CONTENTS

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REFERENCE

SHEET NO.	DESCRIPTION
1	TITLE SHEET
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3	SITE PLAN
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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY MOORE

PROJECT DESCRIPTION BRIDGE NO. 19 ON SR 1112 (ROSELAND RD) OVER DEEP CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.8.R.89	1	9

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 SOLI TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C, DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-8850. 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 GENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARLY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU IN-PLACE/IEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOL MOISTURE CONDITIONS MAY VARY CONSDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE UBSURFACE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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 INVESTIGATION AS HE DEEMS NECESSART TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS FOR ON THO THE SUBFIRING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR CUARANTEED 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 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.

B. WORLEY, PG
L. GONZALEZ
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INVESTIGATED BY B. WORLEY, PG
DRAWN BY B. WORLEY, PG
CHECKED BY D. DEWEY, PE
Summit Design and SUBMITTED BY <u>Engineering Services, PLL</u> C
DATE OCTOBER , 2016
Prepared in the Office of:
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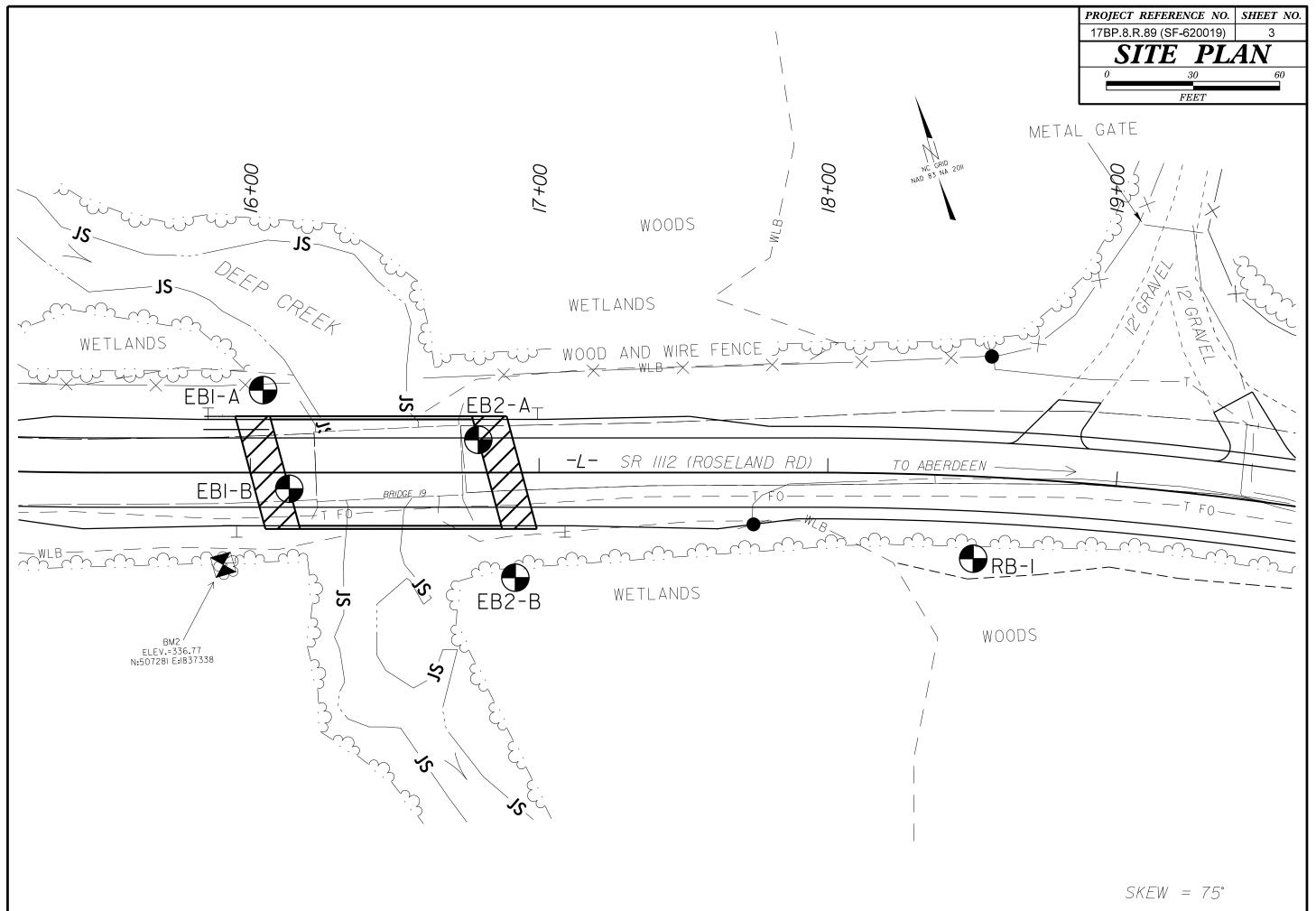
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

