STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33259.1.1 (B-3803)	1	21

PROJECT: 33259.1.1

ID: B-3803

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33259.1.1 (B-3803) F.A. PROJ. BRZ-1169(2)

COUNTY ASHE

PROJECT DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169 (CONLEY CHEEK ROAD)

SITE DESCRIPTION

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE 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 ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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PERSONNEL

L.L. ACKER, LG

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INVESTIGATED BY L.L. ACKER, LG

CHECKED BY W.D. FRYE JR., LG

SUBMITTED BY W.D. FRYE JR., LG

DATE 09/29/2006

NORTH CAROLINA LICENSED SEAL 1007 GEOLOGIST LOUIS L. ACKER

09/29/2006

DRAWN BY: M.M. HAGER, LG

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

PROJECT REFERENCE NO.	SHEET NO.
33259.1.1 (B-3803)	2

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	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/FT²)
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	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

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 CPT DPT DMT VST PMT — 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 [N] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] 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: SPIKE IN TREE, 194.26' LT OF -BL- STATION 19+07.70

ELEVATION: 2851.08' FT.

NOTES:

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

September 29, 2006

STATE PROJECT: 33259.1.1 (B-3803)
F. A. PROJECT: BRZ-1169(2)
COUNTY: Ashe

DESCRIPTION: Bridge No. 334 over South Fork New River on SR 1169 (Conley Cheek Road)

SUBJECT: Geotechnical Report – Foundation Investigation

Site Description

This project is located in the southern part of Ashe County, approximately 15 miles from the town of West Jefferson and one mile north of the intersection of SR 1169 and SR 1003 (Idlewild Road). The South Fork New River at this site is about 100 feet wide over a channel bed of gravel and submerged hard rock outcrops. The water flow is swift over the whole width of the channel, with only moderate turbulence. The riverbanks are about three to eight feet high. The floodplain is approximately 600 feet wide, and it lies chiefly on the west bank of the river.

Bridge 334 is a single-lane, low water bridge in four spans, with strip footings. Plans call for a replacement bridge on a new alignment that partially overlies the existing alignment. The new structure is to be 200 feet long and 30 feet wide, in three spans of 40 feet, 80 feet and 80 feet, respectively.

The Geotechnical Engineering Unit conducted a foundation investigation for this project in August and September, 2006. Two borings were made at each proposed bent, including six rock core borings and two rotary borings terminated on rock. Borings were made with a CME 550 power drilling machine equipped with a rotary NX casing advancer and NXWL diamond bit coring tools. Standard Penetration Tests (SPT's) were made at five-foot intervals in soil. Five soil samples were submitted to a DOT laboratory for quality testing and eight rock core samples were submitted for strength testing.

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BUILDING B
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Soil and Rock Materials

The materials found on this project consist of alluvial and residual soils and hard crystalline rock.

The alluvial soils on the floodplain comprise six to nine feet of silt and sand (A-4, A-2-4) overlying a thin bed of gravel. Alluvial gravel in the river channel forms a bed 1 to 3 feet thick overlying hard rock; however, most of the gravel has been scoured away in the immediate vicinity of the existing bridge, leaving only bars and patches of gravel among submerged rock outcrops. The proposed new bridge lies across the transition from gravel-covered channel to submerged rock.

Residual soils were found in only three borings, and in two of those the residual soil was less than two feet thick, composed of micaceous, silty sand saprolite (A-2-4). A single boring found almost six feet of micaceous, silty sand saprolite between the base of alluvium and the hard rock line. The saprolite contained rocky ledges or layers up to a foot thick.

Drilling was not able to discern a weathered rock layer between the saprolite and the underlying hard rock.

The hard rock at this site consists of gray, hard, crystalline, thinly to very thinly interbedded mica schist and micaceous metasandstone. The mica content varies to the extent that there are beds intermediate in composition between schist and metasandstone. The metasandtone is more or less calcareous, and some thin beds are of impure marble. A well developed foliation dips southeast at 45 degrees. The rock is for the most part fresh and of good to very good quality (RQD>75%). Instances of lesser quality are confined to a few isolated seams less than two feet in thickness. Those seams include some weathered rock, and one seam is weathered to saprolite.

Bent Descriptions

End Bent One (EB1)

This end bent lies on the flood plain approximately 25 feet from the west bank of the river. It is on level ground in grass and weeds.

Borings on the Left and Right Sides (EB1-A and EB1-B) found 9 to 10 feet of alluvium overlying saprolite. The alluvium consisted of about 8 feet of brown, very soft to soft sandy silt (A-4) with interbedded silty sand overlying 1 to 2 feet of loose, sandy gravel with cobbles and boulders.

Beneath the alluvium, the saprolite on the Left Side (EB1-A) was less than a foot thick overlying hard rock. The saprolite on the Right Side (EB1-B) was approximately 6 feet thick overlying hard rock. Weathered rock or hard rock seams about a foot thick were encountered within the saprolite layer.

The hard rock line was encountered in both borings at an elevation of approximately 2819 feet. The Left Side boring (EB1-A) was continued through 2.7 feet of slightly weathered, good quality metasandstone before termination at a depth of 12.8 feet. The Right Side boring (EB1-B) was terminated at the rock line.

Bent One (B1)

This bent is located in the channel 5 to 10 feet from the west bank, with the Left Side of the bent about 2 feet upstream of the existing bridge. The channel bed there is irregular and chiefly consists of a bare rock surface beneath the water, except for a thin gravel cover on the Right Side. The water depth is 4.3 feet on the Left Side and 1.5 feet on the Right Side.

A boring on the Left Side (B1-A) encountered hard crystalline rock beneath less than a foot of channel gravel and a little less than 2 feet of saprolite. The saprolite was composed of hard silty, micaceous sand (A-2-4).

Hard crystalline rock was encountered at a depth of 2.6 feet and was cored to a depth of 20.7 feet. The rock was composed of good to very good quality, fresh mica schist, except for a very poor seam (RQD=0%) between depths of 9.2 and 10.7 feet. The seam included about 0.6 foot of weathered rock.

A boring on the Right Side (B1-B) encountered hard crystalline rock beneath 0.8 feet of channel gravel. The rock was cored to a depth of 23.8 feet. It was composed of about 8 feet of micaceous metasandstone grading downward through about 15 feet of mica schist with thin interbeds of calcareous metasandstone and impure marble. The rock was hard, fresh and of very good quality, with minor exceptions. The upper 1.4 feet were slightly to severely weathered and very poor quality. A seam that yielded only 5% recovery between depths of 7.4 feet and 8.8 feet was interpreted as weathered rock and/or saprolite.

Bent Two (B2)

This bent is located in the river channel about 10 feet from the east bank. The Left Side of the bent overlies the existing bridge about ten feet from the existing end bent. The channel bed at this bent consists of a submerged, rough rock surface on the Left Side and a gravel bed on the Right Side. The water depth varies from approximately 3 feet on the Left Side to 1.5 feet on the Right Side.

A core boring on the Left Side (B2-A) began on a rock surface and penetrated 22.5 feet of hard crystalline rock composed of micaceous metasandstone. The rock was slightly weathered to fresh and of good to very good quality, with the exception of two seams: a slightly to moderately weathered, poor quality (RQD=40%) fractured seam at 5.7 to 7.2 feet, and a moderately weathered very poor quality seam (RQD=0%) at 19.9 to 20.9 feet.

