

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.8.R.63 (SF-610036)	1	8

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 17BP.8.R.63 (SF-610036) F.A. PROJ. NA
 COUNTY MONTGOMERY
 PROJECT DESCRIPTION BRIDGE NO. 36 ON SR 1544
(CALVARY CHURCH ROAD) OVER DISONS CREEK

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
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PERSONNEL

S. CROCKETT

B. BOYCE

INVESTIGATED BY S. CROCKETT

CHECKED BY P. ZHANG

SUBMITTED BY P. ZHANG

DATE MARCH 2014

CAUTION NOTICE

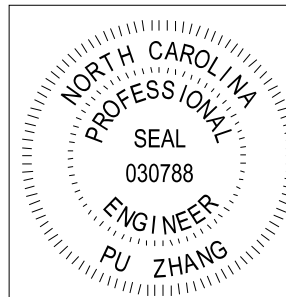
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.



[Signature]
3/20/14

SIGNATURE

DRAWN BY: S. CROCKETT

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION																																										
SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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.																																										
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION																																										
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.																																										
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-4, A-5, A-6, A-7										COMPRESSIBILITY																																										
SYMBOL										SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50																																										
% PASSING #10, #40, #200										PERCENTAGE OF MATERIAL																																										
LIQUID LIMIT PLASTIC INDEX										ORGANIC MATERIAL GRANULAR SILTS SILT-CLAY SILTS 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																																										
GROUP INDEX										GROUND WATER																																										
USUAL TYPES OF MAJOR MATERIALS																																																				
GEN. RATING AS A SUBGRADE										EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE																																										
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																																																				
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS																																										
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F ²)																																																				
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)										N/A																																										
GENERALLY SILT-CLAY MATERIAL (COHESIVE)										<0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4																																										
TEXTURE OR GRAIN SIZE										ABBREVIATIONS																																										
U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270, 4.76, 2.00, 0.42, 0.25, 0.075, 0.053										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL - CLAY MOD. - MODERATELY CL - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 1/4 - DRY UNIT WEIGHT CSE. - COARSE ORG. - ORGANIC 1/4 - UNIT WEIGHT DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC S - BULK e - VOID RATIO SD. - SAND, SANDY SS - SPLIT SPOON F - FINE SL. - SILT, SILTY ST - SHELBY TUBE FOSS. - FOSSILIFEROUS SLL. - SLIGHTLY RS - ROCK FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS. - FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO HI. - HIGHLY v - VERY																																										
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)										GRAIN SIZE MM 305, 75, 2.0, 0.25, 0.05, 0.005 IN. 12, 3																																										
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT																																										
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DRILL UNITS:</td> <td style="width: 33%;">ADVANCING TOOLS:</td> <td style="width: 33%;">HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> MOBILE B-____</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> BK-51</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td rowspan="2">CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B____</td> </tr> <tr> <td><input type="checkbox"/> CME-550</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><input type="checkbox"/> -H____</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td rowspan="2">HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> _____</td> <td><input type="checkbox"/> TRICONE _____ ' STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE _____ ' TUNG.-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> </table>										DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	<input type="checkbox"/> MOBILE B-____	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> BK-51	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	<input type="checkbox"/> CME-45C	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B____	<input type="checkbox"/> CME-550	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -N____	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> -H____	<input type="checkbox"/> CME-55	<input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER	HAND TOOLS:	<input type="checkbox"/> _____	<input type="checkbox"/> TRICONE _____ ' STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER		<input type="checkbox"/> TRICONE _____ ' TUNG.-CARB.	<input type="checkbox"/> HAND AUGER		<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD			<input type="checkbox"/> VANE SHEAR TEST
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LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																				
PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																				
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE																																																				
SL - SL - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																				
PLASTICITY																																																				
NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH																																																				
LOW PLASTICITY 0-5 VERY LOW																																																				
MED. PLASTICITY 6-15 SLIGHT																																																				
HIGH PLASTICITY 16-25 MEDIUM																																																				
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.																																																				

