

## **GEOTECHNICAL ATTACHMENT**

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.31	1	17

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

**STRUCTURE  
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 17BP.12.R.31 F.A. PROJ. NA  
 COUNTY Catawba  
 PROJECT DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over  
Allen Creek

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INVESTIGATED BY F&R, Inc.

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DATE May 2013

**CAUTION NOTICE**

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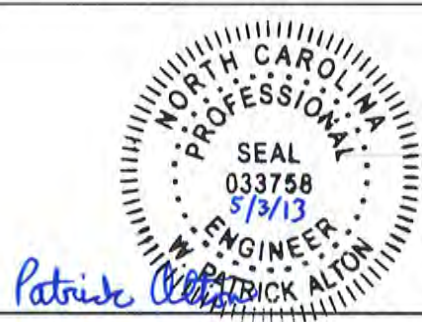
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-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.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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: D. Racey

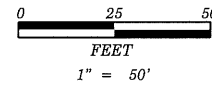


**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
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GEOTECHNICAL ENGINEERING UNIT  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

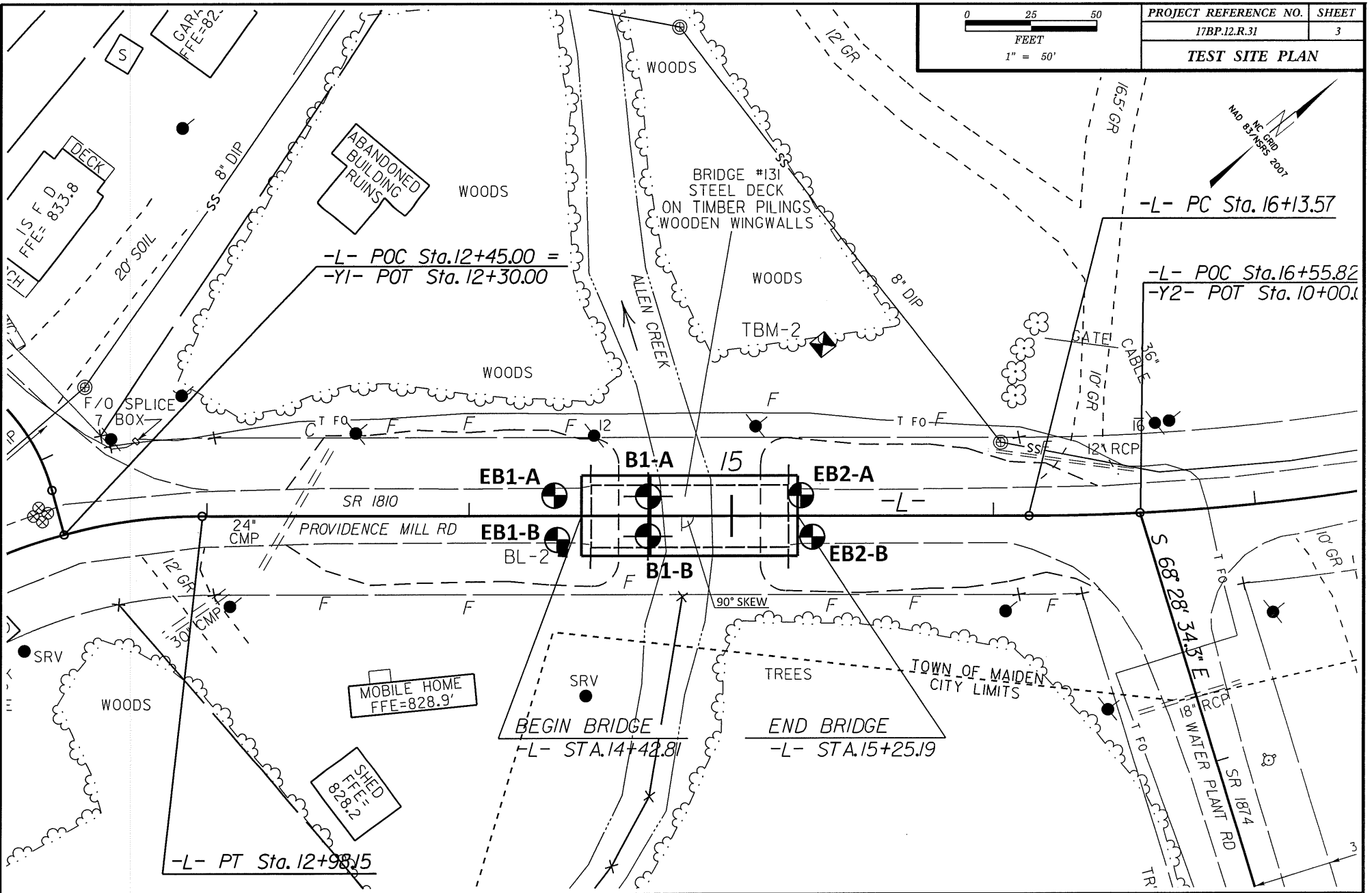
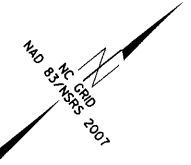
SOIL DESCRIPTION										GRADATION									
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>MINERALOGICAL COMPOSITION</b>									
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.									
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										<b>COMPRESSIBILITY</b>									
SYMBOL										SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50									
% PASSING # 10, # 40, # 200										<b>PERCENTAGE OF MATERIAL</b>									
LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL									
USUAL TYPES OF MAJOR MATERIALS										TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE									
GEN. RATING AS A SUBGRADE										<b>GROUND WATER</b>									
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										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									
<b>CONSISTENCY OR DENSENESS</b>										<b>MISCELLANEOUS SYMBOLS</b>									
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TDNS/F12)										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 TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD									
<b>TEXTURE OR GRAIN SIZE</b>										<b>ABBREVIATIONS</b>									
U.S. STD. SIEVE SIZE OPENING (MM)										AR - AUGER REFUSAL, BT - BORING TERMINATED, CL. - CLAY, CPT - CONE PENETRATION TEST, CSE. - COARSE, DMT - OILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES, FRAGS. - FRAGMENTS, HL. - HIGHLY, MED. - MEDIUM, MICA. - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, V - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL RATIO, CBR - CALIFORNIA BEARING RATIO									
BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>									
GRAIN SIZE MM, IN.										DRILL UNITS: <input type="checkbox"/> MOBILE B-___, <input type="checkbox"/> BK-51, <input type="checkbox"/> CME-45C, <input checked="" type="checkbox"/> CME-55, <input type="checkbox"/> PORTABLE HOIST ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS, <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER, <input checked="" type="checkbox"/> 8" HOLLOW AUGERS, <input type="checkbox"/> HARD FACED FINGER BITS, <input type="checkbox"/> TUNG.-CARBIDE INSERTS, <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER, <input type="checkbox"/> TRICONE ___ STEEL TEETH, <input type="checkbox"/> TRICONE ___ TUNG.-CARB., <input checked="" type="checkbox"/> CORE BIT HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B___, <input checked="" type="checkbox"/> -N_02_, <input type="checkbox"/> -H___ HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER, <input type="checkbox"/> HAND AUGER, <input type="checkbox"/> SOUNDING ROD, <input type="checkbox"/> VANE SHEAR TEST									
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>PLASTICITY</b>									
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY INDEX (PI), DRY STRENGTH									
LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY									
<b>COLOR</b>										<b>SOIL MOISTURE - CORRELATION OF TERMS</b>									
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									

