

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33386.1.1 (B-4019) F.A. PROJ. BRSTP-32(3)
COUNTY BEAUFORT
PROJECT DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK AT -L- STATION 19+52

INVENTORY

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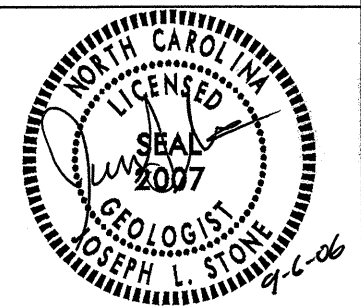
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PROJECT: 33386.1.1 ID: B-4019

PERSONNEL

- K.B.Q
- F.M.W
- W.N.C
- R.E.S
- L.W.D
- H.R.C

INVESTIGATED BY J.L. STONE
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE SEPTEMBER 2006



DRAWN BY: T.T. WALKER, J.L. STONE

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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. 33386.I(KB-4019)	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 (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: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)		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 148 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 (SCREC) - 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)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH VERY SLIGHT (V SLI) SLIGHT (SLI) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE				
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	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE		ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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> 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> 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> 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.				
SYMBOL	[Symbolic representation of soil groups]		PERCENTAGE OF MATERIAL ORGANIC MATERIAL TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%		WEATHERING				
% PASSING	[Table with sieve sizes and percentages]		LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50		ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.				
LIQUID LIMIT PLASTIC INDEX	[Table with LL and PI values]		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		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.				
GROUP INDEX	[Table with GI values]		MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.				
USUAL TYPES OF MAJOR MATERIALS	[Table with soil types]		SAMPLE DESIGNATIONS S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE		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.				
GEN. RATING AS A SURGRADE	[Table with ratings]		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		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.				
CONSISTENCY OR DENSENESS		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		ROCK HARDNESS					
[Table with consistency and strength]		[Table with unconfined strength]		VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. 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. 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. 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 FINGERNAIL.			
TEXTURE OR GRAIN SIZE		[Table with sieve sizes]		FRACTURE SPACING		BEDDING			
[Table with texture]		[Table with grain size]		TERM VERY WIDE WIDE MODERATELY CLOSE CLOSE VERY CLOSE		THICKNESS > 4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET 0.03 - 0.16 FEET 0.008 - 0.03 FEET < 0.008 FEET			
SOIL MOISTURE - CORRELATION OF TERMS		[Table with moisture terms]		INDURATION		[Table with induration]			
[Table with moisture terms]		[Table with moisture terms]		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.			
PLASTICITY		[Table with plasticity]		EQUIPMENT USED ON SUBJECT PROJECT		BENCH MARK: -BL5- -L- S+α, I4+48 16.4 LT			
[Table with plasticity]		[Table with equipment]		ELEVATION: 7.29 FT.					
COLOR		[Table with color]		NOTES:					
[Table with color]		[Table with color]		[Table with notes]					



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

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

LYNDO TIPPETT
SECRETARY

September 6, 2006

STATE PROJECT: 33386.1.1 B-4019
F.A. PROJECT: BRSTP-32 (3)
COUNTY: Beaufort
DESCRIPTION: Bridge No. 103 on NC 32 over Runyon Creek

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for
NC 32 over Runyon Creek at -L- Sta. 19+52.00

Site Description

The proposed bridge site is located at the existing NC 32 bridge over Runyon Creek, in the city of Washington. The replacement structure will be constructed along the existing alignment. Based on the proposed design, the new structure will have seven spans having a total length of 455 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. In addition to Standard Penetration Tests, rock core was obtained from B4-A and attempted at B6-B using NXWL core equipment. The -SPT- borings were made with an ATV mounted CME-45B drill machine and 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 Tertiary age marine sediments of the Yorktown, Castle Hayne, and Beaufort Formations. Runyon Creek is 400± feet wide and typically 4± feet deep with some variation. Topography along the project is nearly flat to gently sloping. Elevations at the site range from -4± feet along the streambed to 8± feet along the existing NC 32 embankment.

Ground water elevations range from 2± feet above sea level to -1± feet below sea level, whereas the surface of Runyon Creek was found to be -1.4± feet below sea level with some variation due to wind influences.

Soil Description

Soil units within this area have been divided into 6 groups, roadway embankment soils, artificial fill, alluvial soils, and the formational soils of the Yorktown, Castle Hayne, and Beaufort Formations.

Alluvial deposits are composed of 8 to 17 feet of very soft to soft sandy clayey silt (A-4), 5 to 16 feet of very soft to soft sandy clayey silt with little to moderate organic material (A-4), 1± foot of muck at bent 2, and 6± feet of very loose to loose sand and silty sand at Bent 6 and End Bent 2.

Underlying these alluvial sediments are the marine deposits of the Pleistocene aged Yorktown Formation. In this area, this unit is composed of 2 to 15 feet of very loose to medium dense sand and silty sand (A-3, A-2-4).

The Yorktown Formation is underlain by the Eocene age Castle Hayne Formation at an elevation of -22 to -30 feet. This unit is composed of 34 to 41 feet of poorly indurated limestone, with interbedded, unconsolidated sand and shell layers.

Underlying the Castle Hayne Formation is the Paleocene age Beaufort Formation. The Beaufort Formation is composed of soft to medium stiff sandy silt (A-4) and loose to medium dense silty sand (A-2-4). Additionally, a limestone horizon was identified at Bent 3 at an elevation of -103 feet.

Artificial fill soils are composed of 4± feet of medium dense sand with brick and asphalt fragments (A-3).

Based on the proposed design, the existing grade will be raised approximately 5± feet at the bridge site. The existing embankment material primarily consists of 2 to 6 feet of medium dense silty sand (A-2-4). 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.

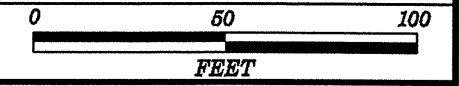
Notice

This Geotechnical Foundation Report is based on the Bridge Survey and Hydraulic Design Report for Runyon Creek dated December 13, 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.

