

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.13.R.114	1	11

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 17BP.13.R.114 F.A. PROJ. SF-560281
 COUNTY MADISON
 PROJECT DESCRIPTION BRIDGE NO. 281 ON SR 1349 OVER
SPRINKLE CREEK

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PERSONNEL
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<u>PAUL, A. S.</u>
<u>TRIGON EXP</u>

INVESTIGATED BY PAUL, A. S.
 CHECKED BY NORVILLE, C. V.
 SUBMITTED BY FALCON ENG
 DATE SEPTEMBER 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.

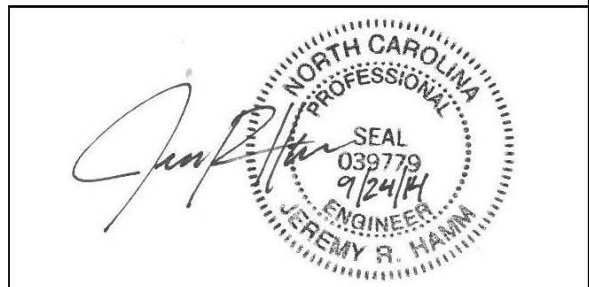
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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.

DRAWN BY: HUNSBERGER, W. S.



PROJECT REFERENCE NO. 17BP.13.R.114	SHEET NO. 2
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**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 T286, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY 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, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY 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			
GENERAL CLASS.				MINERALOGICAL COMPOSITION			
GROUP CLASS.				COMPRESSIBILITY			
SYMBOL				PERCENTAGE OF MATERIAL			
% PASSING				GROUND WATER			
LIQUID LIMIT				MISCELLANEOUS SYMBOLS			
GROUP INDEX				ABBREVIATIONS			
USUAL TYPES OF MAJOR MATERIALS				EQUIPMENT USED ON SUBJECT PROJECT			
GEN. RATING AS A SUBGRADE							
CONSISTENCY OR DENSENESS							
TEXTURE OR GRAIN SIZE							
SOIL MOISTURE - CORRELATION OF TERMS							
PLASTICITY							
COLOR							

PROJECT REFERENCE NO.	SHEET NO.
17BP.13.R.144	2A

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

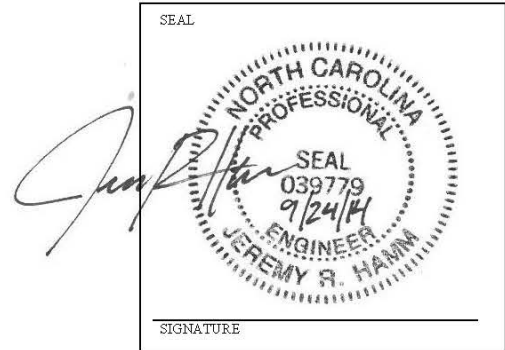
ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 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 (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. 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 DR (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 (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. 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 PHYLLITE, 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. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u></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. <u>IF TESTED, YIELDS SPT N VALUES > 100 BPF</u></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. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPF</u></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 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.</p>		
<p>SOFT</p>	<p>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.</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		BEDDING	
<p>TERM</p>	<p>SPACING</p>	<p>TERM</p>	<p>THICKNESS</p>
<p>VERY WIDE</p>	<p>MORE THAN 10 FEET</p>	<p>VERY THICKLY BEDDED</p>	<p>> 4 FEET</p>
<p>WIDE</p>	<p>3 TO 10 FEET</p>	<p>THICKLY BEDDED</p>	<p>1.5 - 4 FEET</p>
<p>MODERATELY CLOSE</p>	<p>1 TO 3 FEET</p>	<p>THINLY BEDDED</p>	<p>0.16 - 1.5 FEET</p>
<p>CLOSE</p>	<p>0.16 TO 1 FEET</p>	<p>VERY THINLY BEDDED</p>	<p>0.03 - 0.16 FEET</p>
<p>VERY CLOSE</p>	<p>LESS THAN 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>		
<p>BENCH MARK:</p>		<p>ELEVATION: _____ FT.</p>	
<p>NOTES: F.I.A.D. - FILLED IMMEDIATELY AFTER DRILLING</p>			