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**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

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><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p><b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.</p> <p><b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p><b>ARGILLACEOUS</b> - 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><b>ARTESIAN</b> - 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><b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p><b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p><b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p><b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p><b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p><b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p><b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p><b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p><b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p><b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p><b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p><b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p><b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p><b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p><b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p><b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p><b>ROCK QUALITY DESIGNATION (ROD)</b> - 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><b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p><b>SILL</b> - 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><b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p><b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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><b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p><b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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><b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>	
<p><b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p> <p><b>CRYSTALLINE ROCK (CR)</b>  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><b>NON-CRYSTALLINE ROCK (NCR)</b>  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><b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>			
<b>WEATHERING</b>			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		
VERY SLIGHT (V SL.)	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 (SL.)	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.		
<b>ROCK HARDNESS</b>			
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 GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLDWS 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 FINGER NAIL.		
<b>FRACTURE SPACING</b>		<b>BEDDING</b>	
<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
<b>INDURATION</b>			
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><b>BENCH MARK:</b> TMB-2; RAILROAD SPIKE IN BASE OF 20' SYCAMORE  65.45' LT. OF STA. 15+34.72 -L-  ELEVATION: 826.29 FT.</p>	
NOTES:			



PROJECT REFERENCE NO.	SHEET
17BP.12.R.31	3
<b>TEST SITE PLAN</b>	



	<b>FROEHLING &amp; ROBERTSON, INC.</b>	
	<i>Engineering Stability Since 1881</i>	
	310 Hubert Street Raleigh, North Carolina 27603-2302 USA T 919.828.3441 F 919.828.5751 www.fandr.com	
	<b>TEST SITE PLAN</b>	
	PROJECT REFERENCE NO.: 17BP.12.R.31	F&R PROJECT NO.: 66P-0181
I.D. NO.: N/A	F.A. PROJECT NO.: N/A	COUNTY: Catawba
PROJECT DESCRIPTION: Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek		
SITE DESCRIPTION: Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek		
DRAWN BY: D. Racey	CHECKED BY: P. Alton, P.E.	
DATE: May 2013	SCALE: 1"=50'	



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 17BP.12.R.31	TIP N/A	COUNTY CATAWBA	GEOLOGIST D. Racey
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 14+33	OFFSET 8 ft LT	ALIGNMENT -L-
COLLAR ELEV. 829.4 ft	TOTAL DEPTH 24.7 ft	NORTHING 674,493	EASTING 1,347,467
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 04/16/13	COMP. DATE 04/16/13	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						
830																
	828.6	0.8	6	19	81/0.3											
	825.9	3.5	3	4	2											
825																
	820.9	8.5	2	1	2											
820																
	815.9	13.5	2	6	8											
815																
	810.9	18.5	73	27/0.2												
810																
	805.9	23.5	100/0.3													
805	804.7	24.7	60/0.0													

829.4	GROUND SURFACE	0.0
828.6	ASPHALT	0.8
824.4	ROADWAY EMBANKMENT Red-brown, fine to coarse sandy SILT (A-4), with some mica, trace gravel.	5.0
817.4	ALLUVIAL Dark gray, fine sandy SILT (A-4), with trace coarse sand.	12.0
812.4	WEATHERED ROCK Gray & brown, (MICA SCHIST).	17.0
804.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 804.7 ft on CRYSTALLINE ROCK (MICA SCHIST)	24.7

**NOTES:**

- 1) Blow counts at 0.8' likely inflated due to presence of gravel.
- 2) Boring Filled Immediately After Drilling (FIAD) due to location in road.
- 3) Auger refusal at 24.7'.