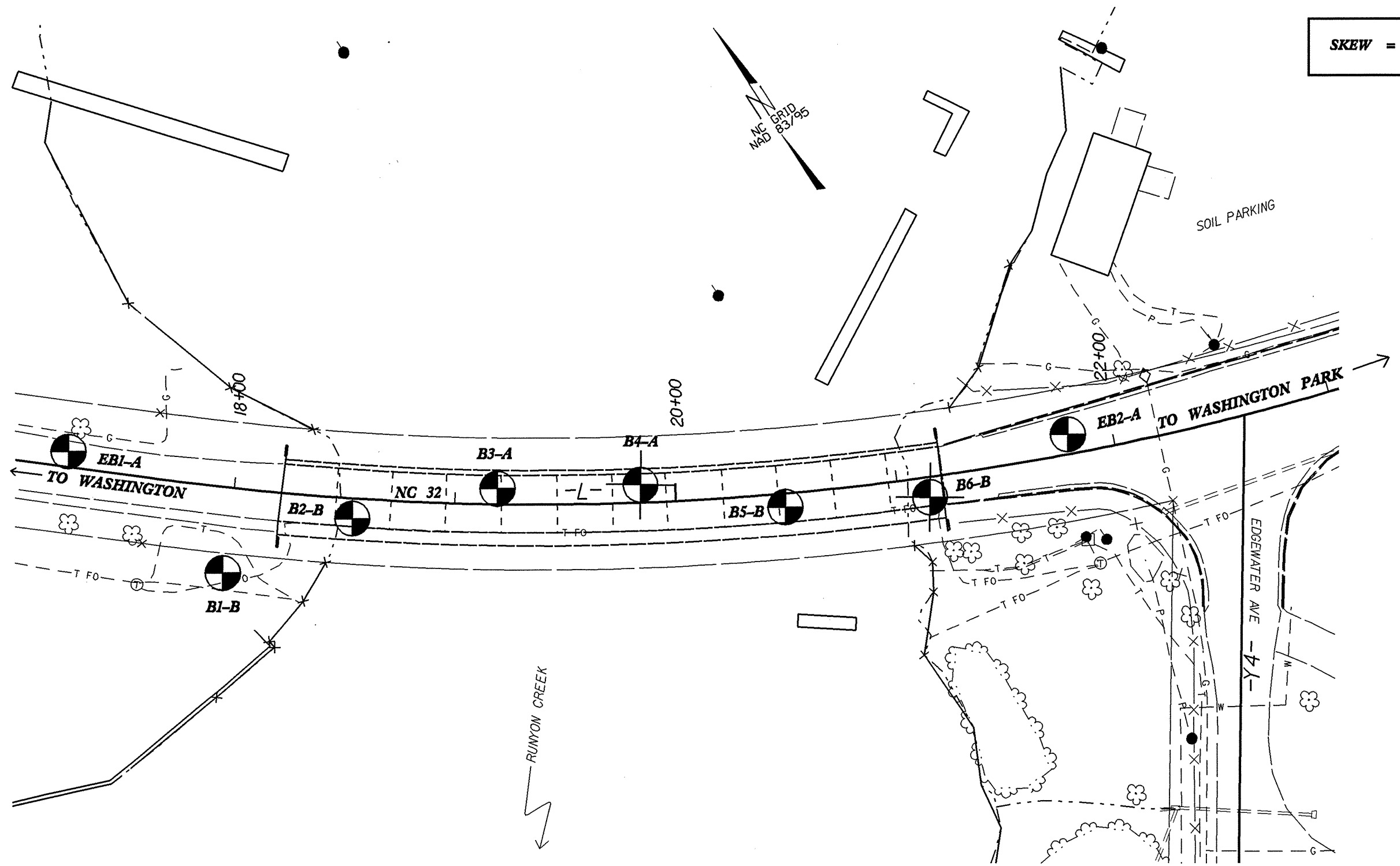
Prepared By:

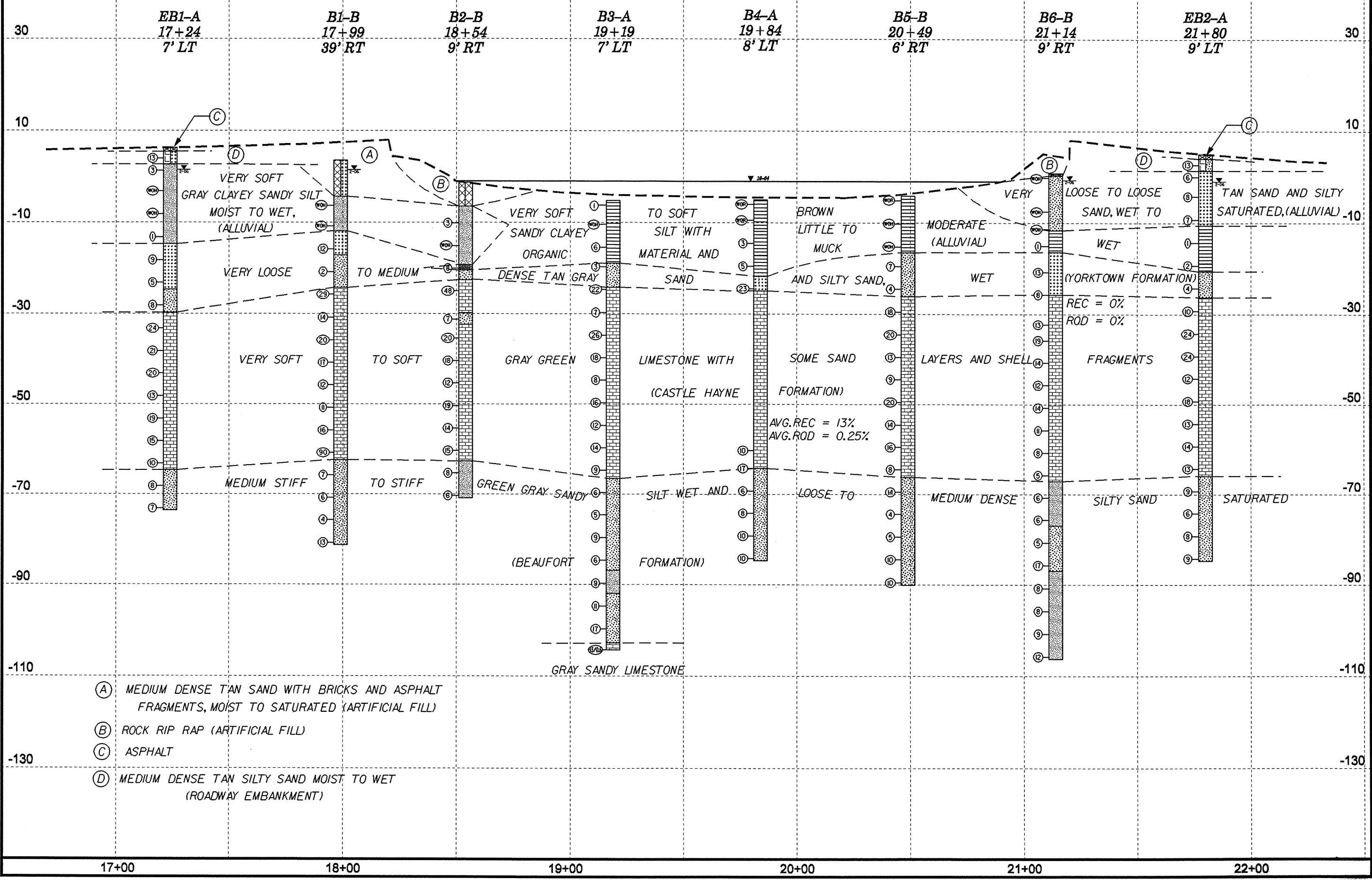
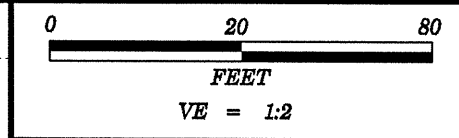
Joseph L Stone, L.G.
Engineering Geologist II

SITE PLAN



SKEW = 90°





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. EBI-A	BORING LOCATION 17+24	OFFSET 7' LT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 6.4'	NORTHING 655820'	EASTING 2583189'	24 HR. 4.9'
TOTAL DEPTH 80.0'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/23/06	COMPLETION DATE 2/23/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.0

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. EBI-A	BORING LOCATION 17+24	OFFSET 7' LT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 6.4'	NORTHING 655820'	EASTING 2583189'	24 HR. 4.9'
TOTAL DEPTH 80.0'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/23/06	COMPLETION DATE 2/23/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.0

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				
5.0	1.3	9	7	6	1.0									ASPHALT
	4.0	WOH	1	2	1.0									TAN SAND, MOIST. (ROADWAY EMBANKMENT)
0.0	8.5	WOH	WOH	WOH	1.0									15% BLUE GRAY CLAYEY SILT, MOI. TO WET. (ALLUVIAL)
-5.0	13.5	WOH	WOH	WOH	1.0									
-10.0	18.5	WOH	WOH	1	1.0									SS-45
-15.0	23.5	3	5	4	1.0									SS-46
-20.0	28.5	3	3	2	1.0									TAN TO GRAY SAND AND SILTY SAND, SATURATED. (YORKTOWN FORMATION)
-25.0	33.5	3	4	4	1.0									SS-47
-30.0	38.5	13	11	13	1.0									SS-48
-35.0	43.5	8	11	10	1.0									GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-40.0	48.5	15	10	10	1.0									
-45.0	53.5	6	6	7	1.0									
-50.0	58.5	8	7	12	1.0									SS-49
-55.0	63.5	6	6	9	1.0									
-60.0	68.5	4	3	7	1.0									SS-50
-65.0	73.5	1	3	5	1.0									SS-51
-70.0														GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)

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				
-75.0	78.5	1	3	4	1.0									BORING TERMINATED AT ELEVATION -73.6 FEET IN LOOSE SILTY SAND
-80.0														GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. BI-B	BORING LOCATION 17+99	OFFSET 39' RT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 3.7'	NORTHING 655735'	EASTING 2583217'	24 HR. 2.2'
TOTAL DEPTH 84.9'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/5/04	COMPLETION DATE 2/5/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.9

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. BI-B	BORING LOCATION 17+99	OFFSET 39' RT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 3.7'	NORTHING 655735'	EASTING 2583217'	24 HR. 2.2'
TOTAL DEPTH 84.9'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/5/04	COMPLETION DATE 2/5/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.9

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			
0.0												TAN SAND WITH BRICKS AND ASPHALT, MOIST. (ARTIFICIAL FILL)
-5.0	9.0	WOH	WOH	WOH	1.0							BROWN GRAY CLAYEY SILT WET. (ALLUVIAL)
-10.0	13.4	WOH	WOH	WOH	1.0							TAN GRAY SAND. (YORKTOWN FORMATION)
-15.0	18.4	3	6	6	1.0							TAN BLUE GRAY, SILTY CLAY.
-20.0	23.4	1	1	1	1.0							GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-25.0	28.4	16	15	14	1.0							
-30.0	33.4	3	5	9	1.0							
-35.0	38.4	9	10	10	1.0							
-40.0	43.4	5	3	14	1.0							
-45.0	48.4	4	6	6	1.0							
-50.0	53.4	7	6	5	1.0							GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)
-55.0	58.4	6	8	8	1.0							
-60.0	63.4	8	60	30	1.0							
-65.0	68.4	3	3	4	1.0							
-70.0	73.4	2	3	3	1.0							
-75.0	78.4	2	2	2	1.0							