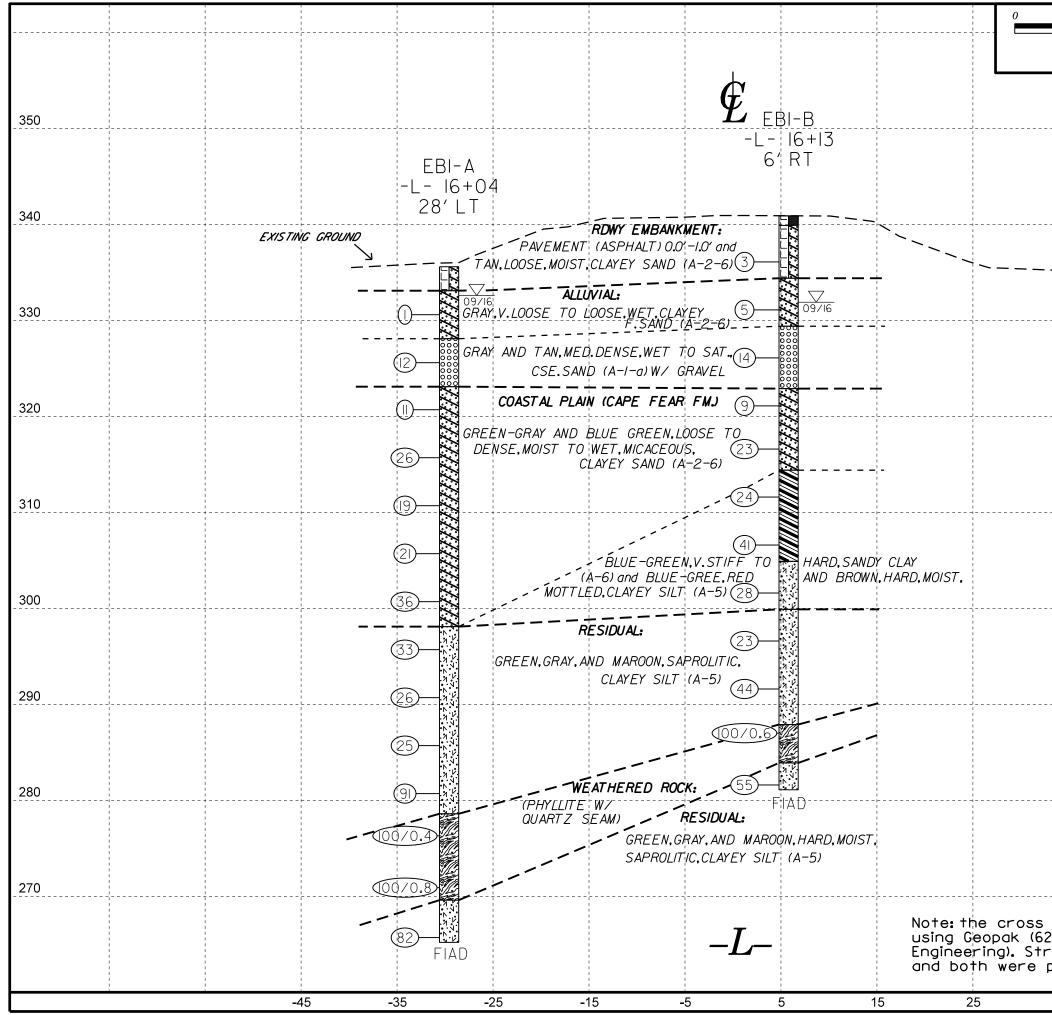
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		ROCK DESCRIPTION HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	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.	ROCK IS NOW CONSINE FLERING THERING THEN WOLD THED SPIT REFOSEL IF TESTED, HN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOLLD YHELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.				
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:	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 THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEDUS - 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 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.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.				
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CONCLAIL INF	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				
ULASS. (\$ 35% PASSINU *200) (> 35% PASSINU *200)	MINERAL NAMES SUCH AS OUARTZ, 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. CALCAREOUS (CALC.) - 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-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7 A-1, A-2 A-4, A-5 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN 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 (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN C	OF SLOPE.				
2. PASSING	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.				
10 50 MX GRANULAR SILI MUCK, 40 30 MX 50 MX 51 MN SI NN SILI SILI MUCK,	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - 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 SOLLS SOLLS 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 PASSING #40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.				
LL – 40 MX 41 MN 50LS WITH PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 10 MX 10 MX	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% 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.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.				
	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 STORE FRACS. 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. <u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.				
OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> 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. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	PARENT MATERIAL.				
AS SUBURAUE PUUK		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 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.				
		(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 CONSISTENCY (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) 25/025 WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.				
		(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.				
GENERALLY LOUSE 4 TO 10 GRANULAR LOUSE 4 TO 10 MEDIUM DENSE 10 TO 30 N/A	SOIL SYMBOL	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 THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.				
VERY DENSE > 50 VERY SOFT < 2		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.				
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		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	SINE MUNITORING WELL TO 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 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER OF 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.				
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.				
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	XX UNDERCUT VICLASSIFIED EXCAVATION - TAK UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES 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		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 THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.				
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. 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				
(BLDR.) (COB.) (GR.) (SL.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.				
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REDUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL				
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY γ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_{1} - 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 CUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	PUINT OF A GEULUGIST'S PICK. 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 BODE FOR FIELD MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 DR GREATER THAN 4 INCHES DIVIDED BY				
	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. <u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.				
PLASTIC SEMISOLID; REOUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING					
	FRAGS FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BM2 -BL- 14+40.44.25.7' LT				
OUL SOLID; AT 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: 336.77 FEET				
	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	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					
ATTAIN OPTIMUM MOISTURE	CME-55 6° CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	4				
PLASTICITY	8" HOLLOW AUGERS		4				
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS:	FIAD = Filled In After Drilling				
NON PLASTIC Ø-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;					
	AND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.					
	X TRICONE <u>2 5/8</u> · TUNGCARB.	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). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.							
AGUA ALIG GOON NO ETONI, DHINK, DHILMED, ETO, HILE USED TO DESCRIDE NI FEMANUE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14				