NCDOT BORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT\_GDT 5/3/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 17BP.12.R.31	TIP N/A	COUNTY CATAWBA	GEOLOGIST D. Racey
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+34	OFFSET 9 ft RT	ALIGNMENT -L-
COLLAR ELEV. 829.4 ft	TOTAL DEPTH 28.6 ft	NORTHING 674,483	EASTING 1,347,481
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 04/16/13	COMP. DATE 04/16/13	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)	
830	828.7	0.7	4	3	4									829.4	0.0	GROUND SURFACE
														828.7	0.7	ASPHALT
														828.0	1.4	ROADWAY EMBANKMENT
825	825.9	3.5	4	2	4									824.4	5.0	Brown, silty fine SAND (A-2-4), with trace mica.
														820.4	9.0	Red-brown to brown, fine to coarse sandy SILT (A-4), with some mica, trace gravel.
820	820.9	8.5	WOH	1	2									820.4	9.0	ALLUVIAL Dark gray, fine sandy SILT (A-4), with trace coarse sand.
														817.4	12.0	Brown, fine sandy clayey SILT (A-5).
815	815.9	13.5	2	4	14									812.9	16.5	Gray & tan, silty fine to coarse SAND (A-2-4), with trace quartz fragments.
																WEATHERED ROCK
810	810.9	18.5	39	61/0.4												Gray & brown, (MICA SCHIST).
805	805.9	23.5	100/0.2													
	800.9	28.5	60/0.1											800.9	28.5	CRYSTALLINE ROCK
														800.8	28.6	Gray, (MICA SCHIST).

Boring Terminated with Standard Penetration Test Refusal at Elevation 800.8 ft in CRYSTALLINE ROCK (MICA SCHIST)

- NOTES:
- 1) Boring Filled Immediately After Drilling (FIAD) due to location in road.

NCDOT BORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT\_GDT 5/3/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 17BP.12.R.31			TIP N/A			COUNTY CATAWBA			GEOLOGIST D. Racey								
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek									GROUND WTR (ft)								
BORING NO. B1-A			STATION 14+68			OFFSET 7 ft LT			ALIGNMENT -L-								
COLLAR ELEV. 819.2 ft			TOTAL DEPTH 41.3 ft			NORTHING 674,520			EASTING 1,347,489								
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12						DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic								
DRILLER C. Boyce			START DATE 04/17/13			COMP. DATE 04/17/13			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)		
820															819.2	GROUND SURFACE	0.0
815	815.7	3.5	2	1	0									Sat.			
810	810.7	8.5	7	69	31/0.1										810.2		9.0
	807.9	11.3	60/0.0							100/0.6					808.1	WEATHERED ROCK	11.1
										60/0.0				RS-1	807.9	Gray & brown, (MICA SCHIST).	11.3
805																CRYSTALLINE ROCK	
																Gray & brown, (MICA SCHIST).	
800																	
795																	
790																	
															788.9	Gray & white, (QUARTZITE).	30.3
785														RS-2			
780																	
															777.9	Boring Terminated at Elevation 777.9 ft in CRYSTALLINE ROCK (QUARTZITE)	41.3
															NOTES:		
															1) Auger refusal at 11.3', began coring.		
															2) 0 hr. water level not measured due to water introduced for coring.		