FOUNDATION RECOMMENDATIONS

WBS # 17BP.13.R.114
 T.I.P. NO. SF560281
 COUNTY Madison
 STATION 12+39.64 -L-

DESCRIPTION Bridge No. 281 on SR 1349
over Sprinkle Creek

	INITIALS	DATE
DESIGN	JRH	09/24/14
CHECK	CVN	09/24/14
APPROVAL		

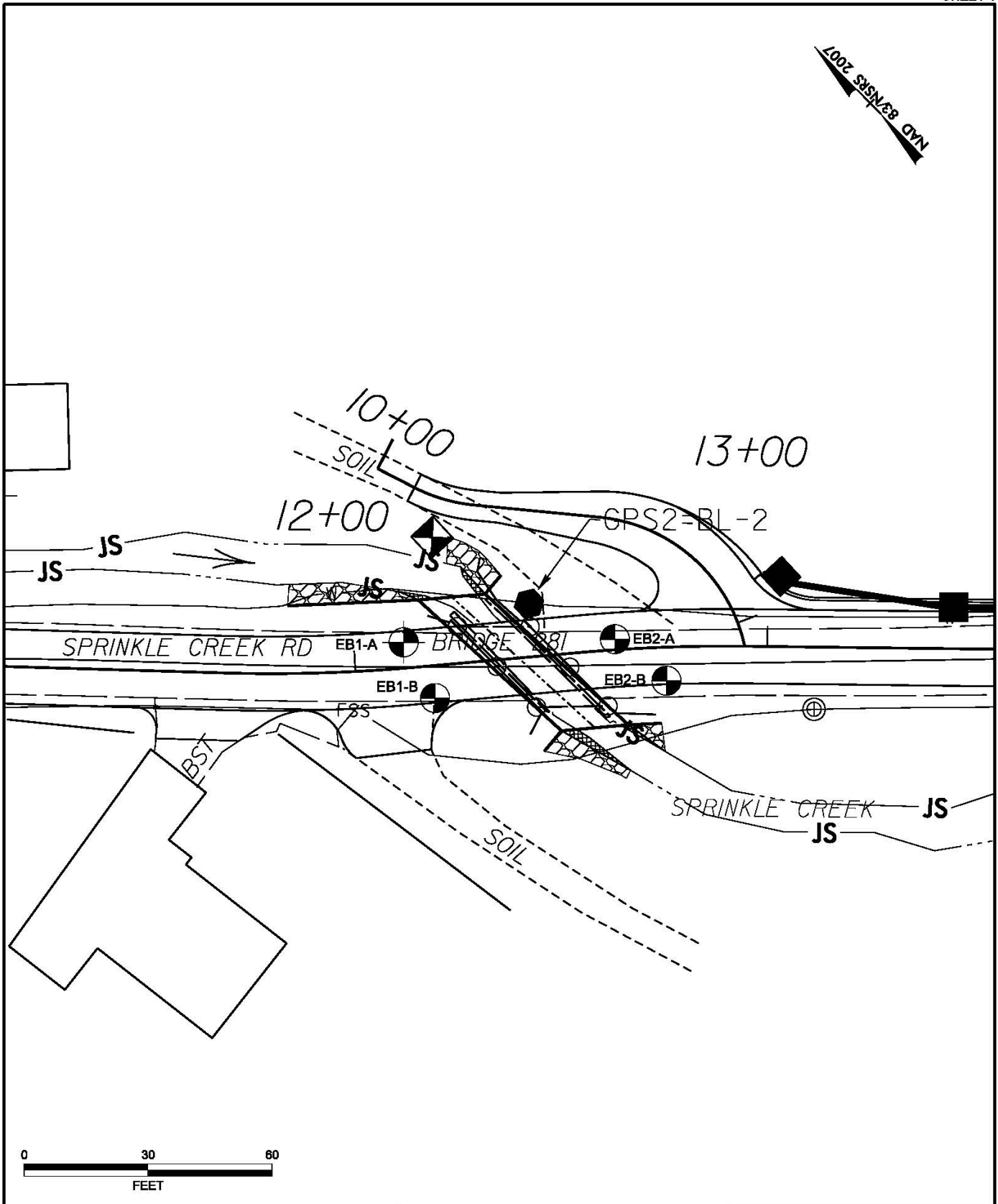


CULVERT SIZE	STATION	FOUNDATION TYPE	EXCAVATION DEPTH	MISCELLANEOUS DETAILS
12' x 8' Reinforced Concrete Box Culvert	-L- 12+39.64	12" Class VI Foundation Conditioning Material	1 foot below bottom of culvert	Culvert Length = 47 ft Culvert Skew = 47 degrees Centerline Invert Elevation = 2556.4 ft Slope = 2.94%

