

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

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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 45360.1.30 F.A. PROJ. N/A  
 COUNTY Transylvania  
 PROJECT DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road)  
over East Fork French Broad River

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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) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

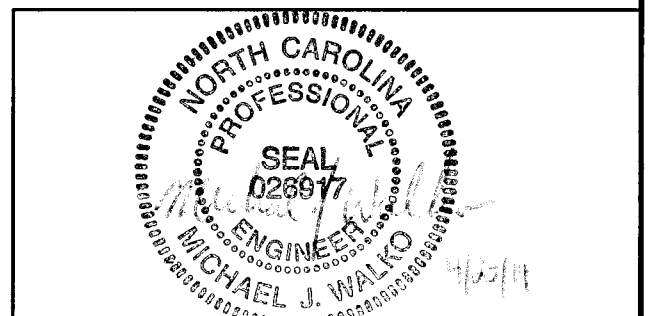
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

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

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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.

DRAWN BY: M. Brewer, E.I.



# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## DIVISION OF HIGHWAYS

### GEOTECHNICAL ENGINEERING UNIT

## 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*

### 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**.

### 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-4, A-5				
SYMBOL														
% PASSING	# 10 # 40 # 200													
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 11 MN	40 MX 10 MX	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS	
GROUP INDEX	0	0	0	0	4 MX	8 MX	12 MX	16 MX	No 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	UNSATURABLE			

### 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
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	>10%	>20%	HIGHLY

### GROUND WATER

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

### CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )
GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)	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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

### 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
- DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- SPT REFUSAL

### TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	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 IN. 12	75 3	2.0	0.25	0.05	0.005

### SOIL MOISTURE - CORRELATION OF TERMS

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

### 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.

### ABBREVIATIONS

- AR - AUGER REFUSAL
  - BT - BORING TERMINATED
  - CL - CLAY
  - CPT - CONE PENETRATION TEST
  - CSE. - COARSE
  - CT - CORING TERMINATED
  - DMT - DILATOMETER TEST
  - DPT - DYNAMIC PENETRATION TEST
  - e - VOID RATIO
  - EMBANK. - EMBANKMENT
  - 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
  - SDY. - SANDY
  - SL. - SILT, SILTY
  - SLI. - SLIGHTLY
  - TCR - TRICONE REFUSAL
  - w - MOISTURE CONTENT
  - v - VERY
  - WEA. - WEATHERED
  - γ<sub>u</sub> - UNIT WEIGHT
  - γ<sub>d</sub> - DRY UNIT WEIGHT
- SAMPLE ABBREVIATIONS**
- S - BULK
  - SS - SPLIT SPOON
  - ST - SHELBY TUBE
  - RS - ROCK
  - RT - RECOMPACTED TRIAXIAL
  - CBR - CALIFORNIA BEARING RATIO

### EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
<input type="checkbox"/> MOBILE B- _____	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL
<input type="checkbox"/> BK-51	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:
<input type="checkbox"/> CME-550X	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B _____
<input checked="" type="checkbox"/> CME-75	<input type="checkbox"/> HARD FACED FINGER BITS	<input checked="" type="checkbox"/> -N 02
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> -H _____
<input type="checkbox"/> _____	<input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER	HAND TOOLS:
<input type="checkbox"/> _____	<input checked="" type="checkbox"/> TRICONE 2-15/16" STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER
<input type="checkbox"/> _____	<input type="checkbox"/> TRICONE _____ " TUNG.-CARB.	<input type="checkbox"/> HAND AUGER
<input type="checkbox"/> _____	<input checked="" type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD
<input type="checkbox"/> _____	<input type="checkbox"/> _____	<input type="checkbox"/> VANE SHEAR TEST

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ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>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:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>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.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>	
<p>WEATHERED ROCK (WR)</p> 	<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p>		
<p>CRYSTALLINE ROCK (CR)</p> 	<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>		
<p>NON-CRYSTALLINE ROCK (NCR)</p> 	<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>		
<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> 	<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>		
WEATHERING			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.		
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.		
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.		
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>		
SEVERE (SEV.)	ALL 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i>		
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i>		
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		
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 PIECES 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		BEDDING	
<b>TERM</b>	<b>SPACING</b>	<b>TERM</b>	<b>THICKNESS</b>
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 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.		
<p>BENCH MARK: Survey information provided by Vaughn &amp; Melton, Inc.  TBM BL-2: N - 525,85.97, E - 864,823.88  ELEVATION: 2208.92 FT.</p>			
NOTES:			



SITE

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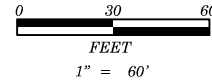
**SITE LOCATION PLAN**  
 Bridge No. 870086 on  
 SR 1107 (E. Fork Road) over  
 East Fork French Broad River

