

PROJECT: 40108

REFERENCE: B-4950

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE

SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND /SAMPSON

PROJECT DESCRIPTION REPLACE BRIDGE NO.172

OVER SOUTH RIVER ON SR 1851

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4950	1	9

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

GW Stalls

BR Spiro

MR English

KR Cullen

INVESTIGATED BY GET SOLUTIONS

DRAWN BY KR Cullen, BR Spiro

CHECKED BY BR Spiro

SUBMITTED BY GW Stalls

DATE October 31, 2016



DocuSigned by:

Gerald W. Stalls, Jr., 11/18/2016

D9E3B2726348414

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS			
GROUP CLASS.	A-1	A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5		
SYMBOL	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7		A-7-a	A-3	A-6, A-7		
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX 35 MX	35 MX 10 MX	35 MX 11 MN	35 MX 11 MN	36 MN 10 MX	36 MN 10 MX	36 MN 11 MN	36 MN 11 MN	GRANULAR SOILS	SILT-CLAY SOILS
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	
GROUP INDEX	0		0		4 MX		8 MX	12 MX	16 MX	NO MX	HIGHLY ORGANIC SOILS	
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS			
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR			FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE

MM	305	75	2.0	0.25	0.05	0.005
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL PLASTIC RANGE (PI) PL	LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
	PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
		- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM SL	OPTIMUM MOISTURE SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

PLASTICITY INDEX (PI)		DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY

GROUND WATER

▽

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING

▼

STATIC WATER LEVEL AFTER 24 HOURS

▽PW

PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA

SPRING OR SEEP

MISCELLANEOUS SYMBOLS

ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION

SOIL SYMBOL

ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT

INFERRED SOIL BOUNDARY

INFERRED ROCK LINE

ALLUVIAL SOIL BOUNDARY

DIP & DIP DIRECTION OF ROCK STRUCTURES

TEST BORING

AUGER BORING

CORE BORING

MONITORING WELL

PIEZOMETER INSTALLATION

SLOPE INDICATOR INSTALLATION

CONE PENETROMETER TEST

SOUNDING ROD

TEST BORING WITH CORE

SPT N-VALUE

RECOMMENDATION SYMBOLS

UNDERCUT

SHALLOW UNDERCUT

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE

UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

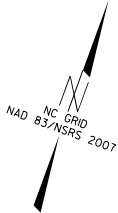
ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - CONE PENETRATION TEST
CSE - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS - FOSSILIFEROUS
FRAC - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HL - HIGHLY

MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY

VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO



WOODS

SOUTH RIVER

WOODS

BRIDGE #172

← TO SR 1848

17

SR 1851 FAIRCLOTH BRIDGE RD

18

19

20

TO SR 1424 →

EBI-B

17+34

7 FT RT

BI-B

17+70

7 FT RT

B2-B

18+25

7 FT RT

B3-B

18+80

7 FT RT

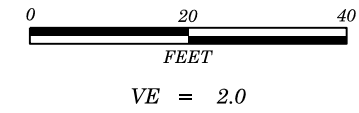
EB2-B

19+21

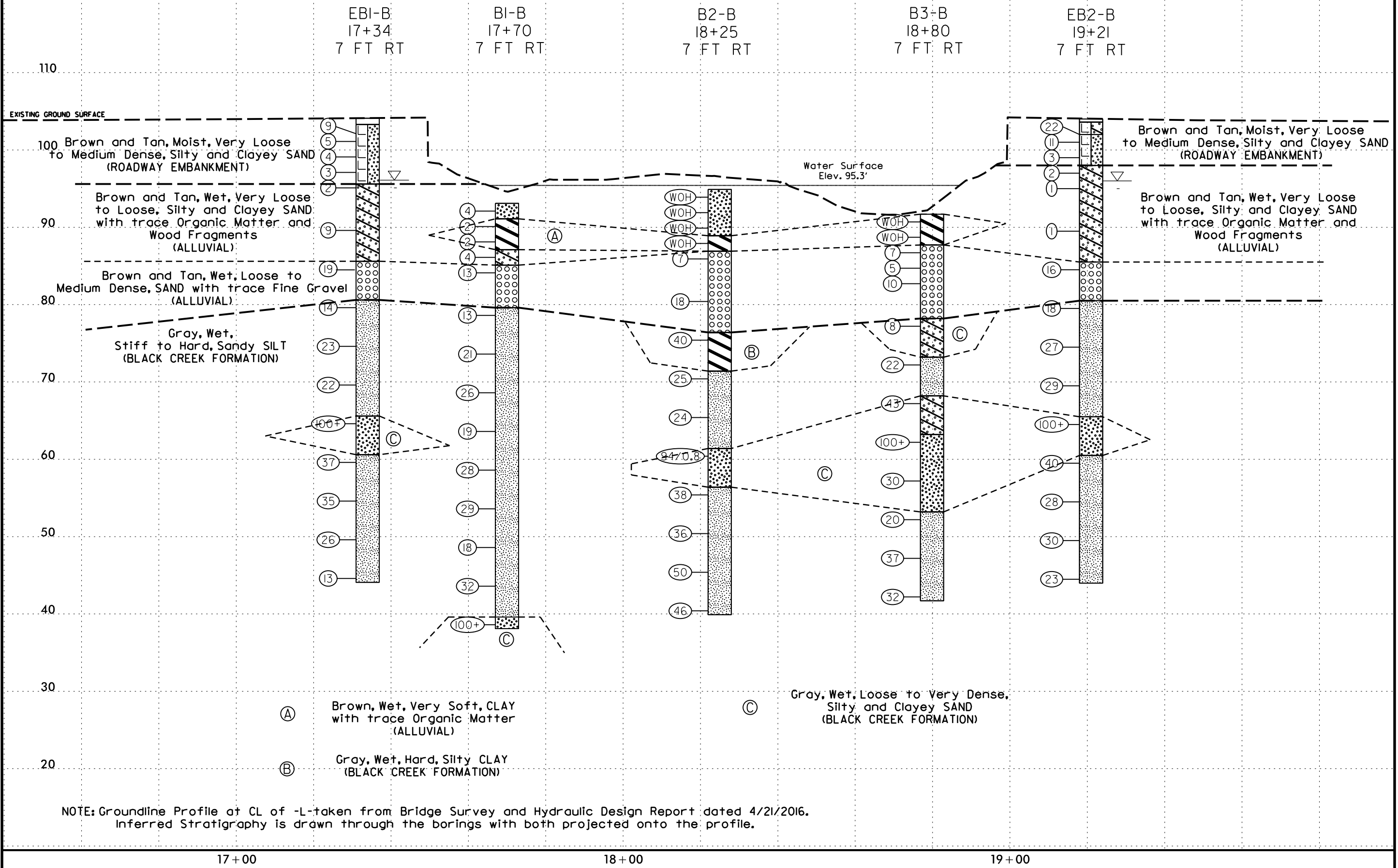
7 FT RT

SOUTH RIVER

WOODS



PROJECT REFERENCE NO.	SHEET NO.
B-4950	4
SUBSURFACE PROFILE ALONG CENTERLINE	



NCDOT BORE DOUBLE EC16-223G B4950 BR172.GPJ NC DOT.GDT 10/27/16

WBS 40108.1.1			TIP B4950			COUNTY CUMBERLAND			GEOLOGIST E. Setnicky							
SITE DESCRIPTION Replace Bridge 172 over South River on SR 1851										GROUND WTR (ft) 0 HR. N/A 24 HR. N/A						
BORING NO. B1-B			STATION 17+70			OFFSET 7 ft RT			ALIGNMENT -L-							
COLLAR ELEV. 93.1 ft			TOTAL DEPTH 55.0 ft			NORTHING 474,247			EASTING 2,102,718							
DRILL RIG/HAMMER EFF./DATE GET4354 CME-45C 81% 01/06/2016						DRILL METHOD Mud Rotary				HAMMER TYPE Automatic						
DRILLER W. Riddick				START DATE 08/02/16				COMP. DATE 08/02/16				SURFACE WATER DEPTH 2.2ft				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
95														WATER SURFACE (08/02/16)		
90	93.1	0.0	WOH	1	3	4								93.1	MUDLINE	0.0
	91.1	2.0	1	1	1	2								91.1	ALLUVIAL Brown, Silty Fine SAND with trace Wood Fragments	2.0
	89.1	4.0	1	1	1	2								87.1	High Plasticity, Brown, CLAY with trace Organic Matter	6.0
85	87.1	6.0	1	2	2	4								85.1	Brown, Clayey Fine SAND	8.0
	85.1	8.0	4	8	5	13									Tan, Fine to Coarse SAND	
80	79.6	13.5	5	5	8	13								79.6		13.5
75	74.6	18.5	5	8	13	21									COASTAL PLAIN Low Plasticity, Gray, Sandy SILT, "Black Creek Formation"	
70	69.6	23.5	6	11	15	26										
65	64.6	28.5	7	9	10	19										
60	59.6	33.5	7	12	16	28										
55	54.6	38.5	9	13	16	29										
50	49.6	43.5	5	8	10	18										
45	44.6	48.5	7	15	17	32										
40	39.6	53.5	28	90	10/0.1	100/0.6								39.6		53.5
														38.1	Gray, Silty Fine to Coarse SAND, "Black Creek Formation"	55.0
														Boring Terminated at Elevation 38.1 ft in Clayey Fine SAND ("Black Creek Formation")		
														Deck to water surface: 8.8 ft Deck to mudline: 11 ft		

