

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-430187	1	8

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY HAYWOOD
 PROJECT DESCRIPTION CULVERT NO. 430187 OVER
MARTINS CREEK ON SR 134I
(MARTINS CREEK ROAD)

REFERENCE: SF-430187

PROJECT: BPI4.R002

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
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PERSONNEL
GUTOWSKI, S. W.
RUMMAGE, E.

INVESTIGATED BY GUTOWSKI, S. W.
 DRAWN BY FIELDS, W. D.
 CHECKED BY PLUMMER, K. R.
 SUBMITTED BY RIGGS, Jr., A. F.
 DATE DECEMBER 2023

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2701 WESTPORT ROAD,
 CHARLOTTE, NORTH CAROLINA 28208
 NC REGISTERED ENGINEERING FIRM F-0869
 NC REGISTERED GEOLOGIC FIRM C-367



DocuSigned by:
Abner Riggs Jr. 12/11/2025
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SIGNATURE DATE
**DOCUMENT NOT CONSIDERED FINAL
 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 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-4, A-5	
SYMBOL	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7		A-7-5, A-7-6	A-3	A-6, A-7	
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN
MATERIAL PASSING #40 LL PI	- 6 MX	- NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	
GROUP INDEX	0	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 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

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		

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

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
			SLOPE INDICATOR INSTALLATION
			CONE PENETROMETER TEST
			SOUNDING ROD
			TEST BORING WITH CORE
			SPT N-VALUE

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.)							

RECOMMENDATION SYMBOLS			
	UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
	SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
	UNCLASSIFIED EXCAVATION - ACCEPTABLE		UNCLASSIFIED EXCAVATION - ACCEPTABLE IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

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	SLL. - 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	

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
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

EQUIPMENT USED ON SUBJECT PROJECT		
DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> CME-550 (HPC2473)	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6' CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE 2 1/2" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG-CARB. <input type="checkbox"/> CORE BIT <input checked="" type="checkbox"/> HOLLOW STEM AUGERS	HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____ HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST

PLASTICITY		
	PLASTICITY INDEX (PI)	DRY STRENGTH
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.		

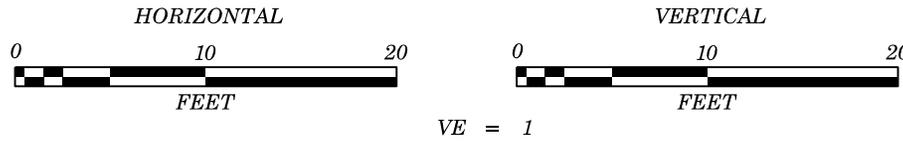
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**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 2 OF 2)**

