CONTENTS:

DESCRIPTION

TITLE SHEET

TEST SITE PLAN

PROFILE ALONG -L-

SOIL TEST RESULTS

SITE PHOTOGRAPH

SCOUR REPORT

CORE LOG REPORT (B2-A)

CORE PHOTOGRAPH (B2-A)

BORING LOG REPORTS (EBI-A, BI-A, B2-A)

BORING LOG REPORTS (B3-B, B4-A, EB2-A)

DRA

LEGEND REPORT

SHEET NO.

10, 11, 12

13, 14

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STAT	E PROJECT	8.1421	201	I.D. NO	B-3613
F.A. I	PROJECT _	BRSTP-	-41(5)		
COU	VTY I	BLADEN/SA	MPSON		
PRO]	ECT DESCI	RIPTION_	BRIDG	E NO. 44 O	N
				UTH RIVE	
SITE	DESCRIPT	ION BRI	DGE NO	D. 44 ON NO	7 41
	OVER	SOUTH F	RIVER A	IT -L- STA.	19 + 42.

STATE	STATE PR	OJECT REFERENCE	NO.	SHBET NO.	TOTAL SHEETS
N.C.		B-3613		1	16
STATE	PROJ. NO.	F. A. PROJ. NO.		DESCRIP	TION
8,142	1201	BRSTP-41(5)		P.E,	
				CONS	T.

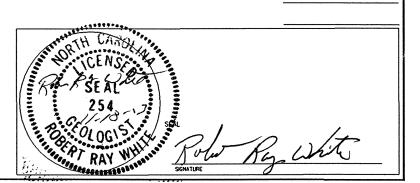
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INVESTIGATED BY SSB/KBM PERSONNEL MMH KBM ZZA LWD RRW RRJ **ELD** DATE NOVEMBER, 2003 RES **IAH**



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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATE PROJECT NO. | SHEET NO. | TOTAL SHEET