Scale: N.T.S.	DR.	CHK.	REV.
	DMB	MJW	

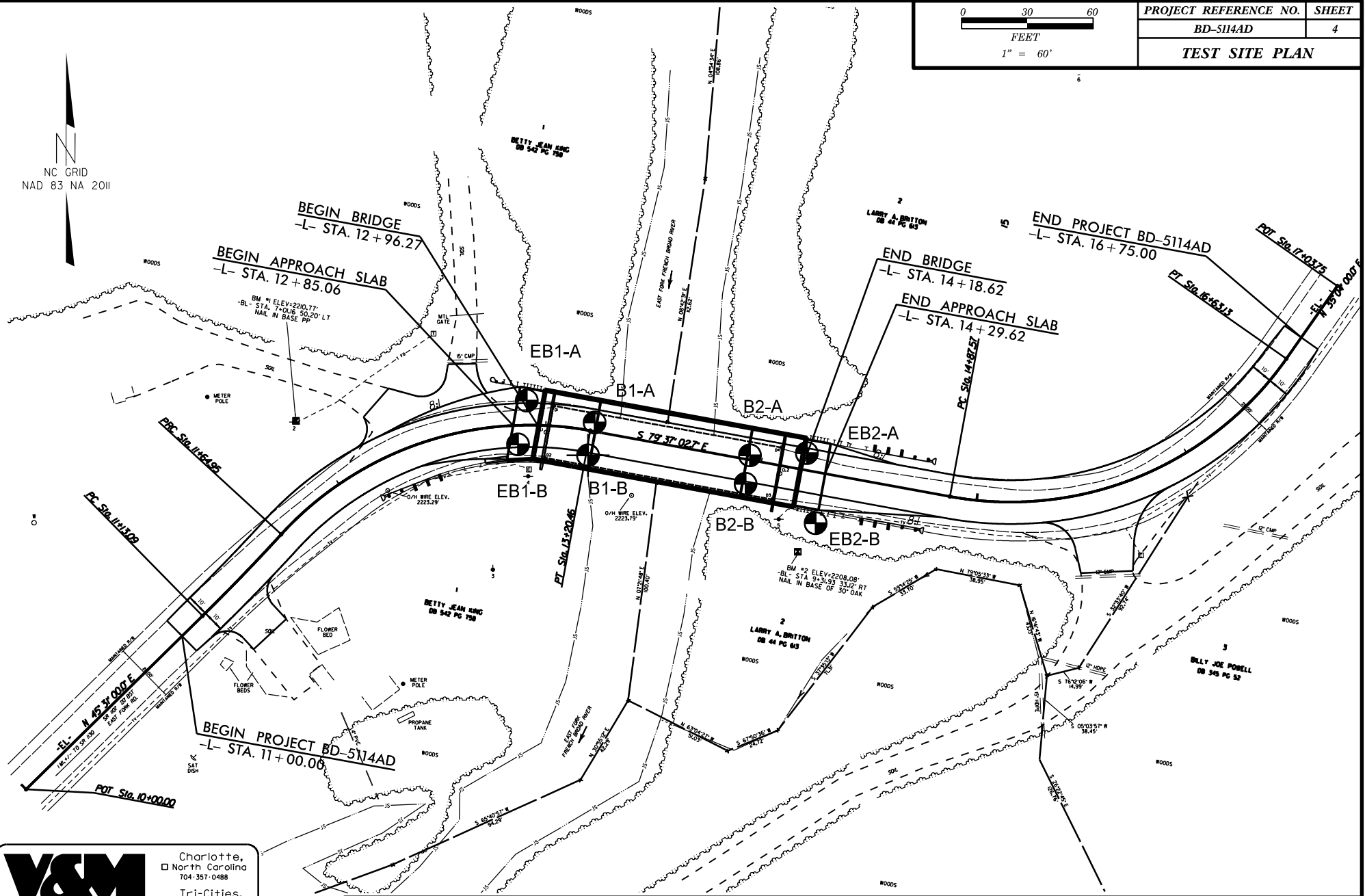
Prepared For:  
 NCDOT TIP No.: BD-5114AD



Froehling & Robertson, Inc.  
 2505 Hutchison-McDonald Road  
 Charlotte, North Carolina



PROJECT REFERENCE NO.	SHEET
BD-5114AD	4
<b>TEST SITE PLAN</b>	



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<b>TEST SITE PLAN</b>		
PROJECT REFERENCE NO.: 45360.1.30	F&R PROJECT NO.: 63P-0310-0086	
I.D. NO.: BD-5114AD	F.A. PROJECT NO.: N/A	COUNTY: TRANSYLVANIA
PROJECT DESCRIPTION: Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River		
SITE DESCRIPTION: Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River		
DRAWN BY: M. Brewer, E.I.	CHECKED BY: M. Walko, P.E.	
DATE: April 2014	SCALE: 1" = 60'	



