STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33607.1.1 (B-4265)	1	18

PROJECT: ID: B-4265

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33607.1.1 (B-4265) F.A. PROJ. BRZ-1733(13)

COUNTY RUTHERFORD

PROJECT DESCRIPTION BRIDGE NO. 202 ON SR-1733 OVER FIRST BROAD RIVER

SITE DESCRIPTION

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CAUTION NOTICE

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PERSONNEL
M M HAGER
D O CHEEK
G K ROSE

INVESTIGATED BY C A DUNNAGAN
CHECKED BY W D FRYE, Jr
SUBMITTED BY W D FRYE, Jr
DATE JULY 2006

DRAWN BY: C A DUNNAGAN

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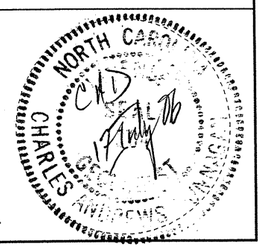

PROJECT REFERENCE NO.	SHEET NO.
33607.1.1_(B-4265)	2/18

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 THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 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	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	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, YELLOW-BROWN, 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 IS 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 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 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 SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — 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 - CALIFORNIA BEARING RATIO 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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B__
- [X] -N XWL
- [ ] -H__

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD 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 ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *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 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 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 THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #1- RR SPIKE IN 24" SWEETGUM TREE
-BL- STA 7+44, 60'RT
ELEVATION: 1045.25 FT.

NOTES:
-

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 13, 2006

STATE PROJECT: 33607.1.1 (B-4265)
F. A. PROJECT: BRZ-1733(13)
COUNTY: Rutherford

DESCRIPTION: Bridge No. 202 on SR-1733 over First Broad River

SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This project is located in northeast Rutherford County, approximately 14.0 miles northeast of Forest City. The existing bridge will be replaced with a double span structure. The spans will each be 80.0 feet long; the skew will be 90 degrees.

The subsurface investigation was conducted using a CME-550 drill machine with an automatic drop hammer. The borings were drilled using -N- casing and advancer. Standard Penetration Tests were performed at intervals of 5.0 feet. Soil samples were collected and submitted for testing of quality. Rock core was retrieved from five of the six borings using -NXWL- equipment. Two rock core samples were submitted for testing for Unit Weight, Compressive Strength (Qu), Young's Modulus (E) and Split Tensile Strength.

Geology and Rock Characteristics

The rocks recovered from this site are a gray biotite gneiss with varying amounts of garnets. They are generally fresh, hard and well foliated. On the Geologic Map of North Carolina (1985) they are labeled CZbg. Rock Core Recoveries from this project ranged from 53 to 100 percent (91 percent average); the RQD's were also from 53 to 100 percent (88 percent average).

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WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Foundation Material

End Bent One

Roadway embankment is present across this bent. It consists of about 10.0 feet of soft to medium stiff silty clay. The embankment was placed upon alluvial deposits. This is made of horizons of soft silty clay and sandy silt and a basal layer of medium dense gravel, cobbles, and boulders.

In the boring for EB1-A, a layer of weathered rock separates the alluvium and crystalline rock. Coring was begun at 21.0 feet (elevation 1021.9) and terminated at 30.1 feet (elevation 1012.8). The Recoveries and RQD's were 98 and 100 percent. No weathered rock was noted in the boring for EB1-B. Coring began at 21.3 feet (elevation 1021.1) and was terminated at 29.3 feet (elevation 1013.1). The Recoveries were 53 and 100 percent; the RQD's were also 53 and 100 percent.

Static groundwater was measured in EB1-A at 17.5 feet (elevation 1025.4). In EB1-B, it was measured at 16.3 feet (elevation 1026.1).

Interior Bent One

The boring for B1-A penetrated 14.0 feet of alluvium. At B1-B, the alluvium was 20.0 feet. This horizon is comprised of layers of loose to dense silty sand and gravel.

Weathered rock was noted at 14.0 feet in B1-A. Coring in the biotite gneiss began at 15.5 feet (elevation 1018.0) and was terminated at 25.0 feet (elevation 1008.5). Recoveries were 89 and 100 percent; RQD's were 80 and 100 percent. Rock Sample RS-2 was taken from 16.0 feet to 16.9 feet.

Weathered rock was not noted in the boring for B1-B. Coring was begun at 19.9 feet (elevation 1013.8) and terminated at 29.9 feet (elevation 1003.8). Recoveries were 90 and 98 percent; RQD's were 78 and 98 percent. A rock sample (RS-1) was taken from 26.4 feet to 27.3 feet.

A significant scour feature is located at this site. It is a scallop-shaped area approximately 15.0 feet wide and 5.0 feet deep. It is presumed that this is a product of the storms (hurricanes) of 2004.

Static groundwater was not recorded from either boring for Interior Bent One.

End Bent Two

Embankment is present at the surface across this site. It consists of 6.0 to 10.0 feet of medium stiff clayey silt.

Alluvium underlies the embankment. This horizon is made of layers of loose silty sand and sandy silt with a loose basal layer of gravel. Weathered rock was encountered in both borings. At EB2-A, weathered rock is present at 21.4 feet. Coring was begun at 28.0 feet (elevation

1015.9) and terminated at 34.8 feet (elevation 1009.1). Recoveries were 94 and 86 percent; RQD's were 94 and 82 percent.

