BR REFERENCE **CONTENTS** 

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

BORF LOGS SITE PHOTOGRAPHS

PROFILE

SHEET NO.

5 **-** 7

#### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>EDGE</u>COMBE PROJECT DESCRIPTION REPLACE BRIDGES 320003, 320004 AND 320005 OVER SWIFT CREEK ON SR 1404 (SEVEN BRIDGES ROAD) **BRIDGE** NO. 320005 SITE DESCRIPTION AT - L - STA. 16 + 80.00

STATE PROJECT REFERENCE NO. **BR-0111** 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 (IN-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 NDICATED 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 WARRANTE OR GLARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS 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 HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE 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.

- 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 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** RUSSEK, S. C. DUGGINS, W. T. TURNER, A. D. INVESTIGATED BY \_\_RUSSEK, S. C. FIELDS, W.D. DRAWN BY NASH, A. A. CHECKED BY SUBMITTED BY \_ALEXANDER, M. J. OCTOBER 2019

Prepared in the Office of:

Consulting Engineers and Scientists



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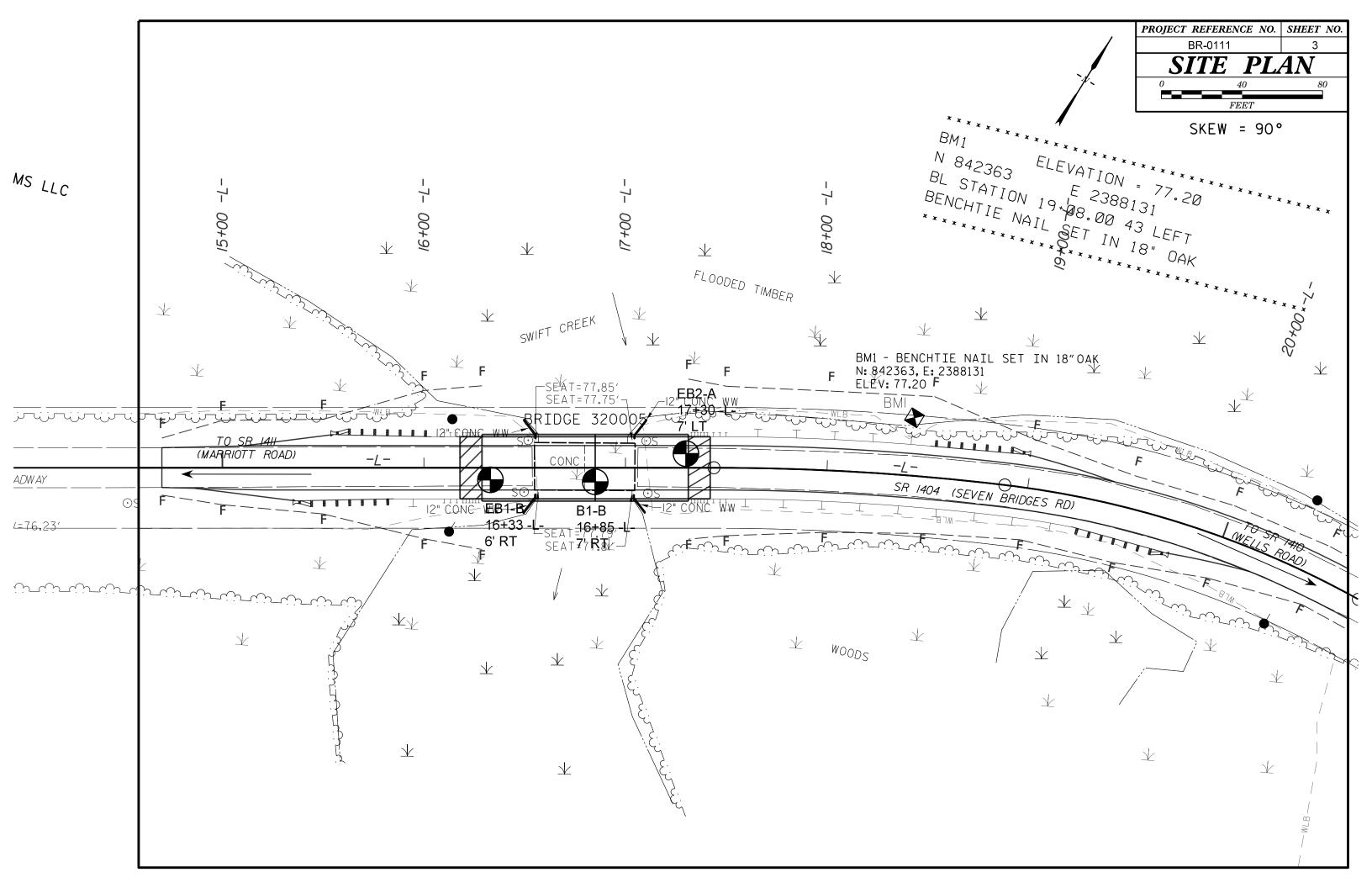
PROJECT REFERENCE NO. SHEET NO. 2

