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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5237	1	11

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY WAKE
PROJECT DESCRIPTION REPLACE BRIDGE 248 ON
SR 2703 OVER MAHLER'S CREEK

SITE DESCRIPTION _____

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11	SOIL TEST RESULTS

PERSONNEL

D. G. PINTER

N. O. MOORE

INVESTIGATED BY N. T. ROBERSON

DRAWN BY N. T. ROBERSON

CHECKED BY J. L. PEDRO

SUBMITTED BY N. T. ROBERSON

DATE APRIL 2017

CAUTION NOTICE

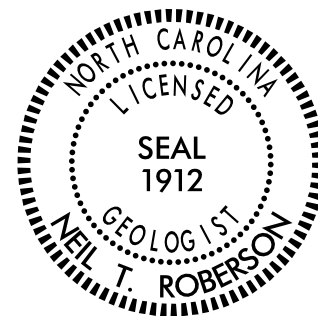
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DocuSigned by:

Neil Roberson

5/18/2018

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SIGNATURE

DATE

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REFERENCE: B-5237

PROJECT: 42838

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION





SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

SOIL DESCRIPTION										GRADATION									
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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS									
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERALOGICAL COMPOSITION									
GROUP CLASS. A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-3 A-4, A-5 A-6, A-7										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.									
SYMBOL										COMPRESSIBILITY									
% PASSING #10 #40 #200										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50									
MATERIAL PASSING #40 LL PI										PERCENTAGE OF MATERIAL									
GROUP INDEX										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL									
USUAL TYPES OF MAJOR MATERIALS										GROUND WATER									
GEN. RATING AS SUBGRADE										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									
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS									
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY 25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT VST PMT 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									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS									
U.S. STD. SIEVE SIZE OPENING (MM)										UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL									
GRAIN SIZE										ABBREVIATIONS									
SOIL MOISTURE - CORRELATION OF TERMS										AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE. - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL RATIO CBR - CALIFORNIA BEARING RATIO									
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT									
PLASTICITY INDEX (PI) DRY STRENGTH										DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE _____ * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> _____ <input type="checkbox"/> _____ HAMMER TYPE: <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____ HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> _____ <input type="checkbox"/> _____									
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.									

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

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 2 OF 2)

ROCK DESCRIPTION		TERMS AND DEFINITIONS
<p>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. 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 REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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 SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF 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 TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>
WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)		FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)		COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.
WEATHERING		
FRESH		ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SL.)		ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SL.)		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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)		SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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 WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)		ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>
SEVERE (SEV.)		ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</u>
VERY SEVERE (V SEV.)		ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>
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 ALSO AN EXAMPLE.
ROCK HARDNESS		
VERY HARD		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD		CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD		CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD		CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT		CAN BE GROOVED 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 PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT		CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.
FRACTURE SPACING		BEDDING
TERM	SPACING	TERM
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED
WIDE	3 TO 10 FEET	THICKLY BEDDED
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED
CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED
		THINLY LAMINATED
		4 FEET
		1.5 - 4 FEET
		0.16 - 1.5 FEET
		0.03 - 0.16 FEET
		0.008 - 0.03 FEET
		< 0.008 FEET
INDURATION		
FRIABLE		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.
BENCH MARK:		
		ELEVATION: FEET
NOTES:		
BORING ELEVATIONS WERE TAKEN FROM THE TIN FILE DATED 9/10/2015.		
DATE: 8-15-14		



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

April 7, 2017

STATE PROJECT: 42838.1.1 (B-5237)
COUNTY: Wake
DESCRIPTION: Approaches to Bridge 248 on SR 2703 over Mahler's
Creek
SUBJECT: Geotechnical Report – Inventory

Project Description

This project lies just south of the town of Garner in Wake County. The project consists of replacing Bridge 248 and upgrades to the approaches on SR 2703 (New Bethel Church Road). The total mainline (-L-) project length is 0.616 miles.

Seven hand auger borings were performed at various offset locations along the -L- alignment by the NCDOT Geotechnical Engineering Unit. The work was performed in April 2017. Representative samples were collected for visual classification in the field and eight samples were submitted for laboratory analysis by the Materials and Tests Unit.

Physiography and Geology

The project is located in the Piedmont physiographic province of North Carolina. The project corridor is primarily urban and suburban residential. Grass fields and home sites lie along the project corridor. The terrain consists of gently rolling hills and shallow valleys. Geologically, the soils in this region are derived from the weathering of underlying biotite schists belonging to the Raleigh Belt.

Soil Properties

Soils encountered during this investigation are separated into three categories; roadway embankment, alluvial and residual soils.

Roadway Embankment soils are likely derived from nearby sources and are similar to residual soils in composition. These soils generally consist of red-brown, medium dense to dense, silty sands (A-2-4) and medium stiff to stiff, sandy clays (A-6).