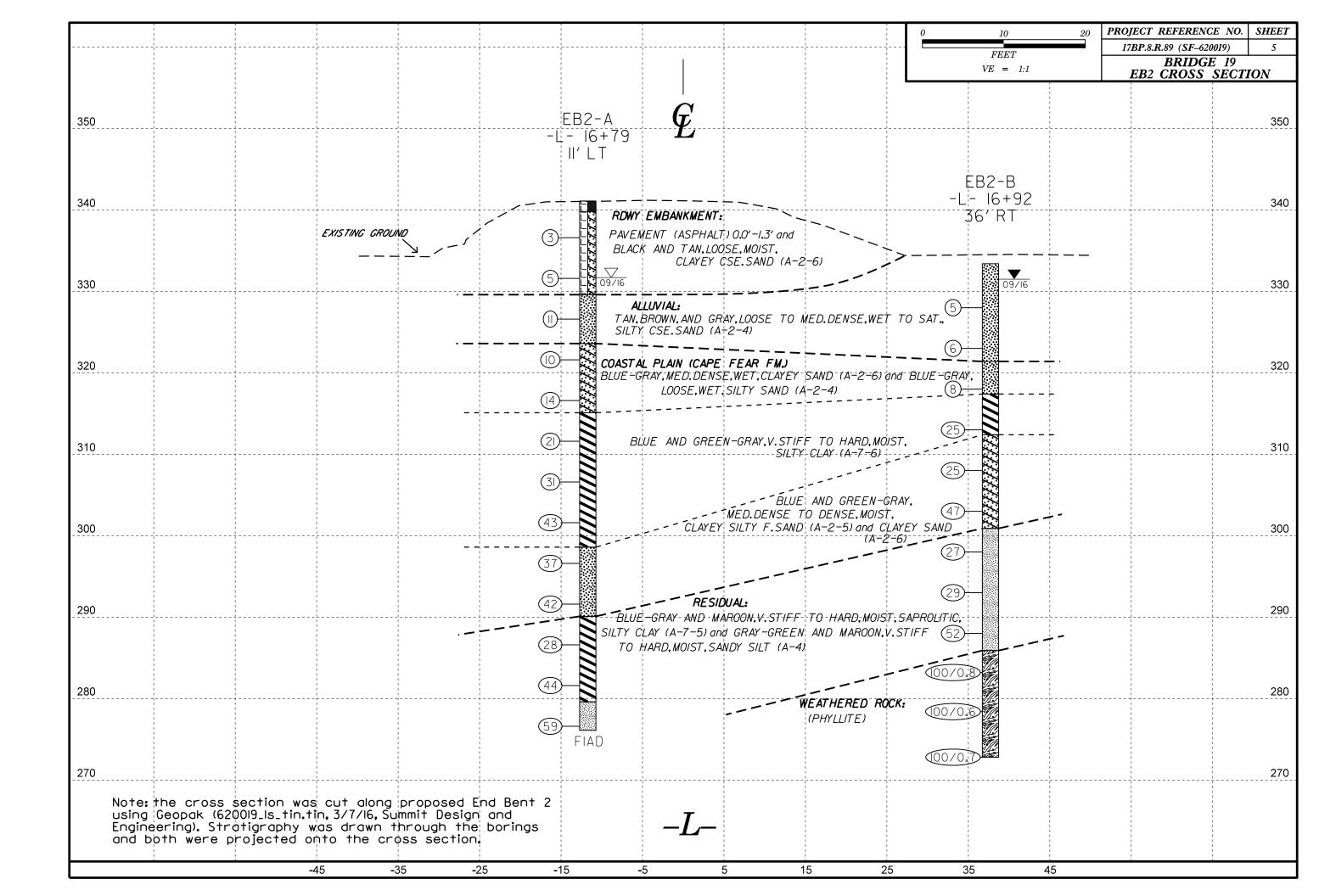
project reference no.