12+50

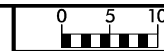
13+00

13+50

14+00

14+50

15+00



PROJ. REFERENCE NO.  
BD-5114AD

SHEET NO.  
5

2252

2244

2236

2228

2220

2212

2204

2196

2188

2180

2172

2164

2156

2148

2140

2132

2124

-L- (LEFT OF CENTERLINE)  
SR 1107 (EAST FORK ROAD)

BEGIN BRIDGE  
-L- STA. 12+96.27

END BRIDGE  
-L- STA. 14+18.62

PI = 12+40.00  
EL = 2,208.99'

EBI-A  
12+91  
11' LT

BI-A  
13+22  
4' LT

B2-A  
13+94  
2' LT

EB2-A  
14+20  
8' LT  
PI = 14+25.00  
EL = 2,209.55'

**-ROADWAY EMBANKMENT-**  
Md. stiff to soft, moist, brown-black, fine sandy SILT (A-4)

Loose, moist, tan silty fine to coarse SAND (A-2-4)

**-ALLUVIAL-**  
Md. Dense, sat., brown, silty f.-c. sandy GRAVEL (A-1-a)

**-RESIDUAL-**  
Loose to v. dense, wet to moist, orange, f.-c. coarse SAND (A-2-4)

**-ROADWAY EMBANKMENT-**  
Loose to medium dense, moist, brown silty fine to coarse SAND (A-2-4)

**-ALLUVIAL-**  
Very loose, wet, tan-white, fine to coarse SAND (A-3)

Md. Dense, sat., brown, silty f.-c. sandy GRAVEL (A-1-a)

**-RESIDUAL-**  
Loose to very dense, wet to moist, gray-white, silty f.-c. SAND (A-2-4)

**-WEATHERED ROCK-**  
(HENDERSON GNEISS)

**-WEATHERED ROCK-**  
(HENDERSON GNEISS)

**-WEATHERED ROCK-**  
(HENDERSON GNEISS)

**-WEATHERED ROCK-**  
(HENDERSON GNEISS)

**-CRYSTALLINE ROCK-**  
(HENDERSON GNEISS)

**-CRYSTALLINE ROCK-**  
(HENDERSON GNEISS)

**-WEATHERED ROCK-**  
(HENDERSON GNEISS)

- (A) **-ROADWAY EMBANKMENT-** Md. stiff to soft, moist, brown-black, fine sandy SILT (A-4)
- (B) **-ROADWAY EMBANKMENT-** Loose and md. dense, moist, tan-brown silty f.-c. SAND (A-2-4)
- (C) **-ALLUVIAL-** Very loose, wet, gray, silty fine SAND (A-2-4)
- (D) **-ALLUVIAL-** Very loose, wet, tan-white, fine to coarse SAND (A-3)
- (E) **-ALLUVIAL-** Md. Dense, sat., brown, silty f.-c. sandy GRAVEL (A-1-a)
- (F) **-RESIDUAL-** Loose to v. dense, wet to moist, orange-brown to gray-tan, silty f.-c. SAND (A-2-4)
- (G) **-WEATHERED ROCK-** (HENDERSON GNEISS)
- (H) **-CRYSTALLINE ROCK-** (HENDERSON GNEISS)

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 2/17/14. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