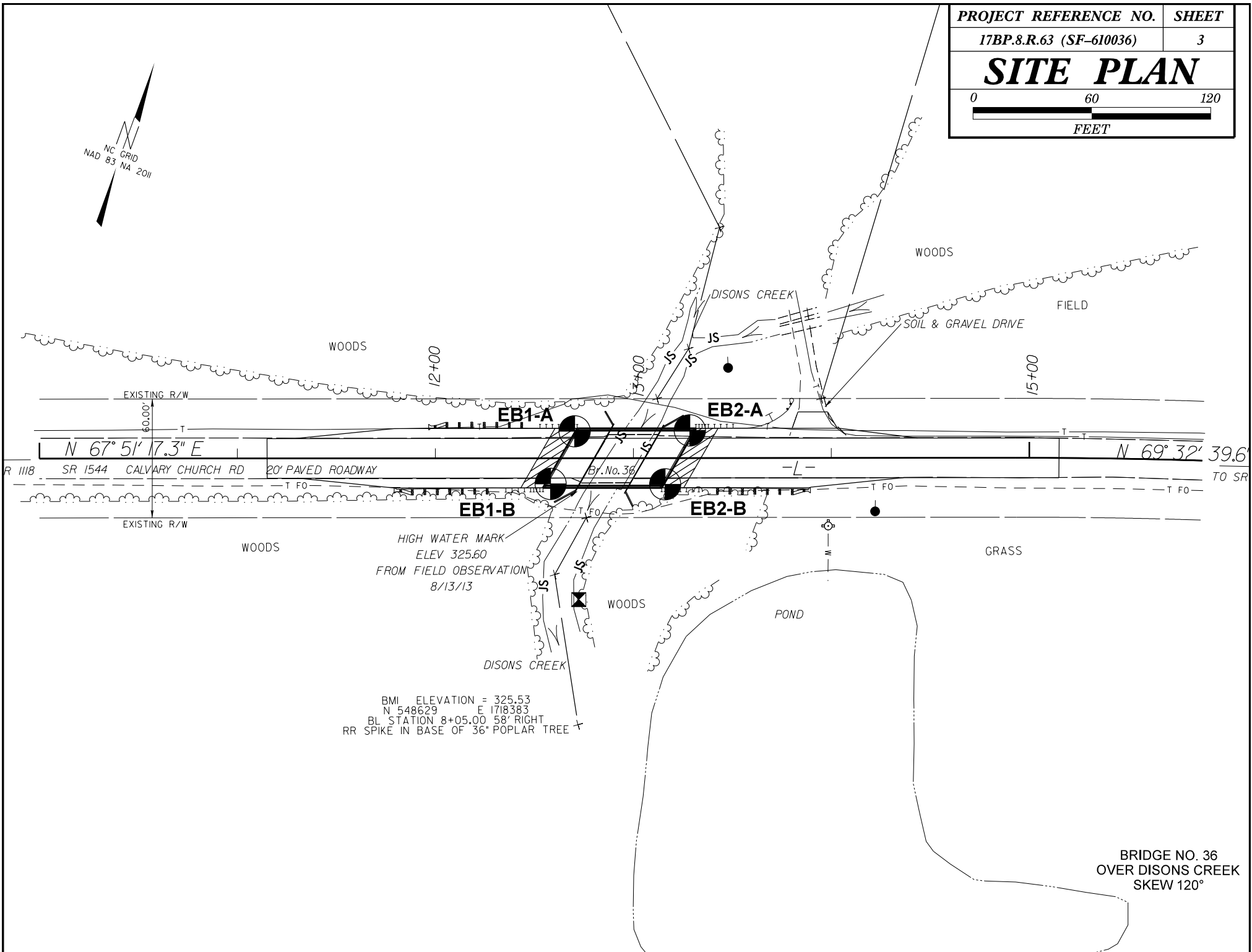
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ROCK DESCRIPTION		TERMS AND DEFINITIONS
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. 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. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. 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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>
<p>WEATHERED ROCK (WR)</p> 	<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>	
<p>CRYSTALLINE ROCK (CR)</p> 	<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>	
<p>NON-CRYSTALLINE ROCK (NCR)</p> 	<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC.</p>	
<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> 	<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>	
WEATHERING		
<p>FRESH</p>	<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>	
<p>VERY SLIGHT (V SL.)</p>	<p>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.</p>	
<p>SLIGHT (SL.)</p>	<p>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.</p>	
<p>MODERATE (MOD.)</p>	<p>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.</p>	
<p>MODERATELY SEVERE (MOD. SEV.)</p>	<p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p>	
<p>SEVERE (SEV.)</p>	<p>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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i></p>	
<p>VERY SEVERE (V SEV.)</p>	<p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i></p>	
<p>COMPLETE</p>	<p>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.</p>	
ROCK HARDNESS		
<p>VERY HARD</p>	<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p>	
<p>HARD</p>	<p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p>	
<p>MODERATELY HARD</p>	<p>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.</p>	
<p>MEDIUM HARD</p>	<p>CAN BE GROUDED 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.</p>	
<p>SOFT</p>	<p>CAN BE GROUDED 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.</p>	
<p>VERY SOFT</p>	<p>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.</p>	
FRACTURE SPACING		
<p>VERY WIDE</p>	<p>MORE THAN 10 FEET</p>	
<p>WIDE</p>	<p>3 TO 10 FEET</p>	
<p>MODERATELY CLOSE</p>	<p>1 TO 3 FEET</p>	
<p>CLOSE</p>	<p>0.16 TO 1 FEET</p>	
<p>VERY CLOSE</p>	<p>LESS THAN 0.16 FEET</p>	
BEDDING		
<p>VERY THICKLY BEDDED</p>	<p>> 4 FEET</p>	
<p>THICKLY BEDDED</p>	<p>1.5 - 4 FEET</p>	
<p>THINLY BEDDED</p>	<p>0.16 - 1.5 FEET</p>	
<p>VERY THINLY BEDDED</p>	<p>0.03 - 0.16 FEET</p>	
<p>THICKLY LAMINATED</p>	<p>0.008 - 0.03 FEET</p>	
<p>THINLY LAMINATED</p>	<p>< 0.008 FEET</p>	
INDURATION		
<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>		
<p>FRIABLE</p>	<p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>	
<p>MODERATELY INDURATED</p>	<p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>	
<p>INDURATED</p>	<p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>	
<p>EXTREMELY INDURATED</p>	<p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>	

