

PROJECT: 8.1421201 ID: B-3613

# STATE OF NORTH CAROLINA

## DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT

# STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 8.1421201 I.D. NO. B-3613

F.A. PROJECT BRSTP-41(5)

COUNTY BLADEN/SAMPSON

PROJECT DESCRIPTION BRIDGE NO. 44 ON  
NC 41 OVER SOUTH RIVER

SITE DESCRIPTION BRIDGE NO. 44 ON NC 41  
OVER SOUTH RIVER AT -L- STA. 19+42.5

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3613	1	16
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
8.1421201	BRSTP-41(5)	P.R. CONST.	

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

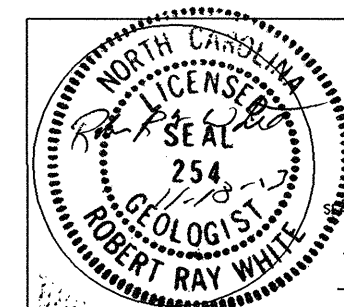
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

INVESTIGATED BY SSB/KBM PERSONNEL MMH  
 CHECKED BY KBM LWD  
 SUBMITTED BY RRW ELD  
 DATE NOVEMBER, 2003 RES  
JAH

DRAWN BY: DRA

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.



*Robert Ray White*  
SIGNATURE

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3613	8.1421201	2	16

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p>WELL GRADED: INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM: INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP GRADED: INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT  
SECRETARY

November 18, 2003

STATE PROJECT: 8.1421201 B-3613  
FEDERAL PROJECT: BRSTP-41(5)  
COUNTY: Bladen/Sampson  
DESCRIPTION: Bridge No. 44 on NC 41 over South River

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for  
Bridge No. 44 on NC 41 over South River at -L- Station 19+42.5

**Site Description**

The proposed bridge site is located at the existing NC 41 bridge over South River approximately 3 miles southwest of Tomahawk. The replacement structure will be constructed 40± feet southeast of the existing bridge. Based on the proposed design, the new structure will consist of 6 spans having an overall length of 322 feet. The bents will have a skew of 90 degrees. The existing NC 41 roadway will be utilized as a detour during the construction of the project.

One Standard Penetration Test (SPT) boring was made at or near each proposed bent location to provide subsurface information relative to foundation design. The borings for End Bent 1, Bent 1, Bent 4, Bent 5 and End Bent 2 were made by NCDOT Geotechnical Engineering Unit personnel. The borings for Bent 2 and Bent 3 were contracted to S&M Engineers, Inc. The Geotechnical Engineering Unit borings were made with an ATV mounted CME-45B drill machine. The S&ME borings were made with a barge mounted CME-45C drill machine. All borings were advanced by rotary drill methods using bentonite drilling fluid. In boring B2-A, rock core was obtained using a NWD-4 core barrel and NW casing.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by Recent alluvial deposits and Cretaceous age sediments of the Black Creek Formation. South River is typically a slow to moderately flowing stream approximately 40 to 70 feet wide and 5 to 10 feet deep. However, after heavy precipitation or during abnormally wet seasons the river is up to 15± feet deep in areas near the channel. Topography along the project is nearly flat to gently sloping. Elevations at the site range from 24± feet along the stream bed to 48± feet along the existing NC 41 embankment. The existing approach embankments are bordered by an 800±

feet wide floodplain lying at elevations ranging from 38± to 42± feet. During this investigation, water levels in the boreholes and the surface of South River were measured at elevations ranging from 37± to 40± feet from early June to mid August during a period of above average rainfall.

**Foundation Description**

Surficial alluvial soils at the bridge site generally consist of 2 to 5 feet of very soft to stiff silty clay and clayey sandy silt (A-7-6, A-4) underlain by 3 to 5 feet of medium dense fine to coarse sand (A-1-b, A-2-4). Alluvial deposits within the stream are primarily composed of 2± feet of very soft to stiff organic clay.

The Black Creek Formation underlies the alluvial deposits at elevations ranging from 31± to 33± feet in the South River floodplain. The Cretaceous soils were encountered near an elevation of 25± within the stream channel. The upper 5 to 20 feet of sediments within this formation typically consist of loose to dense fine sand (A-2-4) and stiff to hard silty sandy clay (A-7-5, A-7-6). The granular soils were noted above the cohesive deposits primarily along the east side of the river. A sample of clay was tested at a moisture content of 50 percent. Borings indicate that 40 to 55 feet or more of medium dense to very dense fine to coarse sand (A-2-4) and clayey sand (A-2-6) underlies the upper horizon of the Black Creek Formation. A 1 to 2± feet thick sandy limestone layer was encountered in borings B2-A and B3-B at elevations ranging from -43.7 to -44.7 feet. In boring B2-A, a rock core of the limestone was obtained at an elevation of -44.7 to -49.0 feet yielding a recovery of 28%. RQD values in Coastal Plain rocks are not applicable because they are not indicative of the continuity of the samples. Underlying the limestone layer near an elevation of -46± feet is 10 feet or more of very dense fine to coarse sand (A-2-4) and clayey sand (A-2-7). Drilling fluid loss was observed in boring B3-B at elevations ranging from -49± to -54± feet. It should be noted that lignite occurs throughout the majority of the Cretaceous sediments. With the exception of the limestone layer, no cemented and/or indurated layers were noted at this site.

