

CONTRACT: ID: B-4124

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33477.1.1 I.D. NO. B-4124
 F.A. PROJECT BRZ-1141(10)
 COUNTY GRANVILLE
 PROJECT DESCRIPTION BRIDGE NO. 84
-L- (SR 1141, MORIAH RD.) OVER
TAR RIVER

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33477.1.1 (B-4124)	1	16
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33477.1.1	BRZ-1141(10)	P.E.	
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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

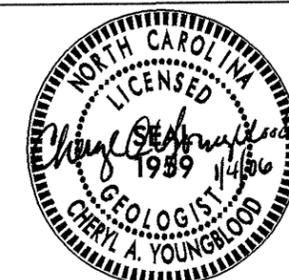
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

INVESTIGATED BY CAY PERSONNEL CDC
 CHECKED BY NTR HRC
 SUBMITTED BY NTR WNC
 DATE JANUARY 2006 DWD
MLR

DRAWN BY: CDC

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 UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4124	33477.1.1	2	16

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																																																																																															
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6</i></p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS, IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p>																																																																																																																																																																																																															
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (>85% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (>85% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-1-b</th><th>A-3</th><th>A-2</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</th><th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th><th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th><th></th><th></th><th></th> </tr> <tr> <td>GROUP CLASS.</td> <td colspan="7">A-1-a</td><td colspan="7">A-2-a</td><td colspan="3">A-3</td><td colspan="3">A-4, A-5</td> </tr> <tr> <td>SYMBOL</td> <td colspan="7">[Symbol]</td><td colspan="7">[Symbol]</td><td colspan="3">[Symbol]</td><td colspan="3">[Symbol]</td> </tr> <tr> <td>% PASSING</td> <td colspan="7">50 MX</td><td colspan="7">30 MX</td><td colspan="3">15 MX</td><td colspan="3">10 MX</td> </tr> <tr> <td>LIQUID LIMIT</td> <td colspan="7">6 MX</td><td colspan="7">N.P.</td><td colspan="3">10 MX</td><td colspan="3">11 MN</td> </tr> <tr> <td>PLASTIC INDEX</td> <td colspan="7">0</td><td colspan="7">0</td><td colspan="3">4 MX</td><td colspan="3">8 MX</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="7">STONE FRAGS. 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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p>		<p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V. SLI.) 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.</p> <p>SLIGHT (SLI.) 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.</p> <p>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.</p> <p>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, IF TESTED, WOULD YIELD SPT REFUSAL.</p> <p>SEVERE (SEV.) ALL ROCKS 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, IF TESTED, YIELDS SPT N VALUES > 100 B.P.F.</p> <p>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, IF TESTED, YIELDS SPT N VALUES < 100 B.P.F.</p> <p>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.</p>	
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<p style="text-align: center;">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.</p> <p>▽ STATIC WATER LEVEL AFTER 24 HOURS.</p> <p>▽PW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEPAGE</p>		<p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>[Symbol] ROADWAY EMBANKMENT WITH SOIL DESCRIPTION</td> <td>[Symbol] SOIL SYMBOL</td> <td>[Symbol] AUGER BORING</td> <td>[Symbol] TEST BORING</td> <td>[Symbol] SAMPLE DESIGNATIONS</td> </tr> <tr> <td>[Symbol] ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS</td> <td>[Symbol] INFERRED SOIL BOUNDARIES</td> <td>[Symbol] CORE BORING</td> <td>[Symbol] MONITORING WELL</td> <td>[Symbol] S - BULK SAMPLE</td> </tr> <tr> <td>[Symbol] INFERRED ROCK LINE</td> <td>[Symbol] ALLUVIAL SOIL BOUNDARY</td> <td>[Symbol] PIEZOMETER INSTALLATION</td> <td>[Symbol] SLOPE INDICATOR INSTALLATION</td> <td>[Symbol] SS - SPLIT SPOON SAMPLE</td> </tr> <tr> <td>[Symbol] DIP/DIP DIRECTION OF ROCK STRUCTURES</td> <td>[Symbol] SOUNDING ROD</td> <td>[Symbol] SPT N-VALUE</td> <td>[Symbol] SPT REFUSAL</td> <td>[Symbol] ST - SHELBY TUBE SAMPLE</td> </tr> <tr> <td></td> <td></td> <td>[Symbol] SLOPE INDICATOR INSTALLATION</td> <td></td> <td>[Symbol] RS - ROCK SAMPLE</td> </tr> <tr> <td></td> <td></td> <td>[Symbol] SPT N-VALUE</td> <td></td> <td>[Symbol] RT - RECOMPACTED TRIAXIAL SAMPLE</td> </tr> <tr> <td></td> <td></td> <td>[Symbol] SPT REFUSAL</td> <td></td> <td>[Symbol] CBR - CBR SAMPLE</td> </tr> </table>		[Symbol] ROADWAY EMBANKMENT WITH SOIL DESCRIPTION	[Symbol] SOIL SYMBOL	[Symbol] AUGER BORING	[Symbol] TEST BORING	[Symbol] SAMPLE DESIGNATIONS	[Symbol] ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS	[Symbol] INFERRED SOIL BOUNDARIES	[Symbol] CORE BORING	[Symbol] MONITORING WELL	[Symbol] S - BULK SAMPLE	[Symbol] INFERRED ROCK LINE	[Symbol] ALLUVIAL SOIL BOUNDARY	[Symbol] PIEZOMETER INSTALLATION	[Symbol] SLOPE INDICATOR INSTALLATION	[Symbol] SS - SPLIT SPOON SAMPLE	[Symbol] DIP/DIP DIRECTION OF ROCK STRUCTURES	[Symbol] SOUNDING ROD	[Symbol] SPT N-VALUE	[Symbol] SPT REFUSAL	[Symbol] ST - SHELBY TUBE SAMPLE			[Symbol] SLOPE INDICATOR INSTALLATION		[Symbol] RS - ROCK SAMPLE			[Symbol] SPT N-VALUE		[Symbol] RT - RECOMPACTED TRIAXIAL SAMPLE			[Symbol] SPT REFUSAL		[Symbol] CBR - CBR SAMPLE	<p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>																																																																																																																																																																														
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

January 4, 2006

STATE PROJECT: 33477.1.1 (B-4124)
F.A. PROJECT: BRZ-1141(10)
COUNTY: Granville

DESCRIPTION: Bridge No. 84 on -L- (SR 1141, Moriah Rd.) over Tar River

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

This project consists of a 230-foot long three span bridge to be constructed over the Tar River, in approximately the same location as the existing structure. Proposed span lengths are 55 feet, 90 feet, and 85 feet. The bridge will be on a 130° skew. The project is located in Granville County about six miles west of Oxford.

The subsurface investigation was conducted during September and October of 2005 using an ATV-mounted CME-550 drill machine. Standard Penetration Test borings were performed at each of the four proposed bent locations. All borings were advanced until crystalline rock was encountered. Borings B1-A and B2-B were cored using NXWL core equipment. Representative soil and rock samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic Province. Geologically, the site is located within the Carolina Slate Belt and is underlain by crystalline meta-volcanic rock. The area consists of wooded land and sparse homes.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial and residual soils.

Roadway embankment soils are present at all the end bent borings except EB2-A. These soils consist primarily of red-brown, soft to stiff, moist, silty clay (A-7). These soils range from 4.0 to 12.3 feet thick and are underlain by alluvial and residual soils.

Alluvial soils are present at all bent locations except for end bent two and range in thickness from 3.6 to 6.1 feet. These soils consist primarily of brown and gray, soft to medium stiff, wet, sandy silt (A-4) and brown, very loose, wet, coarse sand (A-1-b). The alluvial soils are underlain by residual soil and weathered rock.

Residual soils are present at both end bents and B1-B, and range in thickness from 4.0 to 13.7 feet. These soils consist primarily of orange-brown, medium stiff to hard, dry to moist, sandy and silty clay (A-6, A-7). Minor amounts of tan-brown, soft, moist, sandy silt (A-4) and tan-brown, very dense, dry, saprolitic, coarse sand (A-1-b) are also present. Residual soils are derived from weathering of the underlying weathered and crystalline rock.

Rock Properties

Weathered rock is present at each boring location. Weathered rock is derived from the underlying crystalline meta-volcanic rock and ranges in thickness from 0.3 to 7.1 feet. The top of weathered rock was encountered at elevations ranging from 401.6 to 416.7 feet.

Crystalline rock was encountered at each boring location. The top of crystalline rock ranges in elevation from 395.9 to 415.5 feet. Rock core was obtained from B1-A and B2-B. Crystalline rock consists of blue gray, moderately weathered to fresh, hard, closely to widely fractured, meta-volcanic. Core recovery (REC) ranges from 92% to 100% and rock quality designation (RQD) ranges from 8% to 100%. More detailed rock descriptions can be found in the core boring reports. Four rock core samples were submitted to the lab to determine Unconfined Compressive Strength and Unit Weight. Compressive strengths ranged from 2.97 to 18.14 ksi.

Groundwater

Groundwater was encountered at B1-B and B2-A. Groundwater elevations ranged from 403.4 to 406.8 feet. Surface water in Tar River was at elevation 404.3 on February 22, 2005.

