

GEOTECHNICAL DATA SUMMARY REPORT

**SC 9 OVER CATAWBA RIVER
CHESTER/LANCASTER COUNTY, SOUTH CAROLINA
S&ME PROJECT NO. 1611-10-290**

Prepared For:



STV / Ralph Whitehead Associates
4975 Lacross Road Suite 314
North Charleston, SC 29406-6531

Prepared By:



134 Suber Road
Columbia SC 29210

April 12, 2011



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STV / Ralph Whitehead Associates
4975 Lacross Road Suite 314
North Charleston, SC 29406-6531

Attention: Mr. Dan Moses, P.E.

Reference: **GEOTECHNICAL DATA SUMMARY REPORT**
SC 9 Over Catawba River
Lancaster County, South Carolina
S&ME Project No. 1611-10-290

Dear Mr. Moses:

We have completed our Geotechnical Exploration for the replacement bridge over Cane Creek in Lancaster County, South Carolina. Our exploration was performed in general accordance with our Master Services Subconsultant Agreement dated May 9, 2007.

As requested, S&ME, Inc. personnel were present at the above referenced site on March 2 through March 4, 2011 to conduct soil test borings. Borings were generally conducted at the proposed bridge locations provided to the SCDOT prior to the field exploration. Approximate boring locations are shown in Figure 2 – *Test Location Plan*. A summary of borings and soundings is presented in Table 1.

Table 1 – Test Borings and Soundings

BORING ID	DEPTH	STATION	OFFSET	TYPE	NOTE
B-1	83.7'	11+10	7'R	SPT	EAST END BENT
B-2	76'	25+47	7'L	SPT	WEST END BENT
SW-1	n/a	n/a	n/a	MASW	WEST END BENT

Stationing and offsets are described on the individual attached boring logs. The borings were conducted to the SCDOT requested depths. Groundwater levels were not measured for the soil test borings due to the rotary wash drilling method and the need for immediate backfilling of roadway borings on account of safety concerns.

SPT hammer energy measurements were previously obtained with a Pile Driving Analyzer (PDA) on the CME 550 drill rig used to perform the borings on this project. The N-values indicated on the logs are field values and have not been corrected for hammer efficiency which is noted on the logs.

Shear wave velocities were measured near the proposed bridge location as shown on the Test Location Plan using Multi-Channel Analysis of Surface Waves (MASW) and Microtremor Array Method (MAM) with non-linear array geometry, combining the dispersion curves from both tests prior to the inversion process.

The logs of our soil test borings are attached. Test locations were initially located by S&ME personnel measuring from existing site features as noted on the drawing provided. Offsets to the existing alignment centerline were utilized as noted on the log.

Soils were classified in general accordance with ASTM D 2488. These logs represent our interpretation of the subsurface conditions based on the test data. Stratification lines on the boring logs represent approximate boundaries between soil types; however, the actual transition may be gradual and the thicknesses of the strata will vary across the site. Rock core samples were tested for compressive strength in Borings B-1 and B-2 at depths of 69 feet and 56 feet, respectively. The soil samples will be retained at our laboratory until SCDOT requests them, until completion of the new bridge, or 365 days after drilling, whichever is least.

The borings were backfilled by S&ME, Inc. with sand and cuttings. Once backfilled, cold-patch asphalt-patch was placed in the borehole and tamped until flush with the existing roadway surface.


Environmental assessment of soils, water, wetlands, and endangered species was not included in our scope of services for this project. The boring log information is intended for SCDOT's engineering interpretation of the data collected.

This data report has been prepared in accordance with generally applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

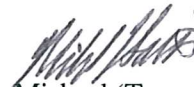
S&ME, Inc. appreciates this opportunity to work with STV/Ralph Whitehead Associates as your local geotechnical consultant on this project. If you have any questions or need any further information in regard to this letter, please do not hesitate to contact us at 803-561-9024.

Sincerely,

S&ME, Inc.



