

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.37	1	6

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.12.R.37 F.A. PROJ. _____
COUNTY ALEXANDER
PROJECT DESCRIPTION BRIDGE 079 ON SR 1328 (KIRBY LACKEY RD.)
OVER GRASSY CREEK

SITE DESCRIPTION _____

CONTENTS

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PERSONNEL

J.K. STICKNEY

C.L. SMITH

INVESTIGATED BY C.B. LITTLE

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

DATE NOVEMBER 2013

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

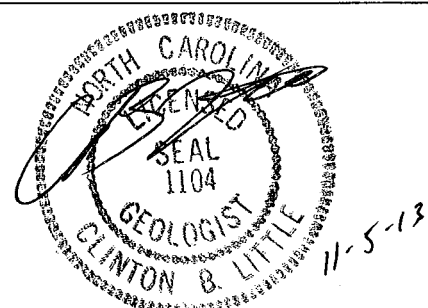
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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.

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DRAWN BY: J.K. McClURE



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.

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

GENERAL CLASS.	GRANULAR MATERIALS ($\leq 35\%$ 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	A-1-a	A-1-b			A-2-4	A-2-5	A-2-6	A-2-7					A-7-8	A-7-9		A-3		A-6, A-7	
% PASSING 10 40 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 18 MX		35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	36 MN	36 MN	36 MN	36 MN	36 MN				GRANULAR SOILS		SILT- CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP		40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	41 MN 10 MN	40 MX 10 MX	41 MN 10 MN	40 MX 11 MN	41 MN 11 MN						SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS
GROUP INDEX	0		0		0		4 MX		8 MX	12 MX	16 MX	No MX							
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS		CLAYEY SOILS									
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR		POOR		UNSATISFACTORY		

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

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

<u>ORGANIC MATERIAL</u>	GRANULAR SOILS	SILT - CLAY SOILS	<u>OTHER MATERIAL</u>
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY 35% AND ABOVE

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

MISCELLANEOUS SYMBOLS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FY 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

	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		SPT DPT VST	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		MW	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

U.S. STD. SIEVE SIZE		4		10		40		60		200		270	
OPENING (MM)		4.76		2.00		0.42		0.25		0.075		0.053	
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GRV.)		COARSE SAND (CSE. SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)	
GRAIN SIZE	MM IN.	305	75	2.0				0.25		0.05		0.005	
		12	3										

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL. - CLAY	MOD. - MODERATELY	γ_u - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	<u>SAMPLE ABBREVIATIONS</u>
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
HL. - HIGHLY	v - VERY	RATIO

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

DRILL UNITS: ☐ MOBILE B- ____ ☐ BK-51 ☐ CME-45C ☒ CME-550 ☐ PORTABLE HOIST ☐ _____ ☐ _____	ADVANCING TOOLS: ☐ CLAY BITS ☐ 6" CONTINUOUS FLIGHT AUGER ☐ 8" HOLLOW AUGERS ☐ HARD FACED FINGER BITS ☐ TUNG.-CARBIDE INSERTS ☒ CASING ☒ W/ ADVANCER ☐ TRICONE _____ * STEEL TEETH ☒ TRICONE <u>2 15/16</u> * TUNG.-CARB. ☐ CORE BIT ☐ _____	HAMMER TYPE: ☒ AUTOMATIC ☐ MANUAL CORE SIZE: ☐ -B- _____ ☐ -N- _____ ☐ -H- _____ HAND TOOLS: ☐ POST HOLE DIGGER ☐ HAND AUGER ☐ SOUNDING ROD ☐ VANE SHEAR TEST ☐ _____
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	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

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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
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 DISLOOED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.		
	FINE TO COARSE GRAIN (IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.		
	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 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 BPF</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 BPF</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 GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.		
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.		
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY 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: R.R. SPIKE IN BASE OF TREE

(ASSUMED)

ELEVATION: 100.00 FT.

NOTES:

NO SURVEY DATA AVAILABLE AT THE TIME OF THIS REPORT.



