

PROJECT: 32595.1.1 ID: B-1382

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 32595.1.1 I.D. NO. B-1382
F.A. PROJECT BRSTP-41 (8)
COUNTY SAMPSON
PROJECT DESCRIPTION BRIDGE 12 ON
NC 41 OVER BLACK RIVER AT -L-
STATION 18+07.50

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	32595.1.1 (B-1382)	1	11
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
	BRSTP-41(8)	P.E. CONST.	

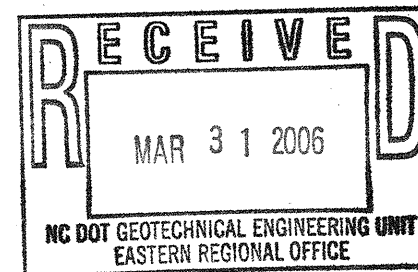
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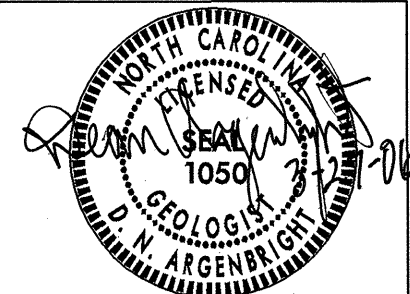
INVESTIGATED BY F. M. WESCOTT PERSONNEL K. B. QUICK
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SUBMITTED BY D. N. ARGENBRIGHT R. E. SMITH
DATE MARCH 2006



DRAWN BY: C. M. KENT

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 32595.1(I)(B-1382)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY-SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6</i>	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) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF 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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. 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. 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) 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 PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SRCR) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
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-3, A-4, A-5, A-6, A-7 SYMBOL	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SILT-CLAY OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP
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, 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 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4	MISCELLANEOUS SYMBOLS 	TEST BORING DESIGNATIONS S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RM - RESILIENT MODULUS SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGER NAIL.
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 (C.S. 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	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 HI. - 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	FRACATURE SPACING TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET BEDDING TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-51, BK-51, CME-45C, CME-550, PORTABLE HOIST, OTHER CME-45B, OTHER ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING W/ ADVANCER, TRICONE 2 1/8" STEEL TEETH, TRICONE " TUNG-CARB., CORE BIT, OTHER HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST, OTHER
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	PLASTICITY NONPLASTIC LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW, SLIGHT, MEDIUM, HIGH	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	FRACATURE SPACING BENCH MARK: BM# I.R.R. SPIKE IN 12" PINE TREE AT -BL- STATION 10+31, 60' LT ELEVATION: 46.08 FT. NOTES:
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.			



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 29, 2006

STATE PROJECT: 32595.1.1 B-1382
F. A. PROJECT: BRSTP-41(8)
COUNTY: Sampson
DESCRIPTION: Bridge No. 12 on NC 41 (Tomahawk Rd) over Black River

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for
NC 41 (Tomahawk Rd) over Black River at -L- Station
18+07.50

Site Description

The proposed bridge site is located at the existing NC 41 bridge over Black River approximately 4± miles east of Harrells. The replacement structure will be constructed along the existing NC 41 alignment. Based on the proposed design, the new structure will have four spans with a total length of 265 feet. The bents will have a skew of 90 degrees.

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 were made with ATV mounted CME-45B drill machine and were advanced by rotary drill methods using bentonite drilling fluid.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by Recent alluvial deposits, upland soils, and Cretaceous age soils of the Black Creek Formation. Topography at the site is nearly flat to gentle sloping. Elevations at the site range from 16± feet along the channel bed to 46± feet along the existing NC 41 roadway. Artesian flow was noted at the site in the borings at Bents 2, 3, 4, and End Bent 2. The hydraulic head was measured at an elevation of 28± feet. The natural ground water at End Bent 1 and Bent 1 occurs at an elevation of 36± feet. The true water levels east of the river will generally match the stream flow line. The surface of Black River was at an elevation of 23± feet.

Soil Description

Subsurface conditions at the site are relatively uniform. Surficial alluvial soils generally consist of very soft to soft sandy silt (A-4) and very loose to loose sand (A-2-4) with trace to moderate amounts of organics as well as very loose to loose sand (A-1-b, A-2-4, A-3) east of the river. Tested organic samples within the silts and sands ranged from 0.8 to 5 percent. A 3± to 7± foot thick upland deposit was noted at End Bent 1 and Bent 1. The upland soils consist of very loose sand (A-1-b, A-3). Soils belonging to the Cretaceous age Black Creek Formation underlie the alluvial and upland deposits at elevations ranging from 12± to 30± feet. Soils of the Black Creek Formation consist of loose to very dense sand (A-2-4, A-2-6, A-3).

Based on the proposed design, the existing grade will be raised 1± foot at the proposed bridge site. The existing roadway embankment at the end bents consists of 3± to 7± feet of very loose to loose sand (A-3). The proposed end bent slopes will be mainly constructed within the existing embankment. Some additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

