

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 45354.1.8 (BD-5108G) F.A. PROJ. BRZ-1163(II)
 COUNTY RANDOLPH
 PROJECT DESCRIPTION BRIDGE NO. 14 ON SR 1163 (TOT HILL FARM RD.) OVER McGEE'S CREEK

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DATE JUNE 2011

CAUTION NOTICE

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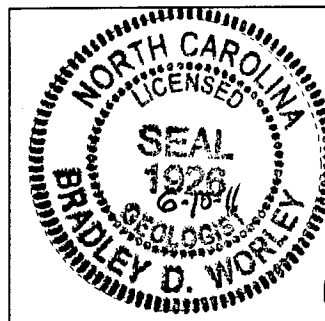
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELED 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 IS IT 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.

DRAWN BY: B.D. WORLEY



Bradley D. Worley

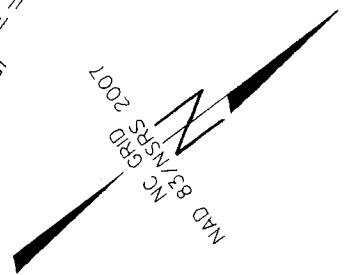
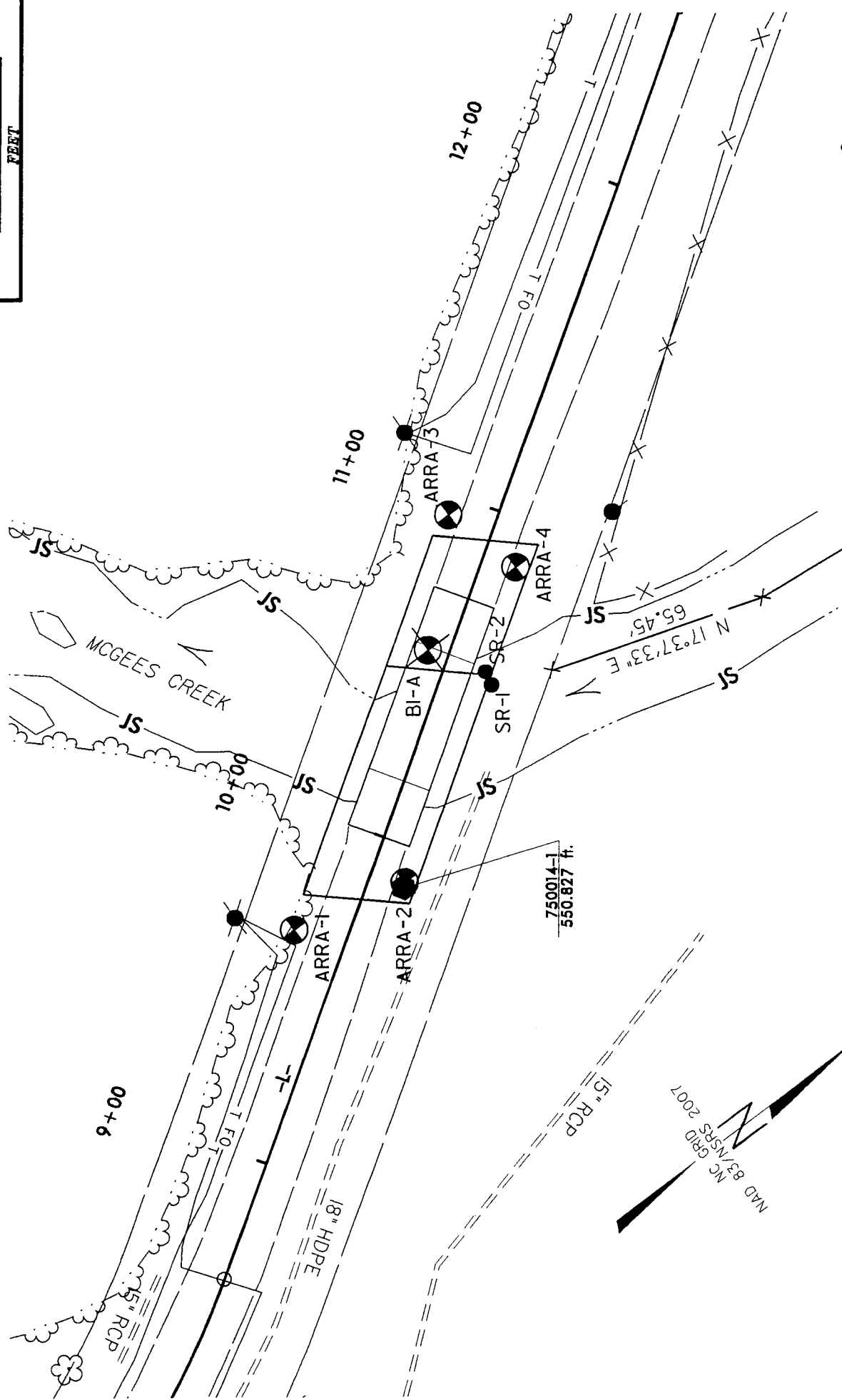
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, GRN. SILTY CLAY, MOST 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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .									
GENERAL CLASS.										MINERALOGICAL COMPOSITION									
GRANULAR MATERIALS (<= 35% PASSING #200)										ORGANIC MATERIALS									
SILT-CLAY MATERIALS (> 35% PASSING #200)										COMPRESSIBILITY									
GROUP CLASS.										SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE									
SYMBOL										LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50									
% PASSING										PERCENTAGE OF MATERIAL									
# 10 # 40 # 200										ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL									
LIQUID LIMIT PLASTIC INDEX										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 - 22% SOME 20 - 35% HIGHLY ORGANIC >12% >22% HIGHLY 35% AND ABOVE									
GROUP INDEX										GROUND WATER									
USUAL TYPES OF MAJOR MATERIALS										 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									
GEN. RATING AS A SURGRADE										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										MISCELLANEOUS SYMBOLS									
CONSISTENCY OR DENSENESS										 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									
PRIMARY SOIL TYPE										RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)									