12+50

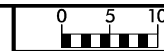
13+00

13+50

14+00

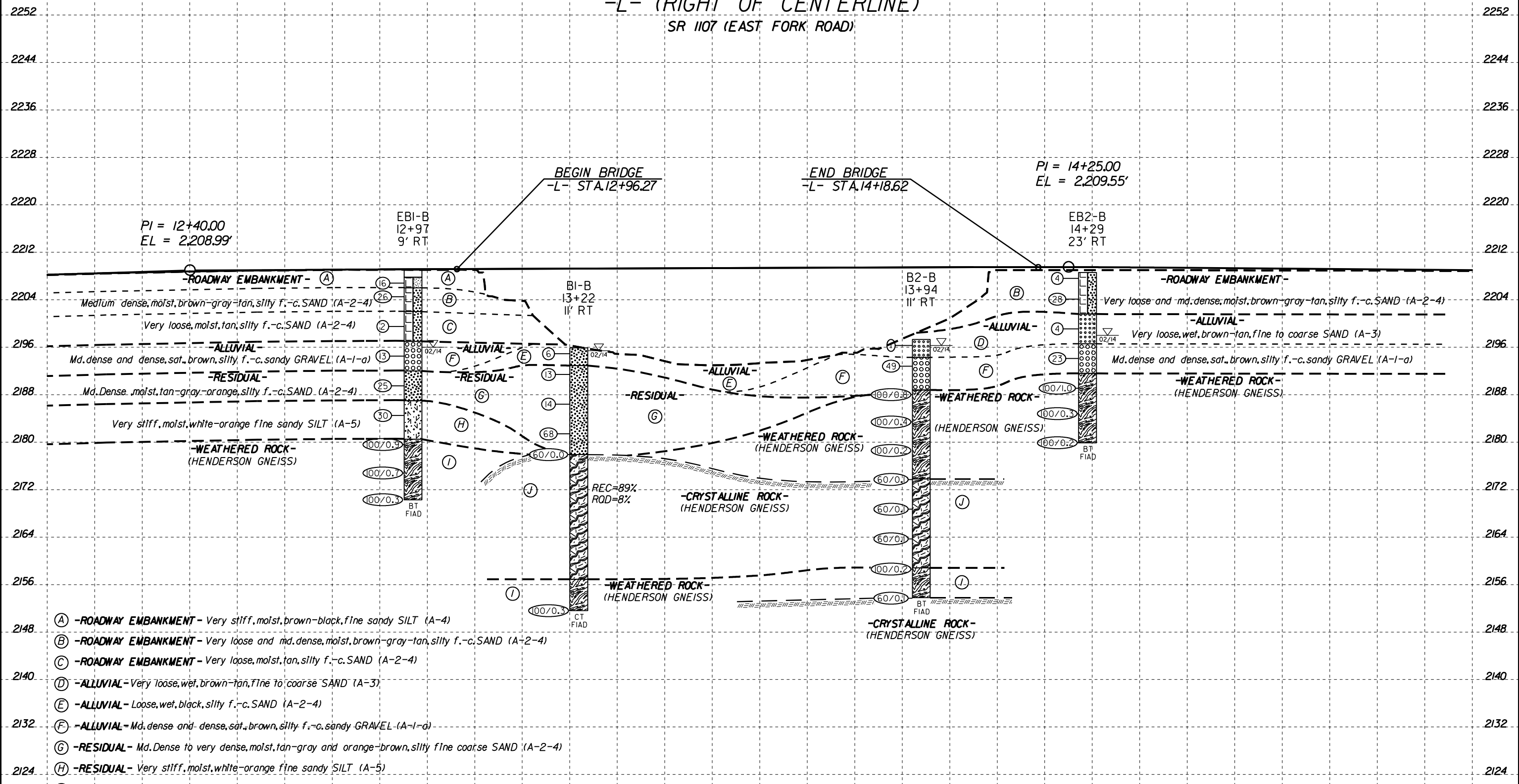
14+50

15+00



12+50                      13+00                      13+50                      14+00                      14+50                      15+00

-L- (RIGHT OF CENTERLINE)  
SR 1107 (EAST FORK ROAD)



PI = 12+40.00  
EL = 2,208.99'

EBI-B  
12+97  
9' RT

BEGIN BRIDGE  
-L- STA. 12+96.27

BI-B  
13+22  
11' RT

END BRIDGE  
-L- STA. 14+18.62

B2-B  
13+94  
11' RT

PI = 14+25.00  
EL = 2,209.55'

EB2-B  
14+29  
23' RT

- (A) -ROADWAY EMBANKMENT- Very stiff, moist, brown-black, fine sandy SILT (A-4)
- (B) -ROADWAY EMBANKMENT- Very loose and md. dense, moist, brown-gray-tan, silty f.-c. SAND (A-2-4)
- (C) -ROADWAY EMBANKMENT- Very loose, moist, tan, silty f.-c. SAND (A-2-4)
- (D) -ALLUVIAL- Very loose, wet, brown-tan, fine to coarse SAND (A-3)
- (E) -ALLUVIAL- Loose, wet, black, silty f.-c. SAND (A-2-4)
- (F) -ALLUVIAL- Md. dense and dense, sat., brown, silty f.-c. sandy GRAVEL (A-1-a)
- (G) -RESIDUAL- Md. Dense to very dense, moist, tan-gray and orange-brown, silty fine coarse SAND (A-2-4)
- (H) -RESIDUAL- Very stiff, moist, white-orange fine sandy SILT (A-5)
- (I) -WEATHERED ROCK- (HENDERSON GNEISS)
- (J) -CRYSTALLINE ROCK- (HENDERSON GNEISS)

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 2/17/14. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

12+50                      13+00                      13+50                      14+00                      14+50                      15+00