The proposed end slopes will primarily be constructed within the South River floodplain. Based on the current design, the elevation of the proposed alignment will typically match the grade of the existing NC 41 roadway at the end bents. Fill heights at the proposed end bents will be approximately 10± feet and constructed from borrow. Borrow meeting Coastal Plain criteria is available in nearby areas.

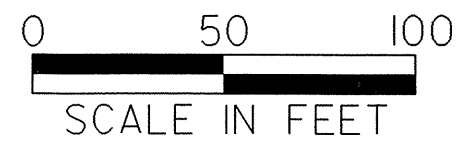
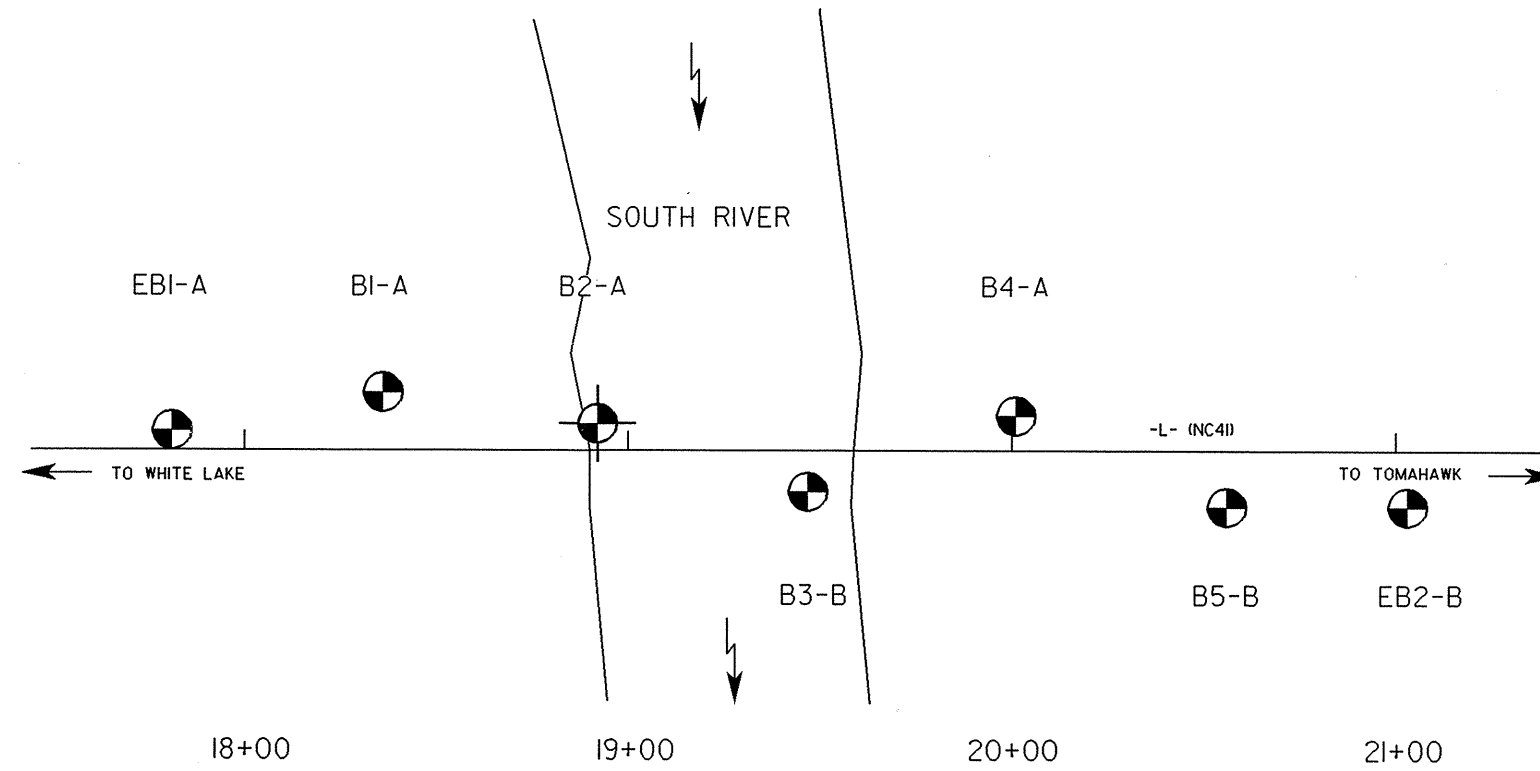
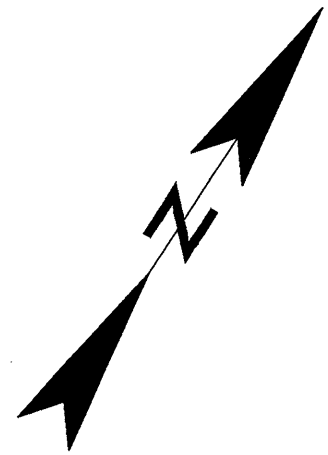
The Geotechnical foundation report is based on the bridge survey report for South River dated August 16, 2002. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully submitted,