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GEOTECHNICAL BORING REPORT BORE LOG

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	AR ELI							i 70.4 f	+	NORTHI					FING 1,837,368		4 HR. FIAD		LAR EL							H 59.8 ft	 7	NO
								11/06/201					י חר	Mud Rotary	1		TYPE Automatic	-								6 11/06/2015		
			-	L 30				09/23/	-	COMP. D					FACE WATER DEPTH			-			-	L 301				09/20/1	-	со
ELEV				ow co					PER FOC				, // L	.				ELEV	DRIVE	DEPTH		W CO					PER FOC	
(ft)	ELEV (ft)	(ft)	·	0.5ft	-	0	25		50	75 10		17	0 DI G		SOIL AND ROCK	DESCR	IPTION DEPTH (f	(ft)	ELEV (ft)	(ft)	·	0.5ft	-	0	2		50	75
							I		_						•)												, _ I	
340																		345										
		Ŧ												F						Ŧ								
	-	Ŧ												335.6	GROUND S	SURFAC	E 0.			Ŧ								
335	_	Ŧ							+						ROADWAY EM Tan, Clayey SA	IBANKM	ENT 2 6)	340	-	Ē							+	\pm
	331.6 -	4.0					•••					\square		<u>333.1</u> .	ALLUV	VIAL	·		337.1	3.8		-						
330	- 331.0	1 4.0 1	WOH	WOH	1				· · ·		-	м	/./.		Gray, Clayey S/	Sand (a-	-2-6)	335		ŧ	2	2	1	• 3				
	-	Ŧ					•••						/./.	328.1			7.			Ī								
	326.6	9.0	1	3	9		•••				.	l w	000		Brown, cse. SAND		-		332.1	8.8	1	2	3					
325	-	ŧ					12						000		(switched to mud	d rotary at		330	-	ŧ								
	321.7 -	 - 13.9						· · · ·						<u>323.1</u> .	COASTAL		<u>12</u> .		327.1	13.8					<u>)::</u>			: :
320		-	2	5	6	- •	1				-	w	/./.	×	CAPE FEAR F			325		ŧ	3	6	8		þ 14			· ·
	-	ŧ					<u>,</u> .	· · · ·			·		/~/~~	<u>~</u>	Gray and green-gray, C w/ some	Clayey S/ e mica	AND (A-2-6)			<u>+</u>					1 · ·		· · · ·	
045	316.7	- 18.9	8	13	13		: Ì\				-	м							322.1	18.8	2	3	6		9	::::		: :
315	-	ŧ					, T						·~~~~					320	-	ŧ					<u>``</u> .		<u> </u>	
	311.7 -	- 23.9					: :/	· · · · ·	· · · ·		.		·/~/						317.6	23.3	5	10	13				· · · ·	· · ·
310	-	ŧ	3	8	11		• 19		· · ·		-	M	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					315	-	ŧ					· · · •			· ·
	-	‡					• †	· · · · ·			•		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						312.6	- 28.3							· · · ·	
305	306.7 -	- 28.9 -	6	9	12		21	· · · · ·			-	D	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					310		ŧ	6	10	14		ļ	24		: :
303	-	ŧ											///					310	1 .	ŧ						<u> </u>	· · · ·	
1	- 301.7 -	+ - <u>33.9</u>					· · `	\ 		· · · · ·	-		//						307.6	+ 33.3 +	10	17	24					· · ·
300	-	ŧ	14	17	19			36			·	M	///					305	-	ŧ						⊢- <i>/</i>	· · · ·	
		‡						: ; : :			•		%	<u>298.1</u>	RESIDI		<u>37</u> .		302.6	- 38.3		10	45			//		
295	296.7	+ <u>38.9</u> +	8	13	20			• 33				м	N N		Green-gray and ma saprolitic, Claye	aroon an	d green,	300		ŧ	8	13	15			9 28		
200	-	Ŧ						1					N N		(harder at 52.0', muc					ŧ						<u> </u>		
	- 291.7 -	43.9	9	10	16			/····					N				a at 07.0 j		297.6	+ 43.3 	8	10	13			23 · · · ·		
290		Ŧ		10			••••	26	+ • • •			M	N N					295		Ŧ								
	286.7 -	T 48.9											N N	<u>.</u>					292.6	48.3	12	21	23					
285		+ 40.9 	10	10	15			25			-	м	N,	ř.				290		Ŧ	12	21	25			4	14 \	
280		Ŧ											N L	v v					207.6	- 53.3								\cdot
	281.7	53.9	9	31	60							М	N	¥.[v.[207.0	<u> </u>	90	10/0.1						: 1
280	-	ŧ		-						•••9	1		7	278.6			57.0	285	-	ŧ								
	276.7 -	- 58.9						· · · ·	· · ·						WEATHERE (phylli	ED ROCI	K		282.6	58.3	14	22	33					: :
275	- 210.1	1 00.0	100/0.4	4						100/0	.4•				(priyin	inte)			<u> </u>	<u> </u>						·	\$ 55	
	-	ŧ						· · · ·	· · ·											ŧ								
070	271.7 -	63.9	57	43/0.3							-									ŧ								
270	-	ŧ											T	2 <u>69.6</u>			<u> </u>	4	-	ŧ								
	266.7 -	68.9						· · · · ·	· · ·				N N	₩ 1.	Maroon and gray-gree SILT (A	en,saprol	litic, Clayey			‡								
	-	+	39	51	31							м	1	265.2	Boring Terminated at B		70.4		-	‡								
	-	‡												È.	Residual Claye					‡								
	-	‡												Ę						‡								
	_	L	1	I	I	I													I	L		L	L	I				