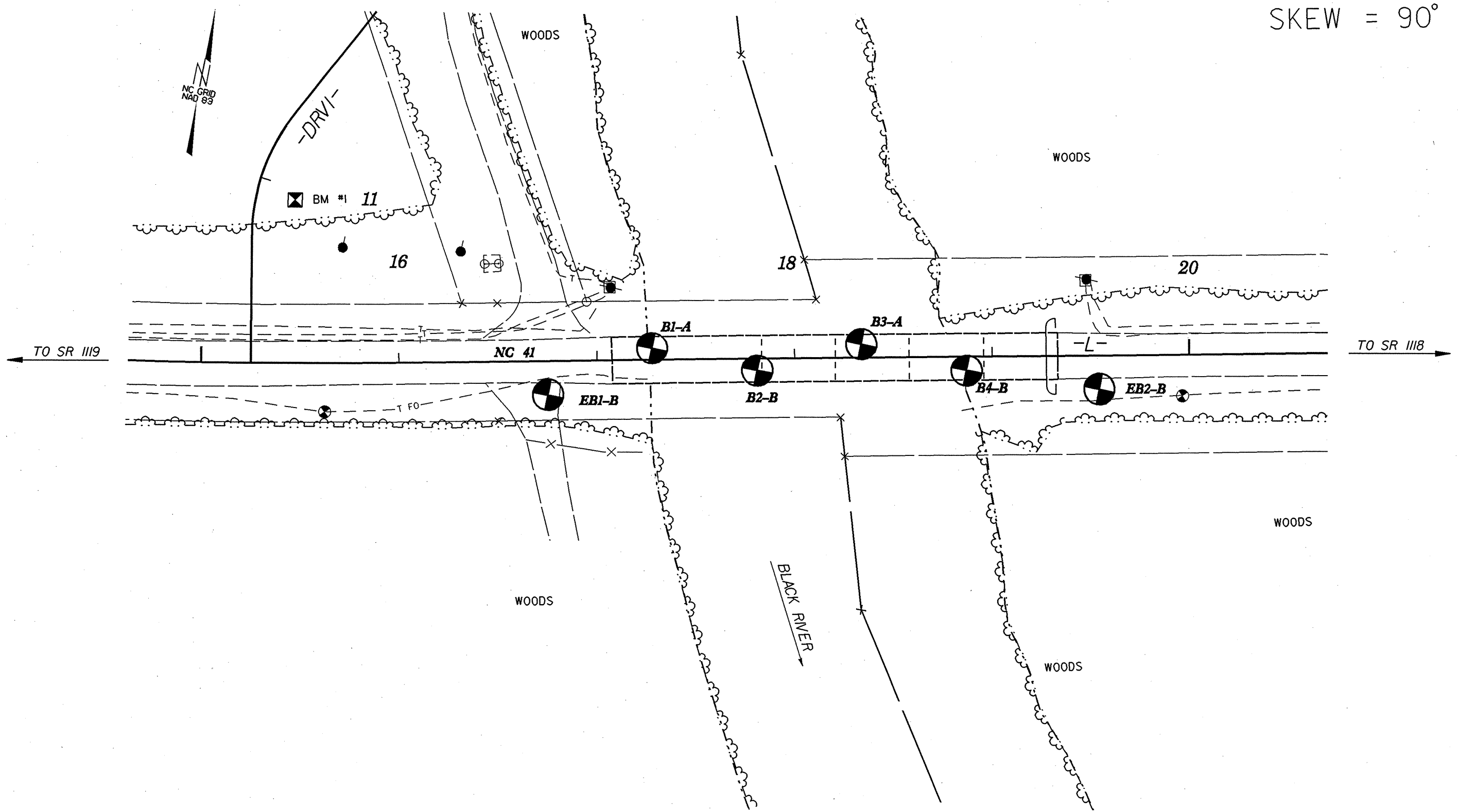
The Geotechnical foundation report is based on the Bridge Survey and Hydraulic Design Report dated October 19, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared By:

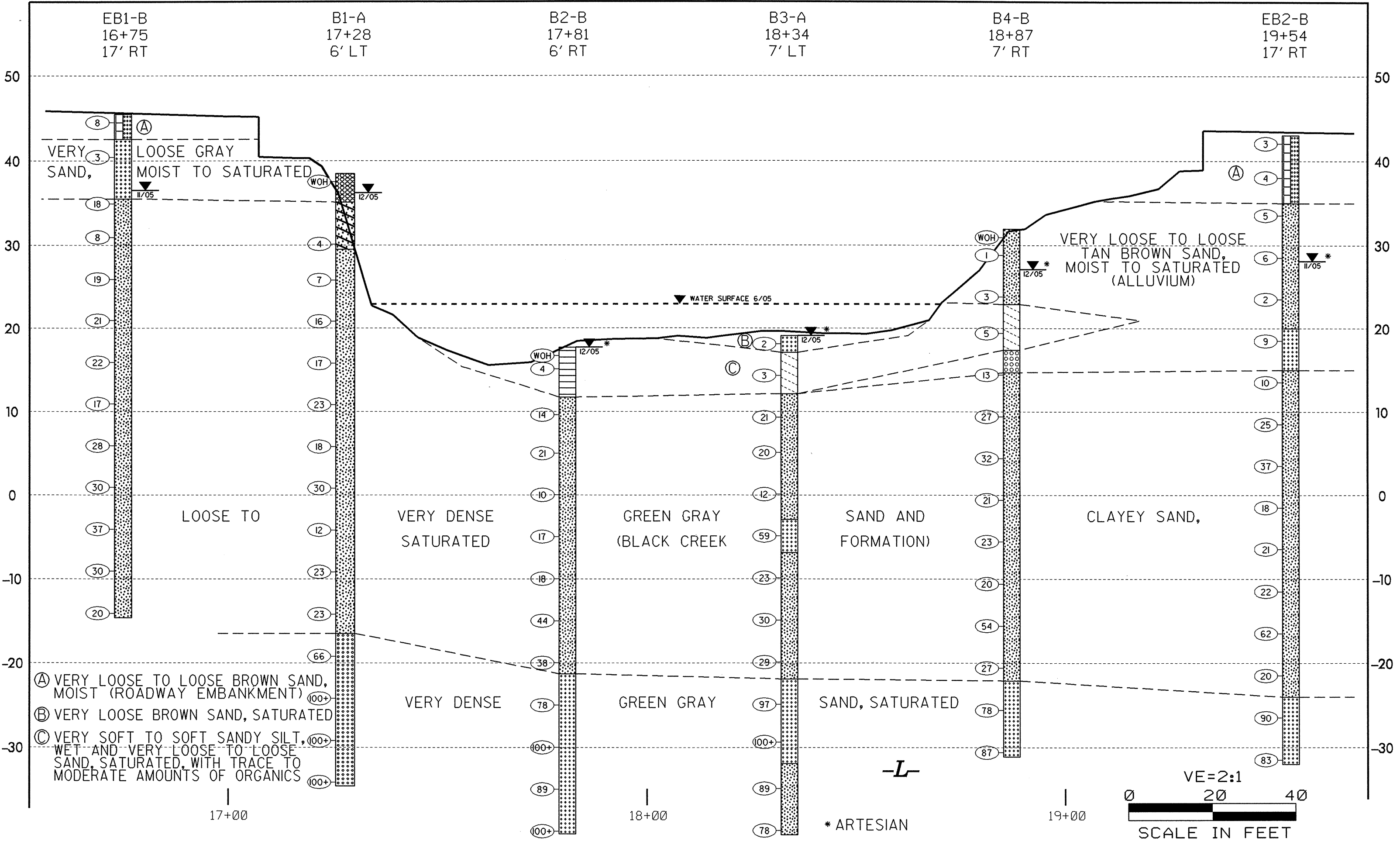
Fred M. Wescott III
Project Engineering Geologist