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30		TIP BD-5114AD		COUNTY Transylvania		GEOLOGIST M. Brewer												
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River							GROUND WTR (ft)											
BORING NO. EB1-A		STATION 12+91		OFFSET 11 ft LT		ALIGNMENT -L-	0 HR. 16.2											
COLLAR ELEV. 2,208.9 ft		TOTAL DEPTH 43.8 ft		NORTHING 525,185		EASTING 864,828	24 HR. 14.1											
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/22/2014				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER S. Davis		START DATE 02/20/14		COMP. DATE 02/20/14		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)			
2210	2,208.9	0.0													2,208.9	0.0	GROUND SURFACE	
			3	3	4								M				<b>ROADWAY EMBANKMENT</b> Brown-black, fine sandy SILT (A-4), with trace gravel and trace organics.	
2205	2,205.4	3.5	3	2	2								M					
															2,201.9	7.0	Tan, silty fine to coarse SAND (A-2-4), with trace gravel.	
2200	2,200.4	8.5	1	2	3								M					
															2,196.9	12.0	<b>ALLUVIAL</b> Brown-gray-orange, silty fine to coarse sandy GRAVEL (A-1-a).	
2195	2,195.4	13.5	3	11	14								Sat.					
															2,191.9	17.0	<b>RESIDUAL</b> Orange-black to tan, silty fine to coarse SAND (A-2-4), with trace gravel-sized rock fragments and trace clay.	
2190	2,190.4	18.5	8	10	13								M					
2185	2,185.4	23.5	9	18	20								M					
2180	2,180.4	28.5	13	13	16								M					
2175	2,175.4	33.5	47	53/0.3											2,175.4	33.5	<b>WEATHERED ROCK</b> Orange-tan, (HENDERSON GNEISS).	
2170	2,170.4	38.5	100/0.5															
	2,165.4	43.5	100/0.3												2,165.1	43.8	Boring Terminated at Elevation 2,165.1 ft IN WEATHERED ROCK (HENDERSON GNEISS)	

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30		TIP BD-5114AD		COUNTY Transylvania		GEOLOGIST M. Brewer											
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River							GROUND WTR (ft)										
BORING NO. EB1-B		STATION 12+87		OFFSET 9 ft RT		ALIGNMENT -L-		0 HR. 13.0									
COLLAR ELEV. 2,209.0 ft		TOTAL DEPTH 38.7 ft		NORTHING 525,165		EASTING 864,824		24 HR. FIAD									
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Fowler		START DATE 02/24/14		COMP. DATE 02/24/14		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2210															2,209.0	GROUND SURFACE	0.0
	2,207.8	1.2	8	4	12										2,207.8	Asphalt (0.3') and ABC Stone (0.9')	1.2
	2,205.5	3.5	3	5	21										2,206.0	<b>ROADWAY EMBANKMENT</b> Brown-gray, fine to coarse sandy SILT (A-4), with little clay, trace gravel, and trace organics.	3.0
2205															2,202.0	Brown-gray-tan, silty fine to coarse SAND (A-2-4), with trace gravel and asphalt fragments.	7.0
2200	2,200.5	8.5	2	1	1										2,197.0	Tan, silty fine to coarse SAND (A-2-4), with trace gravel.	12.0
2195	2,195.5	13.5	2	4	9											<b>ALLUVIAL</b> Brown-gray-orange, silty fine to coarse sandy GRAVEL (A-1-a).	17.0
2190	2,190.5	18.5	9	10	15										2,192.0	<b>RESIDUAL</b> Tan-gray, silty fine to coarse SAND (A-2-4), with trace gravel-sized rock fragments.	22.0
2185	2,185.5	23.5	11	14	16										2,187.0	White-orange, clayey fine to coarse SAND (A-2-7(0)).	28.5
2180	2,180.5	28.5	52	48/0.4								SS-1	21%		2,180.5	<b>WEATHERED ROCK</b> Orange-brown, (HENDERSON GNEISS).	28.5
2175	2,175.5	33.5	51	49/0.2											2,170.3	Boring Terminated at Elevation 2,170.3 ft IN WEATHERED ROCK (HENDERSON GNEISS)	38.7
	2,170.3	38.5	100/0.3														