A boring on the Right Side (B2-B) encountered hard crystalline rock beneath one foot of alluvial gravel. The rock, composed of micaceous metasandstone, was cored to a depth of 23.8 feet. The boring found fractured hard rock and weathered rock (RQD=0%) from 1.0 to 3.0 feet, and then penetrated good to very good quality rock to a depth of 19.6 feet.

Slightly weathered, poor quality rock (RQD=31%) was found from 19.6 feet to the base of the boring at 23.8 feet.

End Bent Two (EB2)

End Bent Two is located on the flood plain 35 to 65 feet east of the river bank and approximately 65 to 70 feet up station from the end of the existing bridge. The end bent lies at the entrance of a private, gravel road on the Left Side.

A boring on the Left Side (EB2-A) penetrated 4.7 feet of very soft alluvial sandy silt (A-4), and then alluvial silty sand and gravel (A-1-b) from 4.7 feet to 6.3 feet, where hard crystalline rock was encountered. The rock was penetrated with a rotary bit to a depth of 8.1 feet, where the boring was terminated with SPT spoon refusal.

A boring on the Right Side (EB2-B) found 6.5 feet of very soft alluvial sandy silt overlying about 2 feet of alluvial gravel. Hard crystalline rock was encountered beneath the gravel at a depth of 8.4 feet. The rock was cored from 8.4 feet to a total depth of 13.6 feet. The lithology was fair quality, moderately weathered mica schist and micaceous metasandstone with garnet.

Respectfully submitted,

Louis L. Acker, LG
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET
33259.1.1 (B-3803)	4

SITE PLAN

0 20 40

FEET

EBI-A
14+72
14' LT

BI-A
15+12
24' LT

SOUTH FORK
NEW RIVER

NC GRID
NAD 83

-L-

15

#334

B2-A
15+92
12' LT

EB2-A
16+70
8' LT

EBI-B
14+72
14' RT

BI-B
15+16
13' RT

B2-B
15+92
15' RT

EB2-B
16+72
15' RT

0	20	40
FEET		
VE = 2		

PROJECT REFERENCE NO.	SHEET
33259.1.1 (B-3803)	5

PROFILE ALONG B SIDE 15' RT OF -L-

2870'
2860'
2850'
2840'
2830'
2820'
2810'
2800'
2790'
2780'

SS-5
SS-6

EB1-B
14+72
14 RT

B1-B
15+16
13' RT

B2-B
15+92
15' RT

SS-1

EB2-B
16+72
15 RT

OUTCROPPING ROCK

WATER SURFACE 05/06

EXISTING GROUND

09/06
2
61
10
60/0.00
BT

REC= 79%
RQD= 0%
REC= 96%
RQD= 96%
REC= 5%
RQD= 0%

CRYSTALLINE ROCK: MICA SCHIST AND METASANDSTONE.

