

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.13.R.87	1	9

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.13.R.87 F.A. PROJ. NA
COUNTY YANCEY
PROJECT DESCRIPTION DIVISION 13 EXPRESS DESIGN BUILD
BRIDGE REPLACEMENT

SITE DESCRIPTION BRIDGE NO. 200 OVER SHUFORD CREEK
ON SR-1168 (HANNAH BRANCH ROAD)

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INVESTIGATED BY SC&ME, INC.

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SUBMITTED BY SC&ME, INC.

DATE JULY, 2012

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DRAWN BY: B. RATTI



7/19/12

Robert F. Riggs, Jr.

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, MOST WITH INTERBEDDED FINE SAND LENSES, HIGH 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	
SYMBOL	A-1-a	A-1-b			A-2-4	A-2-5	A-2-6	A-2-7							A-7-8	A-7-9					
% PASSING # 10 = 48 = 200	50 MX 30 MX 15 MX	30 MX 30 MX 25 MX	50 MX 30 MX 15 MX	51 MN 18 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN			GRANULAR SOILS	SILT- CLAY SOILS	MUCK, PEAT		
LIQUID LIMIT PLASTIC INDEX	6 MX		NP		48 MX 38 MX	41 MN 18 MX	48 MX 11 MN	41 MN 11 MN	48 MX 38 MX	41 MN 18 MX	48 MX 11 MN	41 MN 11 MN	41 MN 11 MN	41 MN 11 MN			SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS			
GROUP INDEX	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		UNSATURABLE		
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																					

PI OF A-7-5 SUBGROUP IS $\leq$ LL - 30; PI OF A-7-6 SUBGROUP IS $>$ LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.75	2.00	0.42	0.25	0.075	0.053
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SO.)	FINE SAND (F SO.)	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

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

COLOR

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

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE
 MODERATELY COMPRESSIBLE
 HIGHLY COMPRESSIBLE

LIQUID LIMIT LESS THAN 31
 LIQUID LIMIT EQUAL TO 31-50
 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 - 18%	12 - 28%	SOME
HIGHLY ORGANIC	$> 18\%$	$> 28\%$	HIGHLY
			35% AND ABOVE

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

MISCELLANEOUS SYMBOLS

	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		TEST BORING		TEST BORING W/ CORE
	SOIL SYMBOL		AUGER BORING		SPT N-VALUE
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		CORE BORING		SPT REFUSAL
	INFERRED SOIL BOUNDARY		MONITORING WELL		
	INFERRED ROCK LINE		PIEZOMETER INSTALLATION		
	ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION		
	DIP & DIP DIRECTION OF ROCK STRUCTURES		CONE PENETROMETER TEST		
			SOUNDING ROD		

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED
CL - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HL - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
☐ MOBILE B- _____	☐ CLAY BITS	☒ AUTOMATIC ☐ MANUAL
☐ BK-51	☐ 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:
☐ CME-45C	☐ 8" HOLLOW AUGERS	☐ -B _____
☐ CME-55B	☐ HARD FACED FINGER BITS	☒ -N NWD4
☐ PORTABLE HOIST	☐ TUNG.-CARBIDE INSERTS	☐ -H _____
☒ CME-45B	☐ CASING ☐ W/ ADVANCER	HAND TOOLS:
	☐ TRICONE _____ * STEEL TEETH	☐ POST HOLE DIGGER
	☐ TRICONE _____ * TUNG.-CARB.	☐ HAND AUGER
	☒ CORE BIT	☐ SOUNDING ROD
	☒ 3 1/4" HOLLOW AUGER	☐ VANE SHEAR TEST

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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ROCK DESCRIPTION		TERMS AND DEFINITIONS	
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:		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FPI) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPFI OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
WEATHERED ROCK (WRI)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	
CRYSTALLINE ROCK (CRI)		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 (NCRI)		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.	
COASTAL PLAIN SEDIMENTARY ROCK (CPI)		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 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. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>		
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. <u>IF TESTED, YIELDS SPT N VALUES > 100 BPFI</u>		
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. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPFI</u>		
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 GROUVED 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 GROUVED 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 FINGER NAIL.		
FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	THICKNESS
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.		