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			
-80.0	83.4	2	4	9	1.0							GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)
-85.0												BORING TERMINATED AT ELEVATION -81.2 FEET IN MEDIUM DENSE SILTY SAND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B3-A	BORING LOCATION 19+19	OFFSET 7' LT	ALIGNMENT -L-
COLLAR ELEVATION -5.2'			NORTHING 655700'
EASTING 2583342'			24 HR. N.M.
TOTAL DEPTH 99.0'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/6/06	COMPLETION DATE 2/7/06	SURFACE WATER DEPTH 5.1'	DEPTH TO ROCK 18.9

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B3-A	BORING LOCATION 19+19	OFFSET 7' LT	ALIGNMENT -L-
COLLAR ELEVATION -5.2'			NORTHING 655700'
EASTING 2583342'			24 HR. N.M.
TOTAL DEPTH 99.0'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/6/06	COMPLETION DATE 2/7/06	SURFACE WATER DEPTH 5.1'	DEPTH TO ROCK 18.9

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
0.0	5.0	WOH	1	1.0											
-10.0	4.1	WOH	WOH	WOH	1.0										BROWN MODERATELY ORGANIC SILT WITH WOOD, SATURATED (ALLUVIUM)
-15.0	9.1	4	3	3	1.0										
-20.0	13.4	4	1	2	1.0									SS-1	BLUE GRAY SILTY SAND, SATURATED. (YORKTOWN FORMATION)
-25.0	18.4	3	12	10	1.0									SS-2	
-30.0	23.4	4	4	3	1.0										
-35.0	28.4	9	15	11	1.0										
-40.0	33.4	8	9	9	1.0									SS-3	GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-45.0	38.4	4	4	4	1.0										
-50.0	43.4	5	8	8	1.0									SS-4	
-55.0	48.4	5	4	8	1.0										
-60.0	53.4	7	7	7	1.0									SS-5	
-65.0	58.4	8	4	5	1.0										
-70.0	63.4	3	1	5	1.0									SS-6	21% GREEN GRAY SILTY SAND, SATURATED. (BEAUFORT FORMATION)
-75.0	68.4	2	2	3	1.0										
-80.0	73.4	3	4	5	1.0									SS-7	
-85.0	78.4	3	3	3	1.0										

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100						
-90.0	83.4	2	3	6	1.0										SS-8	19% GREEN GRAY SANDY SILT, SATURATED.
-95.0	88.4	3	4	7	1.0											GREEN GRAY SILTY SAND, SATURATED
-100.0	93.4	7	7	10	1.0											
-105.0	98.4	33	60	0.6											SS-9	GRAY SANDY LIMESTONE
BORING TERMINATED AT ELEVATION -104.2 FEET IN LIMESTONE																

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

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST F.M. WESCOTT
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B4-A	BORING LOCATION 19+84	OFFSET 8' LT	ALIGNMENT -L- 0 HR. N.M. 24 HR. N.M.
COLLAR ELEVATION -5.0	NORTHING 655666'	EASTING 2583397'	
TOTAL DEPTH 79.7'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/7/06	COMPLETION DATE 2/9/06	SURFACE WATER DEPTH 4.3'	DEPTH TO ROCK 19.9

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
0.0	WOR	WOR	WOR	WOR	1.0	X 0						SS-10			
3.4	WOR	WOR	WOR	WOR	1.0	X 0						SS-11			
-10.0															
8.4	4	2	1	1.0		X 3									BROWN MOD. ORGANIC SILT, SATURATED (ALLUVIUM)
-15.0															
13.4	1	3	2	1.0		X 5									
-20.0															
18.4	9	8	15	1.0		X 23						SS-12			GRAY, SAND, SATURATED (YORKTOWN FORMATION)
-25.0															
-30.0															
-35.0															
-40.0															
-45.0															
-50.0															
-55.0															
-60.0	54.2	9	4	6	1.0	X 10						SS-13			GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION) AVG. REC = 13% AVG. RQD = 0.25%
-65.0	58.2	13	13	4	1.0	X 17									
-70.0	63.2	3	2	4	1.0	X 6						SS-14			GREEN-GRAY, SILTY SAND WITH PHOSPHATE (BEAUFORT FORMATION)
-75.0	68.2	2	3	5	1.0	X 8									
-80.0	73.2	3	5	5	1.0	X 10						SS-15			
-85.0	78.2	3	3	7	1.0	X 10									

BORING TERMINATED AT
ELEVATION -84.7 FEET
IN LOOSE SILTY SAND.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST F.M. WESCOTT
SITE DESCRIPTION BRIDGE NO.103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B5-B	BORING LOCATION 20+49	OFFSET 6' RT	ALIGNMENT -L-
COLLAR ELEVATION -4.1'			NORTHING 655622'
EASTING 2583446'			0 HR. N.M.
TOTAL DEPTH 85.8'			24 HR. N.M.
DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC	
START DATE 2/14/06	COMPLETION DATE 2/14/06	SURFACE WATER DEPTH 2.7'	DEPTH TO ROCK 22.0

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST F.M. WESCOTT
SITE DESCRIPTION BRIDGE NO.103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B5-B	BORING LOCATION 20+49	OFFSET 6' RT	ALIGNMENT -L-
COLLAR ELEVATION -4.1'			NORTHING 655622'
EASTING 2583446'			0 HR. N.M.
TOTAL DEPTH 85.8'			24 HR. N.M.
DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC	
START DATE 2/14/06	COMPLETION DATE 2/14/06	SURFACE WATER DEPTH 2.7'	DEPTH TO ROCK 22.0