NCDOT BORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT.GDT 5/3/13



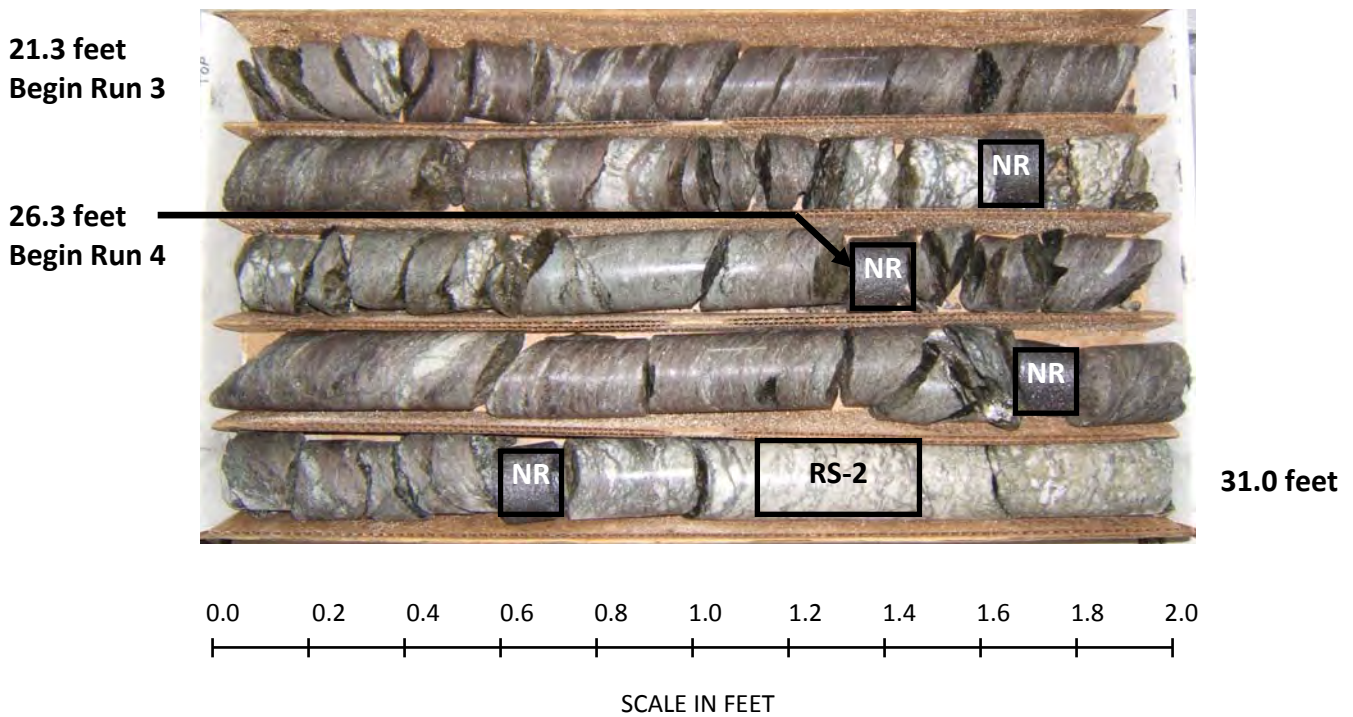
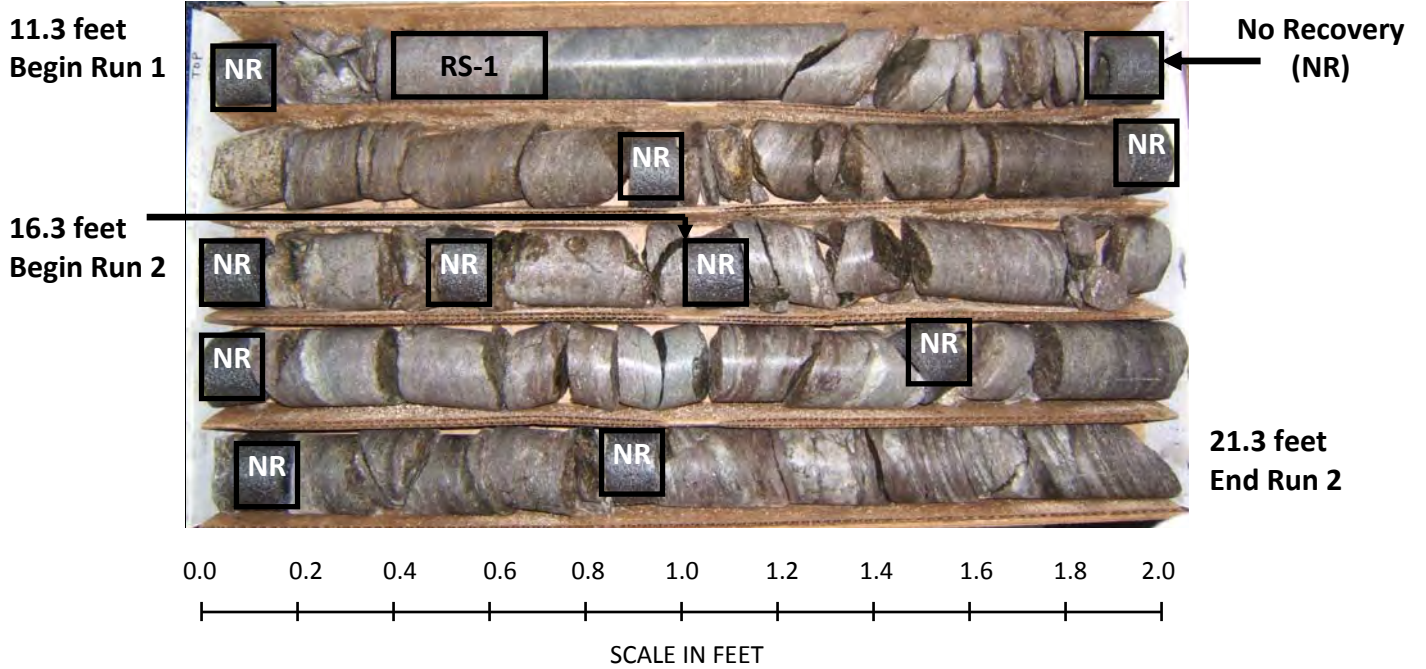


# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

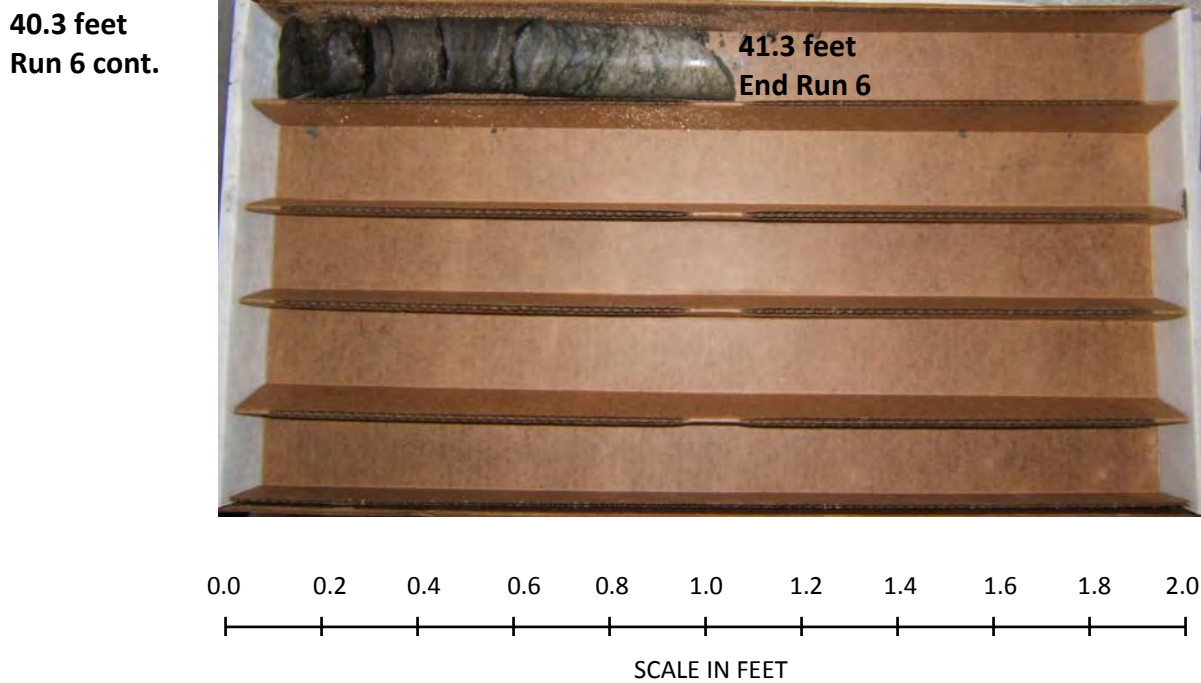
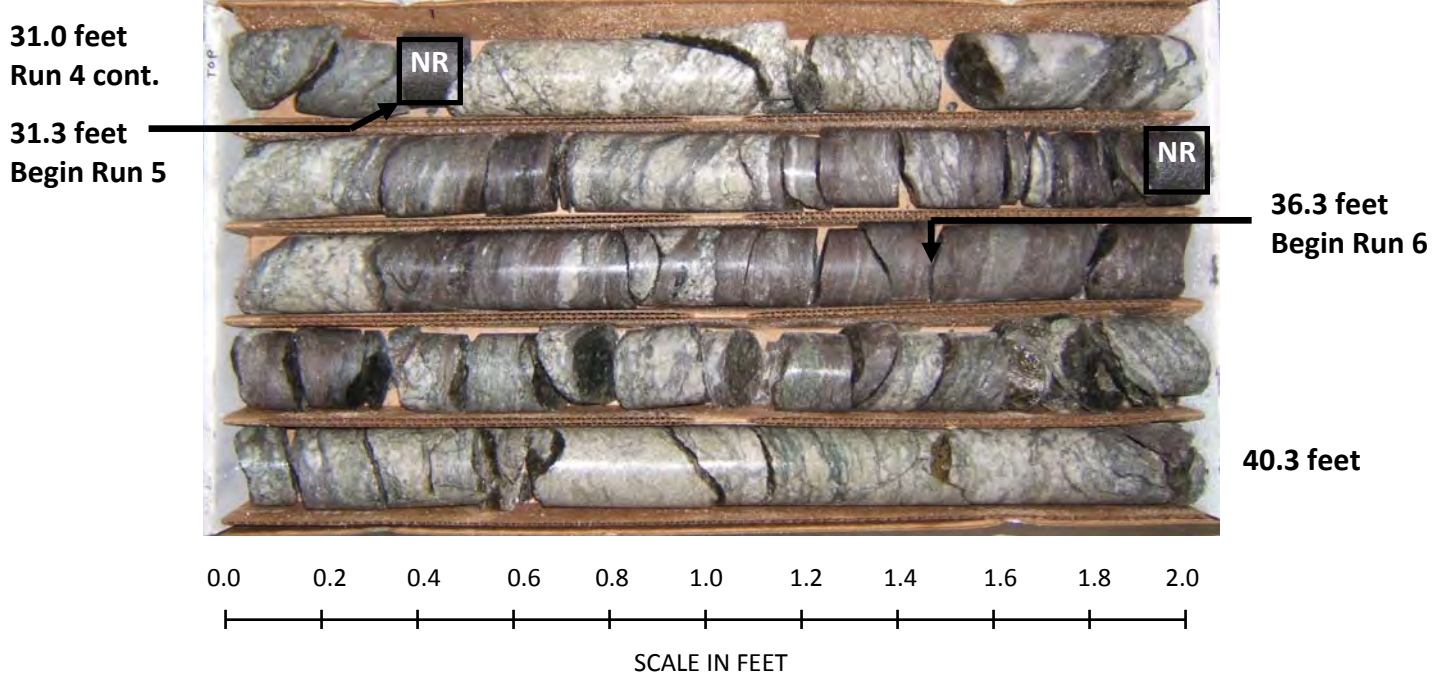
WBS 17BP.12.R.31		TIP N/A		COUNTY CATAWBA		GEOLOGIST D. Racey					
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek							GROUND WTR (ft)				
BORING NO. B1-A		STATION 14+68		OFFSET 7 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 819.2 ft		TOTAL DEPTH 41.3 ft		NORTHING 674,520		EASTING 1,347,489					
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic					
DRILLER C. Boyce		START DATE 04/17/13		COMP. DATE 04/17/13		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 30.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	ROD (ft) %	REC. (ft) %	ROD (ft) %			
807.9										Begin Coring @ 11.3 ft	
805	807.9	11.3	5.0	N=60/0.0 2:42/1.0 2:50/1.0 3:24/1.0 3:22/1.0 2:55/1.0	(4.4) 88%	(0.5) 10%	RS-1	(17.5) 92%	(3.5) 18%	807.9 Gray & brown, medium to moderately hard, moderately weathered, (MICA SCHIST), very close to close fracture spacing.	11.3
	802.9	16.3								RS-1: 11.7'-12.0' qu = 12,112 psi (1,744 ksf) R <sub>1</sub> =7, R <sub>2</sub> =3, R <sub>3</sub> =5, R <sub>4</sub> =6, R <sub>5</sub> =7, RMR = 28, Rock Type = E	
800			5.0	2:28/1.0 3:00/1.0 3:18/1.0 3:32/1.0 3:24/1.0	(4.5) 90%	(0.3) 6%					
	797.9	21.3									
795			5.0	5:55/1.0 2:28/1.0 3:36/1.0 2:34/1.0 2:54/1.0	(4.9) 98%	(1.8) 36%					
	792.9	26.3									
790			5.0	3:22/1.0 3:21/1.0 3:50/1.0 3:39/1.0 4:51/1.0	(4.7) 94%	(1.9) 38%					
	787.9	31.3					RS-2	(10.8) 98%	(4.2) 38%	788.9 Gray & white, hard, moderately to slightly weathered, (QUARTZITE), very close to close fracture spacing.	30.3
785			5.0	4:02/1.0 3:08/1.0 1:09/1.0 1:59/1.0 6:28/1.0	(4.8) 96%	(1.5) 30%				RS-2: 30.3'-30.6' qu = 8,008 psi (1,153 ksf) R <sub>1</sub> =7, R <sub>2</sub> =8, R <sub>3</sub> =10, R <sub>4</sub> =6, R <sub>5</sub> =7, RMR = 38, Rock Type = E	
	782.9	36.3									
780			5.0	5:36/1.0 4:04/1.0 3:07/1.0 4:06/1.0 4:48/1.0	(5.0) 100%	(1.7) 34%					
	777.9	41.3								777.9 Boring Terminated at Elevation 777.9 ft in CRYSTALLINE ROCK (QUARTZITE)	41.3
<p>NOTES:</p> <p>1) Auger refusal at 11.3', began coring.</p> <p>2) 0 hr. water level not measured due to water introduced for coring.</p>											