BENCH MARK: REFERENCE "G" MARKED ON BRIDGE DECK IN S.W. CORNER	
ELEVATION: 100.00 FT.	
NOTES:	
BM - BENCH MARK	

BENCH MARK; REFERENCE 'G' MARKED ON BRIDGE DECK IN S.W. CORNER

ELEVATION: 100.00 FT.

NOTES:

 **BM - BENCH MARK**



0 40 80
 FEET

SCALE: 1" = 40'

DATE: JULY 2012

DRAWN BY: BTR

PROJECT NO:
 1051-12-064H



S&ME
 WWW.SMEINC.COM

NC ENGINEER LICENSE #F-0176
 3201 SPRING FOREST RD, RALEIGH, NC 27616

BORING LOCATION MAP
 BRIDGE NO. 200
 OVER SHUFORD CREEK ON SR-1168
 STATE PROJ NO. 17BP.13.R.87
 YANCEY COUNTY, NORTH CAROLINA

FIGURE NO.

3



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 4

WBS 17BP.13.R.87			TIP 17BP.13.R.87			COUNTY YANCEY			GEOLOGIST Brandsen, J.									
SITE DESCRIPTION Bridge No. 200 Over Shuford Creek on SR. 1168										GROUND WTR (ft)								
BORING NO. EB1-A			STATION N/A			OFFSET N/A			ALIGNMENT N/A									
COLLAR ELEV. 99.7 ft			TOTAL DEPTH 18.0 ft			NORTHING 770,198			EASTING 1,055,403									
0 HR. FIAD			24 HR. FIAD															
DRILL RIG/HAMMER EFF./DATE SME CME 45B 77% 6/29/12						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER Hardee, S.			START DATE 04/11/12			COMP. DATE 04/11/12			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)			
100	99.7	0.0	8	6	4										99.7	GROUND SURFACE	0.0	
95	96.2	3.5	6	6	7							M						
90	91.2	8.5	10	20	21							M				92.7	RESIDUAL	7.0
85	86.2	13.5	11	26	24							M					Tan-Brown Clayey Fine SAND	
	81.7	18.0										M				81.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 81.7 ft on Crystalline Rock (Gneiss)	18.0
																	1) Advanced 3-1/4 H.S.A. to 18 feet.	



WBS 17BP.13.R.87			TIP 17BP.13.R.87			COUNTY YANCEY			GEOLOGIST Brandsen, J.					
SITE DESCRIPTION Bridge No. 200 Over Shuford Creek on SR. 1168									GROUND WTR (ft)					
BORING NO. EB1-B			STATION N/A			OFFSET N/A			ALIGNMENT N/A					
COLLAR ELEV. 99.1 ft			TOTAL DEPTH 18.4 ft			NORTHING 770,173			EASTING 1,055,430					
DRILL RIG/HAMMER EFF./DATE SME CME 45B 77% 6/29/12						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Hardee, S.			START DATE 04/11/12			COMP. DATE 04/11/12			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				
100														
	98.1	1.0	3	5	2								99.1 GROUND SURFACE 0.0	
95	95.6	3.5	3	4	7								ALLUVIAL Tan-Brown Silty Fine SAND with Little Gravel	
90	90.6	8.5	4	6	9									
85	85.6	13.5	25	54	46/0.4								85.1 WEATHERED ROCK (Gneiss) 14.0	
	80.7	18.4	60/0.0										80.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 80.7 ft on Crystalline Rock (Gneiss) 18.4	
													1) Advanced 3-1/4" HSA to 18.4 Feet.	



