

STATE	STATE PROJECT REFERENCE NO.	SHEET	TOTAL SHEETS
N.C.	33385.1.1	1	11

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33385.1.1 B-4018 F.A. PROJ. BRSTP-32(2)  
COUNTY BEAUFORT  
PROJECT DESCRIPTION BRIDGE NO. 104 ON NC 32 OVER BROAD CREEK AT -L- STATION 16+85

**CONTENTS**

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**PROJECT: 33385.1.1 ID: B-4018**

**PERSONNEL**

J. R. SWARTLEY

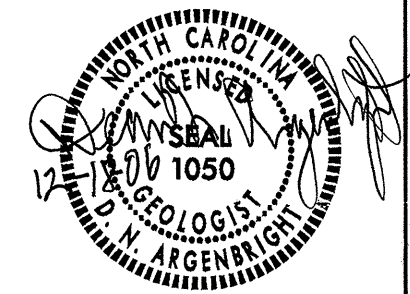
**F & R PERSONNEL**

INVESTIGATED BY F. M. WESCOTT III

CHECKED BY D. N. ARGENBRIGHT

SUBMITTED BY D. N. ARGENBRIGHT

DATE DECEMBER, 2006



DRAWN BY: F. M. WESCOTT III, T. T. WALKER

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

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

PROJECT REFERENCE NO.  
33385.11

SHEET NO.  
2

**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, HIGH 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.  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 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:  WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE ROCK (NCR)  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 SEDIMENTARY ROCK (CPS)  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 (FML) - 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 (ROD) - 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 60 BLOWS PER FOOT. STRATA CORE RECOVERY (SCREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>GRADATION</b>	<b>ROCK DESCRIPTION</b>	<b>TERMS AND DEFINITIONS</b>
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.		
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	<b>ANGULARITY OF GRAINS</b>		
SYMBOL	<b>MINERALOGICAL COMPOSITION</b>		
% PASSING #10, #40, #200	<b>COMPRESSIBILITY</b>		
LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX	<b>PERCENTAGE OF MATERIAL</b>		
USUAL TYPES OF MAJOR MATERIALS	<b>GROUND WATER</b>		
GEN. RATING AS A SUBGRADE	<b>MISCELLANEOUS SYMBOLS</b>		
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30			
<b>CONSISTENCY OR DENSENESS</b>			
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )			
GENERAL GRANULAR MATERIAL (NON-COHESIVE), GENERAL SILT-CLAY MATERIAL (COHESIVE)			
<b>TEXTURE OR GRAIN SIZE</b>			
U.S. STD. SIEVE SIZE OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>			
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT			
<b>PLASTICITY</b>			
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY			
<b>COLOR</b>			
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.			
	<b>ABBREVIATIONS</b>		
	AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE. - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES, FRAGS. - FRAGMENTS, HL - HIGHLY, MED. - MEDIUM, MICA. - MICACEOUS, MDD. - 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, W - UNIT WEIGHT, W - DRY UNIT WEIGHT		
	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		
	DRILL UNITS: MOBILE B-, BK-51, CHE-45B, CHE-550, PORTABLE HOIST		
	ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE 2 1/2" STEEL TEETH, TRICONE TUNG-CARB., CORE BIT		
	HAMMER TYPE: AUTOMATIC, MANUAL		
	CORE SIZE: B, N, H		
	HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST		
	<b>ROCK HARDNESS</b>		
	VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT		
	<b>FRACTURE SPACING</b>		
	TERM, SPACING		
	<b>BEDDING</b>		
	TERM, THICKNESS		
	<b>INDURATION</b>		
	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		
	FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED		
	<b>BENCH MARK: BL-4 = 11+04.89 -BL-</b>		
	ELEVATION: 7.91' FT.		
	NOTES:		



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

December 18, 2006

STATE PROJECT: 33385.1.1 B-4018  
F. A. PROJECT: BRSTP-32(2)  
COUNTY: Beaufort  
DESCRIPTION: Bridge No. 104 on NC 32 over Broad Creek

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for  
NC 32 over Broad Creek at -L- Station 16+85

**Site Description**

The proposed bridge site is located at the existing NC 32 bridge over Broad Creek approximately 10± miles southeast of Washington. The replacement structure will be constructed along the existing 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 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 and CME-550 drill machines 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, Pliocene age soils of the Yorktown Formation and Eocene age soils of the Castle Hayne Formation. Topography at the site is nearly flat to gentle sloping. Elevations at the site range from -12± feet along the channel bed to 9± feet along the existing NC 32 roadway. During this investigation, water levels within the boreholes and the surface of Broad Creek were measured at elevations ranging from -1± to 1± feet.