Kevin B. Miller, TEG II

KBM

# NC 41 (-L-) OVER SOUTH RIVER





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

PROJECT NO.	8.1421201	ID.	B-3613	COUNTY	BLADEN/SAMPSON	GEOLOGIST	M. M. HAGER					
SITE DESCRIPTION							GROUND WATER					
BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER							0 HR. N.M.					
BORING NO.	EBI-A	BORING LOCATION	17+81	OFFSET	5.0' LT.	ALIGNMENT	-L-					
COLLAR ELEVATION 40.7'							24 HR. 1.0'					
NORTHING 0.00		EASTING 0.00										
TOTAL DEPTH	59.2'	DRILL MACHINE	CME-45B	DRILL METHOD	ROTARY W/MUD	HAMMER TYPE	AUTOMATIC					
START DATE	6/4/03	COMPLETION DATE	6/5/03	SURFACE WATER DEPTH N/A								
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
40.7	0.0	2	6	5	1							
	3.9	3	1	100	1							TAN BROWN SILTY CLAY, WET (FILL)
35.0	8.0	2	12	28	1							CONCRETE GRAVEL
	13.0	75	38	42	1							GRAY SANDY CLAY, WET (BLACK CREEK FORMATION)
	18.0	23	17	29	1							
	23.0	23	36	39	1							
	28.0	18	18	24	1							
	33.0	8	12	14	1							
	38.0	9	17	24	1							
	43.0	10	15	26	1							
	48.0	15	26	33	1							
	53.0	28	29	31	1							
	58.0	32	66	34	0.7							
BORING TERMINATED AT ELEV. -18.5 FEET IN VERY DENSE FINE TO COARSE SAND												

(6)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

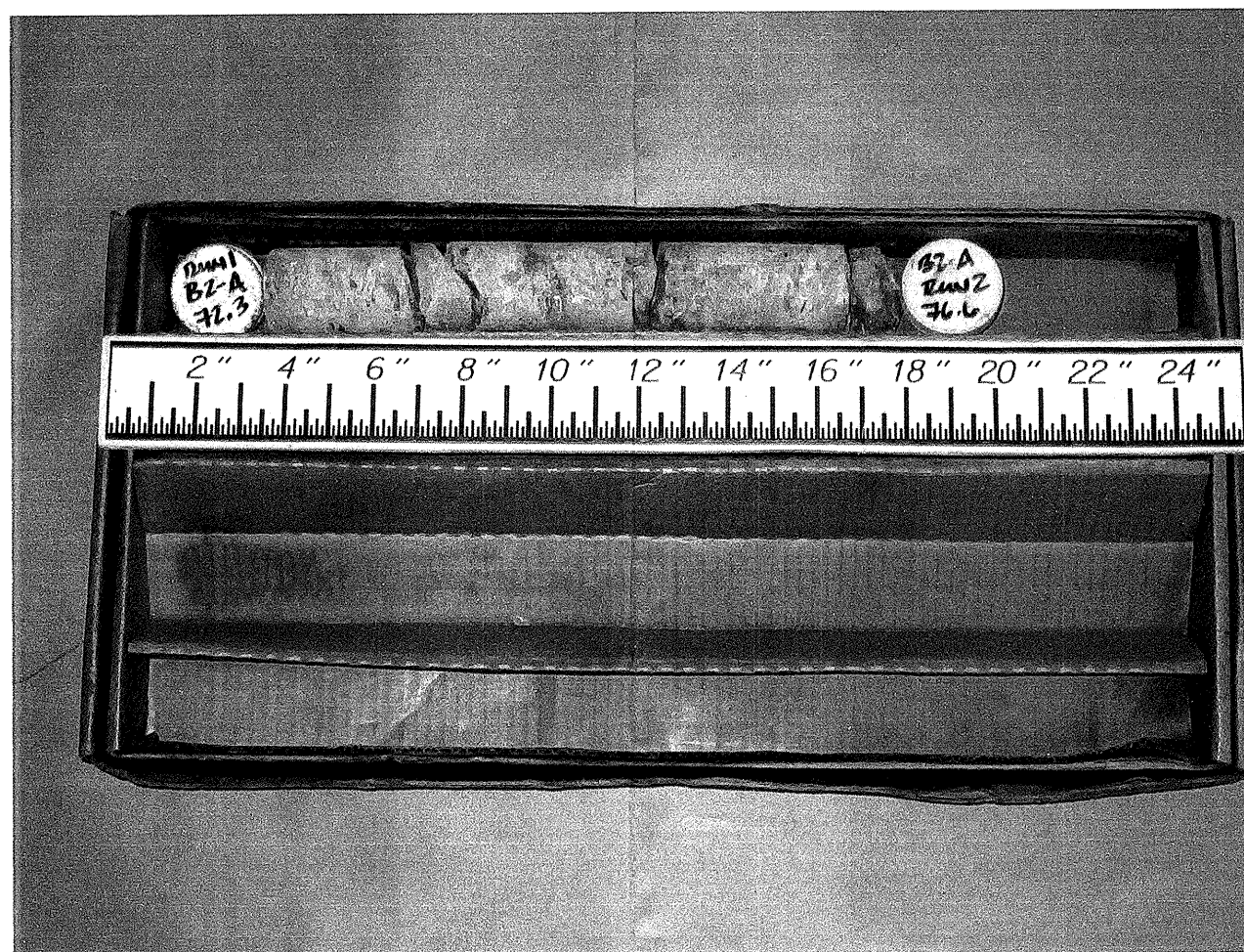
PROJECT NO.	8.1421201	ID.	B-3613	COUNTY	BLADEN/SAMPSON	GEOLOGIST	M. M. HAGER					
SITE DESCRIPTION							GROUND WATER					
BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER							0 HR. N.M.					
BORING NO.	BI-A	BORING LOCATION	18+36	OFFSET	15.0' LT.	ALIGNMENT	-L-					
COLLAR ELEVATION 41.8'							24 HR. 3.0'					
NORTHING 0.00		EASTING 0.00										
TOTAL DEPTH	59.5'	DRILL MACHINE	CME-45B	DRILL METHOD	ROTARY W/MUD	HAMMER TYPE	AUTOMATIC					
START DATE	6/3/03	COMPLETION DATE	6/4/03	SURFACE WATER DEPTH N/A								
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
41.8	0.0	3	4	1								
40.0	3.9	3	5	4	1							TAN SILTY CLAY AND CLAYEY SANDY SILT, WET (ALLUVIUM)
35.0	8.0	4	7	5	1							TAN COARSE SAND, SAT.
30.0	13.0	2	6	7	1							GRAY SANDY SILTY CLAY, WET (BLACK CREEK FORMATION)
25.0	18.0	3	5	7	1							
20.0	23.0	8	16	20	1							
15.0	28.0	5	7	8	1							
10.0	33.0	5	9	10	1							
5.0	38.0	6	11	18	1							
0.0	43.0	10	16	31	1							
-5.0	48.0	5	9	11	1							
-10.0	53.0	9	17	20	1							
-15.0	58.0	52	23	22	1							
BORING TERMINATED AT ELEV. -17.7 FEET IN DENSE FINE TO COARSE SAND												







