Ö REFERENCE

**CONTENTS** 

**DESCRIPTION** TITLE SHEET

LEGEND (SOIL & ROCK)

SITE PLAN

PROFILES BORE LOGS

SHEET NO.

4-5

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### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION BRIDGE NO. 202 ON -L- (SR 1357) OVER MULBERRY BRANCH AT STA. 14+60.00

STATE PROJECT REFERENCE NO. B-5540 8

### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. 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 (1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU LIKEN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE DESTREY DATA THE VIEW OF THE STANDARD TEST METHOD. THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY YARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS,

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HINSELF AS TO CONDITIONS TO BE ENCOUNTERED OF PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- IES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  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.

PERSONNEL C.J. CORNETTE R.E. SMITH J.M. EDMONDSON INVESTIGATED BY \_\_T.C. BOTTOMS DRAWN BY \_C.J. CORNETTE

DATE SEPTEMBER 2018

Jyler Bottoms 10/22/2018 -48A2D3BD08CF4A6 SIGNATURE DATE DOCUMENT NOT CONSIDERED FINAL

**UNLESS ALL SIGNATURES COMPLETED** 

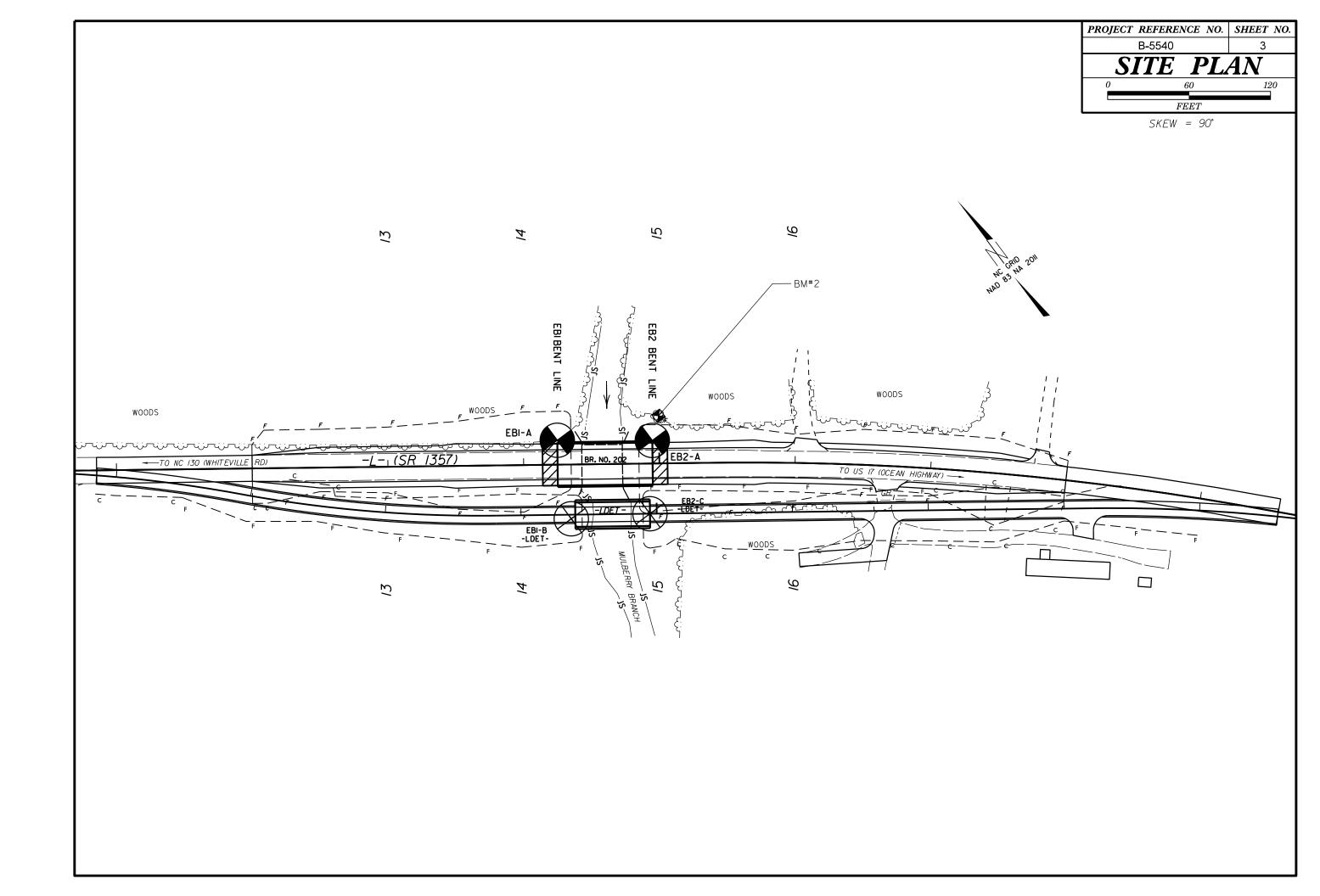
PROJECT REPERENCE NO. SHEET NO. 2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS	
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	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.	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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.	
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.	
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.	
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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.	
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED // NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT	
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTALLINE CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND	
CLASS. (\$ 35% PASSING "200) (> 35% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.	
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-4 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM	
SYMBOL 0000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.	
7. PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.	
■10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT	
#40 38 MX 58 MX 51 MN SOLLS SOLUS SO	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.	
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.	
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE	
LL 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.	
GROUP INDEX 8 8 8 4 4 MX 8 MX 12 MX 16 MX NO MX AND SOLLS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE	
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	√     WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.	
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	lacktright Static water level after $24$ hours	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM	
CEN PATING		(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.	
