Ö REFERENCE

CONTENTS

DESCRIPTION

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS SITE PHOTOGRAPHS

SHEET NO.

59

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION REPLACE BRIDGE NO. 090065

ON NC 87 (MACO ROAD) OVER

BATARORA BRANCH

SITE DESCRIPTION STA. 18 + 30 - L-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5642	1	6

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 1999 707-6550. 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 BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IMP-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS NIDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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 DEPENDENT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE COTAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:

 1. 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.

 2. BY HAVIOR 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 RUSSEK, S. C. STUDNICKY, R. T. MOODY, J. R. INVESTIGATED BY _RUSSEK, S. C. FIELDS, W.D. DRAWN BY NASH, A. A. CHECKED BY RIGGS, Jr., A. F.

SEPTEMBER 2019





11/8/2019 Uhur F. Kiggs, . —5228073BBAHGNATURE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

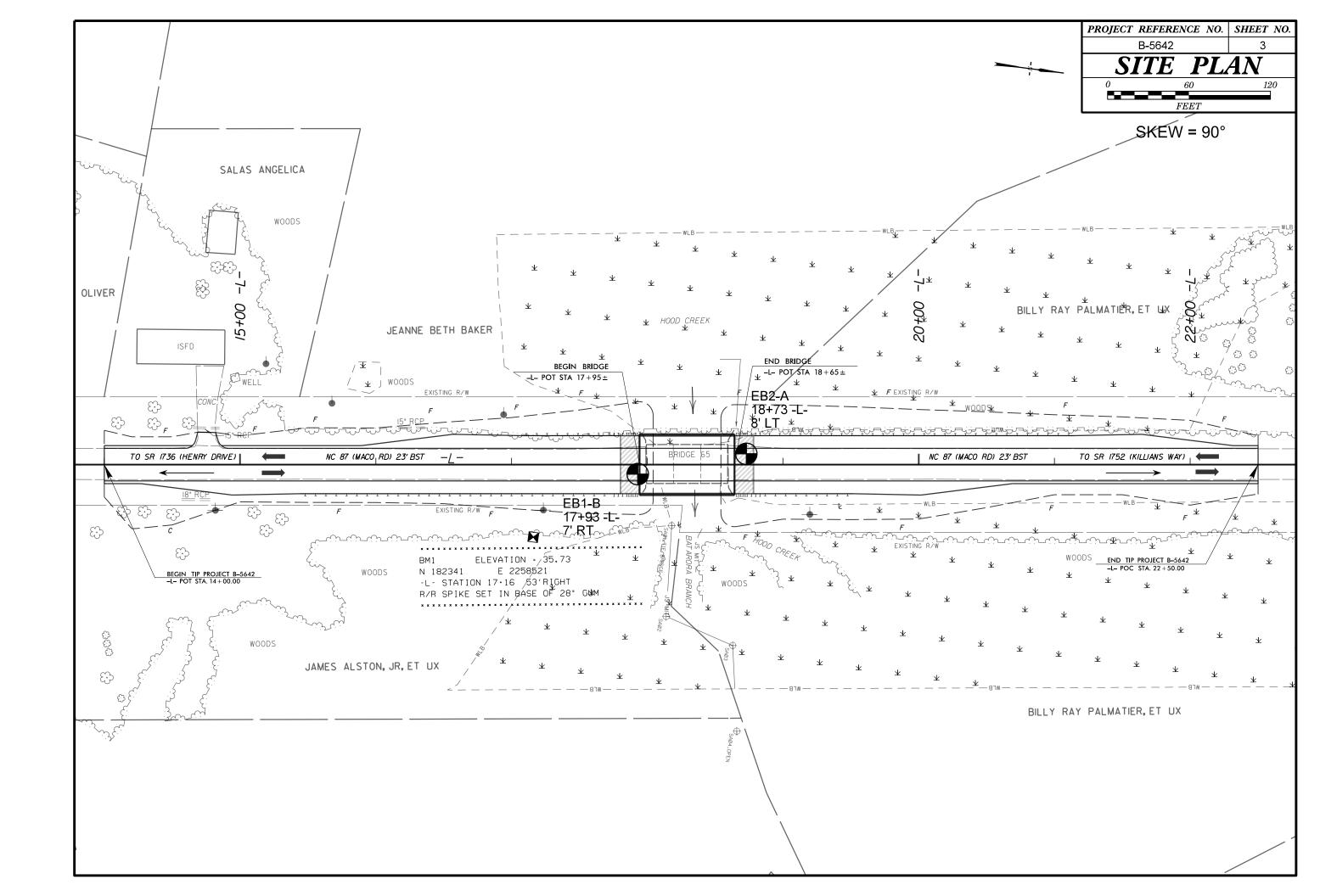
PROJECT REFERENCE NO. SHEET NO. 2

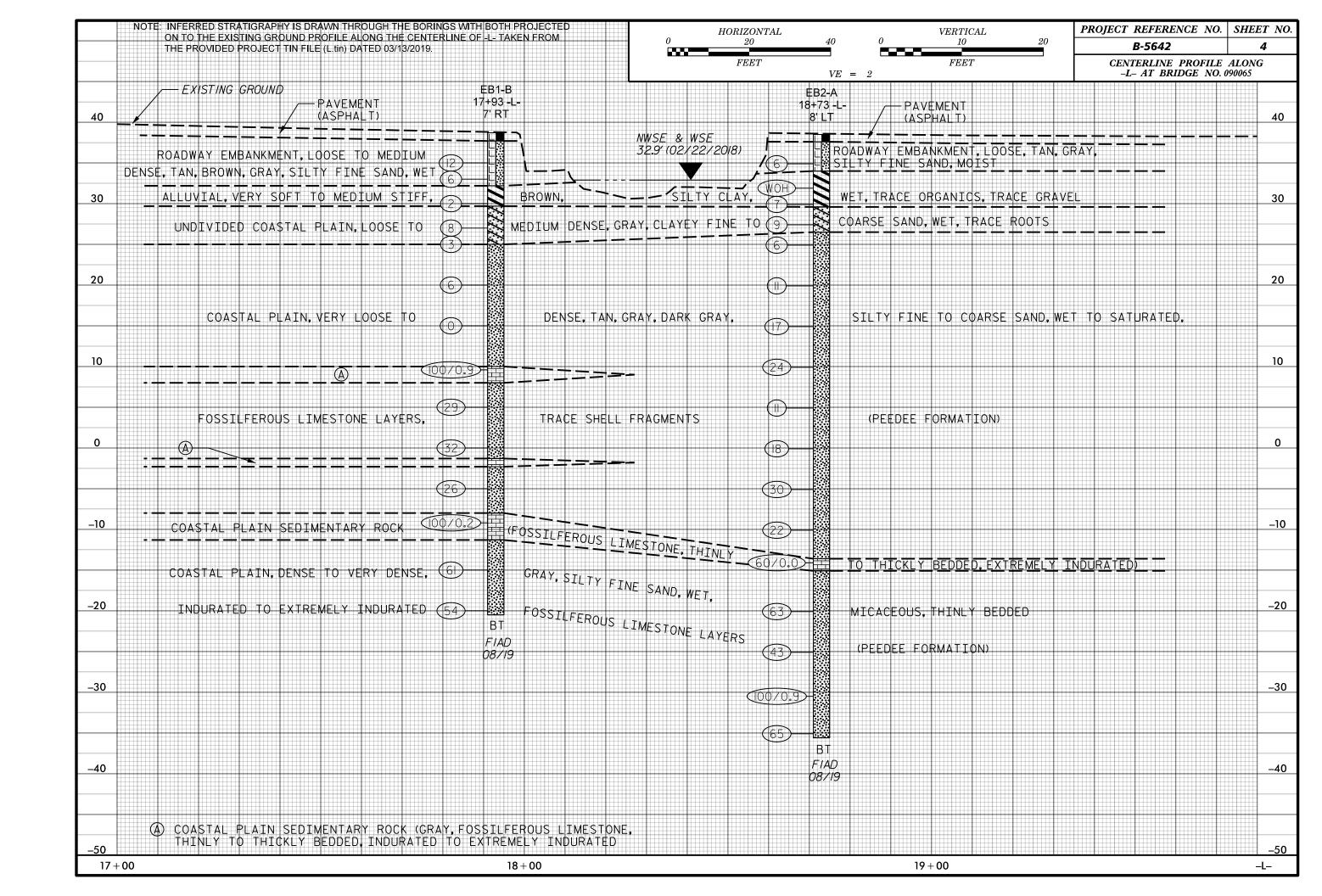
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUYIUM (ALLUY,) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.				
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	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.				
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.				
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING				
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:	WEATHERED WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.				
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT				
CENERAL CRANILLAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	CONSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND				
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	ROCK (CP) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	SURFACE.				
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	DNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.				
CLASS. 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	COMPRESSIBILITY	POCK (NICE) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM				
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.				