Notice

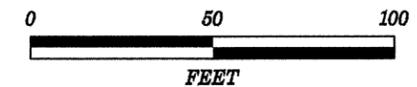
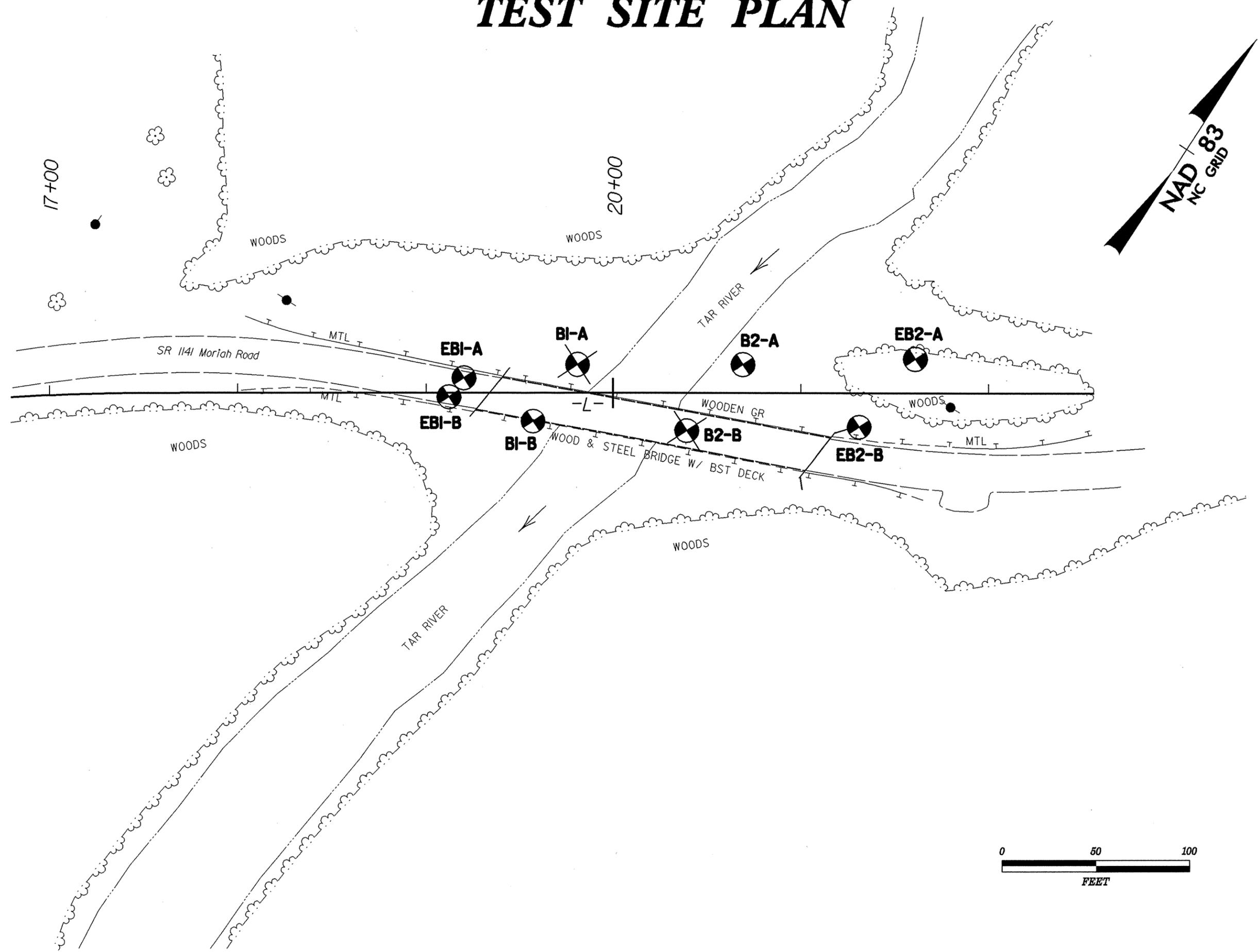
This Geotechnical foundation report is based on the Preliminary General Drawings dated August 8, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully Submitted,

Handwritten signature of Cheryl A. Youngblood in cursive.

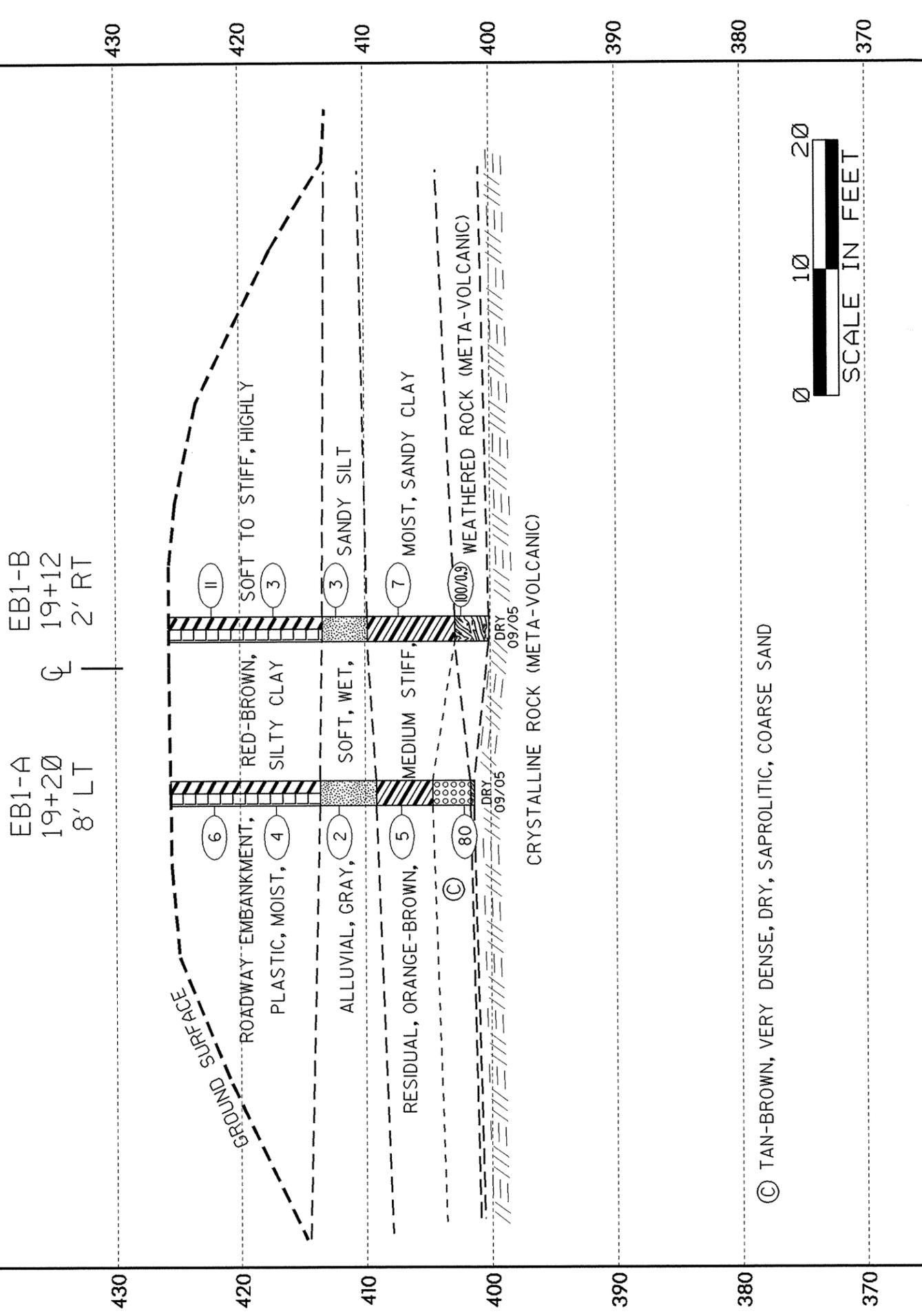
Cheryl A. Youngblood, LG
Project Geologist

TEST SITE PLAN



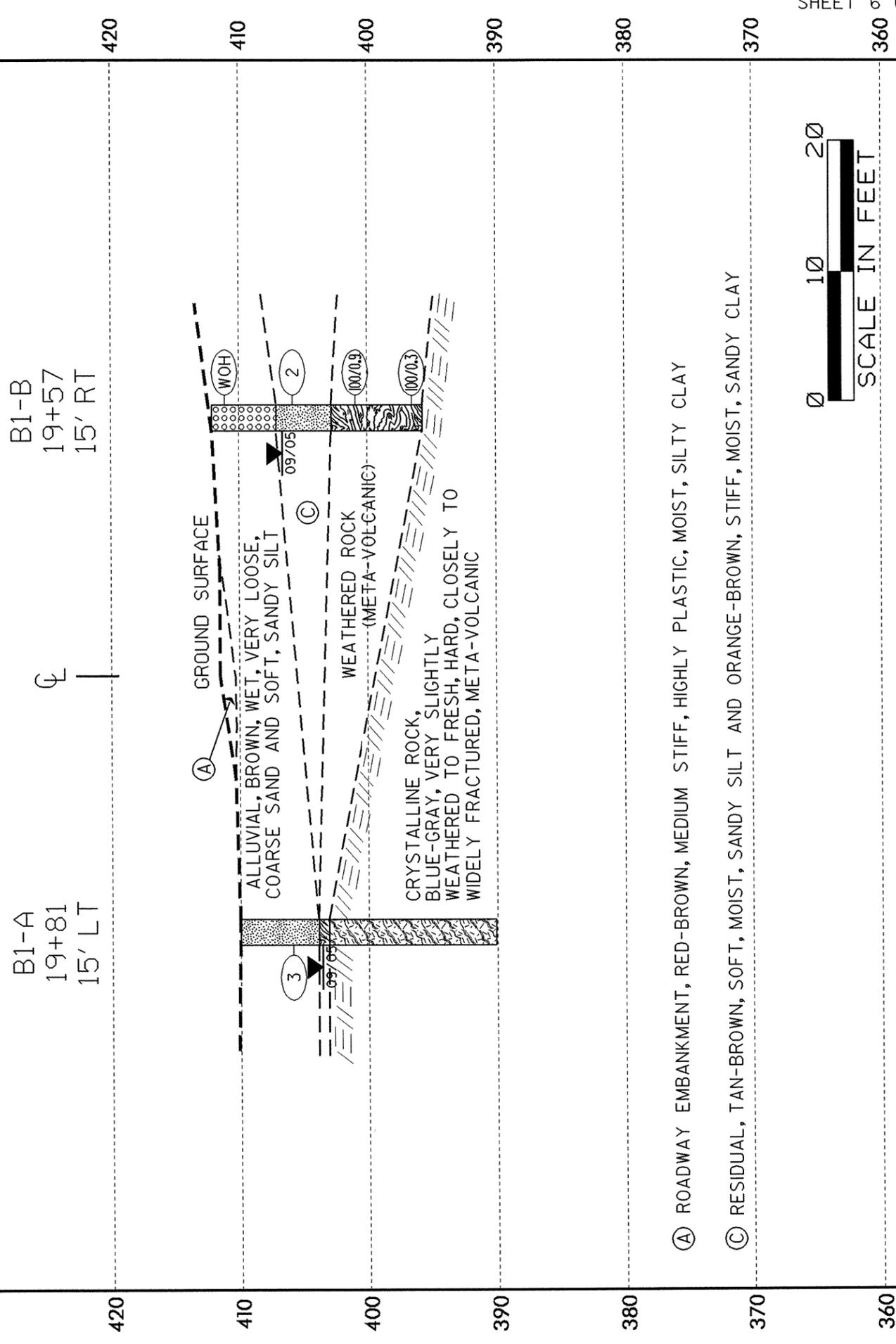
CROSS SECTION THROUGH END BENT I

33477.1.1 (B-4124)