REC= 98%
RQD= 93%
BT

REC= 100%
RQD= 0%

REC= 100%
RQD= 100%

REC= 100%
RQD= 87%

REC= 88%
RQD= 31%
BT

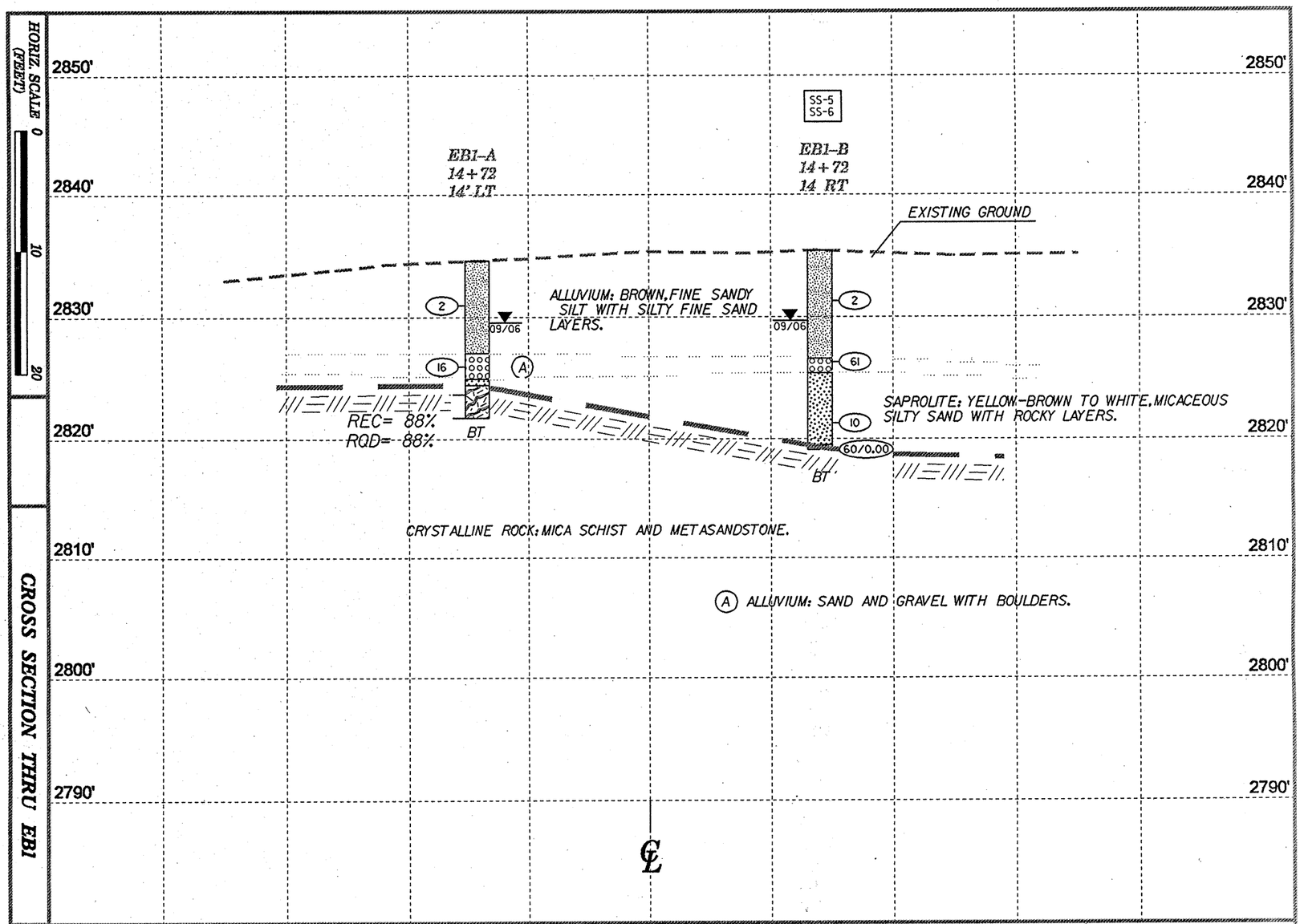
09/07
WOH
100/.02
BT

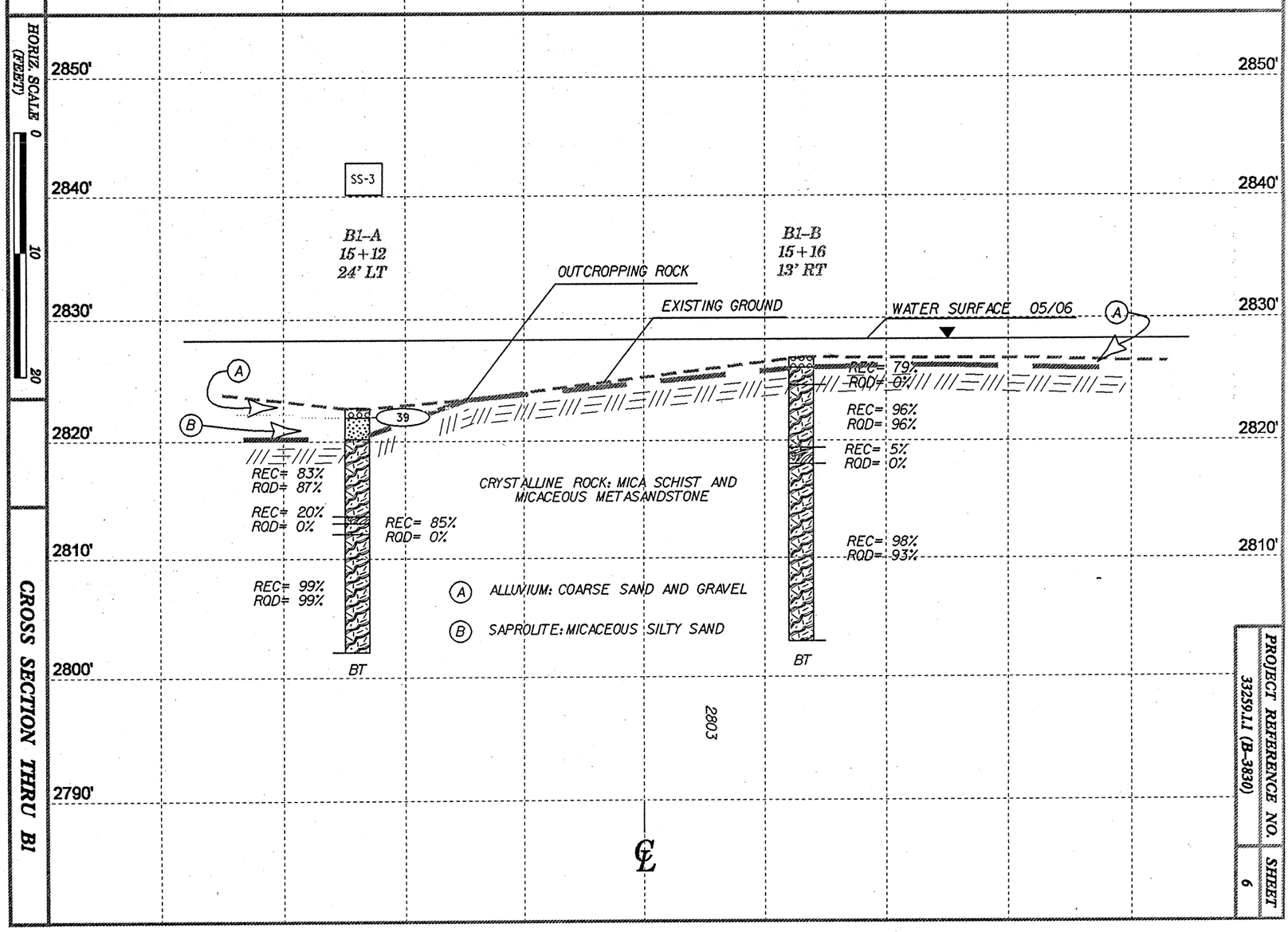
(A) ALLUVIUM: BROWN, FINE SANDY SILT WITH SILTY FINE SAND LAYERS,

(B) ALLUVIUM: SAND AND GRAVEL WITH BOULDERS.

(C) SAPROLITE: BROWN MICACEOUS SILTY SAND WITH ROCK LEDGES.

15+00
16+00
17+00



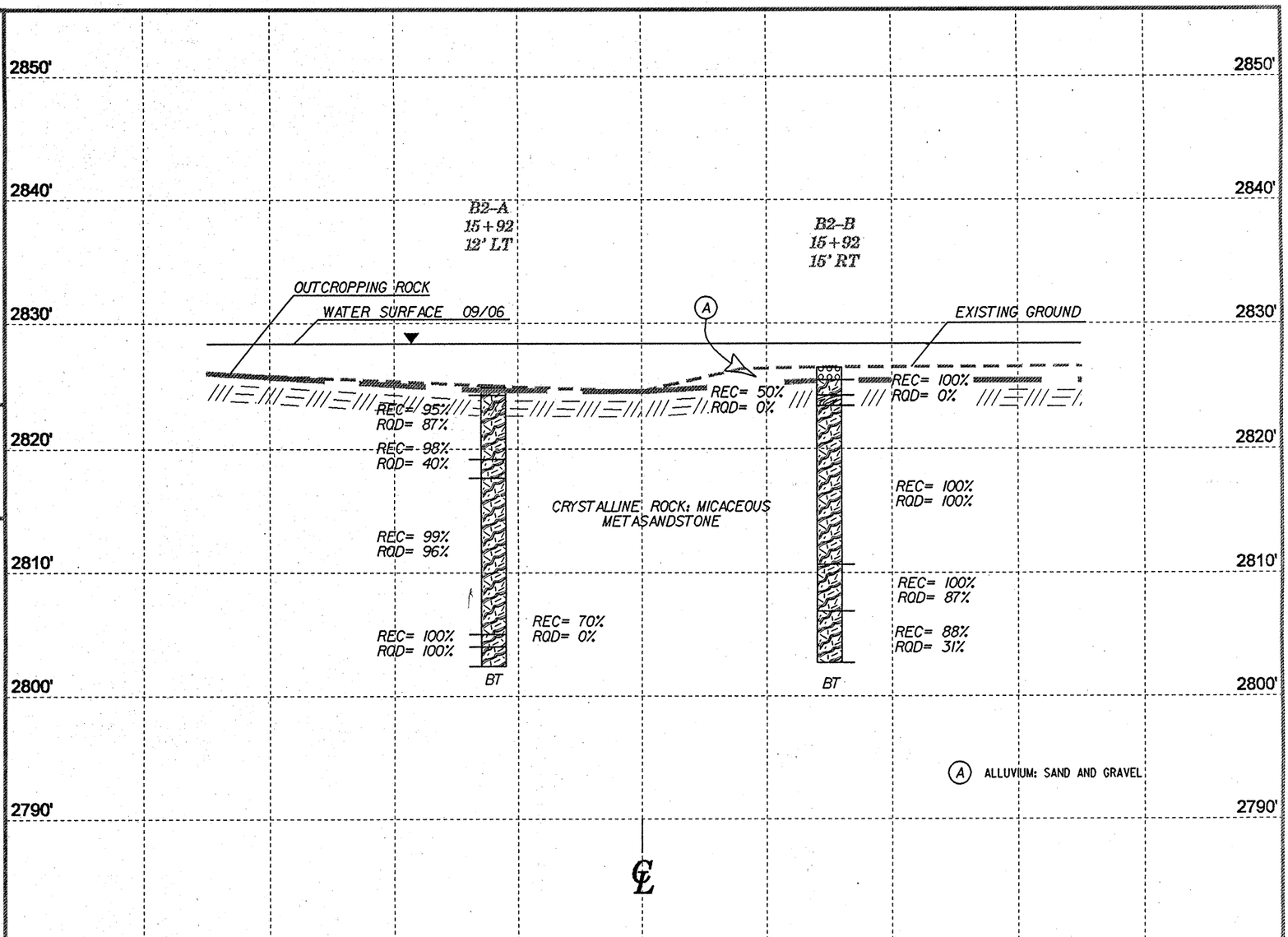


PROJECT REFERENCE NO.
33239.1.1 (B-3830)

