STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33481.1.1 (B-4128)	1	16
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
33481.1.1	BRSTP-1549(4)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33481.1.1 I.D. NO. B-4128

F.A. PROJECT BRSTP-1549(4)

COUNTY GUILFORD

PROJECT DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.) OVER BULL RUN CREEK AT STA. 24+02

INVENTORY

PROJECT: 33481.1.1 ID: B-4128

CONTENTS:

CAUTION NOTICE

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INVESTIGATED BY T.P. MOOREFIELD PERSONNEL N.D. MOHS

CHECKED BY N.T. ROBERSON D.W. DIXON

SUBMITTED BY N.T. ROBERSON H.R. CONLEY

DATE FEBRUARY 2006 M.L. REEDER

DRAWN BY: T.T. WALKER, N.D. MOHS

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NORTH CAROLINA LICENSED SEAL 1307 2-16-06 GEOLOGIST THOMAS P. MOOREFIELD

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4128	33481.1.1	2	16

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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 (AASHTO 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:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	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"				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL - LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL - PLASTIC LIMIT		
OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

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.

GRADATION

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.

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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW - PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 - DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT, CPT, DPT, DMT, VST, PMT - TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- (REF) - SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -NXWL___
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] OTHER _____

ROCK DESCRIPTION

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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

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. *IF TESTED, WOULD YIELD SPT REFUSAL*
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 BPF*
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 BPF*
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.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 FINGERNAIL.

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

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.

TERMS AND DEFINITIONS

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 IS 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 DISLODGED 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.

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.

BENCH MARK: -BL6- 19+96 AT -L- STATION 24+41, 14' LT

ELEVATION: 771.9 FEET

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

February 15, 2006

STATE PROJECT: 33481.1.1 (B-4128)
F.A. PROJECT: BRSTP-1549(4)
COUNTY: Guilford
DESCRIPTION: Bridge No. 73 on -L- (SR 1549) over Bull Run Creek at Station 24+02.0

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A single-span bridge, 100-feet in length with a 120° skew, is proposed at the same location on -L- (SR 1549, Mackay Rd.) over Bull Run Creek to replace the existing structure. The new bridge is 64 feet in width and will accommodate four travel lanes. The existing structure is 40 feet in length and 25 feet in width. An onsite temporary detour bridge is to be constructed approximately 59 feet upstream of the existing bridge. The project is located in Guilford County within the city limits of Greensboro.

The subsurface investigation for the structure was conducted during January 2006 using an ATV-mounted CME-550 drill machine. Two Standard Penetration Test borings were performed at each end bent location. Boring EB2-A was cored using NXWL core equipment. Two borings were completed at the detour end bent locations in March 2005 using an ATV-mounted CME-550 drill machine. All borings were advanced until crystalline rock was encountered. Representative soil 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 gently rolling terrain of the Piedmont Physiographic province. The project area is suburban, with housing developments and an apartment complex nearby. The area along Bull Run Creek is wooded. Geologically, the project is located within the Carolina Slate Belt and is underlain by metamorphosed gabbro and diorite.

Soil Properties

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

Roadway embankment was encountered at end bent one. Embankment soils are from 9.0 to 9.5 feet thick, and are composed of orange-brown, soft, moist, silty clay (A-7-6) at EB1-A, and brown, medium stiff, moist, clayey sand (A-2-6) at EB1-B. The embankment at EB1-B is associated with the former alignment of the roadway.

Artificial fill was encountered at end bent two. These soils are associated with a sewer line easement that parallels Bull Run Creek. Artificial fill ranges from 10.0 to 10.8 feet thick, and consists of brown, soft, moist to wet, sandy silt (A-4).

Alluvial soils were encountered at the end bent one boring locations. The alluvial soils range from 4.1 to 6.2 feet in thickness. These soils consist of orange-tan, very soft, wet, sandy silt (A-4), and tan to brown, loose, moist to saturated, silty sand (A-2-4). The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered at all boring locations and range from 1.2 to 8.5 feet in thickness. The residual soils consist of gray to green-gray, dense to very dense, moist to wet, silty sand (A-2-4), and gray, very dense, coarse sand and gravel (A-1-b). The residual soils are underlain by weathered and/or crystalline rock.

