

REFERENCE: SF-230313

PROJECT: 17BP.6.PE.1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-230313	1	7

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY COLUMBUS

PROJECT DESCRIPTION BRIDGE NO. 313 ON -L-
(SR 1159) OVER BOGGY BRANCH

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DATE AUGUST 2018

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- 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.



DocuSigned by:
Tyler Bottoms 8/9/2018
48A2D3BD06CFAA6... SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

SF-230313

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

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

SOIL DESCRIPTION

SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, **VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6**

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS ($\leq 35\%$ 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-3	A-4, A-5	A-6, A-7				
SYMBOL															
% PASSING	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	41 MN 35 MX 35 MX	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	- 6 MX	- NP	40 MX 10 MX 10 MX	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	41 MN 11 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		
GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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 SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR	POOR	UNSATISFACTORY

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 0.5 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
	4.76	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	75	2.0	0.25	0.05	0.005
	IN.	12	3				

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

NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC
0-5	6-15	16-25	26 OR MORE

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.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES 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 WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 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
			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		DIP & DIP DIRECTION OF ROCK STRUCTURES
	SOIL SYMBOL		TEST BORING
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		AUGER BORING
	INFERRED SOIL BOUNDARY		CORE BORING
	INFERRED ROCK LINE		MONITORING WELL
	ALLUVIAL SOIL BOUNDARY		PIEZOMETER INSTALLATION
			SOUNDING ROD
			TEST BORING WITH CORE
			SPT N-VALUE

RECOMMENDATION SYMBOLS

	UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE		UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL
	SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK		

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED
CL - CLAY	MOD. - MODERATELY	UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	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
HI. - HIGHLY	V - VERY	

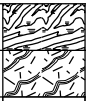
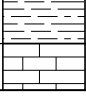
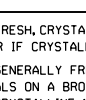
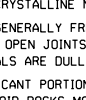
EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
☒ CME-45C	☒ CLAY BITS	☒ AUTOMATIC ☐ MANUAL
☐ CME-55	☐ 6" CONTINUOUS FLIGHT AUGER	
☐ CME-550	☐ 8" HOLLOW AUGERS	CORE SIZE:
☐ VANE SHEAR TEST	☐ HARD FACED FINGER BITS	☐ -B ☐ -H
☐ PORTABLE HOIST	☐ TUNG-CARBIDE INSERTS	☐ -N
	☒ CASING ☐ W/ ADVANCER	
	☒ TRICONE 2 15/16" STEEL TEETH	HAND TOOLS:
	☐ TRICONE " TUNG.-CARB.	☐ POST HOLE DIGGER
	☐ CORE BIT	☐ HAND AUGER
		☐ SOUNDING ROD
		☐ VANE SHEAR TEST

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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 2 OF 2)

ROCK DESCRIPTION		TERMS AND DEFINITIONS	
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. 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.	
WEATHERED ROCK (WR)		AQUIFER - A WATER BEARING FORMATION OR STRATA.	
		ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.	
CRYSTALLINE ROCK (CR)		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.	
NON-CRYSTALLINE ROCK (NCR)		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.	
COASTAL PLAIN SEDIMENTARY ROCK (CP)		CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.	
WEATHERING		COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.	
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	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.	
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.	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.	
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.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.	
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.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.	
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>	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.	
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, WOULD YIELD SPT N VALUES > 100 BPF</u>	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.	
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	FLAAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.	
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.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.	
ROCK HARDNESS		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.	
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.	
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.	
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.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.	
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.	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTILING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.	
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.	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.	
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.	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.	
FRACTURE SPACING		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.	
TERM	SPACING	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.	
VERY WIDE	MORE THAN 10 FEET	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.	
WIDE	3 TO 10 FEET	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.	
MODERATELY CLOSE	1 TO 3 FEET	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.	
CLOSE	0.16 TO 1 FOOT	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.	
VERY CLOSE	LESS THAN 0.16 FEET	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.	
BEDDING		TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
TERM	THICKNESS	BENCH MARK: TBM-1	
VERY THICKLY BEDDED	4 FEET	N: I59807,317 E: 2091041,5013	
THICKLY BEDDED	1.5 - 4 FEET	ELEVATION: 100.0 FEET	
THINLY BEDDED	0.16 - 1.5 FEET	NOTES:	
VERY THINLY BEDDED	0.03 - 0.16 FEET		
THICKLY LAMINATED	0.008 - 0.03 FEET		
THINLY LAMINATED	< 0.008 FEET		
INDURATION			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF 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.		

