

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-400052	1	10

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GUILFORD
PROJECT DESCRIPTION BRIDGE NO. 52 OVER DEEP
RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST.)

CONTENTS

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1	TITLE SHEET
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PERSONNEL
TRIGON EXP.
CROCKETT, S.

INVESTIGATED BY CROCKETT, S.
DRAWN BY CROCKETT, S.
CHECKED BY HAMM, J.R.
SUBMITTED BY FALCON ENG.
DATE AUGUST 2018

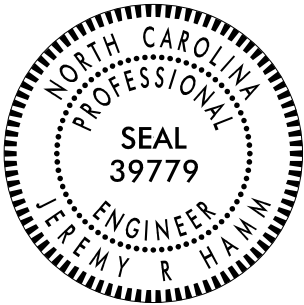
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- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR 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.



Jeremy R Hamm
8/8/2018 9:33:02 PM EDT
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

REFERENCE: SF-400052

PROJECT: 17BP.7.R.114

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

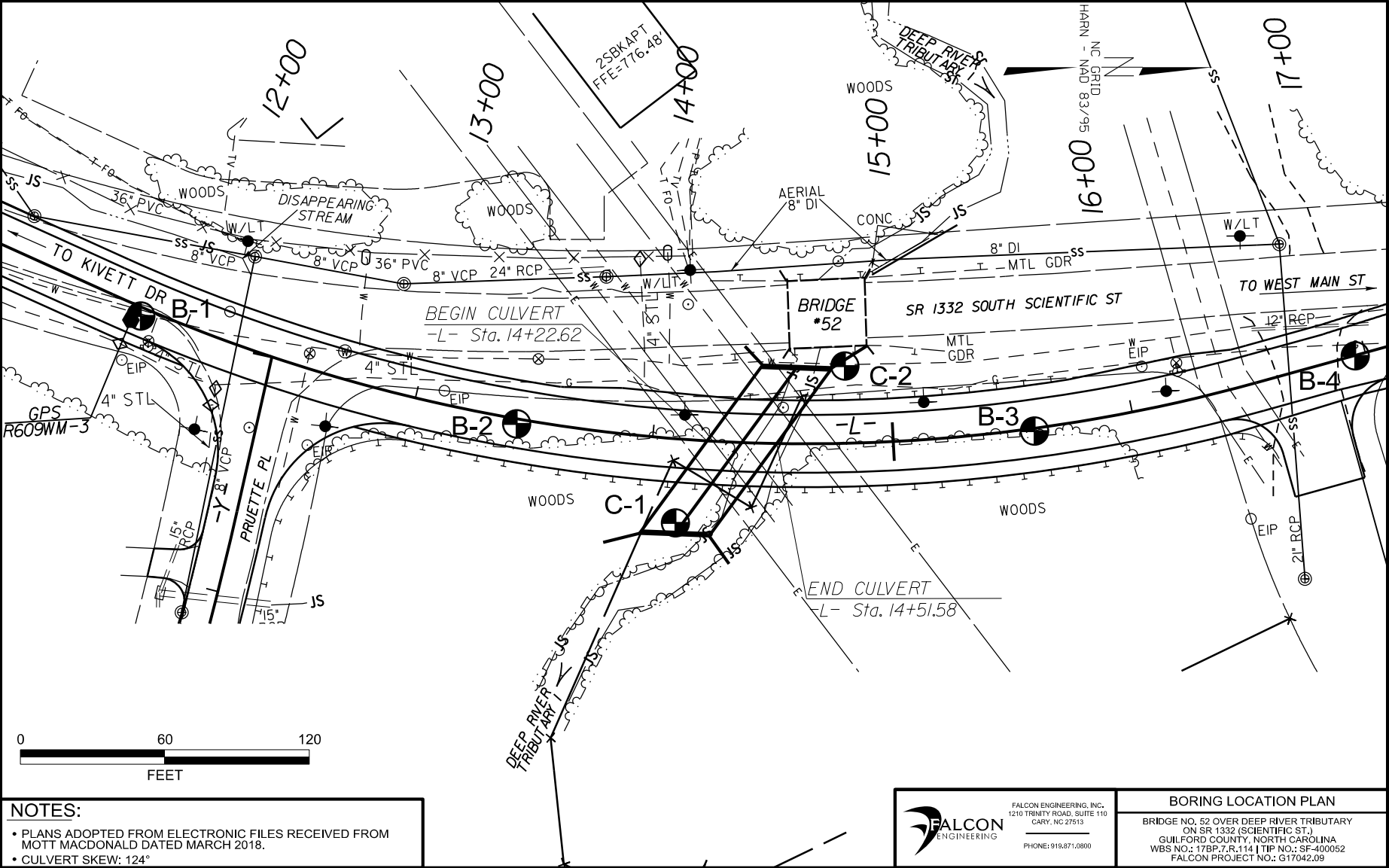
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