8.1421201

R-3613

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS SOIL DESCRIPTION WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COAR UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO POORLY GRADED) GRADATION ROCK DESCRIPTION TERMS AND DEFINITIONS HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL AN INFERRED SOIL IS CONSIDERED TO BE THE LINCONSOLIDATED. SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS. ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. 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. 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 AQUIFER - A WATER BEARING FORMATION OR STRATA. GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: <u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ANGULARITY OF GRAINS OF WEATHERED ROCK. CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS: AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, ARGILLACEDUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS. R HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. VERY STIFF, GRAY SILTY CLAY, WOIST WITH INTERREDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 SUBANGULAR, SUBROUNDED, OR ROUNDED. WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL SOIL LEGEND AND AASHTO CLASSIFICATION MINERALOGICAL COMPOSITION T WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT CRYSTALL INF MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS GENERAL GRANULAR MATERIALS STUT-CLAY MATERIALS GROUND SUBFACE. WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE. ORGANIC MATERIALS BUCK (CB) WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE (\$5% PASSING #200) (>85% PASSING *200) SNEISS, GABBRO, SCHIST, ETC. THE IN CHARSE GRAIN METAMORPHIC AND NON-CHASTA CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COMPRESSIBILITY A-1 A-3 A-2 A-4 A-5 A-6 A-7 NON-CRYSTALLINE ROCK (NCR) A-1. A-2 COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE CLASS. -1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7 SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELE SLOPE. MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 COASTAL PLAIN SEDIMENTARY ROCK SYMBOL 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. SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS. ET PASSING PERCENTAGE OF MATERIAL SILT-DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT WEATHERING # 10 # 40 RANULA GRANULAF SILT- CLAY CLAY ORGANIC MATERIAL ROCKS OR CUTS MASSIVE ROCK. OTHER MATERIAL SOILS PEAT SOILS SOILS SOILS ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER 15 MX 25 MX 100 MX 35 MX 35 MX 35 MX 36 MN 36 FRESH * 200 RACE OF ORGANIC MATTER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE 2 - 3% 3 - 5% TRACE 1 - 10% HAMMER IF CRYSTALLINE. LITTLE ORGANIC MATTER 5 - 12% LITTLE 10 - 20% aa mxlai mn laa mxlai mn laa mxlai mn laa mxlai m ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, MODERATELY ORGANIC SOILS WITH 5 - 10% 12 - 20% SOME 20 - 35% DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF PLASTIC INDEX 6 MX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE (V. SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF натн HE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. OF A CRYSTALLINE NATURE. GROUP INDEX 0 0 4 MX MODERATE ORGANII GROUND WATER FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE AMOUNTS OF ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO SOILS SLIGHT LISHAL TYPES STONE FRAGS. SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. FINE SILTY OR CLAYEY DRGANIC WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. F MAJOR MATTER FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. SAND GRAVEL AND SAND SOILS SOILS ▼__ MATERIAL S SAND STATIC WATER LEVEL AFTER 24 HOURS. SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN MODERATE FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM GEN. RATING **∑**PW GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA (LOOM) EXCELLENT TO GOOD POOR AS A FAIR TO POOR UNSUITABL POOR DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED SUBGRADE FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY SPRING OR SEEPAGE P.I. OF A-7-5 \leq L.L. - 30 : P.I. OF A-7-6 > L. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL MODERATELY CONSISTENCY OR DENSENESS MISCELLANEOUS SYMBOLS AND DISCOLORED AND A MAJORITY SHOW KADLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN RANGE OF UNCONFINED AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK. (MOD. SEV.) COMPACTNESS OR HE FIELD. ROADWAY EMBANKMENT PRIMARY SOIL TYPE DPT DMT TEST BORING PENETRATION RESISTENCE COMPRESSIVE STRENGTH (TONS/FT2) IF TESTED, WOULD YIELD SPT REFUSAL SAMPLE CONSISTENCY IOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. WITH SOIL DESCRIPTION (N-VALUE) DESIGNATIONS ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCE SEVERE _EDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO VERY LOOSE IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. AUGER BORING (SEV.) S- BULK SAMPLE LODSE 4 TO 10 TS LATERAL EXTENT. GRANIII AR MEDIUM DENSE N/A ARTIFICIAL FILL OTHER THAN 10 TO 30 IF TESTED. YIELDS SPT N VALUES > 100 BPF _ENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. SS- SPLIT SPOON DENSE 30 TO 50 CORE RORING (NON-COHESIVE) ROADWAY EMBANKMENTS SAMPLE. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT VERY DENSE >50 OILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. ST- SHELBY TUBE THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK INFERRED SOIL BOUNDARIES VERY SOFT REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINDS ERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN MONITORING WELL <0.25 GENERALLY VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF ITERVENING IMPERVIOUS STRATUM. 0.25 TO 0.5 INFERRED ROCK LINE RS- ROCK SAMPLE MEDIUM STIFF SILT-CLAY 4 TO 8 PIEZOMETER 0.5 TO 1 Δ ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND COMPLETE RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. MATERIAL STIFF VERY STIFF INSTALLATION 1 TO 2 2 TO 4 RT- RECOMPACTED ALLUVIAL SOIL BOUNDAR SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS (COHESIVE) 15 TO 30 ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF TRIAXIAL SAMPLE SLOPE INDICATOR ALSO AN EXAMPLE. \bigcirc DIP/DIP DIRECTION DE ROCK SEGMENTS EQUAL TO DR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND INSTALLATION CBR - CBR SAMPLE ROCK HARDNESS TEXTURE OR GRAIN SIZE - SPT N-VALUE SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SOUNDING ROD J.S. STD. SIEVE SIZE REF- SPT REFUSAL PARENT ROCK. SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. OPENING (MM) 4.76 0.42 0.25 0.075 SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND ABBREVIATIONS CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL COARSE TO DETACH HAND SPECIMEN. COBBLE GRAVEL SILT CLAY AR - AUGER REFUSAL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS SAND SAND PMT - PRESSUREMETER TEST (BLDR.) (C0B₂) (GR.) (SL.) (CL. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. BT - BORING TERMINATED SD. - SAND, SANDY HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED. CL. - CLAY SL. - SILT, SILTY MM 305 IN. 12* 2.0 0.005 0.25 0.05 BY MODERATE BLOWS. - CONE PENETRATION TEST SIZE SLIGHTL STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CSE. - CDARSE TCR - TRICONE REFUSAL 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH SOIL MOISTURE - CORRELATION OF TERMS - DILATOMETER TEST HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE γ - UNIT WEIGHT 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION POINT OF A GEOLOGISTS PICK. DPT - DYNAMIC PENETRATION TEST SOIL MOISTURE SCALE FIELD MOISTURE 7d - DRY UNIT WEIGHT WITH 60 RINWS GUIDE FOR FIELD MOISTURE DESCRIPTION CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS (ATTERBERG LIMITS VOID RATIO SOFT STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. F. - FINE W - MDISTURE CONTENT FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN FOSS. - FOSSILIFEROUS SATURATED V. - VERY PIECES CAN BE BROKEN BY FINGER PRESSURE. USUALLY LIQUID; VERY WET, USUALLY FRAC. - FRACTURED VST - VANE SHEAR TEST TRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: (SAT.) FROM BELOW THE GROUND WATER TABLE CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH FRAGS. - FRAGMENTS LL LIQUID LIMIT TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY MED. - MEDILIM THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PLASTIC SEMISOLID; REQUIRES DRYING TO RANGE - WET - (W) EQUIPMENT USED ON SUBJECT PROJECT TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. FRACTURE SPACING ATTAIN OPTIMUM MOISTURE BEDDING (PI) PLASTIC LIMIT TERM THICKNESS RR SPIKE IN BASE OF 20" 69.0' LT. OF -L- STA. 11+05 TERM 20" GUM TREE SPACING BENCH MARK: ADVANCING TOOLS: DRILL UNITS: VERY THICKLY BEDDED) 4 FFFT VERY WIDE MORE THAN 10 FEET - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE AUTOMATIC OPTIMUM MOISTURE MANUAL THICKLY BEDDED 1.5 - 4 FEET CLAY BITS 3 TO 10 FEET ELEVATION: 43.95 MOBILE B-SHRINKAGE LIMIT THINLY REDDED 0.16 - 1.5 FFFT MODERATELY CLOSE 1 TO 3 FFFT 0.03 - 0.16 FEET 6 CONTINUOUS FLIGHT AUGER VERY THINLY BEDDED REQUIRES ADDITIONAL WATER TO CORE SIZE: 0.16 TO 1 FEET NOTES: - DRY - (D) THICKLY LAMINATED 0.008 - 0.03 FEET RK-51 VERY CLOSE LESS THAN 0.16 FEET ATTAIN OPTIMUM MOISTUR 8° HOLLOW AUGERS THINLY LAMINATED INDURATION PLASTICIT HARD FACED FINGER BITS CME-45 B/BARGE CME-450 -N_WD-4 FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. PLASTICITY INDEX (PI) DRY STRENGTH TUNG.-CARBIDE INSERTS NONPLASTIC VERY LOW CME-550 RUBBING WITH FINGER FREES NUMEROUS GRAINS CASING W/ ADVANCER FRIABLE PLASTICITY 6-15 SLIGHT HAND TOOLS: LASTICITY MEDIUM PORTABLE HOIST TRICONE 25% STEEL TEETH GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; POST HOLE DIGGER PLASTICIT' 26 OR MORE HIGH MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER. TRICONE HAND AUGER OTHER GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: INDURATED SOUNDING ROD CORE BIT DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) DIFFICULT TO BREAK WITH HAMMER. VANE SHEAR TEST OTHER MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE OTHER SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED OTHER SAMPLE BREAKS ACROSS GRAINS. REVISED 09/15/00