Matt Longshore, EIT
Staff Professional



Michael (Trapp) Harris, PE
Geotechnical Department Manager

ML/TH

APPENDIX

Site Vicinity Map (Figure 1)

Test Location Plan (Figure 2)

Soil Test Boring Logs

MASW Shear Wave Velocity Profile

Compressive Strength of Cores Test Results

Field Testing Procedures



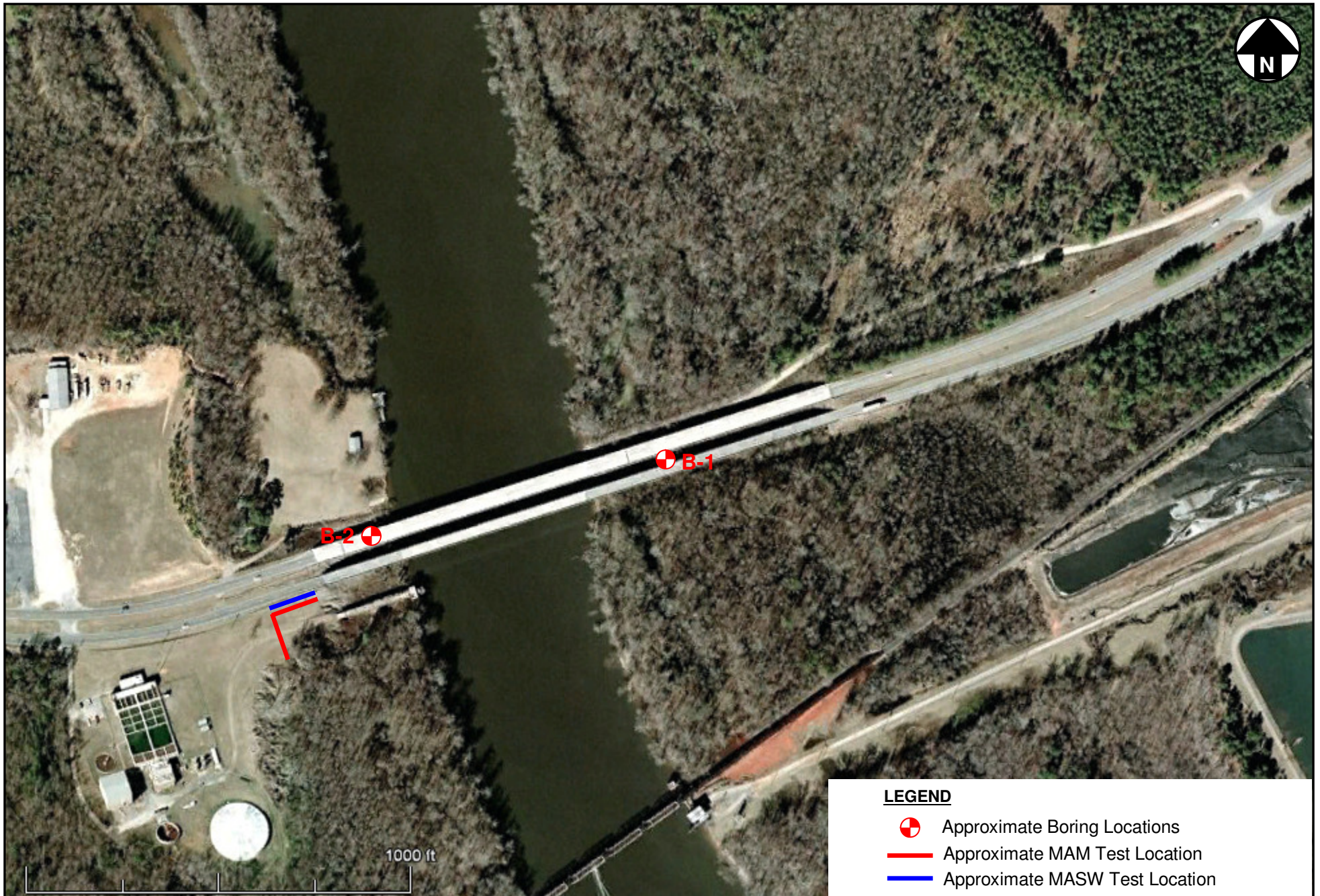
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SITE VICINITY MAP SC 9 OVER CATAWBA RIVER CHESTER/LANCASTER COUNTIES, SOUTH CAROLINA	
JOB NO:	1611-10-290

FIGURE NO.