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																							
THE ANGULARITY OF 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																							
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 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																							
CONSISTENCY OR DENSENESS												RECOMMENDATION SYMBOLS																							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)												UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK																							
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 ? - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC ?g - DRY UNIT WEIGHT CSE. - COARSE ORG. - ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST OPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC e - VOID RATIO SD. - SAND, SANDY F - FINE SL. - SILT, SILTY FOSS. - FOSSILIFEROUS SLL. - SLIGHTLY FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS. - FRAGMENTS w - MOISTURE CONTENT HL - HIGHLY V - VERY												SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO											
SOIL MOISTURE - CORRELATION OF TERMS												EQUIPMENT USED ON SUBJECT PROJECT																							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION												DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS AUTOMATIC MANUAL CME-55 6" CONTINUOUS FLIGHT AUGER CME-550 8" HOLLOW AUGERS VANE SHEAR TEST HARD FACED FINGER BITS PORTABLE HOIST TUNG-CARBIDE INSERTS B-57 CASING w/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT CORE BIT																							
PLASTICITY												CORE SIZE: HAND TOOLS: -B -H -N POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST																							
NON PLASTIC 0-5 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.																																			

PROJECT REFERENCE NO.	SHEET NO.
SF-400052	2A

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

ROCK DESCRIPTION			TERMS AND DEFINITIONS		
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:					
WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.		
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.	AQUIFER - A WATER BEARING FORMATION OR STRATA.		
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.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.		
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.	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.		
WEATHERING			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.		
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.		
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.		COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.		
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.		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.		
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.		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE 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>		DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.		
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>		DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.		
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>		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.		
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.		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.		
ROCK HARDNESS			FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.		
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.		FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.		
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.		
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.		JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.		
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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.		
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 PIECES CAN BE BROKEN BY FINGER PRESSURE.		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.		
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 FINGERNAIL.		MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.		
FRACTURE SPACING			PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.		
TERM	SPACING	TERM	THICKNESS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.	
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET	ROCK QUALITY DESIGNATION (RQD) - 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.	
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.	
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET	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.	
CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED	0.03 - 0.16 FEET	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.	
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	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.	
		THINLY LAMINATED	< 0.008 FEET	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.	
INDURATION			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.		
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
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: GPS R609WM-3, -L- STA. 11+78, 7' RT N: 811803 E: 1718030		
			ELEVATION: 780.57 FEET		
			NOTES:		
			FIAD - FILLED IMMEDIATELY AFTER DRILLING		
DATE: 8-15-14					



BORE LOG

WBS 17BP.7.R.114			TIP SF-400052			COUNTY GUILFORD			GEOLOGIST S. CROCKETT							
SITE DESCRIPTION BRIDGE NO. 52 OVER DEEP RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST)								GROUND WTR (ft)								
BORING NO. C-1			STATION 14+12			OFFSET 35 ft RT			ALIGNMENT -L-							
COLLAR ELEV. 764.5 ft			TOTAL DEPTH 5.0 ft			NORTHING 812,029			EASTING 1,718,115							
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER Estep, J. E.			START DATE 03/14/18			COMP. DATE 03/14/18			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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)
765																
	763.5	1.0	1	1	28									764.5	GROUND SURFACE	0.0
	761.0	3.5												762.5	ALLUVIAL BROWN, CLAYEY SAND (A-2-6)	2.0
760	759.5	5.0	16	4	96/0.0									760.5	RESIDUAL GRAY, SILTY SAND (A-2-4) WITH ROCK FRAGMENTS	4.0
														759.5	WEATHERED ROCK GRAY, GRANITE	5.0
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 759.5 ft ON CRYSTALLINE ROCK: GRANITE	