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 6

WBS 17BP.13.R.87		TIP 17BP.13.R.87		COUNTY YANCEY		GEOLOGIST Brandsen, J.										
SITE DESCRIPTION Bridge No. 200 Over Shuford Creek on SR. 1168							GROUND WTR (ft)									
BORING NO. EB2-A		STATION N/A		OFFSET N/A		ALIGNMENT N/A										
COLLAR ELEV. 101.8 ft		TOTAL DEPTH 10.1 ft		NORTHING 770,253		EASTING 1,055,449										
DRILL RIG/HAMMER EFF/DATE SME CME 45B 77% 6/29/12		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic												
DRILLER Hardee, S.		START DATE 04/10/12		COMP. DATE 04/10/12		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)	
105																
	101.8	0.0	4	6	4	10							M		101.8	GROUND SURFACE 0.0
100	98.3	3.5													98.8	ALLUVIAL Tan-Brown Silty Fine SAND 3.0
	96.7	5.1	100/0.4							100/0.4					96.7	WEATHERED ROCK (Gneiss) 5.1
95			60/0.0							60/0.0						CRYSTALLINE ROCK (Gneiss)
															91.7	10.1
Boring Terminated with Standard Penetration Test Refusal at Elevation 91.7 ft in Crystalline Rock (Gneiss) 1) Advanced 3-1/4" HSA to 5.1 Feet. 2) Advanced NWD4 Core barrel from 5.1 ft to 10.1 ft. 3) Creek Water used as Drilling Fluid																



NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

SHEET 7

WBS 17BP.13.R.87		TIP 17BP.13.R.87		COUNTY YANCEY		GEOLOGIST Brandsen, J.						
SITE DESCRIPTION Bridge No. 200 Over Shuford Creek on SR. 1168						GROUND WTR (ft)						
BORING NO. EB2-A		STATION N/A		OFFSET N/A		ALIGNMENT N/A						
COLLAR ELEV. 101.8 ft		TOTAL DEPTH 10.1 ft		NORTHING 770,253		EASTING 1,055,449						
DRILL RIG/HAMMER EFF./DATE SME CME 45B 77% 6/29/12		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic		0 HR. N/A						
DRILLER Hardee, S.		START DATE 04/10/12		COMP. DATE 04/10/12		24 HR. FIAD						
DRILLER SURFACE WATER DEPTH N/A		TOTAL RUN 5.0 ft										
CORE SIZE NWD4		TOTAL RUN 5.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
96.7	96.7	5.1	5.0	N=60/0.0 1:56/1.0 1:48/1.0 1:43/1.0 2:07/1.0 2:40/1.0	(5.0) 100%	(4.5) 90%		(5.0) 100%	(4.5) 90%		Begin Coring @ 5.1 ft	
95	96.7	5.1	5.0								CRYSTALLINE ROCK	5.1
	91.7	10.1									Hard Black-Gray (Gneiss) with Moderately Close Fracture Spacing 5 Joints @ 30° to 35°	10.1
											Boring Terminated with Standard Penetration Test Refusal at Elevation 91.7 ft in Crystalline Rock (Gneiss)	
											1) Advanced 3-1/4" HSA to 5.1 Feet. 2) Advanced NWD4 Core barrel from 5.1 ft to 10.1 ft. 3) Creek Water used as Drilling Fluid	

CORE PHOTOGRAPHS

EB2-A

BOX 1: 5.1 – 10.1 FEET





NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 9

WBS 17BP.13.R.87			TIP 17BP.13.R.87			COUNTY YANCEY			GEOLOGIST Brandsen, J.							
SITE DESCRIPTION Bridge No. 200 Over Shuford Creek on SR. 1168										GROUND WTR (ft)						
BORING NO. EB2-B			STATION N/A			OFFSET N/A			ALIGNMENT N/A							
COLLAR ELEV. 101.5 ft			TOTAL DEPTH 13.0 ft			NORTHING 770,234			EASTING 1,055,479							
DRILL RIG/HAMMER EFF./DATE SME CME 45B 77% 6/29/12			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Hardee, S.			START DATE 04/10/12			COMP. DATE 04/10/12			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)	
105																
	101.5	0.0													101.5	GROUND SURFACE 0.0
100	98.0	3.5	3	4	2	6										ALLUVIAL Brown-Tan Silty Fine SAND with Some Gravel
			2	3	3	1										
95	93.0	8.5	10	8	21	29										
90	88.5	13.0													88.5	13.0
			60/0.0													Boring Terminated with Standard Penetration Test Refusal at Elevation 88.5 ft on Crystalline Rock (Gneiss)
																1) Advanced 3-1/4" HSA to 13.0 Feet.