FOUNDATION RECOMMENDATION SPECIAL NOTES ON PLANS

- EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

NAD 83/NGS 2007



NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K IN AUGUST 2014.
- BRIDGE SKEW: 47°

FALCON ENGINEERING
 FALCON ENGINEERING, INC.
 1210 TRINITY ROAD, SUITE 110
 RALEIGH, NC 27607
 PHONE: 919.871.0900
 FAX: 919.871.0903

BORING LOCATION PLAN

BRIDGE NO. 281 ON 1349
 OVER SPRINKLE CREEK
 MADISON COUNTY, NC
 PROJ NO.: 17BP.13.R.114 TIP NO.: SF-560281



**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 17BP.13.R.114		TIP SF-560281		COUNTY Madison		GEOLOGIST Paul, A. S.									
SITE DESCRIPTION Bridge No. 281 on SR 1349 over Sprinkle Creek							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 12+12		OFFSET 6 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 2,566.0 ft		TOTAL DEPTH 13.6 ft		NORTHING 792,344		EASTING 951,951									
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Wichard, W.		START DATE 12/04/13		COMP. DATE 12/04/13		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2570															
2565	2,565.0	1.0		10	20	27							M	2,566.0 EXISTING PAVEMENT 0.0 2,565.0 0.5' BITUMINOUS CONCRETE 1.0 2,563.0 0.5' AGGREGATE BASE COURSE 3.0	
	2,562.5	3.5		7	4	3							M	2,563.0 ROADWAY EMBANKMENT 2,560.5 BROWN, DENSE, SILTY SAND (A-2-4) W/ GRAVEL 5.5 2,560.2 ALLUVIAL 5.8 2,558.2 BROWN BLACK, FIRM, F. SANDY SILT (A-4) 7.8	
2560	2,560.2	5.8		60/0.0										2,552.4 RESIDUAL DARK GRAY BROWN AND ORANGE, SILTY SAND (A-2-4) W/ QUARTZ FRAGS. 13.6 CRYSTALLINE ROCK WHITE, SLIGHTLY WEATHERED, VERY HARD, VERY CLOSE TO CLOSELY FRACTURED QUARTZ BLACK WHITE AND TAN, SEVERE TO SLIGHTLY WEATHERED, MED. HARD TO HARD, VERY TO MODERATELY CLOSELY FRACTURED, BIOTITE GNEISS	
2555														Boring Terminated by Auger Refusal at Elevation 2,552.4 ft in CR: Biotite Granitic Gneiss	

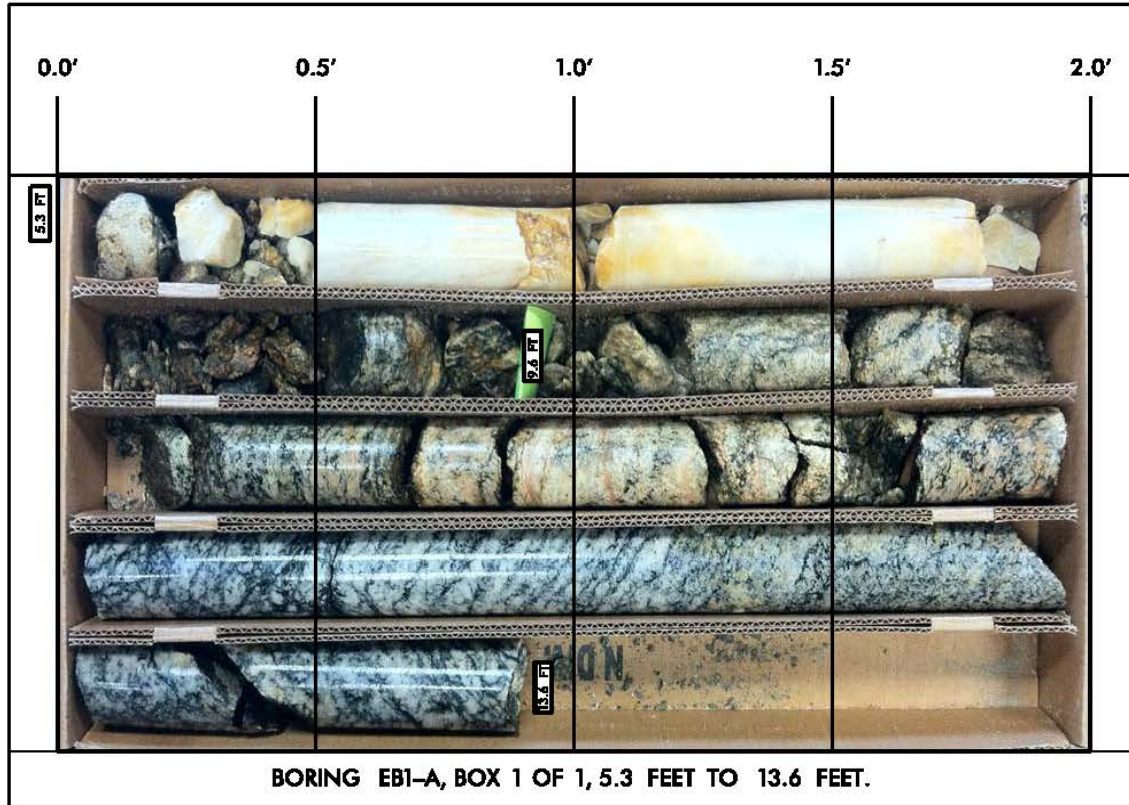
NCDOT BORE SINGLE_GEO_BRDG0281.GPJ NC_DOT_GDT_8/11/14