PROJECT REFERENCE NO.	SHEET
32595.1.1(B-1382)	4
SITE PLAN	
FEET	

SKEW = 90°



PROFILE OF BORINGS ALONG -L-



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 6 OF 11

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 12 ON NC 41 OVER BLACK RIVER							GROUND WATER						
BORING NO. EBI-B		BORING LOCATION 16+75		OFFSET 17' RT		ALIGNMENT -L-							
COLLAR ELEVATION 45.5'		NORTHING 351265		EASTING 2218433		0 HR. N/A							
TOTAL DEPTH 60.1'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 11/08/05		COMPLETION DATE 11/08/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
45.0	0.0	2	5	3	1.0								
40.0	4.1	2	1	2	1.0	X-3						SS-1	BROWN TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
35.0	8.6	6	10	8	1.0	X-18						SS-2	GRAY SAND, MOIST TO SATURATED
30.0	13.6	3	2	6	1.0	X-8						SS-3	
25.0	18.6	5	7	12	1.0	X-19						SS-4	
20.0	23.6	13	9	12	1.0	X-21						SS-5	
15.0	28.6	6	9	13	1.0	X-22						SS-4	GREEN GRAY SAND, SATURATED (BLACK CREEK FORMATION)
10.0	33.6	5	7	10	1.0	X-17						SS-5	
5.0	38.6	8	11	17	1.0	X-28						SS-6	
0.0	43.6	7	13	17	1.0	X-30							
-5.0	48.6	6	12	25	1.0	X-37							
-10.0	53.6	8	12	18	1.0	X-30							
-15.0	58.6	7	8	12	1.0	X-20							
BORING TERMINATED AT ELEVATION -14.6 IN MEDIUM DENSE SAND													

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 12 ON NC 41 OVER BLACK RIVER							GROUND WATER						
BORING NO. BI-A		BORING LOCATION 17+28		OFFSET 6' LT		ALIGNMENT -L-							
COLLAR ELEVATION 38.5'		NORTHING 351298		EASTING 2218480		0 HR. N/A							
TOTAL DEPTH 73.1'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 12/05/05		COMPLETION DATE 12/06/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
38.5	0.0	WOH	WOH	WOH	1.0	X-0							
35.0	2.4	1	2	2	1.0	X-4						SS-28	BROWN SAND, MOIST TO SATURATED
30.0	7.4	3	3	4	1.0	X-7						SS-29	
25.0	11.7	5	6	10	1.0	X-16						SS-30	
20.0	16.7	4	5	12	1.0	X-17						SS-31	
15.0	21.7	8	9	14	1.0	X-23						SS-31	GREEN GRAY CLAYEY SAND AND SAND, SATURATED (BLACK CREEK FORMATION)
10.0	26.7	4	8	10	1.0	X-18						SS-31	
5.0	31.7	13	14	16	1.0	X-30						SS-31	
0.0	36.7	4	5	7	1.0	X-12						SS-31	
-5.0	41.7	6	10	13	1.0	X-23						SS-31	
-10.0	46.7	7	10	13	1.0	X-23						SS-31	
-15.0	51.7	6	8	15	1.0	X-23						SS-32	
-20.0	56.7	10	32	34	1.0	X-66						SS-33	
-25.0	61.7	33	63	37	0.6	100+ X						SS-33	
-30.0	66.7	35	46	54	1.0	100+ X						SS-33	
-35.0	71.7	26	50	50	0.9	100+ X						SS-33	
BORING TERMINATED AT ELEVATION -34.6 IN VERY DENSE SAND													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 7 OF 11

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK	
SITE DESCRIPTION BRIDGE NO.12 ON NC 41 OVER THE BLACK RIVER							GROUND WATER
BORING NO. B2-B		BORING LOCATION 17+81		OFFSET 6' RT		ALIGNMENT -L-	
COLLAR ELEVATION 17.7'		NORTHING		EASTING		24 HR. ARTESIAN	
TOTAL DEPTH 58.0'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC	
START DATE 12/08/05		COMPLETION DATE 12/08/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 1.0' 1.5'	0 1.0	0 25 50 75 100			
17.7	0.0	WOH	1.0	X 4			
15.0	1.6	1 2 2	1.0		SS-39		BROWN TAN COARSE SANDY SILT WITH TRACE AMOUNTS OF ORGANICS, WET (ALLUVIUM)
10.0	7.1	3 5 9	1.0	X 14			
5.0	11.7	5 8 13	1.0	X 21	SS-40		
0.0	16.7	3 4 6	1.0	X 10			
-5.0	21.7	7 8 9	1.0	X 17			
-10.0	26.7	5 7 11	1.0	X 18	SS-41		GREEN GRAY SAND WITH THIN CLAY LAYERS, SATURATED (BLACK CREEK FORMATION)
-15.0	31.7	8 15 29	1.0	X 44			
-20.0	36.7	13 18 20	1.0	X 38	SS-42		
-25.0	41.7	30 38 40	1.0	X 78			
-30.0	46.7	39 56 44	1.0	100+			
-35.0	51.7	25 35 54	1.0	X 89	SS-43		
-40.0	56.7	28 67 33	1.0	100+			
BORING TERMINATED AT ELEVATION -40.3' IN VERY DENSE SAND							