**Soil Description**

Subsurface conditions at the site are relatively uniform. Surficial alluvial soils generally consist of 8 to 22 feet of very loose to dense sand (A-3). Soils belonging to the Pliocene age Yorktown Formation underlie the alluvial deposits at elevations ranging from -18± to -20± feet. Soils of the Yorktown Formation consist of loose to medium dense sand (A-2-4). Shell fragments were noted throughout the Yorktown deposits. The Yorktown soils are underlain at elevations ranging from -44± to -46± feet by the Eocene age Castle Hayne Formation which consists of sandy phosphatic limestone with some sand layers and shell fragments.

Based on the proposed design, the existing grade will be raised 1± foot at the bridge site. The existing roadway embankment at the end bents consists of 6± feet of loose 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.

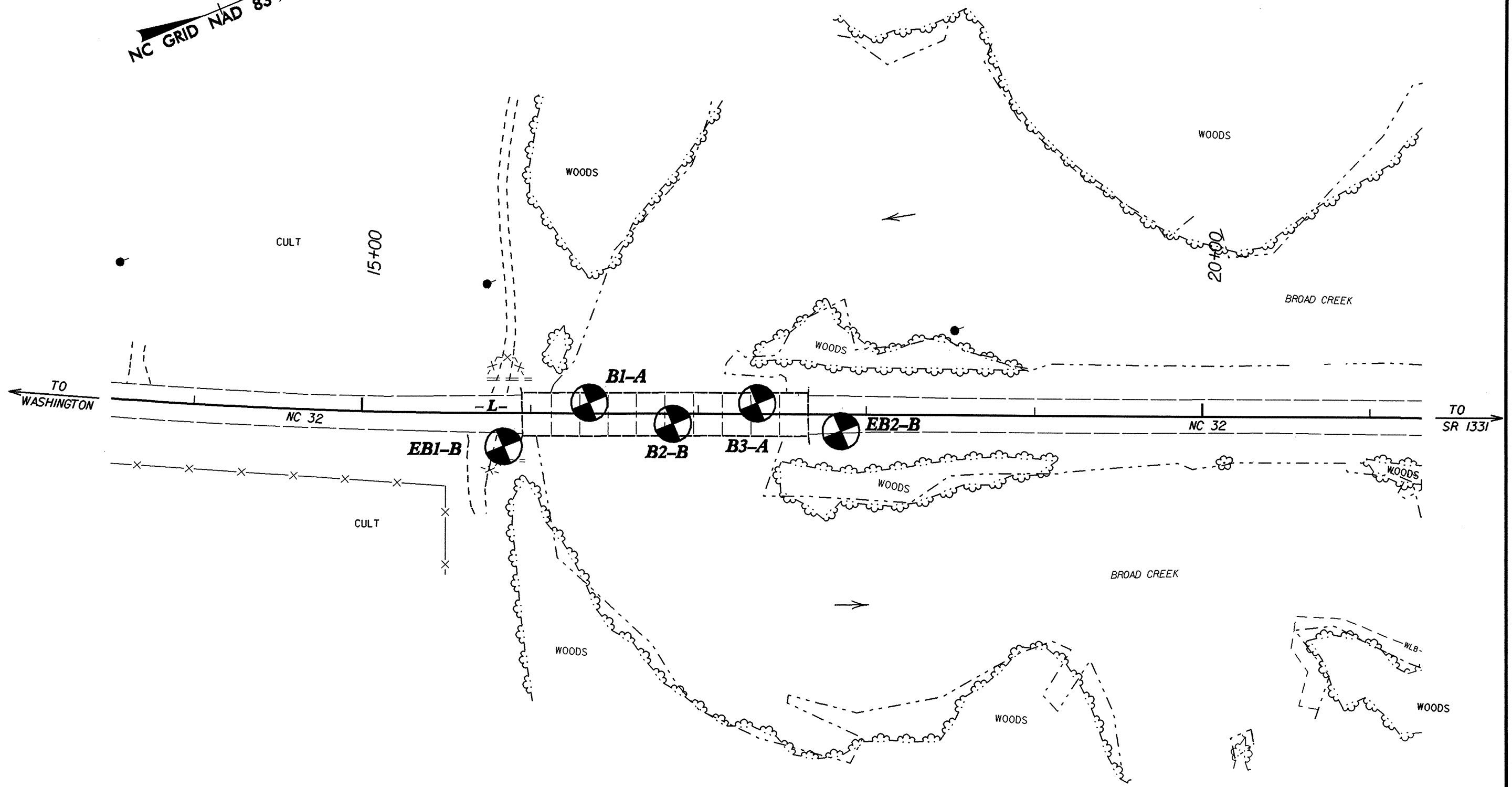
The Geotechnical foundation report is based on the Bridge Survey and Hydraulic Design Report dated August 23, 2006. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared By:

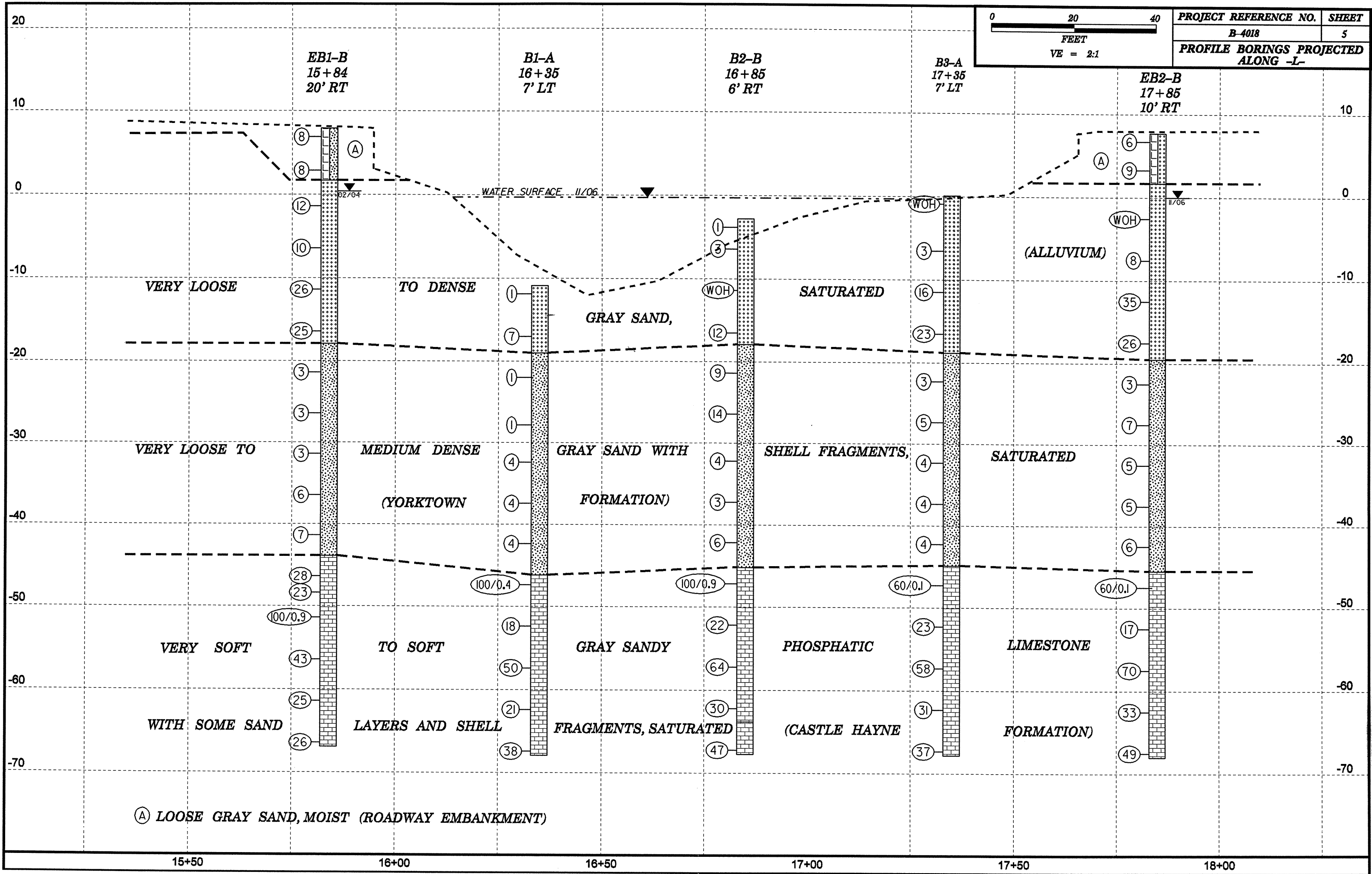
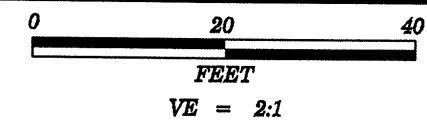
Fred M. Wescott III  
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET
B-4018	4
<b>SITE PLAN</b>	
0                      60                      120	
FEET	