CROSS SECTION THROUGH BENT I

33477.1.1 (B-4124)



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 8 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. EBI-A		BORING LOCATION 19+20		OFFSET 8' LT		ALIGNMENT -L-									
COLLAR ELEVATION 425.6'		NORTHING 932,020		EASTING 2,073,358		0 HR. DRY									
TOTAL DEPTH 24.3'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC									
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 24.3'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOL.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
425.6															
425.0	2.5	2	2	4	1.0	X 6						SS-1	M	ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY	
420.0	7.5	3	2	2	1.0	X 4									
415.0	12.5	2	1	1	1.0	X 2						SS-2	W	ALLUVIAL, GRAY, SANDY SILT	
410.0	17.5	1	2	3	1.0	X 5						SS-3	M	RESIDUAL, ORANGE-BROWN, SANDY CLAY	
405.0	22.5	15	25	55	1.0	X 80						SS-4	D	TAN-BROWN, SAPROLITIC, COARSE SAND	
400.0														WEATHERED ROCK (META-VOLCANIC)	
														AUGER REFUSAL AT ELEVATION 401.3 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)	

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. EBI-B		BORING LOCATION 19+12		OFFSET 2' RT		ALIGNMENT -L-									
COLLAR ELEVATION 425.7'		NORTHING 932,007		EASTING 2,073,357		0 HR. DRY									
TOTAL DEPTH 25.6'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC									
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 25.6'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOL.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
425.7															
425.0	2.4	7	5	6	1.0	X 11							M	ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY	
420.0	7.4	2	1	2	1.0	X 3									
415.0	12.4	WOH	2	1	1.0	X 3							W	ALLUVIAL, GRAY, SANDY SILT	
410.0	17.4	2	3	4	1.0	X 7							M	RESIDUAL, ORANGE-BROWN, SANDY CLAY	
405.0	22.4	20	16	84	0.9									100+ WEATHERED ROCK (META-VOLCANIC)	
400.0														AUGER REFUSAL AT ELEVATION 400.1 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 10 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. BI-B		BORING LOCATION 19+57		OFFSET 15' RT		ALIGNMENT -L-									
COLLAR ELEVATION 412.3'		NORTHING 932,021		EASTING 2,073,402		0 HR. N/A									
TOTAL DEPTH 16.4'		DRILL MACHINE CME-550		DRILL METHOD CASING/WASH/SPT		HAMMER TYPE AUTOMATIC									
START DATE 9/28/05		COMPLETION DATE 9/28/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 16.4'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI. G	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100					
412.3	0.0	WOH	WOH	WOH	1.0	X0									
410.0	5.3	WOH	WOH	2	1.0	X2								SS-5	ALLUVIAL, BROWN, COARSE SAND
405.0	10.3	45	55		0.9										RESIDUAL, TAN-BROWN, SANDY SILT
400.0	15.3	100			0.3										WEATHERED ROCK (META-VOLCANIC)
395.0	TRICONE REFUSAL AT ELEVATION 395.9 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)														

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. B2-A		BORING LOCATION 20+69		OFFSET 15' LT		ALIGNMENT -L-									
COLLAR ELEVATION 409.4'		NORTHING 932,107		EASTING 2,073,479		0 HR. 7.8'									
TOTAL DEPTH 10.1'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC									
START DATE 9/29/05		COMPLETION DATE 9/29/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.1'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI. G	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100					
409.4	2.6	3	3	2	1.0	X5									ALLUVIAL, BROWN, SANDY SILT
405.0	7.6	3	33	67	0.6										WEATHERED ROCK (META-VOLCANIC)
400.0	AUGER REFUSAL AT ELEVATION 399.3 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)														

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 12 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER						
BORING NO. EB2-A		BORING LOCATION 21+61		OFFSET 18' LT		ALIGNMENT -L-							
COLLAR ELEVATION 417.7'		NORTHING 932,160		EASTING 2,073,555		0 HR. DRY 24 HR. FIAD							
TOTAL DEPTH 14.0'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 10/3/05		COMPLETION DATE 10/3/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 14.0'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
417.7													
415.0	2.1	11	5	6	1.0	X 11					SS-8	D	RESIDUAL, BROWN, SILTY CLAY
410.0	7.1	9	6	9	1.0	X 15							
405.0	12.1	15	40	27	1.0	X 67							
AUGER REFUSAL AT ELEVATION 403.7 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)						WEATHERED ROCK (META-VOLCANIC)							

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER						
BORING NO. EB2-B		BORING LOCATION 21+31		OFFSET 18' RT		ALIGNMENT -L-							
COLLAR ELEVATION 424.7'		NORTHING 932,113		EASTING 2,073,549		0 HR. DRY 24 HR. FIAD							
TOTAL DEPTH 9.2'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH		DEPTH TO ROCK 9.2'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
424.7	1.3	4	4	3	1.0	X 7						M	ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY
420.0	6.3	4	4	5	1.0	X 9						M	RESIDUAL, ORANGE-BROWN, SANDY CLAY
AUGER REFUSAL AT ELEVATION 415.5 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)						WEATHERED ROCK (META-VOLCANIC)							

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	8 LT	19+20	2.5-4.0	A-7-6(19)	52	29	13.3	12.5	23.8	50.4	88	79	68	-	-
SS-2	8 LT	19+20	12.5-14.0	A-4(2)	25	7	14.5	28.4	28.8	28.2	97	90	60	-	-
SS-3	8 LT	19+20	17.5-19.0	A-6(7)	34	13	4.0	36.3	27.4	32.3	100	99	68	-	-
SS-4	8 LT	19+20	22.5-24.0	A-1-b(0)	26	3	44.4	23.2	18.3	14.1	58	37	21	-	-

B1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	15 RT	19+57	5.3-6.8	A-4(0)	22	5	8.1	40.7	25.0	26.2	100	99	57	-	-

B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	15 LT	20+69	2.6-4.1	A-4(1)	25	8	29.0	22.4	22.4	26.2	100	90	52	-	-

B2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	20 RT	20+39	0.0-1.5	A-4(3)	27	7	10.5	23.8	35.5	30.2	96	91	67	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	18 LT	21+61	2.1-3.6	A-7-6(14)	42	21	10.6	15.7	30.8	42.9	92	86	72	-	-



**FIELD
 SCOUR REPORT**

WBS: 33477.1.1 TIP: B-4124 COUNTY: Granville

DESCRIPTION(1): Bridge No. 84 on -L- (SR 1141, Moriah Rd.) over Tar River

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel _____ pos: _____)
 Other (explain) Bridge Survey & Hydraulic Design Report

Bridge No.: 84 Length: 179' Total Bents: 6 Bents in Channel: 1 Bents in Floodplain: 5
 Foundation Type: Timber Piles on Concrete Footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Localized Scour at Bent 3 (Exposed Footing)

Channel Bed: Metavolcanic bedrock is outcropping in stream bed.

Channel Bank: Steeply Cut Banks with Exposed Tree Roots

EXISTING SCOUR PROTECTION

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): 2 Large snags (dead trees) at Bent 3

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 geotechnically adjusted scour elevation (GASE) 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 GASE. If the GASE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The GASE 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): Silty Sand and Metavolcanic bedrock

Channel Bank Material(8): Sandy Silt (SS-6, SS-7)

Channel Bank Cover(9): Trees, Shrubs, Grass

Floodplain Width(10): 100-150'

Floodplain Cover(11): Trees, Shrubs, Grass

Stream is(12): Aggrading _____ Degrading Static _____

Chan. Migration Tendency(13): West

Observations and Other Comments:

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet Meters _____

The Geotechnical Engineering Unit agrees with the theoretical scour estimate for the 100 year event provided by the Hydraulics Unit in the Bridge Survey and Hydraulic Design Report, date 4/15/05.

Comparison of GASE to Hydraulics Unit theoretical scour:
 Same

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

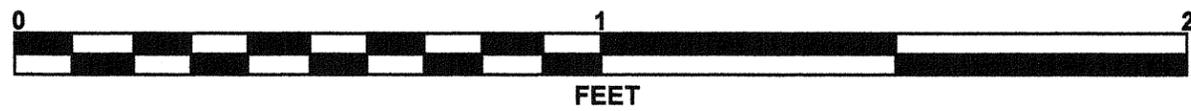
Bed or Bank	Bank	Bank					
Sample No.	SS-6	SS-7					
Retained #4	2	-					
Passed #10	96	100					
Passed #40	91	90					
Passed #200	67	52					
Coarse Sand	10.5	29					
Fine Sand	23.8	22.4					
Silt	35.5	22.4					
Clay	30.2	26.2					
LL	27	25					
PI	7	8					
AASHTO	A-4(3)	A-4(1)					
Station	20+39	20+69					
Offset	20' RT	15' LT					
Depth	0.0' - 1.5'	2.6' - 4.1'					