NCDOT CORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT\_GDT\_5/3/13

**CORE PHOTOGRAPHS: Bridge No. 131 on SR 1810 (Providence Mill Road) over Allen Creek, Boring B1-A**



**CORE PHOTOGRAPHS: Bridge No. 131 on SR 1810 (Providence Mill Road) over Allen Creek, Boring B1-A**







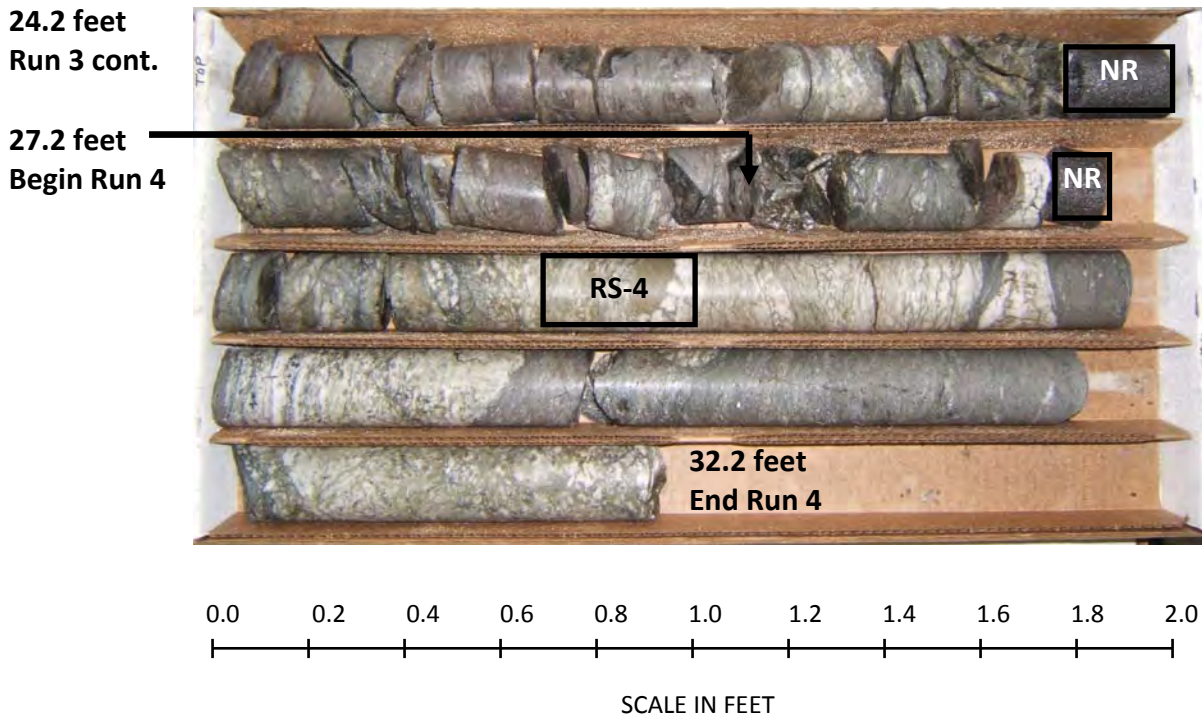
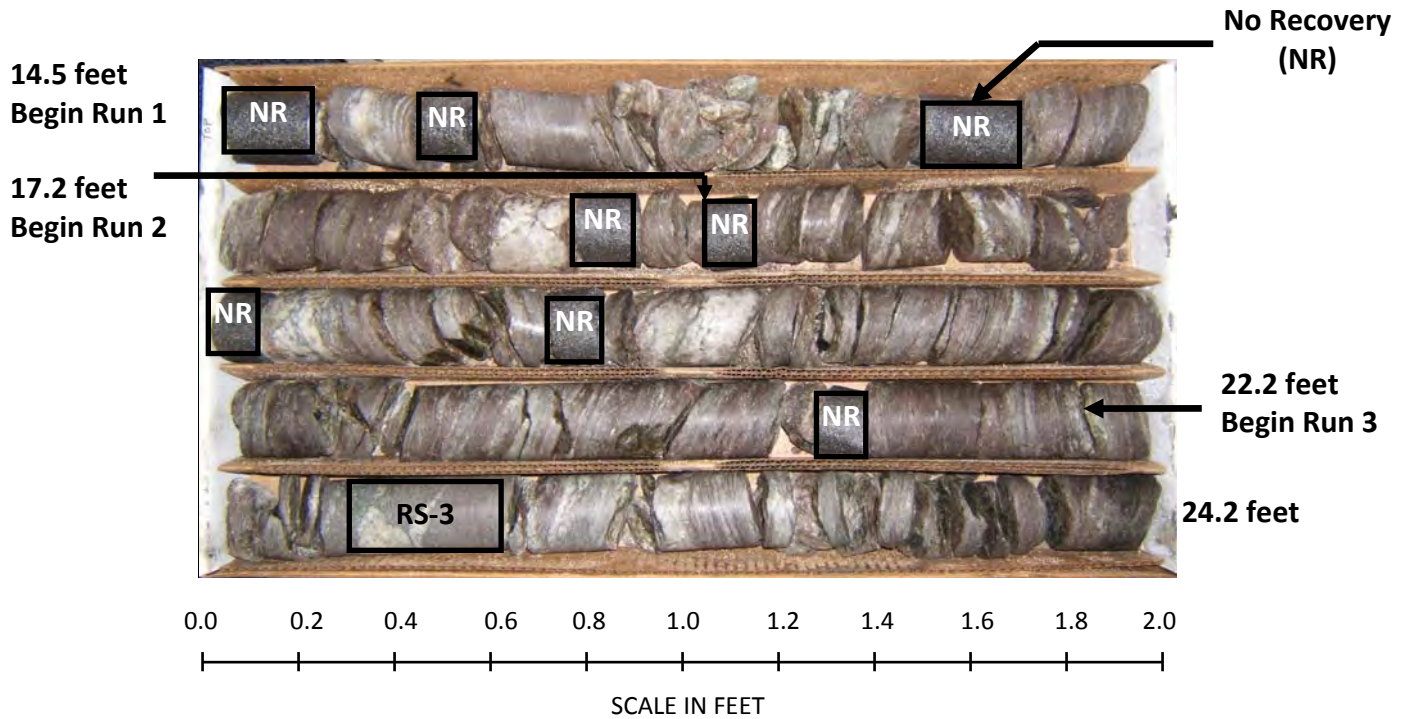
# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