8.1421201 B-3613  
Bladen/Sampson Co.  
Bridge No. 44 on NC 41 over South River



B2-A  
Sta. 18+92 - 7.0' LT.

Run	1	72.3-76.6	REC	28%
			RQD	N/A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 2

PROJECT NO.	8.1421201	ID.	B-3613	COUNTY	BLADEN/SAMPSON	GEOLOGIST	A. NASH							
SITE DESCRIPTION							GROUND WATER							
BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER							0 HR. N.M.							
BORING NO.	B3-B	BORING LOCATION	19+47	OFFSET	11.0' RT.	ALIGNMENT	-L-							
COLLAR ELEVATION 25.7'							24 HR. N.M.							
NORTHING 0.00		EASTING 0.00		DRILL MACHINE		CME-45C	DRILL METHOD	ROTARY W/MUD	HAMMER TYPE	MANUAL				
TOTAL DEPTH 85.4'		DRILL MACHINE		CME-45C	DRILL METHOD		ROTARY W/MUD	HAMMER TYPE		MANUAL				
START DATE 8/13/03		COMPLETION DATE 8/14/03		SURFACE WATER DEPTH 13.9'										
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100				
25.7	0.0	7	4	6	1									
25.0	3.1	6	14	12	1									BROWN ORGANIC CLAY, WET (ALLUVIUM)
20.0	8.1	7	10	12	1									GRAY SANDY SILTY CLAY, WET (BLACK CREEK FORMATION)
15.0	13.1	6	8	10	1									
10.0	18.1	13	18	25	1									
5.0	23.1	14	20	39	1									
0.0	28.1	19	31	54	1									
-5.0	33.1	10	18	72	1									
-10.0	38.1	11	20	40	1									
-15.0	43.7	16	29	71	0.9									GRAY FINE TO COARSE SAND AND CLAYEY SAND, SAT.
-20.0	48.7	80	20		0.6									
-25.0	53.7	21	49	51	1									
-30.0	58.2	14	37	63	0.8									
-35.0	63.2	8	27	73	0.8									
-40.0	68.2	59	41		0.6									
-45.0	74.1	32	68		1									