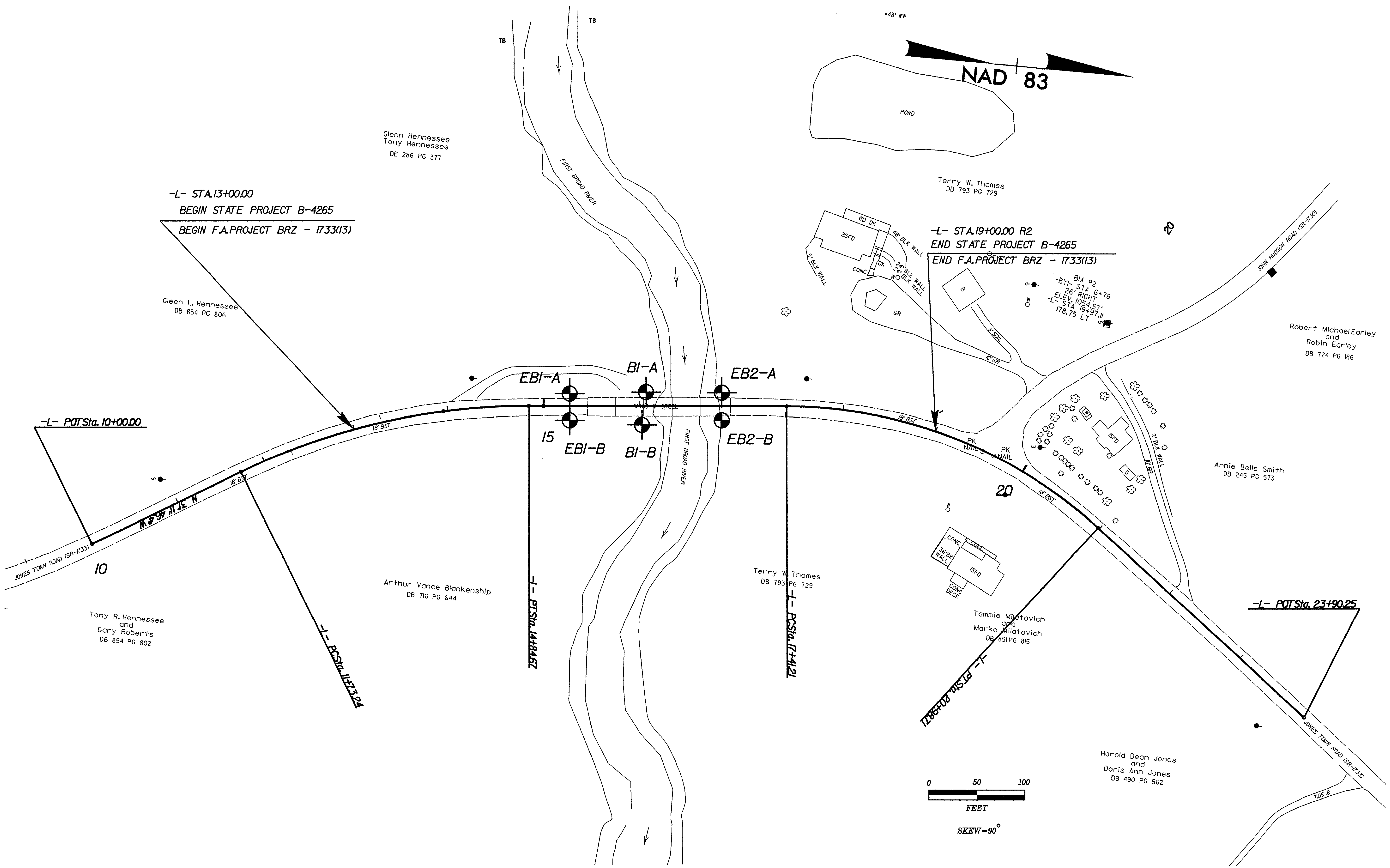
At EB2-B, weathered rock is also present at 21.4 feet. A seam of medium dense saprolite occurs between 23.2 feet and 24.2 feet. Hard, crystalline rock is present by 24.9 feet (elevation 1019.0). Core was not retrieved from this boring.

Static groundwater was not noted in either boring.

Respectfully Submitted,

Charles A. Dunnagan, LG
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET NO.
33607.1.1 (B-4265)	4/18



NAD 83
POND
Glenn Hennessee
Tony Hennessee
DB 286 PG 377
FIRST BROAD RIVER
TB
Terry W. Thomes
DB 793 PG 729
-L- STA.13+00.00
BEGIN STATE PROJECT B-4265
BEGIN F.A.PROJECT BRZ - 1733(13)
-L- STA.19+00.00 R2
END STATE PROJECT B-4265
END F.A.PROJECT BRZ - 1733(13)
2SFD
WD DK
48" BLK WALL
24" BLK WALL
5' BLK WALL
CONC
GR
BM #2
-BYI- STA 6+78
26' RIGHT
ELEV. 1054.57'
-L- STA 19+97.11
178.75 LT
JOHN HUDSON ROAD (SR-1730)
Gleen L. Hennessee
DB 854 PG 806
Robert Michael Earley
and
Robin Earley
DB 724 PG 186
EB1-A
B1-A
EB2-A
EB1-B
B1-B
EB2-B
15
-L- POT Sta. 10+00.00
18' BST
N 57°11'46.6"W
PK NAIL
20
1SFD
Annie Belle Smith
DB 245 PG 573
JONES TOWN ROAD (SR-1733)
10
Arthur Vance Blankenship
DB 716 PG 644
Terry W. Thomes
DB 793 PG 729
Tony R. Hennessee
and
Gary Roberts
DB 854 PG 802
-L- PC Sta. 11+73.24
-L- PT Sta. 14+84.67
-L- PC Sta. 17+41.21
-L- PT Sta. 20+98.71
Tammie Milotovich
and
Marko Milotovich
DB 851 PG 815
CONC DECK
-L- POT Sta. 23+90.25
Harold Dean Jones
and
Doris Ann Jones
DB 490 PG 562
0 50 100
FEET
SKEW=90°

8/17/99

14-JUL-2006 09:16
d:\projects\b4265\Plan_view\b4265_rdy_psh04.dgn

PROFILE 15.0 FEET RIGHT OF CENTERLINE -L-

BRIDGE NO. 202, 33607.1.1 (B-4265)

