PROJECT: 33380.1.1 I.D.: B-4012

STATE	STATE PROJECT REFERENCE NO.		SHEET NO.	TOTAL SHEETS
N.C.	33380.1.1		1	38
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION		
B-4012	BRZ-1118(3)	P.E.		
		CONST.		

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

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33380.1.1 I.D. NO. B-4012

COUNTY ASHE

PROJECT DESCRIPTION BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

SITE DESCRIPTION

For Letting

CONTENTS:

CAUTION NOTICE

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

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DRAWN BY: R.RAHIE

INVESTIGATED BY	MACTEC ENGINEERING AND CONSULTING, INC.	PERSONNEL	M. LEAR
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SUBMITTED BY	M. LEAR		C. HALL
DATE	10/21/05		
REVISED	11/09/05		

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4012	33380.1.1	2	38

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)
GRAIN SIZE MM	305	75	2.0	0.25	0.05	0.005
GRAIN SIZE 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	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI) PL — PLASTIC LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE

UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)

GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- BULK SAMPLE LOCATION
- 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 - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
C.I. - CAVE IN
CL - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e -VOID RATIO
F. - FINE
FIAD - FILLED IMMEDIATELY AFTER DRILLING
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
V. - VERY
VST - VANE SHEAR TEST
W - MOISTURE CONTENT

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- ___
- [ ] BK-51
- [ ] CME-45
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] OTHER CME-55 LC
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [X] TRICONE 3" & 4" STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [X] CORE BIT SERIES 2&6
- [ ] OTHER _____

HAMMER TYPE:
[X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B ____
- [X] -N Q
- [ ] -H WD4

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

ROCK DESCRIPTION

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

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V. SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-5, 17+93, 14 ft LT -L-, ELEV. 3119.86 ft MSL, SET BY NCDOT PERS.

NOTES:
Geotechnical Exploration
Performed By:

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RALEIGH, NORTH CAROLINA 27604
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SUBJECT: **GEOTECHNICAL REPORT**

DESCRIPTION: **BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118**
STATE PROJECT: 33380.1.1
TIP: B-4012
F.A. NUMBER: BRZ-1118(3)

1.0 PROJECT DESCRIPTION

1.1 Background

The purpose of this investigation was to obtain geotechnical information for foundation design and construction of the proposed replacement bridge and detour structure on SR 1118 over the North Fork New River, Ashe County, North Carolina (Drawings 1 and 2). Our understanding of this project comes from a site visit on September 21, 2005; conversations with NCDOT Geotechnical Unit personnel; and from documents and drawings provided by the Geotechnical Unit including a Request for Proposal dated September 1, 2005, Bridge Survey and Hydraulic Design Reports dated June 13 & 20, 2005, preliminary general drawings dated June 29, 2005, and electronic files, including site photographs, obtained via the NCDOT ftp website.

The project includes a primary replacement structure approximately 115 feet long and 33 feet wide, to be constructed at the approximate grade of the existing bridge. It will consist of three spans, with side spans of 30 feet and a center span of 55 feet in length. The proposed end bents and interior bents are skewed 135° to the alignment (-L-). The proposed detour structure will be located downstream of the existing bridge along the alignment (-DET-) and will parallel the primary alignment (-L-). The detour structure will be approximately 140 feet in length and 24 feet wide.

This geotechnical report describes the results of our subsurface investigation performed during September and October, 2005.

1.2 Field Testing

MACTEC advanced 9 borings for the primary structure at the locations shown on the Boring Location Plan (Drawing 3). MACTEC advanced 2 borings for the detour structure at the locations shown on the Detour Boring Location Plan (Drawing 9). The borings were drilled with a CME 55 LC track mounted ATV drill rig. All borings were advanced using rotary wash drilling and, where required, NQ sized rock coring techniques. End bent borings for the primary structure and detour structure borings were drilled to depths that satisfy the minimum criteria for the NCDOT Ultimate Pile Capacity Chart for 12-inch steel piles. Interior bent borings for the primary structure were drilled to depths that satisfy the minimum criteria for drilled shaft foundations.

Proposed boring locations were established at the project site utilizing GPS equipment and existing site features. Boring location coordinates were determined from the provided electronic files. Two borings were drilled at each end bent and interior bent for the primary structure. Primary structure end bent and interior bent borings were drilled on the shoulders of SR 1118, except for boring EB1-B, which was drilled within the roadway of SR 1118. Detour structure borings were drilled

downstream of the existing bridge. DB-1 was drilled within the wooded floodplain on the north side of the river. DB-2 was drilled in the cleared cow pasture on the south side of the river.

Borings EB1-B and EB2-B were offset from proposed locations due to underground utilities. Boring DB-2 was offset from the proposed location due to a barbed-wire fence and large trees at the proposed location. Boring B2-B OS was drilled in addition to and offset from boring B2-B due to coring difficulties preventing satisfactory completion of B2-B. Conventional survey techniques were used to establish the collar elevations at all boring locations and selected ground surface points depicted on the subsurface profile and cross section drawings submitted with this report (Drawings 4 to 8 and 10). Reference Survey point BL-5, established at the project site by NCDOT personnel, was used as a benchmark.

Standard penetration tests (SPT) were conducted and soil samples collected at approximately five foot intervals within the soil profile using a split-barrel sampler and a 140 lb. automatic hammer. Weathered and crystalline rock was cored using NQ-sized core equipment.

1.3 Laboratory Testing

Laboratory testing consisting of AASHTO classification and grain-size distribution tests were performed on split-barrel samples SS-1 through SS-6, and bulk samples S-1 and S-2, collected from the North Fork New River channel bed and channel bank, respectively. The natural moisture content was determined for cohesive soils. Unconfined compressive strength tests were performed on rock samples RS-1 and RS-2.

Laboratory testing was performed in accordance with applicable ASTM/AASHTO/NCDOT specifications. Test results for AASHTO classification, grain-size distribution, and moisture content are included with this report. Summaries of Rock Test Results are also included in this report.

2.0 PHYSIOGRAPHY AND GEOLOGY

2.1 Site Description

The project site is located in the narrow, generally flat, fluvial valley of the northwesterly flowing North Fork New River. The floodplain is approximately 200 to 300 feet wide in the vicinity of the existing bridge. Ground surface elevations along SR 1118 are approximately 3120 feet mean sea level (MSL). Ground surface elevations in the floodplain are approximately 3114 feet MSL and the elevation of the riverbed is approximately 3111 feet MSL. Slight to moderate slopes occur along the banks of the river and along the roadway embankment for SR 1118. The topography northeast and southwest of the existing bridge, outside of the floodplain, rises steeply to over 3600 feet MSL. Locally, outcrops of biotite Gneiss are exposed within and along the banks of the North Fork New River at the project site and at the foot of the mountains northeast of the project site. The banks of the river and floodplain are open to moderately wooded with small to large trees and brush.

Overhead and underground utilities are present at the project site along both sides of SR 1118. Utilities include power, cable, phone, and fiber optic lines.

2.2 Geology

The project site is located within the Blue Ridge Belt of the Blue Ridge Physiographic Province. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geological Survey, indicates that biotite granitic Gneiss underlies the project area. Our investigation identified surficial soils consisting of roadway embankment fill and/or alluvium, underlain by residual soils showing relict rock fabric and/or weathered rock, underlain by crystalline rock consisting of biotite Gneiss.

Alluvial sediments consist of silty, fine to coarse sand (A-2-4) with trace organic debris, wood fragments and rock fragment gravel; and silty, fine to coarse sand and gravel (A-1-a/A-1-b). We interpret these soils to be Quaternary-aged (<2 million years ago) sediments deposited by the North Fork New River fluvial system.

Blue Ridge Belt materials consisting of residual soil, weathered rock, and crystalline rock unconformably underlie alluvial materials. Residual soils consist of loose to very dense, clayey, silty, fine to coarse sand (A-2-4). A relatively thin zone of weathered rock: Gneiss typically occurs above crystalline rock: Gneiss.

3.0 FOUNDATION MATERIALS

Boring and coring logs describing subsurface conditions at each of the boring locations are included with this report. A generalized profile, Drawing 4 in the report, depicts subsurface conditions 10 feet left of the alignment -L-. Generalized cross-sections, Drawings 5 to 8 in the report, depict subsurface conditions along End Bent 1, Bent 1, Bent 2, and End Bent 2 of the primary structure. A generalized profile, Drawing 10 in the report, depicts subsurface conditions along the alignment -DET-.

3.1 Subsurface Conditions

Subsurface materials encountered at the project site during our investigation are divided into five major geologic strata including Roadway Embankment Fill, Alluvium, Residual Soil, Weathered Rock, and Crystalline Rock. These five strata are divided into five major material units that generally occupy the following relative vertical positions downward from the surface:

Roadway Embankment Fill
- Sand and Gravel

Alluvium
- Sand and Gravel

Residual Soil
- Sand

Weathered Rock
- Gneiss

Crystalline Rock
- Gneiss

3.1.1 Roadway Embankment Fill: Sand and Gravel

Roadway Embankment Fill: Sand and Gravel occurs as the surface unit in all borings completed for the primary structure. The unit is 2.5 to 7.0 feet thick and is characterized as loose to dense, dry to moist, clayey, silty, fine to coarse sand (A-2-4), with trace to little gravel and trace wood fragments, and silty, fine to coarse sandy, gravel (A-1-b) with trace organic debris. The elevation of the base of the unit ranges from 3117.3 to 3112.2 feet MSL. Roadway embankment fill was not encountered in borings completed for the detour structure.

3.1.2 Alluvium: Sand and Gravel

The Alluvium: Sand and Gravel material unit consists of very loose to medium dense, moist to wet, silty, fine to coarse sand (A-2-4), with trace roots, wood fragments and gravel, and silty, fine to coarse sandy, gravel (A-1-b/A-1-a). The unit ranges from 1.5 to 4.2 feet thick. The elevation of the base of the unit ranges from 3113.9 to 3109.7 feet MSL. Alluvium was not encountered in borings EB1-A and B1-B for the primary structure, and is the surface unit in borings completed for the detour structure.

3.1.3 Residual Soil: Sand

The Residual Soil: Sand material unit consists of loose to very dense, dry to moist, micaceous, clayey, silty, fine to coarse sand (A-2-4/A-2-7) with relict rock fabric and trace biotite Gneiss rock fragments. The unit was only encountered in borings EB1-A, B1-B, B2-B, B2-B OS, EB2-A, and EB2-B. The thickness of the unit, where encountered, ranges from 1.0 to 4.5 feet, and the elevation of the base of the unit ranges from 3113.3 to 3108.9 feet MSL.

3.1.4 Weathered Rock: Biotite Gneiss

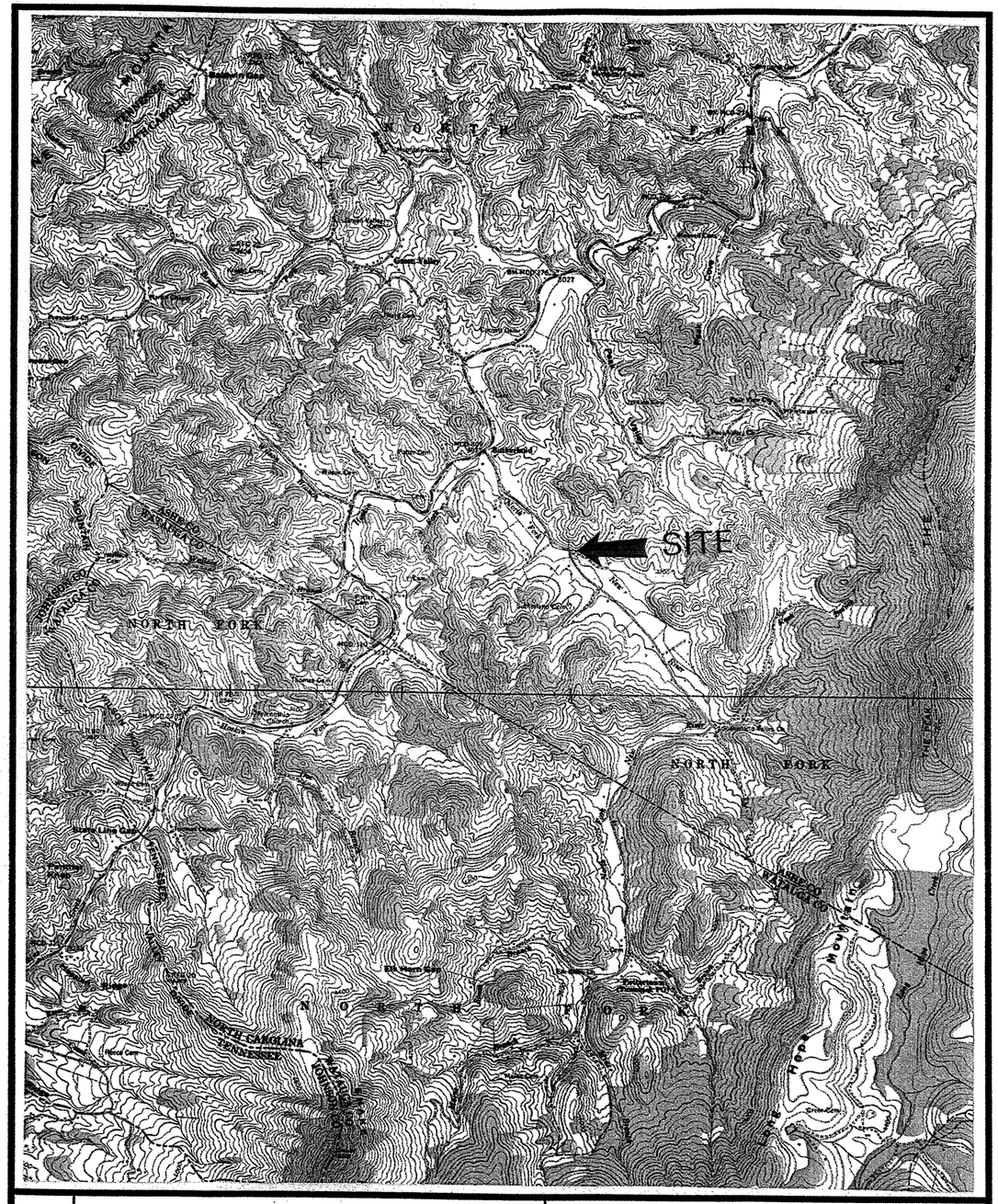
The Weathered Rock: Biotite Gneiss material unit consists of severely weathered, very closely fractured, soft to medium hard, biotite Gneiss. No weathered rock was recovered from the core holes completed at the site. The Weathered Rock: Biotite Gneiss unit ranges in thickness from less than 1.0 to over 5.0 feet thick and the elevation of the base of the unit ranges from 3112.8 ft to 3105.4 feet MSL.

3.1.5 Crystalline Rock: Biotite Gneiss

The Crystalline Rock: Biotite Gneiss material unit consists of an upper section of moderately severe to slightly weathered, very closely to closely fractured, medium hard to hard, biotite Gneiss, and a lower section of slightly weathered to fresh, closely to widely fractured, hard to very hard, biotite Gneiss. Fracture and joint orientations, observed in the recovered core, range from 20° to 90° relative to the core axis, with the most prevalent orientation being 20-30° to core axis. The rock displays a well developed foliation that is also typically inclined at 20-30° to the core axis. Local outcrops in the vicinity of the site display two primary fracture orientations of N45°E, dipping 30° to the south, and N70°E, dipping 45° to the south, and represent a strong and a weak foliation, respectively. Detailed stereographic analyses of fracture/joint orientations could not be performed due to a lack of field measurements, resulting from poor outcrop exposure. All borings performed in the project area were terminated on or in Crystalline Rock: Biotite Gneiss.

4.0 GROUNDWATER

No 24-Hour groundwater levels were recorded at the site due to cave-in upon removal of drill casing at all boring locations. Borings EB1-B and EB2-B were backfilled immediately after drilling because of their location in or near the roadway of SR 1118. Boring DB-2 was backfilled immediately after drilling because of its location in a cow pasture. The cave-in depths noted at the boring locations may reflect the groundwater level at the site. The average cave-in elevation for the borings at the site is approximately 3113.5 ft MSL, which is slightly elevated with respect to the surface water elevation of the North Fork New River which was 3112.8 ft MSL, measured on September 28, 2005.