000000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	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.				
7. PASSING	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.					
*40 30 MX 50 MX 51 MN S0ILS SOILS SOILS SOILS	GRANULAR SILT - CLAY	WEATHERING	<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.				
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE				
MATERIAL DAGGING ALG	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%, LITTLE ORGANIC MATTER 3 - 5%, 5 - 12%, LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.				
PASSING *40 40 MX 41 MN	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, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE				
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.				
CODID INDEX A A A A A A A A A A A A A A A A A A A	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 FRACS. CHUR CHAYEN CHAYEN CHAYEN CHAYEN CHAYEN CHAYEN		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.				
OF MAJOR GRAYEL, AND SAND GRAYEL AND SAND SAND SAND SAND SAND SAND SAND	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.				
MATERIALS SAND SAND SAND SAND SAND SAND SAND SAN		MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.				
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	▼PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED					
AS SUBSTRADE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.				
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	0 11	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	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				
CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.				
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SPT DAT TEST BORING SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.				
CRANIII AR LUUSE 4 IU IV	SOIL STMBOL INSTALLATION INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED. WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS				
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.				
(NON-COHESIVE) VERY DENSE > 50	THE TOPOWH EMBRICATION 1	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	— INFERRED SOIL BOUNDARY — CORE BORING ■ SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.				
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.				
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF				
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	→ → → → → ← ALLUVIAL SOIL BOUNDARY \(\triangle \text{PIEZOMETER INSTALLATION} \) \(\triangle \text{SPT N-VALUE} \)	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.				
