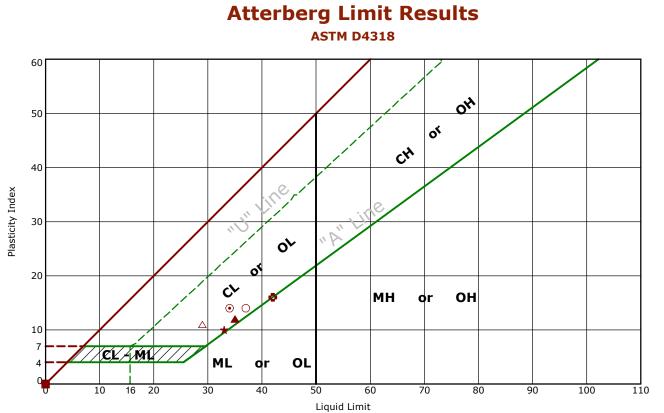
Boring ID	Depth (Ft.)	Soil Classification USCS & AASHTO	Liquid Limit	Plastic Limit	Plasticity Index	% Gravel	% Sand	% Fines	% Silt	% Clay	Water Content (%)	Proctor Dry Density (pcf)/Opt. Moisture (%)
S-42-31-2	4-6	SILTY SAND(SM) / A-2-4 **				14.5	61.0	24.5			15.2	
S-42-31-2	6-8	CLAYEY SAND(SC) / A-2-6 **									18.0	
S-42-31-2	8-10	SANDY SILT(ML) / A-7-6 **									28.8	
S-42-31-2	13.5-15	SANDY SILT(ML) / A-7-6 (6)	42	26	16	1.8	46.1	52.1			20.3	
S-42-31-2	18.5-20	CLAYEY SAND(SC) / A-6 (2)	37	23	14	6.8	52.1	41.1	41.1	0.0	20.4	
S-42-31-2	23.5-24.83	SILTY SAND(SM) / A-2-4 **									17.1	
S-42-31-2	28.5-28.75	SILTY SAND(SM) / A-2-4 **									15.8	
S-42-31-2 Bulk	1-5	CLAYEY SAND(SC) / A-6 (1)	29	18	11	3.6	53.9	42.5			13.7	117.6 / 13.3

** Where index test was not conclusive, soil was classified per ASTM D2488 - Visual-Manual Procedure









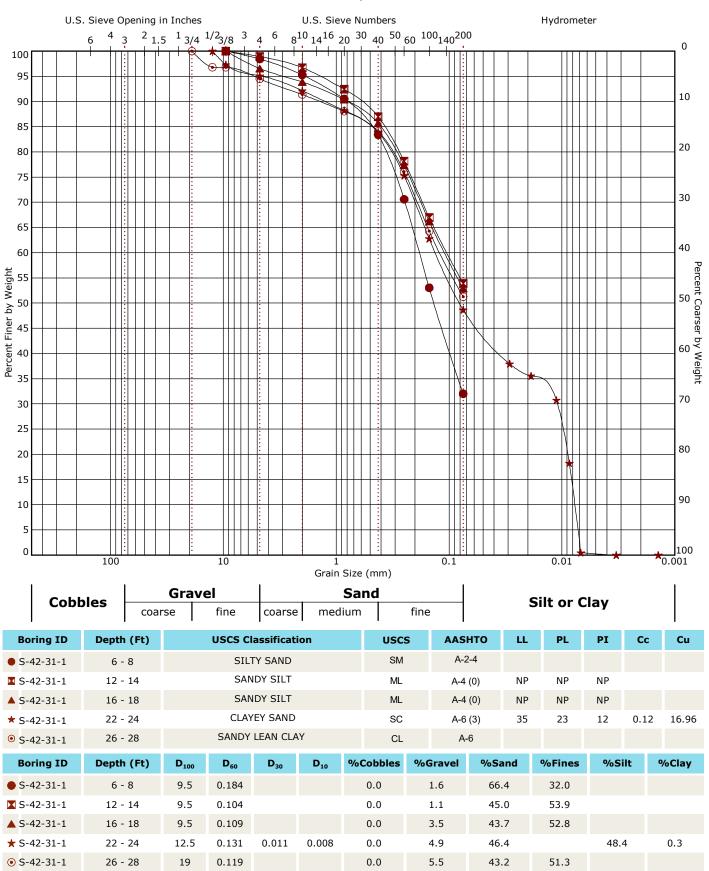
	Boring ID	Depth (Ft)	ш	PL	PI	Fines	AASHTO	Description
•	S-42-31-1	12 - 14	NP	NP	NP	53.9	A-4 (0)	SANDY SILT
	S-42-31-1	16 - 18	NP	NP	NP	52.8	A-4 (0)	SANDY SILT
	S-42-31-1	22 - 24	35	23	12	48.7	A-6 (3)	CLAYEY SAND
*	S-42-31-1	28 - 30	33	23	10	50.6	A-4 (3)	SANDY LEAN CLAY
۲	S-42-31-2	0.5 - 2	34	20	14	52.0	A-6 (4)	SANDY LEAN CLAY
٥	S-42-31-2	13.5 - 15	42	26	16	52.1	A-7-6 (6)	SANDY SILT
0	S-42-31-2	18.5 - 20	37	23	14	41.1	A-6 (2)	CLAYEY SAND
Δ	S-42-31-2 Bulk	1 - 5	29	18	11	42.5	A-6 (1)	CLAYEY SAND

Laboratory tests are not valid if separated from original report.