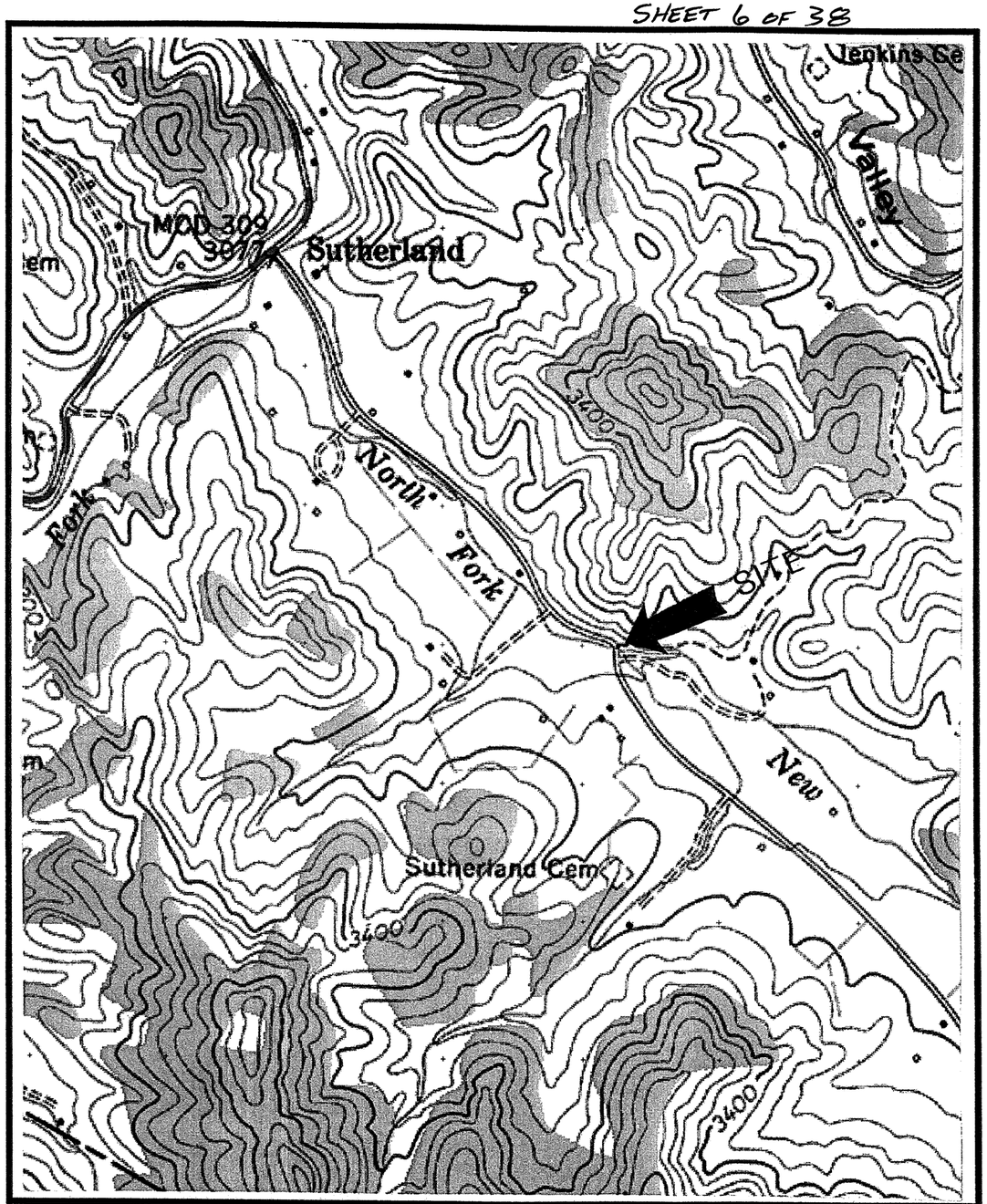
N

SITE LOCATION MAP
Bridge 117 over North Fork New River on SR 1118
N.C. DOT Project No. 33380.1.1 (B-4012)
F.A. No. BRZ-1118(3)
Ashe County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DWG: 1 | DATE: October 2005

REF: USGS QUADS.: Baldwin Gap, NC-TN; Zionville, NC-TN | SCALE: 1"= 4000' | MACTEC JOB NO: 6468-05-1195



N

TOPOGRAPHIC SITE MAP
Bridge 117 over North Fork New River on SR 1118
N.C. DOT Project No. 33380.1.1 (B-4012)
F.A. No. BRZ-1118(3)
Ashe County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DWG: 2 | DATE: October 2005

REF: USGS Quad-Baldwin Gap, NC-Tenn. | SCALE: 1"= 1,000' | MACTEC JOB NO: 6468-05-1195

-T-105 16+33.88 PINC
ELEV=3124.43' NAIL SET

S 89° 23' 44.0" E

WOODS

NORTH FORK NEW RIVER

-BL-4 10+25.67 PINC
-L- STA. 13+85.21
OFF 14.8995'
-T-103 10+22.90 PINC
ELEV=3115.92'
IRON&CAP SET

WOODS

48"WW

SOIL

15+00

N 87° 49' 12.0" E

WOODS

I S F D

WATER TANK

WD RAIL FENCE

APPROX. SEPTIC LINE

GRAVEL

20+00

EB1-A

B1-A

B2-A

EB2-A

-L-

EB1-B

#117

B2-B

EB2-B

S 45° 11' 27" E

S 48° 00' 20.5" E

15+00

B1-B

B2-B OS

5 S B W

S 40° 29' 48.6" E

-DET-

-DET-

48" WW W/1SBW

MTL GATE

SOIL

SPRING

S-2

S-1

WOODS

BST

WOOD

NORTH FORK NEW RIVER

-BL-5 14+35.57 PINC
-L- STA. 17+92.60 OFF
= -13.7755' -T-104
14+32.80
PINC ELEV=3119.86'
IRON&CAP SET

BARN

BM#2
-BL- STA 13+02.21
84.57' RIGHT
ELEV.3114.46'

4SBW

WD FENCE

BST

WD FENCE

SKEW=135°

0 25' 50' 100'

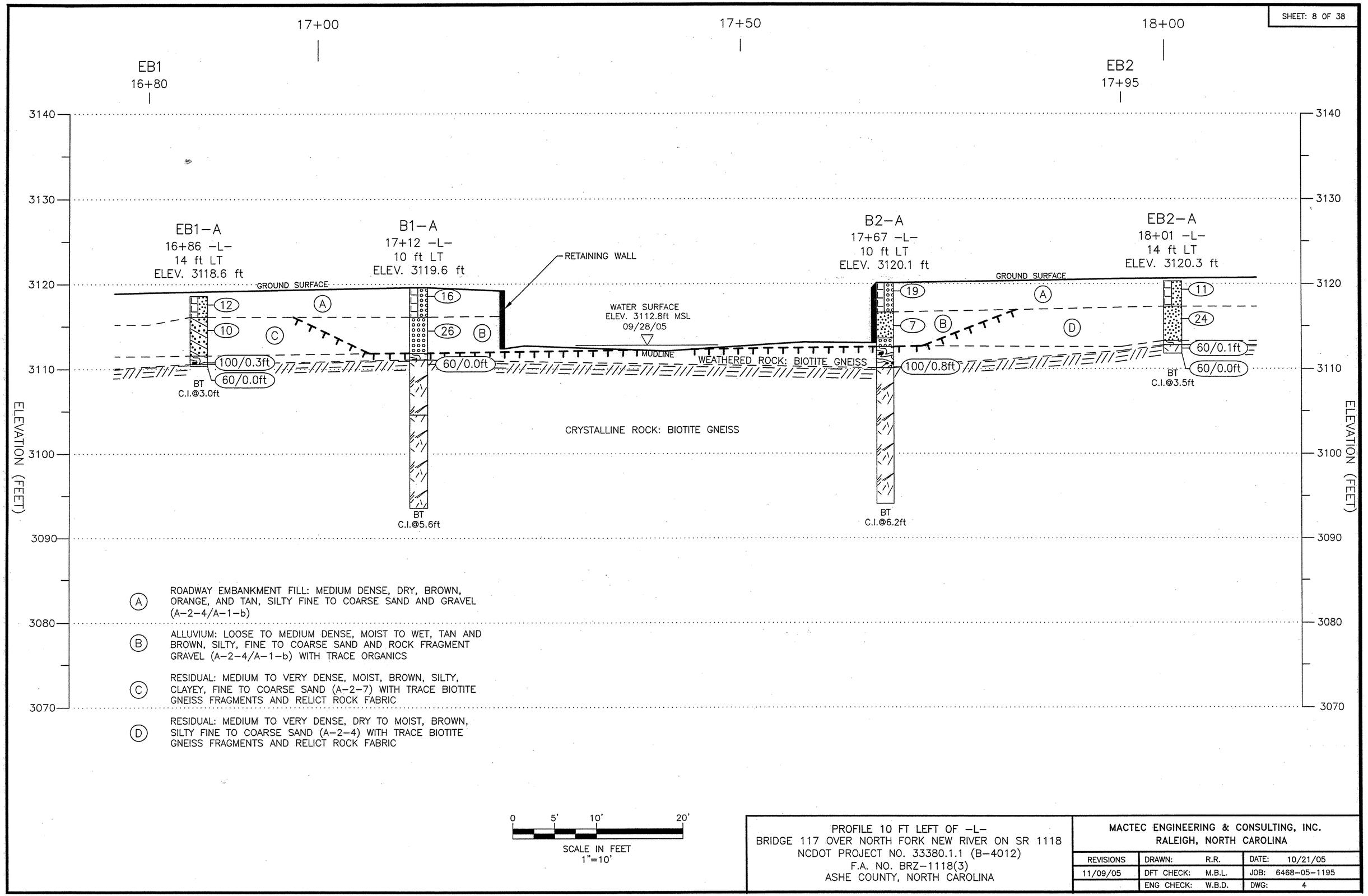
SCALE (FEET)
1" : 50'

NAD 83

BORING LOCATION PLAN
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1(B-4012)
F.A. No. BRZ-1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 10/21/05
11/09/05	DFT CHECK: M.B.L.	JOB : 6468-05-1195
	ENG CHECK: W.B.D.	DWG: 3



(A) ROADWAY EMBANKMENT FILL: MEDIUM DENSE, DRY, BROWN, ORANGE, AND TAN, SILTY FINE TO COARSE SAND AND GRAVEL (A–2–4/A–1–b)

(B) ALLUVIUM: LOOSE TO MEDIUM DENSE, MOIST TO WET, TAN AND BROWN, SILTY, FINE TO COARSE SAND AND ROCK FRAGMENT GRAVEL (A–2–4/A–1–b) WITH TRACE ORGANICS

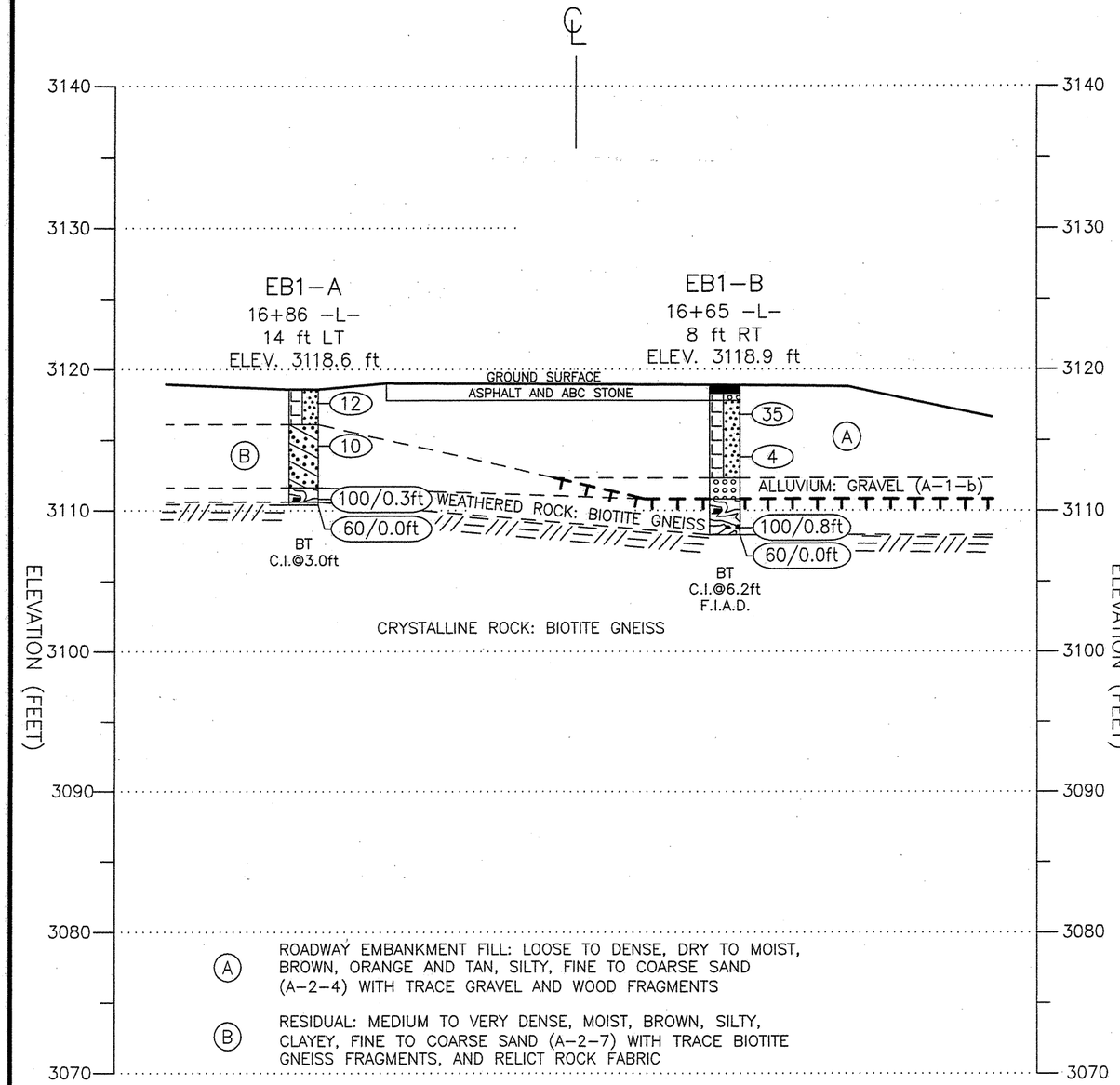
(C) RESIDUAL: MEDIUM TO VERY DENSE, MOIST, BROWN, SILTY, CLAYEY, FINE TO COARSE SAND (A–2–7) WITH TRACE BIOTITE GNEISS FRAGMENTS AND RELICT ROCK FABRIC

(D) RESIDUAL: MEDIUM TO VERY DENSE, DRY TO MOIST, BROWN, SILTY FINE TO COARSE SAND (A–2–4) WITH TRACE BIOTITE GNEISS FRAGMENTS AND RELICT ROCK FABRIC