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				
-5.0	0.0	WOR	WOR	WOR	1.0	X 0								
-10.0	5.0	WOH	WOH	WOH	1.0	X 0								BROWN MODERATELY ORGANIC SILT, SATURATED. (ALLUVIAL)
-15.0	10.0	WOH	WOH	WOH	1.0	X 0								
-20.0	14.3	1	3	4	1.0	X 7								GRAY SILTY SAND, SATURATED. (YORKTOWN FORMATION)
-25.0	19.3	2	2	2	1.0	X 4								
-30.0	24.3	8	11	7	1.0	X 18						SS-21		
-35.0	29.3	13	8	12	1.0	X 20								
-40.0	34.3	7	7	6	1.0	X 13								
-45.0	39.3	8	4	5	1.0	X 9						SS-22		GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-50.0	44.3	6	10	10	1.0	X 20								
-55.0	49.3	8	7	7	1.0	X 14								
-60.0	54.3	9	9	7	1.0	X 16						SS-23		
-65.0	59.3	14	3	5	1.0	X 8								
-70.0	64.3	4	9	5	1.0	X 14								
-75.0	69.3	2	2	2	1.0	X 4								GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)
-80.0	74.3	2	2	3	1.0	X 5								

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				
-85.0	79.3	5	5	5	1.0	X 10								GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)
-90.0	84.3	3	3	7	1.0	X 10								
						BORING TERMINATED AT ELEVATION -89.9 FEET IN LOOSE SILTY SAND								

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 13 OF 19

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO.103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B6-B	BORING LOCATION 21+14	OFFSET 9' RT	ALIGNMENT -L- 0 HR. N.M. 24 HR. 1.5'
COLLAR ELEVATION 0.9'	NORTHING 655591'	EASTING 2583504'	
TOTAL DEPTH 107.1'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/15/06	COMPLETION DATE 2/17/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.6

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO.103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. B6-B	BORING LOCATION 21+14	OFFSET 9' RT	ALIGNMENT -L- 0 HR. N.M. 24 HR. 1.5'
COLLAR ELEVATION 0.9'	NORTHING 655591'	EASTING 2583504'	
TOTAL DEPTH 107.1'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/15/06	COMPLETION DATE 2/17/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.6

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				
0.0	0.0	WOH	WOH	WOH	1.0	X0								ROCK RIP RAP (ARTIFICIAL FILL)
-5.0	7.4	WOR	WOR	WOH	1.0	X0								TAN SILTY SAND, SATURATED. (ALLUVIAL)
-10.0	11.2	WOH	WOH	WOH	1.0	X0								BROWN MODERATELY ORGANIC SILT, SATURATED.
-15.0	14.9	WOH	1	0	1.0	X1								BROWN GRAY SAND, SATURATED. (YORKTOWN FORMATION)
-20.0	20.6	4	7	6	1.0	X13								
-25.0	25.6	2	3	5	1.0	X8								
-30.0	32.1	6	6	7	1.0	X13								REC = 0% ROD = 0%
-35.0	35.6	9	10	9	1.0	X19								
-40.0	40.6	9	7	7	1.0	X14								GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-45.0	45.6	7	6	6	1.0	X12								
-50.0	50.6	10	7	7	1.0	X14								
-55.0	55.6	8	5	6	1.0	X11								
-60.0	60.6	6	4	4	1.0	X8								
-65.0	65.6	3	3	2	1.0	X5								
-70.0	70.6	3	3	3	1.0	X6								GREEN SANDY SILT, WET. (BEAUFORT FORMATION)
-75.0	75.6	5	3	3	1.0	X6								

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				
-80.0	80.6	3	2	3	1.0	X5								GREEN SILTY SAND, SATURATED.
-85.0	85.6	3	12	5	1.0	X17								
-90.0	90.6	3	4	4	1.0	X8								GREEN SANDY SILT, WET
-95.0	95.6	4	3	5	1.0	X8								
-100.0	100.6	4	3	6	1.0	X9								
-105.0	105.6	5	5	7	1.0	X12								
-110.0														BORING TERMINATED AT ELEVATION -106.2 FEET IN STIFF SANDY SILT.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 32 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. EB2-A	BORING LOCATION 21+80	OFFSET 9' LT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 5.2'	NORTHING 655581'	EASTING 2583571'	24 HR. 6.1'
TOTAL DEPTH 89.9'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/21/06	COMPLETION DATE 2/21/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 31.4

PROJECT NO. 33386.1.1	ID. B-4019	COUNTY BEAUFORT	GEOLOGIST K.B. QUICK
SITE DESCRIPTION BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK			GROUND WATER
BORING NO. EB2-A	BORING LOCATION 21+80	OFFSET 9' LT	ALIGNMENT -L- 0 HR. N.M.
COLLAR ELEVATION 5.2'	NORTHING 655581'	EASTING 2583571'	24 HR. 6.1'
TOTAL DEPTH 89.9'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/21/06	COMPLETION DATE 2/21/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 31.4

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				
5.0	1.4	6	6	7	1.0									ASPHALT
0.0	4.1	2	1	5	1.0									TAN SILTY SAND, WET. (ROADWAY EMBANKMENT)
-5.0	8.4	3	3	5	1.0									TAN SAND WITH WOOD, SATURATED. (ALLUVIAL)
-10.0	13.4	2	3	4	1.0									
-15.0	18.4	1	0	1	1.0									BROWN SILT WITH LITTLE ORGANIC MATTER, WET.
-20.0	23.4	1	0	2	1.0									
-25.0	28.4	1	1	3	1.0									GRAY SILTY SAND, SATURATED. (YORKTOWN FORMATION)
-30.0	33.4	6	4	6	1.0									
-35.0	38.4	17	12	12	1.0									GRAY GREEN VERY SOFT TO SOFT LIMESTONE WITH SOME SAND LAYERS AND SHELL FRAGMENTS (CASTLE HAYNE FORMATION)
-40.0	43.4	11	11	13	1.0									
-45.0	48.4	10	7	5	1.0									
-50.0	53.4	6	8	10	1.0									
-55.0	58.4	3	6	7	1.0									
-60.0	63.4	7	9	5	1.0									
-65.0	68.4	15	7	6	1.0									
-70.0	73.4	2	3	6	1.0									GREEN SILTY SAND, SATURATED. (BEAUFORT FORMATION)