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30	TIP BD-5114AD	COUNTY Transylvania	GEOLOGIST M. Brewer
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River			GROUND WTR (ft)
BORING NO. B1-A	STATION 13+22	OFFSET 4 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,196.2 ft	TOTAL DEPTH 48.7 ft	NORTHING 525,175	EASTING 864,859
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. Fowler	START DATE 02/25/14	COMP. DATE 02/25/14	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
2200																	
2195	2,196.2	0.0	1	WOH	1								W	2,196.2	GROUND SURFACE	0.0	
2190	2,192.7	3.5	2		3	5							W	2,193.2	<b>ALLUVIAL</b> Gray, silty fine SAND (A-2-4), with trace gravel.	3.0	
2185	2,187.7	8.5	5		7	15							W		<b>RESIDUAL</b> Tan-orange, silty fine SAND (A-2-4), with trace gravel-sized rock fragments.		
2180	2,182.7	13.5								100/0.2				2,185.2	<b>WEATHERED ROCK</b> Brown-orange, (HENDERSON GNEISS).	11.0	
2175	2,177.7	18.5								100/0.4							
2170	2,172.7	23.5								100/0.3							
2165	2,167.7	28.5								100/0.2							
2160	2,162.7	33.5								100/0.2							
2155	2,157.7	38.5								60/0.1				2,157.7	<b>CRYSTALLINE ROCK</b> (HENDERSON GNEISS).	38.5	
2150	2,152.7	43.5								100/0.2				2,152.7	<b>WEATHERED ROCK</b> Brown-orange-pink, (HENDERSON GNEISS).	43.5	
	2,147.7	48.5								100/0.2				2,147.5	Boring Terminated at Elevation 2,147.5 ft IN WEATHERED ROCK (HENDERSON GNEISS)	48.7	

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## CORE BORING REPORT

WBS 45360.1.30		TIP BD-5114AD		COUNTY Transylvania		GEOLOGIST M. Brewer								
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River							GROUND WTR (ft)							
BORING NO. B1-B		STATION 13+22		OFFSET 11 ft RT		ALIGNMENT -L-	0 HR. 0.5							
COLLAR ELEV. 2,195.9 ft		TOTAL DEPTH 44.3 ft		NORTHING 525,160		EASTING 864,856	24 HR. N/A							
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER J. Fowler		START DATE 02/24/14		COMP. DATE 02/24/14		SURFACE WATER DEPTH N/A								
CORE SIZE NQ2		TOTAL RUN 25.0 ft												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)			
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %						
2176.9										Begin Coring @ 19.0 ft				
2175	2,176.9	19.0	5.0	0:24/1.0 2:10/1.0 4:14/1.0	(4.1) 82%	(0.9) 18%	RS-1	(17.8) 89%	(1.6) 8%		2,176.9	Moderately severe to severely weathered, moderately hard to soft, brown-white to gray, (HENDERSON GNEISS), with very close and close fracture spacing.	19.0	
	2,171.9	24.0		3:31/1.0 2:22/1.0										
2170			5.0	3:16/1.0 3:38/1.0 2:12/1.0	(4.1) 82%	(0.7) 14%							RS-1: 19.6 - 19.9 feet RMR = 2 + 3 + 5 + 12 + 7 = 29 q <sub>u</sub> = 3,020 psi	
	2,166.9	29.0		1:39/1.0 3:24/1.0										
2165			5.0	4:25/1.0 1:41/1.0 2:02/1.0	(5.0) 100%	(0.0) 0%								
	2,161.9	34.0		2:14/1.0 2:02/1.0										
2160			5.0	1:30/1.0 2:01/1.0 2:51/1.0	(4.6) 92%	(0.0) 0%								
	2,156.9	39.0		3:27/1.0 2:21/1.0										
2155			5.0	1:55/1.0 0:53/1.0 1:19/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%				<b>WEATHERED ROCK</b> No Core Sample Recovered	
	2,151.9	44.0		1:45/1.0 1:55/1.0										
				N=100/0.3										
Boring Terminated at Elevation 2,151.6 ft IN WEATHERED ROCK (HENDERSON GNEISS)														
Note:														
1) NQ2 Coring equipment utilized from 18.0'-44.0'														
2) Casing set to 19.0'														