NC GRID NAD 83 / 95



SKEW=90°



EB1-B  
15+84  
20' RT

B1-A  
16+35  
7' LT

B2-B  
16+85  
6' RT

B3-A  
17+35  
7' LT

EB2-B  
17+85  
10' RT

WATER SURFACE 11/06

VERY LOOSE

TO DENSE

SATURATED

(ALLUVIUM)

VERY LOOSE TO

MEDIUM DENSE

GRAY SAND WITH

SHELL FRAGMENTS,

SATURATED

(YORKTOWN

FORMATION)

SHELL FRAGMENTS,

SATURATED

VERY SOFT

TO SOFT

GRAY SANDY

PHOSPHATIC

LIMESTONE

WITH SOME SAND

LAYERS AND SHELL

FRAGMENTS, SATURATED

(CASTLE HAYNE

FORMATION)

(A) LOOSE GRAY SAND, MOIST (ROADWAY EMBANKMENT)

15+50

16+00

16+50

17+00

17+50

18+00

PROJECT NO. 33385.1.1		ID. B-4018		COUNTY Beaufort		GEOLOGIST Hager, M. M.							
SITE DESCRIPTION Bridge No. 104 on NC 32 over Broad Creek						GROUND WTR (ft)							
BORING NO. EB1-B		STATION 15+84		OFFSET 20ft RT		ALIGNMENT -L-							
COLLAR ELEV. 7.9 ft		TOTAL DEPTH 74.8 ft		NORTHING 646,951		EASTING 2,605,262							
DRILL MACHINE CME-45B		DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
START DATE 02/06/04		COMP. DATE 02/06/04		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 51.8 ft							
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
10	7.9											GROUND SURFACE	0.0
	3.9	2	4	4	8						SS-1	Gray sand, moist (Roadway Embankment)	6.2
	-0.4	5	4	4	8								
	-5.4	5	6	6	12								
	-10.4	6	6	4	10						SS-2	Gray sand, saturated (Alluvium)	
	-15.4	4	16	10	26								
	-20.4	9	11	14	25						SS-3		25.8
	-25.4	2	1	2	3						SS-4		
	-30.4	3	2	1	3								
	-35.4	1	1	2	3						SS-5	Gray sand with shell fragments, saturated (Yorktown Formation)	
	-40.4	2	3	3	5								
	-45.4	2	3	4	7						SS-6		51.8
	-47.4	2	7	21	28								
	-50.4	10	7	16	23						SS-7		
	-55.4	24	50	50/0.4	100/0.9								
	-60.4	18	22	21	43							Gray sandy phosphatic limestone with some sand layers and shell fragments, saturated (Castle Hayne Formation)	
	-65.4	14	12	13	25								
	-66.9	19	15	11	26							Boring Terminated at Elevation -66.9 ft in soft limestone	74.8

PROJECT NO. 33385.1.1		ID. B-4018		COUNTY Beaufort		GEOLOGIST Swartley, J. R.							
SITE DESCRIPTION Bridge No. 104 on NC 32 over Broad Creek						GROUND WTR (ft)							
BORING NO. B1-A		STATION 16+35		OFFSET 7ft LT		ALIGNMENT -L-							
COLLAR ELEV. -10.9 ft		TOTAL DEPTH 57.0 ft		NORTHING 647,008		EASTING 2,605,257							
DRILL MACHINE CME-550		DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
START DATE 10/31/06		COMP. DATE 10/31/06		SURFACE WATER DEPTH 10.8ft		DEPTH TO ROCK 35.3 ft							
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-10	-10.9											GROUND SURFACE	0.0
	-16.0	1	2	5	7						SS-1A	Gray sand, saturated (Alluvium)	8.1
	-21.0	1			1						SS-2A		
	-26.8	1			1								
	-31.4	1	2	2	4						SS-3A	Gray sand with shell fragments, saturated (Yorktown Formation)	
	-36.4	2	2	2	4								
	-41.4	2	2	2	4						SS-4A		
	-46.4	100/0.4			100/0.4						SS-5A		35.3
	-51.4	9	8	10	18						SS-6A		
	-56.4	22	25	25	50						SS-7A	Gray sandy phosphatic limestone with some sand layers and shell fragments, saturated (Castle Hayne Formation)	
	-61.4	13	11	10	21								
	-66.4	17	16	22	38								
	-67.9											Boring Terminated at Elevation -67.9 ft in soft limestone	57.0