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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

LYNDO TIPPETT

GOVERNOR

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 $40\pm$ 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±

(3)

feet wide floodplain lying at elevations ranging from $38\pm$ to $42\pm$ feet. During this investigation, water levels in the boreholes and the surface of South River were measured at elevations ranging from $37\pm$ to $40\pm$ 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 clavey 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,

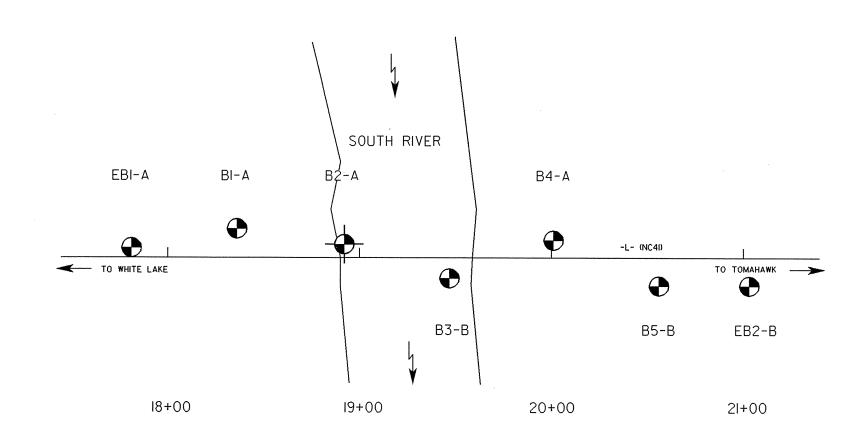
Levi B. Mill

Kevin B. Miller, TEG II

KBM

NC 41 (-L-) OVER SOUTH RIVER







SOIL PROFILE ALONG NC 41 (-L-) OVER SOUTH RIVER

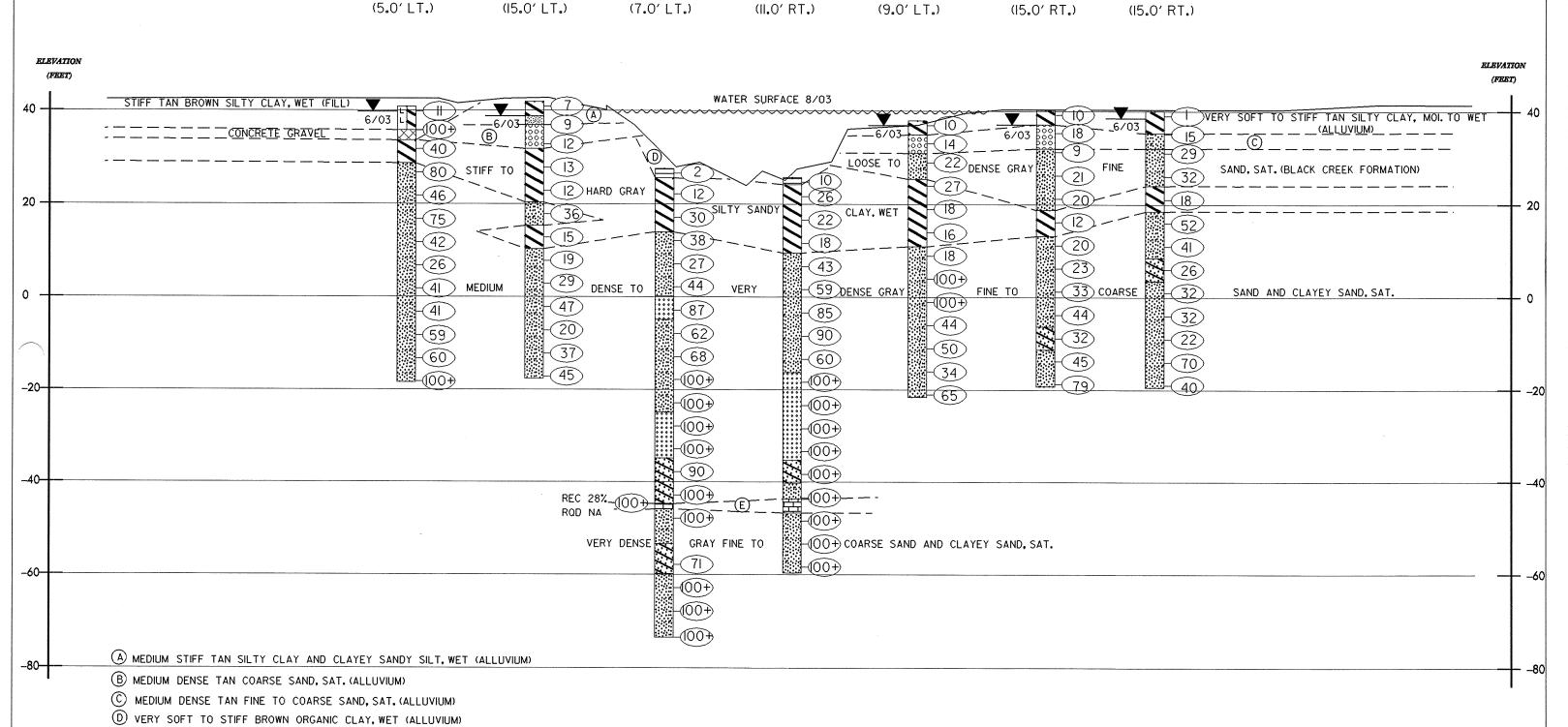
PROJECT NO. | COUNTY | BRIDGE NO. SHEET NO. TOTAL SHEETS
201 B-3613 | BLADEN/SAMPSON | 44 | 5 | 16

EBI-A (5.0′ LT.) BI-A

B2-A

B3-B (II.0′ RT.) B4-A

B5-B (I5.0' RT.) EB2-B (I5.0' RT.)



(E) GRAY SANDY LIMESTONE, SAT. (BLACK CREEK FORMATION)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

SHEET | OF | PROJECT NO. 8.1421201 **ID.** B-3613 COUNTY BLADEN/SAMPSON GEOLOGIST M. M. HAGER TTE DESCRIPTION BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER GROUND WATER JRING NO. EBI-A BORING LOCATION 17+81 OFFSET 5.0'LT. ALIGNMENT -L-0 HR. N.M. COLLAR ELEVATION 40.7 NORTHING 0.00 EASTING 0.00 24 HR. 1.0' 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 DEPTH BLOW COUNT PEN. BLOWS PER FOOT SAMPLE SOIL AND ROCK 100 NUMBER MOL Ğ 0.510.510.5(FT.) DESCRIPTION 48:3 TAN BROWN SILTY CLAY, WET (FILL) 3 100 3.9 35.0 CONCRETE GRAVEL 2 12 28 SS-9 GRAY SANDY CLAY, WET (BLACK CREEK FORMATION) 30.0 13.0 | 75 | 38 | 42 SS-IO 708 X 25.0 18.0 23 17 29 20.0 23.0 | 23 | 36 39 SS-II 7.0 28.0 | 18 | 18 24 10.0 GRAY FINE TO COARSE 33.0 8 12 14 SS-I2 SAND, SAT. 5.0 9 17 24 38.0 0.0 43.0 10 15 26 SS-I3 48.0 | 15 26 | 33 -10.0 53.0 28 29 31 X60 SS-14 -15.058.0 | 32 | 66 | 34 | 0.7 -20.0 BORING TERMINATED AT _ELEV. -18.5_FEET_IN_VERY_ -25.0 DENSE FINE TO COARSE SAND -30.0

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL UNIT BORING LOG SHEET | OF | **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. BI-A BORING LOCATION 18+36 **OFFSET** 15.0'LT. ALIGNMENT -L-**0 HR.** N.M. COLLAR ELEVATION 41.8 **NORTHING EASTING** 0.00 0.00 24 HR. 3.0' 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 DEPTHIBLOW COUNTIPEN. BLOWS PER FOOT SAMPLE 🔽 SOIL AND ROCK SAMPLE NUMBER MOI. G (FT.) 0.510.510.5 (FT.) 50 DESCRIPTION 41.8 0.0 TAN SILTY CLAY AND 40.0 CLAYEY SANDY SILT. WET 5 3.9 3 (ALLUVIUM) SS-I 35.0 TAN COARSE SAND, SAT. 7 8.0 4 5 SS-2 30.0 2 6 13.0 7 50% SS-3 GRAY SANDY SILTY CLAY, WET 25.0 (BLACK CREEK FORMATION) 3 20.0 8 16 20 23.0 SS-4 GRAY FINE TO COARSE SAND, SAT. 15.0 5 7 28.0 8 SS-5 GRAY SILTY SANDY CLAY. WET 10.0 5 9 33.0 10 SS-6 5.0 6 11 38.0 18 0.0 16 43.0 10 31 SS-7 GRAY FINE TO COARSE SAND. SAT. -5.0 5 9 48.0 11 -10.0 53.0 9 17 20 -15.0 58.0 | 52 | 23 | 22 SS-8 -20.0 BORING TERMINATED AT ___EUEV.-17.7_FEET_IN__ -25.0 DENSE FINE TO COARSE -30.0