COMPACTNESS OR CONSISTENCY										N/A									
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)										< 4 4 TO 10 10 TO 30 30 TO 50 > 50									
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE										< 0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 > 4									
VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD										< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30									
TEXTURE OR GRAIN SIZE										ABBREVIATIONS									
U.S. STD. SIEVE SIZE OPENING (MM)										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 HL - HIGHLY									
BOULDER (BLDR.)										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									
GRAIN SIZE										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 CBR - CALIFORNIA BEARING RATIO									
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)										DRILL UNITS:									
FIELD MOISTURE DESCRIPTION										ADVANCING TOOLS:									
GUIDE FOR FIELD MOISTURE DESCRIPTION										HAMMER TYPE:									
- SATURATED - (SAT)										CORE SIZE:									
- WET - (W)										HAND TOOLS:									
- MOIST - (M)										POST HOLE DIGGER									
- DRY - (D)										HAND AUGER									
REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										SOUNDING ROD									
REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										VANE SHEAR TEST									
PLASTICITY										DEIDRICH D-50									
NONPLASTIC										CLAY BITS									
LOW PLASTICITY										6" CONTINUOUS FLIGHT AUGER									
MED. PLASTICITY										8" HOLLOW AUGERS									
HIGH PLASTICITY										HARD FACED FINGER BITS									
PLASTICITY INDEX (PI)										TUNG-CARBIDE INSERTS									
DRY STRENGTH										CASING w/ ADVANCER									
VERY LOW										TRICONE * STEEL TEETH									
SLIGHT										TRICONE * TUNG-CARB.									
MEDIUM										CORE BIT									
HIGH										CORE BIT									
TEXTURE OR GRAIN SIZE										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.									