SHEET
6

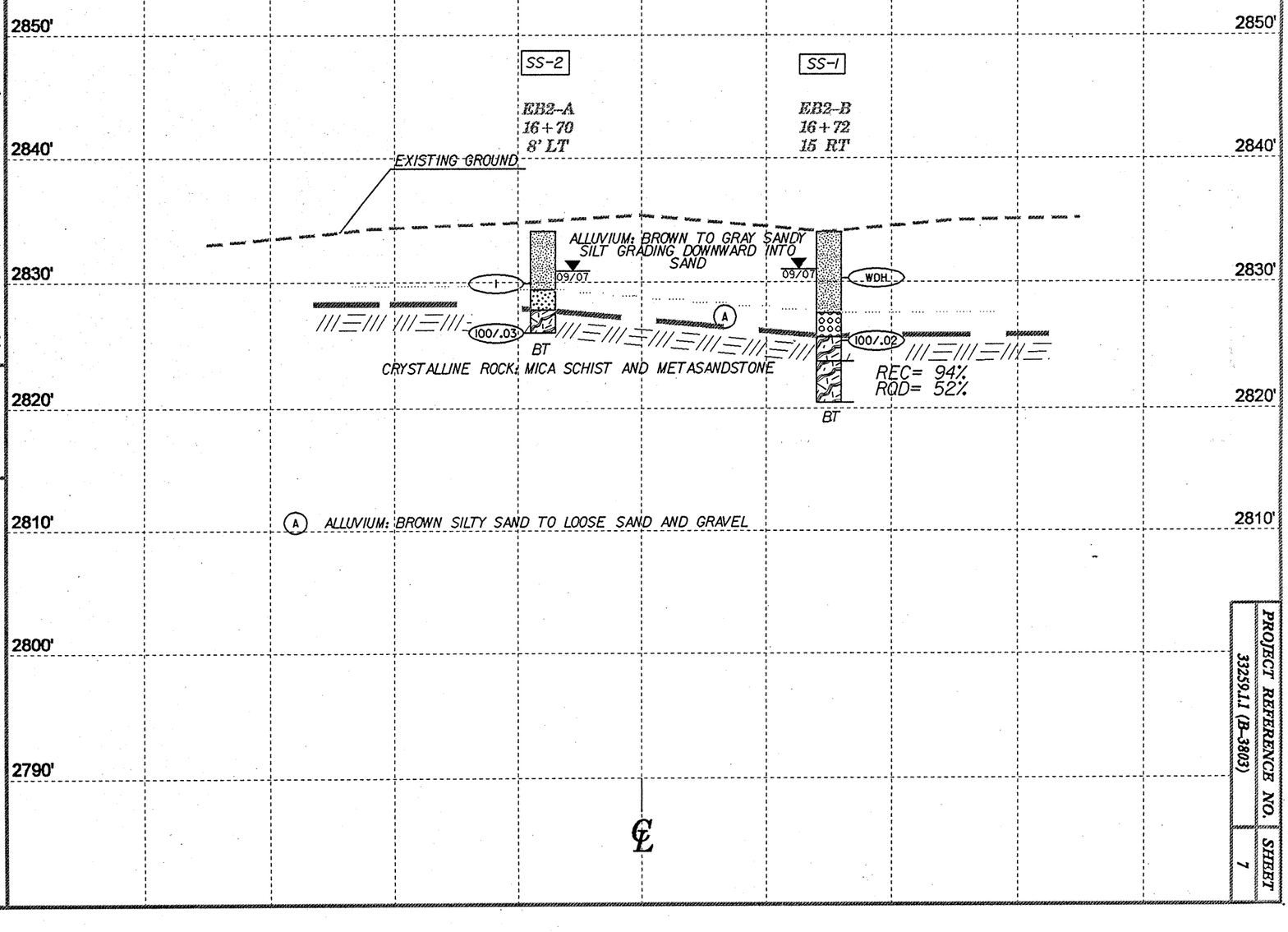
CROSS SECTION THRU B2

HORIZ. SCALE (FEET) 0 10 20



CROSS SECTION THRU EB2

HORIZ. SCALE (FEET) 0 10 20



PROJECT REFERENCE NO.	SHEET
33259.1.1 (B-3803)	7

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER	
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169				**GND WATER**
BORING NO EB1-A	**NORTHING** 936762.00	**EASTING** 1272615.00		**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 14+72.000	**OFFSET** 14.00ft LT		**24 HR** 5.00ft
COLLAR ELEV 2834.60ft	**TOTAL DEPTH** 12.80ft	**START DATE** 9/05/06	**COMPLETION DATE** 09/05/06	
DRILL MACHINE CME 550	**DRILL METHOD** ROTARY W/O MUD		**HAMMER TYPE** AUTOMATIC	
SURFACE WATER DEPTH	**DEPTH TO ROCK** 10.10ft		**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
2834.60						Ground Surface				
	3.60	1	0	2	1.0	2		▼		ALLUVIUM: BROWN, SANDY SILT WITH SANDY LAYERS
2830.00	8.60	6	7	9	1.0	16	CORE 1			ALLUVIUM: SAND AND GRAVEL WITH BOULDERS
2821.80						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2834.6 FEET.				SAPROLITE: GRAY TO WHITE SILTY SAND CRYSTALLINE ROCK: NOT CORED CRYSTALLINE ROCK: MICACEOUS METASANDSTONE REC=88% RQD=88%

PROJECT NO: 33259.1.1 (B-3803)
COUNTY: Ashe

CORE BORING REPORT
EB1-A

CORE 1: 10.9 – 12.8 REC=88% RQD=88%

10.9 – 12.8 Hard, fresh mica schist with thin beds of calcareous metasandstone to impure marble. Low recovery due to machine error. REC=88% RQD=88%