(6)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION | | NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

SHEET | OF 2 PROJECT NO. 8.1421201 **ID.** B-3613 COUNTY BLADEN/SAMPSON GEOLOGIST A. NASH "TE DESCRIPTION BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER GROUND WATER NRING NO. B2-A BORING LOCATION 18+92 OFFSET 7.0'LT. ALIGNMENT -L-HR. N.M. COLLAR ELEVATION 27.6' NORTHING 0.00 EASTING 0.00 24 HR. N.M. TOTAL DEPTH |OLI' DRILL MACHINE CME-45 C DRILL METHOD NWD4 CORE/ROTARY W/MUD HAMMER TYPE MANUAL **START DATE** 8/12/03 COMPLETION DATE 8/13/03 SURFACE WATER DEPTH 12.5' DEPTHIBLOW COUNTIPEN BLOWS PER FOOT SAMPLE | 🔻 / SOIL AND ROCK 100 NUMBER MOI. G ELEV. 50 0.510.510.5(FT.) DESCRIPTION 27.6 BROWN ORGANIC CLAY, WET SS-35 (ALLUVIUM) 25.0 6 6 4.5 GRAY SANDY SILTY CLAY. WET 20.0 (BLACK CREEK FORMATION) 5 14 | 16 SS-36 15.0 14.5 23 17 21 10.0 14 | 13 SS-37 5.0 24.5 15 16 28 29.5 16 35 52 SS-38 -5.0 34.5 11 14 48 -10.039.6 20 26 42 SS-39 X-6-8----15.0GRAY FINE TO COARSE SAND AND 44.6 18 49 51 0.8 +00+> CLAYEY SAND, SAT. -20.0 49.6 38 62 -100+ 0.9 -25.0 54.9 36 64 100+ X SS-40 -30.0 59.9 24 54 46 0.8 100+ -35.0 64.9 19 27 63 90 X SS-4I -40.0 69.9 21 27 60 0.6 100± 0 I 72.3 60 REC 28% 100+ GRAY SANDY LIMESTONE, SAT. RQD N/A GRAY FINE TO COARSE SAND AND CLAYEY SAND. SAT. + 76.6| 31 | 49 | 51 | 0.8 100+-# SS-42

GEOTECHNICAL UNIT BORING LOG

SHEET 2 OF 2 PROJECT NO. 8.1421201 **ID.** B-3613 COUNTY BLADEN/SAMPSON GEOLOGIST A. NASH SITE DESCRIPTION BRIDGE NO. 44 ON NC 41 OVER SOUTH RIVER GROUND WATER BORING NO. B2-A OHR. N.M. BORING LOCATION 18 + 92OFFSET 7.0'LT. ALIGNMENT -L-COLLAR ELEVATION 27.6' NORTHING 0.00 24 HR. N.M. EASTING 0.00 TOTAL DEPTH 101.1' DRILL MACHINE CME-45C DRILL METHOD NWD4 CORE/ROTARY W/MUD HAMMER TYPE MANUAL **START DATE** 8/12/03 COMPLETION DATE 8/13/03 SURFACE WATER DEPTH 12.5' |DEPTH|BLOW COUNT|PEN. BLOWS PER FOOT SAMPLE SOIL AND ROCK MOI. G (FT.) |0.510.510.5(FT.)| 25 100 NUMBER DESCRIPTION 75 50.0 -55.0 85.2 30 33 38 SS-43 GRAY FINE TO COARSE SAND AND -60.0 CLAYEY SAND. SAT. 90.2 52 48 0.7 ŢŌŌŦ, -65.0 95.2 | 27 | 51 | 49 | 0.8 700+X SS-44 -70.0 100.2 25 75 1<u>0</u>0± -75.0 _BORING_TERMINATED_AT ELEV. \$73.5 FEET IN VERY -80.0 DENSE_FINE JO_COARSE SAND -85.0 -90.0 -95.0 -100.0 -105.0 -110.0 -115.0 -120.0 -125.0

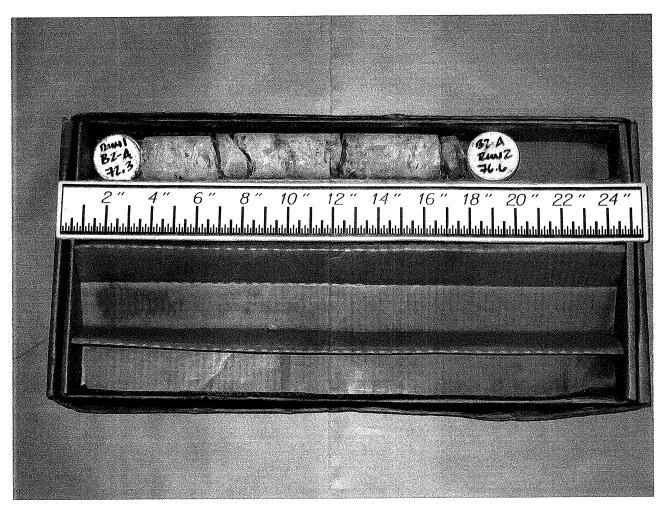
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO.: 8.1421201