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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 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 (ROQ) - 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 IN 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 60 BLOWS 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 (SROQ) - 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>	
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 SLL.)		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 (SLL.)		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, YIELDS SPT N VALUES > 100 BPF</u>	
VERY SEVERE (V SEV.)		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. <u>IF TESTED, YIELDS 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 0.25 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	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET
		THINLY LAMINATED	< 0.008 FEET
INDURATION			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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: 750014-1 N 688744 E 1728876 ELEVATION: 550.83 FT.	
NOTES: ARRA borings originally drilled by Summit Consulting under TIP M-0423 in March 2010. F.I.A.D. = Filled In After Drilling			

PROJECT REFERENCE NO.	SHEET
45354.1.8 (RD-5108G)	3
SITE PLAN	



Proposed Skew = 75°



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45354.1.8	TIP BD-5108G	COUNTY Randolph	GEOLOGIST Skeen, M
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek			GROUND WTR (ft)
BORING NO. ARRA-1	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 550.4 ft	TOTAL DEPTH 10.6 ft	NORTHING 688,937	EASTING 1,728,745
DRILL RIG/HAMMER EFF./DATE Diedrich D-50		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Duggins, W. T.	START DATE 03/19/10	COMP. DATE 03/19/10	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		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
555																
550															550.4	0.0
545	547.0	3.4	2	1	1											
	542.0	8.4	6	21	28										541.9	8.5
540	539.8	10.6	60/0												539.8	10.6

NCDOT BORE SINGLE 076&000_GEO_BRDG0014.GPJ NC_DOT_GDT 6/10/11

GROUND SURFACE

ROADWAY EMBANKMENT
Red and brown very soft fine sandy silty
CLAY (A-7-5)

RESIDUAL
Tan dense silty fine **SAND (A-2-4)**
Boring Terminated by Auger Refusal at
Elevation 539.8 ft on Crystalline Rock: Gray
Metavolcanic Rock

1) Advanced 2-1/4" HSA to 10.6 feet.



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45354.1.8	TIP BD-5108G	COUNTY Randolph	GEOLOGIST Skeen, M
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek			GROUND WTR (ft)
BORING NO. ARRA-2	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 550.7 ft	TOTAL DEPTH 11.5 ft	NORTHING 688,971	EASTING 1,728,753
DRILL RIG/HAMMER EFF./DATE Diedrich D-50		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Duggins, W. T.	START DATE 03/19/10	COMP. DATE 03/19/10	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)	
555																
550															550.7	0.0
545	546.9	3.8	1	3	4								M			
540	541.9	8.8	6	7	14								M		543.7	7.0
	539.2	11.5	60/0										No Rec		539.2	11.5

NCDOT BORE SINGLE 076&000_GEO_BRDG0014.GPJ NC_DOT_GDT 6/10/11



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45354.1.8	TIP BD-5108G	COUNTY Randolph	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek			GROUND WTR (ft)
BORING NO. B1-A	STATION N/A	OFFSET N/A	0 HR. 5.0
COLLAR ELEV. 537.9 ft	TOTAL DEPTH 19.4 ft	NORTHING 689,016	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Smith, M. L.	START DATE 05/16/11	COMP. DATE 05/16/11	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)	
540																
															537.9	GROUND SURFACE 0.0
															535.8	ALLUVIAL Brown, loose, Silty Sand (A-2-4) 2.1
535	535.5	2.4	30	18	69										533.9	RESIDUAL Brown and gray, dense to very dense, Silty Sand (A-2-4) 4.0
530																
525																
520																
															518.5	Boring Terminated at Elevation 518.5 ft in Crystalline Rock (felsic metavolcanic) 19.4