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				
-75.0	78.4	1	2	4	1.0									
-80.0	83.4	2	2	6	1.0									
-85.0	88.4	3	3	6	1.0									
														BORING TERMINATED AT ELEVATION -84.7 FEET IN LOOSE SILTY SAND

B-4019
BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
B3-A	SS-1	100	100	35	5.2	69.5	11.2	14.1	19	NP	A-2-4(0)	13.6-14.9		
	SS-2	36	22	9	60.9	15.7	11.4	12.1	22	NP	A-1-a(0)	18.9-19.9		
	SS-3	59	20	8	74.6	13.9	7.5	4.0	20	NP	A-1-b(0)	33.4-34.9		
	SS-4	39	28	15	38.8	24.1	21.0	16.1	21	5	A-1-a(0)	43.4-44.9		
	SS-5	44	29	12	42.0	33.8	10.2	14.1	25	NP	A-1-a(0)	53.4-54.9		
	SS-6	68	61	33	17.7	39.0	21.2	22.1	21	NP	A-2-4(0)	63.4-64.9	21.0	
	SS-7	80	72	28	20.9	48.4	14.6	16.1	22	NP	A-2-4(0)	73.4-74.9		
	SS-8	94	90	37	8.2	56.3	15.4	20.1	21	NP	A-4(0)	83.4-84.9	18.7	
	SS-9	47	41	21	21.1	40.4	22.4	16.1	20	NP	A-1-b(0)	98.4-99.0		
B4-A	SS-10	91	88	42	5.4	73.8	12.8	8.0	27	NP	A-4(0)	0.0-1.5		
	SS-11	100	93	44	26.7	34.0	27.2	12.1	17	NP	A-4(0)	3.4-4.9		16.2
	SS-12	100	97	4	29.1	68.1	2.7	0.0	21	NP	A-3(0)	18.4-19.9		
	SS-13	59	39	21	43.6	24.3	16.0	16.1	33	NP	A-1-b(0)	54.2-55.7		
	SS-14	67	57	31	24.3	33.8	21.8	20.1	23	NP	A-2-4(0)	63.2-64.7		
	SS-15	69	64	23	16.3	54.3	15.4	14.1	19	NP	A-2-4(0)	73.2-74.7		
B2-B	SS-16	100	96	54	16.3	41.4	22.2	20.1	28	7	A-4(1)	7.9-9.4	18.3	
	SS-17	NOT	ENOUGH	SAMPLE	-	-	-	-	-	-	-	18.0-19.2	45.3	26.0
	SS-18	34	10	5	80.4	6.4	7.9	5.2	17	NP	A-1-a(0)	22.8-24.3		
	SS-19	88	74	14	54.9	30.6	9.3	5.2	18	NP	A-2-4(0)	28.9-30.4		
	SS-20	80	71	37	18.7	40.4	21.6	19.3	18	NP	A-4(0)	63.1-64.6		
B5-B	SS-21	60	35	14	59.7	17.9	13.2	9.2	17	NP	A-1-b(0)	24.3-25.8		
	SS-22	69	39	19	55.5	19.5	15.8	9.2	21	NP	A-1-b(0)	39.3-40.8		
	SS-23	55	34	16	47.8	5.4	35.5	11.3	16	NP	A-1-b(0)	54.3-55.8		
	SS-24	65	55	31	22.9	34.8	23.0	19.3	21	NP	A-2-4(0)	64.3-65.8		
	SS-25	75	70	23	15.5	57.5	15.8	11.3	18	NP	A-2-4(0)	79.3-80.8		
B6-B	SS-26	100	89	15	34.2	54.3	8.3	3.2	14	NP	A-2-4(0)	1.0-1.5		
	SS-27	NOT	ENOUGH	SAMPLE	-	-	-	-	-	-	-	14.9-16.2	31.2	15.2
	SS-28	100	76	4	65.1	32.4	1.7	0.8	14	NP	A-3(0)	20.6-22.1		
	SS-29	77	50	21	48.8	26.9	22.2	2.0	21	NP	A-1-b(0)	32.1-33.6		
	SS-30	67	41	21	47.8	21.5	23.4	7.2	26	NP	A-1-b(0)	60.6-62.1		
	SS-31	78	68	37	19.3	38.8	30.7	11.3	23	NP	A-4(0)	70.6-72.1		
	SS-32	81	73	33	20.9	43.6	16.2	19.3	22	NP	A-2-4(0)	80.6-82.1		
	SS-33	88	84	50	8.0	55.7	19.0	17.3	23	NP	A-4(0)	90.6-92.1		
	SS-34	96	88	36	16.1	51.7	15.0	17.3	24	NP	A-4(0)	100.6-102.1		
EB2-A	SS-35	100	92	13	29.2	60.2	4.2	6.4	20	NP	A-2-4(0)	1.4-2.9		
	SS-36	100	75	7	64.0	30.2	3.4	2.4	19	NP	A-3(0)	8.4-9.9		
	SS-37	NOT	ENOUGH	SAMPLE	-	-	-	-	-	-	-	18.4-19.9		4.9
	SS-38	66	27	11	71.6	12.6	7.4	8.4	23	NP	A-1-b(0)	33.4-34.9		
	SS-39	60	41	21	42.6	25.4	17.6	14.4	19	NP	A-1-b(0)	53.4-54.9		
	SS-40	50	33	14	45.2	28.6	15.8	10.4	21	NP	A-1-b(0)	68.4-69.9		
	SS-41	84	76	31	17.6	48.6	19.4	14.4	18	NP	A-2-4(0)	78.4-79.9		
	SS-42	74	68	21	18.2	55.6	15.8	10.4	18	NP	A-2-4(0)	88.4-89.9		