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 2 OF 2

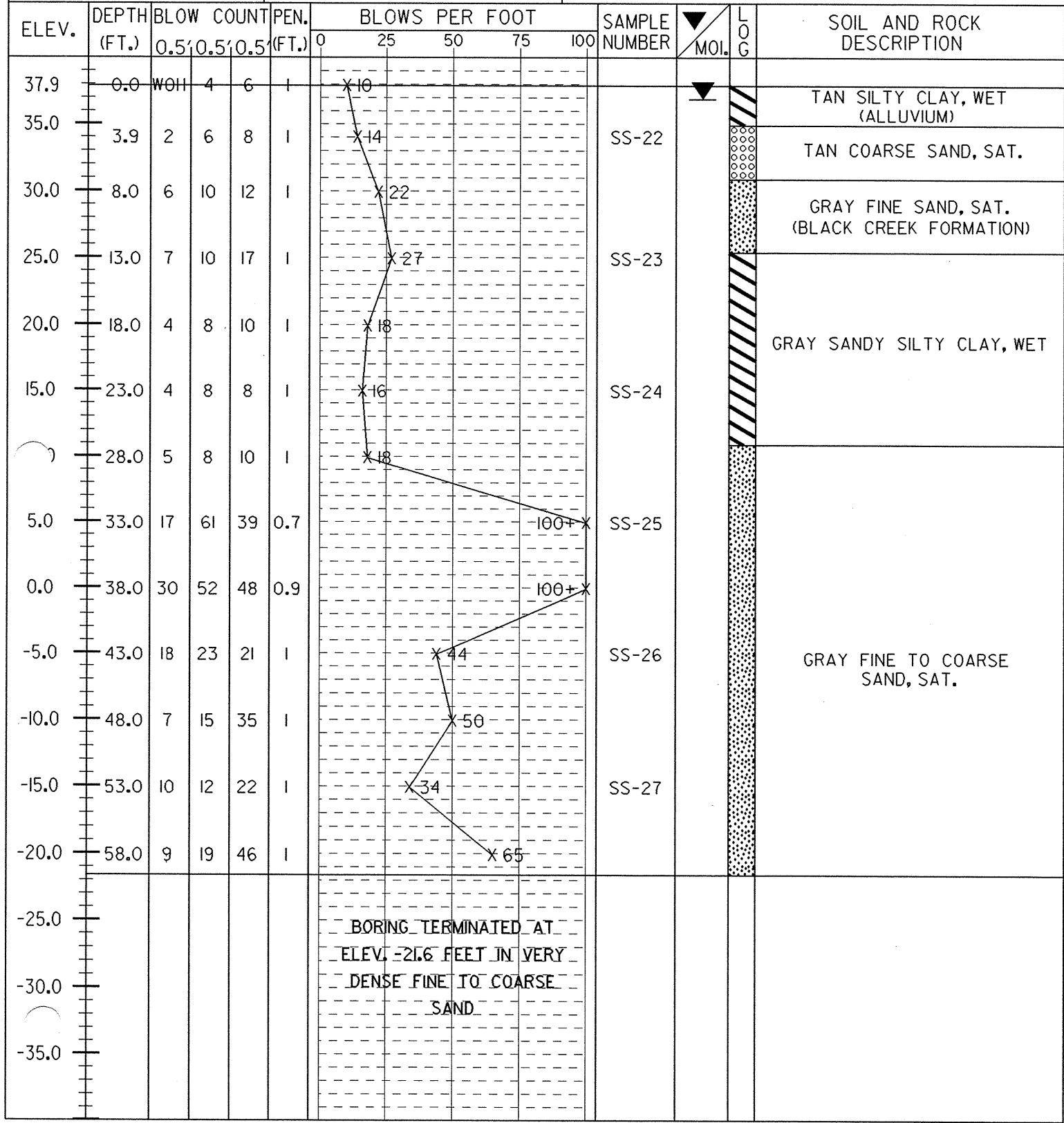
PROJECT NO.	8.1421201	ID.	B-3613	COUNTY	BLADEN/SAMPSON	GEOLOGIST	A. NASH							
SITE DESCRIPTION							GROUND WATER							
BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER							0 HR. N.M.							
BORING NO.	B3-B	BORING LOCATION	19+47	OFFSET	11.0' RT.	ALIGNMENT	-L-							
COLLAR ELEVATION 25.7'							24 HR. N.M.							
NORTHING 0.00		EASTING 0.00		DRILL MACHINE		CME-45C	DRILL METHOD	ROTARY W/MUD	HAMMER TYPE	MANUAL				
TOTAL DEPTH 85.4'		DRILL MACHINE		CME-45C	DRILL METHOD		ROTARY W/MUD	HAMMER TYPE		MANUAL				
START DATE 8/13/03		COMPLETION DATE 8/14/03		SURFACE WATER DEPTH 13.9'										
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100				
50.0														
-55.0	79.1	14	28	72	0.9									GRAY FINE TO COARSE SAND, SAT.
-60.0	84.1	15	36	64	0.8									
-65.0														
-70.0														
-75.0														
-80.0														
-85.0														
-90.0														
-95.0														
-100.0														
-105.0														
-110.0														
-115.0														
-120.0														
-125.0														