Alluvial soils consist of gray to orange-brown, loose to medium dense, silty sand (A-2-4) and gray to red-brown, soft to medium stiff, sandy clays (A-7-5). These soils overlie residual soils on the project.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

Telephone: 919-707-6850
Fax: 919-250-4237
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

Residual soils are derived from the weathering of the underlying biotite schists, and generally consist of red-brown, medium dense to dense, silty sands (A-2-4) and medium stiff to stiff, sandy clays (A-6).

Groundwater

Groundwater was encountered in the borings which were performed in the alluvial floodplain, but was not encountered in the upland areas where residual soils were encountered. Groundwater elevation in the floodplain is similar to that of Mahler's Creek, and is not anticipated to cause stability problems during construction.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42838.1.1			TIP B-5237			COUNTY WAKE			GEOLOGIST Roberson, N. T.							
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek									GROUND WTR (ft)							
BORING NO. B1			STATION 36+00			OFFSET 30 ft LT			ALIGNMENT -L-							
COLLAR ELEV. 242.2 ft			TOTAL DEPTH 12.0 ft			NORTHING 696,665			EASTING 2,118,776							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER Pinter, D. G.			START DATE 04/05/17			COMP. DATE 04/05/17			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
245																
														242.2	GROUND SURFACE 0.0	
240										S-1			239.7	RESIDUAL Red-Brown Med. Stiff to Stiff, Highly Plastic, Silty Clay with Mica Red-Brown Soft to Med. Stiff, Silty Clay with Mica 2.5		
235										S-2						
										S-3			233.2	Orange and Brown-Gray, Loose, Silty Sand with Mica and Pebbles 9.0		
										S-4			230.2	Boring Terminated at Elevation 230.2 ft in Residual (Silty Sand) 12.0		

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42838.1.1		TIP B-5237		COUNTY WAKE		GEOLOGIST Roberson, N. T.									
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek							GROUND WTR (ft)								
BORING NO. B2		STATION 36+00		OFFSET 50 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 234.4 ft		TOTAL DEPTH 6.0 ft		NORTHING 696,619		EASTING 2,118,710									
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE N/A									
DRILLER Pinter, D. G.		START DATE 04/05/17		COMP. DATE 04/05/17		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
235														GROUND SURFACE	0.0
230														RESIDUAL Red-Brown Soft to Med. Stiff, Silty Clay with Mica and Trace Pebbles	4.5
														Orange Loose to Med. Dense, Silty Sand with Mica and Pebbles	6.0
														Boring Terminated at Elevation 228.4 ft in Residual (Silty Sand)	

NCDOT BORE SINGLE B5237_GEO_BH.GPJ NC_DOT.GDT 4/18/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 42838.1.1			TIP B-5237			COUNTY WAKE			GEOLOGIST Roberson, N. T.							
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek									GROUND WTR (ft)							
BORING NO. B3			STATION 37+50			OFFSET 70 ft RT			ALIGNMENT -L-							
COLLAR ELEV. 226.4 ft			TOTAL DEPTH 4.8 ft			NORTHING 696,484			EASTING 2,118,779							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER Pinter, D. G.			START DATE 04/05/17			COMP. DATE 04/05/17			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
230																
225															226.4	GROUND SURFACE 0.0
															221.9	ALLUVIAL Red-Brown Soft to Stiff, Silty Clay with some Mica and Pebbles 4.5
															221.6	Orange Loose, Silty Sand with Mica and Pebbles 4.8
																Boring Terminated at Elevation 221.6 ft in Alluvial (Silty Sand)

NCDOT BORE SINGLE B5237_GEO_BH.GPJ NC_DOT.GDT 4/18/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42838.1.1		TIP B-5237		COUNTY WAKE		GEOLOGIST Roberson, N. T.												
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek							GROUND WTR (ft)											
BORING NO. B4		STATION 38+00		OFFSET 70 ft RT		ALIGNMENT -L-	0 HR. Dry											
COLLAR ELEV. 226.0 ft		TOTAL DEPTH 6.0 ft		NORTHING 696,443		EASTING 2,118,807	24 HR. 1.4 Caved											
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE N/A												
DRILLER Pinter, D. G.		START DATE 04/05/17		COMP. DATE 04/05/17		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT					BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100	ELEV. (ft)	DEPTH (ft)						
230																		
225																		
220																		

GROUND SURFACE 0.0

ALLUVIAL

224.0 Orange-Red Soft to Med. Stiff, Silty Clay with Mica 2.0

223.5 Tan Brown Soft to Med. Stiff, Silty Sand with Mica 2.5

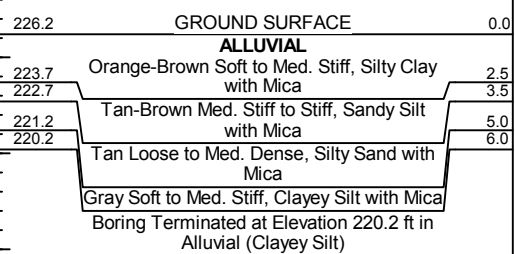
221.0 Tan Loose to Med. Dense, Silty Sand with Mica 5.0