B-4019
BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB1-A	SS-43	100	90	10	40.6	50.2	6.8	2.4	12	NP	A-3(0)	1.3-2.8		
	SS-44	100	99	80	2.2	31.6	27.8	38.4	35	5	A-4(5)	4.0-5.5	14.8	
	SS-45	100	99	83	2.2	28.8	34.6	34.4	37	9	A-4(8)	18.5-20.0		
	SS-46	100	92	9	36.4	57.4	5.8	0.4	18	NP	A-3(0)	23.5-25.0		
	SS-47	67	60	13	40.2	42.0	7.4	10.4	16	NP	A-2-4(0)	33.5-35.0		
	SS-48	46	23	10	62.0	17.4	10.2	10.4	21	NP	A-1-a(0)	38.5-40.0		
	SS-49	56	41	20	38.6	27.8	21.2	12.4	23	NP	A-1-b(0)	53.5-55.0		
	SS-50	64	42	17	46.2	29.4	14.0	10.4	23	NP	A-1-b(0)	68.5-70.0		
	SS-51	84	65	30	36.4	32.2	27.0	4.4	22	NP	A-2-4(0)	73.5-75.0		



**FIELD
 SCOUR REPORT**

WBS: 33386.1.1 TIP: B-4019 COUNTY: BEAUFORT

DESCRIPTION(1): BRIDGE NO 103 ON NC 32 OVER RUNYON CREEK

EXISTING BRIDGE

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

Bridge No.: 103 Length: 300 Total Bents: 13 Bents in Channel: 11 Bents in Floodplain: 2
 Foundation Type: TIMBER PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: evidence of past erosion along end slopes

Interior Bents: none noted

Channel Bed: none noted

Channel Bank: none noted

EXISTING SCOUR PROTECTION

Type(3): concrete end walls and rip rap

Extent(4): end walls extend 8 feet outside edge of bridge, rip rap is along both end slopes

Effectiveness(5): end slopes seem to be stabilized by rip rap

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): moderately organic silt

Channel Bank Material(8): moderately organic silt, and silty sand

Channel Bank Cover(9): grass

Floodplain Width(10): approximately 1200 feet

Floodplain Cover(11): urban development, grass, and trees

Stream is(12): Aggrading _____ Degrading x Static _____

Channel Migration Tendency(13): low

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet X Meters _____

Bent 1	Bent 2	Bent 3	Bent 4	Bent 5	Bent 6						
-0.5	-3.0	-10.6	-11.0	-10.3	-6.0						

Comparison of DSE to Hydraulics Unit theoretical scour:
 Geotechnical analysis agrees with the maximum theoretical scour elevations as outlined by the Bridge Survey Hydraulic Design Report.

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											

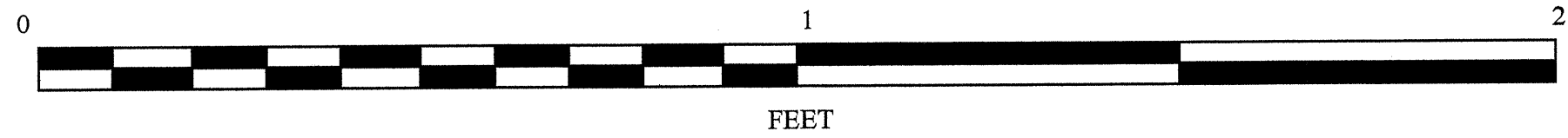
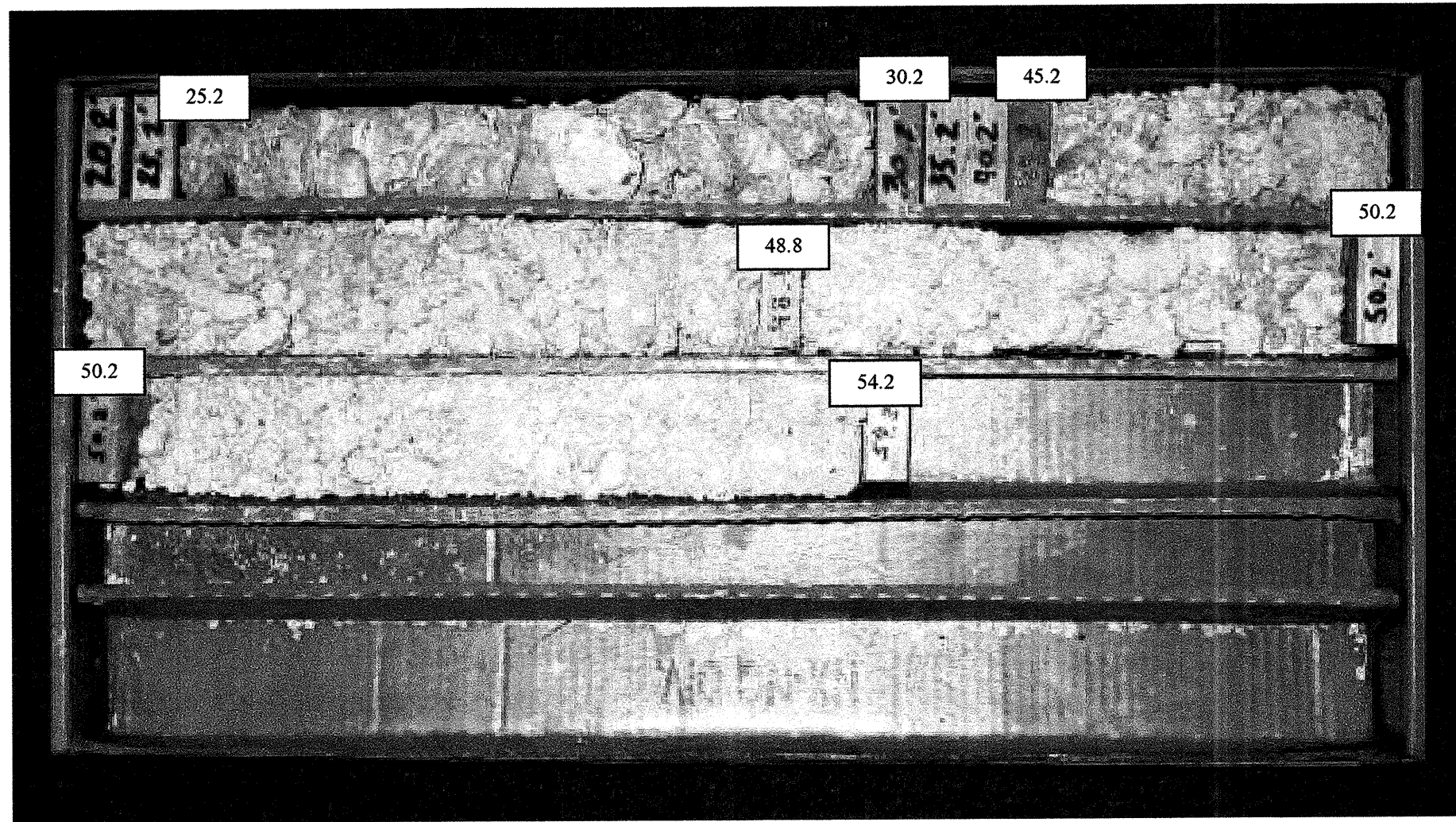
See Sheet, 10 and 10A
 "Soil Test Results",
 for samples:
 Channel Bank: SS-26, SS-44
 Channel Bed: SS-11

