

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5887	1	9

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY HENDERSON

SITE DESCRIPTION STRUCTURE NO. 323 ON SR 1783
(HIGHLAND LAKE ROAD) OVER KING CREEK

REFERENCE: U-5887

PROJECT: N/A

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-8	BORE LOGS

PERSONNEL
A. BLACKMORE
ELITE TECHNIQUES

INVESTIGATED BY ECS SOUTHEAST, LLP
DRAWN BY K. DE MONTBRUN, P.E.
CHECKED BY M. WALKO, P.E.
SUBMITTED BY ECS SOUTHEAST, LLP
DATE JUNE 2020

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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.



Prepared in the Office of:

ECS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINEERING
FIRM # F-1078



DocuSigned by:

Kelly de Montbrun 6/25/2020

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SIGNATURE

DATE

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UNLESS ALL SIGNATURES COMPLETED**

**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, GRAV, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY 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	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5 A-6, A-7
SYMBOL													
% PASSING	#10 30 MX	#10 50 MX	#10 51 MN	#10 35 MX	#10 35 MX	#10 35 MX	#10 35 MX	#10 36 MN	#10 36 MN	#10 36 MN	#10 36 MN	GRANULAR SOILS	SILT-CLAY SOILS
MATERIAL PASSING #40	-	-	-	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	
LL	-	-	-	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	HIGHLY ORGANIC SOILS	
PI	-	6 MX	NP	10 MX	11 MN	10 MX	11 MN	10 MX	11 MN	10 MX	11 MN	HIGHLY ORGANIC SOILS	
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX				HIGHLY ORGANIC SOILS	
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	UNSUITABLE	
PI OF A-7-5 SUBGROUP IS ≤ 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							
GRAIN SIZE IN.	12	3											
SOIL MOISTURE - CORRELATION OF TERMS													
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION										
PLASTIC RANGE (PI)	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		0-5		VERY LOW									
SLIGHTLY PLASTIC		6-15		SLIGHT									
MODERATELY PLASTIC		16-25		MEDIUM									
HIGHLY PLASTIC		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. 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 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
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		SPT DPT VST PMT 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
			CONE PENETROMETER TEST
			TEST BORING WITH CORE
			SPT N-VALUE
RECOMMENDATION SYMBOLS			
	UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
	SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
			UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL
ABBREVIATIONS			
AR - AUGER REFUSAL	BT - BORING TERMINATED	CL - CLAY	CPT - CONE PENETRATION TEST
CSE - COARSE	DMT - DILATOMETER TEST	DPT - DYNAMIC PENETRATION TEST	e - VOID RATIO
F - FINE	FOSS - FOSSILIFEROUS	FRAC. - FRACTURED, FRACTURES	FRAGS. - FRAGMENTS
HI. - HIGHLY	MED. - MEDIUM	MICA. - MICACEOUS	MOD. - MODERATELY
NP - NON PLASTIC	ORG. - ORGANIC	PMT - PRESSUREMETER TEST	SAP. - SAPROLITIC
SD. - SAND, SANDY	SL. - SILT, SILTY	SLI. - SLIGHTLY	TCR - TRICONE REFUSAL
w - MOISTURE CONTENT	V - VERY	VST - VANE SHEAR TEST	WEA. - WEATHERED
W - UNIT WEIGHT	W _d - DRY UNIT WEIGHT	SAMPLE ABBREVIATIONS	
S - BULK	SS - SPLIT SPOON	ST - SHELBY TUBE	RS - ROCK
RT - RECOMPACTED TRIAXIAL	CBR - CALIFORNIA BEARING RATIO		
EQUIPMENT USED ON SUBJECT PROJECT			
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	
<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	
<input type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	
<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____	
<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -N _____	
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	HAND TOOLS:	
<input checked="" type="checkbox"/> 7822DT	<input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER	<input type="checkbox"/> POST HOLE DIGGER	
	<input type="checkbox"/> TRICONE _____ * STEEL TEETH	<input checked="" type="checkbox"/> HAND AUGER	
	<input type="checkbox"/> TRICONE _____ * TUNG.-CARB.	<input type="checkbox"/> SOUNDING ROD	
	<input type="checkbox"/> CORE BIT	<input type="checkbox"/> VANE SHEAR TEST	
		<input type="checkbox"/>	