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.	
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.	
CONSISTENCY OR DENSENESS  RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.	
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO	
(N-VALUE) (TUNS/FT=)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES  SEL COURSES  SE	SEVERE 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	ITS LATERAL EXTENT.	
GENERALLY VERY LOOSE < 4 TO 10 GRANULAR LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  SCOPE INDICATOR  INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.	
MATERIAL DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.	
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE	
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) 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 &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.	
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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	
MATERIAL   STIFF   8 TO 15   1 TO 2	PIEZOMETER COT NO VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE	
HARD > 30 > 4	INSTRUCTUTION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT	
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.	
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	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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	
COARSE FINE	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.	
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT	
(LSE, SU.) (F SU.)	ABBRE VIATIONS  AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF	
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL	
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.	
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY	
(ATTERBERG LIMITS) DESCRIPTION COME FOR TIELD MOISTONE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.	
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY  (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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	
(SAT.) FROM BELOW THE GROUND WATER TABLE  LL _ LIOUID LIMIT	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
PLASTIC   SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING		
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BM #2 N: 88063, E: 2182891	
- MOIST - (M) SOLIDAAT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 17.36 FEET	
OM _ OPTIMUM MOISTURE SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:	
- DRY - (D) REQUIRES ADDITIONAL WATER TO	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE	10123	
ATTAIN OPTIMUM MOISTURE	CME-55 6° CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET		
PLASTICITY	□ B'HOLLOW AUGERS □ -H □ -	INDURATION		
PLASTICITY INDEX (PI)  DRY STRENGTH	L CME-550 L HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS;		
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;		
COLOR	PORTABLE HOIST X TRICONE 2 15/6 STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.		
	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.		
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14	