WBS 17BP.12.R.31		TIP N/A		COUNTY CATAWBA		GEOLOGIST D. Racey					
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek							GROUND WTR (ft)				
BORING NO. B1-B		STATION 14+68		OFFSET 8 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 820.0 ft		TOTAL DEPTH 39.2 ft		NORTHING 674,511		EASTING 1,347,501					
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic					
DRILLER C. Boyce		START DATE 04/18/13		COMP. DATE 04/18/13		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 24.7 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) %			
805.5	805.5	14.5	2.7	N=60/0.0 4:33/0.7 4:54/1.0 4:44/1.0	(2.5) 93%	(0.0) 0%	(11.8) 93%	(0.4) 3%		Begin Coring @ 14.5 ft	14.5
	802.8	17.2	5.0	4:40/1.0 2:48/1.0 3:26/1.0 3:09/1.0 4:31/1.0	(4.5) 90%	(0.0) 0%				Gray & brown, medium to moderately hard, moderately weathered, (MICA SCHIST), very close to close fracture spacing.	
	797.8	22.2	5.0	2:57/1.0 3:39/1.0 3:24/1.0 2:09/1.0 3:28/1.0	(4.8) 96%	(0.4) 8%			RS-3	RS-3: 22.6'-22.9' qu = 9,282 psi (1,337 ksf) R <sub>1</sub> =7, R <sub>2</sub> =3, R <sub>3</sub> =5, R <sub>4</sub> =6, R <sub>5</sub> =7, RMR = 28, Rock Type = E	
	792.8	27.2	5.0	3:11/1.0 5:09/1.0 4:18/1.0 3:25/1.0 4:42/1.0	(4.9) 98%	(4.1) 82%	(11.3) 94%	(9.0) 75%		Gray & white, very slightly weathered to fresh, moderately hard to hard, (QUARTZITE), close to moderately close fracture spacing.	27.2
	787.8	32.2	5.0	2:53/1.0 4:34/1.0 5:43/1.0 5:41/1.0 5:45/1.0	(5.0) 100%	(3.7) 74%			RS-4	RS-4: 28.5'-28.8' qu = 8,195 psi (1,180 ksf) R <sub>1</sub> =7, R <sub>2</sub> =17, R <sub>3</sub> =10, R <sub>4</sub> =12, R <sub>5</sub> =7, RMR = 53, Rock Type = E	
	782.8	37.2	2.0	6:13/1.0 5:00/1.0	(1.4) 70%	(1.2) 60%					
	780.8	39.2								Boring Terminated at Elevation 780.8 ft in CRYSTALLINE ROCK (QUARTZITE)	39.2
<p>NOTES:</p> <ol style="list-style-type: none"> <li>1) Auger refusal at 14.5'.</li> <li>2) Blow counts from 7'-10' are implied based on driller observations.</li> <li>3) Boring Filled Immediately After Drilling (FIAD).</li> </ol>											