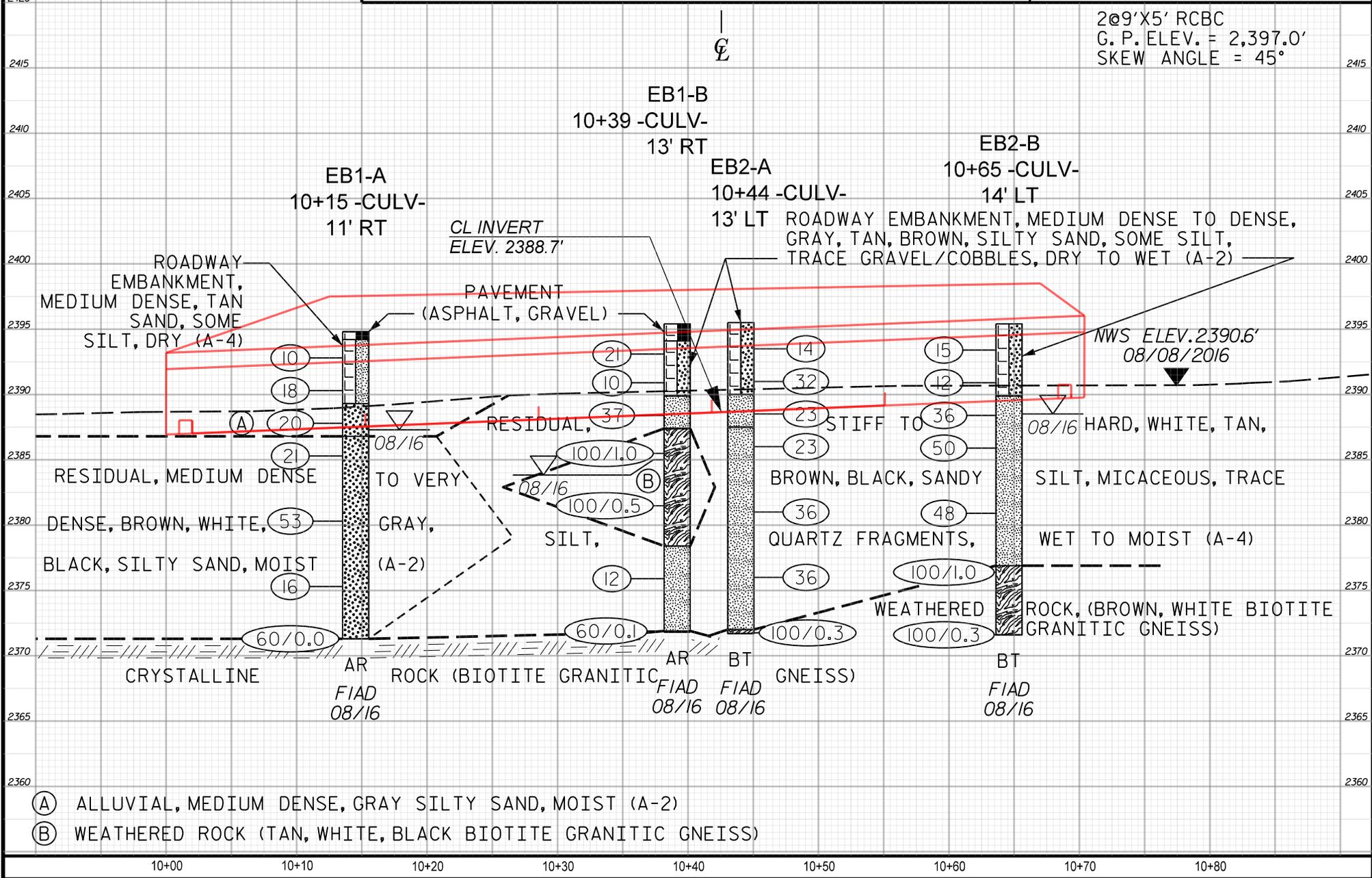
ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 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>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, 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 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.</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>VERY WIDE</p> <p>WIDE</p> <p>MODERATELY CLOSE</p> <p>CLOSE</p> <p>VERY CLOSE</p>	<p>SPACING</p> <p>MORE THAN 10 FEET</p> <p>3 TO 10 FEET</p> <p>1 TO 3 FEET</p> <p>0.16 TO 1 FOOT</p> <p>LESS THAN 0.16 FEET</p>	<p>TERM</p> <p>VERY THICKLY BEDDED</p> <p>THICKLY BEDDED</p> <p>THINLY BEDDED</p> <p>VERY THINLY BEDDED</p> <p>THICKLY LAMINATED</p> <p>THINLY LAMINATED</p>	<p>THICKNESS</p> <p>4 FEET</p> <p>1.5 - 4 FEET</p> <p>0.16 - 1.5 FEET</p> <p>0.03 - 0.16 FEET</p> <p>0.008 - 0.03 FEET</p> <p>< 0.008 FEET</p>
INDURATION			
<p>FRIABLE</p> <p>ROCK 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: EXISTING GROUND AND TOP OF BORING ELEVATIONS ESTIMATED USING PROVIDED DTM FILE CONVERTED TO TIN FILE: 430187_Is_tin.tin, DATED: 11/08/23 ELEVATION: N/A FEET</p>			
<p>NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>			

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -CULV- TAKEN FROM THE PROVIDED PROJECT TIN FILE (430187_ls_tin.tin) DATED 11/08/2023.