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK	
SITE DESCRIPTION BRIDGE NO.12 ON NC 41 OVER THE BLACK RIVER							GROUND WATER
BORING NO. B3-A		BORING LOCATION 18+34		OFFSET 7' LT		ALIGNMENT -L-	
COLLAR ELEVATION 19.1'		NORTHING		EASTING		24 HR. ARTESIAN	
TOTAL DEPTH 59.5'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC	
START DATE 12/07/05		COMPLETION DATE 12/07/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 0.5' 0.5'	0 1.0	0 25 50 75 100			
19.1	0.0	WOH 1 1	1.0	X 2			
15.0	3.8	1 1 2	1.0	X 3	SS-34		BROWN TAN SAND, SATURATED (ALLUVIUM)
10.0	8.8	6 10 11	1.0	X 21	SS-35		BROWN SAND WITH TRACE AMOUNTS OF ORGANICS, SATURATED
5.0	13	9 9 11	1.0	X 20			
0.0	18	5 5 7	1.0	X 12			
-5.0	23	22 27 32	1.0	X 59	SS-36		GREEN GRAY SAND WITH THIN CLAY LAYERS, SATURATED (BLACK CREEK FORMATION)
-10.0	28	6 9 14	1.0	X 23			
-15.0	33	5 9 21	1.0	X 30			
-20.0	38	5 9 20	1.0	X 29	SS-37		
-25.0	43	21 39 58	1.0	97			
-30.0	48	46 54	0.4	100+			
-35.0	53	15 35 54	1.0	X 89	SS-38		
-40.0	58	30 33 45	1.0	X 78			
BORING TERMINATED AT ELEVATION -40.3' IN VERY DENSE SAND							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 12 ON NC 41 OVER BLACK RIVER							GROUND WATER						
BORING NO. B4-B		BORING LOCATION 18+87		OFFSET 7' RT		ALIGNMENT -L-							
COLLAR ELEVATION 31.9'		NORTHING 351319		EASTING 2218639		0 HR. N/A							
TOTAL DEPTH 63.0'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 12/08/05		COMPLETION DATE 12/13/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
31.9	0.0	W	0	W	1.0	X0							
30.0	2.1	1	0	1	1.0	X1							
25.0	7.1	2	1	2	1.0	X3							
20.0	11.5	2	3	2	1.0	X5							
15.0	16.5	4	6	7	1.0	X13							
10.0	21.5	8	11	16	1.0	X27							
5.0	26.5	10	14	18	1.0	X32							
0.0	31.5	6	8	13	1.0	X21							
-5.0	36.5	6	9	14	1.0	X23							
-10.0	41.5	6	8	12	1.0	X20							
-15.0	46.5	9	17	37	1.0	X54							
-20.0	51.5	7	10	17	1.0	X27							
-25.0	56.5	22	43	35	1.0	X78							
-30.0	61.5	31	46	41	1.0	X87							
BORING TERMINATED AT ELEVATION -31.4 IN VERY DENSE SAND													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 12 ON NC 41 OVER BLACK RIVER							GROUND WATER						
BORING NO. EB2-B		BORING LOCATION 19+54		OFFSET 17' RT		ALIGNMENT -L-							
COLLAR ELEVATION 43.0'		NORTHING 351323		EASTING 2218706		0 HR. N/A							
TOTAL DEPTH 75.0'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 11/10/05		COMPLETION DATE 11/10/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
43.0	0.0	1	1	2	1.0	X3							
40.0	4.0	2	1	3	1.0	X4							
35.0	8.5	1	2	3	1.0	X5							
30.0	13.5	2	3	3	1.0	X6							
25.0	18.5	1	1	1	1.0	X2							
20.0	23.5	5	4	5	1.0	X9							
15.0	28.5	3	4	6	1.0	X10							
10.0	33.5	7	10	15	1.0	X25							
5.0	38.5	9	16	21	1.0	X37							
0.0	43.5	4	7	11	1.0	X18							
-5.0	48.5	6	8	13	1.0	X21							
-10.0	53.5	6	8	14	1.0	X22							
-15.0	58.5	10	21	41	1.0	X62							
-20.0	63.5	5	8	12	1.0	X20							
-25.0	68.5	13	30	60	1.0	X90							
-30.0	73.5	18	39	44	1.0	X83							
BORING TERMINATED AT ELEVATION -32.0 IN VERY DENSE SAND													

B-1382
Bridge No. 12 on NC 41 over Black River

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB1-B	SS-1	93	56	10	62.4	28.6	3.4	5.6	16	NP	A-3(0)	4.1-5.6		
	SS-2	97	69	21	56.6	22.2	7.6	13.6	33	6	A-2-4(0)	13.6-15.1		
	SS-3	92	60	14	67.8	18.2	4.4	9.6	24	NP	A-2-4(0)	18.6-20.1		
	SS-4	98	93	21	43.6	3.6	41.2	11.6	20	NP	A-2-4(0)	33.6-35.1		
	SS-5	100	92	18	61.2	21.8	7.4	9.6	19	NP	A-2-4(0)	43.6-45.1		
	SS-6	90	88	23	12.0	62.8	9.6	15.6	18	NP	A-2-4(0)	58.6-60.1		
EB2-B	SS-20	100	99	10	21.8	68.7	3.8	5.7	14	NP	A-3(0)	4.0-5.5		
	SS-21	100	100	23	8.3	71.7	10.3	9.7	19	NP	A-2-4(0)	18.5-20.0		
	SS-22	100	87	3	73.3	24.2	0.8	1.6	14	NP	A-3(0)	23.5-25.0		
	SS-23	NOT	ENOUGH	SAMPLE	-	-	-	-	-	-	-	28.5-30.0	27.5	
	SS-24	100	99	12	28.3	60.0	6.1	5.7	15	NP	A-2-4(0)	33.5-35.0		
	SS-25	100	99	13	10.5	77.2	8.7	3.6	14	NP	A-2-4(0)	48.5-50.0		
	SS-26	100	85	30	41.2	31.9	11.1	15.8	23	NP	A-2-4(0)	63.5-65.0		
	SS-27	100	100	5	8.3	87.3	0.8	3.6	14	NP	A-3(0)	68.5-70.0		
B1-A	SS-28	88	46	11	64.7	24.8	0.5	10.0	20	NP	A-1-b(0)	1.0-1.5		
	SS-29	100	69	23	57.9	20.5	0.5	21.2	38	19	A-2-6(1)	7.4-8.9		
	SS-30	98	91	28	14.6	58.8	7.5	19.2	29	3	A-2-4(0)	16.7-18.2		
	SS-31	100	99	14	24.2	62.9	1.8	11.1	23	NP	A-2-4(0)	31.7-33.2		
	SS-32	100	96	26	19.6	57.3	4.0	19.2	30	6	A-2-4(0)	51.7-53.2		
	SS-33	100	99	9	16.5	75.6	0.8	7.0	24	NP	A-3(0)	61.7-62.8		
B3-A	SS-34	98	55	4	63.1	32.9	1.5	5.1	25	NP	A-3(0)	1.0-1.5		
	SS-35	100	98	14	25.5	61.9	1.5	11.1	21	NP	A-2-4(0)	8.8-10.3		
	SS-36	100	99	10	25.3	66.0	0.7	8.1	23	NP	A-3(0)	23.0-24.5		
	SS-37	100	96	24	21.8	55.8	4.2	18.1	26	NP	A-2-4(0)	38.0-39.5		
	SS-38	100	100	11	9.7	81.3	0.0	9.1	23	NP	A-2-4(0)	53.0-54.5		
B2-B	SS-39	97	77	51	33.3	14.1	47.6	5.0	24	NP	A-4(0)	1.6-3.1		
	SS-40	100	98	13	29.1	58.6	0.2	12.1	21	NP	A-2-4(0)	11.7-13.2		
	SS-41	100	99	27	20.4	54.1	3.3	22.2	28	4	A-2-4(0)	26.7-28.2		
	SS-42	100	99	12	12.0	76.7	1.2	10.1	26	NP	A-2-4(0)	36.7-38.2		
	SS-43	100	100	10	6.8	84.3	1.9	7.1	19	NP	A-3(0)	51.7-53.2		
B4-B	SS-44	100	99	21	10.4	72.4	5.1	12.1	25	NP	A-2-4(0)	1.0-1.5		
	SS-45	92	91	20	12.9	68.4	6.6	12.1			NOT ENOUGH	11.5-13.0	5.1	
	SS-46	100	98	14	30.1	57.0	4.8	8.1	23	NP	A-2-4(0)	21.5-23.0		
	SS-47	100	99	16	9.5	75.4	3.0	12.1	27	NP	A-2-4(0)	36.5-38.0		
	SS-48	100	98	8	8.3	85.3	2.4	4.0	24	NP	A-3(0)	56.5-58.0		