1



LEGEND

-  Approximate Boring Locations
-  Approximate MAM Test Location
-  Approximate MASW Test Location

SCALE: AS SHOWN

DRAWN BY: ML

CHECKED BY: TH

DATE: 3/22/2011



TEST LOCATION PLAN
SC 9 OVER CATAWBA RIVER
CHESTER/LANCASTER COUNTIES, SOUTH CAROLINA

JOB NO: 1611-10-290

FIGURE NO.

2

SCDOT Soil Test Boring Log

File No.:		Project No. (PIN):		County:	Chester/Lancaster	Eng./Geo.:	K. Plummer
Site Description:	SC 9 - Bridge over Catawba River (S&ME Job No.: 1611-11-290)					Route:	SC 9
Boring No.:	B-1	Boring Location:	11+10	Offset:	7'R	Alignment:	Existing
Elev.:	ft	Latitude:		Longitude:		Date Started:	3/2/2011
Total Depth:	83.7 ft	Soil Depth:	62.1 ft	Core Depth:	83.7 ft	Date Completed:	3/3/2011
Bore Hole Diameter (in):	6"	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 550X	Drill Method:	Mud Rotary	Hammer Type:	Automatic	Energy Ratio:	
Core Size:	NWD4-2"	Driller:	S&ME	Groundwater:	TOB N/E	24HR	N/E

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	● SPT N VALUE ●	PL MC LL	▲ FINES CONTENT (%)
	0.0	Existing Road Surface										
	0.5	ASPHALT - approximately 9 inches of asphalt		2.0								
	1.4	CONCRETE - approximately 10 inches of concrete		4.0	SS-1	2	3	3	6	●		
				6.0	SS-2	1	1	1	2	●		
		SANDY SILT (ML) - FILL, very soft, some fine sands, moist, tan, with some high plasticity clay pockets		8.0	SS-3	WOH	1	1	2	●		
					SS-4	1	1	1	2	●		
				13.5								
					SS-5	1	1	1	2	●		
				18.5								
					SS-6	1	1	2	3	●		
				23.5								
					SS-7	1	1	2	3	●		
				28.5								
		SANDY SILT (ML) - ALLUVIUM, firm, some fine sands, moist, brown			SS-8	1	3	2	5	●		
	29.0			33.5								
		SANDY LEAN CLAY (CL) - ALLUVIUM, stiff, some fine sands, moist, brown			SS-9	3	4	8	12	●		
	33.0			38.5								
		SANDY SILT (ML) - ALLUVIUM, firm, some fine sands, moist, brown, with trace rootlets			SS-10	1	2	3	5	●		
	42.0			43.5								
		SILTY SAND (SM) - ALLUVIUM, loose, fine sand, some low plasticity fines, moist, gray			SS-11	4	5	5	10	●		
	45.0			48.5								
		SILTY SAND (SM) - RESIDUUM, dense, fine to medium sand, some low plasticity fines, brown			SS-12	12	32	50/5"	100	●		
	49.5			53.5								
		PARTIALLY WEATHERED ROCK (PWR) - very dense, fine to medium sand, some low plasticity fines, brown			SS-13	50/4"			100	●		
				58.5								
					SS-14	50/2"			100	●		
				62.1								
					SS-15	50/0"			100	●		
	63.7			63.7								
		GRANITE - gray, slightly weathered to fresh, moderately hard to hard, close to very close fracture spacing with 15 joints at 10°, 3 joints at 20°, and 6 joints at 45°			RC-1							Rec=98%, RQD=38%
				68.7								Compressive Strength = 7,990 psi
				69.0								Rec=98%, RQD=84%
				73.7								Rec=100%, RQD=96%
				78.7								Rec=100%, RQD=46%
					RC-4							
	83.7	BORING TERMINATED AT 83.7 FEET										