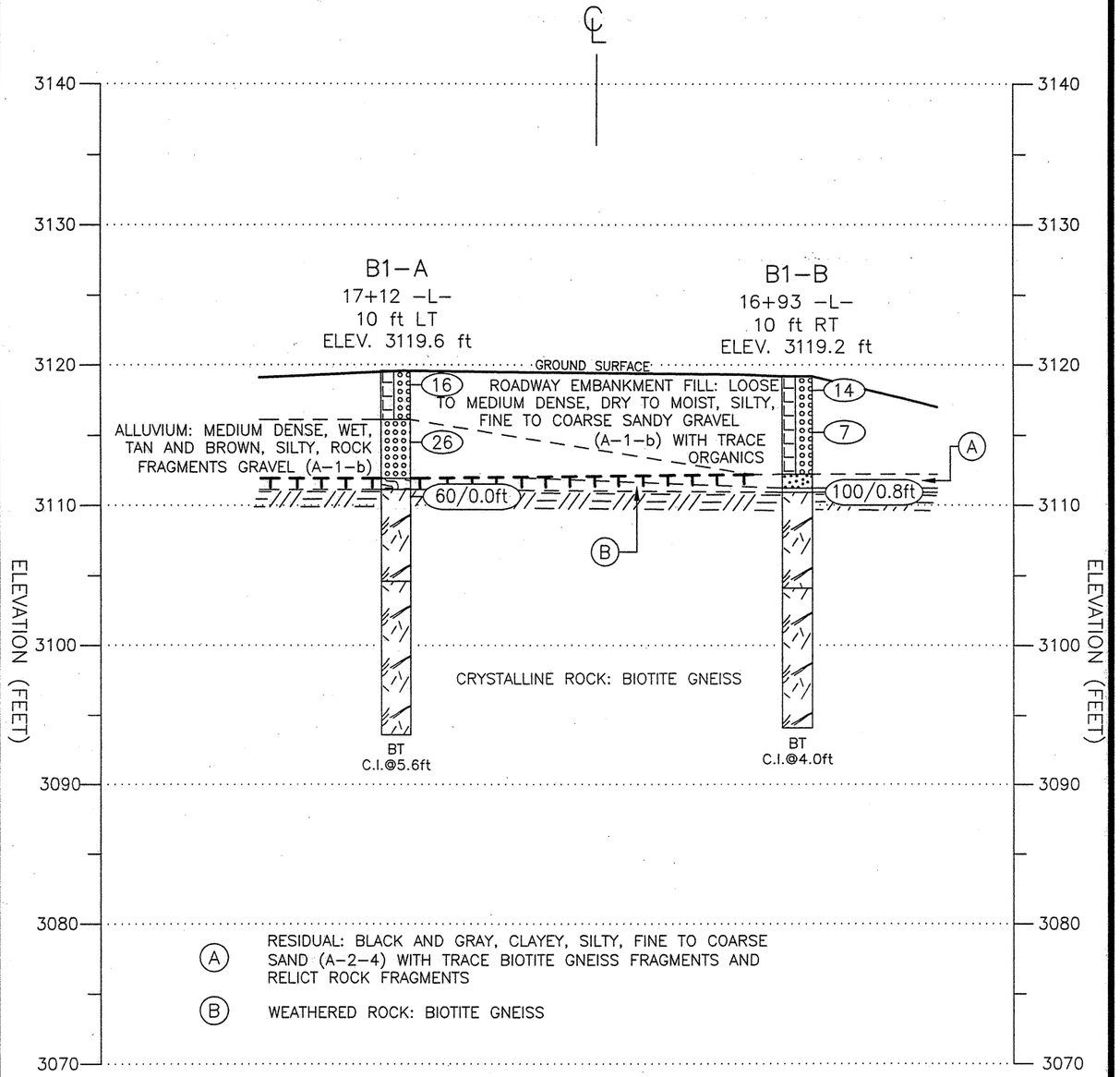
PROFILE 10 FT LEFT OF –L–
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1 (B–4012)
F.A. NO. BRZ–1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

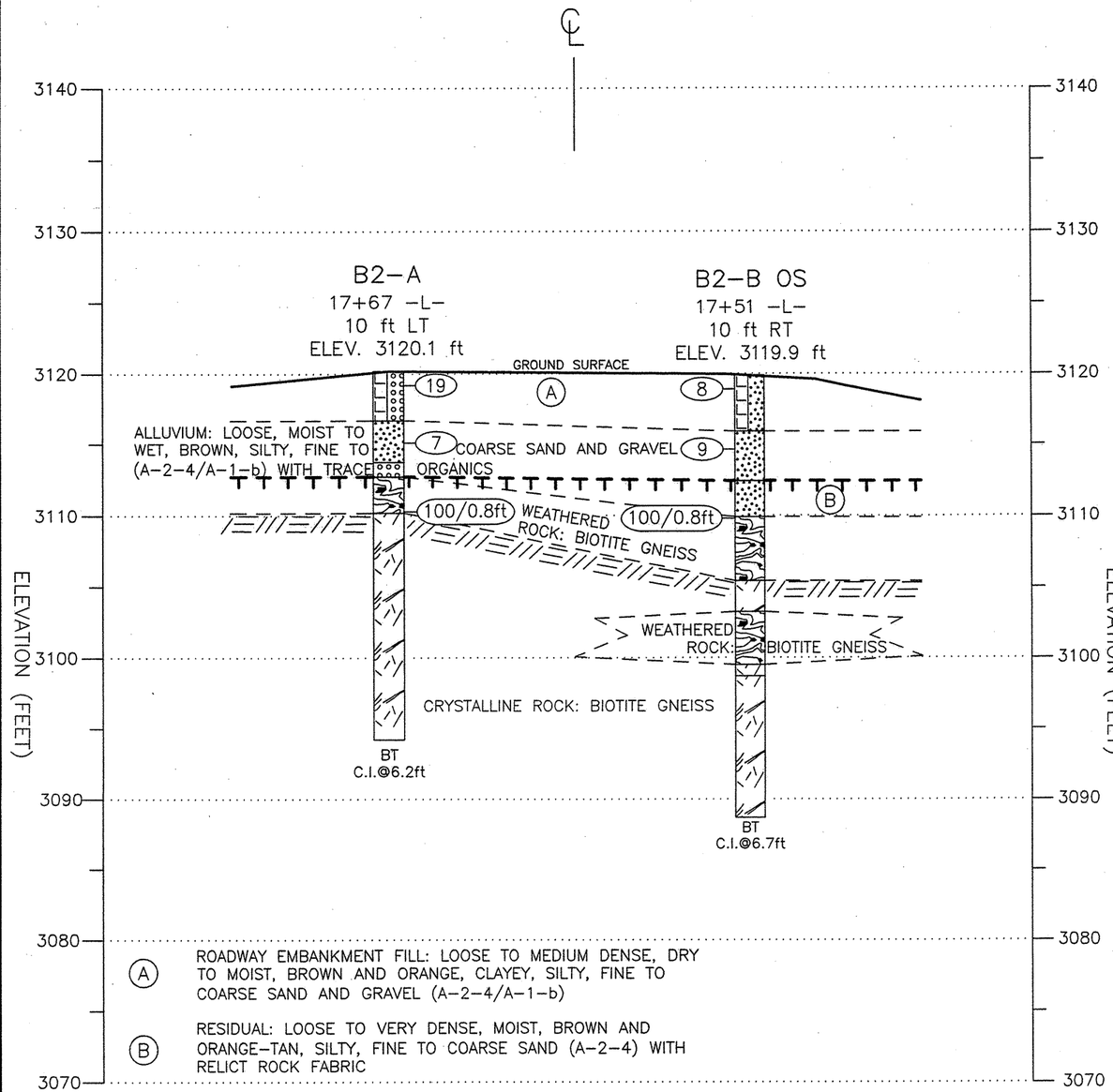
REVISIONS	DRAWN: R.R.	DATE: 10/21/05
11/09/05	DFT CHECK: M.B.L.	JOB: 6468–05–1195
	ENG CHECK: W.B.D.	DWG: 4



CROSS SECTION ALONG END BENT 1 BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118 NCDOT PROJECT NO. 33380.1.1 (B–4012) F.A. NO. BRZ–1118(3) ASHE COUNTY, NORTH CAROLINA	MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA		
	REVISIONS	DRAWN: R.R.	DATE: 10/21/05
		DFT CHECK: M.B.L.	JOB: 6468–05–1195
		ENG CHECK: W.B.D.	DWG: 5



CROSS SECTION ALONG BENT 1 BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118 NCDOT PROJECT NO. 33380.1.1 (B–4012) F.A. NO. BRZ–1118(3) ASHE COUNTY, NORTH CAROLINA	MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA		
	REVISIONS	DRAWN: R.R.	DATE: 10/21/05
	11/09/05	DFT CHECK: M.B.L.	JOB: 6468–05–1195
		ENG CHECK: W.B.D.	DWG: 6



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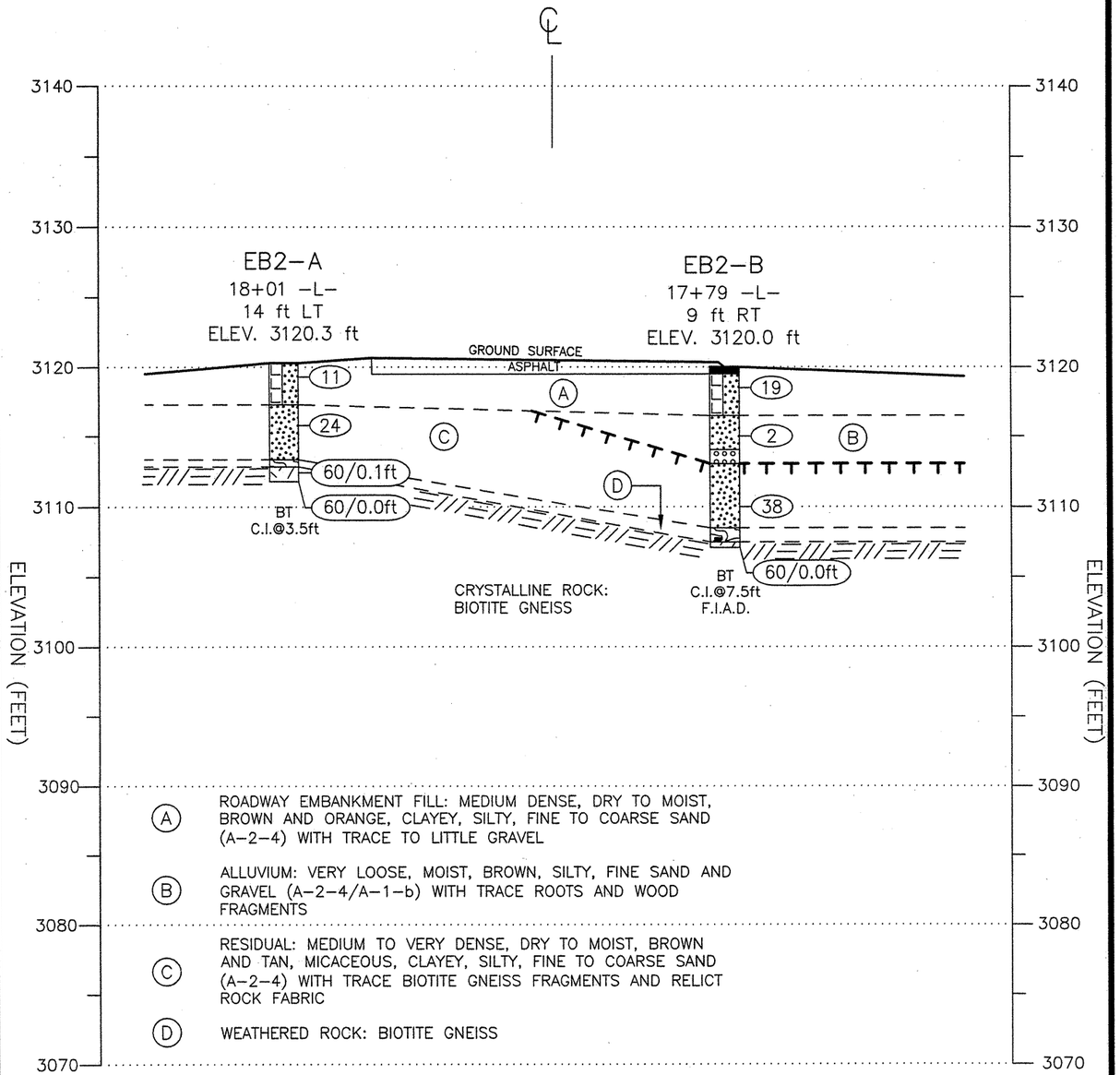
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1 (B–4012)
F.A. NO. BRZ–1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 10/21/05
	DFT CHECK: M.B.L.	JOB: 6468–05–1195
	ENG CHECK: W.B.D.	DWG: 7



CROSS SECTION ALONG END BENT 2
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1 (B–4012)
F.A. NO. BRZ–1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 10/21/05
11/09/05	DFT CHECK: M.B.L.	JOB: 6468–05–1195
	ENG CHECK: W.B.D.	DWG: 8

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

MACTEC

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 16+86	**OFFSET** 14 ft LT	**ALIGNMENT** -L-	**0 HR.** C.I.@3.0
COLLAR ELEV. 3,118.6 ft	**NORTHING** 970,375 **US ft**	**EASTING** 1,209,881 **US ft**		**24 HR.** C.I.@3.0
TOTAL DEPTH 8.2 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/29/05	**COMPLETED** 9/29/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,118.6					Ground Surface				
3,118.6	0.0	4	6	6	12		D		Roadway Embankment Fill: Brown, orange, and tan, silty, f. to cse. SAND (A-2-4) w/ trace gravel
3,115.6	3.0								3,116.1 2.5
		5	4	6	10	SS-3	M		Residual: Brown, silty, clayey, f. to cse. SAND (A-2-7) w/ trace biotite GNEISS rock fragments and relict rock fabric
3,111.1	7.5								3,111.6 7.0
3,110.4	8.2	100/0.3'			100/0.3'				Weathered Rock: Tan and gray, biotite GNEISS 3,110.6 8.0
		60/0.0'			60/0.0'				Crystalline Rock: Hard, biotite GNEISS-roller cone and SPT refusal w/ no penetration 8.2

Boring terminated with roller cone and SPT refusal at 8.2 ft (Elev. 3110.4 ft) in Crystalline Rock: Hard biotite GNEISS

Bits Used: 3" Roller Cone

Drilling Fluid Properties: 8.8 lbs/gal

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG
SHEET 11 OF 38

SHEET 1 OF 1

MACTEC

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 16+65	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@6.2
COLLAR ELEV. 3,118.9 ft	**NORTHING** 970,374 **US ft**	**EASTING** 1,209,852 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 10.5 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/4/05	**COMPLETED** 10/4/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,118.9					Road Surface				
3,118.9	0.0								3,118.9 ASPHALT 0.0
3,117.9	1.0								3,117.9 Roadway Embankment Fill: GRAVEL (A-1-b)-Not Sampled 1.0
		5	24	11	35		M		Roadway Embankment Fill: Brown and orange, silty, f. SAND (A-2-4) w/ trace rock fragment
3,114.9	4.0								
		4	2	2	4		M		3,112.4 gravel and wood fragments 6.5
3,109.9	9.0								3,110.9 Alluvium: GRAVEL (A-1-b)-Not sampled, indicated by drilling 8.0
3,108.4	10.5	46	25	75/0.3'	100/0.3'				3,108.4 Weathered Rock: Brown and gray, biotite GNEISS 10.5
		60/0.0'			60/0.0'				

Boring terminated with roller cone and SPT refusal at 10.5 ft (Elev. 3108.4 ft) on Crystalline Rock: Hard biotite GNEISS

Bits Used: 3" Roller Cone w/ Casing Advancer

Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

MACTEC

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B1-A	**BORING LOCATION** 17+12	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** C.l.@5.6
COLLAR ELEV. 3,119.6 ft	**NORTHING** 970,354 **US ft**	**EASTING** 1,209,898 **US ft**		**24 HR.** C.l.@5.6
TOTAL DEPTH 26.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/5/05	**COMPLETED** 10/6/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,119.6					Ground Surface				3,119.6 0.0
3,119.6	0.0	5	9	7	16		D		Roadway Embankment Fill: Brown, silty, f. to cse. sandy GRAVEL (A-1-b)
3,115.5	4.1	5	11	15	26		W		3,116.1 3.5 Alluvium: Tan and brown, silty, rock fragment GRAVEL (A-1-b)
									3,111.9 7.7
3,110.6	9.0	60/0.0'			60/0.0'				3,111.1 8.5 Weathered Rock: Biotite GNEISS-Not sampled, strata indicated by drilling change / Crystalline Rock: Gray and green with orange Fe stain, mod. to sli. weathered, v. closely to closely fractured, mod. hard to hard, biotite GNEISS
									3,104.6 15.0
						RS-1			Crystalline Rock: Gray and black, v. sli. weathered to fresh, mod. closely to widely fractured, hard to v. hard, biotite GNEISS RS-1: Sampled from 24.1-24.6 ft
									3,093.6 26.0
									Boring and coring terminated at 26.0 ft (Elev. 3093.6 ft) in Crystalline Rock: V. hard, biotite GNEISS Bits Used: 3" Roller Cone w/ Casing Advancer; NQ Series 6 Core Bit Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT
SHEET 12 OF 38