EB1-B
15+27,
15.0' RT

GROUND SURFACE

EMBANKMENT: RED-BROWN SILTY CLAY WITH TRACE OF GRAVEL, DRY

7
8
22
6/06

ALLUVIUM: BROWN SILTY CLAY, SANDY SILT AND SANDY SILT WITH GRAVEL, COBBLES AND BOULDERS, MOIST

CORE 1: 21.3'-24.3'
REC=53% RQD=53%

CORE 2: 24.3'-29.3'
REC=100% RQD=100%

GRAY BIOTITE GNEISS

16+03,
19.5' RT B1-B

6
12
43

WS 6/06

ALLUVIUM: BROWN SILTY CLAY, SANDY SILT AND SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, MOIST

CORE 1: 19.9'-24.6'
REC=90% RQD=78%

CORE 2: 24.9'-29.9'
REC=98% RQD=98%

GRAY BIOTITE GNEISS

EB2-B
16+87,
15.0' RT

GROUND SURFACE

EMBANKMENT: RED CLAYEY SILT, MOIST

6
7
3
13
60/.01

WEATHERED ROCK

GRAY BIOTITE GNEISS

500
1040
1030
1020
1010
1000

0 20 40

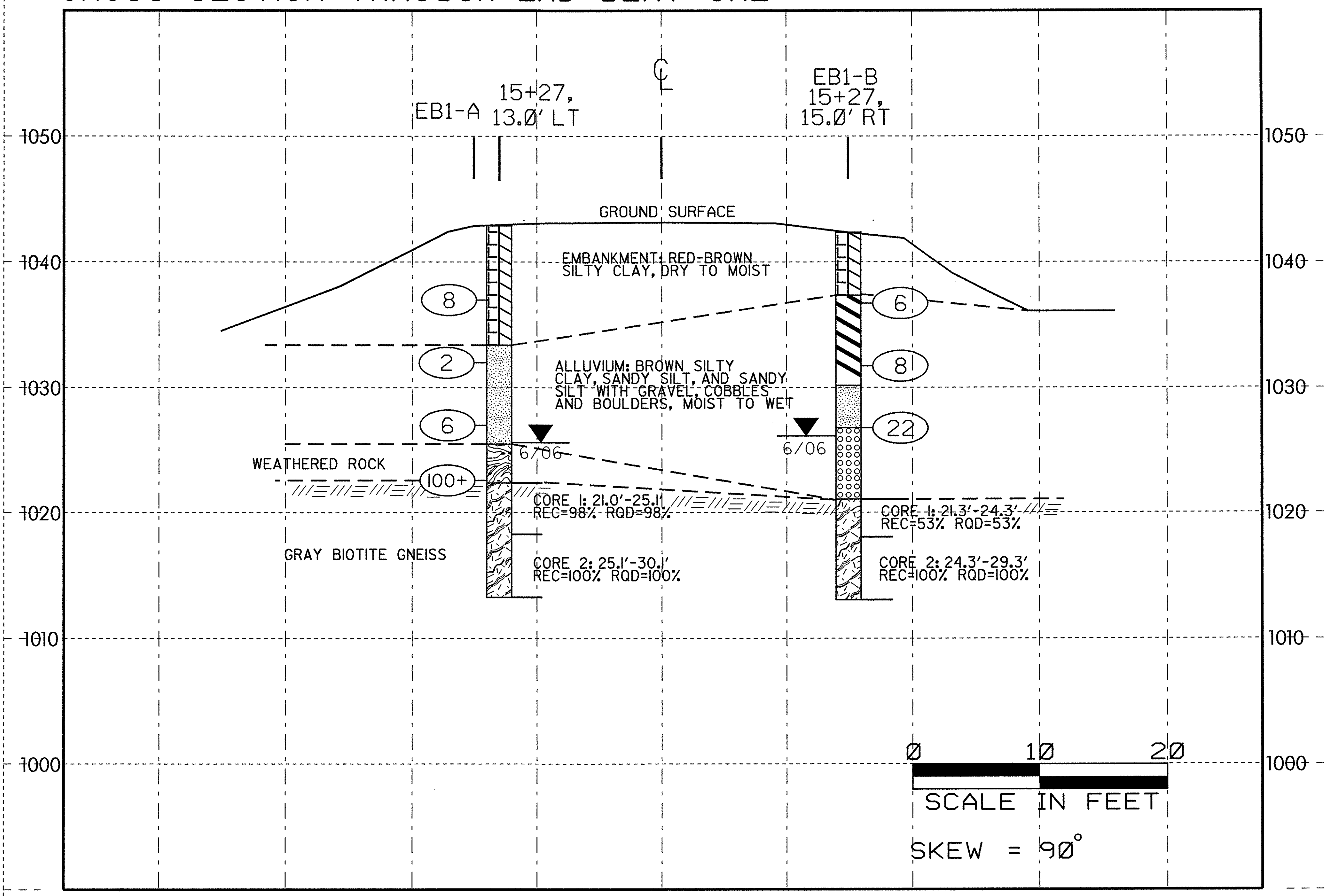
FEET

SKEW = 90°

15+00 -L-
15+50
16+00 -L-
16+50
17+00 -L-

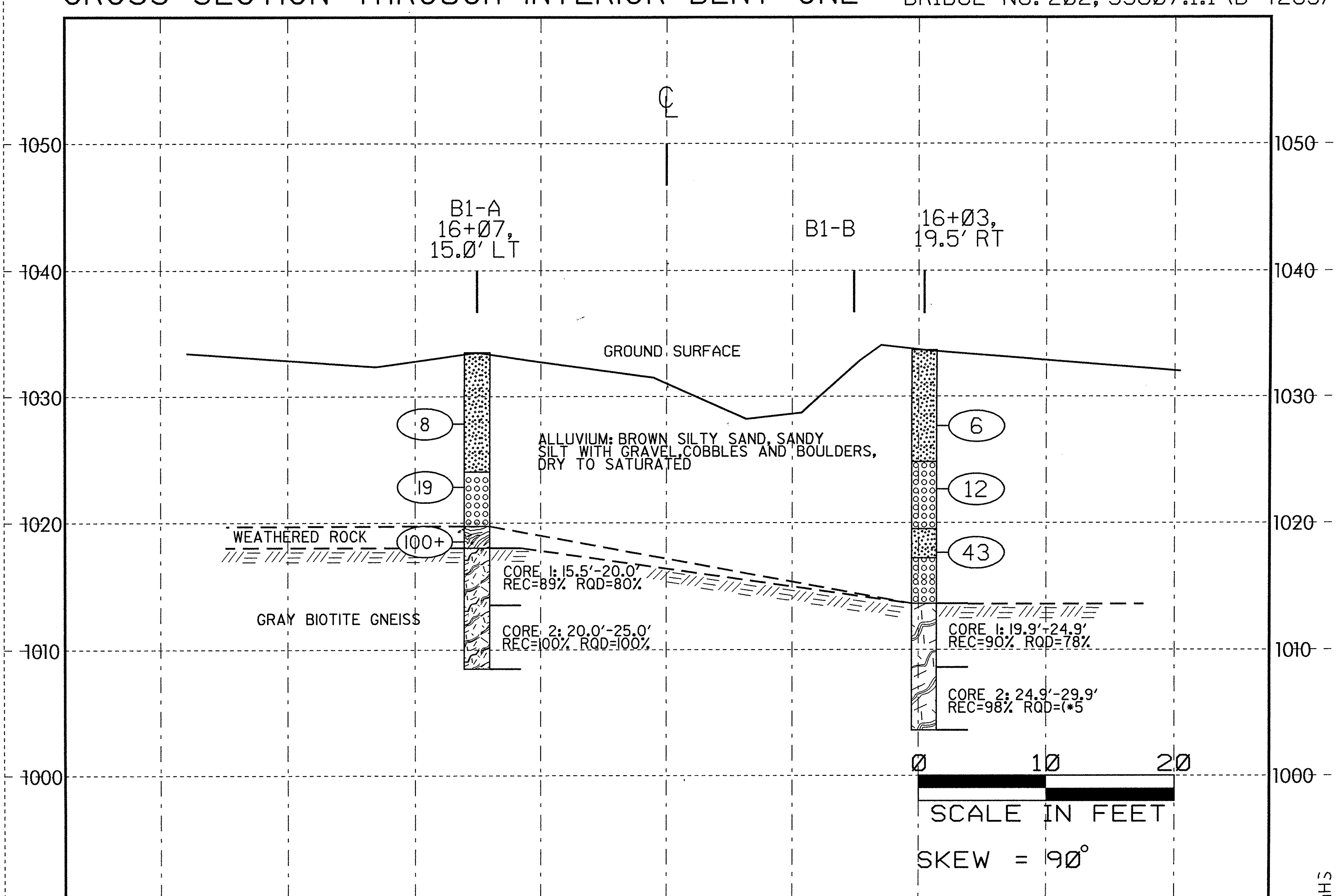
CROSS SECTION THROUGH END BENT ONE

BRIDGE NO. 2Ø2, 336Ø7.1.1 (B-4265)