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169			**GND WATER**
BORING NO EB1-B	**NORTHING** 936745.00	**EASTING** 1272592.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 14+72.000	**OFFSET** 14.00ft RT	**24 HR** 5.70ft
COLLAR ELEV 2835.40ft	**TOTAL DEPTH** 16.30ft	**START DATE** 9/05/06	**COMPLETION DATE** 09/05/06
DRILL MACHINE CME 550	**DRILL METHOD** ROTARY W/O MUD		**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
2835.40						Ground Surface				
2830.00	4.10	1	1	1	1.0	2		▼		ALLUVIUM: BROWN, SILTY FINE SAND WITH SILT LAYERS
	9.10	28	36	25	1.0	61	SS-5	M		ALLUVIUM: SAND AND GRAVEL
2820.00	14.10	2	5	5	1.0	10				SAPROLITE: YELLOW-BROWN, MICACEOUS SILTY SAND WITH ROCKY LAYERS
2819.10	16.30	100			0.0	100	SS-6	M		CRYSTALLINE ROCK: NOT CORED
						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2835.4 FEET.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	ID B-3803	COUNTY ASHE	GEOLOGIST M. M. HAGER	
SITE DESCRIPTION BRIDGE NO. 304 OVER SOUTH FORK NEW RIVER ON SR 1169				GND WATER
BORING NO B1-A	NORTHING 936734.00	EASTING 1272646.00		0 HR N/A
ALIGNMENT -L-	BORING LOCATION 15+12.000	OFFSET 24.00ft LT		24 HR N/A
COLLAR ELEV 2822.80ft	TOTAL DEPTH 20.70ft	START DATE 8/30/06	COMPLETION DATE 08/30/06	
DRILL MACHINE CME 550	DRILL METHOD SPT CORE BORING		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH	DEPTH TO ROCK 2.60ft		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
2822.80						Ground Surface				
	0.80	5	13	26	1.0	X-39	SS-3	M		ALLUVIUM: LOOSE CSE. SAND AND GRAVEL
2820.00							RUN 1			SAPROLITE: SILTY SAND
							RUN 2			CRYSTALLINE ROCK: HARD, FRESH MICA SCHIST REC=83 RQD=87
2810.00							RUN 3			WEATHERED ROCK: MICA SCHIST REC=20 RQD=0
							RUN 4			CRYSTALLINE ROCK: FRACTURED METASANDSTONE REC=85 RQD=0
2802.10						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2802.1 FEET.				CRYSTALLINE ROCK: HARD, FRESH MICA SCHIST REC=99 RQD=99

PROJECT NO: 33259.1.1 (B-3803)
COUNTY: Ashe

CORE BORING REPORT
B1-A

CORE 1: 2.9 – 5.7	REC=75% RQD=71%
CORE 2: 5.7 – 10.7	REC=96% RQD=72%
CORE 3: 10.7 – 15.7	REC=100% RQD=100%
CORE 4: 15.7 – 20.7	REC=98% RQD=98%

LAYER 1: 2.9 – 9.2 Hard, fresh mica schist interbedded with calcareous metasandstone and/or impure marble. Metasandstone/marble beds are approximately 0.1 foot thick and constitute about 25 percent of the total strata. Schist is well foliated at 55 degrees. 5 pieces, longest piece 2.4 feet. 2 joints on foliation, smooth, clean. 1 joint at 20 degrees (2 breaks 0.1 ft apart), very rough, clean. REC=89% RQD=87%

LAYER 2: 9.2 – 9.8 Weathered rock, very little recovery. REC=20% RQD=%

LAYER 3: 9.8 – 10.7 Hard, slightly weathered mica schist. REC=85% RQD=0%

LAYER 4: 10.7 – 20.7 Hard, fresh mica schist with metasandstone/marble beds as in Layer 1. Well foliated at 55 degrees. 5 pieces, longest piece 5.0 feet. 2 joints on foliation, smooth, coated with chlorite. REC=99% RQD=99%

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169			**GND WATER**
BORING NO B1-B	**NORTHING** 936711.00	**EASTING** 1272618.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+16.000	**OFFSET** 13.00ft RT	**24 HR** N/A
COLLAR ELEV 2826.80ft	**TOTAL DEPTH** 23.80ft	**START DATE** 8/29/06	**COMPLETION DATE** 08/29/06
DRILL MACHINE CME 550	**DRILL METHOD** CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 0.80ft		**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
2826.80						Ground Surface				
							RUN 1			ALLUVIUM: LOOSE SAND AND GRAVEL
2820.00							RUN 2			CRYSTALLINE ROCK: WEATHERED METASANDSTONE REC=79 RQD=0
							RUN 3			CRYSTALLINE ROCK: HARD, FRESH METASANDSTONE REC=96 RQD=96
2810.00							RUN 4			WEATHERED ROCK AND/OR SAPROLITE REC=5 RQD=0
							RUN 5			CRYSTALLINE ROCK: HARD, FRESH MICA SCHIST WITH INTERLAYERED CALCAREOUS BEDS REC=98 RQD=93
2803.00						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2826.8 FEET				

PROJECT NO: 33259.1.1 (B-3803)
COUNTY: Ashe

CORE BORING REPORT
B1-B

CORE 1: 0.8 – 3.8	REC=90% RQD=50%
CORE 2: 3.8 – 8.8	REC=74% RQD=68%
CORE 3: 8.8 – 13.8	REC=88% RQD=80%
CORE 4: 13.8 – 18.8	REC=100% RQD=94%
CORE 5: 18.8 – 23.8	REC=96% RQD=96%

LAYER 1: 0.8 – 2.2 Medium hard to hard, slightly to severly weathered, micaceous metasandstone. 8 pieces plus rubble, longest piece 0.3 foot. Joints indeterminate. REC=79% RQD=0%

LAYER 2: 2.2 – 7.4 Hard, fresh, micaceous and calcareous metasandstone. 3 pieces, longest piece 2.2 feet. Well foliated at 55 degrees. 1 joint on foliation, moderately rough. 1 joint at 50 degrees opposite to foliation, moderately rough. All joints with slight Fe oxide stain. REC=96% RQD=96%

LAYER 3: 7.4 – 8.8 Weathered rock and/or saprolite. Very little recovery. REC=5% RQD=0%

LAYER 4: 8.8 – 23.8 Hard, slightly weathered to fresh mica schist interbedded with calcareous metasandstone and/or impure marble. Metasandstone/marble beds are approximately 0.1 foot thick and constitute about 25 percent of the total strata. 10 pieces, longest piece 5.3 feet. Well foliated at 50 degrees, increaseing to 70 degrees in lower 3 feet of core. 4 joints on foliation, smooth, coated with chlorite. 1 joint at 70 degrees, smooth, coated with chlorite. 1 joint at 60 degrees opposite direction, moderately rough, clean. 3 joints at 15-25 degrees, smooth to rough, clean or coated with chlorite. REC=98% RQD=93%

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER	
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169				**GND WATER**
BORING NO B2-A	**NORTHING** 936663.00		**EASTING** 1272683.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+92.000		**OFFSET** 12.00ft LT	**24 HR** N/A
COLLAR ELEV 2824.90ft	**TOTAL DEPTH** 22.50ft	**START DATE** 8/30/06		**COMPLETION DATE** 08/30/06
DRILL MACHINE CME 550	**DRILL METHOD** CORE BORING			**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 0.00ft			**Log B2-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
2824.90						Ground Surface				
							RUN 1			CRYSTALLINE ROCK: NOT CORED
2820.00							RUN 2			CRYSTALLINE ROCK: V. SLI. WEATHERED METASANDSTONE REC=95 RQD=87
							RUN 3			CRYSTALLINE ROCK: SLI. TO MOD. WEATHERED METASANDSTONE REC=98 RQD=40
2810.00							RUN 4			CRYSTALLINE ROCK: FRESH METASANDSTONE REC=99 RQD=96
							RUN 5			CRYSTALLINE ROCK: MOD. WEATHERED METASANDSTONE REC=70 RQD=0
2802.40						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2824.9 FEET				CRYSTALLINE ROCK: FRESH METASANDSTONE REC=100 RQD=100

COUNTY: Ashe

CORE BORING REPORT
B2-A

CORE 1: 0.6 – 2.5	REC=89% RQD=89%
CORE 2: 2.5 – 7.5	REC=100% RQD=84%
CORE 3: 7.5 – 12.5	REC=98% RQD=98%
CORE 4: 12.5 – 17.5	REC=100% RQD=96%
CORE 5: 17.5 – 22.5	REC=96% RQD=80%

