

REFERENCE: B-5704

PROJECT: 45658

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5704	1	7

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS
7	SITE PHOTOGRAPHS

COUNTY HARNETT
PROJECT DESCRIPTION BRIDGE NO. 246 OVER BLACK RIVER ON SR 1718 (ERWIN ROAD)

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 (919) 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 INDICATED 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 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

M. BAHIRADHAN
J. WHITT
C. BUTLER
CATLIN

INVESTIGATED BY J. WHITT
DRAWN BY C. BUTLER
CHECKED BY M. BAHIRADHAN
SUBMITTED BY SCHNABEL ENG.
DATE APRIL 2017



DocuSigned by:
Mahalingam Bahiradhan
4DEAD345C9264A2...
SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

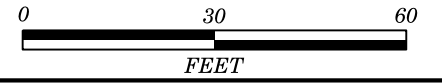
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<p>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 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: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> </tr> <tr> <td colspan="4" style="text-align: center;">CONSISTENCY OR DENSENESS</td> </tr> <tr> <td>PRIMARY SOIL TYPE</td> <td>COMPACTNESS OR CONSISTENCY</td> <td>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</td> <td>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</td> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> <tr> <td colspan="4" style="text-align: center;">TEXTURE OR GRAIN SIZE</td> </tr> <tr> <td>U.S. STD. SIEVE SIZE OPENING (MM)</td> <td>4 4.76</td> <td>10 2.00</td> <td>40 0.42</td> <td>60 0.25</td> <td>200 0.075</td> <td>270 0.053</td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td>COBBLE (COB.)</td> <td>GRAVEL (GR.)</td> <td>COARSE SAND (CS.E. SD.)</td> <td>FINE SAND (F SD.)</td> <td>SILT (SL.)</td> <td>CLAY (CL.)</td> </tr> <tr> <td>GRAIN SIZE</td> <td>MM 305 IN. 12</td> <td>75 3</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td colspan="4" style="text-align: center;">SOIL MOISTURE - CORRELATION OF TERMS</td> </tr> <tr> <td>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</td> <td>FIELD MOISTURE DESCRIPTION</td> <td>GUIDE FOR FIELD MOISTURE DESCRIPTION</td> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="4" style="text-align: center;">PLASTICITY</td> </tr> <tr> <td>NON PLASTIC</td> <td>PLASTICITY INDEX (PI) 0-5</td> <td>DRY STRENGTH VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td>HIGH</td> </tr> <tr> <td colspan="4" style="text-align: center;">COLOR</td> </tr> <tr> <td colspan="4">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.</td> </tr> <tr> <td colspan="4" style="text-align: center;">GRADATION</td> </tr> <tr> <td colspan="4">WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</td> </tr> <tr> <td colspan="4" style="text-align: center;">ANGULARITY OF GRAINS</td> </tr> <tr> <td colspan="4">THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</td> </tr> <tr> <td colspan="4" style="text-align: center;">MINERALOGICAL COMPOSITION</td> </tr> <tr> <td colspan="4">MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</td> </tr> <tr> <td colspan="4" style="text-align: center;">COMPRESSIBILITY</td> </tr> <tr> <td colspan="4">SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</td> </tr> <tr> <td colspan="4" style="text-align: center;">PERCENTAGE OF MATERIAL</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">GROUND WATER</td> </tr> <tr> <td colspan="4"> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP </td> </tr> <tr> <td colspan="4" style="text-align: center;">MISCELLANEOUS SYMBOLS</td> </tr> <tr> <td colspan="4"> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE </td> </tr> <tr> <td colspan="4" style="text-align: center;">RECOMMENDATION SYMBOLS</td> </tr> <tr> <td colspan="4"> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADED ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL </td> </tr> <tr> <td colspan="4" style="text-align: center;">ABBREVIATIONS</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>U - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>U_g - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td>SAMPLE ABBREVIATIONS</td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td>S - BULK</td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td>SS - SPLIT SPOON</td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td>ST - SHELBY TUBE</td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILTY, SILTY</td> <td>RS - ROCK</td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td>RT - RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td>CBR - CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input checked="" type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-45B</td> <td><input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * STEEL TEETH</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/> THIN WALL CORING</td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="2" style="text-align: center;">FRACTURE SPACING</td> <td colspan="2" style="text-align: center;">BEDDING</td> </tr> <tr> <td>TERM</td> <td>SPACING</td> <td>TERM</td> <td>THICKNESS</td> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> <tr> <td colspan="4" style="text-align: center;">INDURATION</td> </tr> <tr> <td colspan="4">FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</td> </tr> <tr> <td>FRIABLE</td> <td colspan="3">RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td colspan="3">GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td colspan="3">GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td colspan="3">SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> <tr> <td colspan="4" style="text-align: center;">NOTES:</td> </tr> <tr> <td colspan="4">FIAD = FILLED IN AFTER DRILLING</td> </tr> <tr> <td colspan="4">END BENT 1 - SOUTH END TOP OF RAIL ELEVATION = 173.8 FEET</td> </tr> <tr> <td colspan="4">END BENT 2 - SOUTH END TOP OF RAIL ELEVATION = 173.7 FEET</td> </tr> <tr> <td colspan="4" style="text-align: center;">BENCH MARK: BL-2 SOIL NAIL NEAR EAST END OF SOUTH RAIL (4' FROM EOP) N: 569793.12 E: 2106476.87 ELEVATION: 171.1 FEET</td> </tr> </tbody> </table>				GENERAL CLASS.	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RATING AS SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE						PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30				CONSISTENCY OR DENSENESS				PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	TEXTURE OR GRAIN SIZE				U.S. STD. SIEVE SIZE OPENING (MM)	4 4.76	10 2.00	40 0.42	60 0.25	200 0.075	270 0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CS.E. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)	GRAIN SIZE	MM 305 IN. 12	75 3	2.0	0.25	0.05	0.005	SOIL MOISTURE - CORRELATION OF TERMS				SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	PLASTICITY				NON PLASTIC	PLASTICITY INDEX (PI) 0-5	DRY STRENGTH VERY LOW	SLIGHTLY PLASTIC	6-15	SLIGHT	MODERATELY PLASTIC	16-25	MEDIUM	HIGHLY PLASTIC	26 OR MORE	HIGH	COLOR				DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				GRADATION				WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.				ANGULARITY OF GRAINS				THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				MINERALOGICAL COMPOSITION				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.				COMPRESSIBILITY				SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50				PERCENTAGE OF MATERIAL				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </tbody> </table>				ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	GROUND WATER				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP				MISCELLANEOUS SYMBOLS				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE				RECOMMENDATION SYMBOLS				UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADED ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL				ABBREVIATIONS				<table border="1" style="width: 100%; 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EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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BENCH MARK: BL-2 SOIL NAIL NEAR EAST END OF SOUTH RAIL (4' FROM EOP) N: 569793.12 E: 2106476.87 ELEVATION: 171.1 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