CROSS SECTION THROUGH INTERIOR BENT ONE

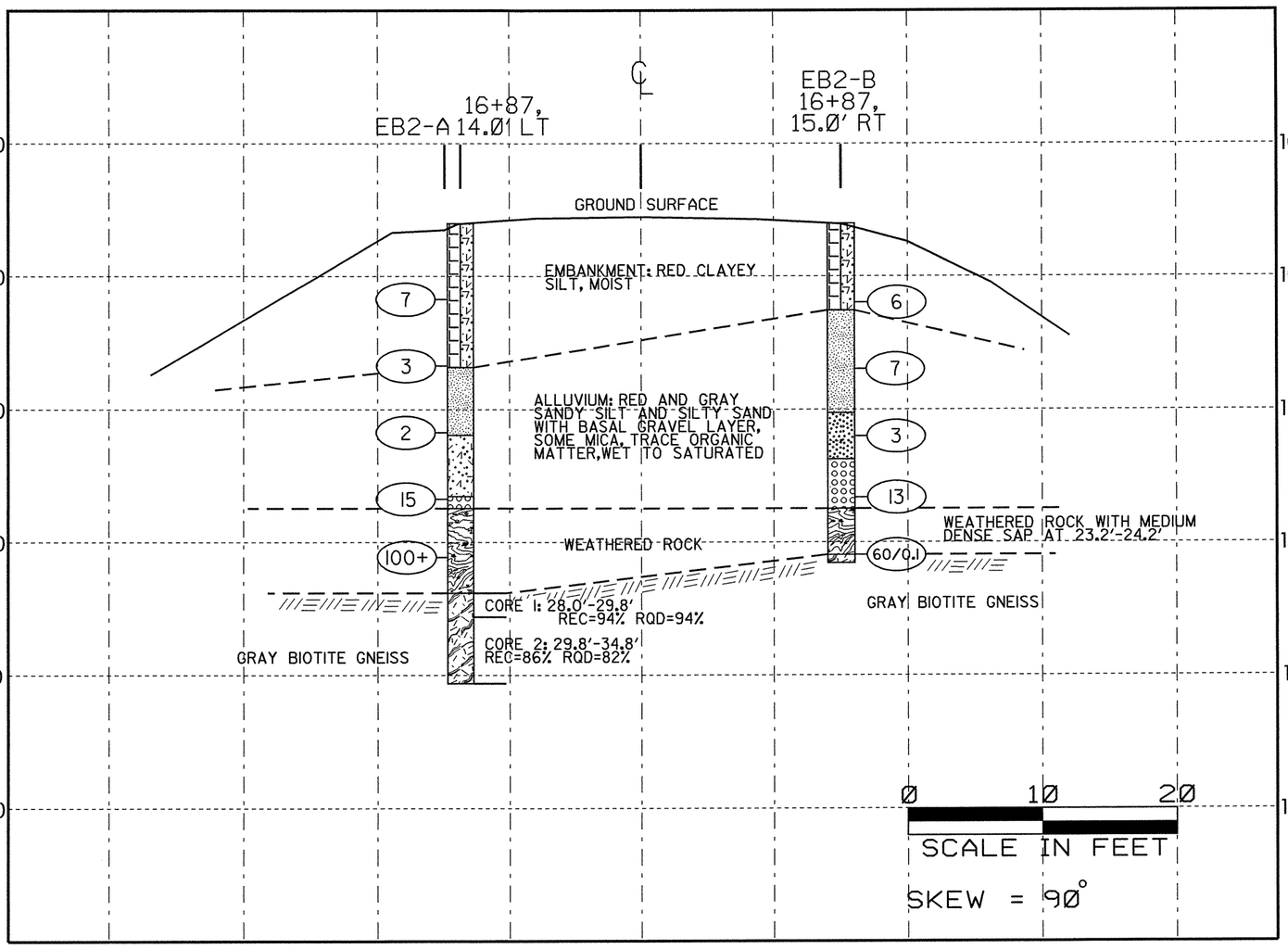
BRIDGE NO. 2Ø2, 336Ø7.1.1 (B-4265)



SHEET 6/18

CROSS SECTION THROUGH END BENT TWO

BRIDGE NO. 202, 3360Ø7.1.1 (B-4265)



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	ID B-4265	COUNTY RUTHERFORD	GEOLOGIST M M HAGER	
SITE DESCRIPTION BRIDGE NO. 202 ON SR-1733 OVER FIRST BROAD RIVER				GND WATER
BORING NO EB1-A	NORTHING 0.00	EASTING 0.00		0 HR N/A
ALIGNMENT -L-	BORING LOCATION 15+27.000	OFFSET 13.00ft LT		24 HR 17.50ft
COLLAR ELEV 1042.90ft	TOTAL DEPTH 30.10ft	START DATE 6/26/06	COMPLETION DATE 06/26/06	
DRILL MACHINE CME 550	DRILL METHOD SPT CORE BORING		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH	DEPTH TO ROCK N/A		Log EB1-A, Page 1 of 1	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1042.90						Ground Surface				
1040.00	4.90	3	4	4	1.0	8				EMBANKMENT: RED-BROWN SILTY CLAY, MOIST
	9.90	0	0	2	1.0	2				
1030.00	14.90	2	3	3	1.0	6		▼		ALLUVIUM: BROWN SANDY SILT WITH MICA, WET
	19.90	100			0.4	100				WEATHERED ROCK
1020.00										CORE 1: 21.0'-25.1' REC=98% RQD=98%
										CORE 2: 25.1'-30.1' REC=100% RQD=100%
1012.80						BORING TERMINATED AT ELEV 1012.8 IN CRYSTALLINE ROCK				

8/18

SHEET 1 OF 1

DATE 28-Jun-06

CORE BORING REPORT

PROJECT: 33607.1.1 I. D. NO: B-4265 BORING NO: EB1-A GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 202 on SR-1733 over First Broad River

COUNTY: Rutherford COLLAR ELEVATION: 1042.9 FT. TOTAL DEPTH: 30.1 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET	REC. %	RQD. FEET	RQD. %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1021.9	21.0		4.1	4.0	98	4.0	98		Gray biotite gneiss with trace pyrite. Hard, fresh.
1017.8	25.1		5.0	5.0	100	5.0	100		
1012.8	30.1								