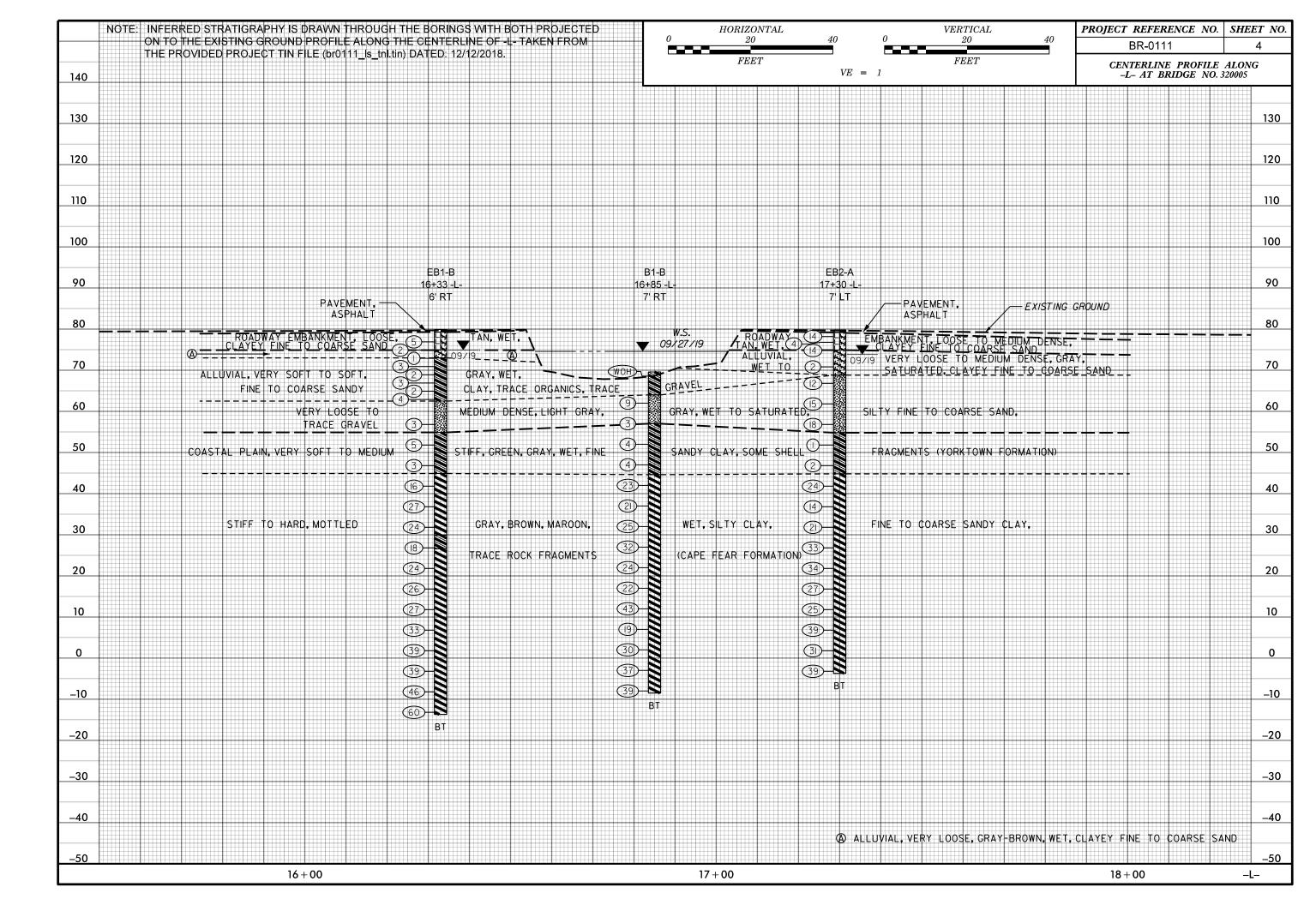
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# 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 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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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.	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	<u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA.
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 VIOLEN NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 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 CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (\$ 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.  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-2-6 A-2-7 A-3-8 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COORDOOC STANDARD STAND	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
2. 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 SILI-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN SOLS SOLS SOLS SOLS SOLS SOLS SOLS SOL	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 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 40 MX 41 MN	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, (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 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 1 MM MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX W W 4 MX 8 MX 12 MX 16 MX NU MX AMUUN 15 UF SOILS	GROUND WATER	SLIGHT 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	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TIPES STUNE FROM: FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	√ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND 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
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u>√PW</u> 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.  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	- O-MN► SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
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	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	T POADWAY EMPANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/02/3  DIP & DIP DIRECTION  OF ROCK STRUCTURES	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.
GENERALLY VERY LOOSE 4 4	SOIL SYMBOL SPET DOT TEST BORING SLOPE INDICATOR INSTALLATION	(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.
GRANULAR LUUSE 4 10 100 GRANULAR MEDIUM DENSE 101 TO 301 N/A	Min	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
MAILERIAL 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.
VERY DENSE	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	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	MW - TECT DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 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	MUNITURING 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO DR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4  HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPPOLITE (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	UNCLASSIFIED EXCAVATION - TOTAL 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	LICED IN THE TOP 2 FEET OF	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 SAND SAND SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (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 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	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - 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  (ATTERBERG LIMITS) 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.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH 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 SEMISOLID; REQUIRES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT- FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RAINGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BM1 - BENCHTIE NAIL SET IN 18" OAK
"" PL L + PLASTIC LIMIT -	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N: 842,363, E: 2,388,131
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: 77.20 FEET
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	
PLASTICITY	CORE 51ZE:	INDURATION	]
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST X CASING W/ ADVANCER HAND TOOLS:	CDAING CAN BE CERABATED FROM CAMPLE WITH CTEEL PROPE.	
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER  POST HOLE DIGGER  STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG,-CARB. 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.	X ACKER RENEGADE	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
		·	