0.8

32595.1.1 B-1382
Sampson Co.
Bridge No. 12 on NC 41 over Black River



View Looking East Toward End Bent 2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	32595.1.1 (B-1382)	1	11
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
	BRSTP-41(8)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 32595.1.1 I.D. NO. B-1382
 F.A. PROJECT BRSTP-41 (8)
 COUNTY SAMPSON
 PROJECT DESCRIPTION BRIDGE 26 ON
NC 41 (TOMAHAWK RD) OVER
BLACK RIVER OVERFLOW AT -L-
STATION 38+37

CONTENTS:

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	STRUCTURE INVENTORY REPORT
4	TEST SITE PLAN
5	PROFILE
6-8	BORE LOGS
9	SCOUR REPORT
10	SOIL TEST RESULTS
11	SITE PHOTOGRAPH

CAUTION NOTICE

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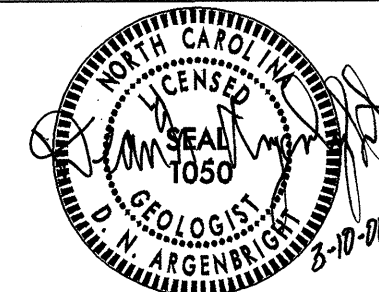
INVESTIGATED BY F. M. WESCOTT PERSONNEL K. B. QUICK
 CHECKED BY D. N. ARGENBRIGHT W. N. CHERRY
 SUBMITTED BY D. N. ARGENBRIGHT R. E. SMITH
 DATE MARCH 2006

CONTRACT: ID: B-1382

DRAWN BY: C. M. KENT

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.

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 32595.11(B-1382)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>		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). GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF 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:  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. 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. 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF 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 PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE			
CONSISTENCY OR DENSENESS		GROUND WATER		MISCELLANEOUS SYMBOLS		ROCK HARDNESS					
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		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 SOUNDING ROD		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.					
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING					
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		AR - AUGER REFUSAL HI. - HIGHLY BT - BORING TERMINATED MED. - MEDIUM CL - CLAY MICA - MICACEOUS CPT - CONE PENETRATION TEST MOD. - MODERATELY CSE. - COARSE NP - NON PLASTIC DMT - DILATOMETER TEST ORG. - ORGANIC DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST e - VOID RATIO SAP. - SAPROLITIC F - FINE SD. - SAND, SANDY FOSS. - FOSSILIFEROUS SL. - SILT, SILTY FRAC. - FRACTURED, FRACTURES SLL. - SLIGHTLY FRAGS. - FRAGMENTS TCR - TRICONE REFUSAL		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST OTHER CME 45B OTHER ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/16" *STEEL TEETH TRICONE *TUNG-CARB. CORE BIT OTHER		TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET					
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		BEDDING		INDURATION					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OH - OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER		VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		BENCH MARK: BM # 2 -- R.R. SPIKE SET IN 6' OAK TREE AT -BL- STA. 40+30, 195' LT. ELEVATION: 39.25 FT.					
NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH LOW PLASTICITY 0-5 VERY LOW MED. PLASTICITY 6-15 SLIGHT HIGH PLASTICITY 16-25 MEDIUM 26 OR MORE HIGH		OTHER CME 45B OTHER		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		NOTES:					
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION					
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.		OTHER CME 45B OTHER		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		INDURATION					



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 10, 2006

STATE PROJECT: 32595.1.1 B-1382
F. A. PROJECT: BRSTP-41(8)
COUNTY: Sampson
DESCRIPTION: Bridge No. 26 on NC 41 (Tomahawk Rd) over Black River
Overflow

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for
NC 41 (Tomahawk Rd) over Black River Overflow at -L-
Station 38+37

Site Description

The proposed bridge site is located at the existing NC 41 over Black River Overflow approximately 4± miles east of Harrells. The replacement structure will be constructed along the existing NC 41 alignment. Based on the proposed design, the new structure will have four spans with a total length of 200 feet. The bents will have a skew of 120 degrees.

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 were made with ATV mounted CME-45B drill machine and were advanced by rotary drill methods using bentonite drilling fluid.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by Recent alluvial deposits and Cretaceous age soils of the Black Creek Formation. Topography at the site is nearly flat to gentle sloping. Elevations at the site range from 29± feet along the channel bed to 43± feet along the existing NC 41 roadway. Artesian flow was noted in all borings drilled at the site. The hydrostatic head elevations ranged from 33± feet to 34± feet within the bore holes. The true water levels will generally match the stream flow line. The surface of Black River Overflow was at an elevation of 31± feet.

Soil Description

Subsurface conditions at the site are relatively uniform. Surficial alluvial soils generally consist of 2± to 6± feet of very soft to stiff silt (A-4) and very loose sand (A-2-4) with trace to moderate amounts of organics underlain by loose to dense sand (A-1-b, A-2-4, A-3). Tested organic samples within the silts and sands ranged from 4 to 14 percent. Soils belonging to the Cretaceous age Black Creek Formation underlie the alluvial deposits at elevations ranging from 23± to 27± feet. Soils of the Black Creek Formation consist of 6± to 16± feet of very loose to very dense sand (A-1-a, A-1-b, A-2-4, A-3) underlain by 3± to 13± feet of stiff to very stiff clayey silt (A-4) and sandy silty clay (A-7-5, A-7-6). The cohesive deposits are underlain at elevations ranging from 4± to 10± feet by medium dense to very dense sand and clayey sand (A-2-4, A-2-6). Approximately 4 feet of calcareous sandstone was encountered within the sands in boring EB2-A at an elevation of -1± feet.