Reported by: C. Doug Czajka
 C. Doug Czajka

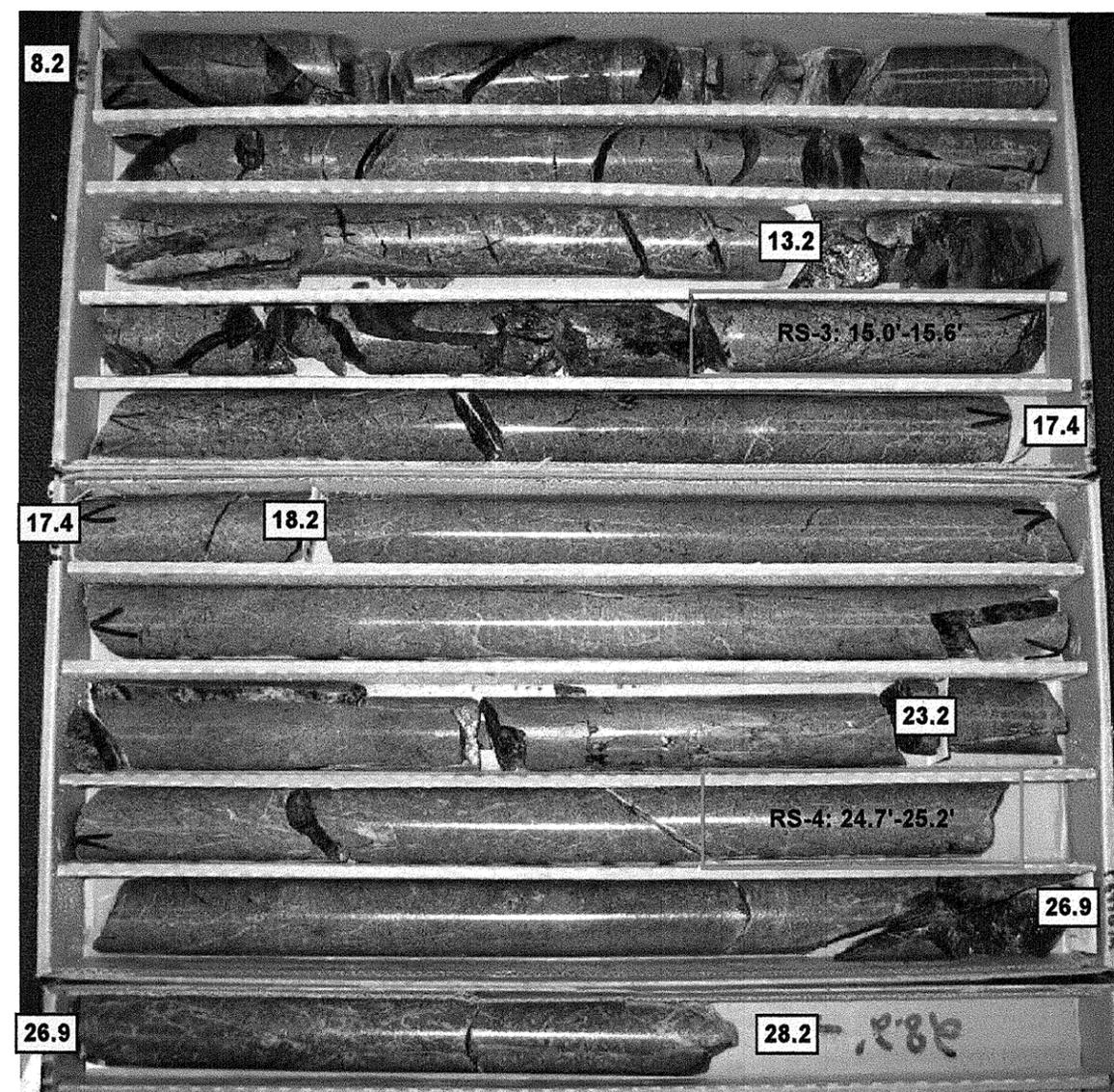
Date: 10/4/2005

CORE PHOTOGRAPHS

B1-A
BOXES 1 & 2: 6.9 - 19.9 FEET



B2-B
BOXES 1, 2 & 3: 8.2 - 28.2 FEET



SITE PHOTOGRAPH

Bridge No. 84 on -L- (SR 1141, Moriah Rd.) Over Tar River



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4124	33477.1.1	2	16

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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <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 ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)	ALLUVIUM (ALLUV.) - SOILS WHICH 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 WHICH 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 DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL CLASS. GRANULAR MATERIALS (75% PASSING #200) SILT-CLAY MATERIALS (75% 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 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS 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. SLI.) 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 (SLI.) 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 ROCKS 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 B.P.F.</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 B.P.F.</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.	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 DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.75 2.0 0.42 0.25 0.075 0.053 BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. 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" 3/16" 1/8" 1/16" 1/32"	MISCELLANEOUS SYMBOLS 	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 GROVED 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.	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH 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, WHICH 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 B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
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	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 FRAGS. - FRAGMENTS MED. - MEDIUM PMT - PRESSUREMETER TEST SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL U - UNIT WEIGHT U _d - DRY UNIT WEIGHT W - MOISTURE CONTENT V. - VERY VST - VANE SHEAR TEST	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 GROVED 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.	BENCH MARK: BL-4, -L- STA. 19+29, 14'LT ELEVATION: 424.87'
PLASTICITY NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> OTHER <input type="checkbox"/> OTHER ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input checked="" type="checkbox"/> HARD FACED FINGER BITS <input checked="" type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING w/ ADVANCER <input type="checkbox"/> TRICONE _____ STEEL TEETH <input type="checkbox"/> TRICONE _____ TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT <input type="checkbox"/> OTHER HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input checked="" type="checkbox"/> -NXWL <input type="checkbox"/> -H HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> OTHER	FRACTURE 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	NOTES:
COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		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.	



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

January 4, 2006

STATE PROJECT: 33477.1.1 (B-4124)
F.A. PROJECT: BRZ-1141(10)
COUNTY: Granville

DESCRIPTION: Bridge No. 84 on -L- (SR 1141, Moriah Rd.) over Tar River

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

This project consists of a 230-foot long three span bridge to be constructed over the Tar River, in approximately the same location as the existing structure. Proposed span lengths are 55 feet, 90 feet, and 85 feet. The bridge will be on a 130° skew. The project is located in Granville County about six miles west of Oxford.

The subsurface investigation was conducted during September and October of 2005 using an ATV-mounted CME-550 drill machine. Standard Penetration Test borings were performed at each of the four proposed bent locations. All borings were advanced until crystalline rock was encountered. Borings B1-A and B2-B were cored using NXWL core equipment. Representative soil and rock samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic Province. Geologically, the site is located within the Carolina Slate Belt and is underlain by crystalline meta-volcanic rock. The area consists of wooded land and sparse homes.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial and residual soils.

Roadway embankment soils are present at all the end bent borings except EB2-A. These soils consist primarily of red-brown, soft to stiff, moist, silty clay (A-7). These soils range from 4.0 to 12.3 feet thick and are underlain by alluvial and residual soils.

Alluvial soils are present at all bent locations except for end bent two and range in thickness from 3.6 to 6.1 feet. These soils consist primarily of brown and gray, soft to medium stiff, wet, sandy silt (A-4) and brown, very loose, wet, coarse sand (A-1-b). The alluvial soils are underlain by residual soil and weathered rock.

Residual soils are present at both end bents and B1-B, and range in thickness from 4.0 to 13.7 feet. These soils consist primarily of orange-brown, medium stiff to hard, dry to moist, sandy and silty clay (A-6, A-7). Minor amounts of tan-brown, soft, moist, sandy silt (A-4) and tan-brown, very dense, dry, saprolitic, coarse sand (A-1-b) are also present. Residual soils are derived from weathering of the underlying weathered and crystalline rock.

Rock Properties

Weathered rock is present at each boring location. Weathered rock is derived from the underlying crystalline meta-volcanic rock and ranges in thickness from 0.3 to 7.1 feet. The top of weathered rock was encountered at elevations ranging from 401.6 to 416.7 feet.

Crystalline rock was encountered at each boring location. The top of crystalline rock ranges in elevation from 395.9 to 415.5 feet. Rock core was obtained from B1-A and B2-B. Crystalline rock consists of blue gray, moderately weathered to fresh, hard, closely to widely fractured, meta-volcanic. Core recovery (REC) ranges from 92% to 100% and rock quality designation (RQD) ranges from 8% to 100%. More detailed rock descriptions can be found in the core boring reports. Four rock core samples were submitted to the lab to determine Unconfined Compressive Strength and Unit Weight. Compressive strengths ranged from 2.97 to 18.14 ksi.

Groundwater

Groundwater was encountered at B1-B and B2-A. Groundwater elevations ranged from 403.4 to 406.8 feet. Surface water in Tar River was at elevation 404.3 on February 22, 2005.

Notice

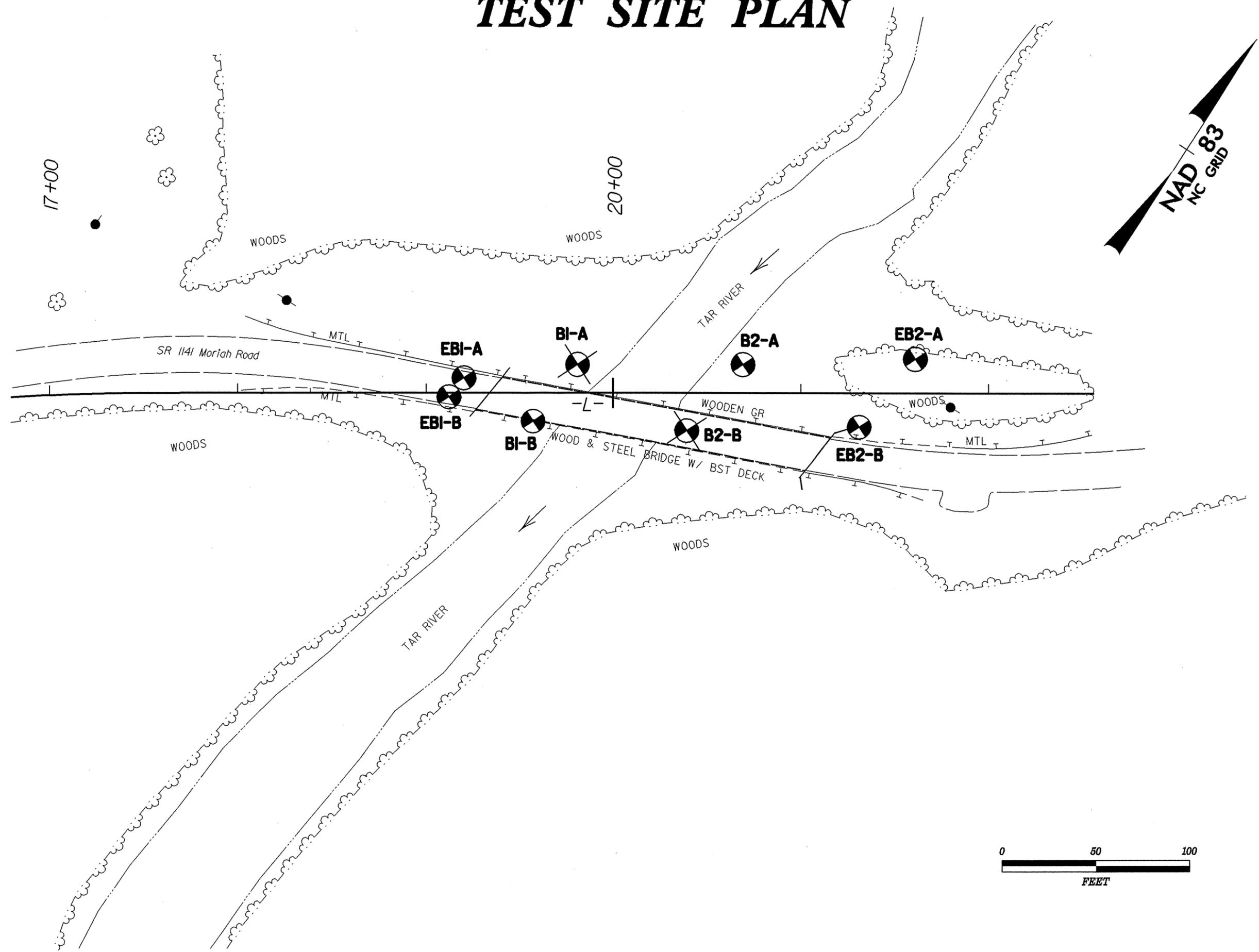
This Geotechnical foundation report is based on the Preliminary General Drawings dated August 8, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully Submitted,