# GEOTECHNICAL BORING REPORT BORE LOG

	BORE	LOG					
<b>WBS</b> 67111.1.1	TIP BR-0111 COUNTY EDGECO	COMBE GEOLOGIS	IST RUSSEK, S. C.	WBS 67111.1.1	TIP BR-0111 COUNT	Y EDGECOMBE	GEOLOGIST RUSSEK, S. C.
SITE DESCRIPTION REPLACE BE	RIDGE 320005 OVER SWIFT CREEK ON SR 1	1404 (SEVEN BRIDGES ROAD)	GROUND WTR (ft)	SITE DESCRIPTION REPLACE B	RIDGE 320005 OVER SWIFT CRE	EK ON SR 1404 (SEVEN BRIDG	GES ROAD) GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+33 OFFSET	6 ft RT ALIGNME	NT -L- 0 HR. N/A	BORING NO. EB1-B	STATION 16+33	OFFSET 6 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 79.9 ft	TOTAL DEPTH 93.6 ft NORTHING	IG 842,226 EASTING	2,387,969 <b>24 HR.</b> 5.0	COLLAR ELEV. 79.9 ft	TOTAL DEPTH 93.6 ft	<b>NORTHING</b> 842,226	<b>EASTING</b> 2,387,969 <b>24 HR.</b> 5.0
DRILL RIG/HAMMER EFF./DATE TER92	2-0 ACKER RENEGADE 86% 02/15/2019	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE TER9:	2-0 ACKER RENEGADE 86% 02/15/2019	DRILL METHOD M	ud Rotary HAMMER TYPE Automatic
DRILLER DUGGINS, W. T.			WATER DEPTH N/A	DRILLER DUGGINS, W. T.	<b>START DATE</b> 09/26/19	<b>COMP. DATE</b> 09/26/19	SURFACE WATER DEPTH N/A
ELEV CHIP CHIP CHIP CHIP CHIP CHIP CHIP CHIP		NO. MOI G ELEV. (ft)	SOIL AND ROCK DESCRIPTION  DEPTH (ft	ELEV (ft) DRIVE (LEV (ft) O.5ft O.5ft O.5ft		T SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
80		79.9	GROUND SURFACE 0.0 PAVEMENT0.6		Match Line		MOTTLED GRAY, BROWN, MAROON,
77.9 2.0 4 3 75.9 4.0 WOH 1	5		ASPHALT  ROADWAY EMBANKMENT AN, CLAYEY FINE TO COARSE SAND  5.0	-2.2 + 82.1   13   20	19	· · · · · · · · · · · · · · · · · · ·	SILTY CLAY (continued)
73.9 6.0 WOH 1 71.9 8.0 2 2	0 1	W GR/	ALLUVIAL GRAY-BROWN, CLAYEY FINE TO COARSE SAND RAY, FINE TO COARSE SANDY CLAY,	-7.2 + 87.1 16 23 1 -10	23	:   : : : :	-
67.9 12.0 WOH 1	1	TF W	RACE ORGANICS, TRACE GRAVEL	-12.2 - 92.1 19 29	31		-13.7 93.6
65 WOH 1 63.9 16.0 WOH 1	1 2	W 62.5	17.4 GHT GRAY, SILTY FINE TO COARSE	<u>                                     </u>			Boring Terminated at Elevation -13.7 ft IN COASTAL PLAIN SILTY CLAY (CAPE FEAR FORMATION)
57.8 + 22.1 3 2	1	_	SAND, TRACE GRAVEL				-  - -
55.8 + 27.1	•   •   •   •   •   •   •   •   •   •		——————————————————————————————————————				- - - - -
50 2 3	2	-	SOME SHELL FRAGMENTS (YORKTOWN FORMATION)				- - -
45 47.8 + 32.1 1 1 1	2	W 44.9	GRAY, BROWN, SILTY CLAY				- - - -
42.8 + 37.1 4 8	8 16		(CAPÉ FEAR FORMATION)				- - - -
37.8 42.1 8 12	15	W W					- - - -
32.8 + 47.1	13	W 200	50.0				- - - -
27.8 + 52.1 4 7	11 0 18	W 26.6 CC	BROWN, GRAY, MAROON, FINE TO OARSE SANDY CLAY, TRACE ROCK FRAGMENTS OTTLED GRAY, BROWN, MAROON,	3			 - - -
<u>" </u>	13		SILTY CLAY				 - - -
ğ    <u> </u>	15						<del>-</del> - - -
12.8 - 67.1 8 14	13 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						- - - -
7.8 72.1 14 16	17						<del>-</del>  - -
5 +	20						- - - -
	¶39'						F