NCDOT BORE SINGLE SF-400052_CULV052.GPJ NC_DOT.GDT 7/13/18

BORE LOG

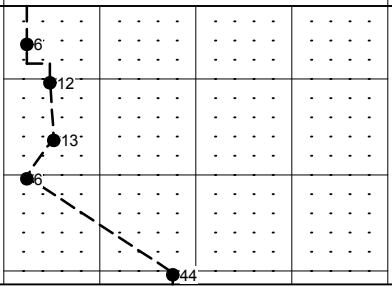
WBS 17BP.7.R.114			TIP SF-400052			COUNTY GUILFORD			GEOLOGIST S. CROCKETT							
SITE DESCRIPTION BRIDGE NO. 52 OVER DEEP RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST)									GROUND WTR (ft)							
BORING NO. C-2			STATION 14+81			OFFSET 32 ft LT			ALIGNMENT -L-		0 HR. 6.0					
COLLAR ELEV. 767.6 ft			TOTAL DEPTH 11.8 ft			NORTHING 812,100			EASTING 1,718,049		24 HR. 4.5					
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER Estep, J. E.			START DATE 03/14/18			COMP. DATE 03/14/18			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		DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)		
770																
765	766.6	1.0												767.6	GROUND SURFACE	0.0
	764.6	3.0	1	WOH	1							M		ALLUVIAL BROWN, SANDY CLAY (A-6) WITH TRACE ORGANICS		
	761.6	6.0		WOH	WOH									761.6		6.0
760	759.6	8.0	2	7	11							M		759.6	RESIDUAL GRAY AND WHITE, SILTY SAND (A-2-4) WITH TRACE ROCK FRAGMENTS	8.0
	755.8	11.8	58	42/0.4						100/0.9				755.8	WEATHERED ROCK GRAY, BLACK, AND WHITE, GRANITE	11.8
			60/0.0							60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 755.8 ft ON CRYSTALLINE ROCK: GRANITE		

NCDOT BORE SINGLE SF-400052_CULV052.GPJ NC_DOT.GDT 7/13/18

WBS 17BP.7.R.114			TIP SF-400052			COUNTY GUILFORD			GEOLOGIST S. CROCKETT					
SITE DESCRIPTION BRIDGE NO. 52 OVER DEEP RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST)									GROUND WTR (ft)					
BORING NO. B-1			STATION 11+81			OFFSET 3 ft RT			ALIGNMENT -L-					
COLLAR ELEV. 780.8 ft			TOTAL DEPTH 14.3 ft			NORTHING 811,807			EASTING 1,718,029					
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Estep, J. E.			START DATE 03/14/18			COMP. DATE 03/14/18			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)
785														
780	779.8	1.0	8	8	7								780.8	0.0
775	777.3	3.5	7	8	9								RESIDUAL ORANGE, TAN, AND BROWN, SILTY SAND (A-2-4) WITH ROCK FRAGMENTS	
	774.8	6.0	3	6	7									
770	772.3	8.5	5	9	14									
	767.3	13.5	6	21	79/0.3								767.3	13.5
													766.5	14.3
													WEATHERED ROCK ORANGE AND BROWN, GRANITE Boring Terminated at Elevation 766.5 ft IN WEATHERED ROCK: GRANITE	

NCDOT BORE SINGLE SF-400052_CULV052.GPJ NC DOT.GDT 7/13/18

BORE LOG

WBS 17BP.7.R.114			TIP SF-400052			COUNTY GUILFORD			GEOLOGIST S. CROCKETT							
SITE DESCRIPTION BRIDGE NO. 52 OVER DEEP RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST)								GROUND WTR (ft)								
BORING NO. B-2			STATION 13+48			OFFSET 2 ft RT		ALIGNMENT -L-		0 HR. Dry						
COLLAR ELEV. 773.8 ft			TOTAL DEPTH 14.5 ft			NORTHING 811,963		EASTING 1,718,074		24 HR. 9.0						
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER Estep, J. E.			START DATE 03/14/18			COMP. DATE 03/14/18			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)	
775																
	772.8	1.0	3	3	3											
770	770.8	3.0	4	5	7							M		770.8	GROUND SURFACE	0.0
	767.8	6.0	5	6	7							M		770.8	ROADWAY EMBANKMENT RED-BROWN, SANDY CLAY (A-6)	3.0
765	765.8	8.0	3	3	3							M		765.8	RESIDUAL ORANGE, CLAYEY SAND (A-2-6)	
	760.8	13.0	13	22	22									765.8	ORANGE, SANDY CLAY (A-6)	8.0
760														762.8	BROWN, CLAYEY SAND (A-2-6) SAPROLITIC	11.0
												D		759.3	Boring Terminated at Elevation 759.3 ft IN RESIDUAL: CLAYEY SAND	14.5