BORING TERMINATED AT ELEV. -59.7 FEET IN VERY DENSE FINE TO COARSE SAND

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

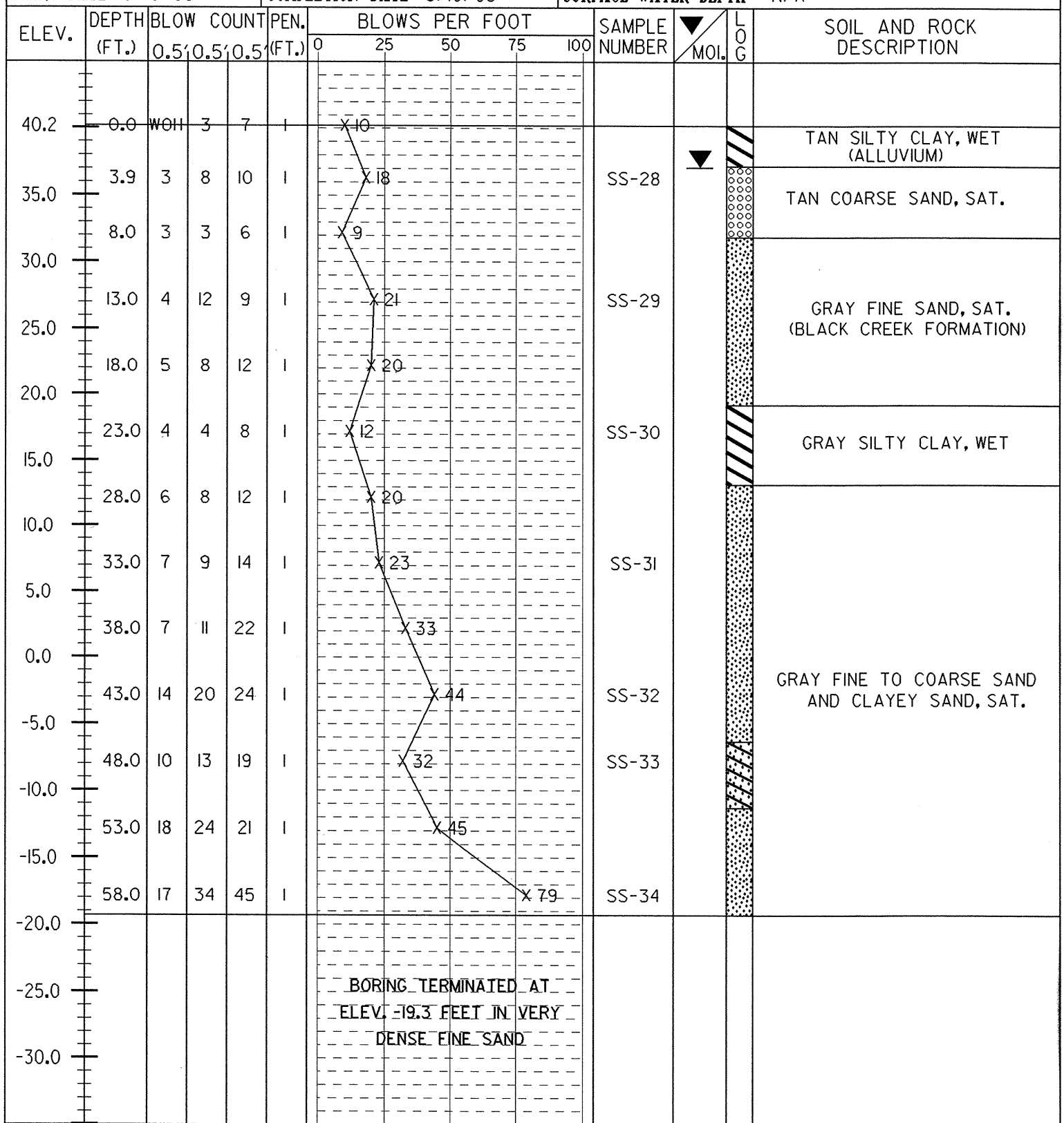
PROJECT NO. 8.1421201	ID. B-3613	COUNTY BLADEN/SAMPSON	GEOLOGIST M. M. HAGER
DESCRIPTION BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER			GROUND WATER
BORING NO. B4-A	BORING LOCATION 20+01	OFFSET 9.0' LT.	ALIGNMENT -L-
COLLAR ELEVATION 37.9'	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 1.0'
TOTAL DEPTH 59.5'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 6/9/03	COMPLETION DATE 6/10/03	SURFACE WATER DEPTH N/A	



# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

PROJECT NO. 8.1421201	ID. B-3613	COUNTY BLADEN/SAMPSON	GEOLOGIST M. M. HAGER
SITE DESCRIPTION BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER			GROUND WATER
BORING NO. B5-B	BORING LOCATION 20+56	OFFSET 15.0' RT.	ALIGNMENT -L-
COLLAR ELEVATION 40.2'	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 3.1'
TOTAL DEPTH 59.5'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 6/10/03	COMPLETION DATE 6/10/03	SURFACE WATER DEPTH N/A	