HARD > 30 > 4		ROCK HARDNESS	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	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND				
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LZZ UNSUITABLE WASTE LXZX ACCEPTABLE, BUT NUT TO BE	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO				
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.				
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	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 OR SLIP PLANE.				
	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.	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				
	$oldsymbol{\bot}$ CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL				
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 _d - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.				
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.				
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL				
- 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	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY				
LL _ LIQUID 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	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.				
PLASTIC CEMICOLIDE PROVIDES DRVING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.				
RANDE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BMI: -L- STATION 17+16.05, 53.43' RIGHT,				
"" PL L _ PLASTIC LIMIT		TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	R/R SPIKE SET IN BASE OF 28" GUM				
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	N-182,341; E-2,258,521 ELEVATION: 35.73 FEET				
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:				
REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING				
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	TIAD - TIELED IMMEDIATELT AFTER DIVILLING				
PLASTICITY	CURE 51ZE: 8* HOLLOW AUGERS	INDURATION					
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS -N	RUBBING WITH FINGER FREES NUMEROUS GRAINS;					
SLIGHTLY PLASTIC 6-15 SLIGHT	I VANE SHEAR TEST □ HAND TOOLS.	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:					
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 3% STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.					
COLOR	TRICONE TRICONE SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.					
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE OF IA				
		SHITELE DREHAS AURUSS URAINS.	DATE: 8-15-14				