I.D. NO.: B-3613 COUNTY: Bladen/Sampson BORING NO.: B2-A
SITE DESCRIPTION: Bridge No. 44 on NC 41 over South River
COLLAR ELEV.: 27.6'
CORE SIZE: NWD-4
EQUIPMENT: CME-45C
DRILLER: C. Richardson
TOTAL DEPTH: 101.1'
TOTAL RUN: 4.3'
DATE: 8/13/03

	ER: C. Ri DEPTH:	chardson 101.1'			LOGIS' AL RUN	T: A. Na N: 4.3'	PERSONNEL: AN/CR DATE: 8/13/03
ELEV. (FT.)	DEPTH (FT.)	DRILL RATE MN/FT	RUN (FT.)	RQD %	REC %	SAMP NO.	FIELD CLASSIFICATION AND REMARKS
-44.7	72.3	2:15	4.3	N/A	28		72.3 – 73.5 COASTAL PLAIN SEDIMENTARY
		1:29					MODERATELY INDURATED SANDY
		1:17					LIMESTONE
		0:58					73.5 – 76.6 GRAY FINE TO COARSE SAND
		0:31/.3					
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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 ORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

RROBECT NO. 8.1421201 ID. 8-3613 COUNTY BLADEN/SAMPSON GBOLOGIST A. NASH						,,		······								SHEET	OF 2
NRING NO. B3-B BORING LOCATION 19+47 OFFSET .0' RT. ALIGNMENT -L- 0 HR. N.M.						J						GE	OLO	GIST A	. NASH		
COLLAR ELEVATION 25.7' NORTHING O.OO D.OO MACHINE O.OO MACHINE CME-45C DRILL MBTHOD ROTARY W/MUD HAMMER TYPE MANUAL															~		
TOTAL DEPTH 85.4' DRILL MACHINE CME-45C DRILL METHOD ROTARY W/MUD HAMMER TYPE MANUAL									OFF	SET							
START DATE 8/13/03 COMPLETION DATE 8/14/03 SURFACE WATER DEPTH 13.9'									<u>y</u>						***************************************		
ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT SAMPLE MOI. G SOIL AND ROCK DESCRIPTION 25:0 - 0.0 7 4 6 - x10 SS-45 3.I 6 14 12 I - x26 SS-45 8.I 7 10 12 I - x22 SS-46 13.I 6 8 10 I - x18 SS-46	OTAL DI	EPTH 85	5.4′	D	RILL	MACH	INE CME-45	5C	DRILL M	ETHO	D ROTA	ARY V	<u> </u>	AUD 1	HAMMER T	YPE MANUA	۸L
ELEV. (FT.) 0.5/0.5/0.5 (FT.) 0 25 50 75 100 NUMBER MOI. 6 DESCRIPTION 25:0 -0.0 7 4 6 -x10	CART DA							E 8/14/()3	SURF	ACE WAT	ER DEF	TH	13.9′			
13.1 6 8 10 1 12 1 13.1 6 8 10 1 13.1 6 8 10 1 13.1 6 8 10 1 13.1 6 8 10 1 13.1 6 8 10 1 13.1 13.1 13.1 13.1 13.1 13.1 14.1 15.0 1	ELEV	1				1 -						lacksquare					
3.1 6 14 12 1		(FT.)	0.5	10.5°	10.5°	(FT.)	0 25	50	75	100	NUMBER	∠MOI.	. Ğ		DESCRI	PTION	
3.1 6 14 12 1	-	‡	1							-							
3.1 6 14 12 1	25.7	<u> </u>	7														
20.0	25:0 -	+ 0.0	′	7		'				-				BR	OWN ORGA	NIC CLAY, V	/ET
15.0	-	± 3.1	6	14	12		x	26		-	SS-45				(ALLO	7 101117	
15.0	20.0 -	<u></u>								-							
15.0	-	+ 01	7	101	12			 		-				CDAY	CANDY	U TV CLAV	WET
15.0	-	‡ 0.1	'	שו	12					-							
	15.0	士								-							
	-	± 13.1	6	8	10		X18			-	SS-46						
	10.0	_								_							
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5.0 +	5.0 -	Ŧ						\-		-							
	-	‡ 23.1	14	20	39			<u>-</u> -X	59	-	SS-47						
↓ 0.0	0.0									-							
[-	‡ 28.1	19	31	54	,			X-8	5							
+	-	‡ 23								-							
-5.0 +	-5.0 -	Ŧ								-							
	-	+ 33.1	10	18	72		F]90X	-	SS-48						
-10.0 	-10.0 -	\pm		-						-							
1 38, 11 20 40 1 [-	± 38.I	11	20	40			<u>-</u> -×	60	-]							
-15.0 +	-15 0 -	<u>+</u>								-							
	-	+								-							
+ 43.7 16 29 71 0.9	-	± 43.7	16	29	71	0.9				+*			0000				AND
-20.0 - CLAYEY SAND, SAT.	20.0 -	+								-11				CL	AYEY SAN	ND, SAT.	
+ 48.7 80 20 0.6	-	± 48.7	80	201		0.6				- +-¥	55-49						
-25.0 +	·25.0 -	+ '*'								-11	00 10						
	-	‡								-							
+ 53.7 21 49 51 1 - - - - - - - 	-	± 53.7	21	49	51												
-30.0 +	30.0	+								-							
\$\dagger \tau \tau \tau \tau \tau \tau \tau \tau	-	[‡] 58.2	14	37	63	0.8			100-	-			0000				
-35.0 	-35 . 0 -	<u></u>								-			0000				
	-	‡ ~ ~		27	70					-	CC E0		11	`			
63.2 8 27 73 0.8	-	‡ 63.2	Q	21	1/3	0.8					22-20		11				
-40.0 +	40.0 -	+								-			1				
\$\frac{1}{2} \frac{1}{2} \frac		‡ 68.2	59	41		0.6			בק-וסס	- 	SS-5I						
.3.0 + GRAY SANDY LIMESTONE, SAT.		<u></u>								-[]			片	GRA`	Y SANDY I	IMESTONE	SAT.
	-	‡								-				1 31.77			
74.1 32 68 1	-	+ 741	132	168	1				-ınd-	-\				GRAY F	TINE TO C	OARSE SANI	TAR