PROJECT REFERENCE NO.	SHEET
17BP.12.R.37	3
SITE PLAN	
0 60 120 FEET	

← GRASSY CREEK

EB1-A



BRIDGE 079



EB1-B



EB2-B

← TO SR 1313 THREE FORKS CHURCH RD. SR 1328 KIRBY LACKEY RD. TO SR 1331 LITTLE RIVER CHURCH RD. →



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 4

WBS 17BP.12.R.37		TIP 17BP12R37		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION BRIDGE 079 ON SR 1328 (KIRBY LACKEY RD.) OVER GRASSY CREEK						GROUND WTR (ft)						
BORING NO. EB1-A		STATION N/A		OFFSET N/A		ALIGNMENT -EL-						
COLLAR ELEV. 106.1 ft		TOTAL DEPTH 41.9 ft		NORTHING 809,430		EASTING 1,340,903						
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 86% 01/09/2013				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 08/29/13		COMP. DATE 08/29/13		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)
110												
105												106.1 GROUND SURFACE 0.0
												ROADWAY EMBANKMENT
												RED-BRN SOFT MOIST SANDY SILTY CLAY (A-7)
100	101.7	4.4	1	2	1						M	100.1 6.0
												ALLUVIAL
												GRAY SOFT TO MED. STIFF MOIST SANDY SILTY CLAY (A-7)
95	96.7	9.4	1	2	2						M	93.1 13.0
												ALLUVIAL
												GRAY LOOSE MOIST CLAYEY SILTY SAND (A-2) W/ GRAVEL LAYER @ 18.0
90	91.7	14.4	2	3	3						M	
85	86.7	19.4	7	4	3						M	
80	81.7	24.4	3	2	3						M	81.7 24.4
												RESIDUAL
												BRN-WHITE & GRAY MED. STIFF TO HARD MOIST MICA. TO V. MICA. SANDY CLAYEY SILT (A-4)
75	76.7	29.4	1	3	5						M	
70	71.7	34.4	4	5	6						M	
65	66.7	39.4	21	23	63						M	64.2 41.9
												Boring Terminated BY TRI-CONE REFUSAL at Elevation 64.2 ft ON CRYSTALLINE ROCK
												NOTE: NO SURVEY DATA AVAILABLE AT THE TIME OF THIS REPORT
												ALL BORING ELEVATIONS ARE ASSUMED.
												NORTHING & EASTINGS FOR ALL BORINGS CAME FROM MICROSTATION MAP FILE
												(002&000_GEO_map_BRDG0079_ALEXANDER.dgn)
												LOCATIONS BASED ON BORING LAYOUTS IN THE FIELD FROM THE EXISTING BRIDGE ENDBENTS.