Reported by: *[Signature]* Date: 11/30/2006

33386.1.1 (B-4019)

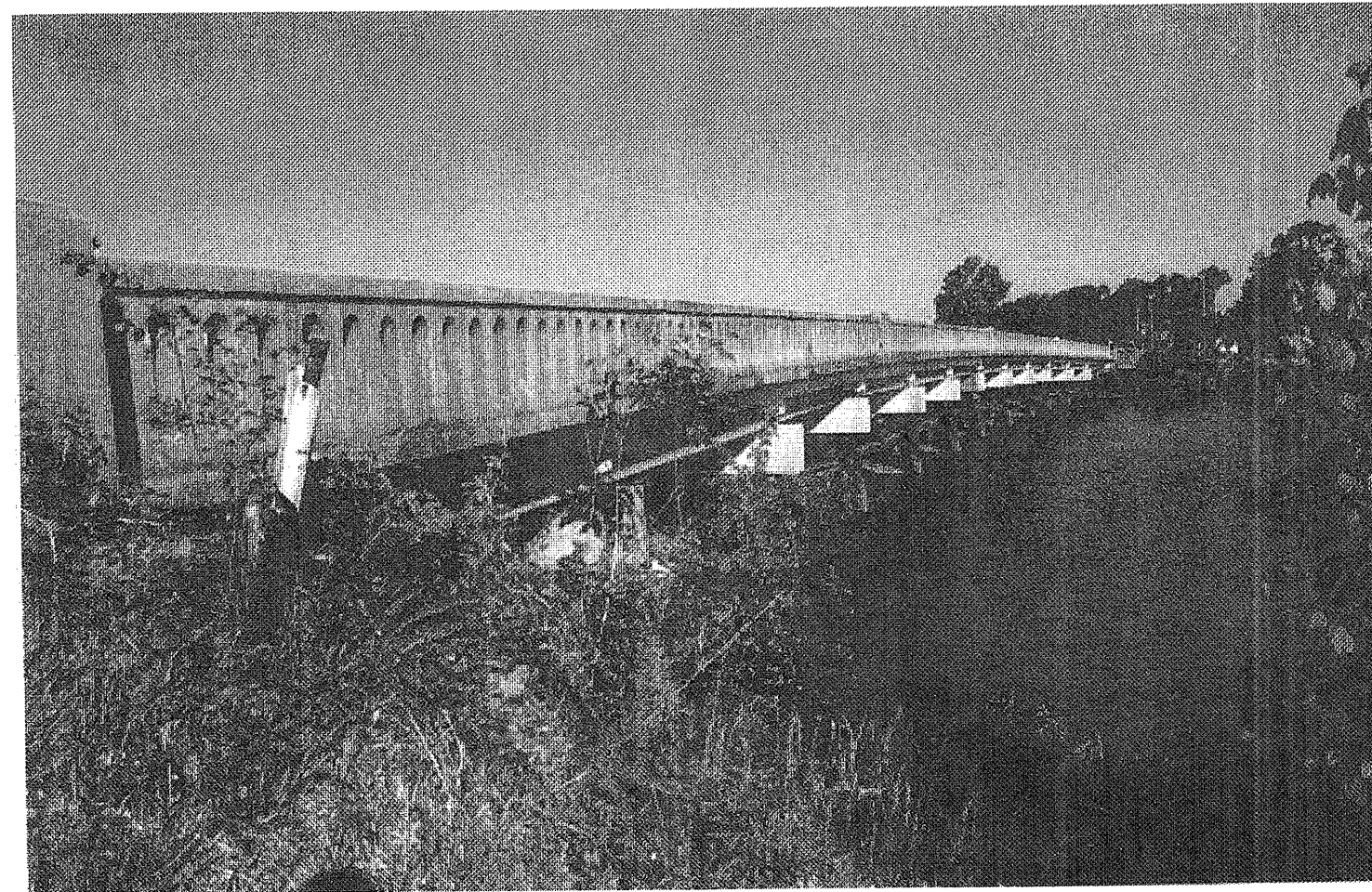
Beaufort Co.
Bridge No. 103 on NC 32 over Runyon Creek

Core Photograph
B4-A Sta. 19+84 8' LT (20.2 feet to 54.2 feet)



33386.1.1
B-4019
Beaufort Co.

BRIDGE NO. 103 ON NC 32 OVER RUNYON CREEK



Looking West Toward End Bent 1