LAYER 1: 0.6 – 5.7 Hard, very slightly weathered, micaceous and calcareous metasandstone. 5 pieces, longest piece 1.6 feet. Well foliated at 50 degrees. 4 joints on foliation, smooth, coated with Fe oxide. 1 joint at 70 degrees on quartz vein, smooth, coated with pyrite, white mica and a little Fe oxide. REC=95% RQD=87%

LAYER 2: 5.7 – 7.2 Hard to moderately hard, slightly to moderately weathered micaceous metasandstone. 6 pieces plus rubble, longest piece 0.6 foot. Well foliated at 55 degrees. 5 joints on foliation, smooth. 1 joint at 30 degrees, smooth. All joints coated with Fe oxide. REC=98% RQD=40%

LAYER 3: 7.2 – 19.9 Hard, fresh, micaceous and calcareous metasandstone. 5 pieces, longest piece 5.0 feet. Well foliated at 45 degrees. 2 joints on foliation, smooth, coated with mica. 1 joint at 45 degrees opposite to foliation, moderately rough, coated with a little pyrite. 1 joint at 10 degrees, moderately rough, coated with a little mica. REC=99% RQD=96%

LAYER 4: 19.9 – 20.9 Moderately hard, moderately weathered, micaceous and calcareous metasandstone. 6 pieces, longest piece 0.2 foot. Well foliated at 45 degrees. 4 joints on foliation, smooth. 1 joint at 70 degrees, smooth. 1 joint at 20 degrees, smooth. All joints coated with Fe oxide. REC=70% RQD=0%

LAYER 5: 20.9 – 22.5 Hard, fresh, micaceous and calcareous metasandstone. 2 pieces, longer piece 0.8 feet. Well foliated at 45 degrees. 1 joint at 55 degrees, moderately rough, coated with chlorite. REC=98% RQD=98%

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER
SITE DESCRIPTION BRIDGE NO. 334OVER SOUTH FORK NEW RIVER ON SR 1169			**GND WATER**
BORING NO B2-B	**NORTHING** 936647.00	**EASTING** 1272661.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+92.000	**OFFSET** 15.00ft RT	**24 HR** N/A
COLLAR ELEV 2826.50ft	**TOTAL DEPTH** 23.80ft	**START DATE** 8/29/06	**COMPLETION DATE** 08/29/06
DRILL MACHINE CME 550	**DRILL METHOD** CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH 1.40ft	**DEPTH TO ROCK** 1.00ft		**Log B2-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
2827.90						Surface Water Ground Surface				
							RUN 1			ALLUVIUM: SAND AND GRAVEL
							RUN 2			CRYSTALLINE ROCK: MOD. WEATHERED METASANDSTONE REC=100 RQD=0
2820.00										WEATHERED ROCK: REC=50 RQD=0
							RUN 3			CRYSTALLINE ROCK: FRESH, MICACEOUS METASANDSTONE REC=100 RQD=100
							RUN 4			
2810.00										CRYSTALLINE ROCK: FRESH, MICACEOUS METASANDSTONE REC=100 RQD=87
							RUN 5			
2802.70						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2826.5 FEET				CRYSTALLINE ROCK: SLI. WEATHERED MICACEOUS METASANDSTONE REC=88 RQD=31

CORE BORING REPORT
B2-B

CORE 1: 1.0 – 3.8	REC=83% RQD=29%
CORE 2: 3.8 – 8.8	REC=100% RQD=100%
CORE 3: 8.8 – 13.8	REC=100% RQD=100%
CORE 4: 13.8 – 18.8	REC=98% RQD=88%
CORE 5: 18.8 – 23.8	REC=92% RQD=30%

LAYER 1: 1.0 – 2.2 Hard to medium hard, slightly to moderately weathered, micaceous metasandstone. 6 pieces, longest piece 0.2 foot. Well foliated at 45 degrees. 6 joints on foliation, smooth, coated with a little Fe oxide. REC=100% RQD=0%

LAYER 2: 2.2 – 3.0 Weathered rock/severely weathered metasandstone. Only rubble recovered. REC=50% RQD=0%

LAYER 3: 3.0 – 15.8 Hard, fresh, micaceous and calcareous metasandstone. Contains a few quartz veins up to 0.4 foot thick. 2 pieces, longer piece 6.9 feet. Well foliated at 45 degrees. 1 joint on foliation at small quartz vein, smooth, clean. Base of layer on weathered joint. REC=100% RQD=100%

LAYER 4: 15.8 – 19.6 Hard, fresh metasandstone as above. 5 joints on foliation at 45 degrees, smooth, clean or with a little chlorite. REC=100% RQD=87%

LAYER 5: 19.6 – 23.8 Hard, slightly weathered, micaceous and calcareous metasandstone. 26 pieces, longest piece 0.4 feet. Well foliated at 45 degrees. All joints coated with Fe oxide.
3 joints on foliation, smooth.
3 joints at 70 to 90 degrees, smooth.
3 joints at 50 degrees (opposite direction to 70 to 90 degree set), moderately rough to rough.
2 joints at 20 degrees, smooth.
REC=88% RQD=31%

PROJECT NO: 33259.1.1 (B-3803)
COUNTY: Ashe

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER	
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169				**GND WATER**
BORING NO EB2-A	**NORTHING** 936598.00	**EASTING** 1272725.00		**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+70.000	**OFFSET** 8.00ft LT		**24 HR** 3.20ft
COLLAR ELEV 2834.10ft	**TOTAL DEPTH** 8.10ft	**START DATE** 8/28/06	**COMPLETION DATE** 08/28/06	
DRILL MACHINE CME 550	**DRILL METHOD** ROTARY W/O MUD		**HAMMER TYPE** AUTOMATIC	
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** 6.30ft		**Log EB2-A, 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
2834.10						Ground Surface				
2830.00	4.20	1	0	1	1.0	1 / 100	SS-2	SAT		ALLUVIUM: BROWN SANDY SILT
										ALLUVIUM: BROWN SILTY SAND WITH BASAL GRAVEL
2826.00	8.10	100			0.0	TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2834.1 FEET.				CRYSTALLINE ROCK: NOT CORED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33259.1.1	**ID** B-3803	**COUNTY** ASHE	**GEOLOGIST** M. M. HAGER	
SITE DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK NEW RIVER ON SR 1169				**GND WATER**
BORING NO EB2-B	**NORTHING** 936582.00	**EASTING** 1272708.00		**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+72.000	**OFFSET** 15.00ft RT		**24 HR** 3.00ft
COLLAR ELEV 2834.10ft	**TOTAL DEPTH** 13.60ft	**START DATE** 8/28/06	**COMPLETION DATE** 08/28/06	
DRILL MACHINE CME 550	**DRILL METHOD** ROTARY W/O MUD		**HAMMER TYPE** AUTOMATIC	
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** 8.40ft		**Log EB2-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
2834.10						Ground Surface				
2830.00	3.70	0	0	0	1.0	0	SS-1	W		ALLUVIUM: GRAY MICACEOUS SANDY SILT GRADING DOWNWARD TO SAND
	8.70	100	0	0	0.0	0	RUN 1			ALLUVIUM: LOOSE SAND AND GRAVEL
2820.50						TERMINATED BORING IN HARD CRYSTALLINE ROCK AT ELEVATION 2834.1 FEET.				CRYSTALLINE ROCK: NOT CORED
										CRYSTALLINE ROCK: MOD. WEATHERED METASANDSTONE AND SCHIST REC=94 RQD=52