CORING TERMINATED AT ELEVATION 1012.8 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	**ID** B-4265	**COUNTY** RUTHERFORD	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 202 ON SR-1733 OVER FIRST BROAD RIVER			**GND WATER**
BORING NO EB1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+27.000	**OFFSET** 15.00ft RT	**24 HR** 16.30ft
COLLAR ELEV 1042.40ft	**TOTAL DEPTH** 29.30ft	**START DATE** 6/23/06	**COMPLETION DATE** 06/23/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB1-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1042.40						Ground Surface				
1040.00										EMBANKMENT: RED-BROWN SILTY CLAY WITH TRACE OF GRAVEL, DRY
	4.40	4	3	3	1.0	6				
	9.40	3	4	4	1.0	8				ALLUVIUM: BROWN SILTY CLAY, MOIST
1030.00										ALLUVIUM: TAN SANDY SILT, MOIST
	14.40	3	5	17	1.0	22		▼		ALLUVIUM: SANDY SILT WITH GRAVEL, COBBLES AND BOULDERS, MOIST
1020.00										CORE 1: 21.3'-24.3' REC=53% RQD=53%
										CORE 2: 24.3'- 29.3' REC=100% RQD=100%
1013.10						BORING TERMINATED AT ELEV 1013.1 IN CRYSTALLINE ROCK				

9/18

SHEET 1 OF 1

DATE 23-Jun-06

CORE BORING REPORT

PROJECT: 33607.1.1 I. D. NO: B-4265 BORING NO: EB1-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 202 on SR-1377 over First Broad River

COUNTY: Rutherford COLLAR ELEVATION: 1042.4 FT. TOTAL DEPTH: 29.3 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1021.1	21.3		3.0	1.6	1.6		
				53	53		Gray biotite gneiss with garnets. Hard, fresh. Generally well foliated.
1018.1	24.3						
1018.1	24.3		5.0	5.0	5.0		
				100	100		
1013.1	29.3						

CORING TERMINATED AT ELEVATION 1013.1 FT.

DRILLER: D O Cheek CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	**ID** B-4265	**COUNTY** RUTHERFORD	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO.202 ON SR-1733 OVER FIRST BROAD RIVER			**GND WATER**
BORING NO B1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+03.000	**OFFSET** 19.50ft RT	**24 HR** N/A
COLLAR ELEV 1033.70ft	**TOTAL DEPTH** 29.90ft	**START DATE** 6/22/06	**COMPLETION DATE** 06/22/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B1-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1033.70						Ground Surface				
1030.00	5.00	3	3	3	1.0	6				ALLUVIUM: RED-BROWN SILTY SAND, DRY
	10.00	1	1	11	1.0	12				ALLUVIUM: BROWN SILTY SAND AND GRAVEL, SATURATED
1020.00	15.00	10	12	31	1.0	43				ALLUVIUM: BROWN SILTY SAND WITH TRACE OF GRAVEL, WET
										ALLUVIUM: SAND, GRAVEL AND BOULDERS, WET
1010.00										CORE 1: 19.9'-24.9' REC=90% RQD=78%
							RS-1			CORE 2: 24.6'-29.9' REC=98% RQD=98%
1003.80						BORING TERMINATED AT ELEV 1003.8 IN CRYSTALLINE ROCK.				

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SHEET 1 OF 1

DATE 23-Jun-06

CORE BORING REPORT

PROJECT: 33607.1.1 I. D. NO: B-4265 BORING NO: B1-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 202 on SR-1733 over First Broad river

COUNTY: Rutherford COLLAR ELEVATION: 1033.7 FT. TOTAL DEPTH: 29.9 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1013.8	19.9		5.0	4.5 90	3.9 78		Light gray to gray biotite gneiss. Slightly weathered to fresh. Hard Massive to well foliated, with garnet-rich zones.
1008.8	24.9						
1008.8	24.9		5.0	4.9 98	4.9 98	RS-1	
1003.8	29.9						

CORING TERMINATED AT ELEVATION 1003.8 FT.

DRILLER: D O Cheek CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	**ID** B-4265	**COUNTY** RUTHERFORD	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 202 ON SR-1733 OVER FIRST BROAD RIVER			**GND WATER**
BORING NO B1-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+07.000	**OFFSET** 15.00ft LT	**24 HR** N/A
COLLAR ELEV 1033.50ft	**TOTAL DEPTH** 25.00ft	**START DATE** 6/21/06	**COMPLETION DATE** 06/21/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		Log B1-A, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1033.50						Ground Surface				
1030.00	4.70	2	3	5	1.0	8				ALLUVIUM: BROWN SILTY SAND WITH TRACE GRAVEL, DRY
	9.70	5	7	12	1.0	19				
1020.00	14.70	100			0.3	100	RS-2			ALLUVIUM: BROWN SILTY SAND, GRAVEL AND COBBLES, SATURATED WEATHERED ROCK CORE 1: 15.5'-20.0' REC=89% RQD=80% CORE 2: 20.0'-25.0' REC= 100% RQD=100%
1010.00										
1008.50						BORING TERMINATED AT ELEV 1008.5 IN CRYSTALLINE ROCK.				

4/18

SHEET 1 OF 1

DATE 23-Jun-06

CORE BORING REPORT

PROJECT: 33607.1.1 I. D. NO: B-4265 BORING NO: B1-A GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 202 on SR-1733 over First Broad River

COUNTY: Rutherford COLLAR ELEVATION: 1033.5 FT. TOTAL DEPTH: 25.0 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1018.0	15.5		4.5	4.0 89	3.6 80	RS-2	Light gray biotite gneiss with garnets. Very slightly weathered to fresh. Mostly well foliated.
1013.5	20.0						
1013.5	20.0		5.0	5.0 100	5.0 100		a) Occasional joints @ 5°. b) 1 part along foliation @ 20°.
1008.5	25.0						

CORING TERMINATED AT ELEVATION 1008.5 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

12/18

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	**ID** B-4265	**COUNTY** RUTHERFORD	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 202 ON SR-1733 OVER FIRST BROAD RIVER			**GND WATER**
BORING NO EB2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+87.000	**OFFSET** 14.00ft LT	**24 HR** N/A
COLLAR ELEV 1043.90ft	**TOTAL DEPTH** 34.80ft	**START DATE** 6/28/06	**COMPLETION DATE** 06/28/06
DRILL MACHINE CME 550	**DRILL METHOD** H.S. AUGERS		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB2-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1043.90						Ground Surface				
1040.00	4.70	3	3	4	1.0	7	SS-1			EMBANKMENT: RED CLAYEY SILT, MOIST
	9.70	0	0	3	1.0	3				
1030.00	14.70	0	1	1	1.0	2	SS-2			ALLUVIUM: BROWN SANDY SILT WITH MICA AND TRACE ORGANICS.
	19.70	1	7	8	1.0	15	SS-3			ALLUVIUM: GRAY SANDY SILT WITH SOME MICA
1020.00	24.70	100			0.4	100				ALLUVIUM: GRAY SILTY SAND WITH GRAVEL. WEATHERED ROCK
										CORE 1: 28.0'-29.8' REC=94% RQD=94%
										CORE 2: 29.8'-34.8' REC=86% RQD=82%
1010.00 1009.10						BORING TERMINATED AT ELEV 1009.1 IN CRYSTALLINE ROCK.				