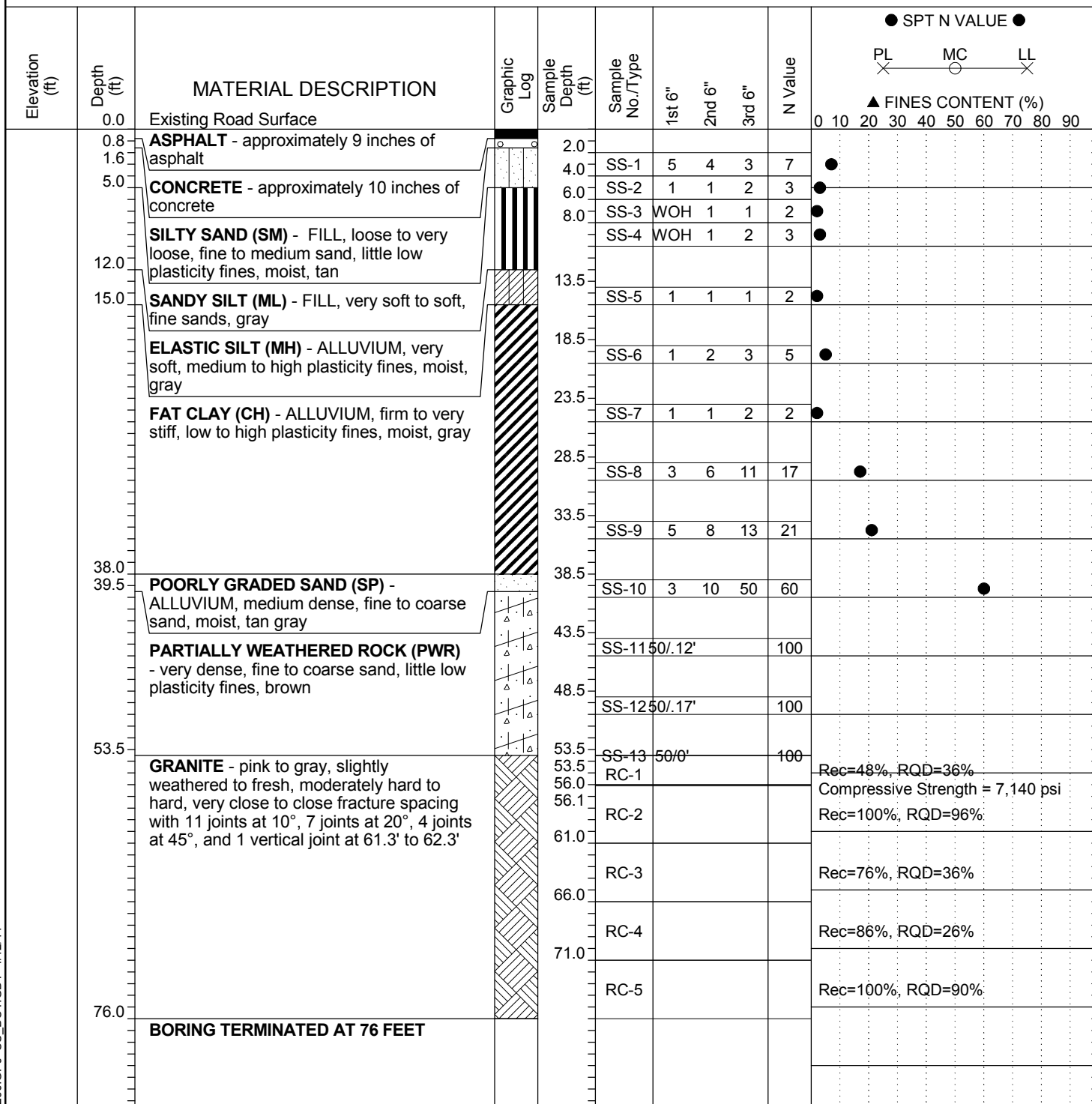
LEGEND

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

SC_DOT 1611-10-290.GPJ SC_DOT.GDT 4/12/11

SCDOT Soil Test Boring Log

File No.:		Project No. (PIN):		County:	Chester/Lancaster	Eng./Geo.:	K. Plummer
Site Description:	SC 9 - Bridge over Catawba River (S&ME Job No.: 1611-11-290)					Route:	SC 9
Boring No.:	B-2	Boring Location:	25+47	Offset:	7'L	Alignment:	Existing
Elev.:	ft	Latitude:		Longitude:		Date Started:	3/3/2011
Total Depth:	76 ft	Soil Depth:	53.5 ft	Core Depth:	76 ft	Date Completed:	3/4/2011
Bore Hole Diameter (in):	6"	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 550X	Drill Method:	Mud Rotary	Hammer Type:	Automatic	Energy Ratio:	
Core Size:	NQ-2"	Driller:	S&ME	Groundwater:	TOB N/E	24HR	N/E