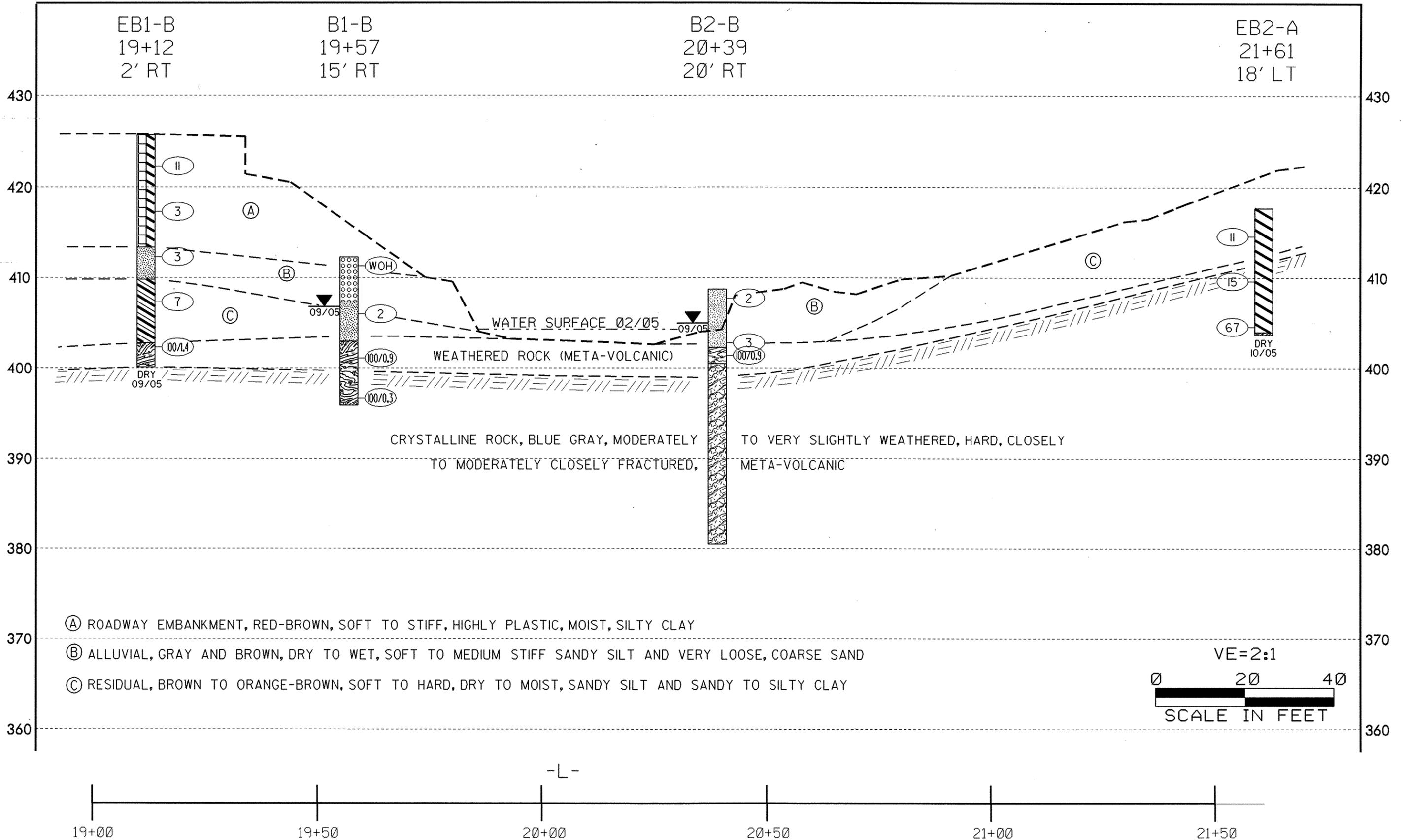
Handwritten signature of Cheryl A. Youngblood in cursive.