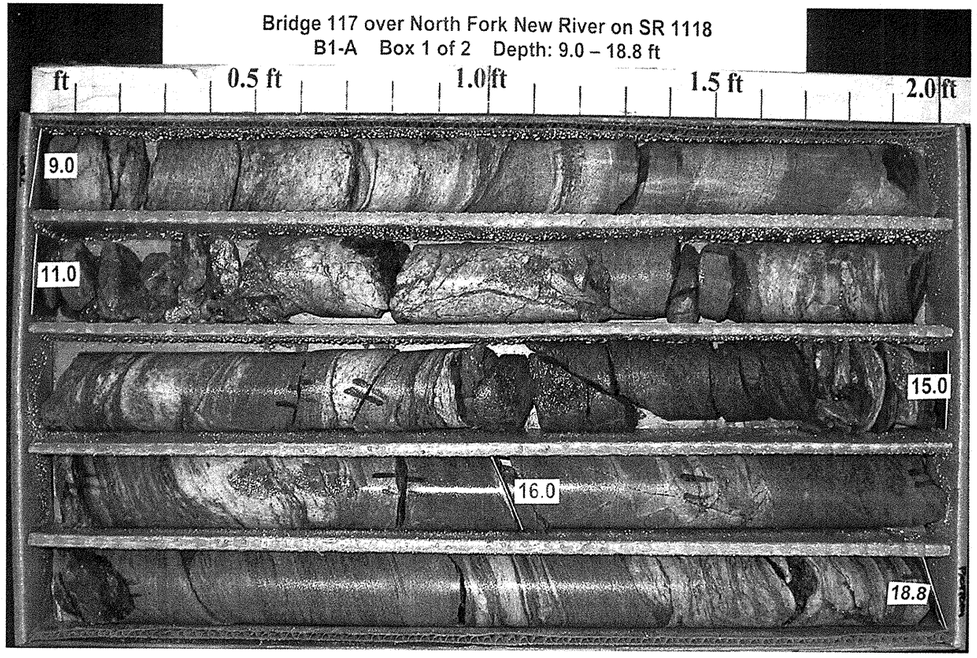
MACTEC

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B1-A	**BORING LOCATION** 17+12	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** C.l.@5.6
COLLAR ELEV. 3,119.6 ft	**NORTHING** 970,354 **US ft**	**EASTING** 1,209,898 **US ft**		**24 HR.** C.l.@5.6
TOTAL DEPTH 26.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/5/05	**COMPLETED** 10/6/05	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 17.0 ft	**DRILLER** E. Burkett	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 9.0 ft
3,110.6	9.0	2.0	N=60/0.0'	(2.0)	(1.5)		(6.0)	(3.4)		Crystalline Rock: Gray and green with orange Fe stain, mod. to sli. weathered, v. closely to closely fractured, mod. hard to hard, biotite GNEISS *(continued)* 9.0-11.0 ft: 4 joints at 20-30° w/ trace clay and orange Fe stain; 1 joint at 70° w/ orange Fe stain 11.0-16.0 ft: 7 joints at 20-30° w/ clay; 3 joints at 60-70° w/ clay and orange Fe stain
3,108.6	11.0	5.0	4:06 4:20 3:56 4:34 3:59 3:01 4:43	100% (5.0) 100%	75% (2.9) 58%		100%	57%		
3,104.6										15.0
3,103.6	16.0	5.0	4:31 4:19 4:46 5:12 6:28	(5.0) 100%	(5.0) 100%		(11.0) 100%	(11.0) 100%		Crystalline Rock: Gray and black, v. sli. weathered to fresh, mod. closely to widely fractured, hard to v. hard, biotite GNEISS RS-1: Sampled from 24.1-24.6 ft 16.0-21.0 ft: 3 joints at 20-30° 21.0-26.0 ft: 4 joints at 20-30°
3,098.6	21.0	5.0	4:46 5:15 5:23 4:45	(5.0) 100%	(5.0) 100%					
3,093.6	26.0		5:26			RS-1				3,093.6 26.0 Coring terminated at 26.0 ft (Elev. 3093.6 ft) in Crystalline Rock: V. hard, biotite GNEISS

NCDOT CORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05


Bridge 117 over North Fork New River on SR 1118
B1-A Box 1 of 2 Depth: 9.0 – 18.8 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
9.0
11.0
15.0
16.0
18.8


Bridge 117 over North Fork New River on SR 1118
B1-A Box 2 of 2 Depth: 18.8 – 26.0 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
18.8
21.0
SPACER
SPACER
26.0
SPACER

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

MACTEC

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B1-B	**BORING LOCATION** 16+93	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@4.0
COLLAR ELEV. 3,119.2 ft	**NORTHING** 970,353 **US ft**	**EASTING** 1,209,869 **US ft**		**24 HR.** C.I.@4.0
TOTAL DEPTH 25.1 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/27/05	**COMPLETED** 9/27/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,119.2					Ground Surface				
3,119.2	0.0	3	6	8	14		M		Roadway Embankment Fill: Brown and gray, silty, f. to cse. sandy GRAVEL (A-1-b) w/ trace organics
3,116.2	3.0								
		5	2	5	7		M		
3,111.7	7.5								3,112.2 — 7.0
		9	91/0.3'		100/0.8'				3,111.2 — 8.0 — Residual: Black and gray, silty, clayey, f. to cse. SAND (A-2-4) w/ trace biotite GNEISS rock fragments and relict rock fabric
									Weathered Rock: Black-gray, biotite GNEISS
									Crystalline Rock: Black and gray, mod. to sli. weathered, v. closely to closely fractured, mod. hard to hard, biotite GNEISS w/ schistose zones
									3,104.1 — 15.1
									Crystalline Rock: Black and gray, v. sli. weathered to fresh, closely to widely fractured, hard, biotite GNEISS w/ schistose zones
									3,094.1 — 25.1
									Boring and coring terminated at 25.1 ft (Elev. 3094.1 ft) in Crystalline Rock: Hard biotite GNEISS

Bits Used: 3" Roller Cone; NQ Series 2 Core Bit

Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 11/8/05

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT
SHEET 14 OF 38

MACTEC

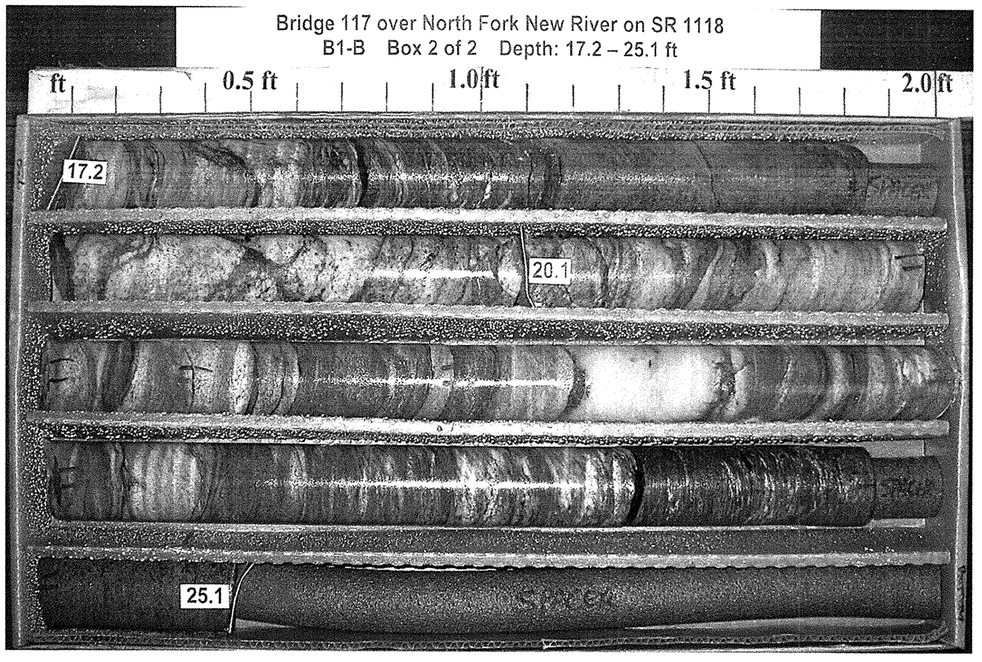
SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B1-B	**BORING LOCATION** 16+93	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@4.0
COLLAR ELEV. 3,119.2 ft	**NORTHING** 970,353 **US ft**	**EASTING** 1,209,869 **US ft**		**24 HR.** C.I.@4.0
TOTAL DEPTH 25.1 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/27/05	**COMPLETED** 9/27/05	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 16.8 ft	**DRILLER** E. Burkett	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 8.3 ft
3,110.9	8.3	1.8	3:36	(1.8)	(0.5)		(6.8)	(4.4)		3,110.9 — 8.3 — Crystalline Rock: Black and gray, mod. to sli. weathered, v. closely to closely fractured, mod. hard to hard, biotite GNEISS w/ schistose zones
3,109.1	10.1		3:44/0.8	100%	28%		100%	65%		8.3-10.1 ft: 7 joints at 20-30° w/ clay and pyrite
		5.0	3:44	(5.0)	(3.9)					10.1-15.1 ft: 12 joints at 20-30° w/ trace clay and pyrite; 1 joint at 80° w/ pyrite
			3:54	100%	78%					
			4:17							
3,104.1	15.1		4:10							3,104.1 — 15.1
			5:44							
		5.0	5:15	(5.0)	(5.0)		(10.0)	(10.0)		Crystalline Rock: Black and gray, v. sli. weathered to fresh, closely to widely fractured, hard, biotite GNEISS w/ schistose zones
			4:27	100%	100%		100%	100%		15.1-20.1 ft: 5 joints at 20-30°
			5:24							
			4:34							
3,099.1	20.1		4:17							20.1-25.1 ft: 2 joints at 20-30°
		5.0	4:17	(5.0)	(5.0)					
			4:18	100%	100%					
			7:09							
			4:29							
3,094.1	25.1		4:33							3,094.1 — 25.1 — Coring terminated at 25.1 ft (Elev. 3094.1 ft) in Crystalline Rock: Hard biotite GNEISS

NCDOT CORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05


Bridge 117 over North Fork New River on SR 1118
B1-B Box 1 of 2 Depth: 8.3 – 17.2 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
8.3
10.1
15.1
17.2


Bridge 117 over North Fork New River on SR 1118
B1-B Box 2 of 2 Depth: 17.2 – 25.1 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
17.2
20.1
25.1

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B2-A	**BORING LOCATION** 17+67	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** C.I.@6.2
COLLAR ELEV. 3,120.1 ft	**NORTHING** 970,315 **US ft**	**EASTING** 1,209,937 **US ft**		**24 HR.** C.I.@6.2
TOTAL DEPTH 26.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic	
DATE STARTED 10/5/05	**COMPLETED** 10/5/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,120.1					Ground Surface				
3,120.1	0.0	7	10	9	19	SS-5	D		Roadway Embankment Fill: Brown, silty, f. to cse. sandy GRAVEL (A-1-b)
3,116.6	3.5								
3,116.0	4.1	2	2	5	7		M		Alluvium: Dark brown, silty, f. to cse. SAND (A-2-4) w/ trace rock fragment gravel and organics
3,113.6	6.5								
3,112.6	7.5								Alluvium: GRAVEL (A-1-b)-Not sampled, strata indicated by drilling
3,111.0	9.1	44	56/0.3'		100/0.8				Weathered Rock: Brown, biotite GNEISS
3,110.1	10.0								Crystalline Rock: Gray and dark green, with orange Fe stain on fractures, sli. weathered to fresh, closely to mod. closely fractured, hard to v. hard, biotite GNEISS
3,094.1	26.0								Boring and coring terminated at 26.0 ft (Elev. 3094.1 ft) in Crystalline Rock: Hard to v. hard, biotite GNEISS

Bits Used: 3" Roller Cone w/ Casing Advancer; NQ Series 6 Core Bit

Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

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N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT
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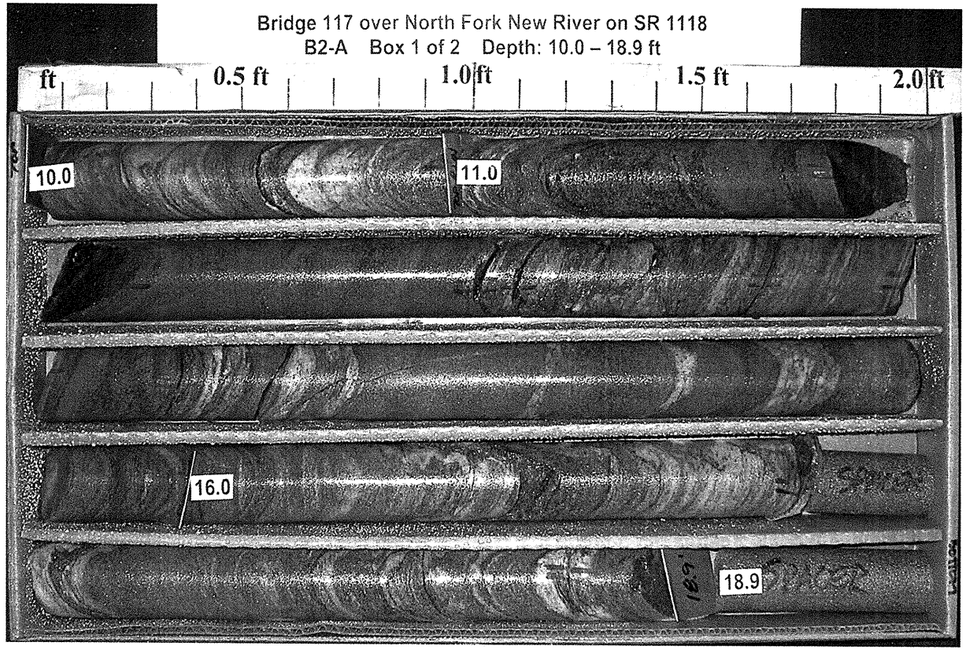
SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B2-A	**BORING LOCATION** 17+67	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** C.I.@6.2
COLLAR ELEV. 3,120.1 ft	**NORTHING** 970,315 **US ft**	**EASTING** 1,209,937 **US ft**		**24 HR.** C.I.@6.2
TOTAL DEPTH 26.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic	
DATE STARTED 10/5/05	**COMPLETED** 10/5/05	**SURFACE WATER DEPTH** N/A		
CORE SIZE NQ	**TOTAL RUN** 16.0 ft	**DRILLER** E. Burkett		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 10.0 ft
3,110.1	10.0	1.0	6:35	(1.0) 100%	(1.0) 100%		(15.8) 99%	(15.8) 99%		3,110.1 Crystalline Rock: Gray and dark green, with orange Fe stain on fractures, sli. weathered to fresh, closely to mod. closely fractured, hard to v. hard, biotite GNEISS 10.0
3,109.1	11.0	5.0	4:30 4:46 4:48 4:37 5:16	(5.0) 100%	(5.0) 100%					10.0-11.0 ft: 2 joints at 30-40° w/ trace pyrite and clay 11.0-16.0 ft: 1 joint at 20-30° w/ trace clay; 2 joints at 30-40° w/ clay and orange-brown Fe stain
3,104.1	16.0	5.0	4:17 3:52 3:33 4:30 4:52	(5.0) 100%	(5.0) 100%					16.0 -21.0 ft: 4 joint at 20-30° w/ trace clay and Fe stain; 2 joints at 70° w/ trace clay
3,099.1	21.0	5.0	4:48 4:09 3:52 2:32 4:00	(4.8) 96%	(4.8) 96%					21.0-26.0 ft: 6 joints at 20-30° w/ trace clay -0.2 ft No recovery in fractures
3,094.1	26.0									3,094.1 Coring terminated at 26.0 ft (Elev. 3094.1 ft) in Crystalline Rock: Hard to v. hard, biotite GNEISS 26.0

NCDOT CORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05


Bridge 117 over North Fork New River on SR 1118
B2-A Box 1 of 2 Depth: 10.0 – 18.9 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
10.0
11.0
16.0
18.9


Bridge 117 over North Fork New River on SR 1118
B2-A Box 2 of 2 Depth: 18.9 – 26.0 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
18.9
21.0
26.0

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

MACTEC

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B2-B	**BORING LOCATION** 17+48	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@7.1
COLLAR ELEV. 3,119.9 ft	**NORTHING** 970,314 **US ft**	**EASTING** 1,209,908 **US ft**		**24 HR.** C.I.@7.1
TOTAL DEPTH 19.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/27/05	**COMPLETED** 9/30/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,119.9					Ground Surface				3,119.9 0.0
3,119.9	0.0	3	4	11	15		M		Roadway Embankment Fill: Brown, silty, f. to cse. sandy GRAVEL (A-1-b)
3,116.3	3.6								
		3	3	4	7		M/W		3,115.9 4.0 Alluvium: Brown, silty, f. to cse. SAND (A-2-4) w/ trace gravel 3,113.9 6.0 Residual: Brown, silty, f. to cse. SAND (A-2-4) w/ relict rock fabric 3,111.7 8.2
3,112.2	7.7								
		39	23	77	100/1.0		M		Weathered Rock: Brown-gray, biotite GNEISS
3,107.2	12.7								
		42	46	54/0.3'	100/0.8				3,105.8 14.1 3,104.3 15.6 Crystalline Rock: Black and gray, and white, mod. to sli. weathered, closely fractured, hard, biotite GNEISS (6 joints at 20-30° w/ clay and orange Fe stain) 3,102.6 17.3 3,100.9 19.0 Weathered Rock: Biotite GNEISS (No Recovery) Crystalline Rock: Black and gray, mod. sev. to mod. weathered, v. closely to closely fractured, med. hard to mod. hard, biotite GNEISS (Many Joints at 20-30° w/ clay) Boring and coring terminated at 19.0 ft (Elev. 3100.9 ft) in Crystalline Rock: Mod. hard biotite GNEISS

Bits Used: 3" Roller Cone; NQ Series 2 Core Bit

Drilling Fluid Properties: Water

Note: Broke two NQ core barrells drilling hole. Offset and drill new hole to required termination criteria.