# GEOTECHNICAL BORING REPORT BORE LOG

		ORE LOG	1				
WBS 67111.1.1		Y EDGECOMBE	GEOLOGIST RUSSEK, S. C.	WBS 67111.1.1		ITY EDGECOMBE	GEOLOGIST RUSSEK, S. C.
	ACE BRIDGE 320005 OVER SWIFT CREE	·	<del>, '</del>		REPLACE BRIDGE 320005 OVER SWIFT CRI	<u> </u>	<del></del>
BORING NO. B1-B	<b>STATION</b> 16+85	OFFSET 7 ft RT	ALIGNMENT -L- 0 HR.	BORING NO. B1-B	<b>STATION</b> 16+85	OFFSET 7 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 69.6 ft	TOTAL DEPTH 78.1 ft	NORTHING 842,253	EASTING 2,388,013 24 HR. 1	COLLAR ELEV. 69		NORTHING 842,253	<b>EASTING</b> 2,388,013 <b>24 HR.</b> N/
DRILLER DUGGINS, W. T	TER92-0 ACKER RENEGADE 86% 02/15/2019  START DATE 09/26/19	DRILL METHOD Mu  COMP. DATE 09/27/19	d Rotary HAMMER TYPE Automati  SURFACE WATER DEPTH 5.2ft	DRILLER DUGGINS	F./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019 S, W. T. <b>START DATE</b> 09/26/19	DRILL METHOD M  COMP. DATE 09/27/19	<u> </u>
FLEY DRIVE DEDTU BLOV		<u> </u>	SURFACE WATER DEPTH 5.2ft	ELEV DRIVE DEPTH			SURFACE WATER DEPTH 5.2ft
		75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPT		0.5ft 0.5ft 0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION
80			_	0	Match Line		
				-2.0 71.6			MOTTLED GRAY, BROWN, MAROON, SILTY CLAY
75 +			WATER CUREAGE (00/00/40)		12 16 21	: :   : : : :	(CAPE FEAR FORMATION) (continued)
75 7 7			WATER SURFACE (09/26/19)	-5			<del>-</del> +
				-7.0 <u>76.6</u>	11 17 22 39		8.5 78
70 69.6 0.0	WOH WOH		-69.6 GROUND SURFACE	‡			Boring Terminated at Elevation -8.5 ft IN COASTAL PLAIN SILTY CLAY (CAPE
	WOH WOH		GRAY, FINE SANDY CLAY, TRACE	‡			FEAR FORMATION)
65	\(\frac{1}{1}\)		ORGANICS				Ł
63.0 6.6	1		GRAY, SILTY FINE TO COARSE SAND,	‡			‡
60	4 5 . 9	.       W	TRACE GRAVEL	‡			‡
58.0 I 11.6			_	‡			-
58.0 + 11.6 + 4	2 1   •3	: ::::     w	57.0 COASTAL PLAIN				F
55			GREEN-GRAY, FINE SANDY CLAY, SOME SHELL FRAGMENTS	‡			-
53.0 16.6 2	2 2		(YORKTOWN FORMATION)				E
50			_				-
48.0 21.6		.					_
WOH	1 3	:   · · · ·					-
45			= 44.6MOTTLED GRAY, BROWN, MAROON,	‡			<del>-</del> -
43.0 26.6	10 13	:   : : : :         w 🔀	SILTY CLAY (CAPE FEAR FORMATION)				-
40 ‡		<del>  </del>     <b> </b>	<u> </u>	‡			-
38.0 31.6 8	10 11						E
35			_				E
33.0 36.6	<u> </u>						-
30 9	12 13						-
28.0 41.6			<del>-</del>	‡			-
28.0 + 41.0 9	15 17	:   : : : :         w 🔰					F
25			_	+ +			E
23.0 46.6 8	12 12						E
20 ‡			_				<u>-</u>
18.0 51.6	10 10	·   · · · ·					-
15   8	10 12	:   : : : :					-
13.0 56.6			-	‡			F
12	20 23	:   : : : :           w   <b>\</b>		‡			E
10			-				-
8.0 7 61.6 7	9 10						<u> </u>
5   +			<del>-</del>	‡			<u>L</u>
3.0 66.6	14 16			‡			‡
38.0 31.6 8 35 33.0 36.6 9 30 28.0 41.6 9 25 23.0 46.6 8 20 18.0 51.6 8 15 13.0 56.6 12 10 8.0 61.6 7 5 3.0 66.6 8	14   16     •30			‡			-