PROJECT REFERENCE NO.	SHEET NO.
SF-430187	4

CENTERLINE PROFILE ALONG CULVERT AT STA. 12+71.14 -L187-



- (A) ALLUVIAL, MEDIUM DENSE, GRAY SILTY SAND, MOIST (A-2)
- (B) WEATHERED ROCK (TAN, WHITE, BLACK BIOTITE GRANITIC GNEISS)

10+00 10+10 10+20 10+30 10+40 10+50 10+60 10+70 10+80

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.14.R.173	TIP SF-430187	COUNTY HAYWOOD	GEOLOGIST Gutowski, S.
SITE DESCRIPTION CULVERT NO. 430187 OVER MARTINS CREEK ON SR 1341 (MARTINS CREEK ROAD)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 12+42	OFFSET 10 ft LT	ALIGNMENT -L187-
COLLAR ELEV. 2,394.8 ft	TOTAL DEPTH 23.5 ft	NORTHING 725,749	EASTING 818,143
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015			DRILL METHOD H.S. Augers
DRILLER Rummage, E.			HAMMER TYPE Automatic
START DATE 08/31/16		COMP. DATE 08/31/16	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					
2395														GROUND SURFACE	0.0
	2,393.8	1.0	6	4	6									PAVEMENT (2.5" ASPHALT, 5" GRAVEL)	0.5
	2,391.3	3.5	16	12	6									ROADWAY EMBANKMENT	
2390														MEDIUM DENSE, TAN SAND, SOME SILT (A-4)	
	2,388.8	6.0	8	6	14									ALLUVIAL	5.5
	2,386.3	8.5	8	5	16									MEDIUM DENSE, GRAY SILTY SAND (A-2)	8.0
2385														RESIDUAL	
	2,381.3	13.5	14	23	30									MEDIUM DENSE TO VERY DENSE, BROWN, WHITE, GRAY, BLACK SILTY SAND (A-2)	
2380															
	2,376.3	18.5	6	6	10										
2375															
	2,371.3	23.5	60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 2,371.3 ft ON CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	23.5

NCDOT BORE SINGLE HAYWOOD COUNTY BRIDGE #187.GPJ NC_DOT.GDT 12/7/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.14.R.173	TIP SF-430187	COUNTY HAYWOOD	GEOLOGIST Gutowski, S.
SITE DESCRIPTION CULVERT NO. 430187 OVER MARTINS CREEK ON SR 1341 (MARTINS CREEK ROAD)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+60	OFFSET 7 ft RT	ALIGNMENT -L187-
COLLAR ELEV. 2,395.4 ft	TOTAL DEPTH 23.6 ft	NORTHING 725,762	EASTING 818,164
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015			DRILL METHOD H.S. Augers
DRILLER Rummage, E.		START DATE 08/31/16	COMP. DATE 08/31/16
SURFACE WATER DEPTH N/A			

DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rummage, E.	START DATE 08/31/16	COMP. DATE 08/31/16
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					
2400															
2395	2,394.1	1.3												2,395.4	0.0
	2,391.9	3.5	4	3	18								M	2,394.1	1.3
2390	2,389.4	6.0	8	5	5								W		
	2,387.4	8.5	18	27	10								W	2,389.9	5.5
2385	2,386.9	8.5	10	30	70									2,387.4	8.0
	2,381.9	13.5	100/0.5												
2380	2,376.9	18.5	5	5	7								M	2,378.4	17.0
2375	2,371.9	23.5	60/0.1											2,371.9	23.5
														2,371.8	23.6

NCDOT BORE SINGLE HAYWOOD COUNTY BRIDGE #187.GPJ NC_DOT.GDT 12/7/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.14.R.173	TIP SF-430187	COUNTY HAYWOOD	GEOLOGIST Gutowski, S.
SITE DESCRIPTION CULVERT NO. 430187 OVER MARTINS CREEK ON SR 1341 (MARTINS CREEK ROAD)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 12+82	OFFSET 7 ft LT	ALIGNMENT -L187-
COLLAR ELEV. 2,395.5 ft	TOTAL DEPTH 23.8 ft	NORTHING 725,786	EASTING 818,153
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rummage, E.	START DATE 08/31/16	COMP. DATE 08/31/16	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					
2400															
2395	2,394.5	1.0	7	7	7									2,395.5	0.0
	2,392.0	3.5	9	17	15										
2390	2,389.5	6.0	47	15	8									2,390.0	5.5
	2,387.0	8.5	5	11	12									2,387.5	8.0
2385															
	2,382.0	13.5	6	12	24										
2380															
	2,377.0	18.5	7	14	22										
2375															
	2,372.0	23.5												2,372.0	23.5
			100/0.3											2,371.7	23.8

NCDOT BORE SINGLE HAYWOOD COUNTY BRIDGE #187.GPJ NC_DOT.GDT 12/7/23