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT
SHEET 18 OF 38

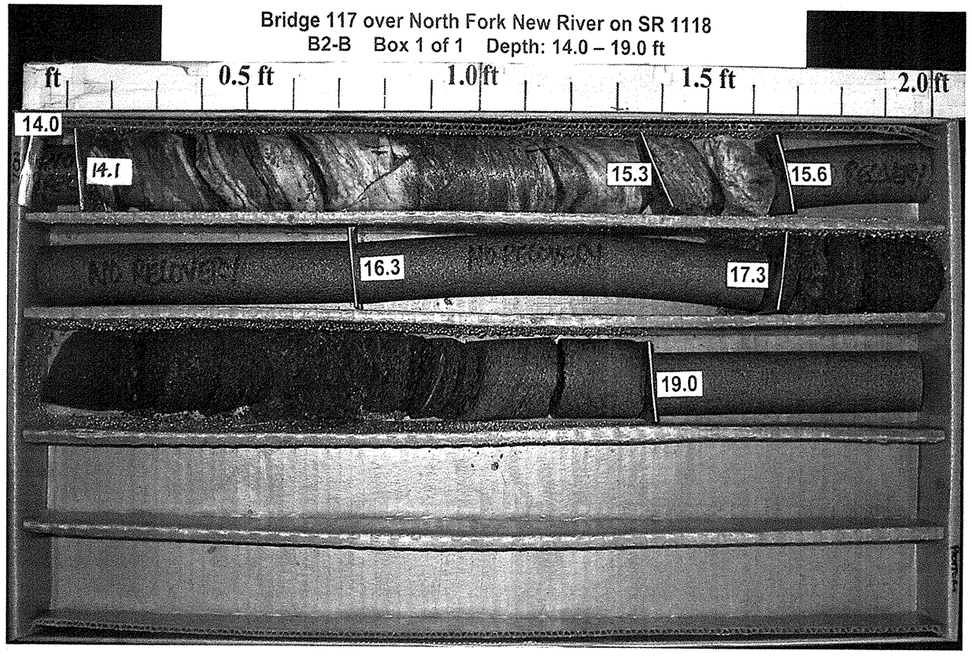
MACTEC

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear	
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118				**GROUND WATER (ft)**
BORING NO. B2-B	**BORING LOCATION** 17+48	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@7.1
COLLAR ELEV. 3,119.9 ft	**NORTHING** 970,314 **US ft**	**EASTING** 1,209,908 **US ft**		**24 HR.** C.I.@7.1
TOTAL DEPTH 19.0 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic	
DATE STARTED 9/27/05	**COMPLETED** 9/30/05	**SURFACE WATER DEPTH** N/A		
CORE SIZE NQ	**TOTAL RUN** 5.0 ft	**DRILLER** E. Burkett		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 14.0 ft
3,105.9	14.0	1.3	3:00	(1.2)	(0.7)		(0.0)	(N/A)		3,105.8 14.1 3,104.3 Weathered Rock: Brown-gray, biotite GNEISS *(continued)* 15.6
3,104.6	15.3	1.0	1:28/0.3	92%	54%		0%	(0.7)		Crystalline Rock: Black and gray, and white, mod. to sli. weathered, closely
3,103.6	16.3	2.7	2:08	(0.3)	(0.0)		(1.5)	47%		3,102.6 fractured, hard, biotite GNEISS (6 joints at 20-30° w/ clay and orange Fe stain) 17.3
			0:37	30%	0%		100%	(N/A)		Weathered Rock: Biotite GNEISS (No Recovery)
3,100.9	19.0		1:06	(1.7)	(0.0)		(0.0)	(0.0)		3,100.9 Crystalline Rock: Black and gray, mod. sev. to mod. weathered, v. closely to 19.0
			13:00/0.7	63%	0%		0%	0%		closely fractured, med. hard to mod. hard, biotite GNEISS (Many Joints at 20-30° w/ clay)
							(1.7)			Coring terminated at 19.0 ft (Elev. 3100.9 ft) in Crystalline Rock: Mod. hard
							100%			biotite GNEISS

NCDOT CORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05


Bridge 117 over North Fork New River on SR 1118
B2-B Box 1 of 1 Depth: 14.0 – 19.0 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
14.0
14.1
15.3
15.6
16.3
17.3
19.0

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B2-B OS	**BORING LOCATION** 17+51	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@6.7
COLLAR ELEV. 3,119.9 ft	**NORTHING** 970,312 **US ft**	**EASTING** 1,209,910 **US ft**		**24 HR.** C.I.@6.7
TOTAL DEPTH 31.2 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/4/05	**COMPLETED** 10/5/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,119.9					Ground Surface				3,119.9 0.0
3,119.9	0.0	2	4	4	8		M		Roadway Embankment Fill: Orange and brown, clayey, silty, f. to cse. SAND (A-2-4) w/ trace rock fragment gravel
3,115.6	4.3								3,115.9 4.0
		4	5	4	9		M/W		Alluvium: Dark brown, silty, f. to cse. SAND (A-2-4) w/ trace to little gravel
3,110.5	9.4								3,112.4 7.5
		19	41	59/0.3'	100/0.8'		M		Residual: Orange-tan, silty, f. to cse. SAND (A-2-4) w/ relict rock fabric
									3,109.9 10.0
									Weathered Rock: Orange-tan, biotite GNEISS
									3,105.4 14.5
									Crystalline Rock: Brown to gray and orange Fe stained, mod. sev. to mod. weathered, v. closely to closely fractured, med. to mod. hard, biotite GNEISS (10 joints at 20-30° w/ clay and orange Fe stain; 2 joints at 90° w/ orange Fe stain)
									3,103.2 16.7
									3,099.5 20.4
									3,098.7 21.2
									Weathered Rock: Biotite GNEISS (No Recovery)
									Crystalline Rock: Gray with orange Fe stain, mod. to sli. weathered, closely fractured, hard, biotite GNEISS (2 joints at 20-30° w/ orange Fe stain)
									Crystalline Rock: Gray, v. sli. weathered to fresh, close to widely fractured, hard to v. hard, biotite GNEISS
						RS-2			3,088.7 31.2
									RS-2: Sampled from 28.3-28.8 ft
									Boring and coring terminated at 31.2 ft (Elev. 3088.7 ft) in Crystalline Rock: Hard to v. hard, biotite GNEISS

Bits Used: 3" Roller Cone w/ Casing Advancer; NQ Series 2 and 6 Core Bits

Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT
SHEET 20 OF 38

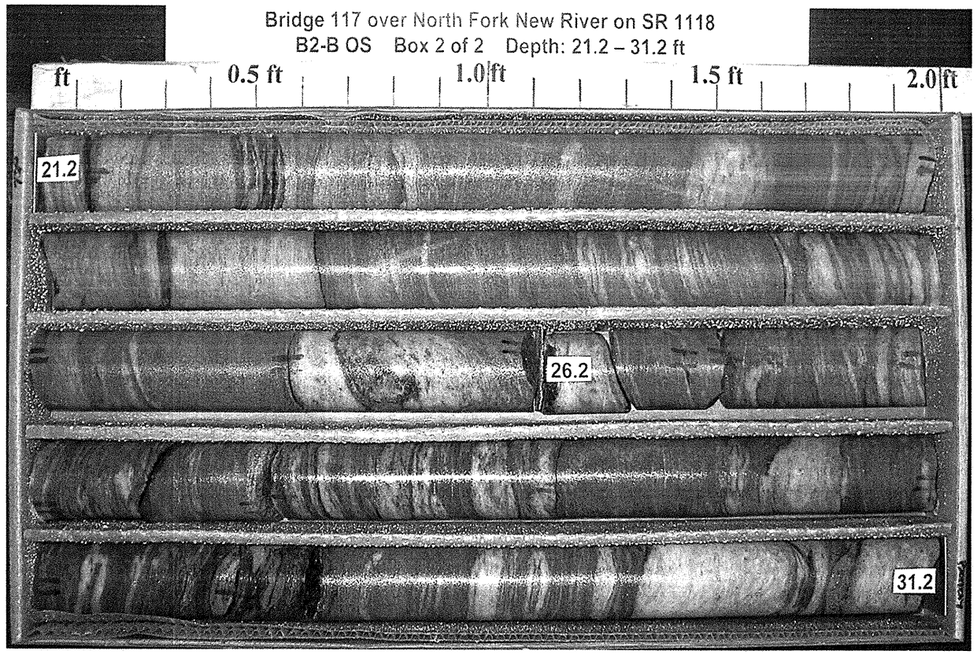
SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. B2-B OS	**BORING LOCATION** 17+51	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** C.I.@6.7
COLLAR ELEV. 3,119.9 ft	**NORTHING** 970,312 **US ft**	**EASTING** 1,209,910 **US ft**		**24 HR.** C.I.@6.7
TOTAL DEPTH 31.2 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash/Core	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/4/05	**COMPLETED** 10/5/05	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 20.0 ft	**DRILLER** E. Burkett	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 11.2 ft
3,108.7	11.2	5.0	1:12 0:50 1:28 1:30 4:54	(1.7) 34%	(0.0) 0%		(0.0) 0%	(N/A)		Weathered Rock: Orange-tan, biotite GNEISS *(continued)*
3,105.4										14.5
3,103.7	16.2						(2.2) 100%	(0.4) 18%		Crystalline Rock: Brown to gray and orange Fe stained, mod. sev. to mod. weathered, v. closely to closely fractured, med. to mod. hard, biotite GNEISS (10 joints at 20-30° w/ clay and orange Fe stain; 2 joints at 90° w/ orange Fe stain)
3,103.2										16.7
3,098.7	21.2	5.0	3:36 1:03 1:31 1:52 4:07	(1.3) 26%	(0.8) 16%		(0.0) 0%	(N/A)		Weathered Rock: Biotite GNEISS (No Recovery)
3,099.5										20.4
3,098.7							(0.8) 100%	(0.4) 50%		Crystalline Rock: Gray with orange Fe stain, mod. to sli. weathered, closely fractured, hard, biotite GNEISS (2 joints at 20-30° w/ orange Fe stain)
3,093.7	26.2	5.0	6:54 10:00 6:27 5:55 4:13	(5.0) 100%	(5.0) 100%		(10.0) 100%	(10.0) 100%		Crystalline Rock: Gray, v. sli. weathered to fresh, close to widely fractured, hard to v. hard, biotite GNEISS
3,088.7	31.2	5.0	4:46 5:36 5:35 5:53 5:45	(5.0) 100%	(5.0) 100%	RS-2				RS-2: Sampled from 28.3-28.8 ft 21.2-26.2 ft: 2 joints at 20-30° 26.2-31.2 ft: 3 joints at 20-30° w/ trace pyrite
3,088.7										31.2
										Coring terminated at 31.2 ft (Elev. 3088.7 ft) in Crystalline Rock: Hard to v. hard, biotite GNEISS

NCDOT CORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05


Bridge 117 over North Fork New River on SR 1118
B2-B OS Box 1 of 2 Depth: 11.2 – 21.2 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
11.2
14.5
16.7
20.4
21.2


Bridge 117 over North Fork New River on SR 1118
B2-B OS Box 2 of 2 Depth: 21.2 – 31.2 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
21.2
26.2
31.2

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 18+01	**OFFSET** 14 ft LT	**ALIGNMENT** -L-	**0 HR.** C.l.@3.5
COLLAR ELEV. 3,120.3 ft	**NORTHING** 970,294 **US ft**	**EASTING** 1,209,963 **US ft**		**24 HR.** C.l.@3.5
TOTAL DEPTH 8.5 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Automatic	
DATE STARTED 9/29/05	**COMPLETED** 9/29/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,120.3					Ground Surface				
3,120.3	0.0	5	5	6	11		D/M		Roadway Embankment Fill: Brown and orange, silty, f. to cse. SAND (A-2-4) w/ trace to little gravel
3,117.3	3.0								
3,116.8	3.5	8	11	13	24	SS-4	D/M		Residual: Brown, silty, f. to cse. SAND (A-2-4) w/ trace biotite GNEISS rock fragments and relict rock fabric
3,113.3	7.0								
3,112.5	7.8								
3,111.8	8.5	60/0.1'			60/0.0'				Weathered Rock: Biotite GNEISS (Not Sampled)
		60/0.0'							Crystalline Rock: Hard Biotite GNEISS-roller cone and SPT refusal w/ no recovery/penetration
									Boring terminated with roller cone and SPT refusal at 8.5 ft (Elev. 3111.8 ft) in Crystalline Rock: Hard biotite GNEISS
									Bits Used: 3" Roller Cone
									Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG
SHEET 22 OF 38

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Primary Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 17+79	**OFFSET** 9 ft RT	**ALIGNMENT** -L-	**0 HR.** C.l.@7.5
COLLAR ELEV. 3,120.4 ft	**NORTHING** 970,293 **US ft**	**EASTING** 1,209,931 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 12.9 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash	**HAMMER TYPE** 140 lb. Automatic	
DATE STARTED 10/4/05	**COMPLETED** 10/4/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,120.4					Ground Surface				
3,119.9	0.5	5	12	7	19	SS-6	D		ASPHALT
3,116.4	4.0								Roadway Embankment Fill: Brown and orange, clayey, silty, f. SAND (A-2-4) w/ trace rock fragment gravel
		1	1	1	2		M		Alluvium: Brown, silty, f. SAND (A-2-4) w/ trace roots, wood fragments and gravel
3,114.4	6.0								
3,113.4	7.0								Alluvium: GRAVEL (A-1-b)-Not sampled, indicated by drilling
3,111.4	9.0	8	11	27	38		M		Residual: Brown and tan, micaceous, clayey, silty, f. SAND (A-2-4) w/ relict rock fabric
3,108.9	11.5								
3,107.5	12.9	60/0.0'			60/0.0'				Weathered Rock: Biotite GNEISS-Not sampled, indicated by drilling
									Crystalline Rock: Biotite GNEISS-roller cone and SPT refusal w/ no penetration
									Boring terminated with roller cone and SPT refusal at 12.9 ft (Elev. 3107.5 ft) in Crystalline Rock: Hard biotite GNEISS
									Bits Used: 3" Roller Cone w/ Casing Advancer
									Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

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MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME AND NUMBER: Bridge 117 over North Fork New River on SR 1118 (6468-05-1195)

PROJECT: 33380.1.1 (B-4012) **COUNTY:** ASHE **OWNER:** N.C.D.O.T.