SHEET 1 OF 1

DATE 28-Jun-06

CORE BORING REPORT

PROJECT: 33607.1.1 I. D. NO: B-4265 BORING NO: EB2-A GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No.202 on SR-1733 over First Broad River

COUNTY: Rutherford COLLAR ELEVATION: 1043.9 FT. TOTAL DEPTH: 34.8 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1015.9	28.0		1.8	1.7	1.7		
1014.1	29.8			94	94		Gray to dark gray biotite gneiss. Trace of pyrite; trace of garnets. Hard; fresh.
1014.1	29.8		5.0	4.3	4.1		
1009.1	34.8			86	82		

CORING TERMINATED AT ELEVATION 1009.1 FT.

DRILLER: D O Cheek CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33607.1.1	**ID** B-4265	**COUNTY** RUTHERFORD	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO.202 ON SR-1733 OVER FIRST BROAD RIVER			**GND WATER**
BORING NO EB2-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-L	**BORING LOCATION** 16+87.000	**OFFSET** 15.00ft RT	**24 HR** N/A
COLLAR ELEV 1043.90ft	**TOTAL DEPTH** 25.50ft	**START DATE** 6/28/06	**COMPLETION DATE** 06/28/06
DRILL MACHINE CME 550	**DRILL METHOD** WASH BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB2-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1043.90						Ground Surface				
1040.00	4.90	0	2	4	1.0	6				EMBANKMENT: RED CLAYEY SILT, MOIST
	9.90	3	3	4	1.0	7				ALLUVIUM: RED-ORANGE SANDY SILT, WET
1030.00	14.90	2	2	1	1.0	3	SS-4			ALLUVIUM: BROWN SILTY SAND WITH LITTLE MICA, SATURATED
	19.90	2	6	7	1.0	13				ALLUVIUM: BROWN SILTY SAND WITH GRAVEL, SATURATED.
1020.00										WEATHERED ROCK WITH MED DENSE SAP AT 23.2'-24.2'.
1018.40	24.90	60			0.1	60				BIOTITE GNEISS
						BORING TERMINATED AT ELEV 1018.4 IN CRYSTALLINE ROCK.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33607.1.1 TIP: B-4265 COUNTY: Rutherford

DESCRIPTION(1): Bridge No. 202 on SR-1733 over First Broad River.

EXISTING BRIDGE

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

Bridge No.: 202 Length: 150ft Total Bents: 6 Bents in Channel: 2 Bents in Floodplain: 4
Foundation Type: Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted.

Interior Bents: Significant amount on slope between Interior Bents 2 and 3.

Channel Bed: None noted.

Channel Bank: Some undercutting both upstream and downstream of existing bridge.

EXISTING SCOUR PROTECTION

Type(3): Rip-rap.

Extent(4): On bank between B2 and B3, and on EB2 slope.

Effectiveness(5): Major portion is gone (scoured) from B2/B3 slope; EB2 slope is in good shape.

Obstructions(6): Several boulders (1'x2'x2') at B4-A.

INSTRUCTIONS

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

DESIGN INFORMATION

Channel Bed Material(7): Silty sand with gravel and occasional boulders.

Channel Bank Material(8): Silty sand.

Channel Bank Cover(9): Trees and shrubs.

Floodplain Width(10): EB1 > 100ft; EB2-A +/- 50ft. EB2-B > 100ft.

Floodplain Cover(11): Grass and trees.

Stream is(12): Aggrading ____ Degrading X Static

Channel Migration Tendency(13): North.

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS	B1
B1-A	1018.5
B1-B	1016.5

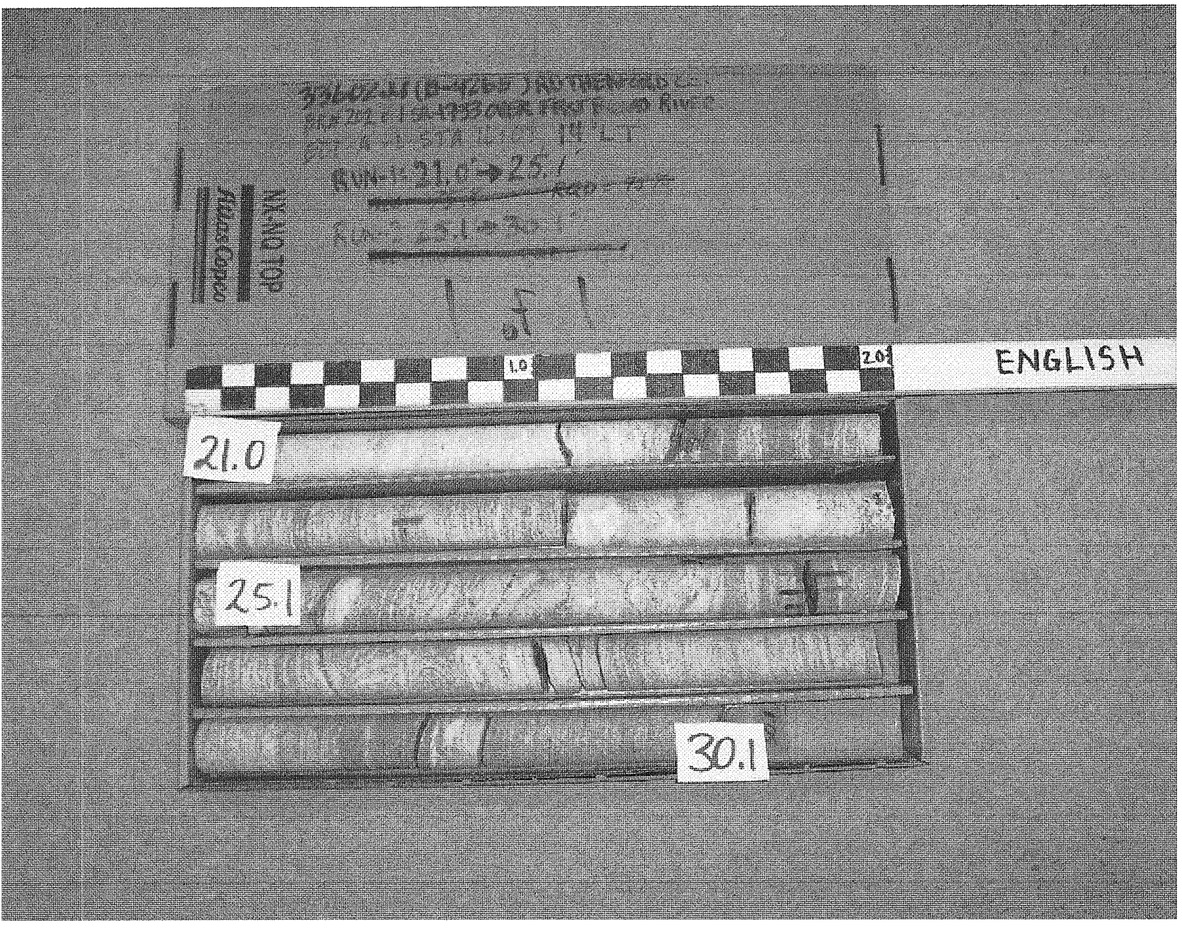
Comparison of DSE to Hydraulics Unit theoretical scour:

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

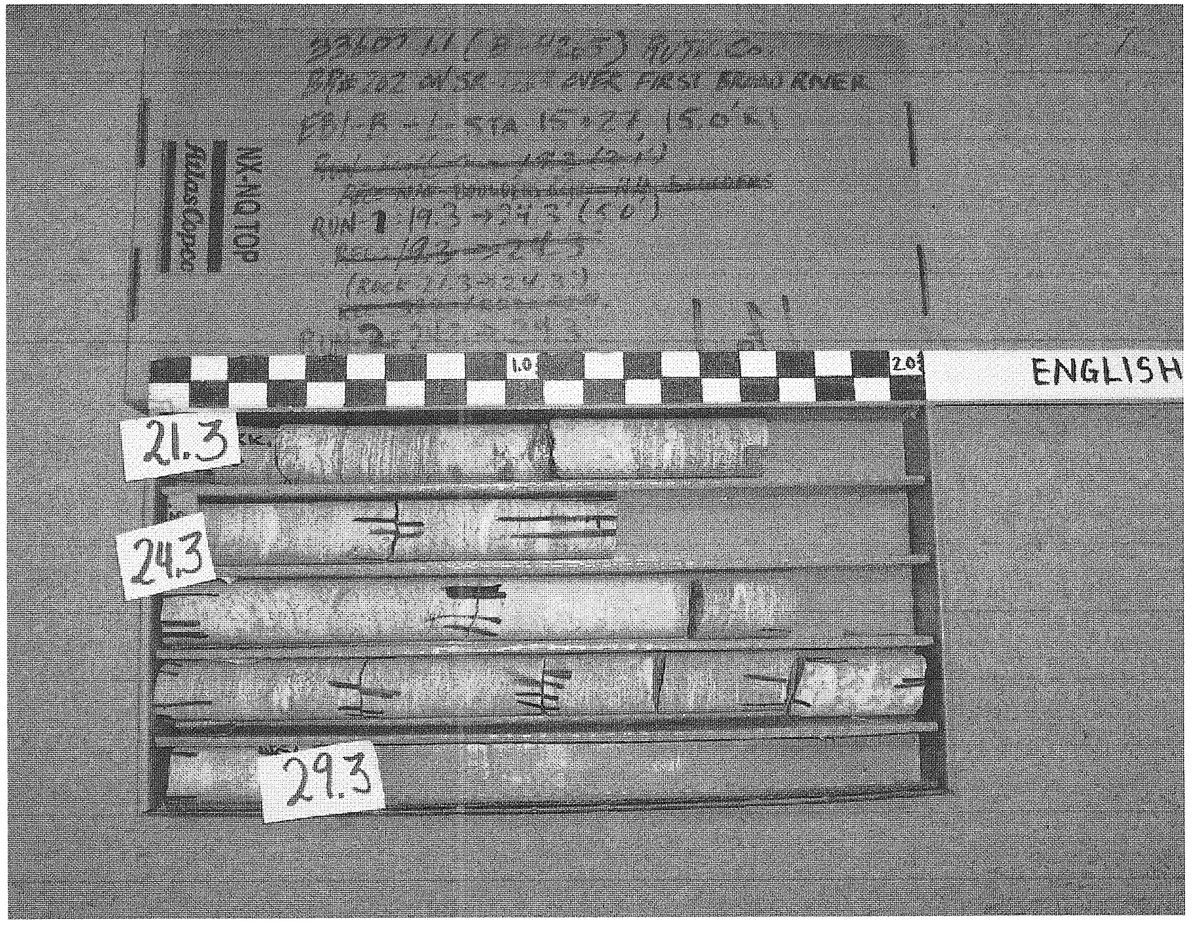
Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

Template Revised 02/07/06

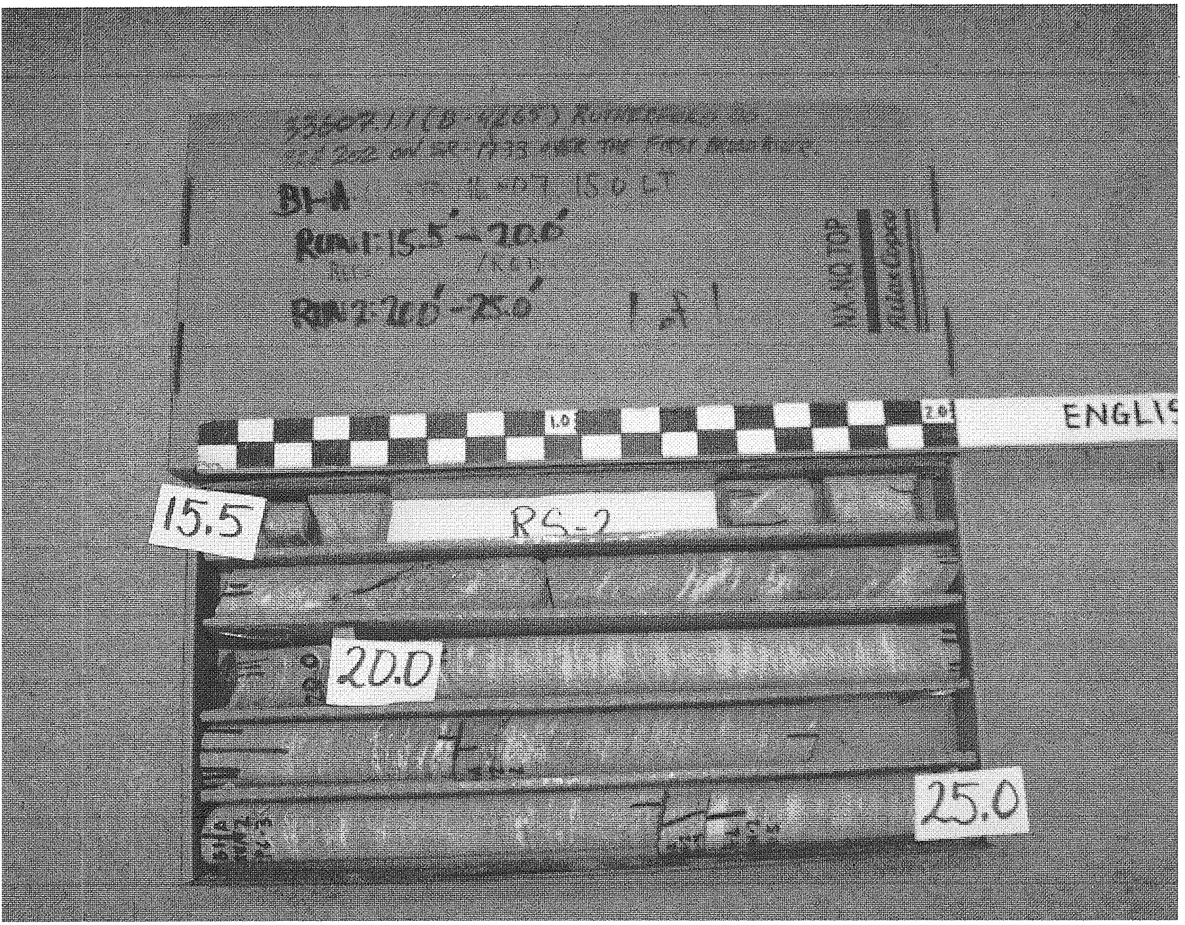
Reported by: C A Dunnagan **Date:** 6/15/2006