Rock Properties

Weathered rock was derived from the underlying bedrock consisting of metamorphosed diorite (metadiorite) and metamorphosed gabbro (metagabbro). The weathered rock ranges in thickness from 1.7 to 6.2 feet. Weathered rock was encountered in all borings except EB2 -DET-. The top of weathered rock ranges in elevation from 752.9 feet at EB1-B to 755.9 feet at EB2-B.

Crystalline rock was encountered at each boring location. The top of crystalline rock ranges in elevation from 743.2 feet at DET-1- to 753.5 feet at EB2-B. Crystalline rock at end bent one is metadiorite while rock at end bent two is metagabbro. Core recovery ranged from 92% to 100%, with an average of 95%. Rock Quality Designation (RQD) ranges from 62% to 78%, with an average of 80%. More detailed rock descriptions can be found in the Core Boring Report.

Temporary Detour Structure

A temporary detour structure will be constructed approximately 59 feet north of the existing bridge at -DET- STA. 24+00. The structure has a total length of 85 feet. Borings DET-1and DET-2, were drilled along the -DET- alignment to provide additional information for the detour structure.
Geologic conditions along the -DET- alignment should correlate directly to those encountered along the main structure.

Groundwater

Groundwater was present in all borings. The groundwater elevations ranged from 756.0 feet at EB1-DET- to 761.1 feet at EB2-A and EB2 -DET-. Surface water in Bull Run Creek was measured at elevation 757.1 feet in January 2006.

Notice

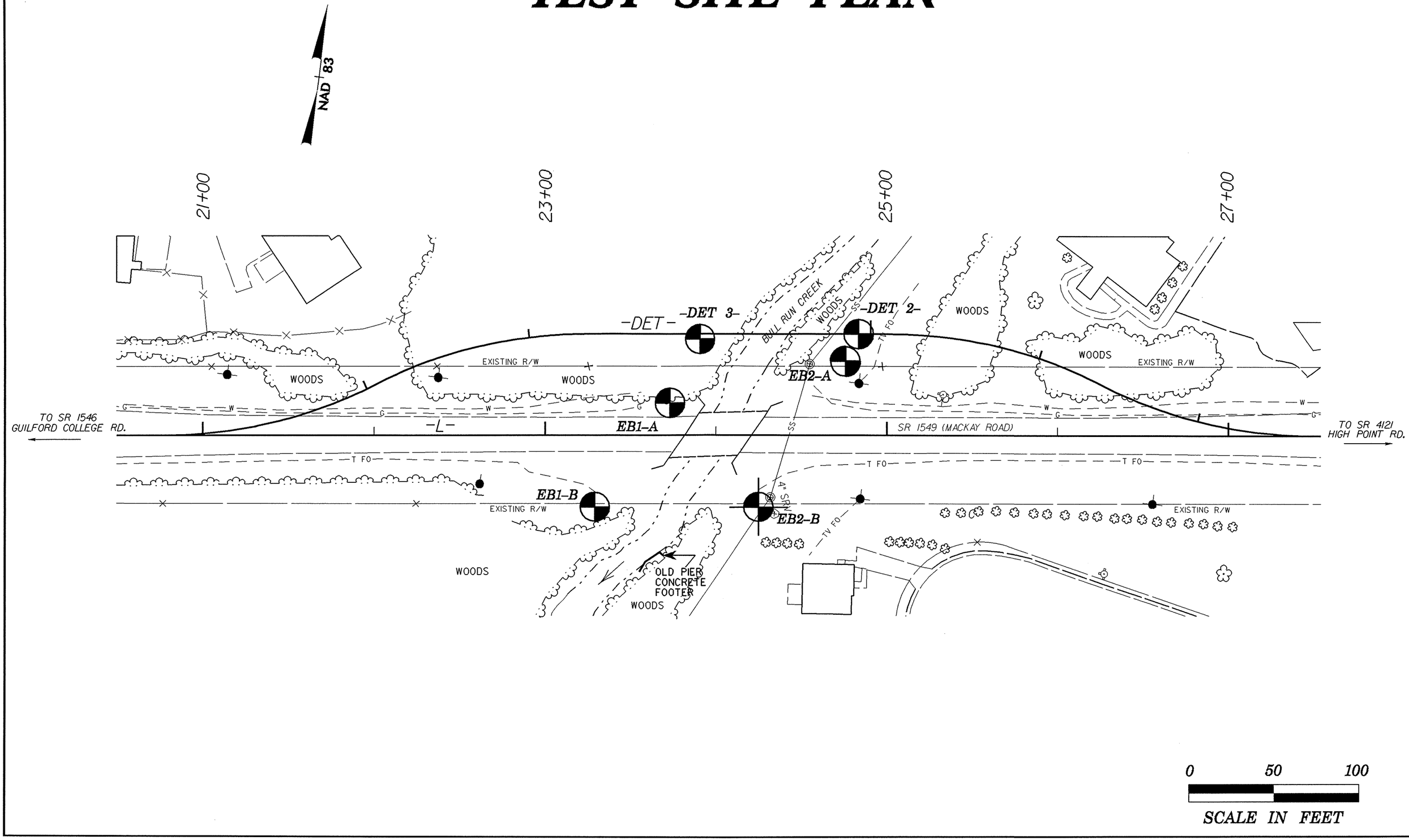
This Geotechnical foundation report is based on the Bridge Survey and Hydraulic Report for Bull Run Creek dated May 2, 2005 and the Preliminary General Drawing dated October 25, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