Cheryl A. Youngblood, LG
Project Geologist

TEST SITE PLAN

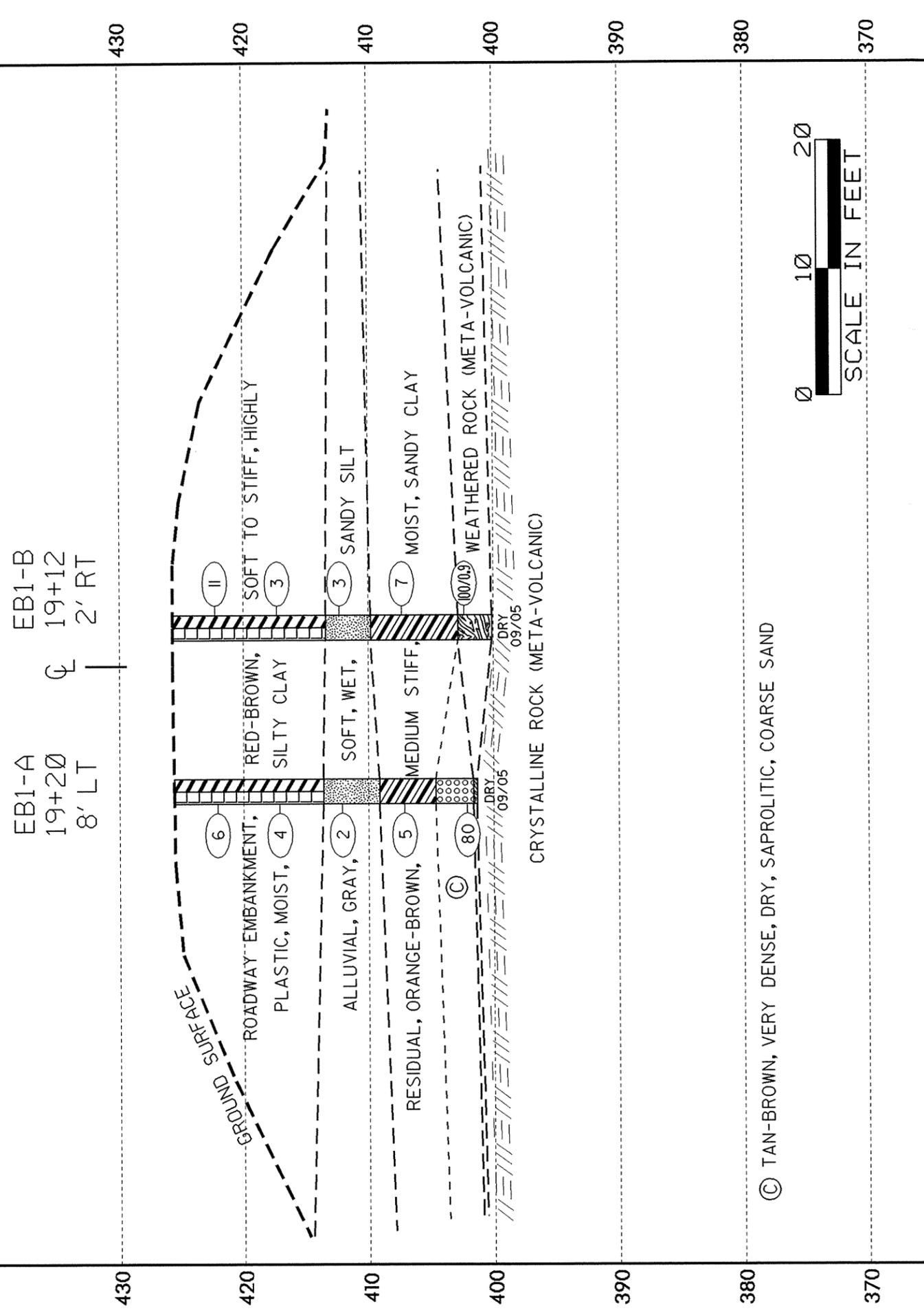


PROFILE THROUGH BORINGS PROJECTED ALONG -L-



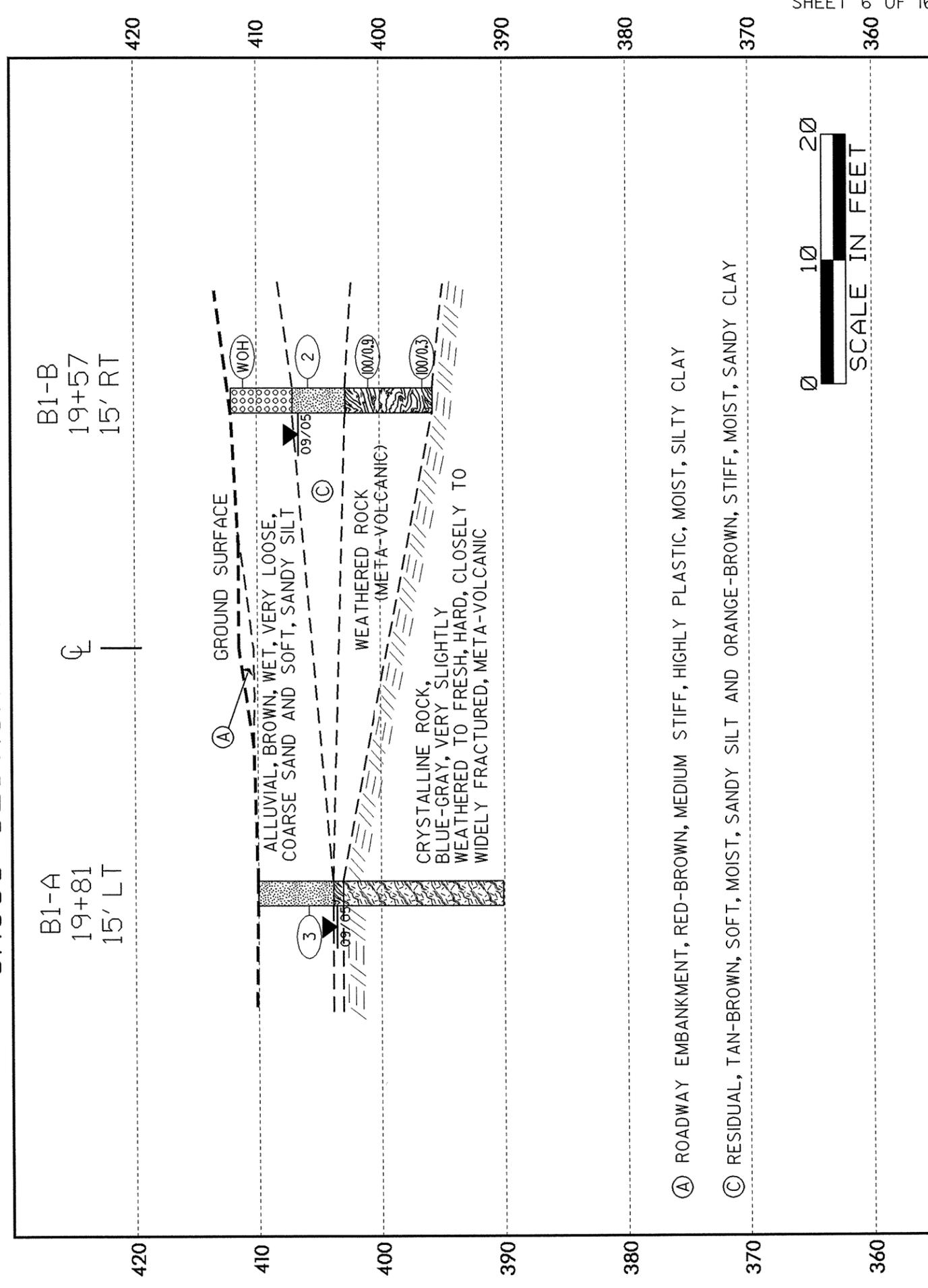
CROSS SECTION THROUGH END BENT I

33477.1.1 (B-4124)



CROSS SECTION THROUGH BENT I

33477.1.1 (B-4124)

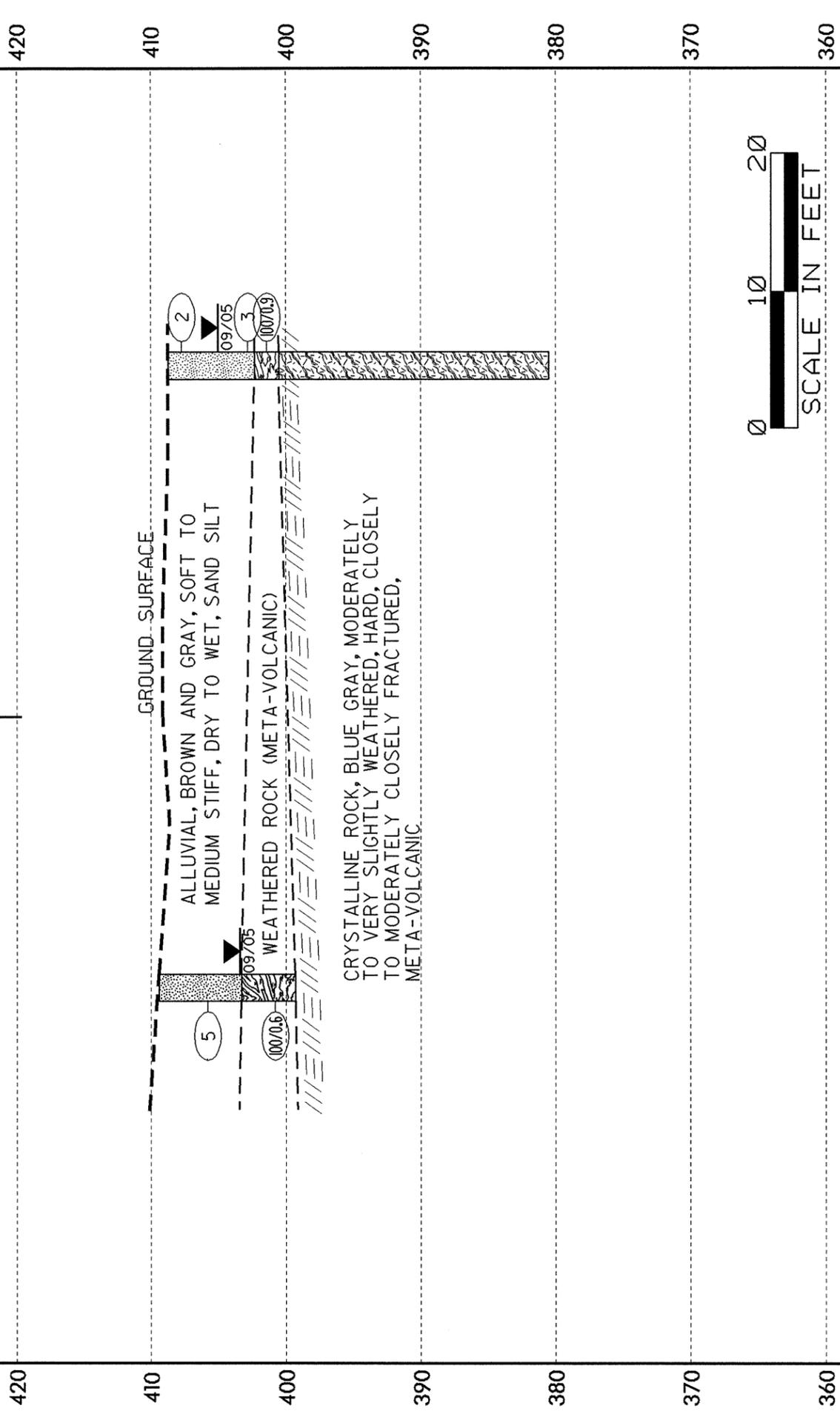


CROSS SECTION THROUGH BENT 2

33477.1.1 (B-4124)

B2-A
20+69
15' LT

B2-B
20+39
20' RT

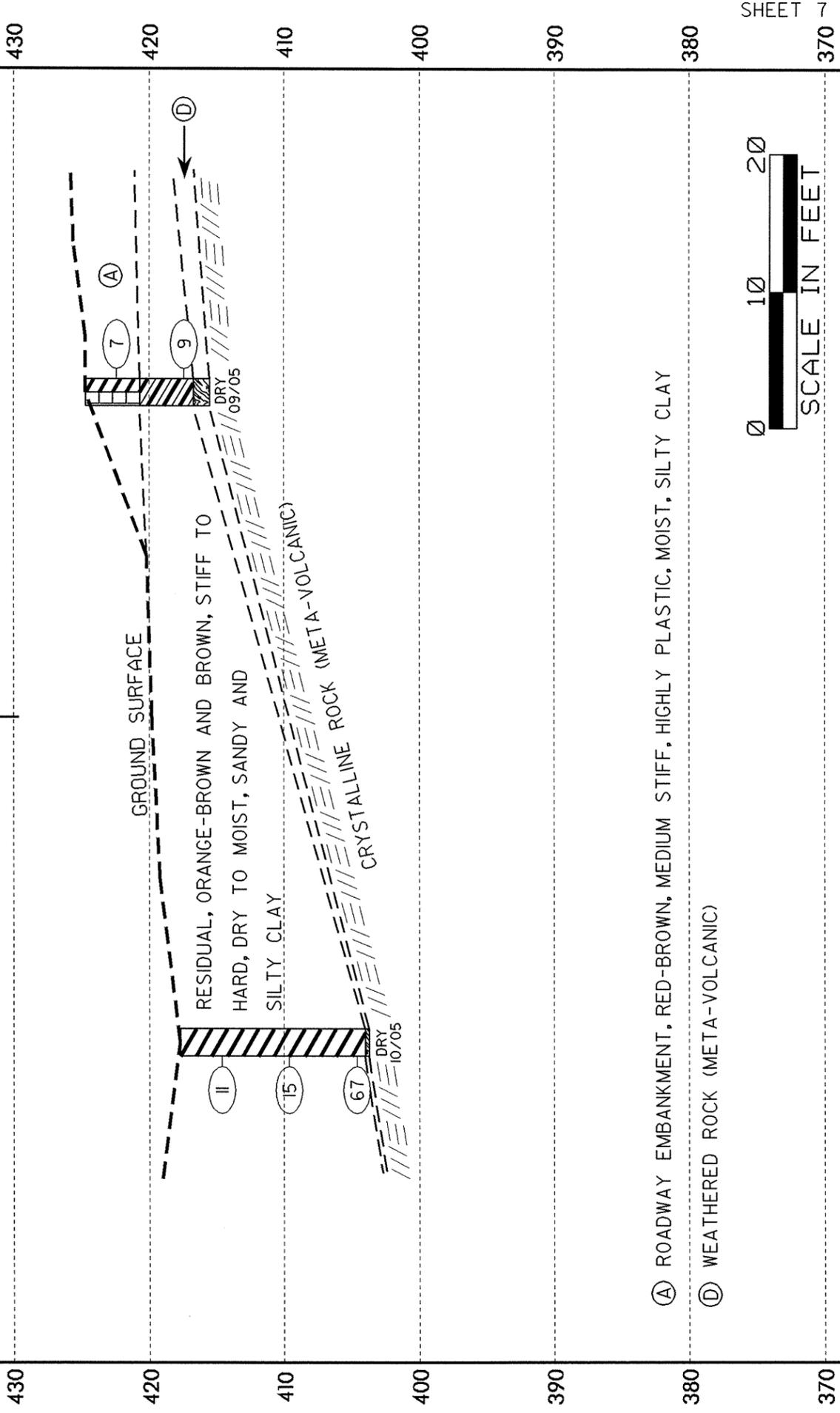


CROSS SECTION THROUGH END BENT 2

33477.1.1 (B-4124)