Grain Size Distribution

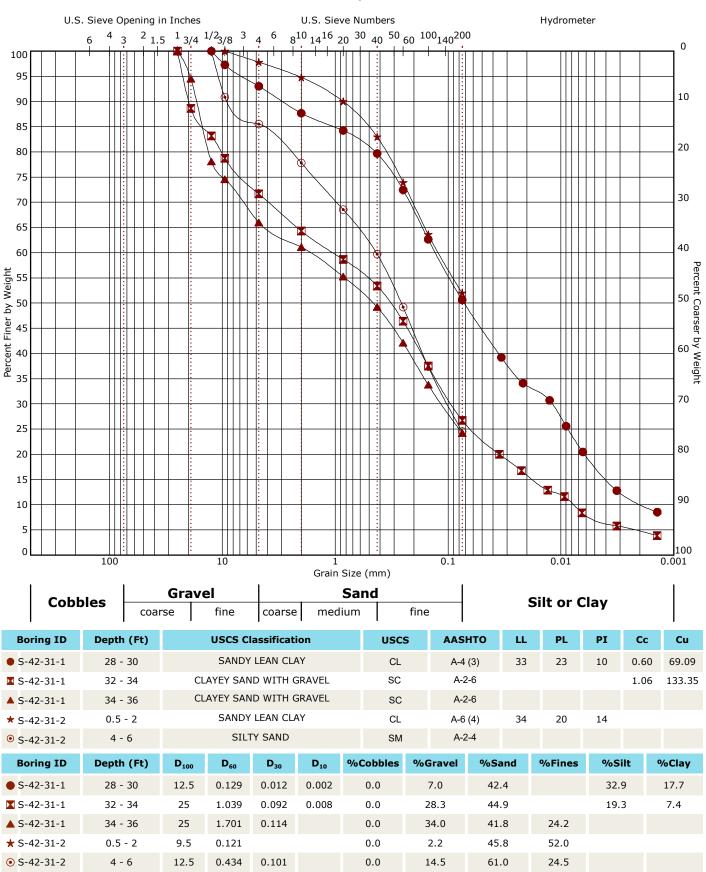
ASTM D422 / ASTM C136





Grain Size Distribution

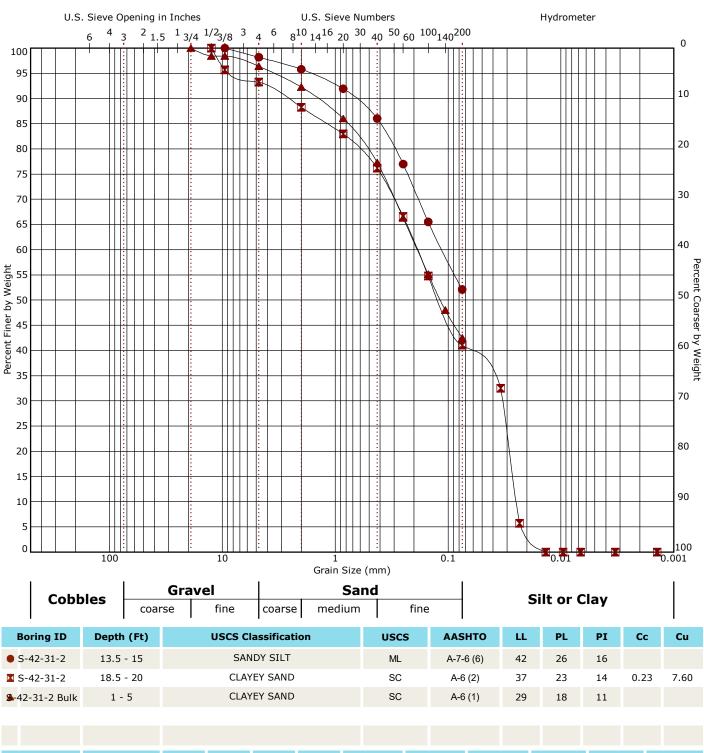
ASTM D422 / ASTM C136





Grain Size Distribution

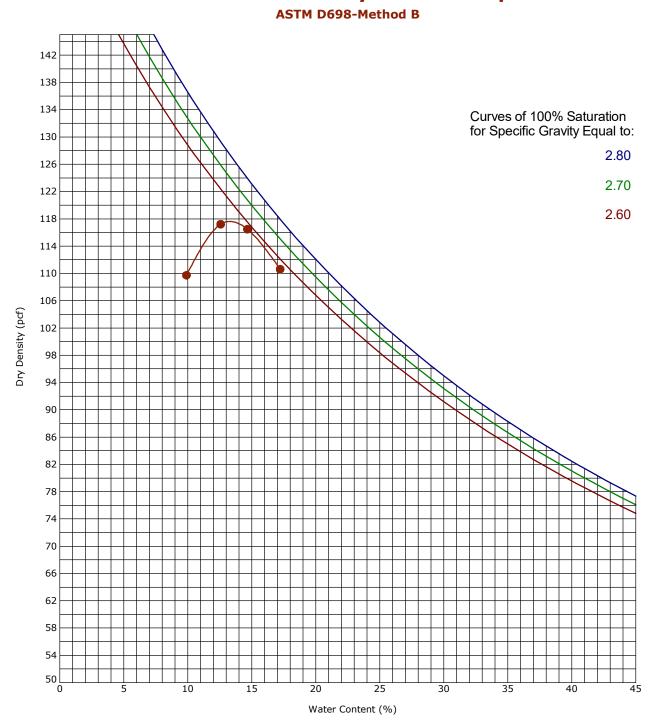
ASTM D422 / ASTM C136



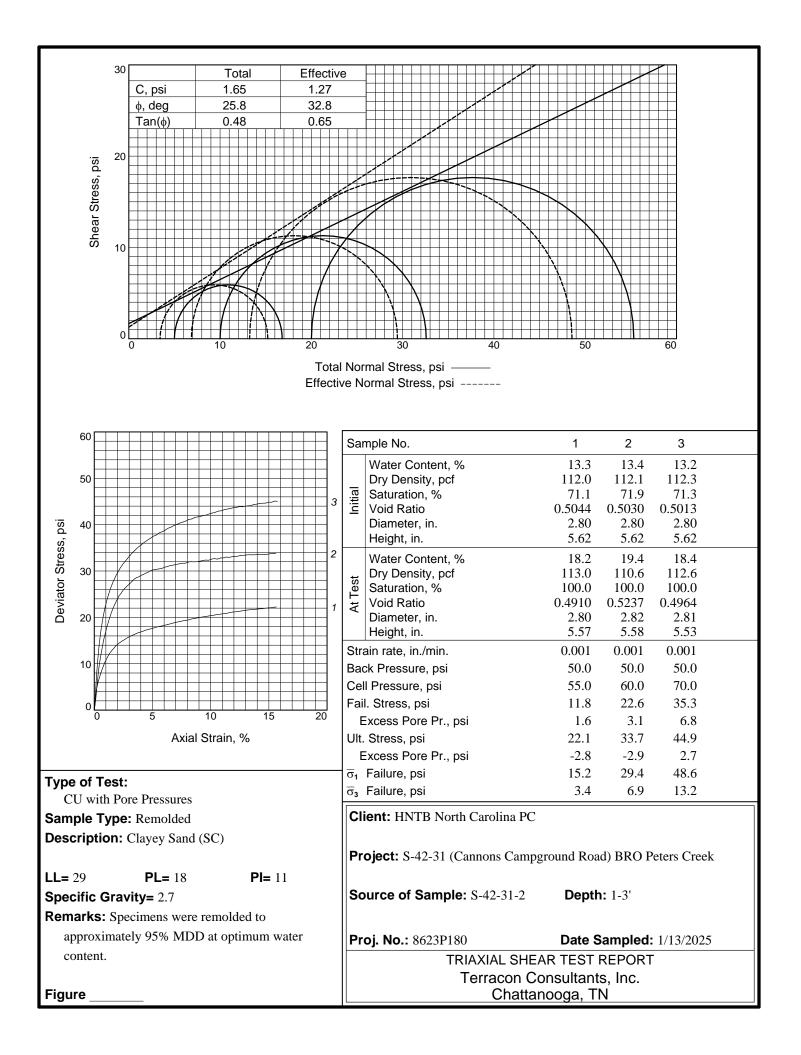
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
• S-42-31-2	13.5 - 15	9.5	0.113			0.0	1.8	46.1	52.1		
S -42-31-2	18.5 - 20	12.5	0.188	0.033	0.025	0.0	6.8	52.1		41.1	0.0
& 42-31-2 Bulk	1 - 5	19	0.187			0.0	3.6	53.9	42.5		
42-31-2 DUIK	1 - 5	19	0.107			0.0	5.0	55.5	42.5		

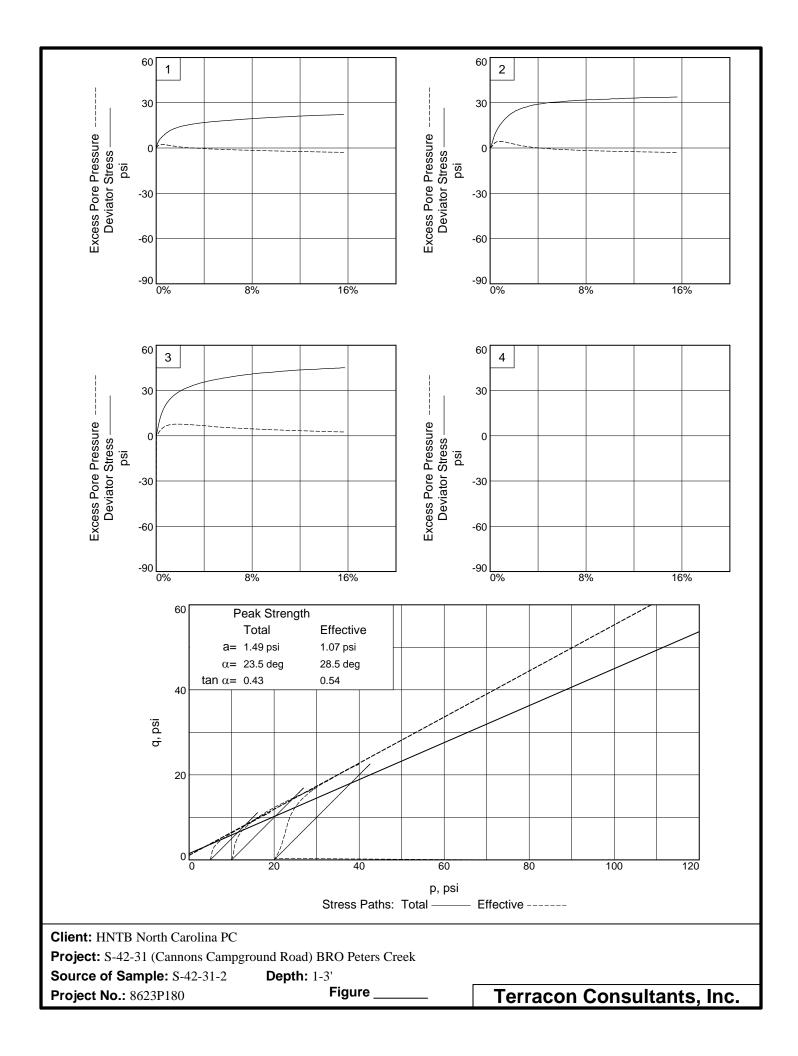


Moisture-Density Relationship



Вс	oring ID	Depth	(Ft)		C	Description of Materials						
S-42	2-31-2 Bulk	1 - 5	5			CLAYEY SAND(SC)						
Fines (%)	Fraction > mm size	ш	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)					
43	0.0	29	18	11	ASTM D698-Method B	117.6	13.3					





750 Pilot Road, Suite F Las Vegas, Nevada 89119 (702) 597-9393

Client HNTB North Carolina PC



Project

SCDOT Bridge Package 19 - Peters Creek

Sample Submitted By: Terracon (86)

Date Received: 2/7/2025

Lab No.: 25-0052

Results	s of Corrosio	n An
Sample Number		
Sample Location	S-42-31-1	
Sample Depth (ft.)	2.0-30.0	
pH Analysis, AASHTO T289	5.45	
Water Soluble Sulfate (SO4), AASHTO T290 (mg/kg)	95	
Sulfides, ASTM D4658, (ppm)	Nil	
Red-Ox, ASTM G200, (mV)	+733	
Chlorides, AASHTO T291, (mg/kg)	130	
Saturated Minimum Resistivity, ASTM G-57, (ohm cm)	2814	

alysis

M. Carp

Analyzed By

Nathan Campo Laboratory Coordinator

The tests were performed in general accordance with applicable ASTM and AWWA test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

Rock Coring Summary PAGE 1 OF 1





PROJECT ID P041165

PROJECT NAME S-42-31 (Cannons Campground Road) BRO Peters Creek

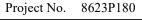
					PROJECT COUNTY Spartanburg						
Borehole		Core Run Top Depth	REC (%)	RQD (%)	q _u (psi)	Poisson's Ratio	Secant Modulus (ksi)	Unit Weight (pcf)	RMR	GSI	
S-42-31-1	NQ-1	38.5	70	15	5449	0.29	718	162	40	48	
S-42-31-1	NQ-2	43.5	82	13	11576	0.22	1449	172	43	53	
S-42-31-1	NQ-3	48.5	90	32	3838	0.04	376	165	50	60	
S-42-31-1	NQ-4	53.5	100	68	5875	0.03	636	170	65	70	
S-42-31-2	NQ-1	33.5	18	0					2	15	
S-42-31-2	NQ-2	38.5	68	20	3263	0.10	132	163	22	43	
S-42-31-2	NQ-3	43.5	100	50	5710	0.03	616	168	55	65	
S-42-31-2	NQ-4	48.5	100	40	3783	0.05	280	165	39	55	



Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19

Multiple Sites







SAMPLE LOCATION										
Site:	SCDOT Brid	lge Package 19 - ove	er Peters Creek							
Rock Type:		Granite								
Boring:	Boring: S-42-31-1 Depth (feet): 38.8-39.5									
SPECIMEN INFORMATION										
Sample No.: R1 Mass (g): 530.78										
Length (in.): 4.19 Diameter (in.): 1.95										
L/D Ratio: 2.1 Density (pcf): 161.59										
	TEST F	RESULTS								
Failure Load (lbs):			16266							
Failure Strain (%):			4.38							
Unconfined Comp	ressive Strength (osi):	5,449							
Elastic Modulus, E	, (ksi):		718							
Poisson's Ratio, u: 0.285										
Time of Failure (min): 00:39										
Rate of Loading (p	,		141.17							
Moisture Content Post-break: 0.3%										



Client		Project	
HNTB North Carolina PC		-	idge Package 19
4922 O'Hear Avenue Suite 203		Multiple Site	
North Charleston, SC 29402		Multiple Site	
		Project No.	8623P180
ASTM D4543 Test Results:			
<u>Parameter</u>		<u>Data</u>	
Sic	le Straightness:	0.0079	
Perpendicu	larity Deviation:		
	Diameter 1a:	0.0017	
	Diameter 1b:	0.0034	
	Diameter 2a:	0.0018	
	Diameter 2b:	0.0028	
Max Deviatior	n from Flatness:	0.0014	
Paralle	elism Deviation:		
	Diameter a:	0.02	
	Diameter b:	0.04	
Equipment:	TICCS ID:		
Calipers:	W-54522		
Scale:	B-71466		
Dial Indicator:	C-70608		
Compression (spherically seated):	C-48999		
· · · · · · · · · · · · · · · · · · ·			

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below:

Notes:

Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.