Nathan Mohs
Engineering Geologist

STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
33481.1.1 (B-4128)	4	16

TEST SITE PLAN



PROFILE THROUGH BORINGS AT 42' RT OF -L-

EB1-B
-L-
23+29
42' RT

EB2-B
-L-
24+25
42' RT

780
770
760
750
740
730
720
710

ROADWAY EMBANKMENT, ORANGE-BROWN, SOFT TO MEDIUM STIFF, MOIST, CLAYEY SAND

8

ALLUVIAL, BROWN, LOOSE, MOIST,

6

1/06

SILTY SAND

RESIDUAL, LIGHT GRAY, VERY DENSE, MOIST, COARSE SAND AND GRAVEL

77

100+

CRYSTALLINE ROCK
(METADIORITE)

BULL RUN CREEK

Q1/06

WEATHERED ROCK (METADIORITE)

ARTIFICIAL FILL, GRAY

3

SOFT, SANDY

MOIST, SILT

2

1/06

RESIDUAL

GREEN-GRAY, VERY DENSE, MOIST, SILTY SAND

100+

CRYSTALLINE ROCK, GREEN-GRAY, HARD, FRESH, CLOSELY TO MODERATELY CLOSELY FRACTURED, METAGABBRO
REC=96% RQD=70%

WHITE AND BLACK, HARD, FRESH, MODERATELY CLOSELY FRACTURED, METADIORITE
REC=100% RQD=70%

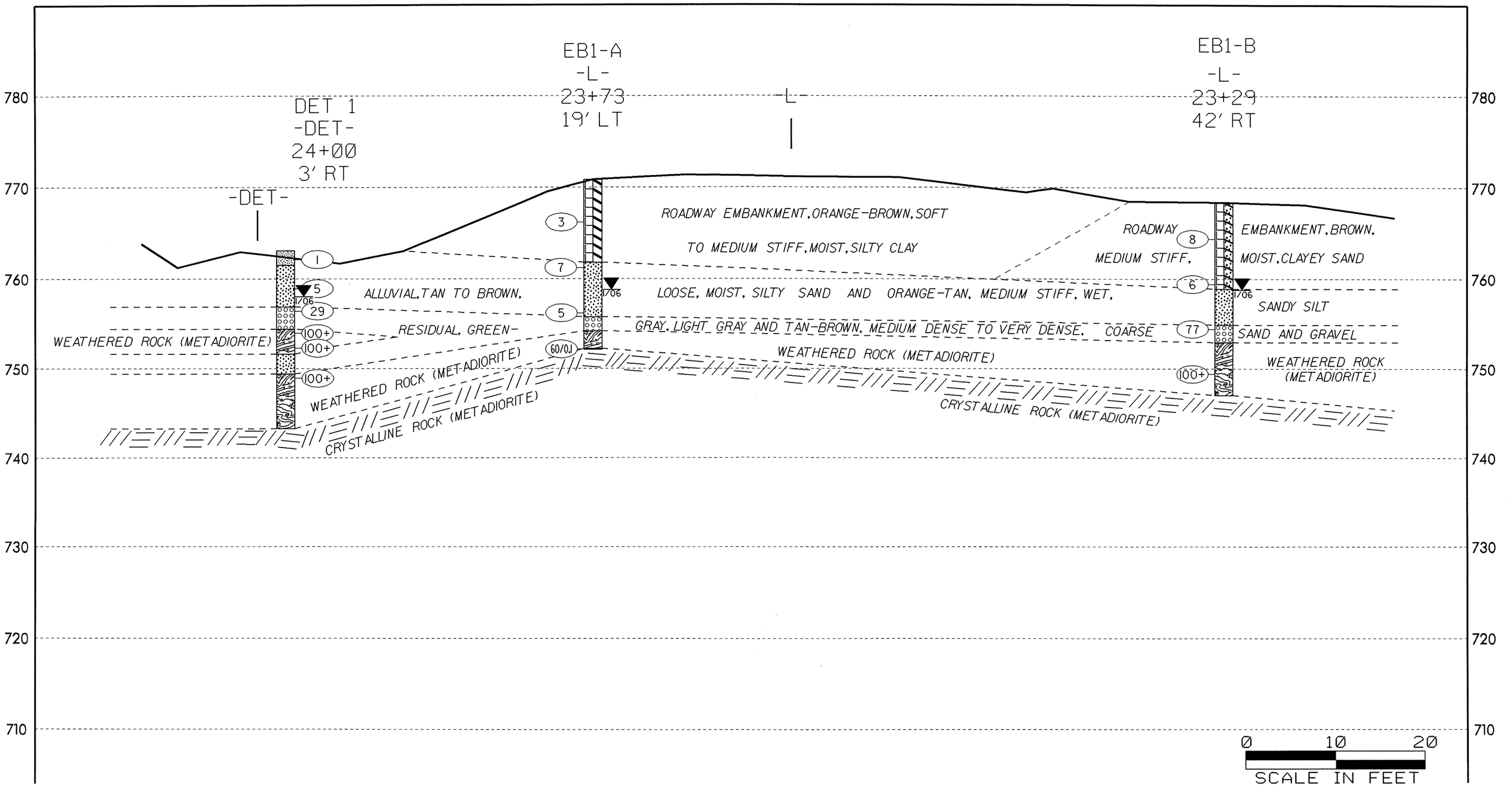
VE=2:1

0 20 40

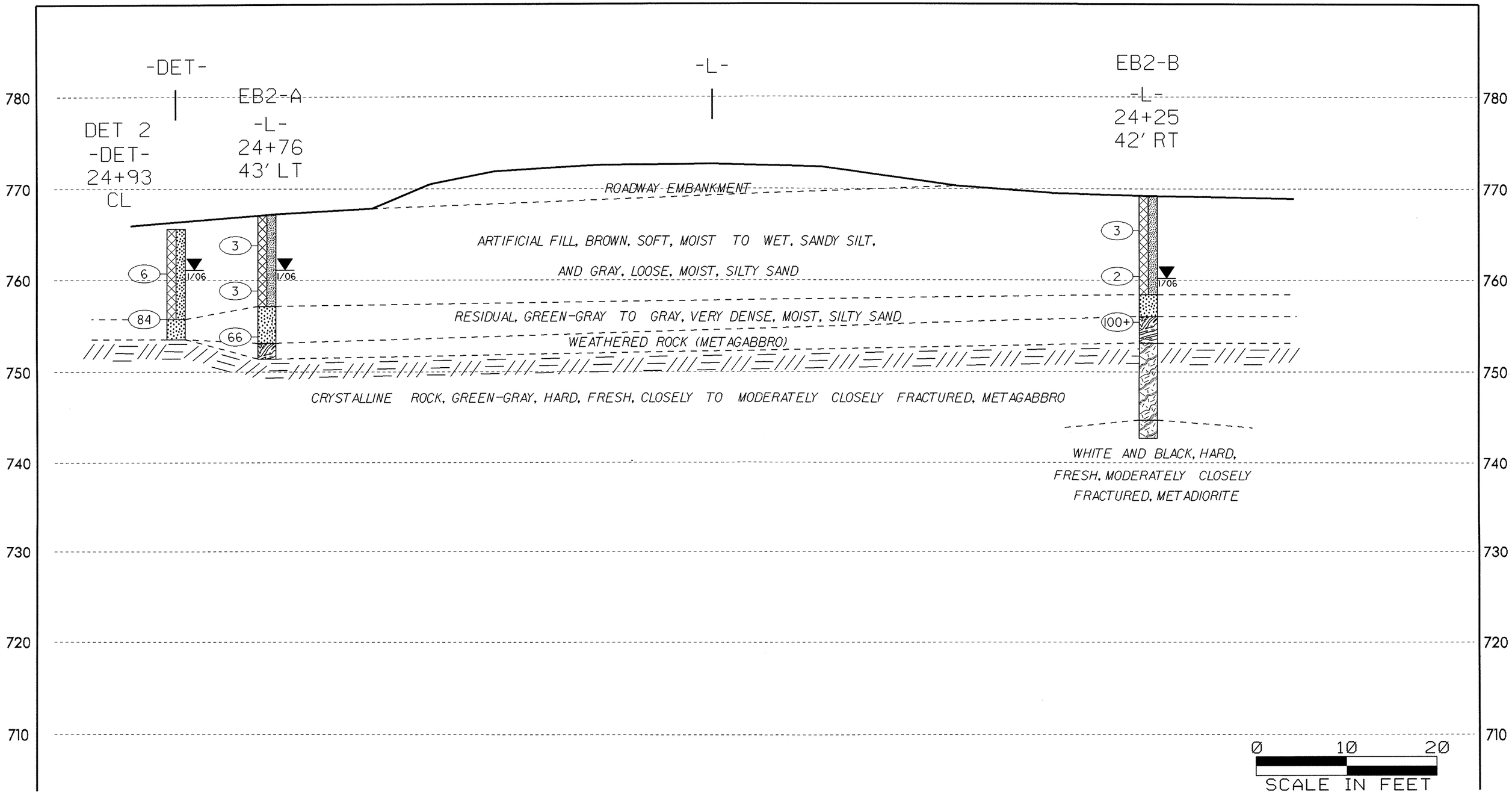
SCALE IN FEET

22+50 23+00 23+50 24+00 24+50 25+00

CROSS SECTION THROUGH END BENT 1



CROSS SECTION THROUGH END BENT 2



PROFILE THROUGH BORINGS ALONG -DET-

DET-1
-DET-
24+00
CL

DET-2
-DET-
24+93
CL

PROPOSED GRADE

GROUND SURFACE

BULL RUN CREEK

ALLUVIAL, TAN, LOOSE, MOIST, SILTY SAND

6

1/06

100+

WEATHERED ROCK (METADIORITE)

23

WEATHERED ROCK (METADIORITE)

100+

RESIDUAL, TAN-BROWN, MEDIUM DENSE, MOIST, COARSE SAND, AND GRAY, VERY DENSE, MOIST, SILTY SAND

01/06

ARTIFICIAL FILL, GRAY, LOOSE, MOIST, SILTY SAND

6

1/06

84

CRYSTALLINE ROCK (METADIORITE)