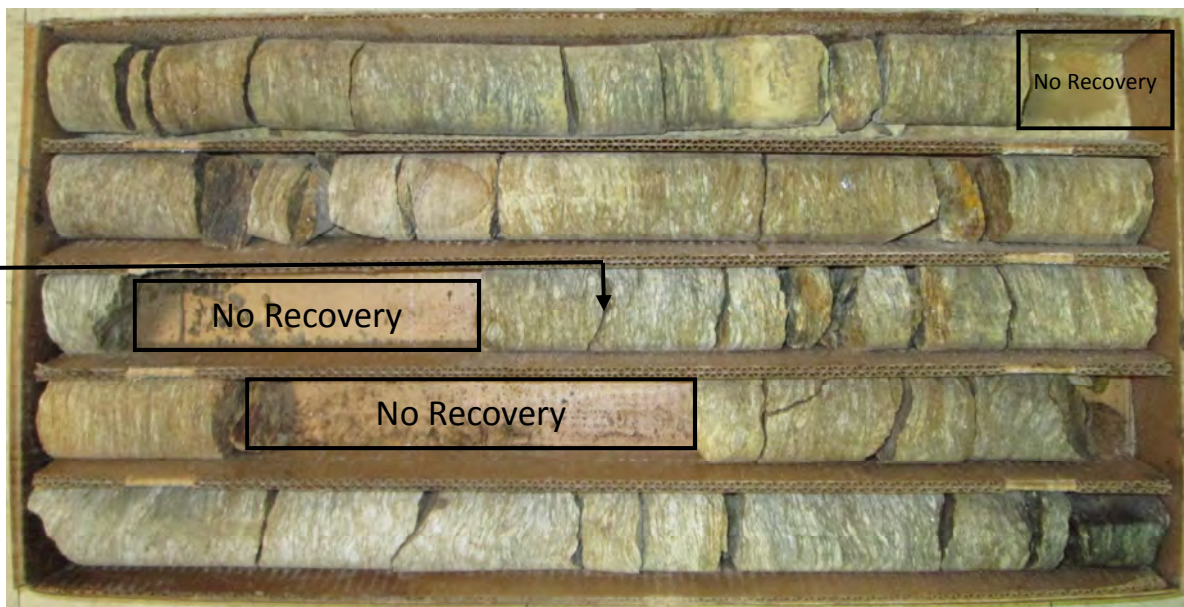
NCDOT CORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 4/10/14



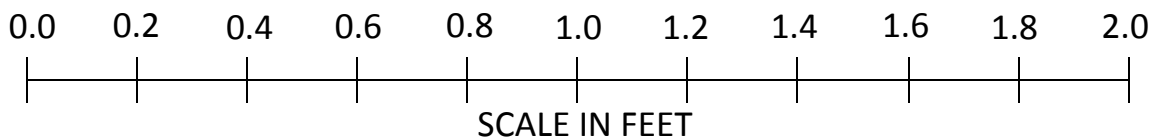
# Bridge No. 870086 on SR 1107 (E. Fork Road)

## CORE PHOTOGRAPHS: B1-B: Station 13+22, 11' RT

Begin Run 1  
19.0 feet



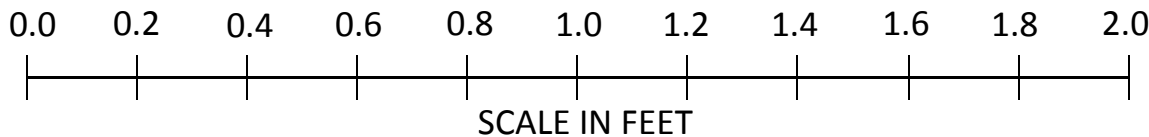
End Run 2  
29.0 feet



Begin Run 3  
29.0 feet



End Run 4  
39.0 feet





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30	TIP BD-5114AD	COUNTY Transylvania	GEOLOGIST M. Brewer
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River			GROUND WTR (ft)
BORING NO. B2-A	STATION 13+94	OFFSET 2 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,197.3 ft	TOTAL DEPTH 43.6 ft	NORTHING 525,160	EASTING 864,930
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. Fowler	START DATE 02/26/14	COMP. DATE 02/26/14	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)		
2200																	
	2,197.3	0.0												2,197.3	GROUND SURFACE	0.0	
2195	2,193.8	3.5	13	7	9									2,194.3	<b>ALLUVIAL</b> Brown-gray, silty, fine to coarse sandy GRAVEL (A-1-a).	3.0	
2190	2,188.8	8.5	12	12	38										<b>RESIDUAL</b> Brown-gray to orange, silty fine to coarse SAND (A-2-4), with trace gravel-sized rock fragments.	8.5	
2185	2,183.8	13.5	56	44	0.2									2,188.8	<b>WEATHERED ROCK</b> Orange-tan, (HENDERSON GNEISS).	8.5	
2180	2,178.8	18.5	100	0.3													
2175	2,173.8	23.5	48	52	0.4									2,173.8	<b>CRYSTALLINE ROCK</b> (HENDERSON GNEISS).	23.5	
2170	2,168.8	28.5															
2165	2,163.8	33.5															
2160	2,158.8	38.5															
2155	2,153.8	43.5												2,153.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 2,153.7 ft IN CRYSTALLINE ROCK (HENDERSON GNEISS)	43.6	