PROJECT REFERENCE NO.	SHEET NO.
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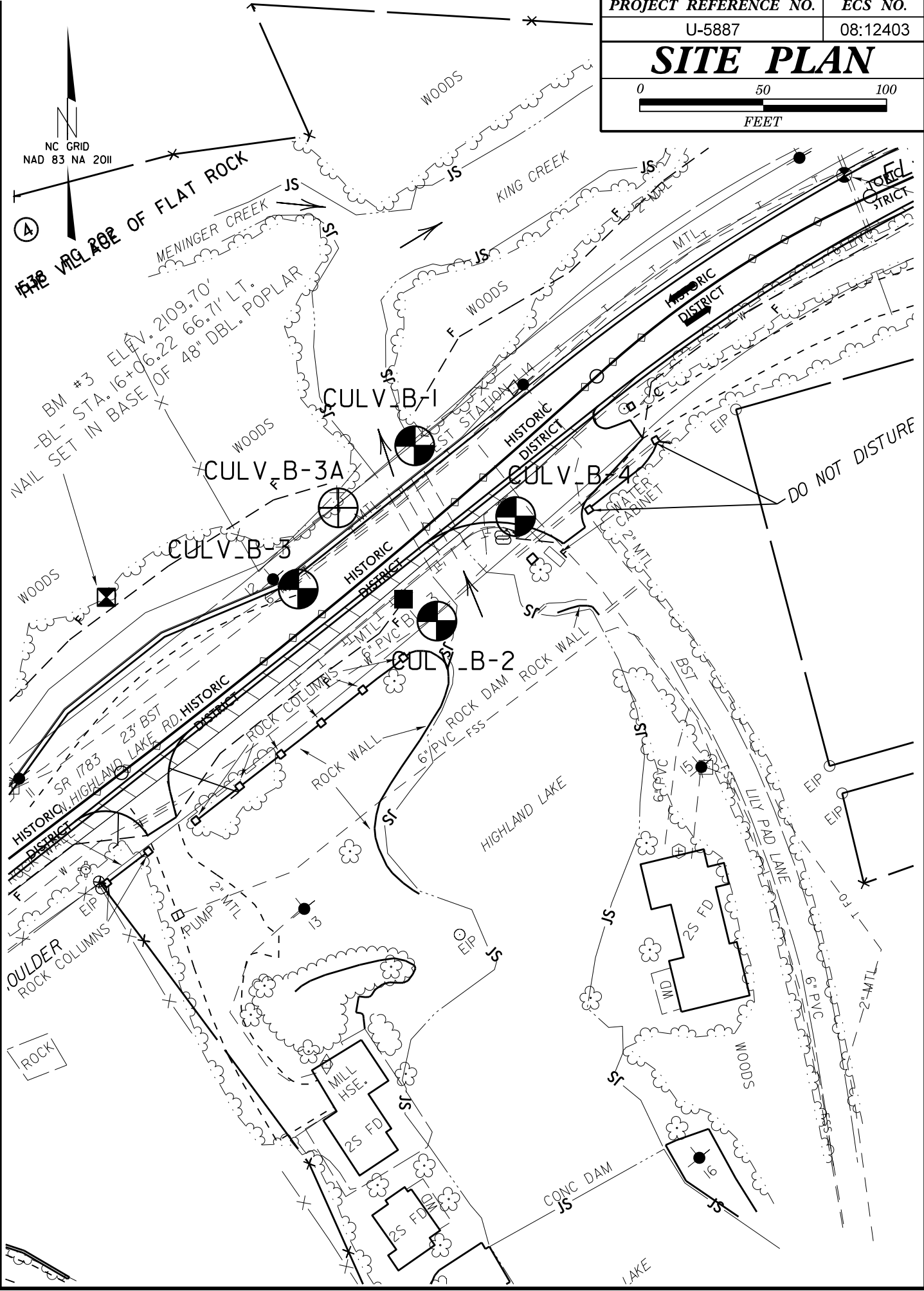
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
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ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>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:</p>		<p>ALLOUVIUM (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, SUCH 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 DISLODGED 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 (ROD) - 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 (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. 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 (SROD) - 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.</p>	
<p>WEATHERED ROCK (WR)</p> 	<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>		
<p>CRYSTALLINE ROCK (CR)</p> 	<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>		
<p>NON-CRYSTALLINE ROCK (NCR)</p> 	<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>		
<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> 	<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>		
WEATHERING			
<p>FRESH</p>	<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>		
<p>VERY SLIGHT (V SL.)</p>	<p>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.</p>		
<p>SLIGHT (SL.)</p>	<p>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.</p>		
<p>MODERATE (MOD.)</p>	<p>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.</p>		
<p>MODERATELY SEVERE (MOD. SEV.)</p>	<p>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></p>		
<p>SEVERE (SEV.)</p>	<p>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></p>		
<p>VERY SEVERE (V SEV.)</p>	<p>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></p>		
<p>COMPLETE</p>	<p>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.</p>		
ROCK HARDNESS			
<p>VERY HARD</p>	<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p>		
<p>HARD</p>	<p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p>		
<p>MODERATELY HARD</p>	<p>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.</p>		
<p>MEDIUM HARD</p>	<p>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.</p>		
<p>SOFT</p>	<p>CAN BE GROOVED 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.</p>		
<p>VERY SOFT</p>	<p>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.</p>		
FRACTURE SPACING		BEDDING	
<p>TERM</p>	<p>SPACING</p>	<p>TERM</p>	<p>THICKNESS</p>
<p>VERY WIDE</p>	<p>MORE THAN 10 FEET</p>	<p>VERY THICKLY BEDDED</p>	<p>4 FEET</p>
<p>WIDE</p>	<p>3 TO 10 FEET</p>	<p>THICKLY BEDDED</p>	<p>1.5 - 4 FEET</p>
<p>MODERATELY CLOSE</p>	<p>1 TO 3 FEET</p>	<p>THINLY BEDDED</p>	<p>0.16 - 1.5 FEET</p>
<p>CLOSE</p>	<p>0.16 TO 1 FOOT</p>	<p>VERY THINLY BEDDED</p>	<p>0.03 - 0.16 FEET</p>
<p>VERY CLOSE</p>	<p>LESS THAN 0.16 FEET</p>	<p>THICKLY LAMINATED</p>	<p>0.008 - 0.03 FEET</p>
		<p>THINLY LAMINATED</p>	<p>< 0.008 FEET</p>
INDURATION			
<p>FRIABLE</p>	<p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>		
<p>MODERATELY INDURATED</p>	<p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>		
<p>INDURATED</p>	<p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>		
<p>EXTREMELY INDURATED</p>	<p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		
<p>BENCH MARK: BM#3 STA. 16+06.22 66.71' LT</p>		<p align="right">ELEVATION: 2109.70 FEET</p>	
<p>NOTES: ROADWAY DESIGN FILES, .TIN, AND .GPK FILE PROVIDED BY V&M NORTHING AND EASTING OBTAINED USING A TRIMBLE GEO7X ELEVATIONS FOR CULVERT BORINGS OBTAINED USING BENCHMARK BM#3 (STA. 16+06.22 66.71' LT)</p>			
<p>DATE: 8-15-14</p>			