**B-3613**  
**Bridge No. 44 on NC 41 over South River**

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST. ORG.
B1-A	SS-1	100	94	38	27.0	40.9	11.5	20.6	28	10	A4(0)	3.9-4.9	
	SS-2	73	33	4	80.9	14.7	0.3	4.1	21	NP	A1B(0)	8.0-9.5	
	SS-3	100	99	87	1.0	12.8	16.3	70.0	89	58	A75(58)	13.0-14.5	50.0
	SS-4	100	96	26	19.9	54.9	4.6	20.6	27	NP	A24(0)	23.0-24.5	
	SS-5	100	95	77	10.7	13.2	14.4	61.7	75	51	A76(41)	28.0-29.5	
	SS-6	100	93	21	40.1	40.2	5.2	14.4	24	NP	A24(0)	33.0-34.5	
	SS-7	100	100	13	1.7	87.4	3.6	7.2	28	NP	A24(0)	43.0-44.5	
	SS-8	100	99	12	34.3	55.8	0.7	9.3	22	NP	A24(0)	58.0-59.5	
EB1-A	SS-9	100	98	78	3.3	20.0	15.0	61.7	82	64	A76(52)	8.0-9.5	
	SS-10	100	94	22	29.4	49.6	4.5	16.5	24	NP	A24(0)	13.0-14.5	
	SS-11	100	72	12	52.8	35.8	2.2	9.3	25	NP	A24(0)	23.0-24.5	
	SS-12	100	93	19	35.6	47.0	4.0	13.4	22	NP	A24(0)	33.0-34.5	
	SS-13	100	100	15	1.3	86.4	4.0	8.2	24	NP	A24(0)	43.0-44.5	
	SS-14	100	91	20	39.8	41.5	5.3	13.4	25	6	A24(0)	53.0-54.5	
EB2-B	SS-15	100	98	15	28.0	58.8	2.9	10.3	23	NP	A24(0)	4.7-5.4	
	SS-16	100	99	24	5.5	73.1	6.0	15.4	27	NP	A24(0)	8.0-9.5	
	SS-17	100	98	74	6.4	20.6	17.5	55.6	69	44	A76(34)	18.0-19.5	
	SS-18	100	93	12	36.2	53.1	4.5	6.2	23	NP	A24(0)	23.0-24.5	
	SS-19	100	91	28	32.1	42.1	6.7	19.1	31	11	A26(0)	33.0-34.5	
	SS-20	100	98	15	25.7	61.3	3.9	9.0	23	NP	A24(0)	43.0-44.5	
	SS-21	100	99	11	10.5	80.5	4.0	5.0	24	NP	A24(0)	53.0-54.5	
B4-A	SS-22	81	22	3	92.2	5.1	0.6	4.1	20	NP	A1B(0)	3.9-5.4	
	SS-23	100	100	82	1.0	18.6	22.4	57.9	85	58	A76(52)	13.0-14.5	
	SS-24	100	99	83	3.9	13.7	22.4	60.0	91	64	A76(59)	23.0-24.5	
	SS-25	100	99	17	5.0	80.4	5.4	9.3	24	NP	A24(0)	33.0-34.2	
	SS-26	100	97	11	54.1	36.7	4.0	5.2	18	NP	A24(0)	43.0-44.5	
	SS-27	100	98	16	15.1	69.8	4.8	10.3	24	NP	A24(0)	53.0-54.5	
B5-B	SS-28	97	40	3	88.3	8.6	0.4	4.1	18	NP	A1B(0)	3.9-5.4	
	SS-29	100	99	16	7.5	78.3	6.9	7.2	27	NP	A24(0)	13.0-14.5	
	SS-30	100	99	83	2.5	15.9	21.6	60.0	89	65	A76(59)	23.0-24.5	
	SS-31	100	94	19	40.3	41.4	4.9	13.4	26	NP	A24(0)	33.0-34.5	
	SS-32	100	99	12	14.1	76.1	3.6	6.2	29	NP	A24(0)	43.0-44.5	
	SS-33	100	99	30	3.4	70.9	8.1	17.6	36	12	A26(0)	48.0-49.5	
	SS-34	100	100	12	3.3	87.0	3.5	6.2	24	NP	A24(0)	58.0-59.5	