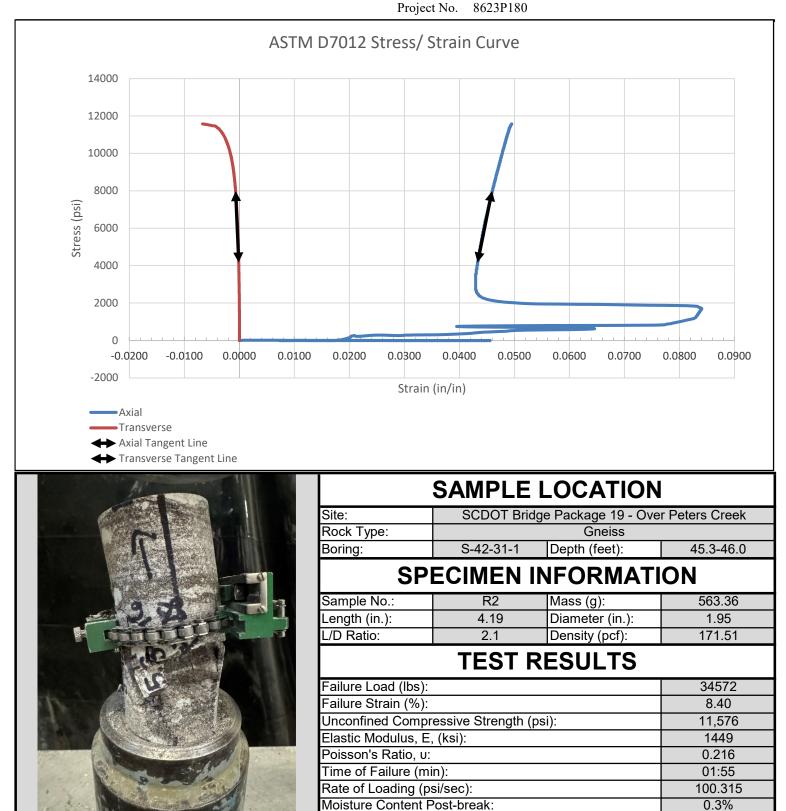
According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.



Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19

Multiple Sites



D7012 Method D and ASTM D4543, 6-16-20, Rev. 1 (3-8-2022)



Olianat	Duchast
Client	Project
HNTB North Carolina PC	SCDOT Bridge Package 19
4922 O'Hear Avenue Suite 203	Multiple Sites
North Charleston, SC 29402	
	Project No. 8623P180
ASTM D4543 Test Results:	
Parameter	<u>Data</u>
Side Straig	
Perpendicularity De	-
	neter 1a: 0.0048
	neter 1b: 0.0019
	neter 2a: 0.0025
	neter 2b: 0.0033
Max Deviation from F	
Parallelism Do	
	ameter a: 0.14
Dia	ameter b: 0.28
Equipment: TIC	CCS ID:
	54522
•	71466
	70608
	48999

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: tes:

Notes:

Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250°.

Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

The inconsistencies on the graph are due to the settling of the chain and movement of the sample during testing. As the testing proceeded, the chain settled into a more stable state. The Elastic Modulus and Poisson's ratio were taken from the stable state. These results may differ from results from a test specimen that does not fluctuate as much.

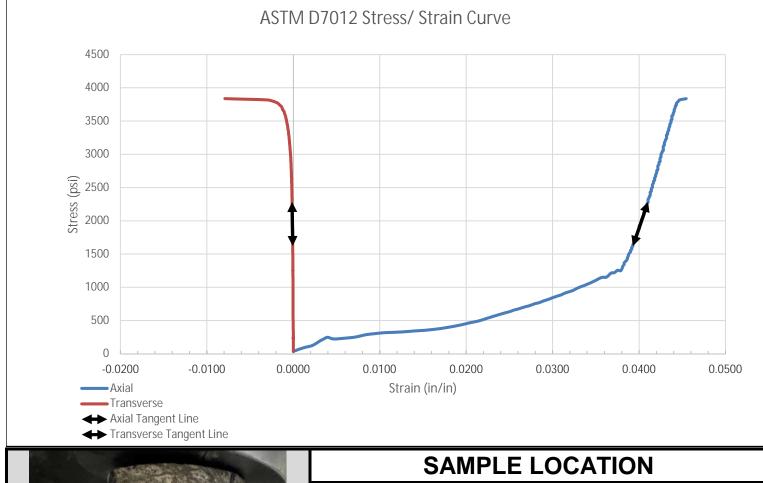


Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project

SCDOT Bridge Package 19 Multiple Sites







SAMPLE LOCATION						
Site:	SCDOT Brid	SCDOT Bridge Package 19 - Over Peters Creek				
Rock Type:		Schist				
Boring:	S-42-31-1	Depth (feet):	49.3-50.4			
SPECIMEN INFORMATION						
Sample No.:	R3	Mass (g):	519.42			
Length (in.):	3.98	Diameter (in.):	1.96			
L/D Ratio:	2.03	Density (pcf):	164.78			
	TEST F	RESULTS				
Failure Load (lbs):			11580			
Failure Strain (%):	4.54					
Unconfined Compre	3,838					
Elastic Modulus, E,	376					
Poisson's Ratio, u:	0.041					
Time of Failure (min):			00:34			
Rate of Loading (ps	112.884					
Moisture Content P	ost-break:		0.5%			



Client HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402	Project SCDOT Bridge Package 19 Multiple Sites
	Project No. 8623P180
ASTM D4543 Test Results:	
Parameter	<u>Data</u>
Side Straight	
Perpendicularity Devia	
Diamete	
Diamete	er 1b: 0.0068
Diamete	er 2a: 0.0099
Diamete	er 2b: 0.0081
Max Deviation from Flat	ness: 0.0070
Parallelism Devia	ation:
Diame	ter a: 0.35
Diame	ter b: 0.82
Equipment: TICCS	ID:
Calipers: W-545	522
Scale: B-714	66
Dial Indicator: C-706	08
Compression (spherically seated): C-489	99

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: tes:

Notes:

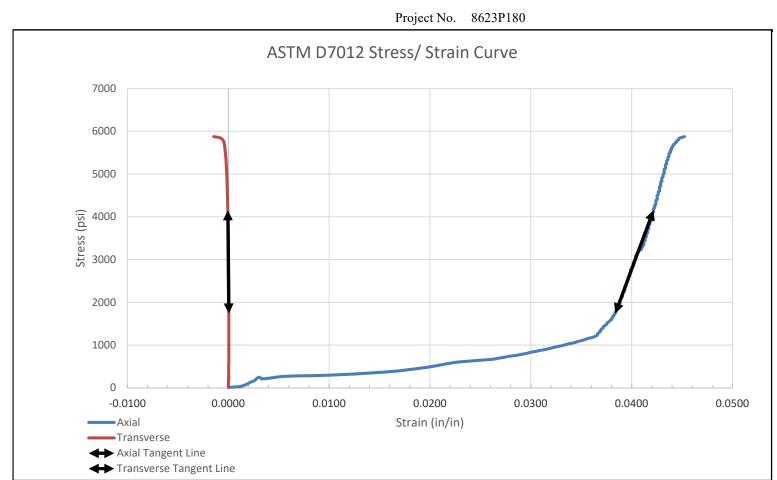
Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250°. Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches. Per ASTM D4543, this specimen has not met the requirements for parallelism, by exceeding 0.25°. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.



Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19

Multiple Sites





SAMPLE LOCATION					
Site:	SCDOT Brid	ge Package 19 - Ove	er Peters Creek		
Rock Type:		Gneiss			
Boring:	S-42-31-1	Depth (feet):	54.9-55.6		
SPECIMEN INFORMATION					
Sample No.:	R4	Mass (g):	556.32		
Length (in.):	4.23	Diameter (in.):	1.94		
L/D Ratio:	2.2	Density (pcf):	169.50		
	TEST R	RESULTS			
Failure Load (lbs): 17357					
Failure Strain (%):	4.52				
Unconfined Compr	5,875				
Elastic Modulus, E,	636				
Poisson's Ratio, u:	0.025				
Time of Failure (min):			00:54		
Rate of Loading (pe	109.20				
Moisture Content P	ost-break:		0.7%		



Aliant	Duciest
Client	Project
HNTB North Carolina PC	SCDOT Bridge Package 19
4922 O'Hear Avenue Suite 203	Multiple Sites
North Charleston, SC 29402	
	Project No. 8623P180
ASTM D4543 Test Results:	
Parameter	Data
Side Straig	
Perpendicularity De	
	eter 1a: 0.0032
	eter 1b: 0.0069
	eter 2a: 0.0020
	eter 2b: 0.0073
Max Deviation from Fla	
Parallelism De	
	neter a: 0.05
Diam	neter b: 0.80
Equipment: TICC	S ID:
Calipers: W-54	4522
Scale: B-71	466
Dial Indicator: C-70	
Compression (spherically seated): C-48	

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: tes:

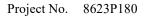
Notes:

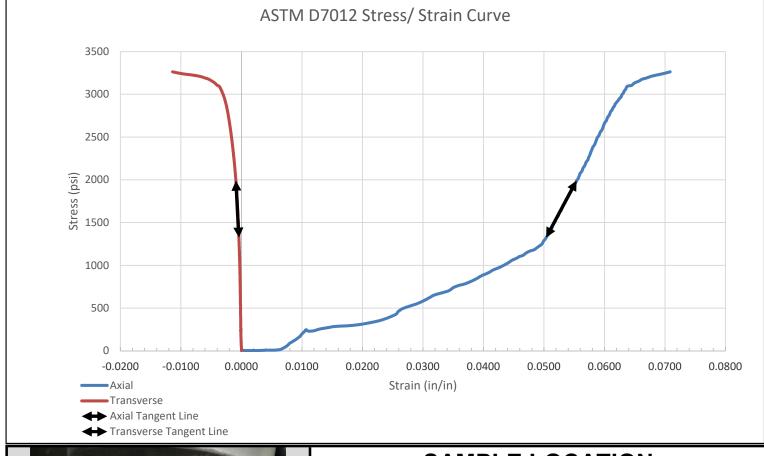
Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250°. Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches. Per ASTM D4543, this specimen has not met the requirements for parallelism, by exceeding 0.25°. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.



Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19 Multiple Sites







	SAMPLE	LOCATION				
Site:	SCDOT Brid	SCDOT Bridge Package 19 - Over Peters Creek				
Rock Type:		Schist				
Boring:	S-42-31-2	Depth (feet):	40.4-41			
SPECIMEN INFORMATION						
Sample No.:	R2	Mass (g):	517.09			
Length (in.):	4.08	Diameter (in.):	1.94			
L/D Ratio:	2.10	Density (pcf):	163.34			
	TEST F	RESULTS				
Failure Load (lbs):			9642			
Failure Strain (%):7.08						
Unconfined Compressive Strength (psi): 3,263						
Elastic Modulus, E,	132					
Poisson's Ratio, u:	0.098					
Time of Failure (min):			00:33			
Rate of Loading (pe	99.49					
Moisture Content P	ost-break:		1.7%			



Client	Project
HNTB North Carolina PC	SCDOT Bridge Package 19
4922 O'Hear Avenue Suite 203	Multiple Sites
North Charleston, SC 29402	
	Project No. 8623P180
ASTM D4543 Test Results:	
Parameter	<u>Data</u>
Side Straig	
Perpendicularity De	-
	neter 1a: 0.0085
	neter 1b: 0.0137
	neter 2a: 0.0043
	neter 2b: 0.0155
Max Deviation from FI	
Parallelism De	
	meter a: 0.19
	meter b: 1.70
	CS ID:
Calipers: W-5	54522
Scale: B-7	71466
Dial Indicator: C-70	70608
Compression (spherically seated): C-44	18999

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: tes:

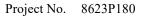
Notes:

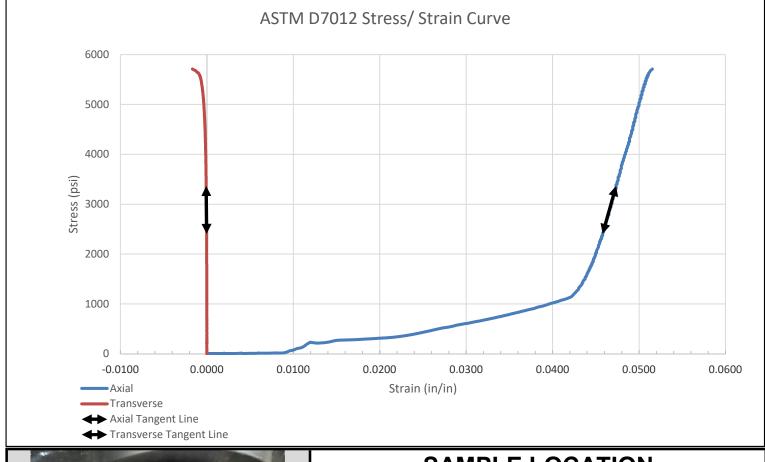
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Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19 Multiple Sites







SAMPLE LOCATION				
Site:	SCDOT Bridge Package 19 - Over Peters Creek			
Rock Type:		Gneiss		
Boring:	S-42-31-2	Depth (feet):	46.7-47.5	
SPECIMEN INFORMATION				
Sample No.:	R3	Mass (g):	551.12	
Length (in.):	4.18	Diameter (in.):	1.95	
L/D Ratio:	2.14	Density (pcf):	168.19	
	TEST F	RESULTS		
Failure Load (lbs):			17043	
Failure Strain (%): 5.15				
Unconfined Compressive Strength (psi): 5,710				
Elastic Modulus, E	616			
Poisson's Ratio, u:	0.029			
Time of Failure (min):			00:56	
Rate of Loading (p	101.59			
Moisture Content Post-break: 1.2%				



		Destant	
Client		Project	
HNTB North Carolina PC		SCDOT Brid	dge Package 19
4922 O'Hear Avenue Suite 203		Multiple Site	es
North Charleston, SC 29402			
		Project No.	8623P180
ASTM D4543 Test Results:			
Parameter		<u>Data</u>	
	Straightness:	0.0049	
	rity Deviation:		
'	, Diameter 1a:	0.0022	
	Diameter 1b:	0.0015	
	Diameter 2a:	0.0008	
	Diameter 2b:	0.0014	
Max Deviation f	rom Flatness:	0.0018	
Paralleli	sm Deviation:	0.0010	
	Diameter a:	0.08	
	Diameter b:	0.03	
Equipment:	TICCS ID:		
Calipers:	W-54522		
Scale:	B-71466		
Dial Indicator:	C-70608		
Compression (spherically seated):	C-48999		
compression (spherically sealed).	0-40999		

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: Notes:

Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.

According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

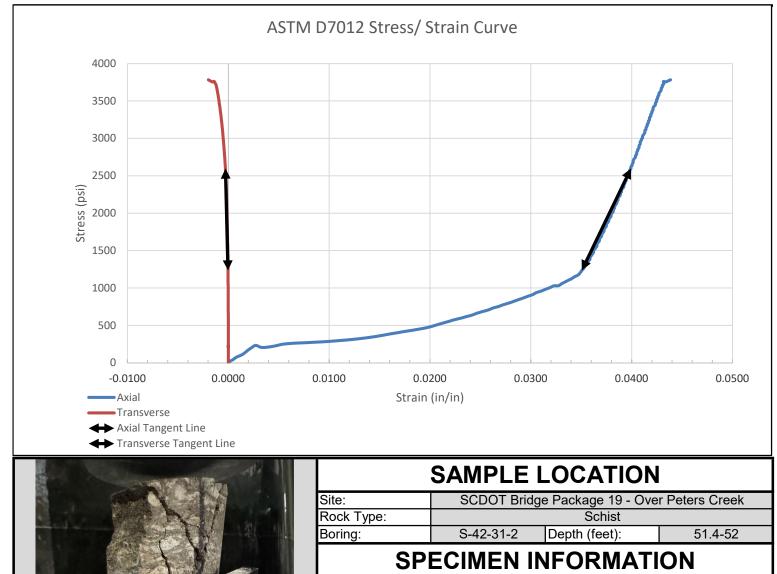


Client

HNTB North Carolina PC 4922 O'Hear Avenue Suite 203 North Charleston, SC 29402 Project SCDOT Bridge Package 19

Multiple Sites

Project No. 8623P180



Sample No.:

Length (in.):	4.33	Diameter (in.):	1.95
L/D Ratio:	2.22	Density (pcf):	164.96
	TEST	RESULTS	
Failure Load (lbs):			11291
Failure Strain (%):	4.38		
Unconfined Compr	3,783		
Elastic Modulus, E,	280		
Poisson's Ratio, u:	0.053		
Time of Failure (mi	00:35		
Rate of Loading (ps	109.33		
Moisture Content Post-break:			1.3%

Mass (g):

559.94

R4



		B · · ·		
Client		Project		
HNTB North Carolina PC		SCDOT Bridge Package 19		
4922 O'Hear Avenue Suite 203		Multiple Site	es	
North Charleston, SC 29402				
		Project No.	8623P180	
ASTM D4543 Test Results:				
Parameter		<u>Data</u>		
	e Straightness:	0.0038		
	arity Deviation:			
	Diameter 1a:	0.0089		
	Diameter 1b:	0.0025		
	Diameter 2a:	0.0088		
	Diameter 2b:			
Mars Daviation	2.0	0.0040		
	from Flatness:	0.0096		
Paralle	lism Deviation:	0.40		
	Diameter a:	0.10		
	Diameter b:	0.15		
Equipment:	TICCS ID:			
Calipers:	W-54522			
Scale:	B-71466			
Dial Indicator:	C-70608			
Compression (spherically seated):	C-48999			
	5 .0000			

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below: tes:

Notes:

Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250°. Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.





Appendix C Supporting Documents

3-Point Acceleration Design Response Spectrum by SCDOT Rig Calibration Report – DR#1327 (8 Pages)

Note: All exhibits are one page unless noted above.

						3-Point /		n Design DT v3.2 - 06/0 [,]	Response Spectro
Project ID:	D0/1165					Latitude:	31 0082		7
Route:	S-42	2-31	County:	42 - Spa	rtanburg	Longitude:			-
Project:		- • ·		Campground	<u>v</u>				-
				10					
Design EQ	PGA	S _{DS}	S _{D1}	Mw	R	PGV	D _{a5-95}	Т'。	7
	g	g	g	-	km	inches/sec	Sec	sec	
FEE	0.04	0.08	0.01	7.30	236.43	0.29	54.72	0.17	
SEE	0.07	0.15	0.02	6.46	159.77	0.61	34.02	0.13	
									_
Fundamenta	al Period of	Range of	Interest V*		— V* _{s,H} Н		T _{NH}		
Structu	re, T_0^*	se	ec	▼ s,H		S	ec		
se	С	0.5*T ₀	2.0*T ₀	ft/sec	ft	(4*H)/V* _{s,H}	(6*H)/V* _{s,H}		
0.0	0	0.00	0.00	1117.75	74.00	0.17	0.40		