PROJECT REFERENCE NO.	ECS NO.
U-5887	08:12403
SITE PLAN	



GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP U-5887		COUNTY HENDERSON		GEOLOGIST A. Blackmore										
SITE DESCRIPTION SR 1783 (Highland Lake Road) Realignment from NC 225 to US 176							GROUND WTR (ft)									
BORING NO. CULV_B-1		STATION 22+58		OFFSET 23 ft LT		ALIGNMENT -L-	0 HR. 4.3									
COLLAR ELEV. 2,101.2 ft		TOTAL DEPTH 14.3 ft		NORTHING 576,840		EASTING 973,682	24 HR. 3.1									
DRILL RIG/HAMMER EFF./DATE ELI0046 Geoprobe 7822DT 91% 09/22/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER N. King		START DATE 10/03/18		COMP. DATE 10/03/18		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						
2105																
2100	2,101.2	0.0	16	3	3										2,101.2	0.0
	2,097.7	3.5	2	6	1											
2095	2,095.2	6.0	1	1	2											
	2,092.7	8.5	1	1	2											
2090	2,087.7	13.5	44	56	0.3										2,087.7	13.5
															2,086.9	14.3

NCDOT BORE SINGLE U-5887_GEO_BORELOGS(2).GPJ NC_DOT_GDT 6/24/20

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP U-5887		COUNTY HENDERSON		GEOLOGIST A. Blackmore											
SITE DESCRIPTION SR 1783 (Highland Lake Road) Realignment from NC 225 to US 176							GROUND WTR (ft)										
BORING NO. CULV_B-2		STATION 22+21		OFFSET 39 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 2,104.0 ft		TOTAL DEPTH 3.1 ft		NORTHING 576,769		EASTING 973,691											
DRILL RIG/HAMMER EFF./DATE EL10046 Geoprobe 7822DT 91% 09/22/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER N. King		START DATE 10/03/18		COMP. DATE 10/03/18		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							
2105																	
	2,104.0	0.0													2,104.0	GROUND SURFACE	0.0
			1	2	3	5						ROADWAY EMBANKMENT	
	2,101.0	3.0													2,101.0	Loose, Brown, Silty Fine to Coarse SAND (A-2-4), with little gravel	3.0
			60/0.1												2,100.9	CRYSTALLINE ROCK	3.1
																Brown (HENDERSON GNEISS)	
																Boring Terminated with Standard Penetration Test Refusal at Elevation 2,100.9 ft In Crystalline Rock (HENDERSON GNEISS)	
																Notes: Boring offset several times with refusal encountered at similar depths.	