BENCH MARK: BM#1-BL - STA. 8+05.00 58' RT RR SPIKE IN BASE OF
 36" POPLAR TREE N548,629 E1,718,383
 ELEVATION: 325.53 FT.

NOTES:
 ADDITIONAL ABBREVIATIONS:
 FIAD - BORING FILLED IN AFTER DRILLING
 CV - CAVED

PROJECT REFERENCE NO.	SHEET
17BP.8.R.63 (SF-610036)	3
SITE PLAN	
FEET	



R 1118 SR 1544 CALVARY CHURCH RD 20' PAVED ROADWAY TO SR

HIGH WATER MARK
ELEV 325.60
FROM FIELD OBSERVATION
8/13/13

BMI ELEVATION = 325.53
N 548629 E 1718383
BL STATION 8+05.00 58' RIGHT
RR SPIKE IN BASE OF 36' POPLAR TREE

BRIDGE NO. 36
OVER DISONS CREEK
SKEW 120°



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.8.R.63		TIP SF-610036		COUNTY MONTGOMERY		GEOLOGIST CROCKETT, S.											
SITE DESCRIPTION BRIDGE NO. 36 ON SR 1544 (CALVARY CHURCH ROAD) OVER DISONS CREEK							GROUND WTR (ft)										
BORING NO. EB1-A		STATION 12+70		OFFSET 14 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 330.9 ft		TOTAL DEPTH 9.1 ft		NORTHING 548,707		EASTING 1,718,349											
DRILL RIG/HAMMER EFF./DATE AME6515 CME-55 89% 09/12/2013				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER BOYCE, B.		START DATE 03/11/14		COMP. DATE 03/11/14		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	DEPTH (ft)
335																	
330	329.9	1.0	2	1	2										330.9	GROUND SURFACE	0.0
	327.4	3.5	1	2	3											ROADWAY EMBANKMENT ORANGE, SANDY CLAY (A-6)	
325	324.9	6.0	3	5	7										326.4	ALLUVIAL BROWN AND GRAY, SANDY CLAY (A-6) WITH GRAVEL	4.5
	322.4	8.5													321.9		9.0
	321.8	9.1	9	91/0.1						100/0.6					321.8	CRYSTALLINE ROCK LIGHT GRAY, METAVOLCANIC ROCK	9.1
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 321.8 ft IN CR: METAVOLCANIC ROCK	

NCDOT BORE SINGLE SF-610036_GEO_BRDG.GPJ NC_DOT.GDT 3/20/14



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.8.R.63	TIP SF-610036	COUNTY MONTGOMERY	GEOLOGIST CROCKETT, S.
SITE DESCRIPTION BRIDGE NO. 36 ON SR 1544 (CALVARY CHURCH ROAD) OVER DISONS CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+58	OFFSET 13 ft RT	ALIGNMENT -L-
COLLAR ELEV. 331.2 ft	TOTAL DEPTH 8.5 ft	NORTHING 548,678	EASTING 1,718,348
DRILL RIG/HAMMER EFF./DATE AME6515 CME-55 89% 09/12/2013		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER BOYCE, B.	START DATE 03/11/14	COMP. DATE 03/11/14	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)		
335																	
															331.2	GROUND SURFACE	0.0
330	330.2	1.0	3	6	4											ROADWAY EMBANKMENT	
	327.7	3.5	2	2	2											ORANGE AND TAN, SANDY SILT (A-4) WITH SOME GRAVEL	
325	325.2	6.0	3	4	6										325.2		6.0
	322.7	8.5													322.7	ALLUVIAL	8.5
																BROWN AND BLACK, SANDY CLAY (A-6) WITH GRAVEL	
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 322.7 ft ON CR: METAVOLCANIC ROCK	