GEOTECHNICAL BORING REPORT BORE LOG

Consulting Engineers and Scientists		BURE LUG	AFOLOGIOT BUIGOFIA O O		WD0 45505	7.4.4	1_	FID D 5040	100	*	A//O//	10.	FOLCOIOT DUODEICO O	
WBS 45597.1.1		NTY BRUNSWICK	GEOLOGIST RUSSEK, S. C.		WBS 45597			FIP B-5642		NTY BRUNSV			EOLOGIST RUSSEK, S. C.	T
SITE DESCRIPTION REPLACE B	<u>'</u>	'		GROUND WTR (ft)					065 ON NC 87 (GROUND WTR (ft)
BORING NO. EB1-B	STATION 17+93	OFFSET 7 ft RT	ALIGNMENT -L-	0 HR. N/A	BORING NO.	EB2-A		STATION 1	8+73	OFFSET	8 ft LT	AL	LIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 38.7 ft	TOTAL DEPTH 59.2 ft	NORTHING 182,411	EASTING 2,258,465	24 HR. FIAD	COLLAR EL	EV. 38.5 f	t T	TOTAL DEP	TH 74.1 ft	NORTHING	3 182,488	E/	ASTING 2,258,439	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE TER1	974 CME-45B 85% 02/15/2019	DRILL METHOD Muc	d Rotary HAMME	R TYPE Automatic	DRILL RIG/HAM	MMER EFF./D	ATE TER1974	CME-45B 85%	02/15/2019		DRILL METHO	D Mud Rota	ary HAMN	IER TYPE Automatic
DRILLER STUDNICKY, R. T.	START DATE 08/20/19	COMP. DATE 08/20/19	SURFACE WATER DEPTH N/A	١	DRILLER S		, R. T. S	START DATI	E 08/19/19	COMP. DA	TE 08/19/19	SU	JRFACE WATER DEPTH N	/A
ELEV (ft) DRIVE (LEV (ft) DEPTH (ft) 0.5ft 0.5ft 0		OOT SAMP. V L O NO. MOI G	SOIL AND ROCK DESC	RIPTION DEPTH (ft)	ELEV DRIVE ELEV (ft)		SLOW COUNT oft 0.5ft 0.5ft	0	BLOWS PER F	75 100	SAMP. NO. MC	L O OI G	SOIL AND ROCK DES	CRIPTION
40				CE 0.0	40			11	1					
36.0 2.7			ASPHALT ROADWAY EMBANK	MENT	35.9	2.6] !:::					ASPHALT	
35 34.0 4.7 5 6	6		TAN, BROWN, GRAY, SILT		35	+ 1 5	3 3	6	ļ		- M	34.0	ROADWAY EMBAN TAN, GRAY, SILTY F	
3 3	3 6	w	32.2	6.5	32.9	1 5.6 W	DH WOH WOF	∄ [:::::					ALLUVIAL BROWN, SILTY CLAY, TR	PACE GRAVEI
30 31.0 7.7 WOH WOH	2		ALLUVIAL BROWN, SILTY CLAY,	TRACE 9.0	30.9	7.6] P (: : : :				N	,	OTOL OTOTVEE
28.0 10.7	2		ORGANICS	9.0	28.4	T I		7				29.6	UNDIVIDED COASTA	
3 5	3 . 8	W	. UNDIVIDED COASTAL GRAY, CLAYEY FINE TO CO	DARSE SAND,		‡ 5	5 4	9			w	26.5	GRAY, CLAYEY FINE SA ROOTS	AND, TRACE 12.0
25 26.0 12.7 5 2	1 3	- · · · · · · · · · · · · · · · · · · ·	TRACE ROOTS	13.7	25.9	12.6	1 4 2] _w		COASTAL PLA	
±			COASTAL PLAII TAN, SILTY FINE SANI			<u>†</u>		100					GRAY, TAN, SILTY FINE SAND, WITH FOSSIL	IFEROUS
21.0 1 17.7			. FOSSILIFEROUS LIMESTO PEEDEE FORMAT	ONE LAYERS	20.9	± 176		. ';					LIMESTONE LAYERS FOSSILIFEROUS LIMES	S, TRACE TONE ROCK
20 2 1	5	w <u> </u>	- (- ====	,	20		2 9	11-			Sat.	 	FRAGMENTS, TRAC FRAGMENT	
			•			‡		::/::					(PEEDEE FORMA	
15 16.0 22.7 5 0			<u>.</u>		15 15.9	22.6	144	_ : : ; ; :						
		W	-		15	‡ `	14 3	17			- w			