NCDOT BORE SINGLE 002&000_GEO_BH_BRDG0079_ALEXANDER.GPJ NC_DOT.GDT 11/5/13



WBS 17BP.12.R.37				TIP 17BP12R37				COUNTY ALEXANDER				GEOLOGIST Stickney, J. K.				
SITE DESCRIPTION BRIDGE 079 ON SR 1328 (KIRBY LACKEY RD.) OVER GRASSY CREEK												GROUND WTR (ft)				
BORING NO. EB1-B				STATION N/A				OFFSET N/A				ALIGNMENT -EL-		0 HR. FIAD		
COLLAR ELEV. 106.0 ft				TOTAL DEPTH 27.7 ft				NORTHING 809,434				EASTING 1,340,926		24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 86% 01/09/2013								DRILL METHOD NW Casing w/ Advancer				HAMMER TYPE Automatic				
DRILLER Smith, C. L.				START DATE 08/29/13				COMP. DATE 08/29/13				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				ELEV. (ft)		
110																
105														106.0	GROUND SURFACE	0.0
															ROADWAY EMBANKMENT RED-BRN SOFT TO MED. STIFF MOIST SANDY SILTY CLAY (A-7)	
100	101.7	4.3	2	2	2								M	100.0		6.0
															ALLUVIAL GRAY SOFT MOIST SANDY SILTY CLAY (A-7)	
95	96.7	9.3	1	1	1								M			
														93.0		13.0
90	91.7	14.3	0	1	1								M		ALLUVIAL GRAY V. LOOSE TO DENSE MOIST CLAYEY SILTY SAND (A-2) W/ GRAVEL LAYER @ 18.3-20.3	
85	86.7	19.3	12	33	6								M	84.0		22.0
															RESIDUAL BRN-WHITE-GRAY V. STIFF MOIST MICA. SANDY CLAYEY SILT (A-4) W/ LAYERS OF CLAYEY SILTY SAND	
80	81.7	24.3	6	8	16								M	78.3		27.7
															Boring Terminated BY TRI-CONE REFUSAL at Elevation 78.3 ft ON CRYSTALLINE ROCK	
															NOTE: NO SURVEY DATA AVAILABLE AT THE TIME OF THIS REPORT ALL BORING ELEVATIONS ARE ASSUMED. NORTHING & EASTINGS FOR ALL BORINGS CAME FROM MICROSTATION MAP FILE (002&000_GEO_map_BRDG0079_ALEXANDER.dgn) LOCATIONS BASED ON BORING LAYOUTS IN THE FIELD FROM THE EXISTING BRIDGE ENDBENTS.	



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 6

WBS 17BP.12.R.37		TIP 17BP12R37		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION BRIDGE 079 ON SR 1328 (KIRBY LACKEY RD.) OVER GRASSY CREEK						GROUND WTR (ft)						
BORING NO. EB2-B		STATION N/A		OFFSET N/A		ALIGNMENT -EL-						
COLLAR ELEV. 106.0 ft		TOTAL DEPTH 33.8 ft		NORTHING 809,564		EASTING 1,340,914						
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 86% 01/09/2013				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 08/30/13		COMP. DATE 08/30/13		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)
110												
105												106.0 GROUND SURFACE 0.0
												ROADWAY EMBANKMENT RED-BRN SOFT TO MED. STIFF MOIST SILTY SANDY CLAY (A-7)
100	101.6	4.4	1	2	2						M	100.0 6.0
												ALLUVIAL BRN SOFT TO MED. STIFF MOIST SANDY SILTY CLAY (A-7) W/ GRAVEL LAYER @ 14.9-15.6
95	96.6	9.4	1	1	1						M	
90	91.6	14.4	1	5	1						M	90.3 15.7
												RESIDUAL GRAY SOFT TO MED. STIFF MOIST V. MICA. SANDY CLAYEY SILT (A-4)
85	86.6	19.4	1	2	2						M	
80	81.6	24.4	4	4	3						M	83.0 23.0
												RESIDUAL BRN-WHITE LOOSE MOIST MICA. CLAYEY SILTY SAND (A-2)
75	76.6	29.4	2	3	4						M	78.0 28.0
												RESIDUAL GRAY MED. STIFF MOIST V. MICA. SANDY CLAYEY SILT (A-4)
												73.4 32.6
												72.2 33.8
												WEATHERED ROCK SEV. WEATH. CRYSTALLINE ROCK Boring Terminated BY TRI-CONE REFUSAL at Elevation 72.2 ft ON CRYSTALLINE ROCK
												NOTE: NO SURVEY DATA AVAILABLE AT THE TIME OF THIS REPORT ALL BORING ELEVATIONS ARE ASSUMED. NORTHING & EASTINGS FOR ALL BORINGS CAME FROM MICROSTATION MAP FILE (002&000_GEO_map_BRDG0079_ALEXANDER.dgn) LOCATIONS BASED ON BORING LAYOUTS IN THE FIELD FROM THE EXISTING BRIDGE ENDBENTS.

NCDOT BORE SINGLE 002&000_GEO_BH_BRDG0079_ALEXANDER.GPJ NC_DOT_GDT 11/5/13