		DDOEUE	TUDOUCU	DODINGS		·	ALONG		PROJECT REFERENCE NO.  B-5540  ROADWAY DESIGN ENGINEER	SHEET  4  HYDRAULICS ENGINEER	<b>4</b>
		PRUFILE		BURINGS			) ALONG -L-		INCOMPLET DO NOT USE FOR RA	E PLANS	3
20			EBI-A 14+25		EB2-		<b>▼</b> *				
			- [8' LT - 6] 「原	N.	, = 17' L (8) = 1		LOOSE TAN SAND, MOIST TO		DOCUMENT NOT CO UNLESS ALL SIGNAT		
10	VERY LOOSE TO LOOSE BROWN MOIST TO SATURATED (ROADWA	AND TAN SAND AY EMBANKMENT)		SURFACE V	/		SATURATED-KROADWAY-EMBANK	ME-N-T -)	V.E.		- -
10	VERY SOFT BROWN SANDY WOOD FRAGMENTS, WET (A	CLAY WITH	WOH	WATER	(13)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					L
<del>-</del>			3		2			. OF	ROXIMATE ELEVATI ARTESIAN HEAD	ION	
.0	VERY L'OO	SE TO MEDIUM (	DENSE TAN S	AND WITH WOOD F	RAGMENTS,	0000	MOIST TO SATURATED (ALLUV	IAL)			_(
	LOOSE GRAY SILTY SATURATED (PEEDE		9		32		HARD GRAY SANDY CLAY WITH LAYERS, WET (PEEDEE FORMA			; ; ; ;	
-10	SATGINATED VIELDE		(12)		(12)			10107			-
<del> </del>			(13)		(13)				<u> </u>		
-20	STIFF	TO HARD GRAY	SANDY AND C	LAYEY SILT WITH	L I MESTONE	Ļ	AYERS, WET (PEEDEE FORMA	I ON )			
			(51)	ļ	(13)					 	
-30			(25)		(12)				<del></del>		
			(76)				HARD GRAY LIMESTONE (PEEDEE FORMATION)				
-40	MEDIUM DENSE	TO DENSE GRAY	(25) AND	GREEN SAND WITH	SHELL 35		FRAGMENTS		<u></u>		
 	,	AND LIMESTONE	L	AYERS, SATURATE	D		(PEEDEE FORMATION)				
-50			· <b></b>	RD GRAY LIMESTO EEDEE FORMATION	· · · · · · · · · · · · · · · · · · ·					-	
			00/0.3 FIAD		(00/0.2)						•
-60				MEDIUM DENSE G	RAY SAND		WITH SHELL AND LIMESTONE				
-00				FRAGMENTS, SAT		`°°°°	(PEEDEE FORMATION)	NOTE: GROUNDLINE TAKEN FROM BRIDGE HYDRAULIC DESIGN	PROFILE ALONG	7	
							GRAY LIMESTONE	NOTE: INFERRED ST THROUGH THE BORIN PROJECTED ONTO TH			,
1 1 1		14	1 1				DEE FORMATION)		16		-