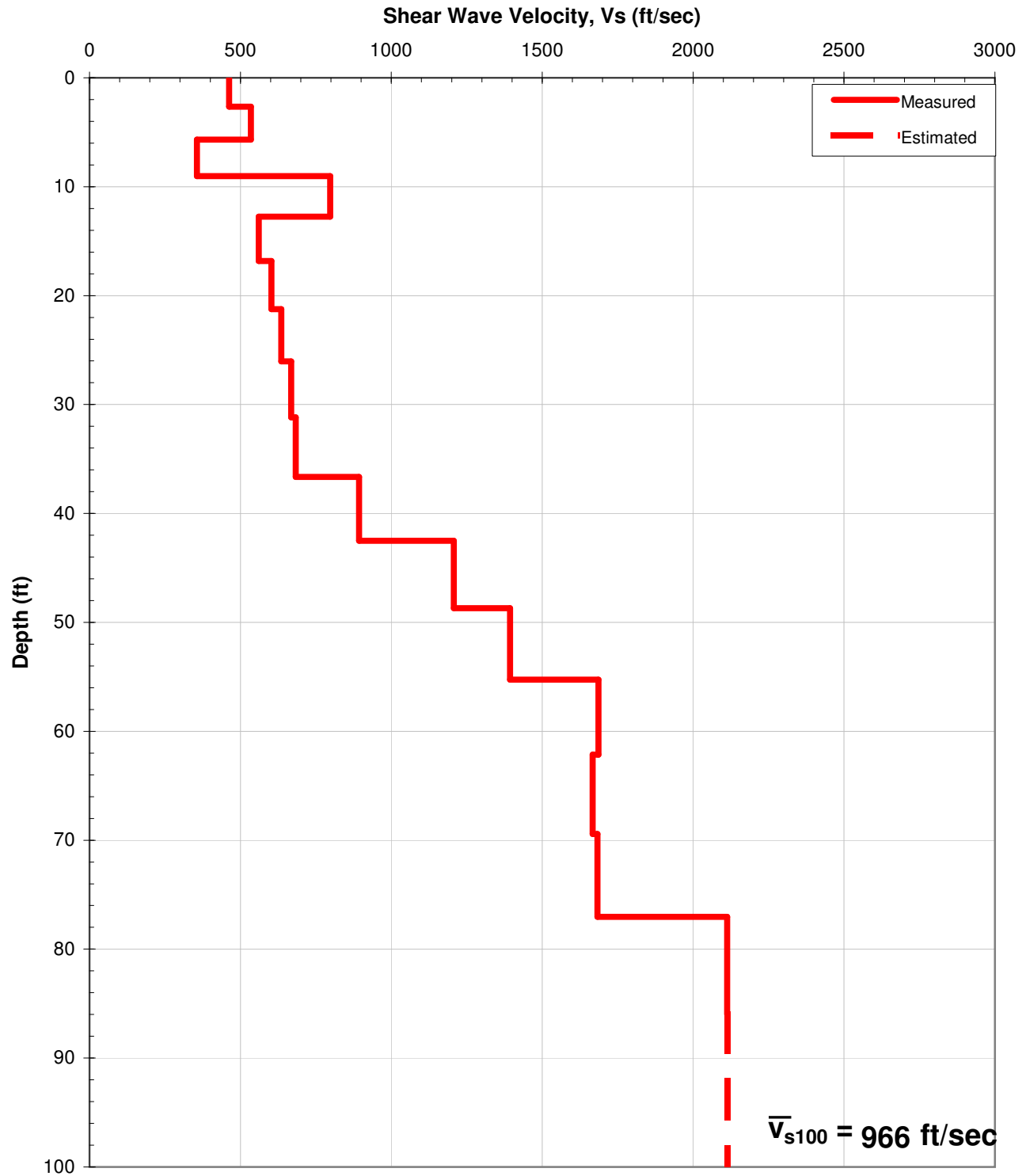
LEGEND

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SC_DOT 1611-10-290.GPJ SC_DOT.GDT 4/12/11



Shear Wave Velocity Profile SW-1
RBO Catawba River - Eastbound Lane
Rock Hill, South Carolina
1611-10-290



COMPRESSIVE STRENGTH OF CORES



ASTM C-39, C-42, C-617

Job Name SC-9- Bridge over Catawba River

Job No. 1611-10-290

Date 4/8/11 Tested

Location	Depth	Height before capping (in.)	Diameter (in.)	Height after capping (in.)	Load (lb.)	Area (sq. in.)	Comp. Strength (psi)	H / D ratio	Correction factor	Corrected Compressive Strength (psi)	Remarks
B-1	69'	3.9	2.049	4.085	26350	3.30	7990	1.99	1.00	7990	C/Shear
B-2	56'	3.904	1.866	4.081	19520	2.74	7137	2.19	1.00	7140	C/Shear
Average										7570	

Sample No.	Remarks

Correction Factor

H / D	1.75	1.5	1.25	1
Factor	0.98	0.96	0.93	0.87

Respectfully Submitted
S&ME, Inc.

SUMMARY OF EXPLORATION PROCEDURES

Layout and Access to Boring Locations

Staking of Borings - S&ME laid out the borings by measuring distances from the ends of the bridges with a measuring wheel and by turning rough right angles from the existing alignment centerline. Boring locations were marked in the field with marking paint on the asphalt surface and roadway shoulders where needed. Boring locations indicated on the attached “Boring Location Plan” must be considered as approximate.

Boring and Sampling

Soil Test Boring with Rotary Wash - Soil sampling and penetration testing were performed in general accordance with ASTM D1586, “Standard Test Method for Penetration Test and Split Barrel Sampling of Soils. A rotary drilling process was used to advance the hole and a heavy drilling fluid was circulated in the bore holes to stabilize the sides and flush the cuttings. . At regular intervals, drilling tools were removed and soil samples were obtained with a standard 1.4 inch I. D., two-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Borehole Closure – Following collection of relevant geotechnical data, boreholes were filled by slowly pouring auger cuttings into the open hole such that minimal “bridging” of the material occurred in the hole. Backfilling of the upper two feet of each hole was tamped as heavily as possible with a shovel handle or other hand held equipment.

Patching of Asphalt Surface – Penetrations of asphalt surfaces made during the drilling process were patched using compacted asphalt cold patch material. Cold patch asphalt was placed to provide a surface flush with existing pavement adjacent to the boring. Cold patch asphalt was compacted by tamping it into the boring with a shovel handle or similar hand held equipment.

Laboratory Testing

Examination of Recovered Soil Samples – Soil samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, “*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*”. The geotechnical engineer also prepared the final boring records enclosed with this report.