SITE PLAN



BRIDGE #246
SKEW 90°



WOODS

BLACK RIVER

16+00

18+00

20+00

EBI-A

CONC

-L-

B2-A

SR 1718 ERWIN RD 22' BST

← TO ERWIN

BI-B

BRDG #246

EB2-B

TO DUNN →

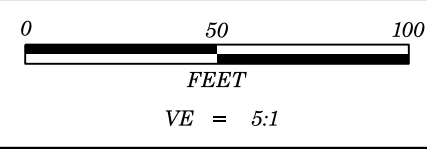
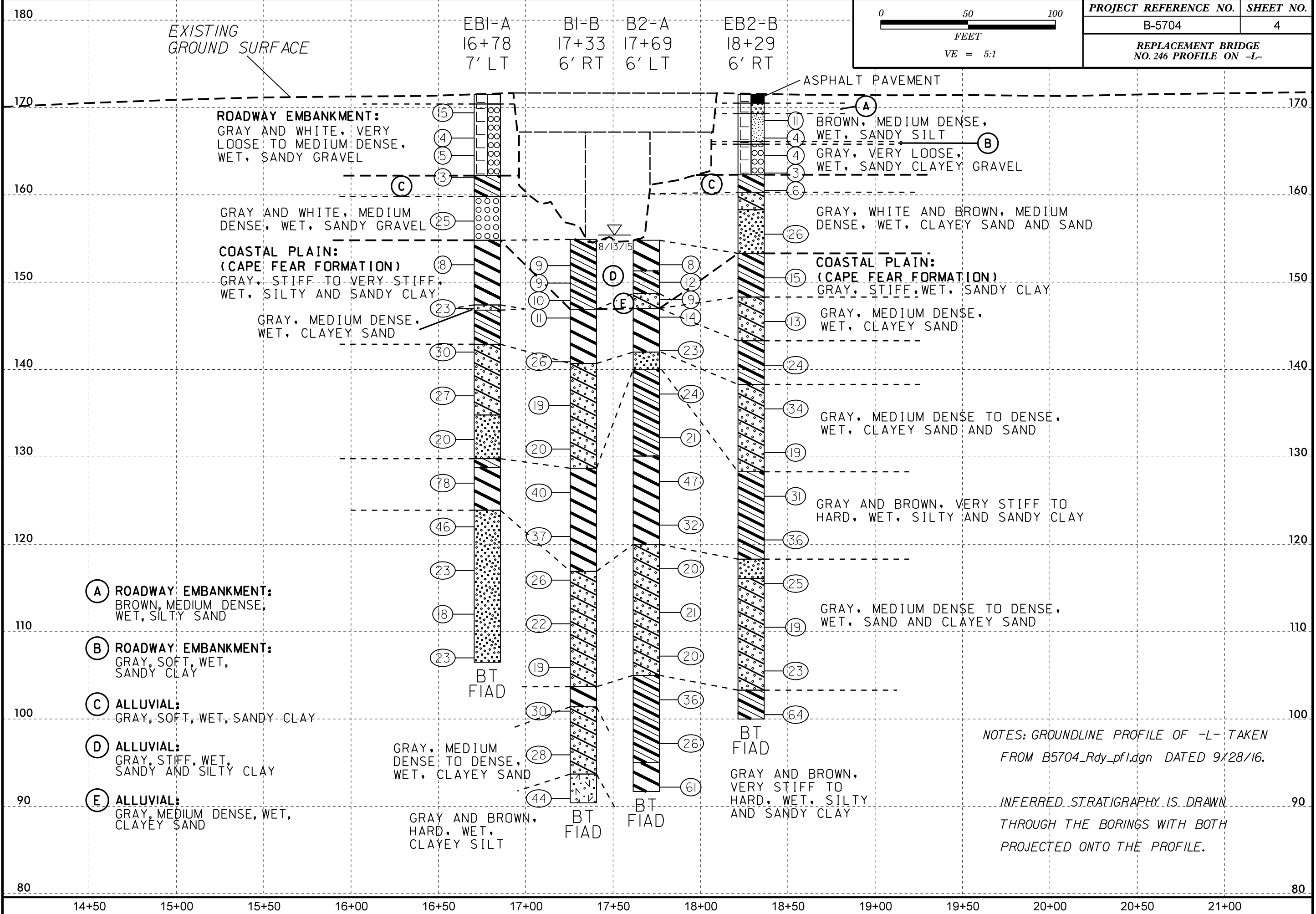
TOP OF RAIL
EL=173.8 FT

TOP OF RAIL
EL=173.7 FT

-BL-2
EL=171.1 FT

WOODS

WOODS



180
170
160
150
140
130
120
110
100
90
80

170
160
150
140
130
120
110
100
90
80

14+50 15+00 15+50 16+00 16+50 17+00 17+50 18+00 18+50 19+00 19+50 20+00 20+50 21+00

EXISTING
GROUND SURFACE

EB1-A 16+78 7' LT
B1-B 17+33 6' RT
B2-A 17+69 6' LT
EB2-B 18+29 6' RT

ASPHALT PAVEMENT

ROADWAY EMBANKMENT:
GRAY AND WHITE, VERY
LOOSE TO MEDIUM DENSE,
WET, SANDY GRAVEL

GRAY AND WHITE, MEDIUM
DENSE, WET, SANDY GRAVEL

**COASTAL PLAIN:
(CAPE FEAR FORMATION)**
GRAY, STIFF TO VERY STIFF,
WET, SILTY AND SANDY CLAY

GRAY, MEDIUM DENSE,
WET, CLAYEY SAND

A BROWN, MEDIUM DENSE,