GEOTECHNICAL UNIT BORING LOG

	4.00										·····			SHEET 2 OF 2
PROJECT						B-36I3				AMPSON	GEOI	OGIST	A. NASH	
SITE DESC						ON NC								GROUND WATER
BORING N							9+47		OFFSET	II.0' RT.			-L-	0 HR. N.M.
COLLAR I						ORTHING	0.00	——————————————————————————————————————		EASTING		00		24 HR. N.M.
TOTAL DE						IINE CME-4				OD ROTA			HAMMER T	YPE MANUAL
START DA						LETION DAT			SUR	FACE WATE	/ 1			
ELEV.	DEPTH	í			1 1		WS PER 50	75	100	SAMPLE	MOI.	5	SOIL AN	
50.0	(FT.)	0.5	<u> 0.5</u>	0.5	(F I.)			13	100	NUMBER	/MOI.	} ::	DESCRI	FIION
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-55.0 -	† 79 . I	14	28	72	0.9				<u>\$_</u> +00	SS-52		CDAY	EINE TO CO	DARSE SAND, SAT.
] 55.0	\pm					l						GRAT	FINE TO CC	JARSE SAND, SAT.
-	84.1	15	36	64	0.8	E			Qσ+_X					
-60.0 -						 					!!!			
=	‡													
-65.0 -	<u> </u>					BORING	_ TERMI	VATED	T_					The state of the s
	<u> </u>					ELEV.	59.7 FE	ETIN	VĒRY					
	‡					DENSE	FINE I	O_COA	RSE_					
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 8.1421201 ID. B-3613 COUNTY BLADEN/SAMPSON GEOLOGIST M. M. HAGER	4
······································	UND WATER
COLLAR ELEVATION 37.9' NORTHING 0.00 EASTING 0.00 20+01 OFFSET 9.0' LT. ALIGNMENT -L- 0 H	
COLLAR ELEVATION 37.9' NORTHING 0.00 EASTING 0.00 24 F TOTAL DEPTH 59.5' DRILL MACHINE CME-45B DRILL METHOD ROTARY W/MUD HAMMER TYPE A	
START DATE 6/9/03 COMPLETION DATE 6/10/03 SURFACE WATER DEPTH N/A	JI OMATIC
DEPTHRIOW COUNTREN BLOWS PER FOOT CAMBLE TO COUNTRE	`K
ELEV. (FT.) 0.5/0.5/0.5/(FT.) 0 25 50 75 100 NUMBER MOI. G DESCRIPTION	/IX
37.9 O.O WOII 4 6	
TAN SILLY CLAY	WET
35.0 + 3.9 2 6 8 - + + + SS-22 (ALLUVIUM)	
+ 33), SAT.
30.0 + 8.0 6 10 12 1	CAT
25.0 + 13.0 7 10 17 1 +27 SS-23	
I I	
20.0 + 18.0 4 8 10 1 + 18	
GRAY SANDY SILTY	LAY, WET
15.0 + 23.0 4 8 8 1 +	
28.0 5 8 10 1 1 *18	
5.0 + 33.0 17 61 39 0.7 +	
0.0 + 38.0 30 52 48 0.9 [
-5.0 +43.0 18 23 21 1	ΔRSF
SAND, SAT.	AITOL
-I0.0 + 48.0 7 I5 35 I +	
-I5.0 + 53.0 I0 I2 22 I	
-I5.0 + 53.0 10 12 22 1 + X34 + SS-27 SS-27	
-20.0 - 58.0 9 19 46 1 - × 6 5	
<u> </u>	
-25.0 BORING_TERMINATED_AT	
-30.0 — DENSE FINE TO COARSE —	
-35.0 +	
±	
+	