NCDOT BORE DOUBLE B4018 BRIDGE104\_NEW.GPJ NC\_DOT\_GDT\_03/07/07





PROJECT NO. 33385.1.1		ID. B-4018		COUNTY Beaufort		GEOLOGIST Swartley, J. R.									
SITE DESCRIPTION Bridge No. 104 on NC 32 over Broad Creek							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 17+85		OFFSET 10ft RT		ALIGNMENT -L-									
COLLAR ELEV. 7.7 ft		TOTAL DEPTH 75.7 ft		NORTHING 647,140		EASTING 2,605,330									
DRILL MACHINE CME-550		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
START DATE 11/01/06		COMP. DATE 11/01/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 53.2 ft									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
10															
7.7	0.0													GROUND SURFACE	0.0
4.2	3.5	2	2	4										Gray sand, moist (Roadway Embankment)	6.0
		4	4	5											
-1.5	9.2	WOH	WOH	WOH										Gray sand, moist to saturated (Alluvium)	27.2
-6.5	14.2	2	5	3											
-11.5	19.2													Gray sand with shell fragments, saturated (Yorktown Formation)	53.2
-16.5	24.2	11	16	19											
-21.5	29.2	7	12	14										Gray sandy phosphatic limestone with some sand layers and shell fragments, saturated (Castle Hayne Formation)	75.7
-26.5	34.2	3	3	4											
-31.5	39.2	1	2	3										Boring Terminated at Elevation -68.0 ft in soft limestone	75.7
-36.5	44.2	2	2	3											
-41.5	49.2	2	3	3											
-46.5	54.2	60/0.1													
-51.5	59.2	4	6	11											
-56.5	64.2	36	42	28											
-61.5	69.2	15	13	20											
-66.5	74.2	13	29	20											