NCDOT BORE SINGLE 076&000_GEO_BRDG0014.GPJ NC_DOT_GDT 6/10/11



NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

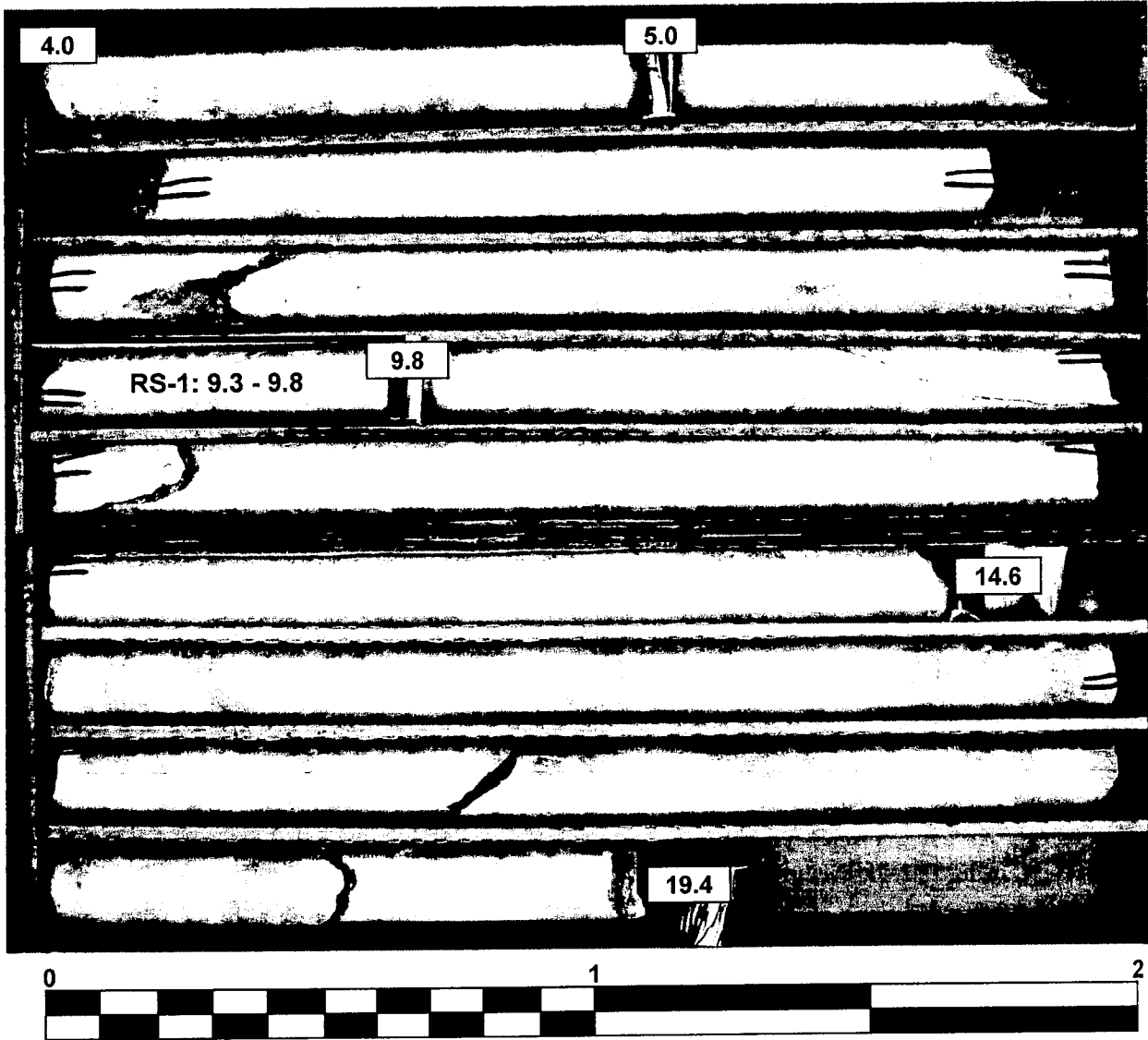
WBS 45354.1.8		TIP BD-5108G		COUNTY Randolph		GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek									GROUND WTR (ft)		
BORING NO. B1-A		STATION N/A		OFFSET N/A		ALIGNMENT -L-		0 HR. 5.0			
COLLAR ELEV. 537.9 ft		TOTAL DEPTH 19.4 ft		NORTHING 689,016		EASTING 1,728,703		24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER Smith, M. L.		START DATE 05/16/11		COMP. DATE 05/16/11		SURFACE WATER DEPTH N/A					
CORE SIZE N		TOTAL RUN 15.4 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	ROD (ft) %	REC. (ft) %	ROD (ft) %			
533.9											
	533.9	4.0	1.0	1:00/1.0	(1.0)	(1.0)	(15.3)	(15.1)		Begin Coring @ 4.0 ft	
	532.9	5.0	4.8	2:10/1.0	100%	100%	99%	98%		CRYSTALLINE ROCK	4.0
530				2:10/1.0	(4.7)	(4.5)				Dark gray to dark green, fresh, hard, mod. close fractured, felsic metavolcanic (felsic tuff)	
				2:20/1.0	98%	94%					
	528.1	9.8	4.8	2:10/1.0					RS-1	R1=7, R2=20, R3=20, R4=12, R5=7; RMR=66	
				2:20/0.8						Rock Type = D	
525				2:10/1.0	(4.8)	(4.8)					
				2:20/1.0	100%	100%					
				2:20/1.0							
	523.3	14.6	4.8	2:10/1.0	(4.8)	(4.8)					
				2:10/1.0	100%	100%					
520				2:10/1.0							
				2:10/1.0							
				2:20/1.0							
	518.5	19.4		2:20/0.8						Boring Terminated at Elevation 518.5 ft in Crystalline Rock (felsic metavolcanic)	19.4