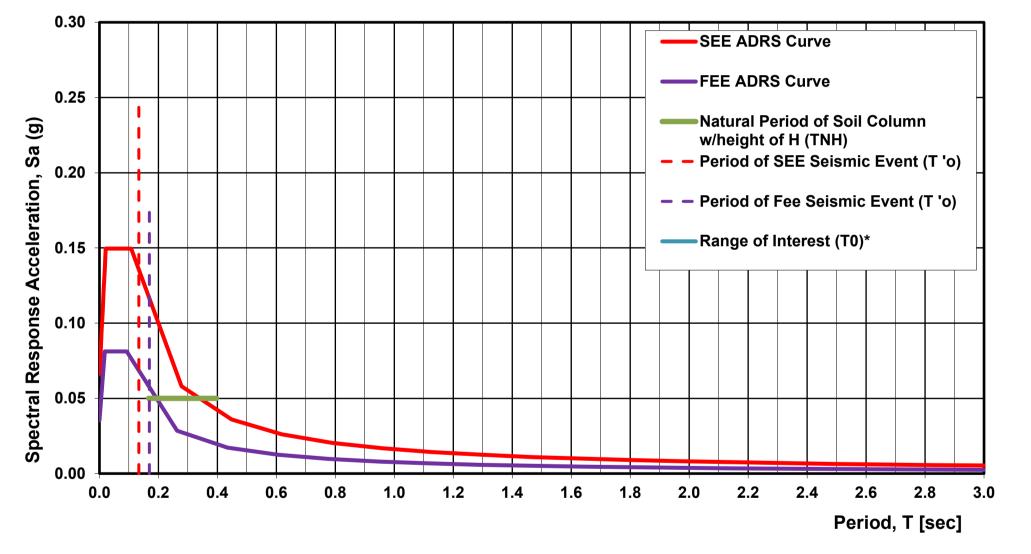
H = B-C Boundary

SC Seismic ADRS Curve

0.00

0.00

0.00



Designer: Date: D. Sapkota - Support 2/5/2025

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

South Carolina Piedmont

*Same Geologic Condition as used in SCENARIO_PC (2006)

_	FEE	Data	· -	SEE	Data
Г	т	S _a	1 1	т	S _a
	0.00	0.035		0.00	0.066
	0.00	0.043		0.00	0.080
	0.01	0.051		0.01	0.094
	0.01	0.058		0.01	0.108
	0.01	0.066		0.01	0.122
	0.02	0.074		0.02	0.136
То	0.02	0.081	То	0.02	0.150
	0.02	0.081		0.03	0.150
	0.03	0.081		0.04	0.150
	0.04	0.081		0.04	0.150
	0.04	0.081		0.05	0.150
	0.05	0.081		0.06	0.150
	0.06	0.081		0.06	0.150
	0.06	0.081		0.07	0.150
	0.07	0.081		0.08	0.150
	0.07	0.081		0.09	0.150
	0.08	0.081		0.09	0.150
	0.09	0.081		0.10	0.150
Ts	0.09	0.081	Ts	0.11	0.150
	0.26	0.029		0.28	0.058
	0.43	0.017		0.45	0.036
	0.61	0.012		0.62	0.026
	0.78	0.010		0.79	0.020
	0.95	0.008		0.96	0.017
	1.12	0.007		1.13	0.014
	1.29	0.006		1.30	0.012
	1.46	0.005		1.47	0.011
	1.63	0.005		1.64	0.010
	1.80	0.004		1.81	0.009
	1.97	0.004		1.98	0.008
	2.14	0.004		2.15	0.008
	2.32	0.003		2.32	0.007
	2.49	0.003		2.49	0.006
	2.66	0.003		2.66	0.006
L	2.83	0.003		2.83	0.006
	3.00	0.003		3.00	0.005

SPT Automatic Hammer Energy Measurement Report

Drill Rig Model: Geoprobe 3126GT Drill Rig Serial Number: 3126S5V224106 Asset Number: DR#1327

September 13, 2024





Terracon Consultants, Inc. Greenville, South Carolina



Ferracon

ITEM	DESCRIPTION				
Drill Rig Owner	Terracon Consultant, Inc. – Greenville, SC				
Drill Rig Operator	Brett Burnett; Terracon Exploration				
Testing Date	9/5/2024				
Testing Location	Sumter County, SC				
Boring Identification	B-3				
Energy Measurement Depths	30 ft, 40 ft, 45 ft, 50 ft				
Subsurface Soils	Poorly graded sands (SP) to clayey sands (SC)				
Hammer Type/Height	140 pounds (automatic) with 2.5-foot drop height				
Boring Method	Mud rotary				
Drill Rods	 AWJ 1-¾" outside diameter 1-¾" inside diameter 1.15 in² cross sectional area 1/4" wall thickness 				
Calibration Testing Equipment	 2-foot AWJ rod instrumented w/ two strain gauges and two accelerometers manufactured by Pile Dynamics Inc. (PDI) SN: 746AWJ Model SPT Analyzer™ (PDA) SN: 4621 TB 				
ASTM Methods Used	ASTM D1586, Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils ASTM D4633-16, Standard Method for Energy Measurement for Dynamic Penetrometers				
SPT Calibration Personnel	Ryan Wakeford – Intermediate PDA Proficiency, Terracon Consultants, Inc.				

2.0 PURPOSE AND SCOPE OF WORK

The North Charleston office of Terracon Consultants, Inc. conducted SPT energy measurements in accordance with ASTM D4633-16 at a site off Panola Road in Sumter County, South Carolina. Energy measurements on the rig were taken during eight samples events.

September 13, 2024

Terracon Consultants Inc. 72 Pointe Circle Greenville, SC 29615

Attn: Nitin Dudani E: nitin.dudani@terracon.com

SPT Automatic Hammer Energy Measurement Report Re: Rig No: 1327

Terracon Project Number: 73245115

Dear Mr. Dudani:

This report provides the Energy Transfer Ratio (ETR) for the Standard Penetration Testing (SPT) automatic hammer as summarized below:

Table 1: Hammer Efficiency Summary

Drill Rig Make/Model	Drill Rig Serial Number	Drill Rig Year	Asset Number	Energy Transfer Ratio (ETR)	Hammer Efficiency Correction (C _E)
Geoprobe	3126S5V224106	2024	DR#1327	92.6% ± 1.75%	1.54

*Please Note: according to ASTM standard, a minimum of three recordings should be collected at five-foot intervals no shallower than twenty feet below current ground surface (bgs). The sample intervals were obtained between 30 and 50 feet bgs.

If you have any questions concerning this summary, or if we may be of further service, please contact

Pza2

Rvan C. Wakeford, P.E. Geotechnical Engineer

Insheel Kolwalkar

Susheel R. Kolwalkar, Ph.D., P.E. Regional Services Manager



Geotechnical Department Manager

Attachments:

Exhibit A: SPT Representative Blow Exhibit B: SPT Analyzer Literature and Equipment Calibrations Exhibit C: SPT Analyzer Results Exhibit D: Field Log Exhibit E: Copy of Certificate of Proficiency

Facilities | Environmental | Geotechnical | Materials i

Ferracon

3.0 TEST RESULTS

Table 2: CDT Llam Collbration Testin

Boring	Start Depth ¹	Rod Length ²	Roc	l Sect	ions ³		asured Blo blows/6	ow Counts inches)	5	SPT N _{meas}	Soil
	(ft)	(ft)	2 ft	5 ft	10 ft	1 st Inc.	2 nd Inc.	3 rd Inc.	4 th I nc.	(bpf)	Type⁴
	28.5	33.7	0	6	0	4	5	6	-	11	SP
B-3	38.5	43.7	0	8	0	7	10	10	-	20	SP
	43.5	48.7	0	9	0	4	5	7	-	12	SP
	48.5	53.7	0	10	0	4	4	7	-	11	SP

1. Depth from existing ground surface to start of SPT

2. Total rod length from instrumentation to bottom of sampler 3. Two-foot section is instrumented and is located at top of drill rods

4. Soil type visually classified by Terracon

	Start	SPT	No.	EMX ³ (ft-lbs)			ETR ³ (%)		
Boring	Depth ¹ (ft)	N _m (bpf)	of Blows ²	Max.	Min.	Ave.	Std. Dev.	Ave.	Std. Dev.
	28.5	11	11	340	313	327	8.8	93.4	2.5
B-3	38.5	20	20	334	309	318	5.6	90.9	1.6
	43.5	12	12	330	309	323	5.5	92.4	1.6
	48.5	11	11	334	320	328	4.5	93.7	1.3
		Average:		335	313	334	6.1	92.6	1.75

 Average:
 335
 313
 334
 6.1
 92.6
 1.75

 1.Boring ID and depth from existing ground surface to start of SPT
 2.Number of blows used in energy calibration analysis; limited to measurements recorded during the
 second and third 6-inch sampling intervals at each depth or during the first increment if refusal were encountered

3.EMX = Maximum Transferred Energy, ETR = Energy Transfer Ratio.

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	Start	SPT	lammer Blow No.		-	PM ³	
Boring	Depth ¹ (ft)	N _{meas} (bpf)	of Blows ²	Max.	Min.	Ave.	Std. Dev.
	28.5	11	11	53.8	53.1	53.5	0.2
B-3	38.5	20	20	53.7	53.0	53.4	0.1
	43.5	12	12	53.6	53.2	53.4	0.1
	48.5	11	11	53.8	53.1	53.4	0.2
		Average:		53.7	53.1	53.4	0.2

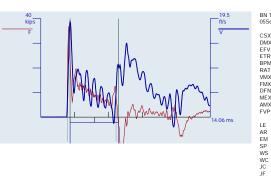
Average: 53.7 53.1 53.4 0.2
 Boring ID and depth from existing ground surface to start of SPT.
 Number of blows used in energy calibration analysis. Limited to measurements recorded during the second and third 6-inch sampling intervals at each depth or during the 1st increment if refusal conditions were encountered.