PROJECT REFERENCE NO.	SHEET NO.
SF-230313	3
SITE PLAN	



GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 4 OF 7

WBS 17BP.6.PE.1			TIP SF-230313			COUNTY COLUMBUS			GEOLOGIST Zimarino, S. N.					
SITE DESCRIPTION BRIDGE NUMBER 313 ON -L- (SR 1159) OVER BOGGY BRANCH									GROUND WTR (ft)					
BORING NO. EB1-A			STATION 9+90			OFFSET 8 ft LT			ALIGNMENT -L-			0 HR. N/A		
COLLAR ELEV. 100.0 ft			TOTAL DEPTH 84.5 ft			NORTHING 159,820			EASTING 2,091,045			24 HR. 3.9		
DRILL RIG/HAMMER EFF./DATE GFO0075 CME-45C 84% 08/21/2017						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER Smith, R. E.			START DATE 08/06/18			COMP. DATE 08/07/18			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)
105														
100														
	99.2	0.8											100.0	0.0
			4	4	3								99.2	0.8
	96.0	4.0	WOH	WOH	WOH								97.0	3.0
95														
	92.0	8.0												
			1	1	2									
90														
	87.0	13.0											89.0	11.0
85			10	10	12									
	82.0	18.0											84.0	16.0
80			4	6	5									
	77.0	23.0											79.0	21.0
75			4	5	6									
	72.0	28.0											74.0	26.0
70			5	7	8									
	67.0	33.0												
65			3	5	6									
	62.0	38.0											64.0	36.0
60			4	4	5									
	57.0	43.0												
55			4	6	8									
	52.0	48.0												
50			20	20	12									
	47.0	53.0												
45			3	6	6									
	42.0	58.0												
40			4	6	8									
	37.0	63.0												
35			9	12	29									
	32.0	68.0												
30			10	8	8									
	27.0	73.0												
25			4	5	7									

NCDOT BORE SINGLE SF230313 GEO_BRDG.GPJ NC_DOT.GDT 8/9/18

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 5 OF 7

WBS 17BP.6.PE.1			TIP SF-230313			COUNTY COLUMBUS			GEOLOGIST Zimarino, S. N.			
SITE DESCRIPTION BRIDGE NUMBER 313 ON -L- (SR 1159) OVER BOGGY BRANCH									GROUND WTR (ft)			
BORING NO. EB1-A			STATION 9+90			OFFSET 8 ft LT			ALIGNMENT -L-			
COLLAR ELEV. 100.0 ft			TOTAL DEPTH 84.5 ft			NORTHING 159,820			EASTING 2,091,045			
DRILL RIG/HAMMER EFF./DATE GFO0075 CME-45C 84% 08/21/2017									DRILL METHOD Mud Rotary			HAMMER TYPE Automatic
DRILLER Smith, R. E.			START DATE 08/06/18			COMP. DATE 08/07/18			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)
25						Match Line										
20	22.0	78.0	6	10	11								24.0	76.0	COASTAL PLAIN GRAY SANDY CLAY, WET (PEEDEE FORMATION)	
	17.0	83.0	6	7	9								19.0	81.0	COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION)	
														15.5	84.5	Boring Terminated at Elevation 15.5 ft in Medium Dense Sand

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 6 OF 7

WBS 17BP.6.PE.1			TIP SF-230313			COUNTY COLUMBUS			GEOLOGIST Zimarino, S. N.					
SITE DESCRIPTION BRIDGE NUMBER 313 ON -L- (SR 1159) OVER BOGGY BRANCH									GROUND WTR (ft)					
BORING NO. EB2-B			STATION 10+83			OFFSET 7 ft RT			ALIGNMENT -L-			0 HR. N/A		
COLLAR ELEV. 100.1 ft			TOTAL DEPTH 99.5 ft			NORTHING 159,729			EASTING 2,091,071			24 HR. 3.9		
DRILL RIG/HAMMER EFF./DATE GFO0075 CME-45C 84% 08/21/2017						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER Edmondson, J. M.			START DATE 08/07/18			COMP. DATE 08/07/18			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		MOI	ELEV. (ft)	DEPTH (ft)
105														
100	99.6	0.5	6	5	5								100.1	0.0
													99.6	0.5
95	96.1	4.0	WOH	WOH	1								97.1	3.0
90	92.1	8.0	1	2	2								93.1	7.0
85	87.1	13.0	4	5	7								89.1	11.0
80	82.1	18.0	10	10	15								84.1	16.0
75	77.1	23.0	1	1	1								74.1	26.0
70	72.1	28.0	9	10	10									
65	67.1	33.0	4	6	6								64.1	36.0
60	62.1	38.0	4	4	5									
55	57.1	43.0	3	5	5									
50	52.1	48.0	4	5	8									
45	47.1	53.0	4	5	7									
40	42.1	58.0	7	9	11									
35	37.1	63.0	6	9	10									
30	32.1	68.0	10	10	11									
25	27.1	73.0	3	5	7									

NCDOT BORE SINGLE SF230313 GEO_BRDG.GPJ NC_DOT.GDT 8/9/18

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 7 OF 7

WBS 17BP.6.PE.1			TIP SF-230313			COUNTY COLUMBUS			GEOLOGIST Zimarino, S. N.		
SITE DESCRIPTION BRIDGE NUMBER 313 ON -L- (SR 1159) OVER BOGGY BRANCH									GROUND WTR (ft)		
BORING NO. EB2-B			STATION 10+83			OFFSET 7 ft RT			ALIGNMENT -L-		
COLLAR ELEV. 100.1 ft			TOTAL DEPTH 99.5 ft			NORTHING 159,729			EASTING 2,091,071		
DRILL RIG/HAMMER EFF./DATE GFO0075 CME-45C 84% 08/21/2017						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic		
DRILLER Edmondson, J. M.			START DATE 08/07/18			COMP. DATE 08/07/18			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						
25						Match Line										
20	22.1	78.0	8	10	12									24.1	76.0	
15	17.1	83.0	4	6	9								19.1	81.0		
10	12.1	88.0	5	6	8											
5	7.1	93.0	14	42	58/0.3											
	2.1	98.0	24	25	26											
Boring Terminated at Elevation 0.6 ft in Very Dense Sand																