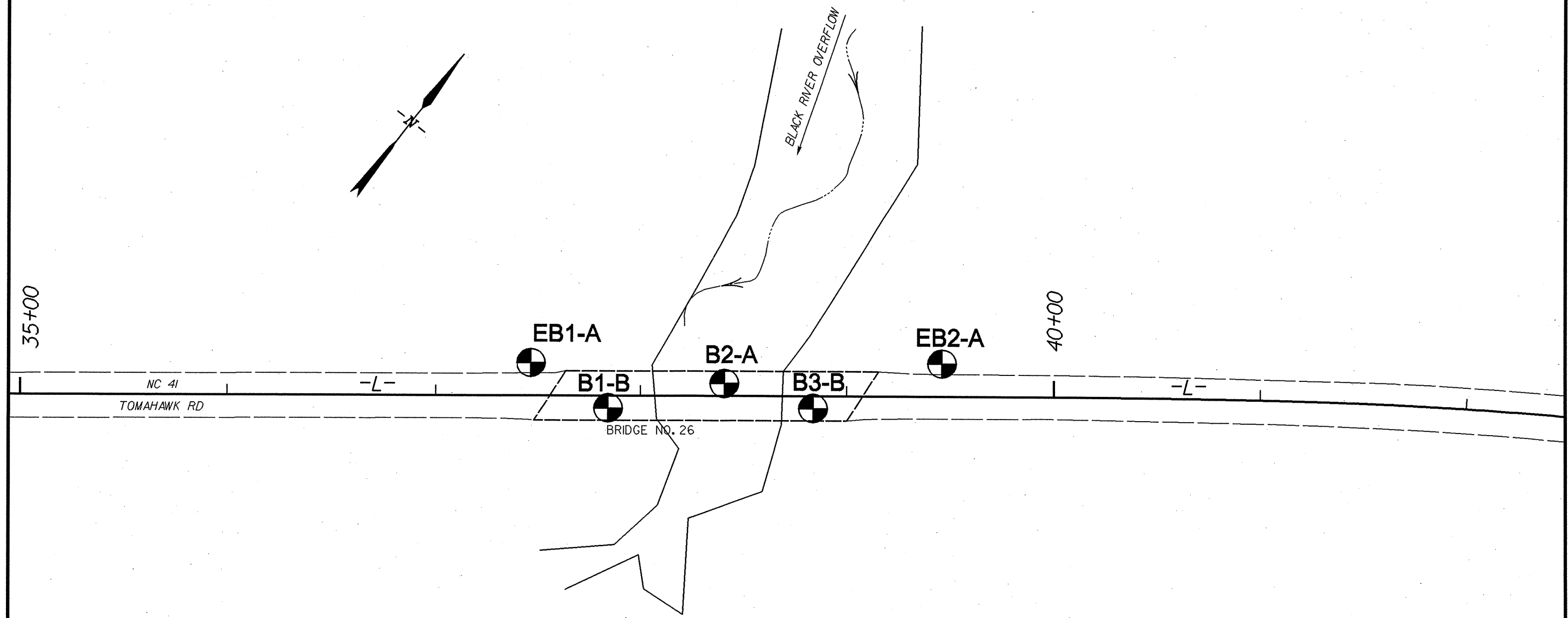
Based on the proposed design, the existing grade will be raised 1± foot at the proposed bridge site. The existing roadway embankment at the end bents consists of 11± feet of very loose to medium dense sand (A-2-4, A-3). The proposed end bent slopes will be mainly constructed within the existing embankment. Some additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

The Geotechnical foundation report is based on the Bridge Survey and Hydraulic Design Report dated August 2, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

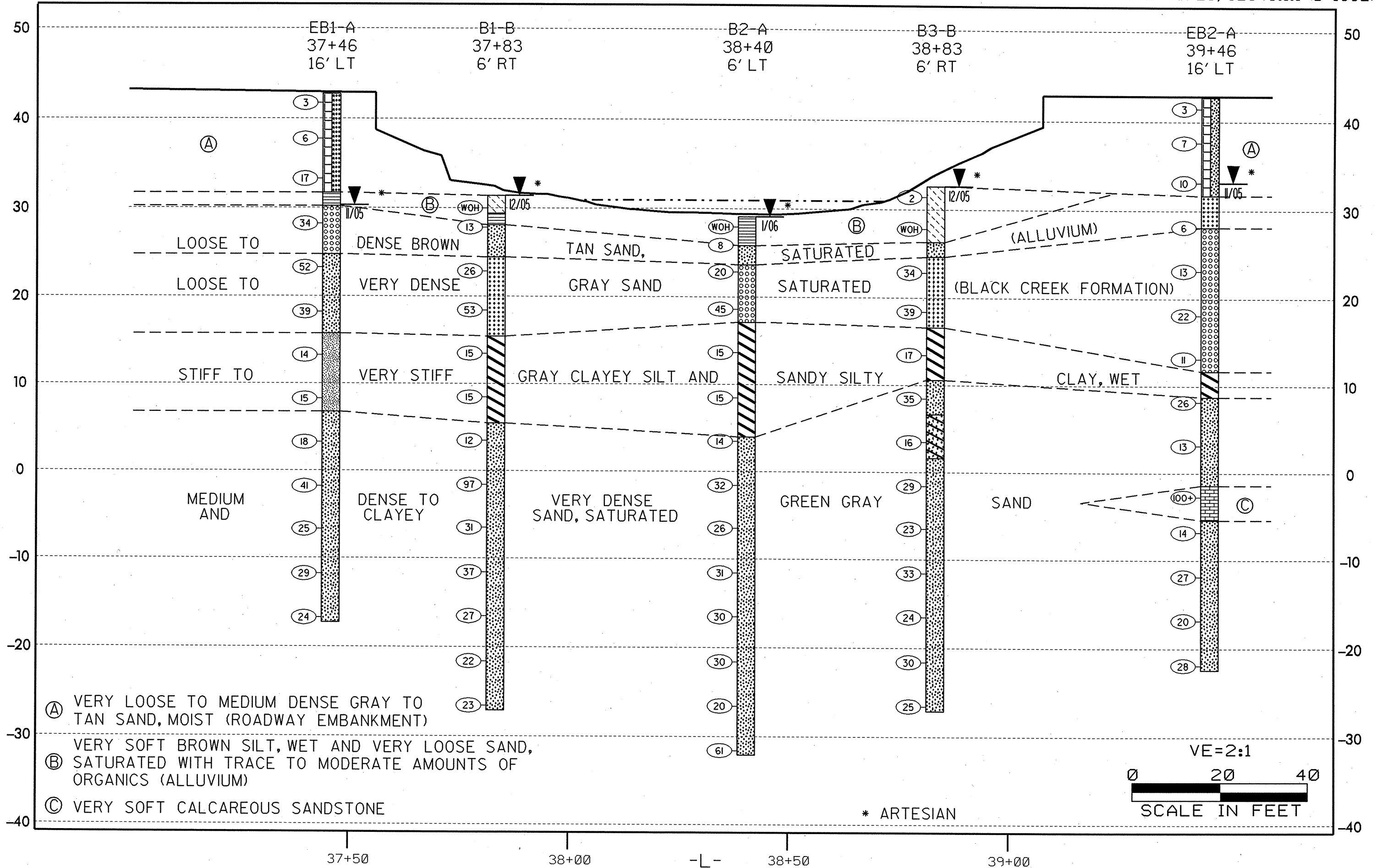
Prepared By:

Fred M. Wescott III
Project Engineering Geologist

TEST SITE PLAN



PROFILE THROUGH BORINGS PROJECTED ALONG -L-



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 32595.I.I		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 26 ON NC41 OVER BLACK RIVER OVERFLOW							GROUND WATER						
BORING NO. EBI-A		BORING LOCATION 37+46		OFFSET 16' LT		ALIGNMENT -L-							
COLLAR ELEVATION 42.7'		NORTHING 352228		EASTING 2220225		0 HR. N.M.							
TOTAL DEPTH 60.0'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 11/9/05		COMPLETION DATE 11/9/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
42.7	0.0	1	1	2	1								
40.0	4.0	2	2	4	1							SS-7	GRAY TAN SAND, MOIST (ROADWAY EMBANKMENT)
35.0	8.5	5	7	10	1								
30.0	13.5	10	15	19	1							SS-8	BROWN MOD. ORGANIC SILT (ALLUVIUM) GRAY SAND, SAT.
25.0	18.5	12	19	33	1								
20.0	23.5	9	18	21	1							SS-9	GRAY SAND, SAT. (BLACK CREEK FORMATION)
15.0	28.5	4	6	8	1						25%	SS-10	GRAY CLAYEY SILT, WET
10.0	33.5	5	6	9	1								
5.0	38.5	5	7	11	1							SS-11	
0.0	43.5	5	15	26	1								
-5.0	48.5	5	12	13	1								
-10.0	53.5	9	12	17	1								
-15.0	58.5	8	11	13	1								
BORING TERMINATED AT ELEVATION -17.3' IN MEDIUM DENSE SAND													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 6 OF 11

PROJECT NO. 32595.I.I		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK							
SITE DESCRIPTION BRIDGE NO. 26 ON NC41 OVER BLACK RIVER OVERFLOW							GROUND WATER						
BORING NO. BI-B		BORING LOCATION 37+83		OFFSET 6' RT		ALIGNMENT -L-							
COLLAR ELEVATION 31.4'		NORTHING 352234		EASTING 352234		0 HR. N.M.							
TOTAL DEPTH 58.5'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 12/20/05		COMPLETION DATE 12/21/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	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
31.4	0.0	WOH	WOH	WOH	1								
30.0	2.6	1	5	8	1							SS-56	BROWN SAND WITH TRACE OF ORGANICS, MOIST TO SAT. (ALLUVIUM)
												SS-57	BROWN SILT WITH TRACE OF ORGANICS, WET TAN SAND, SAT.
25.0	7.6	5	11	15	1								
20.0	12.0	9	23	30	1							SS-58	GREEN GRAY SAND, SAT (BLACK CREEK FORMATION)
15.0	17.0	3	7	8	1							SS-59	4% GRAY SANDY SILTY CLAY, WET
10.0	22.0	4	5	10	1								
5.0	27.0	3	6	6	1								
0.0	32.0	23	45	52	1							SS-60	
-5.0	37.0	6	12	19	1								
-10.0	42.0	12	13	24	1								
-15.0	47.0	7	12	15	1								
-20.0	52.0	5	9	13	1							SS-61	GREEN GRAY SAND, SAT.
-25.0	57.0	6	9	14	1								
BORING TERMINATED AT ELEVATION -27.1' IN MEDIUM DENSE SAND													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 7 OF 11

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK									
SITE DESCRIPTION BRIDGE NO. 26 ON NC41 OVER BLACK RIVER OVERFLOW							GROUND WATER								
BORING NO. B2-A		BORING LOCATION 38+40		OFFSET 6' LT		ALIGNMENT									
COLLAR ELEVATION 29.1'		NORTHING 352278		EASTING 2220305		0 HR. N.M.									
TOTAL DEPTH 61.2'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC									
START DATE 1/4/06		COMPLETION DATE 1/5/06		SURFACE WATER DEPTH 1.8'		DEPTH TO ROCK N/A									
ELEV. (FT.)	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					
29.1	0.0	WOH	WOH	WOH	1										BROWN MODERATELY ORGANIC SILT, WET (ALLUVIUM)
	2.3	1	3	5	1										BROWN TAN SAND, SAT.
25.0	5.3	5	10	10	1										GRAY SAND, SAT (BLACK CREEK FORMATION)
20.0	9.5	13	19	26	1										GRAY SANDY SILTY CLAY, WET
15.0	14.5	3	6	9	1									20%	
10.0	19.5	4	8	7	1										
5.0	24.7	4	6	8	1										
0.0	29.7	8	12	20	1										SS-66
-5.0	34.7	6	10	16	1										
-10.0	39.7	8	11	20	1										
-15.0	44.7	9	12	18	1										
-20.0	49.7	8	12	18	1										SS-67
-25.0	54.7	7	8	12	1										
-30.0	59.7	10	15	46	1										
BORING TERMINATED AT ELEVATION -32.1' IN VERY DENSE SAND															

PROJECT NO. 32595.1.1		ID. B-1382		COUNTY SAMPSON		GEOLOGIST K. B. QUICK												
SITE DESCRIPTION BRIDGE NO. 26 ON NC41 OVER BLACK RIVER OVERFLOW							GROUND WATER											
BORING NO. B3-B		BORING LOCATION 38+83		OFFSET 6' RT		ALIGNMENT -L-												
COLLAR ELEVATION 32.6'		NORTHING 352295		EASTING 2220346		0 HR. N.M.												
TOTAL DEPTH 59.7'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC												
START DATE 12/14/05		COMPLETION DATE 12/19/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A												
ELEV. (FT.)	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								
32.6	0.7	WOH	1	1	1													
30.0	3.8	WOH	WOH	WOH	1													GRAY BROWN MODERATELY ORGANIC SAND, MOIST TO SAT. (ALLUVIUM)
25.0	8.8	12	17	17	1													GRAY SAND, SAT. (BLACK CREEK FORMATION)
20.0	13.2	5	11	28	1													GRAY SANDY SILTY CLAY, WET
15.0	18.2	5	5	12	1												31%	
10.0	23.2	8	17	18	1													
5.0	28.2	3	6	10	1													
0.0	33.2	6	10	19	1													
-5.0	38.2	6	10	13	1													
-10.0	43.2	12	14	19	1													
-15.0	48.2	8	10	14	1													
-20.0	53.2	8	12	18	1													
-25.0	58.2	9	11	14	1													
BORING TERMINATED AT ELEVATION -27.1' IN MEDIUM DENSE SAND																		