3. BPM = Blows per minute

Exhibit A SPT Representative Blow

Facilities | Environmental | Geotechnical | Materials iv

GRL Engineers, Inc. GEOPROBE 3126GT 28.5-30 B3 PDA Operator: RW

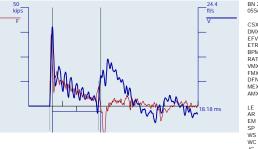


l 13 Sen2024	10:07:23 AM
ocprort	10.07.207.00
x	32.1 ksi
٨X	1.11 in
V	331 ft-lb
R	94.7 %
M	53.8 bpm
T	1.0
1X	18.9 ft/s
1X	37 kips
	1.00 in
X	1070 µE
1X	3001 g's
P	0.6
	33.70 ft
	1.15 in^2
	30000 ksi
	0.492 k/ft3
S	16807.9 ft/s
2	16766.2 ft/s
	0.90
	1.00

F1: [746AWJ1] F2: [746AWJ2] A3 (PR): [K14007] A4 (PR): [K14006] 222.05 PDICAL (1) FF1 222.19 PDICAL (1) FF1 407.233 mv/6.4v/5000g (1) VF1 375.226 mv/6.4v/5000g (1) VF1

Pile Driving Analyzer ® (PDA) Version: 2022.35.2

GRL Engineers, Inc. GEOPROBE 3126GT 38.5-40 B3 PDA Operator: RW



Pile Driving Analyzer ® (PDA) Version: 2022.35.2

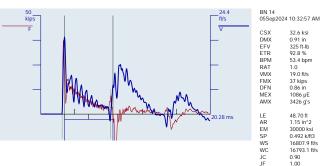
BN 25 05Sep2024 10:24:35 AM 31.7 ksi 0.66 in 324 ft-lb 92.6 % 53.4 bpm 1.1 19.6 ft/s 36 kips 0.60 in 1056 µE 3358 g's CSX DMX EFV ETR BPM RAT VMX FMX DFN MEX AMX 43.70 ft 1.15 in*2 30000 ksi 0.492 k/ft3 16807.9 ft/s 16807.7 ft/s LE AR EM SP WS WC JC JF 0.90 1.00

F1: [746AWJ1] F2: [746AWJ2] A3 (PR): [K14007] A4 (PR): [K14006]

Facilities | Environmental | Geotechnical | Materials i

222.05 PDICAL (1) FF1 222.19 PDICAL (1) FF1 407.233 mv/6.4v/5000g (1) VF1 375.226 mv/6.4v/5000g (1) VF1

GRL Engineers, Inc. GEOPROBE 3126GT 43.5-45 В3 PDA Operator: RW



Pile Driving Analyzer ® (PDA) Version: 2022.35.2

222.05 PDICAL (1) FF1 222.19 PDICAL (1) FF1 407.233 mv/6.4v/5000g (1) VF1 375.226 mv/6.4v/5000g (1) VF1

32.6 ksi

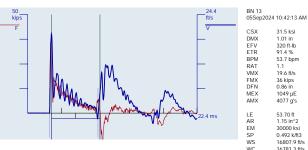
32.6 KSi 0.91 in 325 ft-lb 92.8 % 53.4 bpm 1.0 19.0 ft/s 37 kips 0.86 in 1086 µE 3426 g's

48.70 ft 1.15 in^2 30000 ksi 0.492 k/ft3 16807.9 ft/s 16793.1 ft/s 0.90 1.00 F1: [746AWJ1] F2: [746AWJ2]

A3 (PR): [K14007] A4 (PR): [K14006]

GRL Engineers, Inc.

GEOPROBE 3126GT



05Sep2024	10:42:13 AM
CSX	31.5 ksi
DMX	1.01 in
EFV	320 ft-lb
	91.4 %
BPM	53.7 bpm
RAT	1.1
VMX	19.6 ft/s
FMX	36 kips
DFN	0.86 in
MEX	1049 µE
AMX	4077 q's
	•
LE	53.70 ft
AR	1.15 in^2
EM	30000 ksi
SP	0.492 k/ft3
WS	16807.9 ft/s
WC	16781.3 ft/s
JC	0.90
JF	1.00
F1: [746AW	J11
F2: 746AW	
A3 (PR): [K A4 (PR): [K	14007]

222.05 PDICAL (1) FF1 222.19 PDICAL (1) FF1 407.233 mv/6.4v/5000g (1) VF1 375.226 mv/6.4v/5000g (1) VF1

Ferracon



SPT Analyzer

Measures the energy transferred into an instrumented SPT rod during a Standard Penetration Test (SPT)

Reliable. Simplified. Rugged.

The SPT Analyzer determines the energy transferred by SPT hammers using force and velocity measurements, for improved reliability of SPT N-values.

What is SPT?

The Standard Penetration Test (SPT) is a widelyemployed soil exploration tool that involves using an SPT hammer to drive a split sampler at the bottom of a drill string to obtain soil samples. The number of blows required to penetrate the last 300mm (1ft) is the "N value" which is related to soil strength.

Why measure the energy transferred by the SPT hammer?

Several different types of SPT hammers are used to conduct Standard Penetration Tests. Their varying efficiencies influence the N value. The measured N value is normalized by multiplying it by the ratio of the measured energy transferred to the rod to 60% of the theoretical potential energy. The normalization compensates for the variability of the efficiencies of different SPT hammer types, and improves the reliability of soil strength estimates used in geotechnical applications.

The SPT Analyzer is furnished with a 0.6m sub assembly (or section) of an SPT rod (AW, NW or other type) instrumented with two strain gage bridges, and calibrated by Pile Dynamics. Once in the field, two accelerometers are bolted to the rod section. The instrumented section is inserted at the top of the drill string between the hammer and the existing sampling rod. The sensors on the rod are connected to the SPT Analyzer.

Smart Sensor technology allows the SPT Analyzer to read the rod instrumentation, obtaining the sensor calibration and rod cross sectional area.



- Calculates energy transferred by SPT hammers using force and velocity hammers using measurements
- Determines N Value to help improve reliability of soil strength estimates
- Offers simplified reporting and analysis option to speed testing results
- Operates in English, SI, or Metric units



Exhibit B

SPT Analyzer Literature and Equipment Calibrations

EN ISO 22486-3:2005/ASTM Complant

The SPT Analyzer is compliant with EN ISO 22476-3:2005. ASTM D1586 recommends normalizing results from any SPT test using energy measurements. When these tests are performed to determine the liquefaction potential of sands, ASTM D6066 not only recommends but mandates the normalization. ASTM D4633 states that the only acceptable method of determining energy for normalization of N values is by force and velocity measurements.

These quantities are input to the SPT Analyzer automatically. This significantly simplifies the initial test setup.

The strain gages and accelerometers obtain the force and velocity signals necessary for the calculation of transferred energy to the drill string for each hammer blow. The energy is displayed in real time on the SPT Analyzer screen.

Output

SPT Analyzer data is stored and transferred to a computer via USB memory stick. The software furnished with the SPT Analyzer has a Report Creation Option that makes it quick and easy to summarize results and create output graphs of Force, Velocity, Energy and Displacement versus Time, as well as numerical, statistical, and graphical results for each data set. The software is fully customizable.





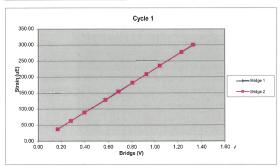
Pile Dynamics, Inc. (PDI) is the world leader in developing, manufacturing and supplying state of the art QA/QC products and systems for the deep foundations industry. The company is headquartered in Cleveland, Ohio, USA, with offices and representatives worldwide. For additional information visit us at <u>www.pile.com</u> or contact <u>info@pile.com</u>.

www.pile.com | +1 (216) 831-6131 | info@pile.com

46AWJ	Cy	rcle 1		
Sample	Force (lb)	Strain (µE)	Bridge 1 (V)	Bridge 2 (V
1	0.00	0.00	0.00	0.00
2	1296.93	37.22	0.17	0.17
3	2135.32	62.74	0.28	0.28
4	3028.79	89.39	0.40	0.40
5	4377.09	128.61	0.58	0.57
6	5243.07	154.57	0.69	0.68
7	6143.17	181.90	0.81	0.81
8	7067.05	208.93	0.93	0.93
9	7958.18	235.42	1.04	1.05
10	9380.66	278.02	1.23	1.23
11	10161.74	300.76	1.34	1.33

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7605.07	Force Calibration (Ib/V)	7606.74
Offset	-0.16	Offset	12.66
Correlation	0.999997	Correlation	0.999990
Strain Calibration (µE/V)	225.99	Strain Calibration (µE/V)	226.04
Offset	-1.01	Offset	-0.63
Correlation	0.999989	Correlation	0.999992

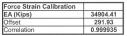
Force Strain Calibration	
EA (Kips)	33651.50
Offset	33.98
Correlation	0.999994

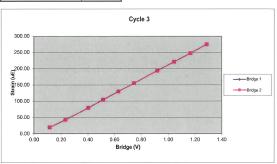


	Pile Dynamics, Inc. certifies that the
	Pile Driving Analyzer®, Model SPT
	Serial Number: <u>4621 TB</u>
using	was calibrated on <u>13 (1)by 2004</u> a PDA Calibration Box whose output was calibrated with test equipment traceable to NIST.
SIZAL SIZAL	This certificate is valid for 2 years from above date.

746AWJ	C	/cle 3		
Sample	Force (lb)	Strain (µE)	Bridge 1 (V)	Bridge 2 (V
1	0.00	0.00	0.00	0.00
2	886.16	19.27	0.11	0.12
3	1786.75	42.28	0.23	0.23
4	3083.67	79.12	0.40	0.40
5	3943.80	104.13	0.51	0.51
6	4839.52	129.87	0.63	0.63
7	5750.14	155.24	0.75	0.75
8	7079.92	194.22	0.92	0.92
9	8007.70	221.43	1.04	1.05
10	8943.28	247.95	1.17	1.17
11	9871.55	275.44	1.29	1.29

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7659.96	Force Calibration (Ib/V)	7667.39
Offset	13.76	Offset	-1.59
Correlation	0.999999	Correlation	0.999998
Strain Calibration (µE/V)	219.43	Strain Calibration (µE/V)	219.64
Offset	-7.95	Offset	-8.39
Correlation	0.999934	Correlation	0.999939





Accelerometer Calibration Certificate Pile Dynamics, Inc.



Calibrated by Pile Dynamics, Inc. Calibration performed on MAY 1 6 2024

Ref Acc 1:	78268	Cal on:	11 Jan2024
Calibrated on:			
Model:	PR	Humidity:	42%
Serial No:	K14006	Temperature:	24.0 °C

986 g's/volt

971 g's/volt

78270!