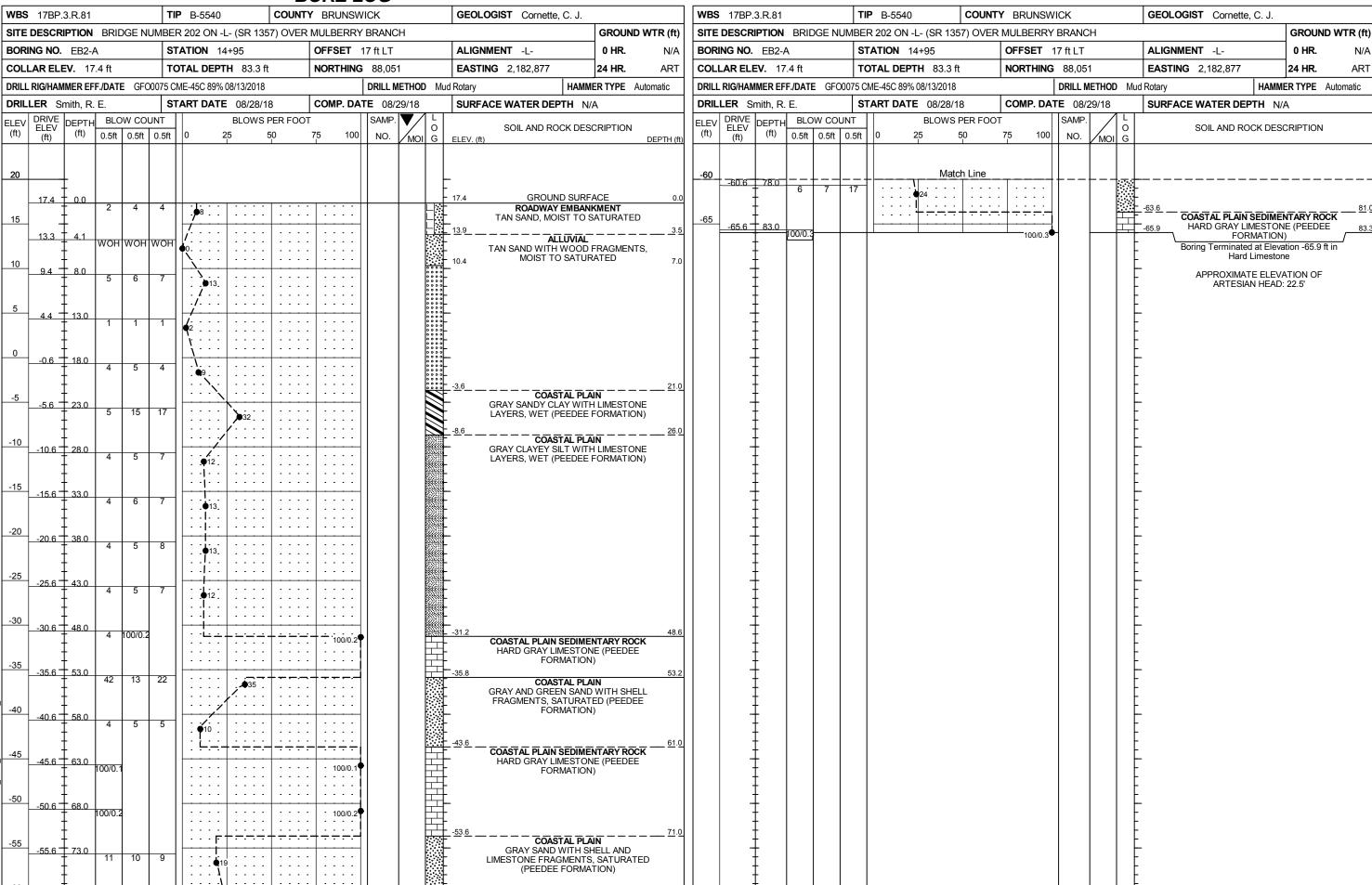
	PROFILE	THROUGH BORINGS PRO	JECTED ALONG -LDET-	B-5540 5  ROADWAY DESIGN HYDRAULICS ENGINEER  INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
	-SAMPLE- NO. S- 1 3' RT	THE CENTER   CENTER   C.B.III   F.B.III	LTS	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED V.E. = 2
20		EBI-B -LDET- 	EB2-C -LDET- -(4+95 CL	20
1.0		B SURFACE  O8/18 SURFACE  WATER	—————————————————————————————————————	10
0		LOOSE GRAY SAND, MOIST	TO SATURATED (ALLUVIAL)	0
		(A)LOOSE GRAY SAND, MOIST	TO SATURATED (ALLUVIAL)	
			TH TRACE ORGANIC MATERIAL, WET (ALLUVI)	AL)
		CVERY_SOFT_GRAY_SANDY_CL	AY • WET (ALLUVIAL)	
				NOTE: GROUNDLINE PROFILE ALONG -LDET-
				NOTE: GROUNDLINE PROFILE ALONG -LDET- TAKEN FROM BRIDGE SURVEY AN HYDRAULIC DESIGN REPORT DATED 08/13/201 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE
	14		15	PROJECTED ONTO THE PROFILE