NCDOT CORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT\_GDT 5/3/13

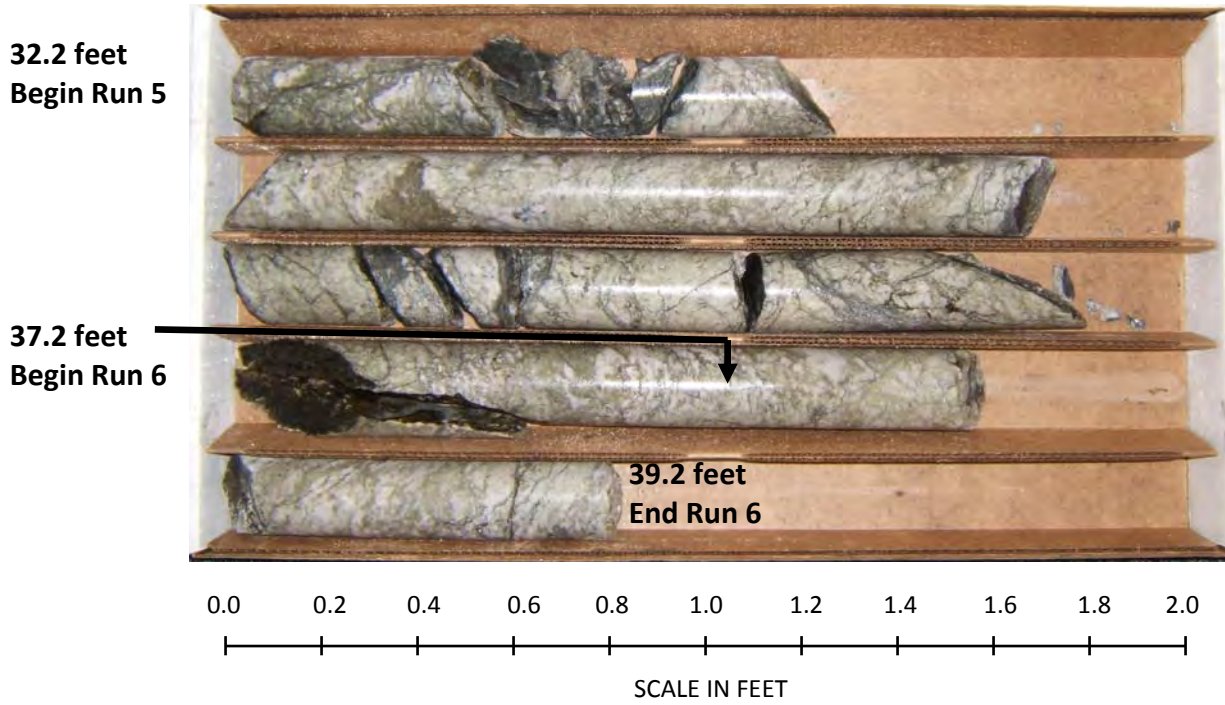


**CORE PHOTOGRAPHS: Bridge No. 131 on SR 1810 (Providence Mill Road) over Allen Creek, Boring B1-B**





**CORE PHOTOGRAPHS: Bridge No. 131 on SR 1810 (Providence Mill Road) over Allen Creek, Boring B1-B**





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 17BP.12.R.31		TIP N/A		COUNTY CATAWBA		GEOLOGIST D. Racey								
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek							GROUND WTR (ft)							
BORING NO. EB2-A		STATION 15+26		OFFSET 8 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 828.3 ft		TOTAL DEPTH 20.5 ft		NORTHING 674,566		EASTING 1,347,525								
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER C. Boyce		START DATE 04/16/13		COMP. DATE 04/16/13		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)
830													828.3	0.0
	827.5	0.8				1	6	4	2				827.5	0.8
825	824.8	3.5				2	2	2						
820	819.8	8.5				1	1	2					819.0	9.3
815	814.8	13.5				1	2	8					816.3	12.0
810	809.8	18.5				14	39	61/0.4					809.3	19.0
	807.8	20.5				60/0.0							808.2	20.1
													807.8	20.5

Notes on right side of table:

- GROUND SURFACE
- ASPHALT
- ROADWAY EMBANKMENT Red & brown, silty fine to coarse SAND (A-2-4), with some mica.
- ALLUVIAL Dark gray, fine sandy SILT (A-4).
- Black, fine sandy SILT (A-4), with little organics.
- WEATHERED ROCK Gray & brown, (MICA SCHIST).
- CRYSTALLINE ROCK Gray, (MICA SCHIST).

Boring Terminated with Standard Penetration Test Refusal at Elevation 807.8 ft in CRYSTALLINE ROCK (MICA SCHIST)

NOTES:

- Boring Filled Immediately After Drilling (FIAD) due to location in road.
- Auger refusal at 20.5'.

NCDOT BORE SINGLE 66P-0181\_0131\_BORELOGS.GPJ NC\_DOT\_GDT 5/3/13





# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.12.R.31			TIP N/A			COUNTY CATAWBA			GEOLOGIST D. Racey						
SITE DESCRIPTION Bridge #131 on SR 1810 (Providence Mill Rd.) over Allen Creek								GROUND WTR (ft)							
BORING NO. EB2-B			STATION 15+31			OFFSET 8 ft RT			ALIGNMENT -L-						
COLLAR ELEV. 828.3 ft			TOTAL DEPTH 21.4 ft			NORTHING 674,560			EASTING 1,347,540						
DRILL RIG/HAMMER EFF./DATE F&R068 CME-55 82% 10/5/12						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER C. Boyce			START DATE 04/16/13			COMP. DATE 04/16/13			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
830															
	827.6	0.7												GROUND SURFACE	0.0
			5	4	4								M	ASPHALT	0.7
	824.8	3.5	3	3	3								M	ROADWAY EMBANKMENT Red & brown, silty fine to coarse SAND (A-2-4), with some mica.	
														ALLUVIAL Dark gray, fine sandy SILT (A-4).	5.0
820	819.8	8.5	2	2	2								M		
815	814.8	13.5	WOH	2	7									Black, fine sandy SILT (A-4), with little organics.	12.0
810	809.8	18.5												WEATHERED ROCK Gray & brown, (MICA SCHIST).	17.0
	806.9	21.4	73	27/0.2						100/0.7				CRYSTALLINE ROCK Gray, (MICA SCHIST).	20.9
			60/0.0							60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 806.9 ft in CRYSTALLINE ROCK (MICA SCHIST)	21.4

**NOTES:**

- 1) Boring Filled Immediately After Drilling (FIAD) due to location in road.
- 2) Auger refusal at 21.4'.

**LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES**

**PROJECT NO.:** 17BP.12.R.31  
**TIP NO.:** N/A  
**COUNTY:** Catawba  
**DESCRIPTION:** Bridge No. 131 on SR 1810 (Providence Mill Road) over Allen Creek

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, E (ksf)	RMR
RS-1	B1-A	11.7 - 12.0	Mica Schist	CZms	10%	3.79	1.96	169.4	12,112	3.22 x 10 <sup>5</sup>	28
RS-2	B1-A	30.3 - 30.6	Quartzite	CZms	38%	4.52	1.97	165.0	8,008	2.82 x 10 <sup>5</sup>	38
RS-3	B1-B	22.6 - 22.9	Mica Schist	CZms	8%	3.97	1.97	168.5	9,282	2.80 x 10 <sup>5</sup>	28
RS-4	B1-B	28.5 - 28.8	Quartzite	CZms	82%	4.46	1.98	166.3	8,195	3.63 x 10 <sup>5</sup>	53