Ref Acc 2:

(75.0 µV(g) R^2: 0.999919 [Chip programmed] Operator: William Johnson

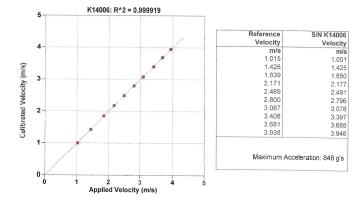
PDA CALIBRATION FACTOR

375.2 mv/5000g



Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

Cal on:



11Jan2024

Accelerometer Calibration Certificate Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc. Calibration performed on

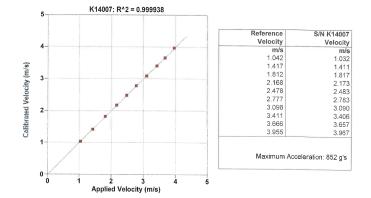
MAY 1 6 2024

Serial No:	K14007	Temperature:	23.8 °C						
Model:	PR	Humidity:	42%						
Calibrated on:	Channel 4 on 8	hannel 4 on 8G 5161 LE							
Ref Acc 1:	78268! 986 g's/volt	Cal on:	11Jan2024						
Ref Acc 2:	78270! 971 g's/volt	Cal on:	11Jan2024						

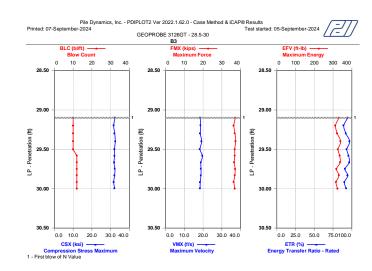
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST). PDA CALIBRATION FACTOR

407.2 mv/5000g 81.4 μv/g) R^2: 0.999938 [Chip programmed]





Version: 2020.30.170 -0.28



Fierracon

Version: 2020.30.170 -0.17

Exhibit C SPT Analyzer Results

Facilities | Environmental | Geotechnical | Materials 2

Pile Dynamics, Inc. PDIPLOT2 2022.1.62.0	Page 1 Printed 07-September-2024
	Case Method & iCAP® Results
GEOPROBE 3126GT - 28.5-30	B3
OP: RW	Date: 05-September-2024
AR: 1.15 in ²	SP: 0.492 k/ft ³
LE: 33.70 ft	EM: 30,000 ksi
WS: 16,807.9 f/s	JC: 0.00
FMX: Maximum Force	BPM: Blows/Minute
VMX: Maximum Velocity	DMX: Maximum Displacement
EMX: Maximum Energy	DFN: Final Displacement
EFV: Maximum Energy	CSX: Compression Stress Maximum
ETR: Energy Transfer Ratio - Rated	

LTR. Energy Hansler Railo - Raieu											
BL#	Depth	BLC	FMX	VMX	EMX	EFV	ETR	BPM	DMX	DFN	CSX
	ft	bl/ft	kips	f/s	ft-lb	ft-lb	(%)	bpm	in	in	ksi
5	29.10	10	37	18.4	331.0	331.0	94.6	53.1	1.58	1.20	32.3
6	29.20	10	36	18.7	312.7	312.7	89.3	53.4	1.47	1.20	31.7
7	29.30	10	37	18.5	323.0	323.0	92.3	53.6	1.54	1.20	32.2
8	29.40	10	37	19.2	340.4	340.4	97.3	53.4	1.57	1.20	32.5
9	29.50	10	37	18.4	326.6	326.6	93.3	53.5	1.48	1.20	32.1
10	29.58	12	37	19.6	335.5	335.5	95.9	53.3	1.41	1.00	32.1
11	29.67	12	37	18.8	338.0	338.0	96.6	53.7	1.58	1.00	31.8
12	29.75	12	37	18.9	318.3	318.3	90.9	53.5	1.37	1.00	32.3
13	29.83	12	37	18.9	331.4	331.4	94.7	53.8	1.11	1.00	32.1
14	29.92	12	36	18.5	315.2	315.2	90.1	53.8	1.09	1.00	31.7
15	30.00	12	37	18.4	324.1	324.1	92.6	53.6	1.07	1.00	32.1
	A	verage	37	18.8	326.9	326.9	93.4	53.5	1.39	1.09	32.1
	Ste	d. Dev.	0	0.4	8.8	8.8	2.5	0.2	0.19	0.10	0.3
	Maximum		37	19.6	340.4	340.4	97.3	53.8	1.58	1.20	32.5
	Minimum		36	18.4	312.7	312.7	89.3	53.1	1.07	1.00	31.7
				Total nu	mber of b	olows ana	lyzed: 11				

BL# Sensors

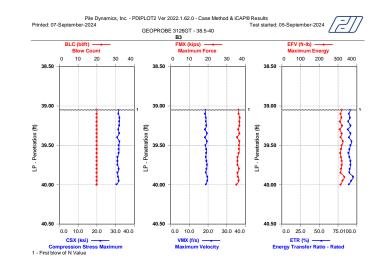
5-15 F1: [746AWJ1] 222.1 (1.00); F2: [746AWJ2] 222.2 (1.00); A3: [K14007] 407.2 (1.00); A4: [K14006] 375.2 (1.00)

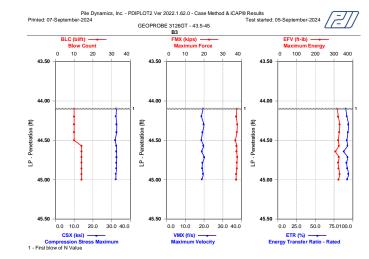
BL# Comments

5 First blow of N Value

Time Summary

Drive 15 seconds 10:07 AM - 10:07 AM BN 1 - 15





	ynamics, li .OT2 2022					iCAP® R		Pri	inted 07-8	Septembe	Page 1 er-2024
GEOF	ROBE 31	26GT - 38	3.5-40	Case	Method 8	ICAP® R	esults				B3
OP: R								0	Date: 05-5	Septembe	
AR:	1.15 in	2									92 k/ft ³
LE:	43.70 ft									EM: 30,0	
	6,807.9 f/									JC: 0.	00
	Maximum							M: Blows			
	Maximum								Displacer	lacement	
	Maximum									Stress Ma	ximum
	Energy Tr		atio - Rate	ed			00			1000 1110	
BL#	Depth	BLC	FMX	VMX	EMX	EFV	ETR	BPM	DMX	DFN	CSX
	ft	bl/ft	kips	f/s	ft-lb	ft-lb	(%)	bpm	in	in	ksi
7	39.05	20	36	18.7	320.4	320.4	91.5	53.3	0.91	0.60	31.6
8	39.10	20	36	18.5	313.6	313.6	89.6	53.2	0.65	0.60	31.6
9	39.15	20	37	18.9	318.4	318.4	91.0	53.4	0.66	0.60	32.1
10 11	39.20 39.25	20 20	37 37	18.9 19.1	309.8 321.4	309.8 321.4	88.5 91.8	53.5 53.2	0.64 0.93	0.60 0.60	31.9 31.9
12	39.25	20	36	18.5	321.4	321.4	88.4	53.2 53.5	0.93	0.60	31.5
13	39.35	20	37	19.5	320.6	320.6	91.6	53.0	0.69	0.60	31.9
14	39.40	20	36	18.4	314.3	314.3	89.8	53.3	0.80	0.60	30.9
15	39.45	20	37	19.5	326.5	326.5	93.3	53.5	0.92	0.60	32.0
16	39.50	20	36	18.6	320.6	320.6	91.6	53.5	1.02	0.60	31.7
17	39.55	20	37	19.1	316.4	316.4	90.4	53.7	0.68	0.60	31.8
18	39.60	20	36	19.0	312.4	312.4	89.2	53.3	0.66	0.60	31.7
19	39.65	20	36	18.8	315.8	315.8	90.2	53.5	0.70	0.60	31.1
20 21	39.70 39.75	20 20	36 36	19.2 19.5	320.1 320.9	320.1 320.9	91.5 91.7	53.4 53.3	0.78 0.63	0.60 0.60	31.1 31.0
21	39.75	20	30	19.5	320.9	320.9	90.6	53.5	0.83	0.60	31.0
23	39.85	20	36	18.8	315.1	315.1	90.0	53.5	0.61	0.60	31.1
24	39.90	20	36	19.7	333.6	333.6	95.3	53.5	0.83	0.60	31.3
25	39.95	20	36	19.6	323.9	323.9	92.6	53.4	0.66	0.60	31.7
26	40.00	20	35	18.9	313.5	313.5	89.6	53.5	0.60	0.60	30.6
		verage	36	19.0	318.2	318.2	90.9	53.4	0.74	0.60	31.5
		d. Dev.	0	0.4	5.6	5.6	1.6	0.1	0.12	0.00	0.4
		ximum	37	19.7	333.6	333.6	95.3	53.7	1.02	0.60	32.1
	Mi	nimum	35	18.4	309.3	309.3	88.4	53.0	0.60	0.60	30.6
Total number of blows analyzed: 20											

BL# Sensors

7-26 F1: [746AWJ1] 222.1 (1.00); F2: [746AWJ2] 222.2 (1.00); A3: [K14007] 407.2 (1.00); A4: [K14006] 375.2 (1.00)

BL# Comments

7 First blow of N Value

Time Summarv

Drive 28 seconds 10:24 AM - 10:24 AM BN 1 - 26

Pile Dynamics, Inc.								Page 1		
PDIPLOT2 2022.1.62.0					Pri	inted 07-S	Septembe	er-2024		
	Case	Method &	iCAP® R	esults						
GEOPROBE 3126GT - 43.5-45								B3		
OP: RW					0	Date: 05-8	Septembe	er-2024		
AR: 1.15 in ²							SP: 0.4	92 k/ft3		
LE: 48.70 ft							EM: 30,0	00 ksi		
WS: 16,807.9 f/s							JC: 0.	.00		
FMX: Maximum Force				BPI	M: Blows	s/Minute				
VMX: Maximum Velocity				DM	X: Maxin	num Disp	lacement			
EMX: Maximum Energy DFN: Final Displacement										
EFV: Maximum Energy				CS.	K: Comp	pression S	Stress Ma	ximum		
ETR: Energy Transfer Ratio - Ra	ated									
PL# Dopth PLC EMV	1/1/1/	EMV	EEV/	ETD	DDM	DMV	DEN	COV		