EB2-A
21+61
18' LT

EB2-B
21+31
18' RT



- (A) ROADWAY EMBANKMENT, RED-BROWN, MEDIUM STIFF, HIGHLY PLASTIC, MOIST, SILTY CLAY
- (D) WEATHERED ROCK (META-VOLCANIC)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 8 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA										
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER									
BORING NO. EBI-A		BORING LOCATION 19+20		OFFSET 8' LT		ALIGNMENT -L-										
COLLAR ELEVATION 425.6'		NORTHING 932,020		EASTING 2,073,358		0 HR. DRY 24 HR. FIAD										
TOTAL DEPTH 24.3'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC										
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 24.3'										
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOL.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100						
425.6 425.0	2.5	2	2	4	1.0											ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY
420.0	7.5	3	2	2	1.0											
415.0	12.5	2	1	1	1.0											ALLUVIAL, GRAY, SANDY SILT
410.0	17.5	1	2	3	1.0											RESIDUAL, ORANGE-BROWN, SANDY CLAY
405.0	22.5	15	25	55	1.0											TAN-BROWN, SAPROLITIC, COARSE SAND
400.0	AUGER REFUSAL AT ELEVATION 401.3 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)														WEATHERED ROCK (META-VOLCANIC)	
395.0																
390.0																
385.0																
380.0																
375.0																
370.0																
365.0																
360.0																
355.0																
350.0																

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA										
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER									
BORING NO. EBI-B		BORING LOCATION 19+12		OFFSET 2' RT		ALIGNMENT -L-										
COLLAR ELEVATION 425.7'		NORTHING 932,007		EASTING 2,073,357		0 HR. DRY 24 HR. DRY										
TOTAL DEPTH 25.6'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC										
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 25.6'										
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOL.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100						
425.7 425.0	2.4	7	5	6	1.0											ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY
420.0	7.4	2	1	2	1.0											
415.0	12.4	WOH	2	1	1.0											ALLUVIAL, GRAY, SANDY SILT
410.0	17.4	2	3	4	1.0											RESIDUAL, ORANGE-BROWN, SANDY CLAY
405.0	22.4	20	16	84	0.9											WEATHERED ROCK (META-VOLCANIC)
400.0	AUGER REFUSAL AT ELEVATION 400.1 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)															
395.0																
390.0																
385.0																
380.0																
375.0																
370.0																
365.0																
360.0																
355.0																
350.0																

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 10 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. BI-B		BORING LOCATION 19+57		OFFSET 15' RT		ALIGNMENT -L-									
COLLAR ELEVATION 412.3'		NORTHING 932,021		EASTING 2,073,402		0 HR. N/A									
TOTAL DEPTH 16.4'		DRILL MACHINE CME-550		DRILL METHOD CASING/WASH/SPT		HAMMER TYPE AUTOMATIC									
START DATE 9/28/05		COMPLETION DATE 9/28/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 16.4'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI. G	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100					
412.3	0.0	WOH	WOH	WOH	1.0	X0									
410.0	5.3	WOH	WOH	2	1.0	X2								SS-5	ALLUVIAL, BROWN, COARSE SAND
405.0	10.3	45	55		0.9										RESIDUAL, TAN-BROWN, SANDY SILT
400.0	15.3	100			0.3										WEATHERED ROCK (META-VOLCANIC)
395.0	TRICONE REFUSAL AT ELEVATION 395.9 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)														

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA									
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER								
BORING NO. B2-A		BORING LOCATION 20+69		OFFSET 15' LT		ALIGNMENT -L-									
COLLAR ELEVATION 409.4'		NORTHING 932,107		EASTING 2,073,479		0 HR. 7.8'									
TOTAL DEPTH 10.1'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC									
START DATE 9/29/05		COMPLETION DATE 9/29/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.1'									
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI. G	SOIL AND ROCK DESCRIPTION		
		0.5'	0.5'	0.5'		0	25	50	75	100					
409.4	2.6	3	3	2	1.0	X5									ALLUVIAL, BROWN, SANDY SILT
405.0	7.6	3	33	67	0.6										WEATHERED ROCK (META-VOLCANIC)
400.0	AUGER REFUSAL AT ELEVATION 399.3 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)														

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA						
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER					
BORING NO. B2-B		BORING LOCATION 20+39		OFFSET 20' RT		ALIGNMENT -L-						
COLLAR ELEVATION 408.7'		NORTHING 932,061		EASTING 2,073,473		0 HR. N/A						
TOTAL DEPTH 28.2'		DRILL MACHINE CME-550		DRILL METHOD CASING/CORE		HAMMER TYPE AUTOMATIC						
START DATE 9/28/05		COMPLETION DATE 9/28/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 8.2'						
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT 0.5' 0.5' 0.5'	PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION		
				0	25	50	75				100	
408.7	0	WOHWOH	2	1.0						SS-6	W	ALLUVIAL, BROWN AND GRAY, SANDY SILT
405.0	3.9	WOHWOH	3	1.0								
	6.4	14	86	0.9								
400.0												WEATHERED ROCK (META-VOLCANIC)
395.0										RS-3		CRYSTALLINE ROCK, BLUE-GRAY, MODERATELY TO VERY SLIGHTLY WEATHERED, HARD, CLOSE TO MODERATELY CLOSELY FRACTURED, META-VOLCANIC
390.0												
385.0										RS-4		
380.0												REC = 98% RQD = 53%
375.0												CORING TERMINATED AT ELEVATION 380.5 FEET IN CRYSTALLINE ROCK (META-VOLCANIC)
370.0												
365.0												
360.0												
355.0												
350.0												
345.0												
340.0												
335.0												
330.0												

CORE BORING REPORT									
PROJECT: 33477.1.1		ID: B-4124		COUNTY: GRANVILLE		BORING NO: B2-B			
DESCRIPTION: Bridge No. 84 on -L- (SR 1141, Moriah Rd.) Over Tar River									
LOCATION OF BORING: -L- STA. 20+39, 20' RT						COMPLETION DATE: 09/28/05			
COLLAR or GROUND ELEVATION: 408.7 ft				CORE SIZE: NXWL		GEOLOGIST: C.D. CZAJKA			
CORE EQUIPMENT: CME-550, N-CASING, NXWL						DRILLER: H.R. CONLEY			
ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS		
400.5	8.2	1:14					BLUE-GRAY, MODERATELY WEATHERED, HARD, CLOSELY FRACTURED, META-VOLCANIC		
		0:46							
		1:01	5.0	5.0	0.4				
		1:04		(100%)	(8%)				
395.5	13.2	1:13							
395.5	13.2	1:27				RS-3	BLUE-GRAY, MODERATELY TO VERY SLIGHTLY WEATHERED, HARD, CLOSELY TO MODERATELY CLOSELY FRACTURED, META-VOLCANIC		
		1:11							
		1:10	5.0	4.6	2.7				
		1:21		(92%)	(54%)				
390.5	18.2	1:36							
390.5	18.2	1:11					BLUE-GRAY, SLIGHTLY WEATHERED, HARD, MODERATELY CLOSELY FRACTURED, META-VOLCANIC		
		1:05							
		1:02	5.0	5.0	3.7				
		1:01		(100%)	(74%)				
385.5	23.2	0:56							
385.5	23.2	1:10				RS-4	BLUE-GRAY, SLIGHTLY WEATHERED, HARD, CLOSELY TO MODERATELY CLOSELY FRACTURED, META-VOLCANIC		
		1:00							
		1:06	5.0	5.0	3.8				
		1:07		(100%)	(76%)				
380.5	28.2	1:17							
							BOREHOLE TERMINATED AT ELEVATION OF 380.5 FEET, IN CYRSTALLINE ROCK.		

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 12 OF 16

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER						
BORING NO. EB2-A		BORING LOCATION 21+61		OFFSET 18' LT		ALIGNMENT -L-							
COLLAR ELEVATION 417.7'		NORTHING 932,160		EASTING 2,073,555		0 HR. DRY 24 HR. FIAD							
TOTAL DEPTH 14.0'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 10/3/05		COMPLETION DATE 10/3/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 14.0'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
417.7													
415.0	2.1	11	5	6	1.0	X 11					SS-8	D	RESIDUAL, BROWN, SILTY CLAY
410.0	7.1	9	6	9	1.0	X 15							
405.0	12.1	15	40	27	1.0	X 67							
AUGER REFUSAL AT ELEVATION 403.7 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)						WEATHERED ROCK (META-VOLCANIC)							

PROJECT NO. 33477.1.1		ID. B-4124		COUNTY GRANVILLE		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 84 ON -L- (SR 1141, MORIAH RD.) OVER TAR RIVER							GROUND WATER						
BORING NO. EB2-B		BORING LOCATION 21+31		OFFSET 18' RT		ALIGNMENT -L-							
COLLAR ELEVATION 424.7'		NORTHING 932,113		EASTING 2,073,549		0 HR. DRY 24 HR. FIAD							
TOTAL DEPTH 9.2'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 9/27/05		COMPLETION DATE 9/27/05		SURFACE WATER DEPTH		DEPTH TO ROCK 9.2'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
424.7	1.3	4	4	3	1.0	X 7						M	ROADWAY EMBANKMENT, RED-BROWN HIGHLY PLASTIC, SILTY CLAY
420.0	6.3	4	4	5	1.0	X 9						M	RESIDUAL, ORANGE-BROWN, SANDY CLAY
AUGER REFUSAL AT ELEVATION 415.5 FEET ON CRYSTALLINE ROCK (META-VOLCANIC)						WEATHERED ROCK (META-VOLCANIC)							

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	8 LT	19+20	2.5-4.0	A-7-6(19)	52	29	13.3	12.5	23.8	50.4	88	79	68	-	-
SS-2	8 LT	19+20	12.5-14.0	A-4(2)	25	7	14.5	28.4	28.8	28.2	97	90	60	-	-
SS-3	8 LT	19+20	17.5-19.0	A-6(7)	34	13	4.0	36.3	27.4	32.3	100	99	68	-	-
SS-4	8 LT	19+20	22.5-24.0	A-1-b(0)	26	3	44.4	23.2	18.3	14.1	58	37	21	-	-

B1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	15 RT	19+57	5.3-6.8	A-4(0)	22	5	8.1	40.7	25.0	26.2	100	99	57	-	-

B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	15 LT	20+69	2.6-4.1	A-4(1)	25	8	29.0	22.4	22.4	26.2	100	90	52	-	-

B2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	20 RT	20+39	0.0-1.5	A-4(3)	27	7	10.5	23.8	35.5	30.2	96	91	67	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	18 LT	21+61	2.1-3.6	A-7-6(14)	42	21	10.6	15.7	30.8	42.9	92	86	72	-	-



**FIELD
 SCOUR REPORT**

WBS: 33477.1.1 TIP: B-4124 COUNTY: Granville

DESCRIPTION(1): Bridge No. 84 on -L- (SR 1141, Moriah Rd.) over Tar River

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel _____ pos: _____)
 Other (explain) Bridge Survey & Hydraulic Design Report

Bridge No.: 84 Length: 179' Total Bents: 6 Bents in Channel: 1 Bents in Floodplain: 5
 Foundation Type: Timber Piles on Concrete Footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Localized Scour at Bent 3 (Exposed Footing)

Channel Bed: Metavolcanic bedrock is outcropping in stream bed.