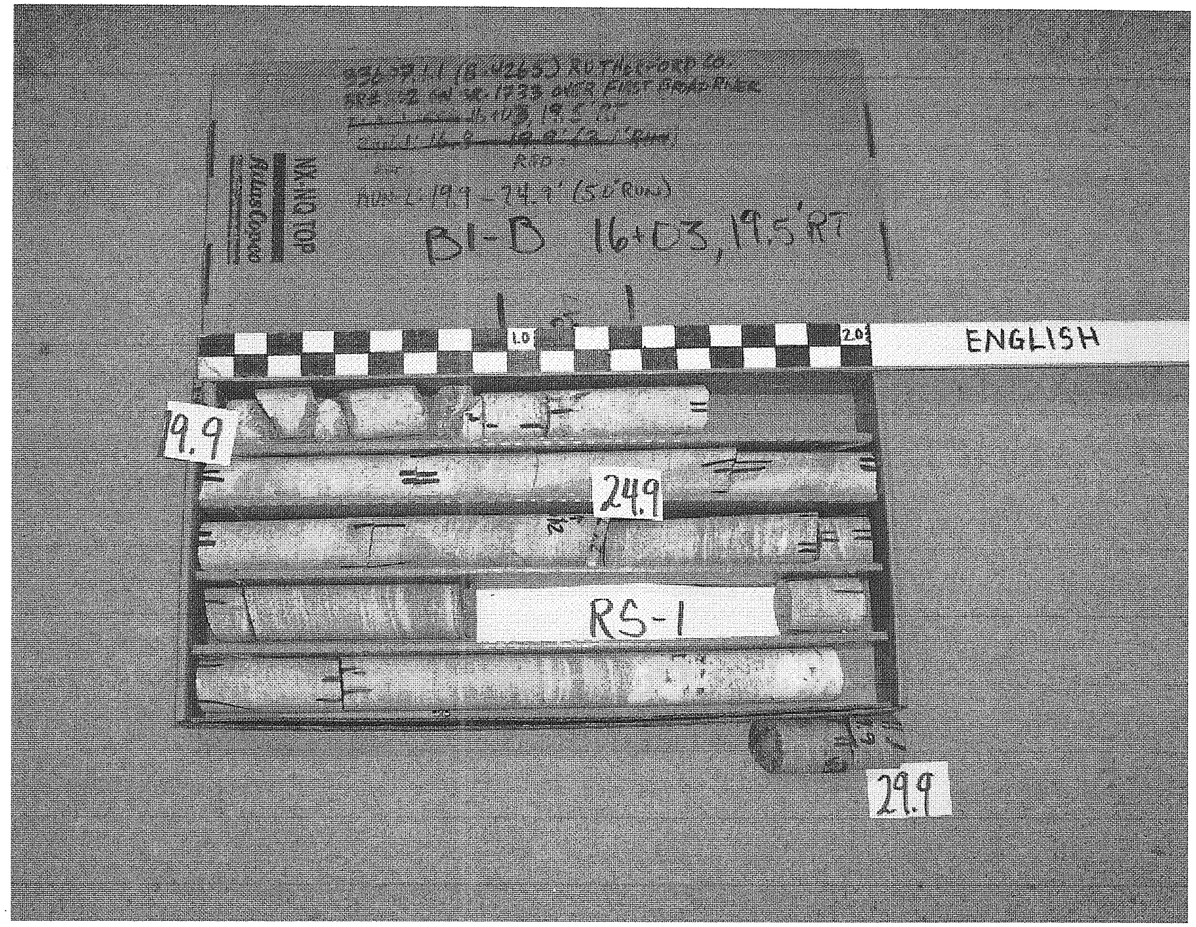
33607.1.1 B-4265
Rutherford Co.
Bridge No. 202 on SR-1733 over First Bridge River
EB1-A
Box 1of 1



33607.1.1 B-4265
Rutherford Co.
Bridge No. 202 on SR-1733 over First Bridge River
EB1-B
Box 1of 1



33607.1.1 B-4265
Rutherford Co.
Bridge No. 202 on SR-1733 over First Bridge River
B1-A
Box 1of 1



33607.1.1 B-4265
Rutherford Co.
Bridge No. 202 on SR-1733 over First Bridge River
B1-B
Box 1 of 1

33607.1.1 B-4265
Rutherford Co.
Bridge No. 202 on SR-1733 over First Bridge River
EB2-A
Box 1of 1

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	**B-4265**

REPORT ON SAMPLES OF:	**Soils for Quality**

PROJECT:	**33607.1.1**	**COUNTY:**	**Rutherford**	**Owner:**	**--**		
DATE SAMPLED:	**6.28.06**	**DATE RECEIVED:**	**6.29.06**	**DATE REPORTED:**	**7.5.06**		
SAMPLED FROM:	**Bridge**	**SAMPLED BY:**	**C. A. Dunnagan**				
SUBMITTED BY:	**W. D. Frye**			**2002**	**STANDARD SPECIFICATION**		
LABORATORY:	**Asheville**						

TEST RESULTS

Project Sample No.	SS-1	SS-2	SS-3	SS-4				
Lab Sample No. A	153048	153049	153050	153051				
HiCAMS Sample #	--	--	--	--				
Retained #4 Sieve %	0.0	0.0	0.0	0.0				
Passing #10 Sieve %	87	93	94	100				
Passing #40 Sieve %	78	91	91	98				
Passing #200 Sieve %	57	45	51	30				

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	19	9	8	8				
Fine Sand - Ret. #270	18	52	48	69				
Silt 0.05-0.005 mm %	15	29	34	19				
Clay < 0.005 mm %	48	10	10	4				
Passing # 40 Sieve %	--	--	--	--				
Passing # 200 Sieve %	--	--	--	--				

Liquid Limit	43	34	44	24				
Plastic Index	8	NP	NP	NP				
AASHTO Classification	A-5 (5)	A-4 (2)	A-5 (3)	A-2-4 (0)				
Quantity								
Texture								
Station	16+87	16+87	16+87	16+87				
Hole No.								
Depth (ft) From:	5.2	15.2	20.2	15.4				
To:	6.2	15.9	20.5	16.4				

Remarks:

A-153048 - 153051

CC:

C. A. Dunnagan	
File	

SOILS ENGINEER:	