NCDOT CORE SINGLE 076&000_GEO_BRDG0014.GPJ_NC_DOT_GDT_6/10/11

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 4.0 - 19.4 FEET



FEET



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45354.1.8	TIP BD-5108G	COUNTY Randolph	GEOLOGIST Skeen, M
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek			GROUND WTR (ft)
BORING NO. ARRA-3	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 550.4 ft	TOTAL DEPTH 13.2 ft	NORTHING 689,044	EASTING 1,728,675
DRILL RIG/HAMMER EFF./DATE Diedrich D-50		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Duggins, W. T.	START DATE 03/19/10	COMP. DATE 03/19/10	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				
555														
550													550.4	0.0
545	547.0	3.4	3	4	4	8					M		541.4	9.0
540	542.0	8.4	3	7	9	16					M		537.2	13.2
	537.2	13.2	60/0			60/0					No Rec			

NCDOT BORE SINGLE 0768000_GEO_BRDG0014.GPJ_NC_DOT.GDT 6/10/11



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 45354.1.8	TIP BD-5108G	COUNTY Randolph	GEOLOGIST Skeen, M
SITE DESCRIPTION Bridge No. 14 on SR 1163 (Tot Hill Farm Road) over McGee's Creek			GROUND WTR (ft)
BORING NO. ARRA-4	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 550.4 ft	TOTAL DEPTH 12.7 ft	NORTHING 689,051	EASTING 1,728,699
DRILL RIG/HAMMER EFF./DATE Diedrich D-50		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Duggins, W. T.	START DATE 03/19/10	COMP. DATE 03/19/10	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)	
555																
550															550.4	0.0
545	546.9	3.5	1	2	2	4						M				
540	541.9	8.5	5	6	9	15						M			542.4	8.0
	537.7	12.7	60/0			60/c						No Rec			537.7	12.7

NCDOT BORE SINGLE 076&000_GEO_BRDG0014.GPJ NC_DOT_GDT 6/10/11

Boring Terminated by Auger Refusal at Elevation 537.7 ft on Crystalline Rock: Gray Metavolcanic Rock

1) Advanced 2-1/4" HSA to 12.7 feet.



NCDOT GEOTECHNICAL ENGINEERING UNIT
FIELD PENETROMETER LOG (ENGLISH)

PROJECT NUMBER	45354-1.8	ID	BD 51086	CO	RANDOLPH	GEO	CCM RHB
SITE DESC	BR 14 OVER McGEES CRK ON SR 1163 TOW HILL FARM RD						
BORING NUMBER	SR-1	STA	10+52	OFFSET	15 FT RT	ALIGNMENT	-L-
ELEVATION	532.44 FT	TOTAL DEPTH	3.1 FT	NORTH		EAST	
DRILL METHOD	1/2" STEEL RODS (BRIDGE RODS)						
START DATE	5-25-11	COMP DATE	5-25-11	SURFACE WTR DEPTH	- FT	DEPTH TO ROCK	3.1 FT

DEPTH (R)	BLOW COUNT			BLOWS PER FOOT					SAMPLE NO. & INTERVAL	MOI	ORIGIN	SOIL & ROCK DESCRIPTION <small>(w/ color, density/consistency, texture, plasticity, organics, other)</small>	
	0.5 R	0.5 R	TOTAL	0	25	50	75	100					
0											ALLUVIAL	RED-BRN V. LOOSE CSE SAND	
1	1	1	2										
2	2	3	5										
3	5	11	16										
3.1	18/1 REF											3.1 REFUSAL	
4													