780
770
760
750
740
730
720
710

VE=2:1

0 20 40

SCALE IN FEET

23+00 23+50 24+00 24+50 25+00 25+50

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** N.D. MOHS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. EBI-A	**BORING LOCATION** 23+73	**OFFSET** 19' LT	**ALIGNMENT** -L-	**0 HR.** DRY
COLLAR ELEVATION 770.8'	**NORTHING** 826879'	**EASTING** 1730159'		**24 HR.** 12.0'
TOTAL DEPTH 18.7'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 1/6/06	**COMPLETION DATE** 1/6/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.6'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
770.8										
770.0										ROADWAY EMBANKMENT, ORANGE-BROWN, SILTY CLAY
	3.6	1	2	1	1.0	X 3	SS-3	M		
765.0										
	8.6	5	4	3	1.0	X 7	SS-4	M		ALLUVIAL, TAN-BROWN, SILTY SAND
760.0										
	13.6	2	3	2	1.0	X 5		SAT.		
755.0										RESIDUAL, GRAY, COARSE SAND
	18.6	60			0.1	60/0.1 X				WEATHERED ROCK (METADIORITE)
750.0						SPT REFUSAL AT ELEVATION 752.1FEET ON CRYSTALLINE ROCK (METADIORITE)				CRYSTALLINE ROCK (METADIORITE)
745.0										
740.0										
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** N.D. MOHS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. EBI-B	**BORING LOCATION** 23+29	**OFFSET** 42' RT	**ALIGNMENT** -L-	**0 HR.** 9.8'
COLLAR ELEVATION 768.4'	**NORTHING** 826815'	**EASTING** 1730134'		**24 HR.** 9.6'
TOTAL DEPTH 21.4'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 1/5/06	**COMPLETION DATE** 1/5/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 21.4'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
768.4										
765.0	3.0	1	5	3	1.0	X 8	SS-1	M		ROADWAY EMBANKMENT, BROWN, CLAYEY SAND
760.0	8.0	2	4	2	1.0	X 6		M		ALLUVIAL, BROWN, SILTY SAND
755.0	13.0	10	29	48	1.0	X 77	SS-2	M		RESIDUAL, LIGHT GRAY, COARSE SAND AND GRAVEL
750.0	18.0	59	41		0.8	100+ X				WEATHERED ROCK (METADIORITE)
745.0						AUGER REFUSAL AT ELEVATION 747.0 FEET ON CRYSTALLINE ROCK (METADIORITE)				
740.0										
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										
690.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** N.D. MOHS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. EB2-A	**BORING LOCATION** 24+76	**OFFSET** 43' LT	**ALIGNMENT** -L-	**0 HR.** 5.5'
COLLAR ELEVATION 767.1'	**NORTHING** 826917'	**EASTING** 1730269'		**24 HR.** 6.0'
TOTAL DEPTH 15.7'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 1/6/06	**COMPLETION DATE** 1/6/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 15.7'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▼ MOI.	LOG	SOIL AND ROCK DESCRIPTION
767.1										
765.0	2.3	1	1	2	1.0	X 3		W		ARTIFICIAL FILL, BROWN, SANDY SILT
760.0	7.3	1	2	1	1.0	X 3		▼		
755.0	12.3	20	29	37	1.0	X 66	SS-5	M		RESIDUAL, GREEN-GRAY, SILTY SAND
										WEATHERED ROCK (METAGABBRO)
750.0						AUGER REFUSAL AT ELEVATION 751.4 FEET ON CRYSTALLINE ROCK (METAGABBRO)				
745.0										
740.0										
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										
690.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** N.D. MOHS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. EB2-B	**BORING LOCATION** 24+25	**OFFSET** 42' RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEVATION 769.2'	**NORTHING** 826826'	**EASTING** 1730228'	**24 HR.** 9.0'
TOTAL DEPTH 26.5'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 1/9/06	**COMPLETION DATE** 1/10/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 15.7'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
769.2										
	2.8	2	2	1	1.0	X 3		M		ARTIFICIAL FILL, BROWN, SANDY SILT
765.0										
	7.8	WOH	WOH	2	1.0	X 2	SS-6	M		
760.0										
	12.8	20	54	46	0.8	100+ X		M		RESIDUAL, GREEN-GRAY, SILTY SAND
755.0										WEATHERED ROCK (METAGABBRO)
										CRYSTALLINE ROCK, GREEN-GRAY, HARD, FRESH, CLOSELY TO MODERATELY CLOSELY FRACTURED, METAGABBRO REC=96% RQD=70%
750.0										
745.0										WHITE AND BLACK, HARD, FRESH, MODERATELY CLOSELY FRACTURED, METADIORITE REC=100% RQD=70%
740.0						CORING TERMINATED AT ELEVATION 742.7 FEET IN CRYSTALLINE ROCK (METADIORITE)				
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										
690.0										