WET, SANDY SILT
B GRAY, VERY LOOSE,
WET, SANDY CLAYEY GRAVEL

GRAY, WHITE AND BROWN, MEDIUM
DENSE, WET, CLAYEY SAND AND SAND

**COASTAL PLAIN:
(CAPE FEAR FORMATION)**
GRAY, STIFF, WET, SANDY CLAY

GRAY, MEDIUM DENSE,
WET, CLAYEY SAND

GRAY, MEDIUM DENSE TO DENSE,
WET, CLAYEY SAND AND SAND

GRAY AND BROWN, VERY STIFF TO
HARD, WET, SILTY AND SANDY CLAY

GRAY, MEDIUM DENSE TO DENSE,
WET, SAND AND CLAYEY SAND

A ROADWAY EMBANKMENT:
BROWN, MEDIUM DENSE,
WET, SILTY SAND

B ROADWAY EMBANKMENT:
GRAY, SOFT, WET,
SANDY CLAY

C ALLUVIAL:
GRAY, SOFT, WET, SANDY CLAY

D ALLUVIAL:
GRAY, STIFF, WET,
SANDY AND SILTY CLAY

E ALLUVIAL:
GRAY, MEDIUM DENSE, WET,
CLAYEY SAND

GRAY, MEDIUM
DENSE TO DENSE,
WET, CLAYEY SAND

GRAY AND BROWN,
HARD, WET,
CLAYEY SILT

BT
FIAD

GRAY AND BROWN,
VERY STIFF TO
HARD, WET, SILTY
AND SANDY CLAY

NOTES: GROUNDLINE PROFILE OF -L- TAKEN
FROM B5704_Rdy_pfl.dgn DATED 9/28/16.