NCDOT BORE DOUBLE EC16-223G B4950 BR172.GPJ NC DOT.GDT 10/27/16

WBS 40108.1.1			TIP B4950			COUNTY SAMPSON			GEOLOGIST M. English						
SITE DESCRIPTION Replace Bridge 172 over South River on SR 1851									GROUND WTR (ft)						
BORING NO. B3-B			STATION 18+80			OFFSET 7 ft RT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 91.7 ft			TOTAL DEPTH 50.0 ft			NORTHING 474,285			EASTING 2,102,821			24 HR. N/A			
DRILL RIG/HAMMER EFF./DATE GET7255 CME-55 80% 01/04/2016						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic						
DRILLER T. Donahue			START DATE 08/02/16			COMP. DATE 08/02/16			SURFACE WATER DEPTH 3.6ft						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95												▼	WATER SURFACE (08/02/16)		
	91.7	0.0											91.7	MUDLINE 0.0	
90	89.7	2.0	WOH	WOH	WOH							W	/	ALLUVIAL High Plasticity, Brown, CLAY with trace Organic Matter	
	87.7	4.0	2	3	4							W		87.7	4.0
	85.7	6.0										W			Brown and Tan, Fine to Coarse SAND
85	83.7	8.0	2	2	3							W	O		
			3	5	5							W			
												W			
80													O		
	78.2	13.5	4	3	5							W		78.2	13.5
75	73.2	18.5	7	9	13							W	/	COASTAL PLAIN Gray, Clayey Fine to Coarse SAND with little Fine Gravel and trace Organic Matter, "Black Creek Formation"	
														73.2	18.5
	68.2	23.5										W			Low Plasticity, Gray, Sandy SILT, "Black Creek Formation"
70	63.2	28.5	41	59	41/0.3							W	/		
														68.2	23.5
	58.2	33.5	11	14	16							W			Gray, Clayey Fine SAND, "Black Creek Formation"
65	53.2	38.5	8	9	11							W	/		
														63.2	28.5
	48.2	43.5	11	17	20							W			Gray, Silty Fine to Coarse SAND, "Black Creek Formation"
60	43.2	48.5	10	12	20							W	/		
														53.2	38.5
												W			Low Plasticity, Gray, Sandy SILT, "Black Creek Formation"
55													/		
												W			
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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40108.1.1			TIP B4950			COUNTY SAMPSON			GEOLOGIST M. English								
SITE DESCRIPTION Replace Bridge 172 over South River on SR 1851												GROUND WTR (ft)					
BORING NO. EB2-B			STATION 19+21			OFFSET 7 ft RT			ALIGNMENT -L-			0 HR.	8.0				
COLLAR ELEV. 104.0 ft			TOTAL DEPTH 60.0 ft			NORTHING 474,299			EASTING 2,102,860			24 HR.	N/A				
DRILL RIG/HAMMER EFF./DATE GET7255 CME-55 80% 01/04/2016						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
DRILLER T. Donahue			START DATE 08/02/16			COMP. DATE 08/02/16			SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
105																	
100	102.0	2.0	6	6	5									104.0 103.6	0.0 0.4	PAVEMENT SURFACE 4.75 Inches of Asphalt Pavement	
	100.0	4.0	3	2	1									102.0	2.0	ROADWAY EMBANKMENT Brown and Tan, Clayey Fine to Medium SAND	
	98.0	6.0	1	1	1									98.0	6.0	Brown and Tan, Silty Fine to Medium SAND	
95	96.0	8.0	1	WOH	1											ALLUVIAL Brown, Clayey Fine to Medium SAND with trace Organic Matter and Wood Fragments	
90	90.5	13.5	WOH	WOH	1												
85	85.5	18.5	6	8	8										85.5	18.5	Brown, Fine to Coarse SAND with trace Fine Gravel
80	80.5	23.5	9	9	9										80.5	23.5	COASTAL PLAIN Low Plasticity, Gray, Sandy SILT, "Black Creek Formation"
75	75.5	28.5	5	10	17												
70	70.5	33.5	9	12	17												
65	65.5	38.5	20	45	55/0.4										65.5	38.5	Gray, Silty Fine to Coarse SAND, "Black Creek Formation"
60	60.5	43.5	15	18	22										60.5	43.5	Low Plasticity, Gray, Sandy SILT, "Black Creek Formation"
55	55.5	48.5	7	10	18												
50	50.5	53.5	9	12	18												
45	45.5	58.5	13	11	12												
																	Boring Terminated at Elevation 44.0 ft in Clayey Fine SAND ("Black Creek Formation")

NCDOT BORE DOUBLE EC16-223G B4950_BR172.GPJ NC_DOT.GDT 10/27/16

SOIL TEST RESULTS B1-B

[illegible]

SOIL TEST RESULTS B2-B

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-49	7 FT RT	18+25	18.5-20.0	A-7-5(15)	47	14	4.6	22.1	46.5	26.8	100	98	87		
SS-52	7 FT RT	18+25	33.5-35.0	A-2-4(0)	25	6	6.6	66.8	13.4	13.2	99	99	32		

SOIL TEST RESULTS B3-B

[illegible]

SITE PHOTOGRAPHS

View Along Faircloth Bridge Rd (SR 1851)
Looking East



View Along Faircloth Bridge Rd (SR 1851)
Looking West