NCDOT BORE SINGLE SF-610036_GEO_BRDG.GPJ NC_DOT.GDT 3/20/14



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 17BP.8.R.63	TIP SF-610036	COUNTY MONTGOMERY	GEOLOGIST CROCKETT, S.
SITE DESCRIPTION BRIDGE NO. 36 ON SR 1544 (CALVARY CHURCH ROAD) OVER DISONS CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 13+29	OFFSET 14 ft LT	ALIGNMENT -L-
COLLAR ELEV. 330.8 ft	TOTAL DEPTH 28.6 ft	NORTHING 548,729	EASTING 1,718,403
DRILL RIG/HAMMER EFF./DATE AME6515 CME-55 89% 09/12/2013		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER BOYCE, B.	START DATE 03/11/14	COMP. DATE 03/11/14	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)			
335																		
330	329.8	1.0	2	2	3										330.8	GROUND SURFACE	0.0	
	327.3	3.5	2	2	1											ROADWAY EMBANKMENT ORANGE AND TAN, SANDY SILT (A-4)		
325	324.8	6.0	6	15	17										326.8	ALLUVIAL BROWN AND GRAY, SANDY SILT (A-4) WITH SOME CLAY	4.0	
	322.3	8.5	7	8	6										324.3	RESIDUAL ORANGE AND BROWN, SANDY SILT (A-4) WITH WEATHERED ROCK FRAGMENTS	6.5	
320																		
	317.3	13.5	12	30	70/0.5													
315																315.8	WEATHERED ROCK LIGHT GRAY AND BROWN, METAVOLCANIC ROCK	15.0
	312.3	18.5	17	30	43										312.8	RESIDUAL BROWN AND GRAY, SILTY SAND (A-2-4) WITH WEATHERED ROCK FRAGMENTS	18.0	
310																310.3	WEATHERED ROCK METAVOLCANIC ROCK	20.5
	307.3	23.5	60/0.1												307.3	CRYSTALLINE ROCK BROWN AND GRAY, METAVOLCANIC ROCK	23.5	
305																		
	302.3	28.5	60/0.1													302.2	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 302.2 ft IN CR: METAVOLCANIC ROCK	28.6

NCDOT BORE SINGLE SF-610036_GEO_BRDG.GPJ NC_DOT.GDT 3/20/14



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.8.R.63	TIP SF-610036	COUNTY MONTGOMERY	GEOLOGIST CROCKETT, S.
SITE DESCRIPTION BRIDGE NO. 36 ON SR 1544 (CALVARY CHURCH ROAD) OVER DISONS CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 13+16	OFFSET 13 ft RT	ALIGNMENT -L-
COLLAR ELEV. 331.0 ft	TOTAL DEPTH 23.6 ft	NORTHING 548,699	EASTING 1,718,401
DRILL RIG/HAMMER EFF./DATE AME6515 CME-55 89% 09/12/2013		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER BOYCE, B.	START DATE 03/11/14	COMP. DATE 03/11/14	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)		
335																	
															331.0	GROUND SURFACE	0.0
330	330.0	1.0	3	3	3								M		ROADWAY EMBANKMENT ORANGE AND TAN, SANDY SILT (A-4) WITH SOME GRAVEL		
	327.5	3.5	3	3	6								M				
325	325.0	6.0	7	10	7								M		ALLUVIAL ORANGE AND BLACK, SANDY SILT (A-4) WITH GRAVEL	6.0	
	322.5	8.5	12	25	35								D		RESIDUAL LIGHT BROWN AND GRAY, SANDY SILT (A-4) WITH SOME WEATHERED ROCK FRAGMENTS		
320															317.0	WEATHERED ROCK LIGHT GRAY, METAVOLCANIC ROCK	14.0
	317.5	13.5	41	57	43/0.4												
315																	
	312.5	18.5	100/0.3														
310																	
	307.5	23.5	60/0.1												307.5	CRYSTALLINE ROCK GRAY, METAVOLCANIC ROCK	23.5
															307.4	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 307.4 ft IN CR: METAVOLCANIC ROCK	23.6

NCDOT BORE SINGLE SF-610036_GEO_BRDG.GPJ NC_DOT.GDT 3/20/14