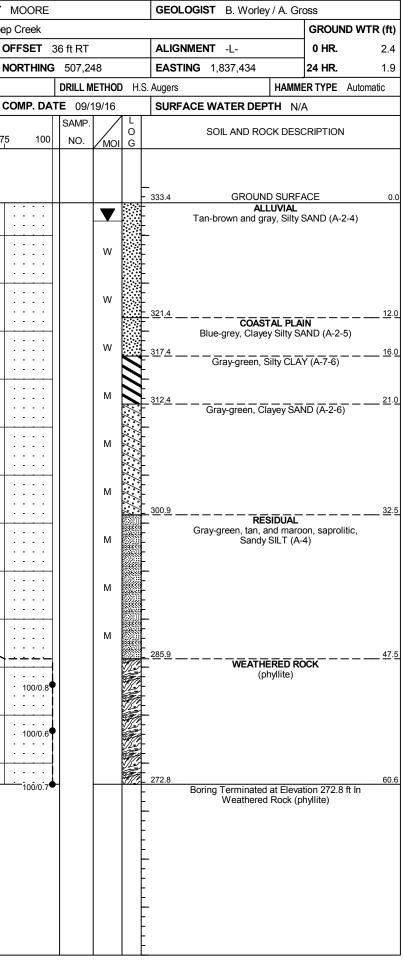
SHEET 6

MOORE				GEOLOGIST A. Gross		
ep Creek					GROUNE	WTR (ft)
OFFSET 6	ft RT			ALIGNMENT -L-	0 HR.	9.0
NORTHING	507,30	00		EASTING 1,837,367	24 HR.	FIAD
	DRILL M		Mu	· · ·		Automatic
COMP. DAT		-	IVIU			atomate
	SAMP.		LI	SURFACE WATER DEPTH	N/A	
75 100	NO.	моі	O G	SOIL AND ROCK	DESCRIPTION	
					BANKMENT alt	0.0
		М	<u>/~/~/~/</u> 	- ROADWAY EM - Tan, Clayey S/ 	AND (A-2-6)	6.5
				ALLUV Gray, Clayey S		
		Sat.	×0000000000000000000000000000000000000) <u></u> A-1-a) w∕ gravel	<u> </u>
		w		322.9 COASTAL CAPE FEAR F Blue-green, Clayey SA	ORMATION	<u>18.0</u>
		w		- mic - - (switch to mud-r - 314.4	a otary at 20.3')	<u> 26.5</u>
		М		Blue-green, San	dy CLAY (A-6)	
		Μ	× 7 ±	304.9 Blue-green and red-bro SILT (/		<u>36.0</u> yey
		м	<u> </u>		green, saprolitio	<u>41.0</u>
· · · · · · · · · · · · · · · · · · ·		M M	7 2 2 2 2 2 7 2 7 2 7 2 7 2 7 2 7 7 2		x/	
100/0.6						<u>53.0</u> <u>57.0</u>
· · · · ·		М	х 7 7 7 7 7 7	283.9 RESID Maroon and green-gra 281.1 SILT (Boring Terminated at	y, saprolitic, Clay A-5)	/ey59.8
				Boring Terminated at Residual Claye *Boring terminated ear while in lane closur personel	y SILT (A-5) ly due to heavy r e. NCDOT GEU	ain