DATE SAMPLED: October 2005 **RECEIVED:** 10/12/05 **REPORTED BY:** MACTEC

SAMPLED FROM: EB1-A, EB2-A, B2-A, EB2-B, Channel Bed, Channel Bank

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1999 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-3	SS-4	SS-5	SS-6	S-1	S-2
Retained 4.75 mm Sieve	(%)	27.0	29.1	33.3	29.4	72.5	16.3
Passing 2.00 mm Sieve	(%)	69.4	64.1	56.9	67.1	20.0	82.1
Passing 425 µm Sieve	(%)	61.2	51.0	44.1	55.4	8.6	71.0
Passing 75 µm Sieve	(%)	32.0	20.9	19.2	31.6	2.0	13.5

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	22.6	32.8	35.0	26.4	69.5	35.0
Fine Sand Ret - 53 µm	(%)	37.8	41.2	36.9	32.9	23.5	52.9
Silt 0.05 - 0.005 mm	(%)	16.4	14.0	16.3	18.2	3.0	6.9
Clay < 0.005 mm	(%)	23.2	12.0	11.8	22.5	4.0	5.2
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	40.6	ND	ND	13.6	ND	ND
Liquid Limit, L.L.		41	26	30	30	29	31
Plasticity Index, P.I.		11	NP	6	6	NP	NP
AASHTO Classification		A-2-7(0)	A-2-4(0)	A-1-b	A-2-4(0)	A-1-a	A-2-4(0)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

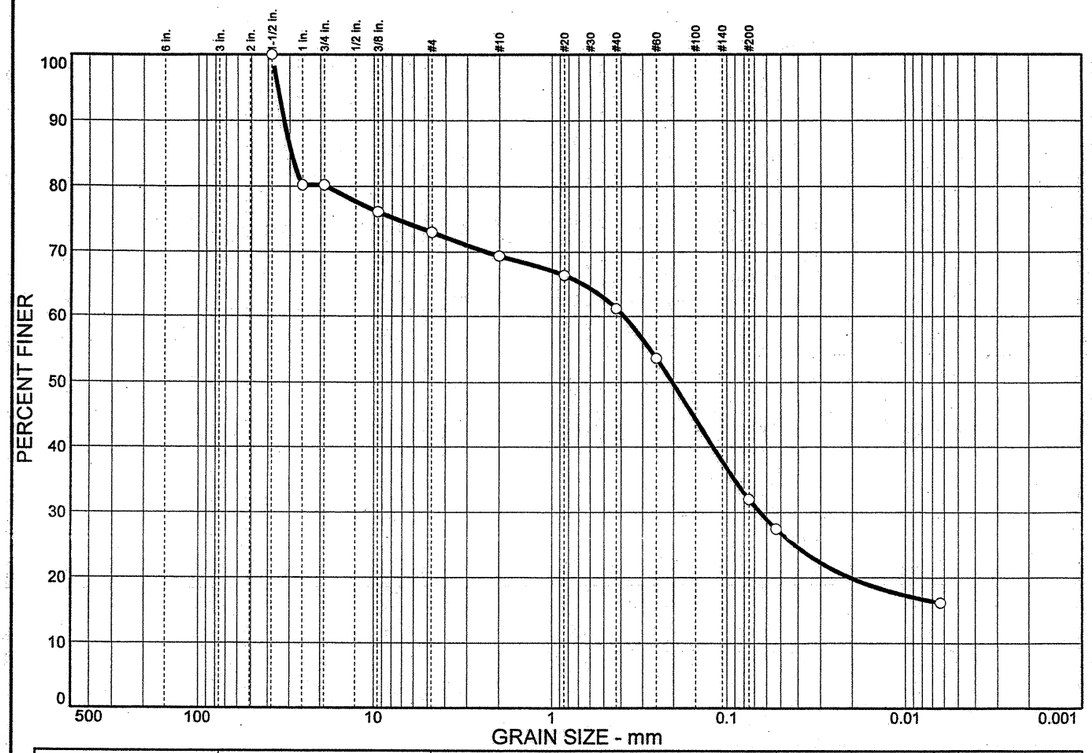
Boring No.		EB1-A	EB2-A	B2-A	EB2-B	Channel Bed	Channel Bank
Station		16+86	18+01	17+67	17+79	16+74	16+35
Offset		14 ft LT	14 ft LT	10 ft LT	9 ft RT	44 ft RT	44 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	3.0	3.5	0.0	0.0	0.0	0.0
	to	4.5	5.0	1.5	1.5	1.0	1.0

REMARKS: ND=Not Determined, NP=Non-Plastic

Submitted by:

Laboratory Manager

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	27.0	45.5	27.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	80.2		
.75 in.	80.2		
.375 in.	76.1		
#4	73.0		
#10	69.4		
#20	66.4		
#40	61.2		
#60	53.7		
#200	32.0		
#270	27.5		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 30 LL= 41 PI= 11

Coefficients

D_{85}= 29.4 D_{60}= 0.384 D_{50}= 0.203
D_{30}= 0.0650 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-2-7(0)

Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-3 **Source of Sample:** **Date:** 10/20/05
Location: EB1-A SS-3 **Elev./Depth:** 3-4.5'

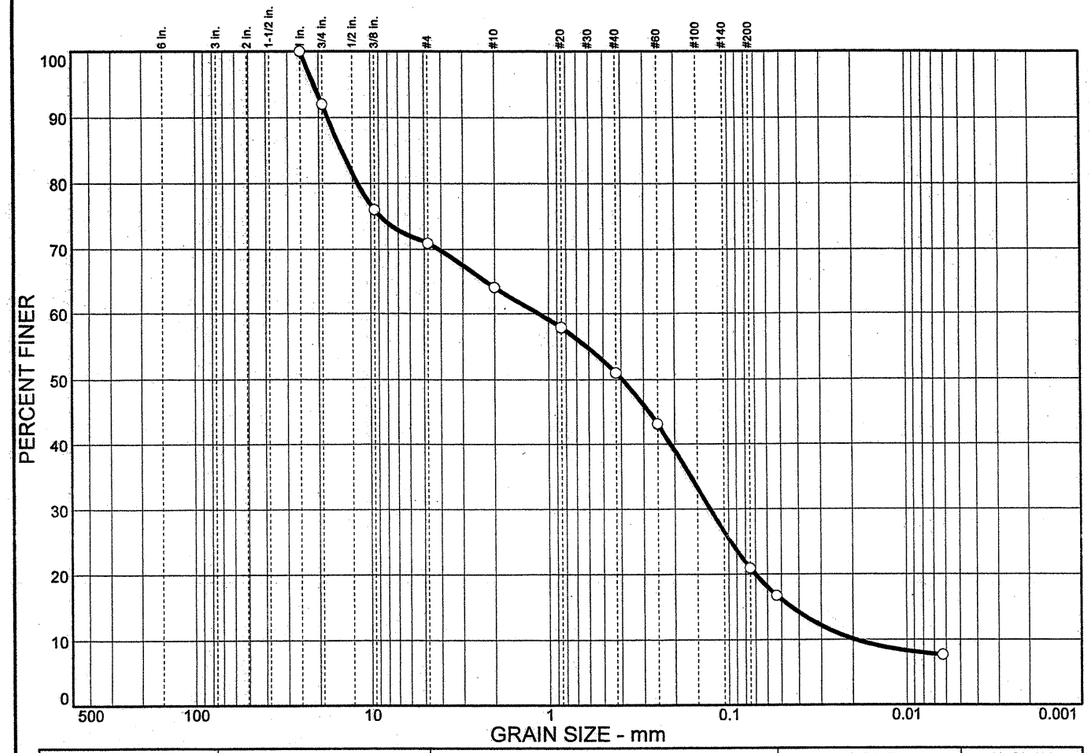
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	29.1	54.2	16.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	92.0		
.375 in.	76.0		
#4	70.9		
#10	64.1		
#20	57.9		
#40	51.0		
#60	43.1		
#200	20.9		
#270	16.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 26 LL= 26 PI= NP

Coefficients

D_{85}= 14.7 D_{60}= 1.13 D_{50}= 0.393
D_{30}= 0.127 D_{15}= 0.0443 D_{10}= 0.0193
C_u= 58.49 C_c= 0.73

Classification

USCS= ND AASHTO= A-2-4(0)

Remarks

ND=NOT DETERMINED, NP=NON-PLASTIC
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-4 **Source of Sample:** **Date:** 10/20/05
Location: EB2-A SS-4 **Elev./Depth:** 3.5-5.0'

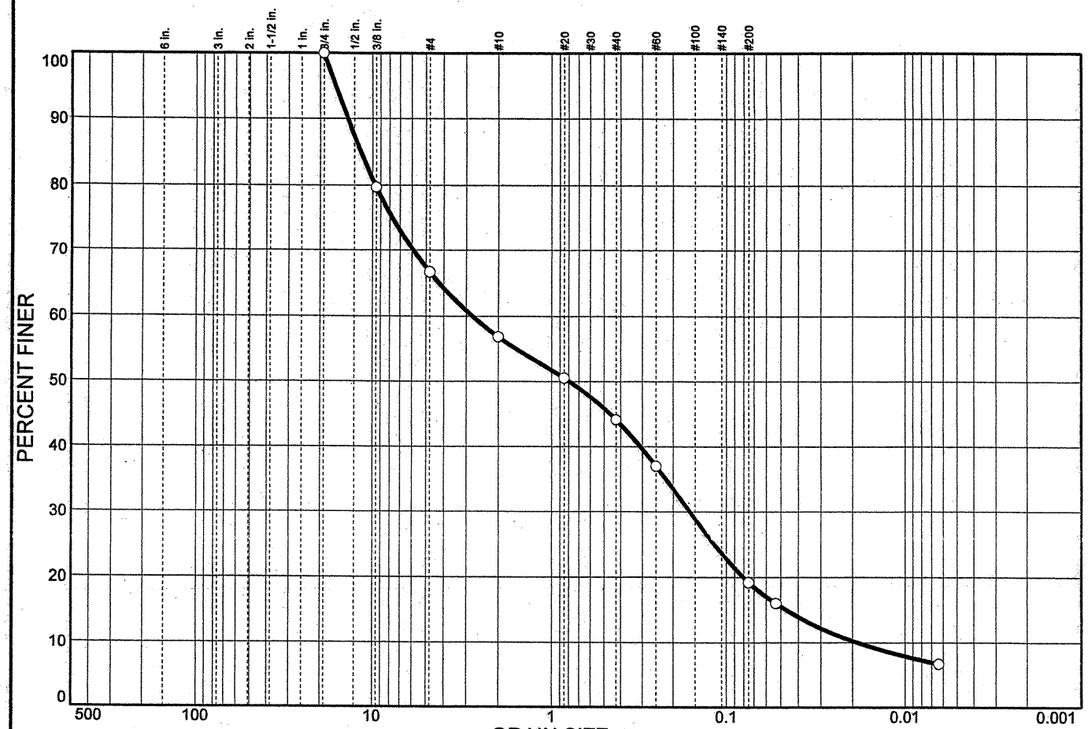
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	33.3	50.7	16.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	79.7		
#4	66.7		
#10	56.9		
#20	50.5		
#40	44.1		
#60	37.0		
#200	19.2		
#270	16.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 24 LL= 30 PI= 6

Coefficients

D_{85}= 11.6 D_{60}= 2.77 D_{50}= 0.796
D_{30}= 0.160 D_{15}= 0.0465 D_{10}= 0.0186
C_u= 148.62 C_c= 0.50

Classification

USCS= ND AASHTO= A-1-b

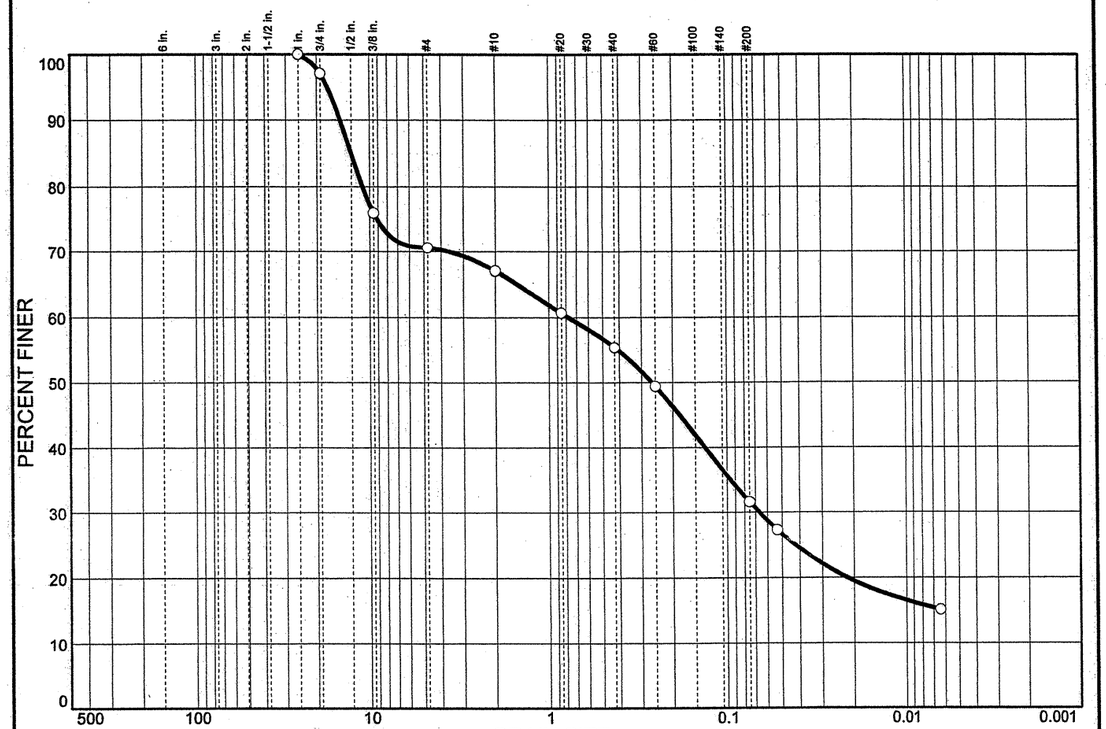
Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-5 **Source of Sample:** **Date:** 10/20/05
Location: B2-A SS-5 **Elev./Depth:** 0-1.5'

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118 **Project No:** 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	29.4	43.3	27.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	97.1		
.375 in.	76.0		
#4	70.6		
#10	67.1		
#20	60.7		
#40	55.4		
#60	49.4		
#200	31.6		
#270	27.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 24 LL= 30 PI= 6

Coefficients

D_{85}= 12.7 D_{60}= 0.772 D_{50}= 0.262
D_{30}= 0.0664 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-2-4(0)

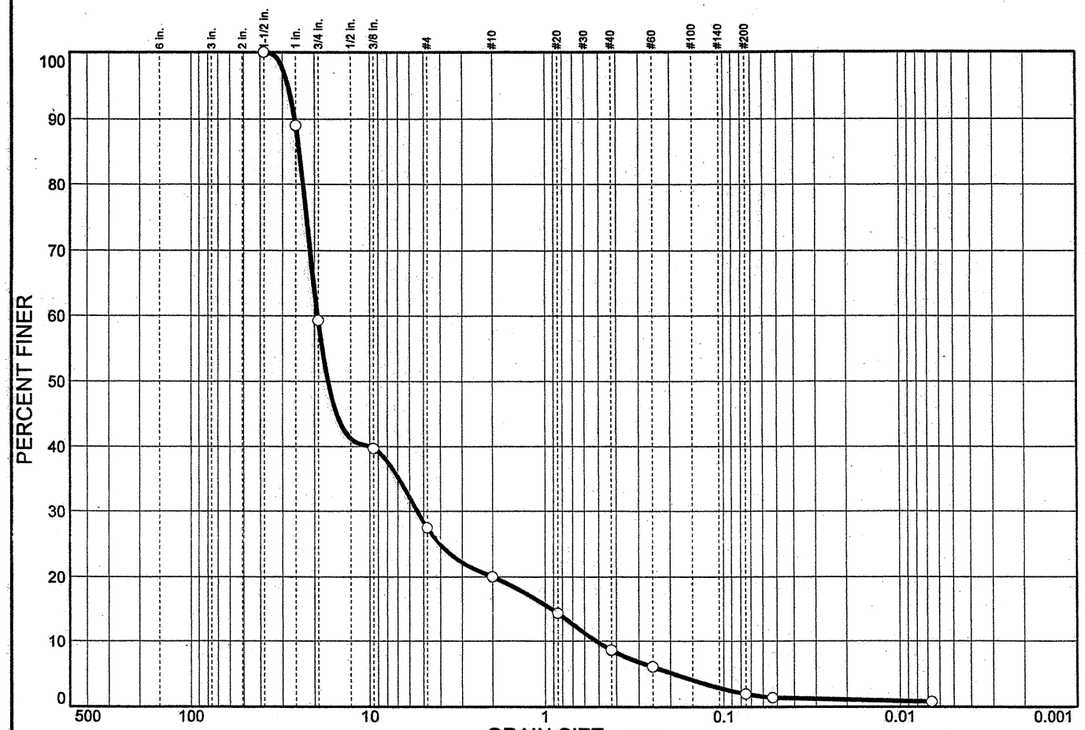
Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-6 **Source of Sample:** **Date:** 10/20/05
Location: EB2-B SS-6 **Elev./Depth:** 0-1.5'

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118 **Project No:** 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	72.5	26.1	1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	89.0		
.75 in.	59.3		
.375 in.	39.7		
#4	27.5		
#10	20.0		
#20	14.3		
#40	8.6		
#60	6.1		
#200	2.0		
#270	1.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 29 PI= NP

Coefficients

D_{85}= 24.3 D_{60}= 19.2 D_{50}= 16.8
D_{30}= 5.42 D_{15}= 0.926 D_{10}= 0.515
C_u= 37.24 C_c= 2.97

Classification

USCS= ND AASHTO= A-1-a

Remarks

ND=NOT DETERMINED, NP=NON-PLASTIC
SPECIFIC GRAVITY IS ASSUMED

Sample No.: S-1 **Source of Sample:** **Date:** 10/20/05
Location: CHANNEL BED S-1 **Elev./Depth:** 0-1.0'