ROCK ELEVATION 532.44
 - 3.1
 = 529.34

NOTES

SIGNATURE BWD DATE 6-9-11

NOTES

DECK TO DATUM DISTANCE FT



NCDOT GEOTECHNICAL ENGINEERING UNIT
FIELD PENETROMETER LOG (ENGLISH)

PROJECT NUMBER	45354.1.8	ID	BD 51086	CO	RANDOLPH	GEO	CCM/CEB
SITE DESC	BR 14 OVER MCGEE'S CRK ON SR 1163 TO HILL FARM RD						
BORING NUMBER	SR-2	STA	10+55	OFFSET	12' RT FT	ALIGNMENT	-L-
ELEVATION	533.34 FT	TOTAL DEPTH	1.5 FT	NORTH		EAST	
DRILL METHOD	1/2" SOUNDING RODS (BRIDE RODS)			DRILLER			
START DATE	5-25-11	COMP DATE	5-25-11	SURFACE WTR DEPTH	FT	DEPTH TO ROCK	1.5 FT

DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMPLE NO. & INTERVAL	MOI	ORIGIN	SOIL & ROCK DESCRIPTION <small>(w/ color, density/consistency, texture, plasticity, organics, other)</small>
	0.5 R	0.5 R	TOTAL	0	25	50	75				
0	1	1	2								ALLUVIAL RED-BROWN V LOOSE CSE SAND
1	6	REF (S/NP)	?						1.5 REFUSAL		SHARP TRANSITION TO ROCK
2											
3											
											ROCK ELEVATION 533.34 - 1.5 = 521.8

NOTES

SIGNATURE BDW DATE 6-9-11

NOTES

RED LINE

DECK TO DATUM DISTANCE FT



FIELD SCOUR REPORT

WBS: 45354.1.8 TIP: BD-5108G COUNTY: Randolph

DESCRIPTION(1): _____

EXISTING BRIDGE

Information from: Field Inspection x Microfilm _____ (reel _____ pos: _____)
Other (explain) BSR dated 4/29/11

Bridge No.: 14 Length: 74' Total Bents: 4 Bents in Channel: 1 Bents in Floodplain: 3
Foundation Type: Timber caps and piles on concrete footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Slight degradation at the streamward side of the southernmost interior bent

Channel Bed: None observed

Channel Bank: None observed

EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): n/a

Effectiveness(5): n/a

Obstructions(6): Large outcroppings of insitu crystalline rock in streambed

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Coarse sand (A-1-b) with gravel and cobbles

Channel Bank Material(8): Silty sand (A-2-4) and sandy silt (A-4)

Channel Bank Cover(9): Grass and brush

Floodplain Width(10): Approximately 150'

Floodplain Cover(11): Grass, brush, medium forest

Stream is(12): Aggrading Degrading Static

Channel Migration Tendency(13): Slightly eastward

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14) Feet Meters

**BENTS
B1**

532										

Comparison of DSE to Hydraulics Unit theoretical scour:
 The Geotechnical Engineering Unit and Hydraulics Unit agree that the Design Scour Elevation should be raised to the top of crystalline rock at elevation 532.0'. (See DSE Memo dated 6/9/2011)

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank							
Sample No.	No soil samples were lab test during this investigation. Soils were visually classified in the field.						
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

Reported by: 

Date: 6-10-11

Rock Test Results

**North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory**

Rock Compression

Lab Number:
Project #:
County:
Tip ID:

366724
45354.1.8
Randolph
B-5108G

Structure Description:
Test Date:

Br #14 over McGee's Cr..
06/01/2011

Sample No.	Diameter in	Area in ²	Specimen Height in	H/D Ratio	Weight lb	Unit Weight lb/m ³	Ultimate lb	Ultimate ksi	Ultimate (corrected) ksi	40% UK Load lb	Sec Mod 40% Mpsi
4	1.8670	2.7377	3.95	2.12	1.1900	190.1	34100	12.45	12.54	13640	321