INFERRERD STRATIGRAPHY IS DRAWN
THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45658.1.1		TIP B-5704		COUNTY HARNETT		GEOLOGIST Whitt, J.										
SITE DESCRIPTION Replace Bridge No. 246 on SR 1718 (Erwin Rd.) over Black River							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 16+78		OFFSET 7 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 171.5 ft		TOTAL DEPTH 65.0 ft		NORTHING 569,869		EASTING 2,106,356										
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 82% 04/15/2016			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Chalmers, T.		START DATE 03/14/17		COMP. DATE 03/14/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
175																
170	170.4	1.1	7	8	7									171.5	GROUND SURFACE	0.0
														170.4	0.5' ASPHALT, 0.6' CONCRETE	1.1
	167.5	4.0	4	2	2										ROADWAY EMBANKMENT	
	165.5	6.0	2	2	3										GRAY, BROWN AND WHITE, SANDY GRAVEL WITH SILT	
	163.0	8.5	2	1	2											
	158.0	13.5	9	14	11									162.2	ALLUVIAL	9.3
	153.0	18.5	4	4	4									159.8	DARK BROWNISH GRAY, SANDY CLAY	11.7
	148.0	23.5	5	10	13									154.8	GRAY AND WHITE, SANDY GRAVEL	
	143.0	28.5	10	13	17									147.4	COASTAL PLAIN	16.7
	138.0	33.5	11	12	15									146.8	(CAPE FEAR FORMATION), LIGHT BLuish GRAY, SILTY CLAY	
	133.0	38.5	7	10	10									142.9	GRAY, CLAYEY FINE SAND	24.1
	128.0	43.5	15	32	46									142.9	GRAY, SANDY CLAY	24.7
	123.0	48.5	12	20	26									142.9	GRAY, SANDY CLAY	28.6
	118.0	53.5	8	10	13									142.9	GRAY, CLAYEY FINE TO COARSE SAND	
	113.0	58.5	8	9	9									134.8	GRAY, CLAYEY FINE TO COARSE SAND	36.7
	108.0	63.5	7	10	13									129.8	GRAY, FINE TO COARSE SAND WITH LITTLE CLAY	41.7
														128.8	GRAY, SANDY CLAY WITH GRAVEL	42.7
														123.9	DARK REDDISH BROWN, CLAY	47.6
														106.5	DARK GRAY, FINE SAND WITH SOME CLAY	65.0
Boring Terminated at Elevation 106.5 ft In COASTAL PLAIN (Cape Fear Formation) (Fine to Coarse Sand)																

WBS 45658.1.1		TIP B-5704		COUNTY HARNETT		GEOLOGIST Whitt, J.										
SITE DESCRIPTION Replace Bridge No. 246 on SR 1718 (Erwin Rd.) over Black River							GROUND WTR (ft)									
BORING NO. B1-B		STATION 17+33		OFFSET 6 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 154.9 ft		TOTAL DEPTH 64.5 ft		NORTHING 569,837		EASTING 2,106,403										
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 82% 04/15/2016			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Chalmers, T.		START DATE 03/17/17		COMP. DATE 03/17/17		SURFACE WATER DEPTH 0.7ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
155																
	152.9	2.0	2	4	5											
	150.9	4.0	3	4	5											
	148.9	6.0	WOH	4	6											
	146.9	8.0	4	4	7											
	141.9	13.0	7	11	15											
	136.9	18.0	7	8	11											
	131.9	23.0	6	9	11											
	126.9	28.0	12	18	22											
	121.9	33.0	11	15	22											
	116.9	38.0	11	12	14											
	111.9	43.0	7	10	12											
	106.9	48.0	8	9	10											
	96.9	58.0	10	13	15											
	91.9	63.0	16	20	24											
Boring Terminated at Elevation 90.4 ft In COASTAL PLAIN (Cape Fear Formation) (Clayey Silt)																