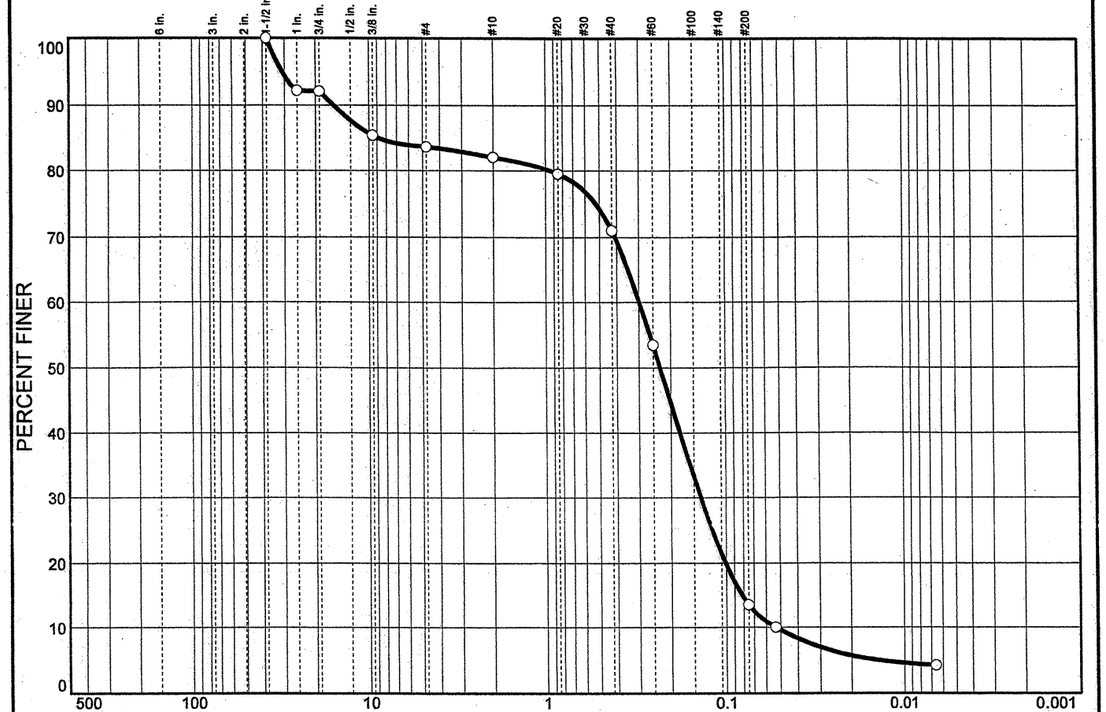
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	16.3	73.7	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.2		
.75 in.	92.1		
.375 in.	85.4		
#4	83.7		
#10	82.1		
#20	79.5		
#40	71.0		
#60	53.4		
#200	13.5		
#270	10.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 31 PI= NP

Coefficients

D_{85}= 8.84 D_{60}= 0.298 D_{50}= 0.229
D_{30}= 0.137 D_{15}= 0.0816 D_{10}= 0.0530
C_u= 5.62 C_c= 1.19

Classification

USCS= ND AASHTO= A-2-4(0)

Remarks

ND=NOT DETERMINED, NP=NON-PLASTIC
SPECIFIC GRAVITY IS ASSUMED

Sample No.: S-2 **Source of Sample:** **Date:** 10/20/05
Location: CHANNEL BANK S-2 **Elev./Depth:** 0-1.0'

MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 33380.1.1 (B-4012)
F.A. NO.: BRZ-1118(3)
COUNTY: ASHE
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Poissons Ratio	Remarks
RS-1	B1-A	24.1-24.6	GNEISS	Blue Ridge Belt	100%	3.78	1.86	168.4	19,350	18.3×10^6	0.137	
RS-2	B2-B OS	28.3-28.8	GNEISS	Blue Ridge Belt	100%	3.72	1.85	169.4	17,640	17.5×10^6	0.129	

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33380.1.1 ID: B-4012 COUNTY: ASHE

DESCRIPTION(1): BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

INFORMATION ON EXISTING BRIDGES Information obtained from: X field inspection
___ microfilm(Reel: ___ Pos: ___)
___ other

COUNTY BRIDGE NO. 117 BRIDGE LENGTH 46 ft NO. BENTS IN: CHANNEL ___ FLOOD PLAIN 2

FOUNDATION TYPE: TIMBER DECK ON STEEL I-BEAMS, TIMBER PILES AND ABUTMENTS

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: Timber abutments out of line, rip-rap placed behind wing walls.

INTERIOR BENTS: N/A

CHANNEL BED: Small scour pockets in channel bed in high flow zones, bedrock exposed.

CHANNEL BANKS: Tree roots exposed and material eroded away.

EXISTING SCOUR PROTECTION:

TYPE(3): Wooden wing walls, large stone/rip-rap.

EXTENT(4): At both end bent abutments.

EFFECTIVENESS(5): Satisfactory, though timber at abutments shows signs of age and weathering.

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Small to large boulders/rock outcrop and downed tree at End Bent One.

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Alluvium: GRAVEL (A-1-b)

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Alluvium: Silty SAND (A-2-4)

CHANNEL BANK COVER(9): Small to large trees and brush, small to large boulders and rock outcrop.

FLOOD PLAIN WIDTH(10): Approximately 200 to 300 ft.

FLOOD PLAIN COVER(11): Small to large trees and brush, grasses, boulders.

DESIGN INFORMATION CONT.

STREAM IS X DEGRADING ___ AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS: River rises quickly during prolonged rain events.

CHANNEL MIGRATION TENDENCY (13): Unlikely, though possible migration tendency to north.

REPORTED BY: Michael E. Lean by WEL with permission DATE: 10/21/2005
MACTEC Engineering and Consulting, Inc.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):

	B1-A	B1-B	B2-A	B2-B
25-yr. GASE	3111.6	3110.5	3112	3111.2

REPORTED BY: _____ DATE: 11-10-05
NCDOT GEOTECHNICAL UNIT

INSTRUCTIONS

(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.

(9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.
(10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
(13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

PROJECT #: 33380.1.1 (B-4012)

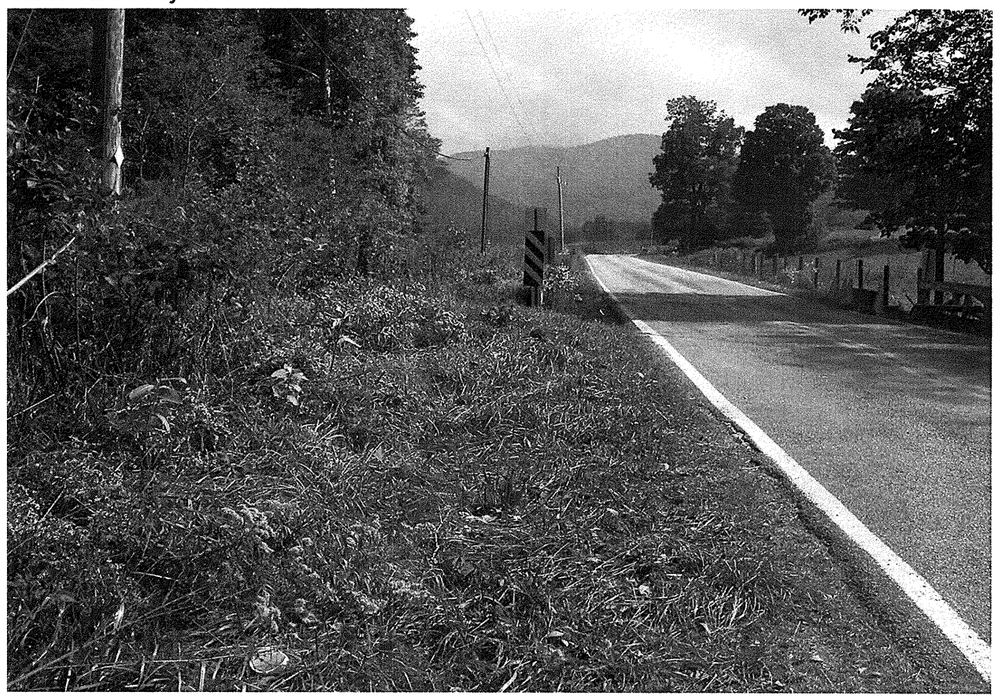
COUNTY: ASHE

DESCRIPTION: Bridge 117 over North Fork New River on SR 1118

	CHANNEL BED MATERIAL			CHANNEL BANK MATERIAL			
SAMPLE #	S-1			S-2			
RETAINED #4	72.5			16.3			
PASSING #10	20.0			82.1			
PASSING #40	8.6			71.0			
PASSING #200	2.0			13.5			
COARSE SAND	69.5			35.0			
FINE SAND	23.5			52.9			
SILT	3.0			6.9			
CLAY	4.0			5.2			
LL	29			31			
PL	NP			NP			
AASHTO CLASSIFICATION	A-1-a			A-2-4(0)			
STATION	16+74			16+35			
OFFSET	44 RT -L-			44 RT -L-			
DEPTH	0-1.0 ft			0-1.0 ft			

Site Photos
MACTEC Proj. No. 6468-05-1195

Bridge 117 over North Fork New River on SR 1118
NCDOT Proj. No. 33380.1.1 (B-4012)



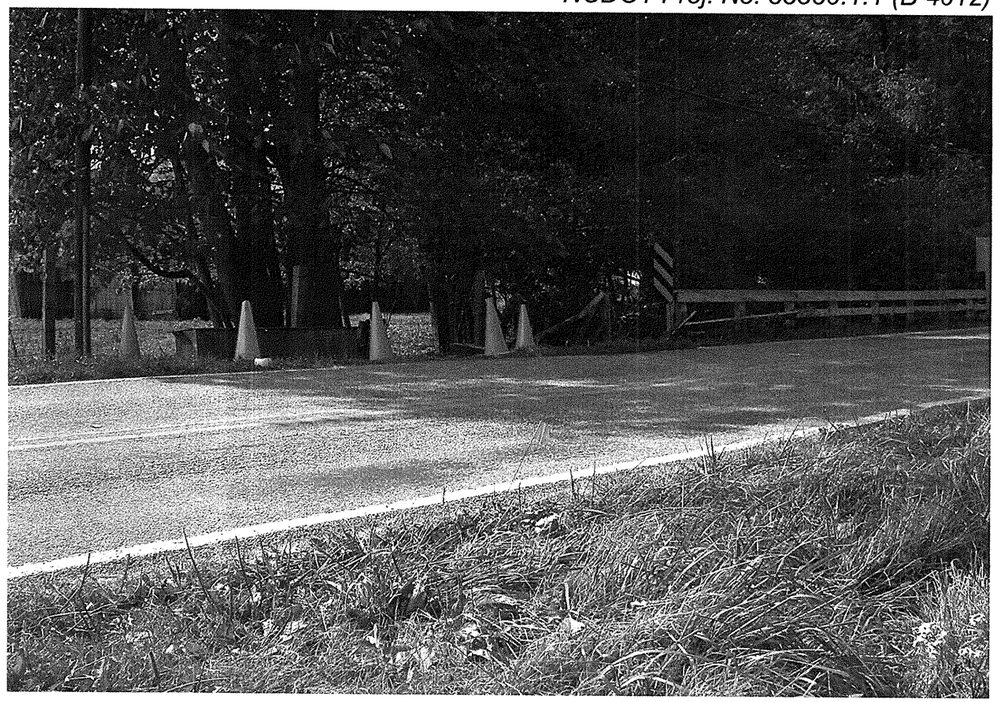
View looking southeast from boring EB1-A towards EB2-A.

View looking southeast from boring EB1-B towards EB2-B.

View looking northwest from boring EB2-A towards EB1-A.

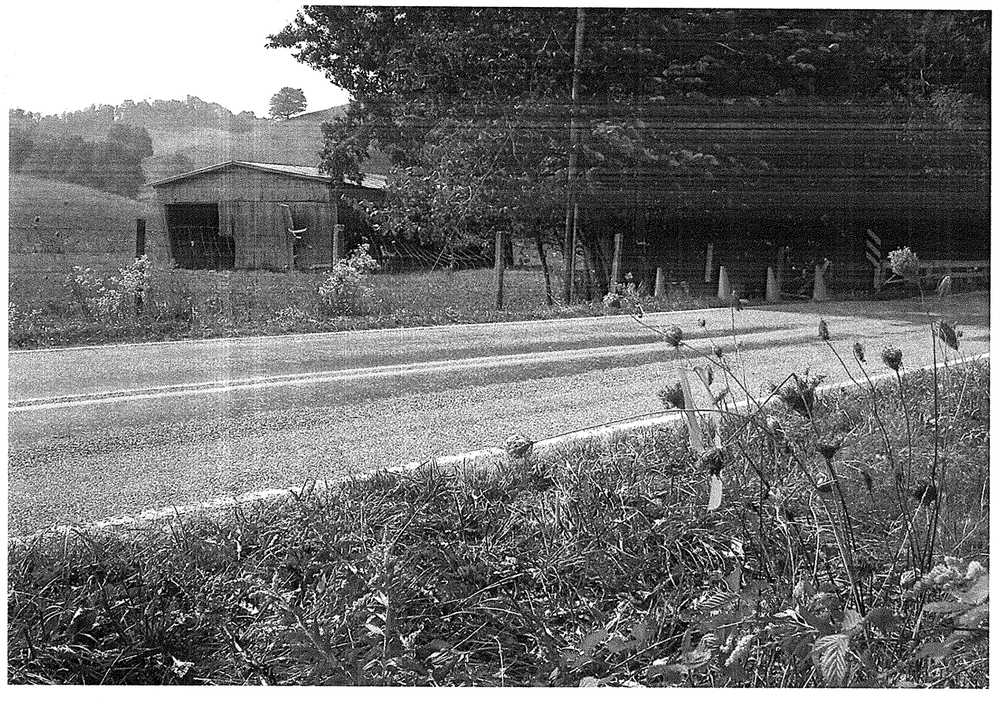
View looking northwest from boring EB2-B towards EB1-B.

View looking west along line of End Bent 1 from boring EB1-A to EB1-B.



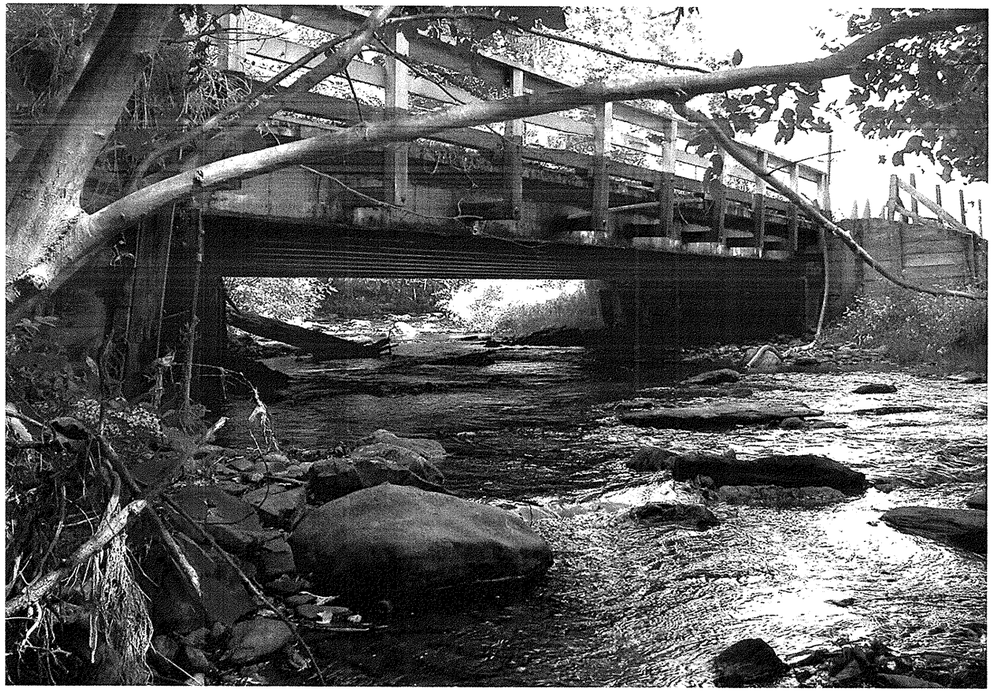
View looking west along line of Bent 2 from boring B2-A to B2-B.

View looking west along line of Bent 1 from boring B1-A to B1-B.



View looking west along line of End Bent 2 from boring EB2-A to EB2-B.

View looking west towards Bridge 117 from south bank of North Fork New River.



View looking east towards Bridge 117 from north bank of North Fork New River.