BL#			FMX	VMX	EMX	EFV	EIR	BPM	DMX	DEN	CSX
	ft	bl/ft	kips	f/s	ft-lb	ft-lb	(%)	bpm	in	in	ksi
5	5 44.10 10 37		19.5	317.4	317.4	90.7	53.2	1.23	1.19	32.6	
6	44.20	10	37	18.7	322.7	322.7	92.2	53.3	1.22	1.20	32.4
7	44.30	10	38	19.9	330.1	330.1	94.3	53.4	1.30	1.20	32.8
8	44.40	10	38	19.2	327.2	327.2	93.5	53.5	1.22	1.20	32.6
9	44.50	10	37	18.6	323.0	323.0	92.3	53.5	1.21	1.20	32.0
10	10 44.57 14 37		37	19.7	325.2	325.2	92.9	53.4	0.95	0.85	32.6
11	11 44.64 14 37		37	18.8	309.1	309.1	88.3	53.6	0.90	0.85	32.5
12	44.71	14	38	20.1	326.0	326.0	93.2	53.5	1.06	0.86	32.8
13	44.79	14	37	19.2	321.1	321.1	91.8	53.4	1.05	0.86	32.6
14	44.86	14	37	19.0	324.7	324.7	92.8	53.4	0.91	0.86	32.6
15	44.93	14	37	19.5	329.6	329.6	94.2	53.5	0.99	0.86	32.3
16	45.00	14	37	18.8	323.5	323.5	92.4	53.4	0.89	0.86	32.3
	A	verage	37	19.3	323.3	323.3	92.4	53.4	1.08	1.00	32.5
	St	d. Dev.	0	0.5	5.5	5.5	1.6	0.1	0.15	0.17	0.2
	Maximum		38	20.1	330.1	330.1	94.3	53.6	1.30	1.20	32.8
	Minimum		37	18.6	309.1	309.1	88.3	53.2	0.89	0.85	32.0
				Total nu	mber of b	lows anal	vzed: 12				

BL# Sensors

5-16 F1: [746AWJ1] 222.1 (1.00); F2: [746AWJ2] 222.2 (1.00); A3: [K14007] 407.2 (1.00); A4: [K14006] 375.2 (1.00)

BL# Comments

5 First blow of N Value

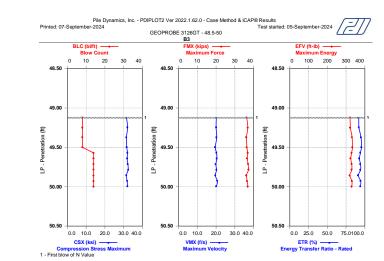
Pile Dynamics, Inc. PDIPLOT2 2022.1.62.0

49.13 49.25 49.38 49.50 49.57 49.64 49.71 49.79 49.86 49.93

15 50.00

Time Summary

Drive 16 seconds 10:32 AM - 10:33 AM BN 1 - 16



Case Method & iCAP® Results
 GEOPROBE 3126GT - 48.5-50

 OP: RW

 AR:
 1.15 in²

 LE:
 53.70 ft

 WS: 16.807.9 t/s

 FMX: Maximum Force

 YMX: Maximum Force

 YMX: Maximum Force

 YMX: Maximum Energy

 EFV: Maximum Energy

 EFV: Maximum Force
 B3 Date: 05-September-2024 SP: 0.492 k/tt³ EM: 30,000 ksi JC: 0.00 BPM: Blows/Minute DMX: Maximum Displacement DFN: Final Displacement CSX: Compression Stress Maximum ETR: Energy Transfer Ra BL# Depth BLC ft bl/ft tio - Rated FMX DFN CSX ksi 31.6 32.1 31.5 31.7 32.1 31.9 32.2 32.4 31.5 31.9 VMX EMX ft-lb 321.6 323.0 332.2 334.0 329.3 324.8 329.7 330.1 319.8 331.0 EFV ft-lb 321.6 323.0 332.2 334.0 329.3 324.8 329.7 330.1 319.8 331.0 FTR **BPM** DMX kips 36 37 36 36 37 37 37 37 37 36 37 f/s (%) 91.9 92.3 94.9 95.4 94.1 92.8 94.2 94.3 91.4 94.6 bpm 53.3 53.4 53.5 53.3 53.8 53.4 53.2 53.7 53.7 53.7 53.7 in in 1.50 1.50 1.50 0.86 0.86 0.86 0.86 0.86 0.86 20.1 20.3 19.6 20.3 20.4 19.9 20.2 19.6 20.7 1.81 1.81 1.50 1.50 0.87 1.00 0.89 0.89 1.01 0.91 8 8 14 14 14 14 14 94.0 94.4 93.7 1.3 20.1 20.1 0.3 330.2 327.8 4.5 330.2 327.8 4.5 53.2 53.4 0.2 1.03 1.20 0.36 32.1 31.9 0.3

95.4 91.4

53.8 53.1 1.81 0.87

Page 1 Printed 07-September-2024

0.86

1.09 0.31

1.50 0.86

32.4 31.5

BL# Sensors

5-15 F1: [746AWJ1] 222.1 (1.00); F2: [746AWJ2] 222.2 (1.00); A3: [K14007] 407.2 (1.00); A4: [K14006] 375.2 (1.00)

Total number of blows analyzed: 11

BL# Comments

5 First blow of N Value

Time Summary

Drive 15 seconds 10:42 AM - 10:42 AM BN 1 - 15

37 37 0

37 36 20.7 19.6 334.0 319.8 334.0 319.8

14

Average Std. Dev.

Maximum Minimum

Ferracon

Exhibit D

Field Log



						ARRIVAL TIME:								
1 10						DEPART TIME:								
						TOTAL TRAVEL:								
							т	OTAL TIME:						
	SPT	HAMMEI	R CAL	IBRA	TION	CLIENT REP:								
		FIELD W	ORKS	SHEET	Г			MILEAGE:						
PRO	JECT NAME:	732451	S			DATE: 9/5/24								
PR	ROJECT NO .:	Transpor!	tation	Asset	5 S.He	TERRACON REP: Ry)								
E	BORING NO .:	8-3				PDA M	IODEL/SN:	SPT	462	TR				
	CLIENT:			TERRAC	ON RIG #:	132	2							
	D	RILL RIG D			SPT	НАММЕ		TA		•				
ту	Type/Transport: Track							Art	0					
	Manufacturer: Grassicole						anufacturer:	Gec	role					
	Model No.: 3126 G-T						Aechanism:	Ma	15					
	Serial No:	312655	1224	06			Model No.:	~	AD	131				
	Year Built:	2024					Serial No:		100	ΟN				
	Modifications:		Hamn	ner Weight:	140)		÷						
Ma	int. Schedule:		Hammer C	Operator(s):	B.B.	rnet	+							
				Γ DATA										
	Operator:	OP	RW			Elastic Modulus (ksi): EM 3000								
Project	No./Location:	PJ	73245	15/		Specific Weigl	ht (kips/ft ³):	SP	0.492			1		
Rig	Model & SN:	PN	600200	2/3126	·67	Wave Spe	eed (ft/sec):	WS	16808					
Hammer Typ	pe, LM, Rods:	PD	Acto	/ AW	J	Increment	Length (ft):	LI	0.5					
Drill R	tod Area (in ²):	AR	1,15	5			Freq. (kHz):		50					
	TRAN	SDUCER IN	FORM4	TION		NOTES: 2	43/8+	25 +	,875	1				
Gage		SN			ration	30	43/0 +	25'+	NO.S		28.3	>1		
E1/E3:	746 A	173		222.0	20			1						
F2/F4:	246 A		-	222.1		SPLIT SPOON SAMPLER LENGTH								
A1/A3:	K1400	200	-	407.2		= = 3.>								
A2/A4:	KI4/CC	×	-	375		¹ LE is Measured from the Center of the Strain Guages to the								
-		8-2	-	- de an		bottom of Split Spoon Sampler								
				THES th (ft)	TING IN	FORMATIO		Blows		opr				
Start Time	Soil	Stick Up Length (ft)	Start	End End	¹ LE (ft)	Rods & Lengths	Start	End	1st 6"	2nd 6"	Blows 3rd 6"	-4th 6"		
		2011g11 (11)	Start	LIK		Longtine	Start	LIN	131.0	2110 0	510.0	4010		
9.55	5		175	25	28.7	515	1.	30	5	10	14	24		
10:05	SP		28.5	30	33.7	5 16	3	18	4	5	6	11		
10:10	CL.		33.5	35	38.7	5 87	1	ľ	8	0	O.	0		
10:15	SR		38.5	40	43.7	5' x8	3	30	7	10	10	20		
0:25	SP.		43.5	45	48.7	5 29	1	18	4	5	\geq	12		
10:35	1:35 SP 48.5 50 53.7			SYD	i	17	4	4	>	1.1				
0:50 SC 53.5 55 58.7					5' x 11	1	6	2	ŀ	2	3			
11:10	5 X12	· \	2		0	0	1							
Individual pairs	of F or V sign	hals versus time :	shall be ver	y similar fo	G3.7 r good qual	lity data.		. ~						
If you see Forc	e goes negați	ve before 2L/C a	fter impact	drill rod joi	ints should	be carefully tighte	ened for goo	d quality d	ata					
PICTURE NUM	MBERS AND	INFO:												

Take Photo of Each Rigs, Boring Locations at the Site

Terracon SPT Rig Calibration Worksheet.xlsx

Facilities | Environmental | Geotechnical | Materials 4

PDCA

This documents that

Susheel R. Kolwalker Terracon Consultants

has on March 11, 2016 achieved the rank of

EXPERT

on the Dynamic Measurement and Analysis Proficiency Test.

The individual identified on this document demonstrated to the degree granted above an understanding of theory, data quality evaluation, interpretation and signal matching for high strain dynamic testing of deep foundations.

The ability of the individual named to provide appropriate knowledge and advice on a specific project is not implied or warranted by the Pile Driving Contractors Association or Pile Dynamics, Inc. The Pile Driving Contractors Association or Pile Dynamics, Inc. assumes no lability for foundation testing and analysis work performed by the bearer of this certificate. This certificate can be verified at www.PDAproficiencytest.com.

Steven A. Hall, Executive Director Pile Driving Contractors Association

Garland Likins, Senior Partner Pile Dynamics, Inc. No. 2005



Exhibit E

Copy of Certificate of Proficiency