CORE BORING REPORT
EB2-B

CORE 1 10.3 – 13.6 REC=94% RQD=52%

10.3 – 13.6 Hard to medium hard, moderately weathered, micaceous and garnetiferous metasandstone/schist. 17 pieces, longest piece 0.7 foot. Well foliated at 45 degrees. 5 joints on foliation, smooth, coated with a little Fe oxide. 5 joints at 15 degrees, all in lower half of core, moderately rough, coated with a little Fe oxide. REC=94% RQD=52%

M&T 503E

JCS

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

T.I.P. ID #:	B-3803

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	33259.1.1	COUNTY:	Ashe		Owner:	--	
DATE SAMPLED:	8.6.06	DATE RECEIVED:	9.7.06		DATE REPORTED:	9.13.06	
SAMPLED FROM:	Bridge	SAMPLED BY:	L. L. Acker				
SUBMITTED BY:	W. D. Frye			2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville						

TEST RESULTS

Project Sample No.	SS-1	SS-2	SS-3	SS-5	SS-6			
Lab Sample No. A	153610	153611	153612	153613	153614			
HiCAMS Sample #	--	--	--	--	--			
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0			
Passing #10 Sieve %	100	100	78	53	59			
Passing #40 Sieve %	100	100	67	44	49			
Passing #200 Sieve %	54	36	28	22	23			

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	2	3	24	24	27			
Fine Sand - Ret. #270	60	73	60	49	47			
Silt 0.05-0.005 mm %	30	18	16	27	24			
Clay < 0.005 mm %	8	6	0.0	0.0	2			
Passing # 40 Sieve %	--	--	--	--	--			
Passing # 200 Sieve %	--	--	--	--	--			

Liquid Limit	32	32	38	32	35			
Plastic Index	NP	NP	NP	NP	NP			
AASHTO Classification	A-4 (4)	A-4 (0)	A-2-4 (0)	A-1-b (0)	A-1-b (0)			
Quantity								
Texture								
Station	16+72	16+69	15+12	14+72	14+72			
Hole No.								
Depth (ft) From:	4.2	4.7	1.3	10.0	14.6			
To:	5.2	5.7	2.3	10.6	15.6			

Remarks:

A-153610 - 153614

CC:

L. L. Acker	
File	

SOILS ENGINEER:	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33259.1.1 TIP: B-3803 COUNTY: ASHE

DESCRIPTION(1): Bridge 334 over South Fork New River on SR 1169 (Conley Cheek Road)

EXISTING BRIDGE

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

Bridge No.: 334 Length: 107 Total Bents: 5 Bents in Channel: 5 Bents in Floodplain: 0
Foundation Type: Strip footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: All scoured

Interior Bents: All scoured

Channel Bed: Scoured apparently due to constriction of flow under low-water bridge

Channel Bank: none

EXISTING SCOUR PROTECTION

Type(3): Concrete abutments and wing walls

Extent(4): Both End Bents

Effectiveness(5): sufficient

Obstructions(6): Logs and debris trapped against bridge

DESIGN INFORMATION

Channel Bed Material(7): Coarse sand, gravel and cobbles

Channel Bank Material(8): Sandy silt

Channel Bank Cover(9): grass, brush

Floodplain Width(10): 500 feet

Floodplain Cover(11): grass meadow, christmas trees

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

Channel Migration Tendency(13): none

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet x Meters ____

BENTS										
B1-A	B1-B	B2-A	B2-B							
2819	2825	2825.5	2824.5							

Comparison of DSE to Hydraulics Unit theoretical scour:
B1-A, B2-A, and B2-B are more than 5 feet higher that theoretical scour due to shallow hard rock.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank						
Sample No.	SS-1						
Retained #4	0						
Passed #10	100						
Passed #40	100						
Passed #200	54						
Coarse Sand	2						
Fine Sand	60						
Silt	30						
Clay	8						
LL	32						
PI	NP						
AASHTO	A-4(4)						
Station	16+72						
Offset	15 RT						
Depth	4.2						

Template Revised 02/07/06

Reported by: L. L. Acker **Date:** 9/27/2006

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 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.