GEOTECHNICAL UNIT BORING LOG

PROJECT	NO. 8.1	4212	OI -		ID.	B-36I3	COUNTY	BLA	DEN/	SAMPSON	·		GIST	M. M. HA		IEET	OF
SITE DESC	CRIPTION	BF				ON NC 41 C	VER SOU	TH RIV	VER							GROUNI	D WATER
BORING 1							+56		FFSET	15.0′ RT.		JGN	MENT	-L-		0 HR.	N.M.
COLLAR			40 . 2′			ORTHING	0.00			EASTING			0.00			24 HR.	3 . l′
TOTAL D						INE CME-45				OD ROTA				HAMMER	TYP	E AUTO	DMATIC
START D						LETION DATE			SUR	FACE WATE		TH	N/A				
ELEV.	DEPTH (FT.)	1					S PER F	75	100	SAMPLE NUMBER	MOI.	Ğ		SOIL A	ND RIPT	ROCK ION	
	+	0.5	10.5	0.5							/ IVI O I a						
	‡																
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35.0 -	3.9	3	8	10	1					SS-28		000	Τ		г сл	NID CA	-
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30.0 -	+					\											
	‡ 13.0	4	12	9	i					SS-29				GRAY FIN	JE S	VND C	۱т
25.0 -	_					-								ACK CRE			
	18.0	5	8	12													
20.0 -	<u> </u>			12	1												
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	<u> 23.</u> 0	4	4	8		[-X 12-				SS-30			G	RAY SIL	TY C	LAY. W	FT
15.0 -	<u>+</u>					[}-							Ĭ	012		,	_
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	43.0	14	20	24				_		SS-32				Y FINE T			
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG SHEET OF LOG

PROJECT		42120	01		ID.	B-36I3	CO	UNTY	BLADEN	/SAMPSON	GEOLO	GIST	М. М. НА		eet i	OF 1
SITE DESC						ON NC 4I		SOUTH								ID WATER
ORING N		2-B					1+03		OFFSE	I 15.0′ RT.	ALIGN		L_		O HR.	N.M.
COLLAR E			40.0			NORTHING		.00		EASTING		.00			24 HR.	I . 5′
TOTAL DE						HINE CME-				THOD ROTAR			HAMMER	TYPE	; AUT	OMATIC
START DA		,				LETION DAT				RFACE WATE	71	N/A				
ELEV.	DEPTH (FT.)	1			1			ER FO		SAMPLE NUMBER	MOI. G		SOIL A			
-	-							-		-						
40.0	‡			١.		 				-						
40.0	0.0	WUII	WUII								▼ >		TAN SILT	Y CL	AY. WE	ΞT
-	3.9	3	7	8	١,	15]					LUVIU		
35.0 -			ļ '		'	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				SS-15		TANI	FINIT TO			ND CAT
_	8.0	8	13	16	١,		 (-29		<u> </u>	SS-16		IAN	FINE TO	CUARS	SE SA	ND, SAT.
30.0	_															
-	<u> </u>						<u> </u>		 	-			GRAY FIN			
25.0	13.0	9	15	17			X-32 -			-		(8	SLACK CR	EEK F	UKMA	HON)
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_	23.0	8	18	34		 		 X-5-2		SS-18						
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-	28.0	9	17	24		l	X-41 /			-						
10.0	-						-/ -/			-						
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B-3613 Bridge No. 44 on NC 41 over South River

HOLE#	SAMPLE#	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	ΡI	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					13.0-14.5	50.0	
	SS-4	100	96	26	19.9	54.9	4.6				, ,	23.0-24.5		
	SS-5	100	95	77	10.7	13.2	14.4					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.
B2-A	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		
B3-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/Sampson
DESCRIPTION (1): Bridge No. 44 on NC 41 over South River
INFORMATION ON EXISTING BRIDGES Information obtained from x field inspection microfilm (Reel: Position: other
COUNTY BRIDGE NO. 44 BRIDGE LENGTH 320.5' NO. BENTS 9 NO. BENTS IN CHANNEL 2 FLOOD PLAIN 7
FOUNDATION TYPE: Concrete cap on timber piles
EVIDENCE OF SCOUR (2):
ABUTMENTS OR END BENT SLOPES: None noted
INTERIOR BENTS: None noted
CHANNEL BED: None noted
CHANNEL BANKS: None noted
EXISTING SCOUR PROTECTION:
TYPE (3): Concrete end slopes and walls
EXTENT (4): Approximately 10 feet from end of bridge towards river and 10 feet from outside edge of bridge
EFFECTIVENESS (5): Appears sastisfactory
OBSTRUCTIONS (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

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FLOOD PLAIN WIDTH (10): 800± feet
FLOOD PLAIN COVER (11): Wooded
STREAM IS X DEGRADING AGGRADING EQUILIBRIUM (12)
OTHER OBSERVATIONS AND COMMENTS:
CHANNEL MIGRATION TENDENCY (13): Channel is entrenched and appears stable
GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14): Scour depths should generally approximate theoretical
scour 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 the
material strength of very stiff sandy silty clay yields a scour elevation of $20\pm$ feet at Bent 2 and $18\pm$ feet at Bent 3.
These scour elevations are 6 to 8 feet higher than the respective overtopping scour elevation provided by the
Hydraulics 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.
- 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