			***************************************	LIFEDOLIC		<u>†</u>		f:::						
10 11.0 27.7 9 21 7	79/0.4		*THINLY BEDDED FOSSI	1 DEPTH OF 28.7	10.9	27.6	14 10	; ; ; ;			Sat.			
† ' ·		100/0.9	26.5 FEET TO 27.0	FEET 1 T		‡ <i>'</i>		;/	24		Jan.			
‡			GRAY, FOSSILIFEROUS L	IMESTONE, I		‡		:::/.						
5 6.0 32.7 8 11	18	w <u>**</u>	. \ THICKLY BEDDED, INDUI		5 5.9	32.6	6 5	· · / ·] w			
			COASTAL PLAII DARK GRAY, SILTY FINE S.			<u>†</u>								
1.0 1 37.7			SHELL FRAGMENTS, MIC	CACEOUS	0.9	I 37 6								
	21 32	w <u></u>	· (PEEDEE FORMAT - *THINLY BEDDED FOSSI	LIFÉROLIS	0 0.3	+ 37.0	7 11	1:	3		- w			
				1 DEPTH OF ,— 40.0 FEET ,— 41.0		‡		:::\						
9 -4.0 42.7	10		COASTAL PLAIN SEDIMEN	TARY ROCK	-4.1	42.6		_ ::::	\ :::: ::					
<u>1/9/66</u> 9 10	16	W	(FOSSILIFEROUS LIMESTO BEDDED, INDURAT		-5	† ³	3 11 19		30		- w		*THINLY BEDDED FOS LIMESTONE LAYER FRO	
			. COASTAL PLAII 8.0 GRAY, SILTY FINE SAND, I	MICACEOUS - 46.7		<u>†</u>			$V: \cdots : V: V$				42.6 FEET TO 42.9	
9.0 47.7		· · · · · · · · · · · · · · · · · · ·	· (PEEDEE FORMAT	ION)	-10 -9.1		8 14	4 * * * * ;	/			::::F	*THINLY BEDDED FOS: LIMESTONE LAYER FRO	
				IMESTONE, <u>50.0</u>		ŦÌ] "		46.6 FEET TO 47.	
-14.0 52.7			THICKLY BEDDED, EXT	REMELY		‡		::::	<u> </u>]	<u>-13.</u>	6	52.
<u>-14.0 52.7 14 22 </u>	39	- · · · · · · · · · · · · · · · · · · ·	COASTAL PLAI	-	-15	52.6	0.0		-	60/0.0	•	-15.	COASTAL PLAIN SEDIME	NTARY ROCK ONE. THINLY ,— 53.1
	:::: :::: :f		. GRAY, SILTY FINE SAND, I . (PEEDEE FORMAT			‡				-			I REDDED TO THICKLY	BEDDED,
5 -19.0 57.7 -19.0	:::: :::: :::: :/:				-19.1	57.6							COASTAL PLA	NN
-20 11 19	35 \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	w <u></u>		59.2	-20	± 6	4 35 28		 	63-	- w		GRAY, SILTY FINE SAND, WITH THINLY BEDDED, IN	
			Boring Terminated at Elevati COASTAL PLAIN SILTY F	FINE SAND		Ŧ			: : : : //:				EXTREMELY INDU FOSSILIFEROUS LIMEST	RATED
[‡	(PEEDEE FORMAT	TION)	-25 -24.1	62.6	14 29		:::;/:::				(PEEDEE FORMA	
			- ·		-	‡ *	14 29		43		- w			
			•			‡				```\\\!!!!				
[P2			-		-30 -29.1	67.6	5 42 58/0.4	4		`] w	li::\text{\text{\text{L}}}		
						<u>†</u>				- 100/0.9	• "			
			: •		-34 1	T 72.6								
		‡	-		-35	1 1	2 15 50	<u> </u>		●65 · · · · ·	<u> </u> w	-35.6	6	74.1
		‡	•			‡						F	Boring Terminated at Eleva COASTAL PLAIN SILTY	
		‡				‡		1					(PEEDEE FORMA	
Z						\bot								

SITE PHOTOGRAPHS

REPLACE BRIDGE NO. 090065 ON NC 87 (MACO ROAD) OVER BATARORA BRANCH



LOOKING SOUTH FROM END BENT 2 TOWARD END BENT 1



EAST SIDE OF BRIDGE LOOKING WEST (UPSTREAM)