33259.1.1 B-3803 Ashe Co. Bridge No. 334 on SR-1169 Over South Fork New River

EB1-A -L- Station 14+72 14' LT

BOX 1 OF 1

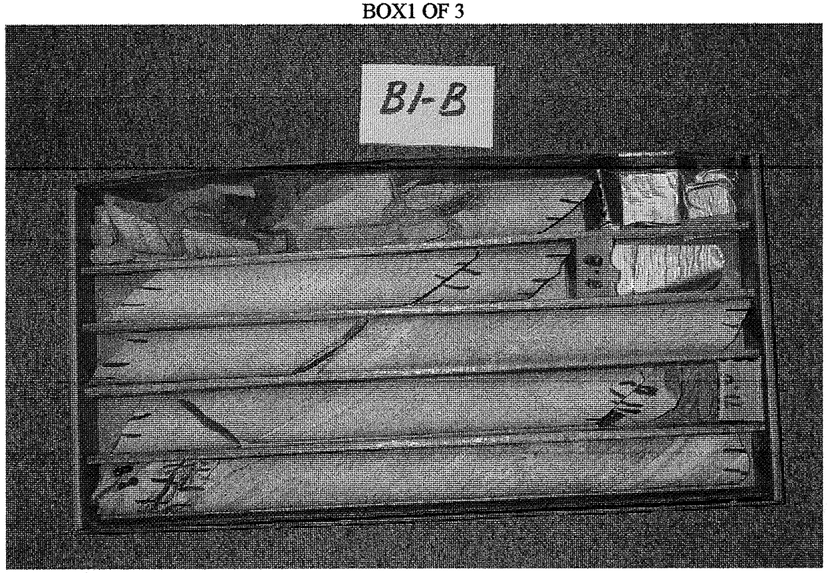
B1-A -L- Station 15+12 24' LT

BOX 1 OF 2

BOX 2 OF 2

B1-B -L- Station 15+16 13' RT

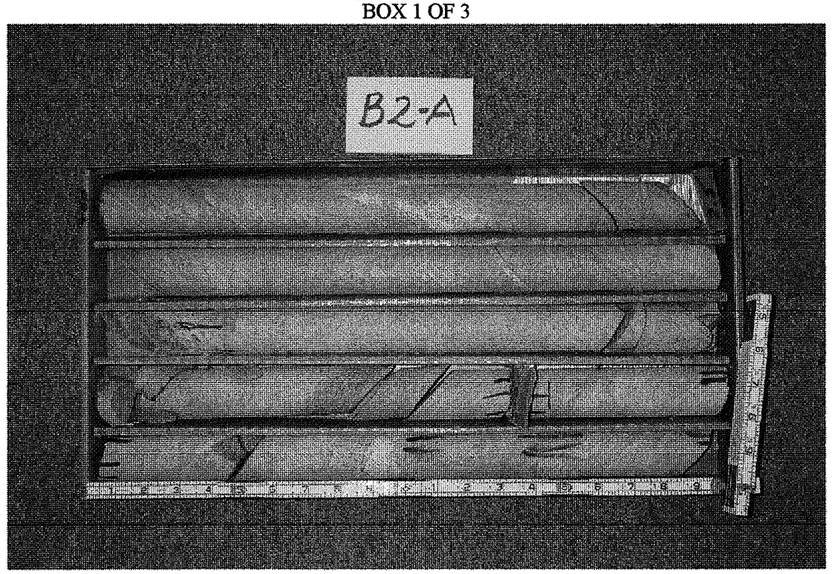
BOX1 OF 3



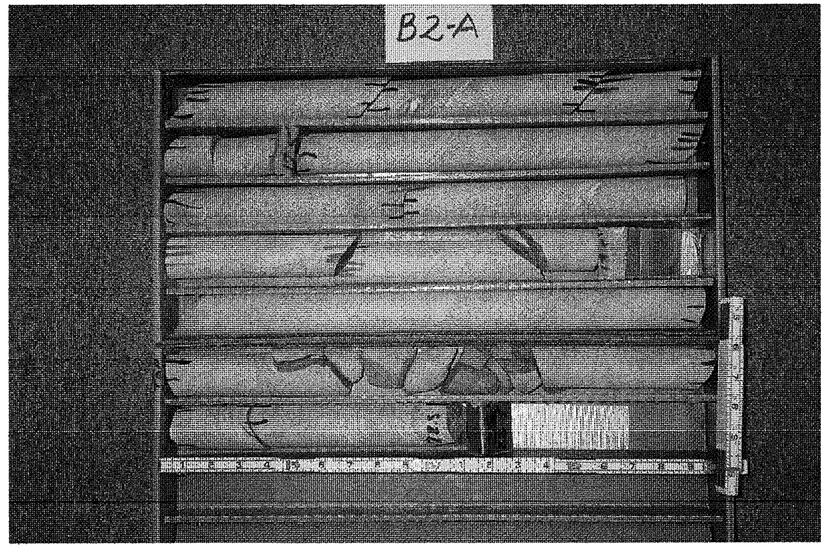
BOX 2 & 3 OF 3

B2-A -L- Station 15+92 12' LT

BOX 1 OF 3

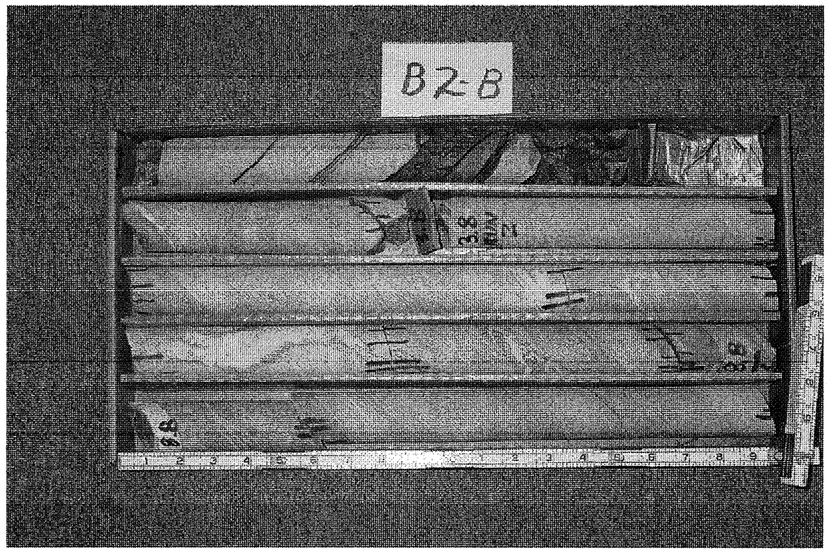


BOX 2 & 3 OF 3

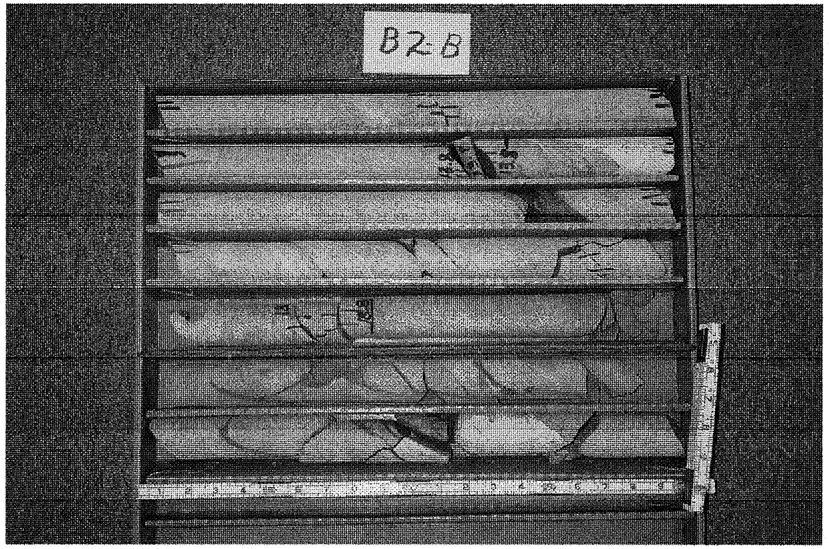


B2-B -L- Station 15+92 15' RT

BOX 1 OF 3



BOX 2 & 3 OF 3

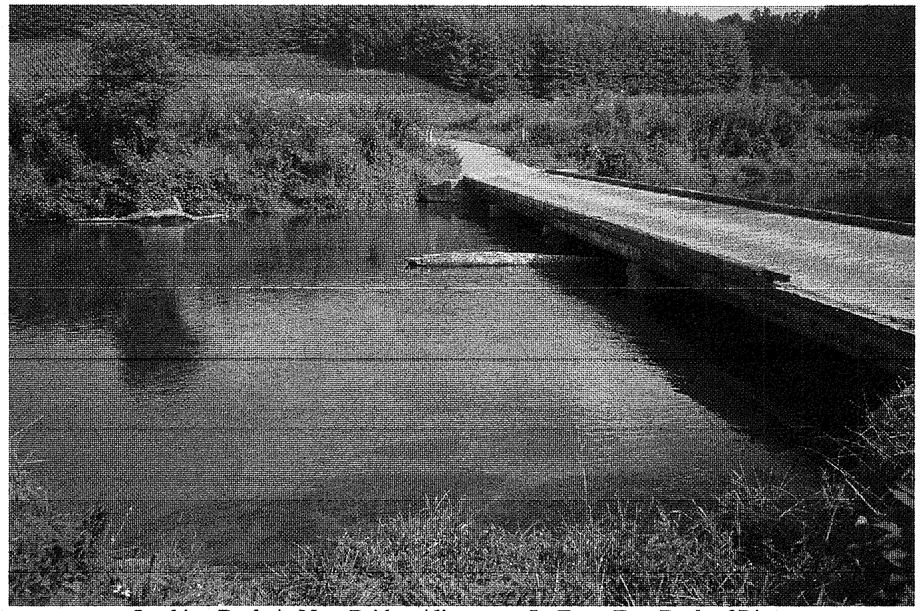


EB2-B -L- Station 16+72 15' RT

BOX 1 OF 1

33259.1.1 B-3803 Ashe Co. Bridge No. 334 on SR-1169 Over South Fork New River

Looking Back From New End Bent 2



Looking Back At New Bridge Alignment -L- From East Bank of River