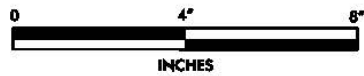
**NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT**

WBS 17BP.13.R.114		TIP SF-560281		COUNTY Madison		GEOLOGIST Paul, A. S.					
SITE DESCRIPTION Bridge No. 281 on SR 1349 over Sprinkle Creek							GROUND WTR (ft)				
BORING NO. EB1-A		STATION 12+12		OFFSET 6 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 2,566.0 ft		TOTAL DEPTH 13.6 ft		NORTHING 792,344		EASTING 951,951					
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic					
DRILLER Wichard, W.		START DATE 12/04/13		COMP. DATE 12/04/13		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 7.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
2566.2										Begin Coring @ 5.8 ft	
	2,560.2	5.8	3.8	1/1.0						CRYSTALLINE ROCK	5.8
	2,558.2			1/1.0						WHITE, SLIGHTLY WEATHERED, VERY HARD, VERY CLOSE TO CLOSELY FRACTURED QUARTZ	7.8
	2,556.4	9.6		1/0.8							
2555			4.0	1/1.0						BLACK WHITE AND TAN, SEVERE TO SLIGHTLY WEATHERED, MED. HARD TO HARD, VERY TO MODERATELY CLOSELY FRACTURED, BIOTITE GNEISS	
	2,552.4	13.6		1/1.0							
				1/1.0						Boring Terminated by Auger Refusal at Elevation 2,552.4 ft in CR: Biotite Granitic Gneiss	13.6

NCDOT CORE SINGLE _GEO_BRDG0281.GPJ NC_DOT_GDT 8/11/14



BORING EB1-A, BOX 1 OF 1, 5.3 FEET TO 13.6 FEET.



FALCON
ENGINEERING

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 118
BALMORH, NC 27607
PHONE: 919.871.0880
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ROCK CORE PHOTOS

BRIDGE NO. 281 ON 1549
OVER SPRINKLE CREEK
MADISON COUNTY, NC
PROJ NO.: 17BP.13.R.114 TP NO.: SF-660281



**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 17BP.13.R.114		TIP SF-560281		COUNTY Madison		GEOLOGIST Hunsberger, W. S.									
SITE DESCRIPTION Bridge No. 281 on SR 1349 over Sprinkle Creek							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 12+19		OFFSET 8 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 2,566.0 ft		TOTAL DEPTH 17.6 ft		NORTHING 792,329		EASTING 951,947									
DRILL RIGHAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Gower, S.		START DATE 02/17/14		COMP. DATE 02/17/14		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)
2570															
2565	2,566.0	1.0	4	9	13									2,566.0 EXISTING PAVEMENT 0.0	
														2,565.0 0.5' BITUMINOUS CONCRETE 1.0	
	2,562.5	3.5	5	5	5									ROADWAY EMBANKMENT	
	2,560.0	6.0	5	8	15									BROWN TAN AND BLACK, SILTY F. SAND (A-2-4) W/ GRAVEL	4.2
2560	2,561.0													ALLUVIAL	5.0
	2,557.5	8.5	9	9	14									BROWN, F. SANDY SILT (A-4) W/ TRACE MICA.	
														RESIDUAL	
2555	2,552.5	13.5	24	30	70/0.4									BROWN TAN AND ORANGE, SILTY F. TO MED. SAND (A-2-4) W/ ROCK FRAGS. AND TRACE MICA.	14.0
														WEATHERED ROCK	
2550	2,548.4	17.6								100/0.9				BROWN GRAY AND ORANGE, GRANITE GNEISS	17.6
			60/0.0							80/0.0				Boring Terminated by Auger Refusal at Elevation 2,548.4 ft on CR: Biotite Granitic Gneiss	