# GEOTECHNICAL BORING REPORT BORE LOG

		11.1.1 TIP BR-0111 COUNTY EDGECOMBE GEOLOGIST RUSSEK, S. C.																																												
WBS	671	11.1.1			TIF	<b>P</b> BR-011	11	C	COUNT	<b>f</b> EDGI	COM	BE			GEC	DLOGIST	r RUS	SEK, S	S. C.			_	WBS 6	7111.1	1.1			TI	<b>ΓΙΡ</b> Β	R-0111		CC	UNTY	EDGE	COMB	E			GEO	LOGIS	T RUS	SSEK, S				
SITE	DESC	RIPTION	REPL	ACE E	RIDG	E 320005	OVER	SWIFT	T CREE	K ON S	R 1404	4 (SEV	EN BF	RIDGE	S ROA	AD)			(	GROUN	D WTR (	ft)	SITE DE	SCRIF	PTION	REPL	LACE I	BRIDO	GE 32	20005 (	OVER S	WIFT	CREE	ON SR	1404	(SEVI	EN BI	RIDGE	S ROA	<u>رD)</u>				GROUN	D WT	₹ (ft
BOR	ING NO	<b>).</b> EB2-	A		ST	ATION 1	17+30			OFFSE	<b>T</b> 71	t LT			ALIC	SNMEN	Γ -L-			0 HR.	N	/A	BORING	NO.	EB2-A	4		S	STATIO	<b>ON</b> 17	<b>7</b> +30			OFFSET	7 ft	LT			ALIG	NMEN	IT -L-			0 HR.		N/A
COL	LAR E	L <b>EV</b> . 7	9.8 ft		TC	TAL DEP	<b>TH</b> 83	.5 ft		NORTH	ING	842,28	38		EAS	TING 2	2,388,0	44	2	24 HR.	6	.0	COLLAR	R ELEV	<b>V.</b> 79.	.8 ft		T	TOTAL	_ DEPT	<b>H</b> 83.	5 ft		NORTHI	NG 8	42,28	38		EAS	ΓING	2,388,0	44		24 HR.		6.0
DRILL	RIG/HA	AMMER E	FF./DATE	TERS	2-0 AC	KER RENE	GADE 86	% 02/15	5/2019		[	ORILL M	ETHOD	) Mu	Rotary	1		н	HAMMER	RTYPE	Automatic	_	DRILL RIG	HAMN	/IER EF	F./DATE	TER	R92-0 A	ACKER	RENEG	ADE 869	6 02/15/2	2019		DF	RILL M	ETHO	D Mu	d Rotary			ŀ	HAMMEI	R TYPE	Automa	atic
DRIL		DUGGIN				ART DAT	E 09/2	25/19		COMP.					SUR	FACE V	VATER	DEPTH	l N/A			_	DRILLEF						START	DATE	09/2	5/19		COMP. I	DATE	09/2	25/19	4	SURF	FACE \	WATER	DEPTH	H N/A			
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft			0	BLOV 25	VS PE	R FOOT		100	SAMP. NO.	/	0	ELEV.	_	OIL ANI	D ROCK	DESCR	RIPTION	DEPTH		/f+\		DEPTH (ft)		W COU		0	2	BLOW 25	/S PER 50		75 1		AMP. NO.	/MO	0 I G			SOIL ANI	D ROCK	K DESC	RIPTION		
80	79.2	0.6				l				T	_				_79.8 79.2		GR	ROUND S		CE		0.0 0.6	0	-+							N I . J .	atch Li	ne	T					<del>-</del>	<u></u>	TTLED (			, MĀRŌC		- —
75	77.8 75.8	+	4 9	8 2 8	6	<b>4</b> 14.					:		W		74.9	TAN,		ASPHA WAY EM EY FINE T	IBANKN		 .ND	4.9		2.2	82.0	12	16	23	<del>  :</del>		/.				-		W		-3.7	Bori	ing Term	inated a	(ATION) at Elevat	(continu	i IN	83.