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30	TIP BD-5114AD	COUNTY Transylvania	GEOLOGIST M. Brewer
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River			GROUND WTR (ft)
BORING NO. B2-B	STATION 13+94	OFFSET 11 ft RT	ALIGNMENT -L-
COLLAR ELEV. 2,197.3 ft	TOTAL DEPTH 43.6 ft	NORTHING 525,147	EASTING 864,928
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. Fowler	START DATE 02/28/14	COMP. DATE 02/28/14	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	
2200																	
	2,197.3	0.0													2,197.3	GROUND SURFACE	0.0
2195			1	WOH	1										2,194.3	<b>ALLUVIAL</b> Brown-tan-orange, fine to coarse SAND (A-3)	3.0
	2,193.8	3.5	6		13	36										Brown-gray, silty, fine to coarse sandy GRAVEL (A-1-a).	
2190			22		78	0.3									2,188.8		8.5
	2,188.8	8.5								100	0.8					<b>WEATHERED ROCK</b> Tan-black-white to gray-orange, (HENDERSON GNEISS).	
2185			100		0.4												
	2,183.8	13.5								100	0.4						
2180			100		0.2												
	2,178.8	18.5								100	0.2						
2175			60		0.1										2,173.8		23.5
	2,173.8	23.5								60	0.1					<b>CRYSTALLINE ROCK</b> (HENDERSON GNEISS).	
2170			60		0.1												
	2,168.8	28.5								60	0.1						
2165			60		0.1												
	2,163.8	33.5								60	0.1						
2160			100		0.2										2,158.8		38.5
	2,158.8	38.5								100	0.2					<b>WEATHERED ROCK</b> Gray, (HENDERSON GNEISS).	
2155			60		0.1										2,153.8		43.5
	2,153.8	43.5								60	0.1					Boring Terminated with Standard Penetration Test Refusal at Elevation 2,153.7 ft IN CRYSTALLINE ROCK (HENDERSON GNEISS)	

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 45360.1.30	TIP BD-5114AD	COUNTY Transylvania	GEOLOGIST M. Brewer
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River			GROUND WTR (ft)
BORING NO. EB2-A	STATION 14+20	OFFSET 8 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,208.7 ft	TOTAL DEPTH 33.9 ft	NORTHING 525,161	EASTING 864,956
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 73% 02/22/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. Fowler	START DATE 02/24/14	COMP. DATE 02/24/14	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
2210	2,208.7	0.0	4	5	4									2,208.7	0.0	GROUND SURFACE
2205	2,205.2	3.5	8	13	4									2,201.7	7.0	ROADWAY EMBANKMENT Brown, silty fine to coarse SAND (A-2-4), with trace gravel.
2200	2,200.2	8.5	1	2	1									2,196.7	12.0	ALLUVIAL Tan-white, fine to coarse SAND (A-3).
2195	2,195.2	13.5	10	8	7									2,191.7	17.0	RESIDUAL Black, silty, fine sandy GRAVEL (A-1-a).
2190	2,190.2	18.5	36	50	32									2,185.2	23.5	WEATHERED ROCK Gray to tan-brown, (HENDERSON GNEISS).
2185	2,185.2	23.5	67	33/0.3						100/0.8						
2180	2,180.2	28.5	86	14/0.1						100/0.6						
2175	2,175.2	33.5	100/0.4							100/0.4				2,174.8	33.9	Boring Terminated at Elevation 2,174.8 ft IN WEATHERED ROCK (HENDERSON GNEISS)

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14





# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45360.1.30	TIP BD-5114AD	COUNTY Transylvania	GEOLOGIST M. Brewer
SITE DESCRIPTION Bridge No. 870086 on SR 1107 (East Fork Road) over East Fork French Broad River			GROUND WTR (ft)
BORING NO. EB2-B	STATION 14+29	OFFSET 23 ft RT	ALIGNMENT -L-
COLLAR ELEV. 2,208.6 ft	TOTAL DEPTH 28.7 ft	NORTHING 525,129	EASTING 864,960
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/22/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	START DATE 02/21/14	COMP. DATE 02/21/14	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2210	2,208.6	0.0												2,208.6	0.0	GROUND SURFACE	
2205	2,205.1	3.5	1	2	2								M	2,201.6	7.0	ROADWAY EMBANKMENT Brown, silty fine to coarse SAND (A-2-4), with trace gravel and trace organics from 0.0'-1.5'.	
2200	2,200.1	8.5	7	8	20								M	2,201.6	7.0	ALLUVIAL Brown-tan, fine to coarse SAND (A-3).	
2195	2,195.1	13.5	2	2	2								W	2,196.6	12.0	Brown, silty, fine sandy GRAVEL (A-1-a(0)).	
2190	2,190.1	18.5	4	17	6								SS-2	2,191.6	17.0	WEATHERED ROCK Orange-brown, (HENDERSON GNEISS).	
2185	2,185.1	23.5	34	66/0.5										100/0.3			
2180	2,180.1	28.5	100/0.2											100/0.2			
																	Boring Terminated at Elevation 2,179.9 ft IN WEATHERED ROCK (HENDERSON GNEISS)

NCDOT BORE SINGLE 63P-0310-0086-DIVISION 14 BRIDGE 086.GPJ NC\_DOT.GDT 3/25/14