NCDOT BORE SINGLE U-5887_GEO_BORELOGS(2).GPJ NC_DOT_GDT 6/24/20

GEOTECHNICAL BORING REPORT BORE LOG

WBS N/A	TIP U-5887	COUNTY HENDERSON	GEOLOGIST A. Blackmore
SITE DESCRIPTION SR 1783 (Highland Lake Road) Realignment from NC 225 to US 176			GROUND WTR (ft)
BORING NO. CULV_B-3	STATION 21+86	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,110.2 ft	TOTAL DEPTH 12.1 ft	NORTHING 576,782	EASTING 973,635
DRILL RIG/HAMMER EFF./DATE EL10049 Geoprobe 7822DT 99% 09/22/2018		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Latimer	START DATE 10/08/19	COMP. DATE 10/08/19	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						
2115																
2110														2,110.2	GROUND SURFACE	0.0
	2,108.7	1.5												2,108.9	Asphalt (0.7') Stone Base (0.6')	1.3
	2,106.7	3.5	17	18	10										ROADWAY EMBANKMENT Very Loose to Medium Dense, Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace gravel	
2105	2,104.2	6.0	9	2	1									2,104.7	RESIDUAL	5.5
	2,101.7	8.5	1	10	18									2,101.7	Medium Dense, Brown-White, Silty Fine to Coarse SAND (A-2-4)	8.5
2100	2,098.2	12.0	31	69/0.4										2,098.2	WEATHERED ROCK Brown (HENDERSON GNEISS)	12.0
			60/0.1											2,098.1	CRYSTALLINE ROCK Brown (HENDERSON GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,098.1 ft In Crystalline Rock (HENDERSON GNEISS)	12.1

NCDOT BORE SINGLE U-5887_GEO_BORELOGS(2).GPJ NC_DOT.GDT 6/24/20

Notes:
Boring Offset from Original Location Due to Utility Conflict and Accessibility Issues

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP U-5887		COUNTY HENDERSON		GEOLOGIST A. Blackmore											
SITE DESCRIPTION N/A							GROUND WTR (ft)										
BORING NO. CULV_B-3A		STATION 22+19		OFFSET 22 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 2,102.0 ft		TOTAL DEPTH 3.5 ft		NORTHING 576,815		EASTING 973,651											
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE N/A											
DRILLER N/A		START DATE 01/28/20		COMP. DATE 01/28/20		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							
2105																	
															2,102.0	GROUND SURFACE	0.0
2100														M M W		ALLUVIAL Brown, Silty Fine to Coarse SAND (A-2-4)	
															2,098.5	Boring Terminated by Auger Refusal at Elevation 2,098.5 ft In Alluvial Silty SAND (A-2-4)	3.5
																Notes: Bridge rod driven at Hand Auger location. Bridge rod refusal at a depth of 5 feet (Elevation 2097.0 ft). Hard driving below 4 feet.	

NCDOT BORE SINGLE U-5887_GEO_BORELOGS(2).GPJ NC_DOT.GDT 6/24/20

GEOTECHNICAL BORING REPORT BORE LOG

WBS N/A	TIP U-5887	COUNTY HENDERSON	GEOLOGIST A. Blackmore
SITE DESCRIPTION SR 1783 (Highland Lake Road) Realignment from NC 225 to US 176			GROUND WTR (ft)
BORING NO. CULV_B-4	STATION 22+73	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 2,111.2 ft	TOTAL DEPTH 4.3 ft	NORTHING 576,811	EASTING 973,723
DRILL RIG/HAMMER EFF./DATE EL10049 Geoprobe 7822DT 99% 09/22/2018		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Latimer		START DATE 10/09/19	COMP. DATE 10/09/19
		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2115																
2110	2,110.7	0.5														
	2,107.7	3.5	6	7	9											
	2,106.9	4.3	100/0.3							100/0.3						
			60/0.0							60/0.0						

GROUND SURFACE 2,111.2 0.0

Asphalt (0.3')

ROADWAY EMBANKMENT

2,107.7 Medium Dense, Brown, Silty Fine to Coarse 3.5

2,106.9 SAND (A-2-4), with trace gravel 4.3

WEATHERED ROCK

Brown (HENDERSON GNEISS)

Boring Terminated with Standard Penetration Test Refusal at Elevation 2,106.9 ft On Crystalline Rock (HENDERSON GNEISS)

NCDOT BORE SINGLE U-5887_GEO_BORELOGS(2).GPJ NC_DOT.GDT 6/24/20