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 32595.1.1 ID: B-1382 COUNTY: Sampson

DESCRIPTION(1): Bridge No. 26 on NC 41 over the Black River Overflow

INFORMATION ON EXISTING BRIDGE

Information obtained from: [x] field inspection [] microfilm (Reel: ___ Pos: ___) [] other: _____

BR. NO.: 26 BR. LENGTH: 150.5' NO. BENTS: 7 NO. BENTS IN: CHANNEL: 2 FLOODPLAIN: 5

FOUNDATION TYPE: 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 wall

EXTENT(4): 8 feet from outside edge of bridge

EFFECTIVENESS(5): Appears satisfactory

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): None Noted

DESIGN INFORMATION

CHANNEL BED MATERIAL(7): Fine to coarse sand and silt with trace to moderate amounts of organics (SS-56, SS-63)

CHANNEL BANK MATERIAL(8): Fine to coarse sand (SS-8) and moderately organic silt

CHANNEL BANK COVER(9): Wooded and grasses

FLOOD PLAIN WIDTH(10): 600 +/- feet

FLOOD PLAIN COVER(11): Wooded

DESIGN INFORMATION CONT.

STREAM IS: DEGRADING [] AGGRADING [x] EQUILIBRIUM (12)

OTHER OBSERVATIONS AND COMMENTS:

CHANNEL MIGRATION TENDENCY (13): Northeast toward end bent 2

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):

Geotechnical analysis agrees with the Hydrualic Unit's estimate of scour at this site. The proposed scour at this site is at elevations of 26 to 27 +/- feet.

REPORTED BY: Fred M. West DATE: 3-10-06

INSTRUCTIONS

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING 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 BASED ON OBSERVATION AND/OR SAMPLES.
(8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
(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 OR AGGRADING.
(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 THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) 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.

Bridge No. 26 on NC 41 over Black River Overflow

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB1-A	SS-7	92	70	7	52.3	41.2	2.8	3.6	14	NP	A-3(0)	4.0-5.5		
	SS-8	90	48	24	72.9	22.8	2.6	1.6	15	NP	A-1-b(0)	13.5-15.0		
	SS-9	89	68	13	63.6	23.2	5.5	7.7	14	NP	A-2-4(0)	23.5-25.0		
	SS-10	86	85	65	3.2	22.6	14.3	59.8	22	NP	A-4(0)	28.5-30.0	24.9	
	SS-11	99	80	15	42.2	43.2	4.8	9.7	14	NP	A-2-4(0)	38.5-40.0		
	SS-12	88	86	16	21.8	64.0	4.4	9.7	18	NP	A-2-4(0)	53.5-55.0		
EB2-A	SS-13	98	85	15	30.3	56.8	5.3	7.7	16	NP	A-2-4(0)	4.1-5.6		
	SS-14	33	31	18	13.7	40.4	10.3	35.6	18	NP	A-1-b(0)	18.6-20.1		
	SS-15	18	17	12	10.9	25.9	19.6	43.6	22	NP	A-1-a(0)	28.6-30.1		
	SS-16	100	97	20	43.6	38.0	8.7	9.7	13	NP	A-2-4(0)	34.0-35.1		
	SS-17	85	76	17	34.5	46.1	7.7	11.7	13	NP	A-2-4(0)	38.6-40.1		
	SS-18	84	81	17	30.1	52.3	7.9	9.7	15	NP	A-2-4(0)	53.6-55.1		
	SS-19	25	24	14	16.8	38.4	17.0	27.9	27	7	A-2-4(0)	58.6-60.1		
B3-B	SS-49	93	82	20	36.1	45.2	8.6	10.1	27	NP	A-2-4(0)	1.0-2.2		6.7
	SS-50	100	72	10	61.9	29.7	3.4	5.0	23	NP	A-3(0)	8.8-10.3		
	SS-51	90	80	42	29.1	26.8	9.8	34.3	54	33	A-7-6(8)	18.2-19.7	30.8	
	SS-52	97	89	25	49.0	28.2	6.7	16.1	31	10	A-2-4(0)	23.2-24.7		
	SS-53	100	98	26	18.3	57.1	4.4	20.2	31	11	A-2-6(0)	28.2-29.7		
	SS-54	100	73	13	55.4	33.4	4.1	7.1	21	NP	A-2-4(0)	38.2-39.7		
	SS-55	100	97	13	13.0	75.7	3.2	8.1	27	NP	A-2-4(0)	53.2-54.7		
B1-B	SS-56	100	87	14	32.2	56.4	2.3	9.1	21	NP	A-2-4(0)	1.0-1.5		
	SS-57	100	92	64	15.3	22.8	54.8	7.1	28	8	A-4(3)	2.6-3.1		4.0
	SS-58	98	68	10	70.2	21.4	3.3	5.0	22	NP	A-3(0)	12.0-13.5		
	SS-59	100	98	75	7.7	23.8	18.1	50.5	79	54	A-7-6(42)	17.0-18.5	41.2	
	SS-60	100	90	20	31.4	49.7	4.7	14.1	28	6	A-2-4(0)	27.0-28.5		
	SS-61	100	94	17	25.8	61.2	4.9	8.1	22	NP	A-2-4(0)	32.0-33.5		
	SS-62	100	91	12	28.0	60.8	3.1	8.1	26	NP	A-2-4(0)	52.0-53.5		
B2-A	SS-63	85	71	51	24.9	17.0	33.1	24.9	32	NP	A-4(0)	2.3-3.3		14.3
	SS-64	96	49	9	73.8	18.2	3.3	4.7	22	NP	A-1-b(0)	5.5-6.8		
	SS-65	100	94	60	17.2	25.9	15.7	41.1	53	17	A-7-5(10)	14.5-15.5	20.4	
	SS-66	100	90	12	41.3	47.6	6.4	4.7	24	NP	A-2-4(0)	29.7-31.2		
	SS-67	100	96	11	16.0	73.6	5.8	4.7	24	NP	A-2-4(0)	49.7-51.2		

32595.1.1 B-1382
Sampson Co.
Bridge No. 26 on NC 41 over Black River Overflow



View Looking West Toward End Bent 1