GEOTECHNICAL BORING REPORT BORE LOG

14/7-0	4====	0 5 6 5				D 07 - 1	0015					<u> </u>			0		/			14/7 6	4-5-							00177	
-	17BP.					P SF-62				Y MOOI					GEO	GEOLOGIST B. Worley / A. Gross GROUND WTR (ft)					WBS 17BP.8.R.89 TIP SF-620019 SITE DESCRIPTION Bridge No. 19 on SR 1112 (Roseland Rd.							COUNT	
				ge No.		SR 1112	-		.) over De										. ,				-	je No.				d.) over D	· ·
	ing no.					TATION				OFFSE					_	NMENT -L-		0 HR.	9.4		NG NO.					TATION 1			OF
	LAR ELE					OTAL DE				NORTH						FING 1,837,435		24 HR.	FIAD		AR ELE						TH 60.6 f		NO
				E SUN		ME-550X 9) Н.:	S. Augers			R TYPE Auto	omatic					SUN			3% 11/06/201		со
DRIL	LER L.	Gonza														SURFACE WATER DEPTH N/A				DRILLER L. Gonzalez						START DATE 09/19/16			
ELEV (ft)	ELEV	DEPTH (ft)		W CO					ER FOOT			AMP.	▼∕	0		SOIL AND ROC	K DESC	RIPTION		ELEV (ft)	DRIVE ELEV	DEPTH (ft)						PER FOO	
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	0	75	100	NO.	/моі	G	ELEV. (ft)		[DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	75
345		+																		335		-							
	-	ŧ													-						-	-				++ • • •		····	· [·
340	-	†						I							341.1 339.8	GROUNE ROADWAY B			0.0 1.3	330	-	-							: :
0+0	-	ŧ				<u>i</u>					•				<u> </u>	∩As	phalt			000	329.0	4.4	1	2	3			+ · · ·	
	337.6 -	- 3.5	3	2	1		· · ·		· · · · ·		-		м	<u>,%</u> ,%	-	ROADWAY B Black and tan, Claye	y cse. SA		1		-	-	'	2		●5···· ···			: :
335	-	ŧ				T ² · ·	· · ·				-				-	some	e gravel			325	-	-							· ·
	- 332.6 -	8.5				ţ : :	· · ·	· · ·	· · · ·		·				-						324.0	9.4	3	2	4			· · · ·	· ·
220	-		2	2	3	• 5	: : :		· · · · ·			ł	∇	L.//	-					200	-	-							
330	-	ŧ				<u>-</u> 								ĻŅ	<u> </u>	ALL	UVIAL		11.5	320	319.0	14.4				<u>.</u>		<u> </u>	<u> </u>
	327.6 -	13.5	3	5	6		· · · ·						Sat.		-	Tan, Silty cse	e. SAND	(A-2-4)			-		4	4	4	·•************************************			: :
325	-	Ł		-	-	9 11					-		Gat.		-					315	-	-				\ .			· ·
	- 322.6	185					· · · ·				·			\sim	<u>323.6</u>				<u> </u>		314.0	19.4	6	10	15				· · ·
	- 522.0	10.5	3	5	5	• 10	: : :						w	\langle / \rangle	_	CAPE FEAF	FORMA	ATION			-	L							
320		Ł					<u> </u>							\langle / \rangle		Blue-gray, Clay	ey SANI	D (A-2-6)		310	309.0	24.4					+	+	+