**B-3613**  
**Bridge No. 44 on NC 41 over South River**

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST. ORG.
<b>B2-A</b>	SS-35	100	99	78	4.2	18.4	14.0	63.4	77	53	A76(44)	1.0-1.5	
	SS-36	97	96	84	2.3	12.5	13.3	71.9	94	68	A76(63)	9.5-11.0	
	SS-37	100	99	16	7.5	79.2	1.7	11.6	28	NP	A24(0)	19.5-21.0	
	SS-38	100	100	5	22.7	74.2	1.2	4.2	25	NP	A3(0)	29.5-31.0	
	SS-39	97	85	18	37.0	46.0	1.2	15.9	30	7	A24(0)	39.6-41.1	
	SS-40	95	61	6	41.9	52.9	2.1	7.4	21	NP	A3(0)	54.9-55.9	
	SS-41	100	93	33	16.3	57.1	3.4	23.3	36	12	A26(0)	64.9-66.4	
	SS-42	100	98	15	23.0	65.8	1.7	9.5	26	NP	A24(0)	76.6-77.9	
	SS-43	95	76	35	49.7	14.7	5.0	30.7	49	33	A27(5)	85.2-86.7	
	SS-44	97	86	14	55.0	33.0	1.5	10.6	23	NP	A24(0)	95.2-96.5	
<b>B3-B</b>	SS-45	91	89	82	3.2	7.8	15.0	74.0	100	72	A76(65)	3.1-4.6	
	SS-46	96	95	78	4.0	16.1	14.4	65.5	104	76	A76(64)	13.1-14.6	
	SS-47	100	98	13	12.3	77.0	1.3	9.5	23	NP	A24(0)	23.1-24.6	
	SS-48	100	97	11	18.4	72.3	0.2	9.5	22	NP	A24(0)	33.1-34.6	
	SS-49	100	99	6	10.7	84.2	1.3	6.3	23	NP	A3(0)	48.7-49.3	
	SS-50	94	86	28	29.4	46.3	5.3	19.0	37	17	A26(1)	63.2-64.5	
	SS-51	97	79	12	60.9	28.8	2.3	12.7	27	NP	A24(0)	68.2-68.8	
	SS-52	95	67	11	63.6	26.2	0.4	10.6	23	NP	A24(0)	79.1-80.5	

Rev. 5/91

**GEOTECHNICAL UNIT FIELD SCOUR REPORT**PROJECT: 8.1421201 ID: B-3613 COUNTY: Bladen/SampsonDESCRIPTION (1): Bridge No. 44 on NC 41 over South River

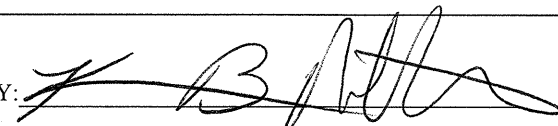
**INFORMATION ON EXISTING BRIDGES** Information obtained from  field inspection  
 microfilm (Reel: \_\_\_\_\_ Position: \_\_\_\_\_)  
 other \_\_\_\_\_

COUNTY BRIDGE NO. 44 BRIDGE LENGTH 320.5' NO. BENTS 9 NO. BENTS IN CHANNEL 2 FLOOD PLAIN 7FOUNDATION TYPE: Concrete cap on timber piles

EVIDENCE OF SCOUR (2):

ABUTMENTS OR END BENT SLOPES: None notedINTERIOR BENTS: None notedCHANNEL BED: None notedCHANNEL BANKS: None noted**EXISTING SCOUR PROTECTION:**TYPE (3): Concrete end slopes and wallsEXTENT (4): Approximately 10 feet from end of bridge towards river and 10 feet from outside edge of bridgeEFFECTIVENESS (5): Appears satisfactoryOBSTRUCTIONS (6) (DAMS, DEBRIS, ETC.): None noted**DESIGN INFORMATION**CHANNEL BED MATERIAL (7) (SAMPLE RESULTS ATTACHED): Very stiff silty sandy clay (SS-45)CHANNEL BANK MATERIAL (8) (SAMPLE RESULTS ATTACHED): Stiff clay (SS-35) and medium dense fine sand (SS-29)CHANNEL BANK COVER (9): Shrubs and grasses**DESIGN INFORMATION CONT.**FLOOD PLAIN WIDTH (10): 800± feetFLOOD PLAIN COVER (11): WoodedSTREAM IS  DEGRADING  AGGRADING  EQUILIBRIUM (12)

OTHER OBSERVATIONS AND COMMENTS: \_\_\_\_\_

CHANNEL MIGRATION TENDENCY (13): Channel is entrenched and appears stableGEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14): Scour depths should generally approximate theoreticalscour elevations provided by the Hydraulics Unit at End Bent 1 and Bent 1 (elev. 29± feet), Bent 4 (elev. 25± feet)and Bent 5 and End Bent 2 (elev. 28± feet). However, calculations based on a correlation of scourability with thematerial strength of very stiff sandy silty clay yields a scour elevation of 20± feet at Bent 2 and 18± feet at Bent 3.These scour elevations are 6 to 8 feet higher than the respective overtopping scour elevation provided by theHydraulics Unit.REPORTED BY:  DATE: October 23, 2003**INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION. ATTACH LAB RESULTS.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION. ATTACH LAB RESULTS.
- (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING, AGGRADING, OR EQUILIBRIUM.
- (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING; SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

**8.1421201    B-3613**  
**Bladen/Sampson Co.**  
**Bridge No. 44 on NC 41 over South River**



**Looking west towards End Bent 1**

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