Channel Bank: Steeply Cut Banks with Exposed Tree Roots

EXISTING SCOUR PROTECTION

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): 2 Large snags (dead trees) at Bent 3

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 geotechnically adjusted scour elevation (GASE) 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 GASE. If the GASE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The GASE 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): Silty Sand and Metavolcanic bedrock

Channel Bank Material(8): Sandy Silt (SS-6, SS-7)

Channel Bank Cover(9): Trees, Shrubs, Grass

Floodplain Width(10): 100-150'

Floodplain Cover(11): Trees, Shrubs, Grass

Stream is(12): Aggrading _____ Degrading Static _____

Chan. Migration Tendency(13): West

Observations and Other Comments:

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet Meters _____

The Geotechnical Engineering Unit agrees with the theoretical scour estimate for the 100 year event provided by the Hydraulics Unit in the Bridge Survey and Hydraulic Design Report, date 4/15/05.

Comparison of GASE to Hydraulics Unit theoretical scour:
 Same

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

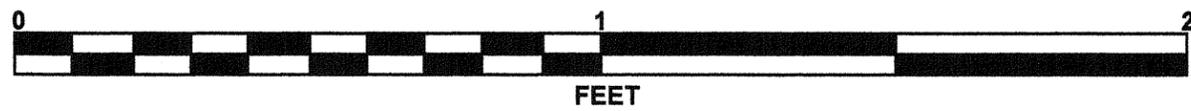
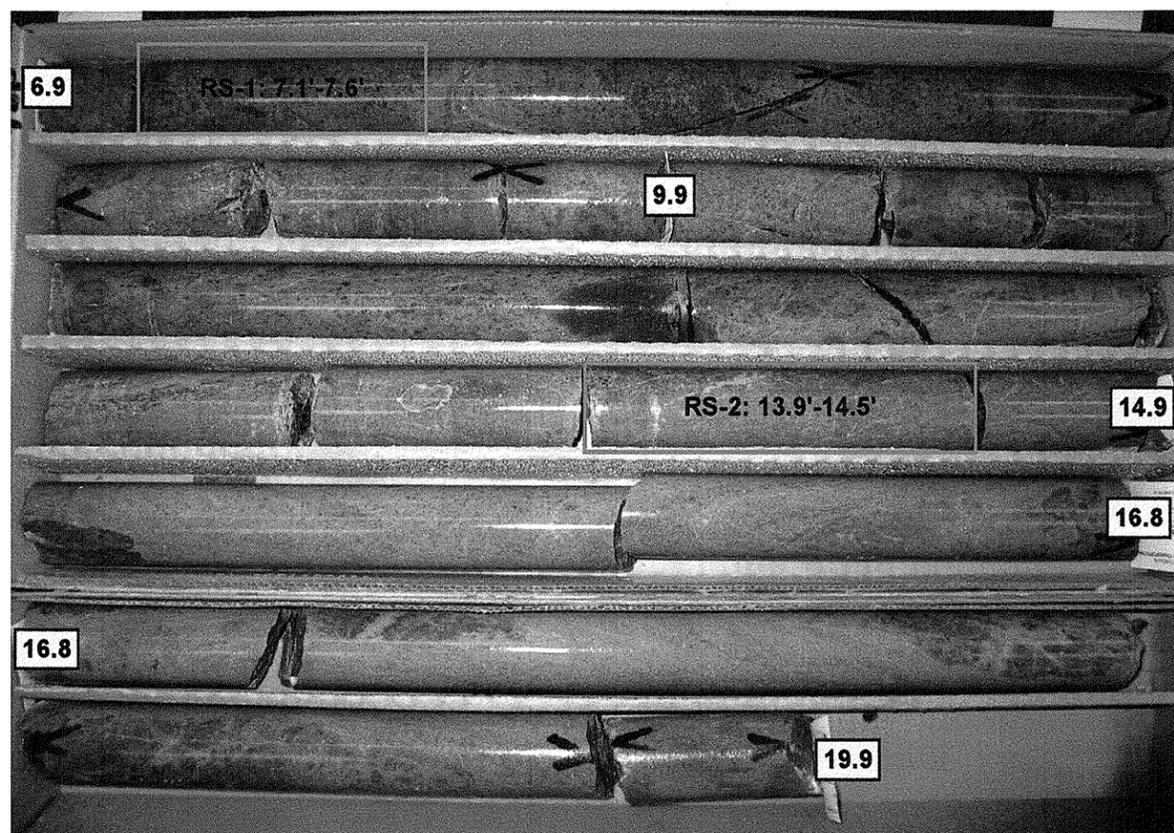
Bed or Bank	Bank	Bank					
Sample No.	SS-6	SS-7					
Retained #4	2	-					
Passed #10	96	100					
Passed #40	91	90					
Passed #200	67	52					
Coarse Sand	10.5	29					
Fine Sand	23.8	22.4					
Silt	35.5	22.4					
Clay	30.2	26.2					
LL	27	25					
PI	7	8					
AASHTO	A-4(3)	A-4(1)					
Station	20+39	20+69					
Offset	20' RT	15' LT					
Depth	0.0' - 1.5'	2.6' - 4.1'					

Reported by: C. Doug Czajka
 C. Doug Czajka

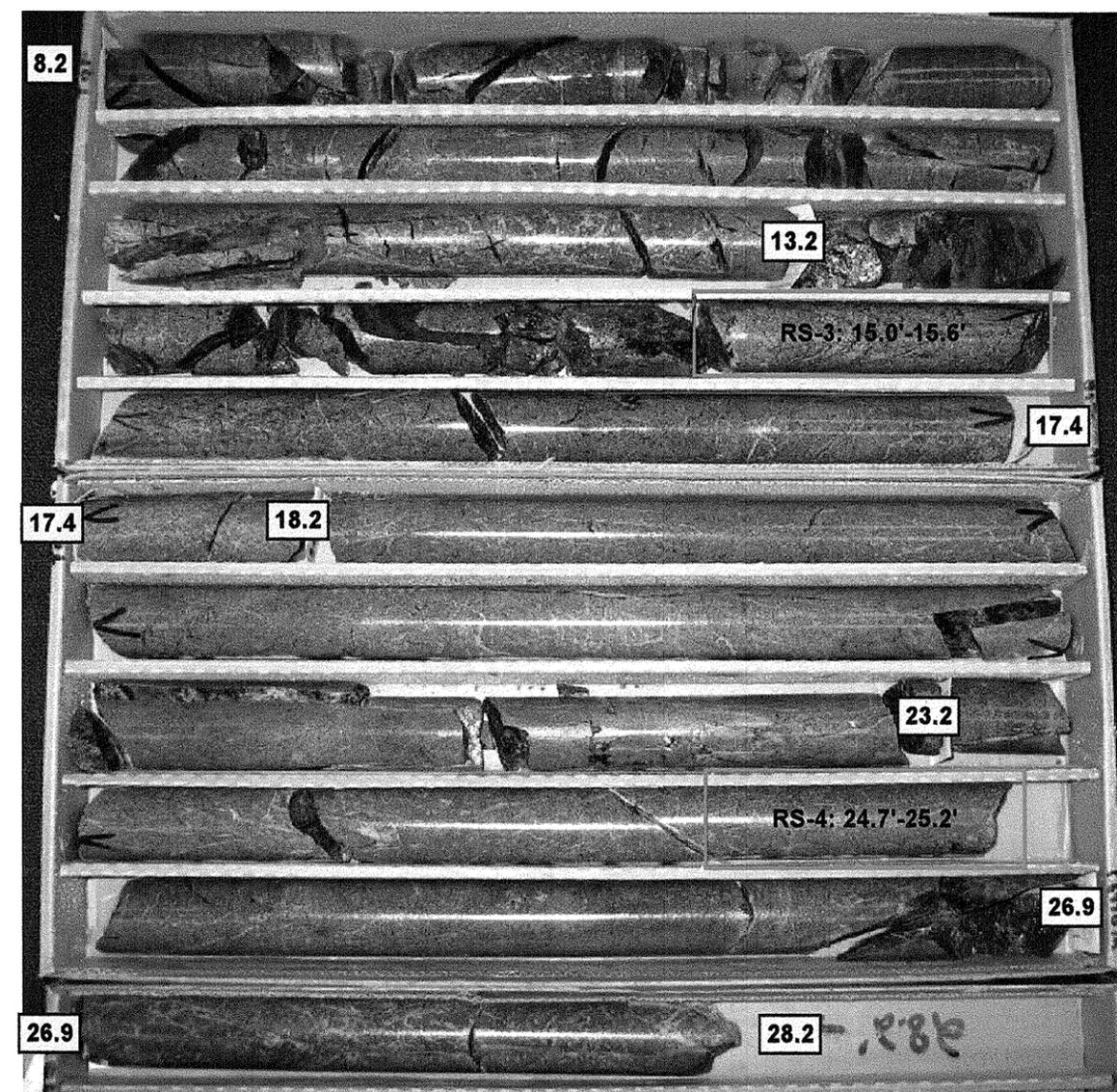
Date: 10/4/2005

CORE PHOTOGRAPHS

B1-A
BOXES 1 & 2: 6.9 - 19.9 FEET



B2-B
BOXES 1, 2 & 3: 8.2 - 28.2 FEET



SITE PHOTOGRAPH

Bridge No. 84 on -L- (SR 1141, Moriah Rd.) Over Tar River