NCDOT BORE SINGLE SF-400052_CULV052.GPJ NC_DOT.GDT 7/13/18

GEOTECHNICAL BORING REPORT

BORE LOG

NC DOT BORE SINGLE SF-40052_CULV052.GPJ NC_DOT.GDT 7/13/18

BORE LOG

WBS 17BP.7.R.114			TIP SF-400052			COUNTY GUILFORD			GEOLOGIST S. CROCKETT					
SITE DESCRIPTION BRIDGE NO. 52 OVER DEEP RIVER TRIBUTARY ON SR 1332 (SCIENTIFIC ST)									GROUND WTR (ft)					
BORING NO. B-4			STATION 16+96			OFFSET CL			ALIGNMENT -L-		0 HR. Dry			
COLLAR ELEV. 781.8 ft			TOTAL DEPTH 13.7 ft			NORTHING 812,312			EASTING 1,718,045		24 HR. 10.7			
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018						DRILL METHOD H.S. Augers				HAMMER TYPE Automatic				
DRILLER Estep, J. E.			START DATE 03/14/18			COMP. DATE 03/14/18			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)
785														
780	780.8	1.0	1	2	3								781.8	0.0
	778.3	3.5	2	5	8							M	TOPSOIL 0.3'	
	775.8	6.0	11	22	25							M	ROADWAY EMBANKMENT BROWN, SILTY SAND (A-2-4)	
775	773.3	8.5	10	8	5							D	RESIDUAL BROWN AND ORANGE, CLAYEY SAND (A-2-6)	
	770												775.8	6.0
770	768.3	13.5											BROWN AND GRAY, SILTY SAND (A-2-4)	
													768.3	13.5
													768.1	13.7
													WEATHERED ROCK BROWN AND GRAY, GRANITE Boring Terminated at Elevation 768.1 ft IN WEATHERED ROCK: GRANITE	

NCDOT BORE SINGLE SF-400052_CULV052.GPJ NC_DOT.GDT 7/13/18



August 23, 2018

Tim Jordan, PE
Mott MacDonald
7621 Purfoy Road, Suite 115
Fuquay-Varina, NC 27526

Project: 17BP.7.R.114 (SF-400052)
County: Guilford
Description: Bridge No. 52 over Deep River Tributary on SR 1332 (Scientific St)
Subject: Culvert Foundation Recommendations

Dear Mr. Jordan:

As authorized, Falcon Engineering Inc. (Falcon) has completed the Culvert Foundation Recommendations for the above referenced project based on current NCDOT LRFD bridge design policy and procedures.

Foundation recommendations and notes on plans are presented in the attachments. These recommendations are based on subsurface data obtained by Falcon as presented in the Subsurface Investigation Report submitted under separate cover. Culvert geometry and scour data used in our analysis were obtained from the approved Culvert Survey and Hydraulic Design Report (CSR).

Falcon appreciates the opportunity to have provided Mott MacDonald with geotechnical engineering services. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

Respectfully submitted:

FALCON ENGINEERING, INC.

A handwritten signature in blue ink that reads "Stephen Crockett".

Stephen Crockett, EI
Geotechnical Professional

A handwritten signature in blue ink that reads "Jeremy R. Hamm".

Jeremy R. Hamm, PE
Geotechnical Engineering Manager

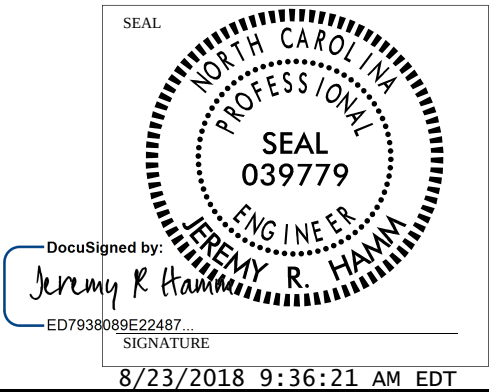
Attachments: Foundation Recommendations and Notes on Plans

FOUNDATION RECOMMENDATIONS

WBS # 17BP.7.R.114
T.I.P. NO. SF-400052
COUNTY Guilford
STATION 14+37.00 -L-

DESCRIPTION Bridge No. 52 on SR 1334 (Scientific St)
over Deep River Tributary

	INITIALS	DATE
DESIGN	SCC	07/12/18
CHECK	JRH	08/08/18
APPROVAL		



CULVERT SIZE	STATION	FOUNDATION TYPE	EXCAVATION DEPTH	MISCELLANEOUS DETAILS
Dual, 12' x 10' Reinforced Concrete Box Culverts	-L- 14+37	Full Concrete Invert on 12" Class VI Foundation Conditioning Material	1.0 foot below bottom of culvert	Approximate Culvert Length = 85 ft Culvert Skew = 124 degrees Culvert Invert Elevation = 761.8 ft Slope = 1.143%

FOUNDATION RECOMMENDATION SPECIAL NOTES ON PLANS

- 1. EXCAVATE FOUNDATION A MINIMUM OF 1.0 FEET BELOW CULVERT BEARING ELEVATION. PLACE 1.0 FEET OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATION.
- 2. OVEREXCAVATE LOOSE/SOFT MATERIAL IF PRESENT TO SUITABLE BEARING MATERIALS AND REPLACE WITH ADDITIONAL CLASS VI FOUNDATION CONDITIONING MATERIAL.