NCDOT BORE DOUBLE B4018\_BRIDGE104\_NEW.GPJ NC\_DOT.GDT 03/07/07



## Bridge No. 104 on NC 32 over Broad Creek

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB1-B	SS-1	100	98	21	13.1	70.0	6.8	10.1	19	NP	A24(0)	4.0-5.5		
	SS-2	95	53	5	77.7	19.1	1.2	2.0	19	NP	A3(0)	13.3-14.8		
	SS-3	90	56	4	79.3	16.9	1.8	2.0	21	NP	A3(0)	23.3-24.8		
	SS-4	100	97	15	9.9	75.9	4.2	10.1	23	NP	A24(0)	28.3-29.8		
	SS-5	100	87	21	47.9	33.0	7.0	12.1	26	NP	A24(0)	38.3-39.8		
	SS-6	88	79	28	29.0	50.1	10.9	10.1	26	NP	A24(0)	48.3-49.8		
	SS-7	73	44	20	58.4	15.5	10.1	16.1	26	NP	A1b(0)	55.3-56.8		
B1-A	SS-1A	99	84	2	65.5	32.5	2.0	0.0	21	NP	A3(0)	5.1-6.6		
	SS-2A	100	98	15	9.0	76.8	8.2	6.0	21	NP	A24(0)	10.1-11.6		
	SS-3A	100	86	23	46.1	31.9	12.0	10.0	27	NP	A24(0)	20.5-22.0		
	SS-4A	100	79	28	39.7	39.5	10.8	10.0	21	NP	A24(0)	30.5-32.0		
	SS-5A	100	78	27	58.7	15.2	14.0	12.0	20	NP	A24(0)	35.5-35.7		
	SS-6A	36	23	9	60.7	15.2	14.0	10.0	26	NP	A1a(0)	40.5-42.0		
	SS-7A	100	53	8	73.1	19.6	5.2	2.0	16	NP	A3(0)	45.5-47.0		
B2-B	SS-8	100	66	2	80.8	17.6	1.6	0.0	21	NP	A3(0)	7.6-9.1		
	SS-9	100	81	4	39.5	57.1	3.4	0.0	20	NP	A3(0)	12.7-14.2		
	SS-10	100	87	22	45.9	33.7	10.4	10.0	25	NP	A24(0)	22.6-24.1		
	SS-11	100	91	34	30.5	48.7	12.8	8.0	23	NP	A24(0)	28.4-29.9		
	SS-12	65	54	31	25.7	41.7	22.6	10.0	22	NP	A24(0)	38.4-39.9		
	SS-13	100	61	27	59.3	14.8	9.8	16.0	27	NP	A24(0)	43.4-44.3		
	SS-14	25	12	5	65.7	17.2	7.0	10.0	24	NP	A1a(0)	48.4-49.9		
	SS-15	42	24	10	57.3	21.4	9.2	12.0	24	NP	A1a(0)	58.4-59.9		
SS-16	100	86	19	27.7	56.8	7.4	8.0	17	NP	A24(0)	63.4-64.9			
EB2-B	SS-17	100	95	5	33.7	62.9	3.4	0.0	16	NP	A3(0)	3.5-5.0		
	SS-18	100	81	4	60.6	35.7	3.6	0.0	16	NP	A3(0)	14.2-15.7		
	SS-19	100	66	4	63.7	35.7	0.6	0.0	21	NP	A3(0)	24.2-25.7		
	SS-20	100	88	15	34.5	51.0	6.4	8.0	22	NP	A24(0)	34.2-35.7		
	SS-21	100	72	35	48.4	18.5	17.1	16.1	28	NP	A24(0)	44.2-45.7		
	SS-22	100	49	15	65.5	21.1	9.4	4.0	23	NP	A1b(0)	59.2-60.7		
	SS-23	100	50	2	82.1	15.9	2.0	0.0	17	NP	A1b(0)	69.2-70.7		
B3-A	SS-24	100	75	3	66.5	30.5	3.0	0.0	16	NP	A3(0)	5.6-7.1		
	SS-25	100	71	7	58.6	34.1	5.2	2.0	19	NP	A3(0)	15.6-17.1		
	SS-26	100	88	15	33.9	51.4	7.0	7.6	23	NP	A24(0)	26.4-27.9		
	SS-27	100	70	30	53.2	18.7	14.1	14.1	24	NP	A24(0)	36.4-37.9		
	SS-28	NOT	ENOUGH	SAMPLE								51.4-52.9		
	SS-29	83	57	25	53.6	18.1	12.2	16.1	21	NP	A24(0)	56.4-57.9		



**FIELD  
SCOUR REPORT**

WBS: 33385.1.1 TIP: B-4018 COUNTY: Beaufort

DESCRIPTION(1): Bridge No. 104 on NC 32 over Broad Creek

**EXISTING BRIDGE**

Information from: Field Inspection  Microfilm  (reel  pos:   
Other (explain)

Bridge No.: 104 Length: 136' Total Bents: 11 Bents in Channel: 7 Bents in Floodplain: 4  
Foundation Type: Wooden Pile with some reenforced steel piles

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: None Noted

Interior Bents: None Noted

Channel Bed: None Noted

Channel Bank: None nNoted

**EXISTING SCOUR PROTECTION**

Type(3): Wooded wing walls

Extent(4): 10' from outside edge of bridge

Effectiveness(5): Appears satisfactory

Obstructions(6): None Noted

**INSTRUCTIONS**

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

**DESIGN INFORMATION**

Channel Bed Material(7): Gray sand

Channel Bank Material(8): Gray sand

Channel Bank Cover(9): Wooded

Floodplain Width(10): 800+/- feet

Floodplain Cover(11): South side wooded, North side farmland

Stream is(12): Aggrading  Degrading  Static

Channel Migration Tendency(13): Likely west towards End Bent 1

Observations and Other Comments: \_\_\_\_\_

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters

**BENTS**

B1	B2	B3											
-12.5	-8	-2											

Comparison of DSE to Hydraulics Unit theoretical scour:

Design Scour Elevation agrees with the Hydraulics Unit's 100 yr. theoretical scour

**SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL**

Bed or Bank													
Sample No.													
Retained #4													
Passed #10													
Passed #40													
Passed #200													
Coarse Sand													
Fine Sand													
Silt													
Clay													
LL													
PI													
AASHTO													
Station													
Offset													
Depth													

See Sheet 9,  
"Soil Test Results",  
for samples:  
SS-1A Channel Bed  
SS-18 Channel Bank

Reported by: \_\_\_\_\_

Date: 12/18/2006

33385.1.1 B-4018  
Beaufort Co.  
Bridge No. 104 on NC 32 over Broad Creek



View Looking Northeast Toward End Bent 2