NCDOT BORE DOUBLE B5704_GEO_BRDG246.GPJ_NC_DOT.GDT 4/6/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45658.1.1		TIP B-5704		COUNTY HARNETT		GEOLOGIST Whitt, J.	
SITE DESCRIPTION Replace Bridge No. 246 on SR 1718 (Erwin Rd.) over Black River							GROUND WTR (ft)
BORING NO. B2-A		STATION 17+69		OFFSET 6 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 154.8 ft		TOTAL DEPTH 63.1 ft		NORTHING 569,833		EASTING 2,106,440	
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 82% 04/15/2016			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Chalmers, T.		START DATE 03/15/17		COMP. DATE 03/15/17		SURFACE WATER DEPTH 0.8ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
155														154.8	WATER SURFACE (03/15/17)	0.0
	153.0	1.8		3	4	4								151.3	ALLUVIAL BLUISH GRAY, SILTY CLAY	3.5
	151.0	3.8		2	5	7								148.7	GRAY, SANDY CLAY	6.1
	149.0	5.8		4	4	5								147.0	GRAY, CLAYEY FINE TO COARSE SAND, MICACEOUS	7.8
	147.0	7.8		4	6	8								142.0	COASTAL PLAIN (CAPE FEAR FORMATION), GRAY, SILTY CLAY WITH LITTLE SAND	12.8
	143.2	11.6		5	9	14								140.0	GRAY, FINE TO COARSE SAND WITH LITTLE CLAY	14.8
	138.2	16.6		11	12	12								130.1	BLUISH GRAY, SANDY CLAY	24.7
	133.2	21.6		6	10	11								120.0	DARK GRAYISH BROWN, SILTY CLAY	34.8
	128.2	26.6		12	22	25								105.0	GRAY AND LIGHT BROWN, CLAYEY FINE TO COARSE SAND	49.8
	123.2	31.6		11	13	19								95.0	GRAY, SANDY CLAY	59.8
	118.2	36.6		6	10	10								91.7	REDDISH BROWN AND GRAY, SILTY CLAY	63.1
	113.2	41.6		8	9	12										
	110.2	46.6		7	8	12										
	108.2	46.6		7	8	12										
	103.2	51.6		11	15	21										
	98.2	56.6		12	13	13										
	93.2	61.6		20	29	32										

WBS 45658.1.1		TIP B-5704		COUNTY HARNETT		GEOLOGIST Whitt, J.	
SITE DESCRIPTION Replace Bridge No. 246 on SR 1718 (Erwin Rd.) over Black River							GROUND WTR (ft)
BORING NO. EB2-B		STATION 18+29		OFFSET 6 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 171.5 ft		TOTAL DEPTH 71.5 ft		NORTHING 569,799		EASTING 2,106,490	
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 82% 04/15/2016			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Chalmers, T.		START DATE 03/16/17		COMP. DATE 03/16/17		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
175														171.5	GROUND SURFACE	0.0
	170.5	0.5												170.5	0.5' ASPHALT, 0.5' CONCRETE	1.0
	169.3	2.2												169.3	ROADWAY EMBANKMENT BROWN, SILTY SAND WITH LITTLE GRAVEL	2.2
	166.1	5.4												166.1	DARK BROWN, SANDY SILT	5.4
	165.8	5.7												165.8	GRAY, SANDY CLAY	5.7
	162.3	9.2												162.3	BROWNISH GRAY, SANDY GRAVEL	9.2
	160.3	11.2												160.3	ALLUVIAL GRAY, SANDY CLAY	11.2
	158.3	13.2												158.3	GRAY, CLAYEY FINE TO COARSE SAND	13.2
	153.3	18.2												153.3	WHITE AND LIGHT PINKISH BROWN, FINE TO COARSE SAND	18.2
	148.3	23.2												148.3	COASTAL PLAIN (CAPE FEAR FORMATION), GRAY, SANDY CLAY	23.2
	143.3	28.2												143.3	GRAY, CLAYEY SAND, MICACEOUS	28.2
	138.3	33.2												138.3	GRAY, SANDY CLAY	33.2
	128.3	43.2												128.3	GREENISH GRAY, CLAYEY FINE TO COARSE SAND	43.2
	118.3	53.2												118.3	DARK GRAY, SANDY CLAY	53.2
	116.1	55.4												116.1	LIGHT GRAY AND LIGHT BROWN, FINE TO COARSE SAND	55.4
	103.3	68.2												103.3	LIGHT GRAY, CLAYEY FINE TO COARSE SAND	68.2
	100.0	71.5												100.0	BLUISH GRAY, SANDY CLAY	71.5

NCDOT BORE DOUBLE_B5704_GEO_BRDG246.GPJ_NC_DOT.GDT_4/16/17

SITE PHOTOGRAPHS
BRIDGE NO. 246 OVER BLACK RIVER ON SR 1718



View of SR 1718 looking southeast.



View of Black River looking southeast.