	317.6 -	23.5	5	4	10						•			~/~/	-						-	_	5	11	14		2 5 · · ·		
315	-	F		7	10	1	4						W	///	315.1				26.0	305	-	F							: :
		F									•			\square	-	Blue-gray, Sar	ndy CLA	(A-7-6)			304.0	29.4	8	16	31			<u> </u>	
	312.6 -	<u>= 28.5</u> 	6	9	12		21				-		м	\square	-						-	F	-		-			47	: :
310	-	ŧ					- <u>\</u>							\square	-					300	299.0	34.4				· · · ·		+ • • •	· ·
	- 307.6 -	33.5					: <u>\</u> . :		· · · · ·		:			\square	-							- 04.4	8	11	16		•27 · · ·		: :
305	-	ŧ	8	13	18		•3	31					М	\square	-					295	-	-							
000		ŧ						Ň.						\square	-					200	294.0	39.4	5	10	10		<u> </u>	· · · ·	. .
	302.6 -	- 38.5	8	17	26		· · ·		· · · · ·		-		м	\Box	-						-	-		10			4 29 · · ·		: :
300	-	ŧ					• • •	· ·/			-				-					290	-	÷				· · · ·	· · · · · · · · · · · · · · · · · · ·	· · ·	· ·
	- 297.6 -	43.5				•••	· · ·	: / ·	· · · ·		·				<u>- 298.6</u> -	Blue-green, Clayey	Silty f. S	AND (A-2-5)	<u>42.5</u>		289.0	44.4	5	20	32			• · · ·	· ·
295	-	+	12	18	19		: : :	\$ 37	· · · · ·		-		М		-		,	()		205	-	-						1	:1.
		ŧ						- \							-					285	284.0	49.4	47	00/0.0				····	<u>.</u>
290	292.6 -	48.5	17	20	22	· · ·	· · · ·	• • •			:		М		-						-		17	83/0.3					: :
290		ŧ						4 2			-		101		290.1				<u> 51.0</u>	280	-	L				· · · ·		· · ·	· ·
	- 287.6 -	- 53.5					: :/	,			·			\square	-	RES Blue-green and ma CLAY	aroon, sa	prolitic, Silty			279.0	54.4	69	31/0.1				· · · ·	· · ·
285	- 207.0	55.5	8	12	16		• 1 28				-		М	\square	-	CLAY	′ (A-7-5)				-								: :
285	-	Ł					$\frac{1}{1}$	<u></u>						\mathbb{N}	_					275	274.0	59.4						+	\pm
	282.6 -	58.5	5	17	27		: :	<u>``\</u>]			:			\mathbb{N}	-								20	54	46/0.2			<u> </u>	<u>. .</u>
280	-	Ł			2.						-		М	\square	- 270.6				61.5		-	L							
		F)	\ <u></u>		•					Blue-green and ma	roon, sap	orolitic, Sandy	01.5		-	F							
	277.6 -	- 63.5 -	10	28	31				59		-		М		276.1		Г (А-4)		65.0		-	-							
5	-	F										Γ			_	Boring Terminated Residual Sa	at Elevat	ion 276.1 ft In (A-4)			-	-							
	-	ŧ													-			·· ·/			-	F							
	-	ŧ													-						-	F							
	-	ŧ													-						-	F							
	-	ŧ													-						-	F							
	-	t													_						-								