	71.8	8.0	WOH			14					:		•			GRAY	ſ, CLAYI	ALLU\ EY FINE		ARSE S	AND			Ŧ															-	CO	ASTAL I FE	PLAIN S AR FOR	SILTY CI RMATIO	_AY (CAF N)	PE	
70	67.8	12.0			'	\ \							Sat.		68.8	— GRĀ		Y FINE TO			<u>ND,</u> —	<u>1.0</u>		‡															· <del>-</del> ·							
65		‡	4	4	8	12			· · · · · · · · · · · · · · · · · · ·		-		Sat.		-		Т	FRACE G	SRAVEL	•				‡															<del>-</del>							
60	62.8	17.0	5	7	8	15		· ·			-		W		_									ŧ															• • •							
	57.8	22.0	4	8	10		18				:		W											† †															•							
55	52.8	27.0	WOH	WOH	1	<u> </u>									<u>54.8</u> .	— — — GR	REEN-GI	COASTAL RAY, FIN SHELL F	NE SANI	DY CLAY	<del>-</del> - <del>-</del> <del>-</del> <del>-</del> - <del>-</del>	5.0		Ŧ															<del>-</del>							
50		‡ +	WOII	Worl		1					-		W		-			TOWN F						‡															- -							
45	47.8	32.0	2	1	1	2			· · · · ·		-		W		<u>44.8</u> .	— <del>.</del>		<del>-</del>	L		·	<u>5.0</u>		‡															· · ·							
40	42.8	37.0	6	10	14		24	· ·			:		М			MOT		GRAY, BF SILTY ( FEAR F	CLAY		√N,			‡															•							
40 35	37.8	42.0	4	6	8	- · · /-					:		W		-									<u> </u>															<del>-</del>							
30 30 30 T	32.8	47.0	6	8	13		21				:		W											† ‡															•							
GPJ N	27.8	52.0	10	15	18		<b>—</b> 300				:		W		-																								-							
25 EDGECOMBE 2002	22.8	57.0	10	14	20		- <b> </b> -	4 -			:		W		_									+															<del>-</del>							
000 BRDG320005 15 15	17.8	62.0	9	10	17		/				:		W		-									‡															· · ·							
10 10	12.8	67.0	8	10	15		25 :				:		W		-									‡															· · ·							
3ORE DOUBLE	7.8	72.0	11	16	23		: `}	39			:		W		_									‡															· · ·							
CDOT BUF	2.8	77.0	10	12	19		31				:		W											† ‡															•							

# SITE PHOTOGRAPHS

REPLACE BRIDGE NO. 320005 OVER SWIFT CREEK ON SR 1404 (SEVEN BRIDGES ROAD)



FROM END BENT 1 LOOKING UPSTATION



FROM END BENT 1 RIGHT LOOKING UPSTREAM