220.0 Orange-Red Med. Stiff to Stiff, Silty Clay with Mica and Gray Sandy Lense (0.3') 6.0

Boring Terminated at Elevation 220.0 ft in Alluvial (Silty Clay)

GEOTECHNICAL BORING REPORT BORE LOG

WBS 42838.1.1			TIP B-5237		COUNTY WAKE			GEOLOGIST Roberson, N. T.								
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek									GROUND WTR (ft)							
BORING NO. B5			STATION 39+00		OFFSET 70 ft RT		ALIGNMENT -L-			0 HR. Dry						
COLLAR ELEV. 226.2 ft			TOTAL DEPTH 6.0 ft		NORTHING 696,361		EASTING 2,118,864			24 HR. 5.5 Caved						
DRILL RIG/HAMMER EFF./DATE N/A					DRILL METHOD Hand Auger			HAMMER TYPE N/A								
DRILLER Pinter, D. G.			START DATE 04/05/17		COMP. DATE 04/05/17		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
230																
225																
											S-7					



NCDOT BORE SINGLE B5237_GEO_BH.GPJ NC_DOT.GDT 4/18/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 42838.1.1			TIP B-5237			COUNTY WAKE			GEOLOGIST Roberson, N. T.							
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek									GROUND WTR (ft)							
BORING NO. B7			STATION 40+00			OFFSET 30 ft LT			ALIGNMENT -L-							
COLLAR ELEV. 231.2 ft			TOTAL DEPTH 6.0 ft			NORTHING 696,336			EASTING 2,119,004							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER Pinter, D. G.			START DATE 04/05/17			COMP. DATE 04/05/17			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
235																
230														231.2	GROUND SURFACE	0.0
															ALLUVIAL Red-Brown and Gray, Med. Stiff to Stiff, Silty Clay with some Mica	
											S-8			225.2	Boring Terminated at Elevation 225.2 ft in Alluvial (Clayey Silt)	6.0

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42838.1.1			TIP B-5237			COUNTY WAKE			GEOLOGIST Roberson, N. T.							
SITE DESCRIPTION BR No. 248 on SR 2703 over Mahler's Creek									GROUND WTR (ft)							
BORING NO. B6			STATION 41+00			OFFSET 40 ft RT			ALIGNMENT -L-							
COLLAR ELEV. 230.6 ft			TOTAL DEPTH 6.0 ft			NORTHING 696,214			EASTING 2,119,003							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER Pinter, D. G.			START DATE 04/05/17			COMP. DATE 04/05/17			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
235																
230														230.6	GROUND SURFACE	0.0
														228.6	ALLUVIAL Orange-Brown Soft to Med. Stiff, Silty Clay with Mica and Some Pebbles	2.0
														227.1	Tan Loose to Med. Dense, Silty Sand with Mica and Pebbles	3.5
														226.1	Tan Loose to Med. Dense, Silty Sand with Mica and Pebbles	4.5
														225.1	Gray Soft to Med. Stiff, Clayey Silt with Mica	5.5
225														224.6	Tan Loose to Med. Dense, Silty Sand with Mica and Pebbles	6.0
															Gray Soft to Med. Stiff, Clayey Silt with Mica	
															Boring Terminated at Elevation 224.6 ft in Alluvial (Silty Clay)	

NCDOT BORE SINGLE B5237_GEO_BH.GPJ NC_DOT.GDT 4/18/17

B1

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-1	30'LT	36+00	1.0-2.0	A-7-5(28)	67	36	9.1	19.1	7.4	64.5	100	96	74	-	-
S-2	30'LT	36+00	3.0-4.0	A-7-5(6)	52	14	19.1	33.2	13.4	34.2	100	95	51	-	-
S-3	30'LT	36+00	9.0-10.0	A-2-4(0)	NEM	NP	33.6	38.9	13.4	14.1	82	65	28	-	-
S-4	30'LT	36+00	10.0-11.0	A-2-4(0)	NEM	NEM	29.0	47.9	11.0	12.1	95	88	27	-	-

B4

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-5	70'RT	38+00	2.0-2.5	A-4(6)	31	8	3.4	18.3	42.0	36.3	100	99	85	-	-
S-6	70'RT	38+00	2.5-3.5	A-2-4(0)	NEM	NEM	31.8	44.5	9.6	14.1	100	86	30	-	-

B5

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-7	70'RT	39+00	5.0-6.0	A-4(8)	32	9	5.6	10.5	43.6	40.3	100	97	87	-	-

B7

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-8	30'LT	40+00	5.0-6.0	A-7-6(6)	44	17	22.6	28.2	13.0	36.3	94	82	51	-	-

*NEM = NOT ENOUGH MATERIAL