-T-105 16+33.88 PINC
ELEV=3124.43' NAIL SET

S 85° 23' 44.0" E

WOODS

NORTH FORK NEW RIVER

-BL-4 10+25.67 PINC
-L- STA. 13+85.21
OFF 14.8995'
-T-103 10+22.90 PINC
ELEV=3115.92'
IRON&CAP SET

WOODS

48"WW

SOIL

15+00

N 67° 49' 12.0" E

I S F D

WATER TANK

WB RAIL FENCE

APPROX. SEPTIC LINE

GRAVEL

20+00

20+00

-L-

#117

-L-

S 45° 11' 12.7" E

S 40° 29' 48.6" E

S 48° 00' 20.5" E

15+00

5 S B W

-DET-

DB1

S-2

S-1

DB2

-DET-

48" WW W/1SBW

MTL GATE

SOIL

WOODS

BST

WOOD

NORTH FORK NEW RIVER

-BL-5 14+35.57 PINC
-L- STA. 17+92.60 OFF
= -13.7755' -T-104
14+32.80
PINC ELEV=3119.86'
IRON&CAP SET

4SBW

WOODS

BM#2
-BL- STA 13+02.21
84.57' RIGHT
ELEV.3114.46'

BARN

WD FENCE

BST

WD FENCE

SKEW=135°

0 25' 50' 100'

SCALE (FEET)
1" : 50'

NAD 83

DETOUR BORING LOCATION PLAN
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1(B-4012)
F.A. No. BRZ-1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 10/21/05
11/09/05	DFT CHECK: M.B.L.	JOB : 6468-05-1195
	ENG CHECK: W.B.D.	DWG: 9

15+50 | 16+00 | 16+50 | 17+00 | 17+50 | 18+00

ELEVATION (FEET)

3130 | 3120 | 3110 | 3100 | 3090 | 3080 | 3070 | 3060

DB–1
16+12 –DET–
0 ft CL
ELEV. 3113.2 ft

GROUND SURFACE

6 ALLUVIUM: LOOSE, MOIST TO WET, BROWN AND GRAY, SILTY, FINE TO COARSE, SAND AND GRAVEL (A–2–4/A–1–b)

100/0.8ft

60/0.0ft

BT
C.I.@2.5ft

WEATHERED ROCK: BIOTITE GNEISS

WATER SURFACE
ELEV. 3111.5ft MSL
10/03/05

MUDLINE

DB–2
17+52 –DET–
5 ft RT
ELEV. 3115.6 ft

GROUND SURFACE

4

100/0.5ft

60/0.0ft

BT
F.I.A.D.

CRYSTALLINE ROCK: BIOTITE GNEISS

0 10' 20' 40'
SCALE IN FEET
1"=20'

PROFILE ALONG –DET–
BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118
NCDOT PROJECT NO. 33380.1.1 (B–4012)
F.A. NO. BRZ–1118(3)
ASHE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 10/21/05
11/09/05	DFT CHECK: M.B.L.	JOB: 6468–05–1195
	ENG CHECK: W.B.D.	DWG: 10

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Detour Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. DB-1	**BORING LOCATION** 16+12	**OFFSET** 0 ft	**ALIGNMENT** -DET-	**0 HR.** C.I.@2.5
COLLAR ELEV. 3,113.2 ft	**NORTHING** 970,393 **US ft**	**EASTING** 1,209,786 **US ft**	**24 HR.** C.I.@2.5
TOTAL DEPTH 7.4 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 10/6/05	**COMPLETED** 10/6/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,113.2					Ground Surface				3,113.2 0.0
3,113.2	0.0	2	3	3	6	SS-1	M		Alluvium: Brown, silty, f. SAND (A-2-4) w/ trace gravel
									3,110.7 2.5
3,109.1	4.1								3,109.7 Alluvium: GRAVEL (A-1-b)-Not sampled, strata indicated by drilling 3.5
		39	55	45/0.3'	.100/0.8				Weathered Rock: Brown, biotite GNEISS
									3,106.7 6.5
3,105.8	7.4	60/0.0'			60/0.0'				3,105.8 Crystalline Rock: Hard, biotite GNEISS-Roller Cone and SPT refusal w/ no penetration 7.4

Boring terminated with roller cone and SPT refusal at 7.4 ft (Elev. 3105.8 ft) in Crystalline Rock: Hard biotite GNEISS

Bits Used: 3" Roller Cone w/ Casing Advancer

Drilling Fluid Properties: Water

Note: Attempted to obtain shelby tube for EFA analyses at offset location. Unable to push tube due to gravel in alluvial material. Two attempts made with no recovery and damaged tube.

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG
SHEET 35 OF 38

SHEET 1 OF 1

PROJECT NO. 33380.1.1	**ID.** B-4012	**COUNTY** Ashe	**GEOLOGIST** M. Lear
SITE DESCRIPTION Detour Bridge: Bridge 117 over North Fork New River on SR 1118			**GROUND WATER (ft)**
BORING NO. DB-2	**BORING LOCATION** 17+52	**OFFSET** 5 ft RT	**ALIGNMENT** -DET-	**0 HR.** 1.5
COLLAR ELEV. 3,115.6 ft	**NORTHING** 970,291 **US ft**	**EASTING** 1,209,881 **US ft**	**24 HR.** FIAD
TOTAL DEPTH 4.7 ft	**DRILL MACHINE** CME-55 LC	**DRILL METHOD** Rotary Wash	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/28/05	**COMPLETED** 9/28/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
3,115.6					Ground Surface				3,115.6 0.0
3,115.6	0.0	2	2	2	4	SS-2	M/W		Alluvium: Dark brown and gray, silty, f. to cse. SAND (A-2-4) w/ trace gravel and aluminum
3,112.6	3.0								can 3.0
		100/0.5'			.100/0.5				3,111.1 Weathered Rock: Brown-gray, biotite GNEISS 4.5
3,110.9	4.7								3,110.9 Crystalline Rock: Hard, biotite GNEISS-roller cone and SPT refusal w/ no penetration 4.7
		60/0.0'			60/0.0'				

Boring terminated with roller cone and SPT refusal at 4.7 ft (Elev. 3110.9 ft) in Crystalline Rock: Hard biotite GNEISS

Bits Used: 3" Roller Cone

Drilling Fluid Properties: Water

NCDOT BORE SINGLE N. FORK NEW RIVER.GPJ NC_DOT.GDT 10/20/05

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME AND NUMBER: Bridge 117 over North Fork New River on SR 1118 (6468-05-1195)

PROJECT: 33380.1.1 (B-4012) **COUNTY:** ASHE **OWNER:** N.C.D.O.T.

DATE SAMPLED: October 2005 **RECEIVED:** 10/12/05 **REPORTED BY:** MACTEC

SAMPLED FROM: DB-1, DB-2

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1999 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained 4.75 mm Sieve	(%)	4.5	0.6				
Passing 2.00 mm Sieve	(%)	94.7	96.2				
Passing 425 µm Sieve	(%)	86.3	72.7				
Passing 75 µm Sieve	(%)	26.5	15.1				

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	26.2	48.6				
Fine Sand Ret - 53 µm	(%)	51.6	38.8				
Silt 0.05 - 0.005 mm	(%)	11.1	6.1				
Clay < 0.005 mm	(%)	11.1	6.4				
		100.0	100.0				

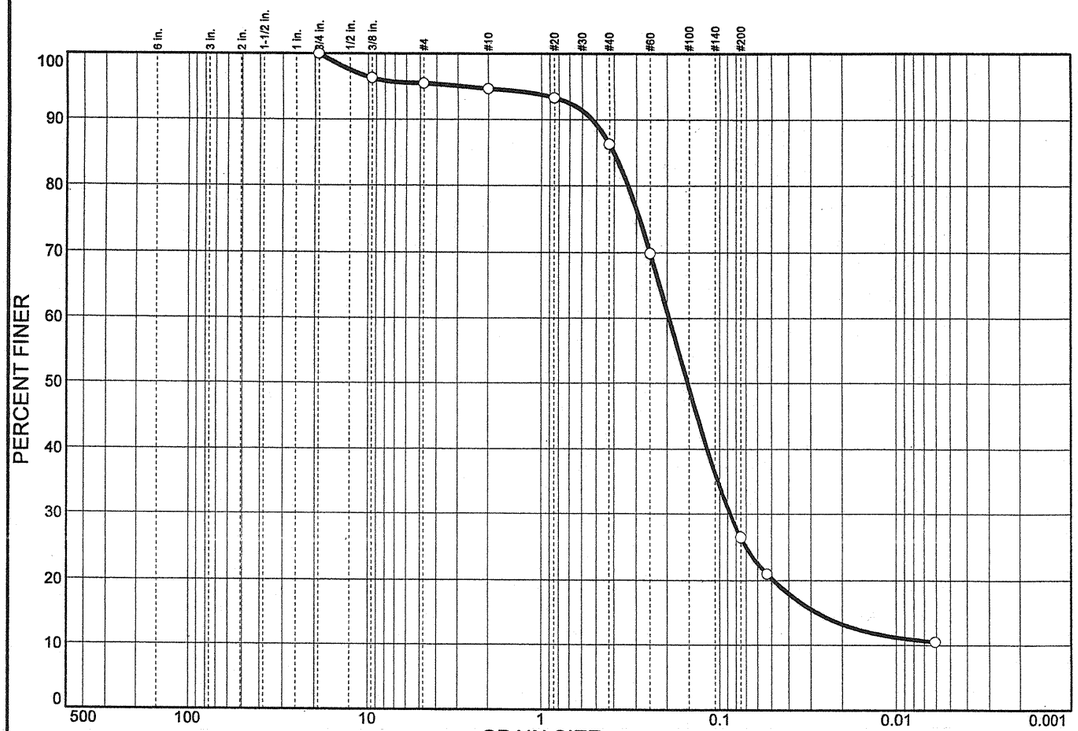
Moisture Content	(%)	12.4	ND				
Liquid Limit, L.L.		29	33				
Plasticity Index, P.I.		NP	NP				
AASHTO Classification		A-2-4(0)	A-2-4(0)				
Organic Content	(%)	ND	ND				

Boring No.		DB-1	DB-2				
Station		16+12	17+52				
Offset		CL	5 ft RT				
Alignment		-DET-	-DET-				
Depth (ft)	From	0.0	0.0				
	to	1.5	1.5				

REMARKS: ND=Not Determined, NP=Non-Plastic

Submitted by: _____
Laboratory Manager

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	4.5	74.5	21.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	96.3		
#4	95.5		
#10	94.7		
#20	93.3		
#40	86.3		
#60	69.9		
#200	26.5		
#270	21.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 29 LL= 29 PI= NP

Coefficients

D_{85}= 0.401 D_{60}= 0.195 D_{50}= 0.152
D_{30}= 0.0865 D_{15}= 0.0275 D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-2-4(0)

Remarks

ND=NOT DETERMINED, NP=NON-PLASTIC
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-1 **Source of Sample:** **Date:** 10/20/05
Location: DB-1 SS-1 **Elev./Depth:** 0-1.5'

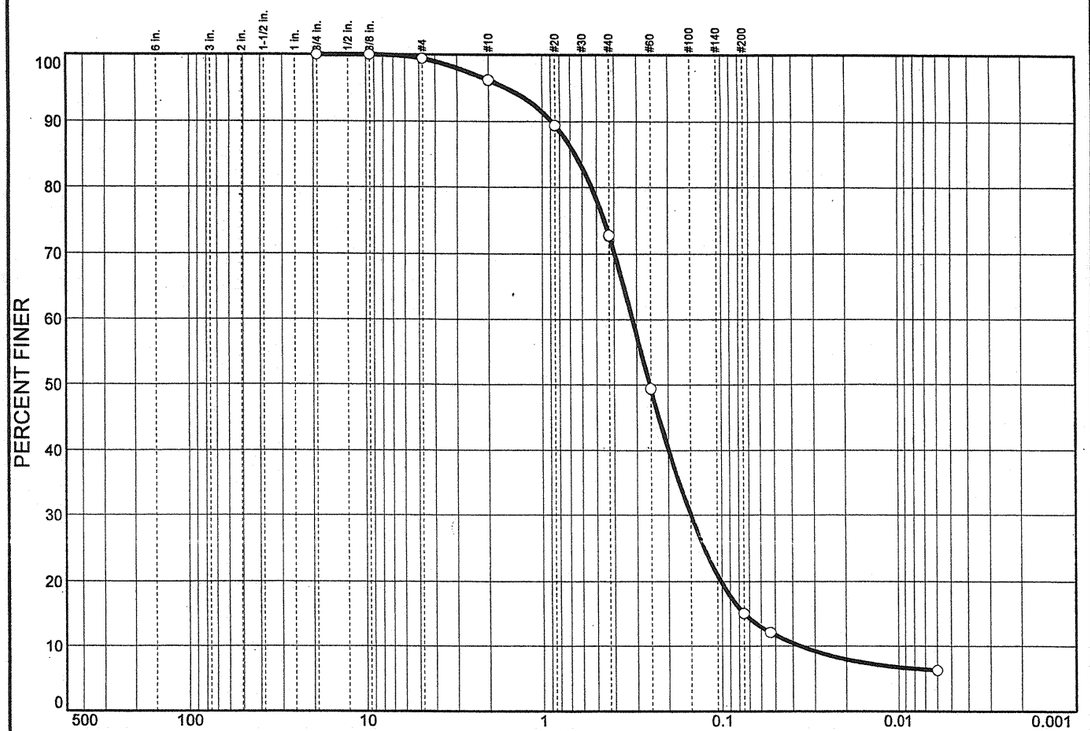
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.6	87.3	12.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	100.0		
#4	99.4		
#10	96.2		
#20	89.4		
#40	72.7		
#60	49.4		
#200	15.1		
#270	12.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 33 PI= NP

Coefficients

D_{85}= 0.656 D_{60}= 0.316 D_{50}= 0.253
D_{30}= 0.149 D_{15}= 0.0744 D_{10}= 0.0362
C_u= 8.73 C_c= 1.95

Classification

USCS= ND AASHTO= A-2-4(0)

Remarks

ND=NOT DETERMINED, NP=NON-PLASTIC
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-2 **Source of Sample:** **Date:** 10/20/05
Location: DB-2 SS-2 **Elev./Depth:** 0-1.5'

MACTEC

ENGINEERING & CONSULTING, INC.

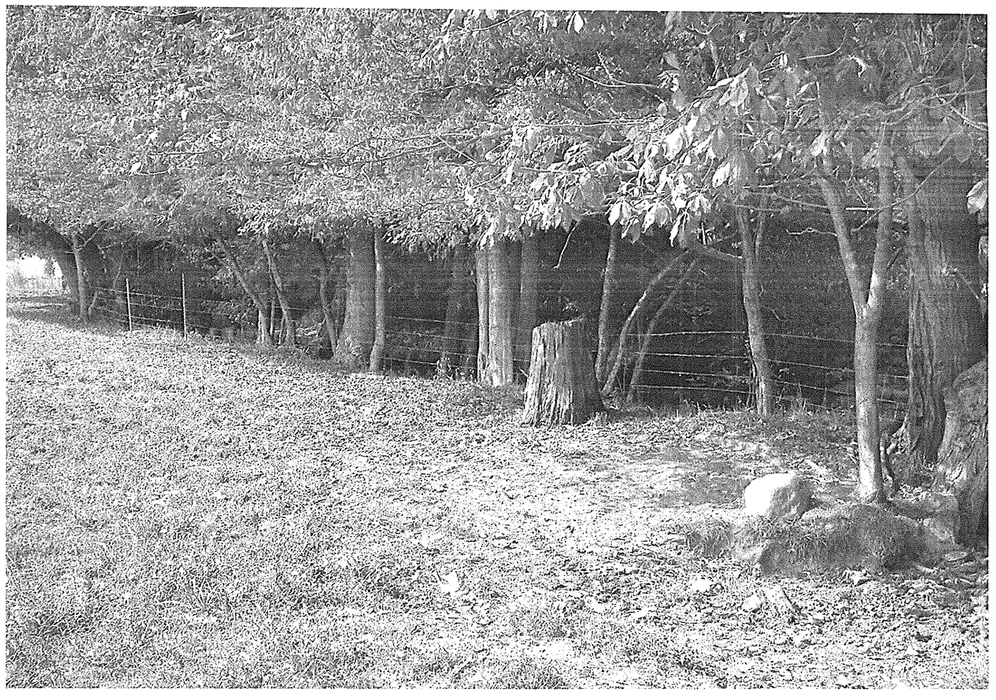
Client: NCDOT
Project: BRIDGE 117 OVER NORTH FORK NEW RIVER ON SR 1118

Project No: 6468-05-1195

Site Photos
MACTEC Proj. No. 6468-05-1195

Bridge 117 over North Fork New River on SR 1118
NCDOT Proj. No. 33380.1.1 (B-4012)

View looking southeast along -DET- from DB-1 towards DB-2.



View looking northwest along -DET- from DB-2 towards DB-1.