### GEOTECHNICAL BORING REPORT BORE LOG

									1		CL				1		$\overline{}$
WBS	17BP.	3.R.81			TI	<b>P</b> B-554	10		COUNT	<b>Y</b> BF	RUNSW	/ICK			GEOLOGIST Cornette, C. J.		
SITE	DESCR	IPTION	BRII	OGE N	UMBE	R 202 OI	۱-L-	(SR 135	7) OVEF	MUL	BERRY	BRANC	Н			<b>GROUND WTR</b>	(ft)
BORI	NG NO.	EB1-A	4		S <sup>-</sup>	TATION	14+2	25		OFF	SET	18 ft LT			ALIGNMENT -L-	0 HR.	N/A
COLL	AR ELE	<b>EV</b> . 17	.4 ft		T	OTAL DE	PTH	68.8 ff	t	NOF	RTHING	88,09	3		<b>EASTING</b> 2,182,821	<b>24 HR</b> . FI	IAD
				F GFC		ME-45C 8				1		DRILL N		) M::/	<u> </u>	R TYPE Automati	
	LER E					TART DA			0	CON	ND DV.	TE 08/:		, ivia	SURFACE WATER DEPTH N/A		
	DD11/E			W CO					PER FOO		MF. DA	SAMP.		1 L T	SORFACE WATER BEFTH N/F	`	
ELEV (ft)	ELEV	DEPTH (ft)	0.5ft		_	0	25		50	75	100	NO.	17	0	SOIL AND ROCK DESC		
` '	(ft)	. ,	0.510	0.511	0.511	H				-,0	100	INO.	MOI	G	ELEV. (ft)	DEPT	ΓΗ (ft)
20		-												-	-		
	- 17.4	0.0													17.4 GROUND SURFA	CE	0.0
	- 17	- "."	2	3	3	<b>6</b>									ROADWAY EMBANK BROWN AND TAN SAND	MENT	
15	-	ŀ				<del>                                   </del>	+		<del> </del>	+-					SATURATED	, IVIOIST TO	
	13.2	4.2	1	2	1	<u> </u>				-   -				나라			
10	-	Ī				7.3	-		: : :	] ]					10.4		7.0
	9.4	8.0	WOH	WOH	WOH	<u> </u>	-								ALLUVIAL BROWN SANDY CLAY W	ITH WOOD	
	-	‡				<b>T</b> <sup>0</sup>				:   :					FRAGMENTS, W	ET	11.0
5							•			-   -					ALLUVIAL		
	4.4	13.0	2	2	1		-			.   .				0000	TAN SAND WITH WOOD F SATURATED	RAGMENTS,	
	-	ļ				ĭ̈́ : :	-							0000			
0	-0.6	18.0				`	-			-   -					-		
	- 0.0	10.0	7	4	4	; <b>∳</b> 8 ;				:   :							
	-	Ĺ				H :\:::	-			-   -				0000	3.6		21.0
-5	-5.6	23.0					-		+	-				I III	COASTAL PLAI GRAY SILTY SAND, SA		
	-	ļ	2	5	4	. <b>•</b> 9 .									(PEEDEE FORMAT	ION)	
4.0	-	‡				] : [ ]	-								8.6		<u>26.0</u>
-10	-10.6	28.0	4	5	7	<del>    .</del>	$\pm$		+	+-				Mt	GRAY SANDY SILT WITH	LIMESTONE	
	-	-	-	3	'	₱1	2.			-   -				₩	LAYERS, WET (PEEDEE F	ORMATION)	
-15	-	F				::: :	-		: : :	] ]				F.			
	-15.6	33.0	5	6	7									III.	-		
	-	<u> </u>				<b>•</b> 1 	3.			:   :							
-20	-						<u>·                                     </u>	<u> </u>	1	<u>:                                    </u>				<b>L</b>	_		
	-20.6	38.0	4	7	44			`.`,	51	-   -				₽			
	-	F					-	/	1	] ]				₩F			
-25	-25.6	43.0					-	· · / · ·	ļ					<b> </b>	-		
		10.0	4	14	11	:::	. •2	5		:   :							
	-	<u> </u>				: : :			] : : :	-   -				<b>i</b> t			
-30	-30.6	48.0	40	00		<u> </u>	+			+-					-		
	-	F	19	68	8		-			76				F			
-35	-	ļ.					-	· · · · .	<u> </u>		: : :						
-33	-35.6	53.0	42	10	15	: : :		<u> </u>		-					-35.9 COASTAL BLAL		53.3
	-	ţ		. ,		: : :	<b>, P</b> <sup>2</sup>	5		:   :	: : :			:::: <u> </u>	<b>COASTAL PLAI</b> GRAY AND GREEN SAND	WITH SHELL	
-40	-	<u> </u>					<i>/</i> -		<u> </u>					₿₿₿	FRAGMENTS AND LIMESTO SATURATED (PEEDEE FO		
	-40.6	58.0	5	5	6	. 21	$\cdot \top$				]						
	-	F				: Ț'	<u>:</u>		<u> </u>	] :	<u> </u>				-43.6		61.0
-45	-45.6 <sup>-</sup>	63.0					<u> </u>		T	77				岸	COASTAL PLAIN SEDIMEN HARD GRAY LIMESTONI	TARY ROCK	-7
	<del>-4</del> 3.0 -	03.0	60/0.1	1		: : :				:   :	-60/0.1	<u>'</u>		団	FORMATION)		
	-	ł					-			-   -				H			
-50	-50.6	68.0			]		-		<del>                                     </del>	+-				臣			
-	-		21	100/0.3	1	11	•		1	-   -	100/0.3	<b>뉘</b>	<u> </u>	H	-51.4 Boring Terminated at Eleva		68.8
	-	‡													Hard Limestone		
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### GEOTECHNICAL BORING REPORT BORE LOG