CORE BORING REPORT

PROJECT: 33481.1.1 ID: B-4128 COUNTY: Guilford BORING NO: EB2-B

DESCRIPTION: Bridge No. 73 on -L- (SR 1549, Mackay Rd.)over Bull Run Creek

LOCATION OF BORING: -L- Station 24+25, 42' RT COMPLETION DATE: 1/10/2006

COLLAR or GROUND ELEVATION: 769.2 ft CORE SIZE: NXWL GEOLOGIST: N. D. Mohs

CORE EQUIPMENT: CME-550, Casing with advancer DRILLER: H. R. Conley

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
753.1	16.1	1:32 1:21 1:19 :20/0.4'	3.4	3.4 (100%)	2.1 (62%)		Crystalline rock, green-gray, hard, fresh, closely to moderately closely fractured, Metagabbro.
749.7	19.5						
749.7	19.5	1:20 1:07 1:03 1:30	5.0	4.6 (92%)	3.9 (78%)		Crystalline rock, green-gray, hard, fresh, closely to moderately closely fractured, Metagabbro.
744.7	24.5	1:21					
744.7	24.5	1:44 1:40	2.0	2.0 (100%)	1.4 (70%)		Crystalline rock, white and black, hard, fresh, moderately closely fractured, Metadiorite.
742.7	26.5						
							BOREHOLE TERMINATED AT ELEVATION OF 742.7 FEET, IN ROCK.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** N.D. MOHS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. DET-1	**BORING LOCATION** 24+00	**OFFSET** 3' RT	**ALIGNMENT** -DET-
COLLAR ELEVATION 763.1'	**NORTHING** 826919'	**EASTING** 1730183'	**24 HR.** 4.7'
TOTAL DEPTH 19.9'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 1/10/06	**COMPLETION DATE** 1/10/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 19.7'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
763.1	0.0	1	Ø	1	1.0	1	SS-8	W		ALLUVIAL, ORANGE-TAN, SANDY SILT
760.0	3.2	2	2	3	1.0	5	SS-9	S		TAN, SILTY SAND
	5.7	3	12	17	1.0	29				
755.0	8.2	18	79	21	0.6		SS-10	S		RESIDUAL, GREEN-GRAY, COARSE SAND AND GRAVEL
	10.7	100			0.3	100+				WEATHERED ROCK (METADIORITE)
750.0	13.2	2	11	89	0.9	100+				RESIDUAL, GREEN-GRAY, SILTY SAND
745.0						100+				WEATHERED ROCK (METADIORITE)
740.0						AUGER REFUSAL AT ELEVATION 743.2 FEET ON CRYSTALLINE ROCK (METADIORITE)				
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										
690.0										
685.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33481.1.1	**ID.** B-4128	**COUNTY** GUILFORD	**GEOLOGIST** J.I. MILKOVITS
SITE DESCRIPTION BRIDGE NO. 73 ON -L- (SR 1549, MACKAY RD.)OVER BULL RUN CREEK			**GROUND WATER**
BORING NO. DET-2	**BORING LOCATION** 24+93	**OFFSET** CL	**ALIGNMENT** -DET-
COLLAR ELEVATION 765.6'	**NORTHING** 826933'	**EASTING** 1730274'	**24 HR.** 4.5'
TOTAL DEPTH 12.1'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 3/9/05	**COMPLETION DATE** 3/9/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 12.1'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
765.6										
765.0										
	3.9	4	4	2	1.0	6	SS-11	M		ARTIFICIAL FILL, GRAY, SILTY SAND
760.0										
	8.9	4	4	80	1.0	84		M		RESIDUAL, GRAY, SILTY SAND
755.0										
750.0						AUGER REFUSAL AT ELEVATION 753.5 FEET ON CRYSTALLINE ROCK (METADIORITE)				
745.0										
740.0										
735.0										
730.0										
725.0										
720.0										
715.0										
710.0										
705.0										
700.0										
695.0										
690.0										