NCDOT BORE SINGLE_GEO_BRDG0281.GPJ NC_DOT_GDT 8/11/14



**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 17BP.13.R.114		TIP SF-560281		COUNTY Madison		GEOLOGIST Hunsberger, W. S.								
SITE DESCRIPTION Bridge No. 281 on SR 1349 over Sprinkle Creek							GROUND WTR (ft)							
BORING NO. EB2-A		STATION 12+63		OFFSET 3 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 2,566.0 ft		TOTAL DEPTH 20.2 ft		NORTHING 792,310		EASTING 951,989								
DRILL RIGHAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Gower, S.		START DATE 02/17/14		COMP. DATE 02/17/14		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
2570														
2565	2,566.0	1.0	3	3	3							M	2,566.0 EXISTING PAVEMENT 0.0	
												M	2,565.0 0.5' BITUMINOUS CONCRETE 1.0	
	2,562.5	3.5	1	2	3							M	0.5' AGGREGATE BASE COURSE	
2560	2,560.0	6.0	3	2	5							M	ROADWAY EMBANKMENT	
												M	BROWN AND ORANGE, F. SANDY SILT (A-4) W/ GRAVEL AND TRACE ORGANICS	5.5
	2,557.5	8.5	23	25	32							D	ALLUVIAL	
												D	BROWN, F. SANDY CLAY (A-6) W/ TRACE MICA.	8.0
2555	2,552.5	13.5	100/0.5									D	RESIDUAL	
												D	TAN BROWN AND WHITE, SAND (A-2-4) W/ TRACE MICA.	13.5
2550	2,547.5	18.5											WEATHERED ROCK	
													BROWN AND WHITE, BIOTITE-GRANITIC GNEISS	
	2,545.8	20.2	24	29	71/0.4									2,545.8 20.2
			60/0.0											Boring Terminated by Auger Refusal at Elevation 2,545.8 ft on GR: Biotite Granitic Gneiss

NCDOT BORE SINGLE_GEO_BRDG0281.GPJ NC_DOT_GDT 8/11/14



**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 17BP.13.R.114		TIP SF-560281		COUNTY Madison		GEOLOGIST Paul, A. S.									
SITE DESCRIPTION Bridge No. 281 on SR 1349 over Sprinkle Creek							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 12+75		OFFSET 8 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 2,566.0 ft		TOTAL DEPTH 16.5 ft		NORTHING 792,294		EASTING 951,991									
DRILL RIGHAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Wichard, W.		START DATE 12/04/13		COMP. DATE 12/04/13		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)
2570															
2565	2,566.0	1.0	8	4	3								M	EXISTING PAVEMENT 0.0	0.0
													M	0.5' BITUMINOUS CONCRETE 0.5'	0.5'
	2,562.5	3.5	6	3	2								M	ROADWAY EMBANKMENT	
2560	2,560.0	6.0	3	2	3								M	BROWN, ORANGE, FIRM, MICACEOUS, F. SANDY SILT (A-4) W/ GRAVEL	5.5
	2,557.5	8.5	8	42	38								D	ALLUVIAL BROWN, FIRM, F. SANDY, CLAY (A-6)	9.0
2555	2,552.5	13.5	23	28	40								D	RESIDUAL TAN, BROWN, WHITE, V. DENSE, MICACEOUS, SILTY SAND (A-2-4) W/ ROCK FRAGS.	
2550	2,549.5	16.5	60/0.0											Boring Terminated by Auger Refusal at Elevation 2,549.5 ft in CR: Biotite Granitic Gneiss	16.5

NCDOT BORE SINGLE_GEO_BRDG0281.GPJ NC_DOT_GDT 8/11/14