### GEOTECHNICAL BORING REPORT BORE LOG

	BORE L							
<b>WBS</b> 17BP.3.R.81	IP B-5540 COUNTY BRUNSV	VICK	<b>GEOLOGIST</b> Cornette, C. J.		<b>WBS</b> 17BP.3.R.81	<b>TIP</b> B-5540 <b>COU</b>	JNTY BRUNSWICK	GEOLOGIST Cornette, C. J.
SITE DESCRIPTION BRIDGE NUMBE	ER 202 ON -L- (SR 1357) OVER MULBERRY	/ BRANCH		GROUND WTR (ft)	SITE DESCRIPTION BRIDGE NU	UMBER 202 ON -L- (SR 1357) OV	/ER MULBERRY BRANCH	GROUND WTR (ft)
BORING NO. EB1-B-LDET- S	TATION 14+37 OFFSET	3 ft RT	ALIGNMENT -LDET-	<b>0 HR</b> . N/A	BORING NO. EB2-C -LDET-	STATION 14+95	OFFSET CL	ALIGNMENT -LDET- 0 HR. N/A
COLLAR ELEV. 11.9 ft	OTAL DEPTH 6.0 ft NORTHING	88,040	<b>EASTING</b> 2,182,794	<b>24 HR.</b> 1.4	COLLAR ELEV. 12.8 ft	TOTAL DEPTH 6.0 ft	NORTHING 88,008	<b>EASTING</b> 2,182,843 <b>24 HR.</b> 2.2
DRILL RIG/HAMMER EFF./DATE GF00075 C	CME-45C 89% 08/13/2018	DRILL METHOD Hand	Auger HAMM	ER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE GFO	0075 CME-45C 89% 08/13/2018	DRILL METHOD	D Hand Auger HAMMER TYPE Automatic
	TART DATE 08/28/18 COMP. DA		SURFACE WATER DEPTH N/A	Ά	DRILLER Smith, R. E.	START DATE 08/28/18	COMP. DATE 08/28/18	SURFACE WATER DEPTH N/A
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	BLOWS PER FOOT 0 25 50 75 100	SAMP. L O NO. MOI G	SOIL AND ROCK DESC	CRIPTION DEPTH (ft)	ELEV (ft) DEPTH BLOW COU	JNT BLOWS PER F0  0.5ft 0 25 50	75 100 SAMP. MOI	L O SOIL AND ROCK DESCRIPTION G
15			OPOUND OUR	A05	15			
10		S-1	11.9 GROUND SURF,  ALLUVIAL  GRAY SAND, MOIST TO:  BROWN SANDY SILT W 7.4 ORGANIC MATERIA	SATURATED 2.5	10		· ·   · · · · ·     <b>V</b>	
NCDOT BORE DOUBLE B5540_GEO_BRDG.GPJ NC_DOT.GDT 9/17/18			ORGANIC MATERIA 5.9 GRAY SANDY CLAY GRAY SAND, SATU Boring Terminated at Elev Loose Sand	NL, WET				Boring Terminated at Elevation 6.8 ft in Loose Sand  Loose Sand