SHEET 7



GEOTECHNICAL BORING REPORT BORE LOG

BORING NO. RB-1 STATION 18+51 OFFSET 28 ft RT ALIGNMENT 4 0 HR. COLLAR ELEV. 338.6 ft TOTAL DEPTH 10.5 ft NORTHING 507.211 EASTING 1,837,588 24 HR. DRILLER L. GONZAIGZ STATION 18+51 OFFSET 28 ft RT ALIGNMENT 4 0 HR. DRILLER L. GONZAIGZ STATION 18+51 OCMP. DATE 03(19) SURFACE WAREN DEPTH HAMMER TYPE A. DRILLER L. GONZAIGZ STATION 18+51 OCMP. DATE 03(19) SURFACE WAREN DEPTH NA ELEV DEPTH BLOWS PER FOOT BLOWS PER FOOT SAMP NO SOIL AND ROCK DESCRIPTION 349																						
WBS	17BP	.8.R.89)		Т	P S	F-62	2001	9		cou	NTY	M	OORE				GEOLOGIST B. Worle	y, PG			
SITE	DESCR		Bric	lge No	. 19 o	n SR	1112	2 (R	osela	and F	Rd.)	over	Dee	p Cree	ek					GROUN	D WTR (f	
WBS 17BP S.R.289 TIP SF-620019 COUNTY MOORE GEOLOGIST B. Worley, PG STE DESCRIPTION Bridge No. 19 on SR 1112 (Roseland Rd.) over Deep Creek GROUND WTR (ft) 0 HR. Dr HR. D HR. <																						
															1		יי חו					
																		1			Automatic	
RIL							DA						CON	IP. DA				SURFACE WATER DEF	PTH N/A	4		
	ELEV		·						BLOV					400		· 🔨	0	SOIL AND RO	CK DESC	RIPTION		
,	(ft)	(11)	0.5ft	0.5ft	0.5ft			25		50)		/5	100	NO.	Имо	I G	ELEV. (ft)			DEPTH	
0		Ļ																-				
	-	<u> </u>				$\left\ \right\ $	1.	•					1.				~~~					
_	-	ŧ					·	:	•••	· ·	· · · ·	· ·	:					CAPE FEA	R FORMA	TION		
5	334.6 -	4.0	4	5	5	<u>├-</u>	ŀ	:					+:					Gray, Claye	y SAND (A-2-6)		
	-	ł				.	•10 •	•	•••				.									
0		F				:	į.					• •					/~/~					
	329.6 -	- <u>9.0</u>	3	4	5		. 9									м	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- 328.1			1	
	-	†	1			<u>'</u>	<u> </u>	(٦			Boring Terminated	at Elevati	on 328.1	ft In	
	-	‡	1																ayey SAN	чы (A-2-0))	
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SHEET 8

SITE PHOTOGRAPH

Bridge No. 19 on SR 1112 (Roseland Rd.) over Deep Creek



View Facing East (Upstation)

View Facing West (Downstation)

SHEET 9 17BP.8.R.89 (SF-620019) Moore Co.