PROJ. NO. - 33481.1.1
ID NO. - B-4128
COUNTY - GUILFORD

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	19 LT	23+73	3.6-5.1	A-7-6(6)	41	16	26.1	19.0	30.6	24.3	92	76	54	-	-
SS-4	19 LT	23+73	8.6-10.1	A-2-4(0)	21	NP	54.7	30.7	8.6	6.1	91	66	15	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	42 RT	23+29	3.0-4.5	A-2-6(1)	36	14	32.6	20.9	26.3	20.2	64	49	32	-	-
SS-2	42 RT	23+29	13.0-14.5	A-1-B(0)	22	NP	56.5	24.3	17.2	2.0	63	37	14	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	43 LT	24+76	12.3-13.8	A-2-4(0)	22	NP	53.8	22.5	23.7	0.0	100	61	28	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	42 RT	24+25	7.8-9.3	A-4(1)	28	9	28.1	24.5	27.1	20.2	93	76	48	-	-

DET-1

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	3 RT	24+00	0.0+1.5	A-4(2)	26	9	26.9	26.1	26.7	20.2	100	87	50	-	-
SS-9	3 RT	24+00	3.2-4.7	A-2-4(0)	20	1	59.1	19.9	10.8	10.1	95	55	22	-	-
SS-10	3 RT	24+00	6.2-7.2	A-1-B(0)	20	4	55.5	22.1	16.4	6.1	54	32	14	-	-

DET-2

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-11	CL	24+93	3.9-5.4	A-2-4(0)	21	NP	43.3	36.2	8.5	12.1	93	73	22	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33481.1.1 TIP: B-4128 COUNTY: Guilford

DESCRIPTION(1): Bridge No. 73 on -L- (SR 1549, Mackay Rd.) over Bull Run Creek

EXISTING BRIDGE

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

Bridge No.: 73 Length: 40' Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
Foundation Type: Piles encased in concrete.

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None.

Interior Bents: N/A

Channel Bed: None.

Channel Bank: None.

EXISTING SCOUR PROTECTION

Type(3): Rip Rap.

Extent(4): Minor along channel banks in front of wingwalls.

Effectiveness(5): Effective.

Obstructions(6): None.

DESIGN INFORMATION

Channel Bed Material(7): Sand, gravel, and boulders.

Channel Bank Material(8): Sand.

Channel Bank Cover(9): Trees, shrubs, and vines.

Floodplain Width(10): Approximately 150'

Floodplain Cover(11): Trees, shrubs, and grass.

Stream is(12): Aggrading ____ Degrading X Static ____

Channel Migration Tendency(13): West.

Observations and Other Comments: ____

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet ____ Meters ____

	BENTS B1	B2	B3	B4							
SB Lanes, Lt											
SB Lanes, Rt											
NB Lanes, Lt											
NB Lanes, Rt											

Comparison of GASE to Hydraulics Unit theoretical scour:

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

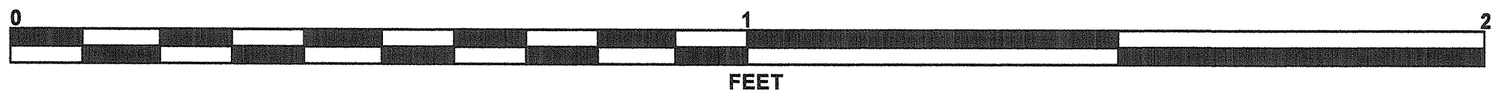
Bed or Bank	Bank	Bed					
Sample No.	SS-8	SS-4					
Retained #4							
Passed #10	100	91					
Passed #40	87	66					
Passed #200	50	15					
Coarse Sand	26.9	54.7					
Fine Sand	26.1	30.7					
Silt	26.7	8.6					
Clay	20.2	6.1					
LL	26	21					
PI	9	NP					
AASHTO	A-4(2)	A-2-4(0)					
Station	24+25	23+29					
Offset	3 RT	19 LT					
Depth	0.0'-1.5'	8.6'-10.1'					

Reported by: Nathan Mohs **Date:** 1/9/2006

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 theoritical 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.

CORE PHOTOGRAPHS
EB2-B
BOXES 1 & 2: 16.1-26.5 FEET



SITE PHOTO

BRIDGE NO. 73 OVER BULL RUN CREEK ON SR 1549 (MACKAY RD.)

LOOKING NORTH