

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	14SP.20221.2	1	11

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 14SP.20221.2 F.A. PROJ. NA  
COUNTY Clay  
PROJECT DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Rd.)  
over Hyatt Mill Creek

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**PERSONNEL**

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S. Joyner

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INVESTIGATED BY F&R, Inc.

CHECKED BY M. Walko, P.E.

SUBMITTED BY F&R, Inc.

DATE February 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.

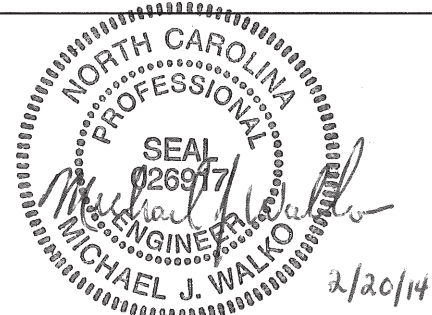
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

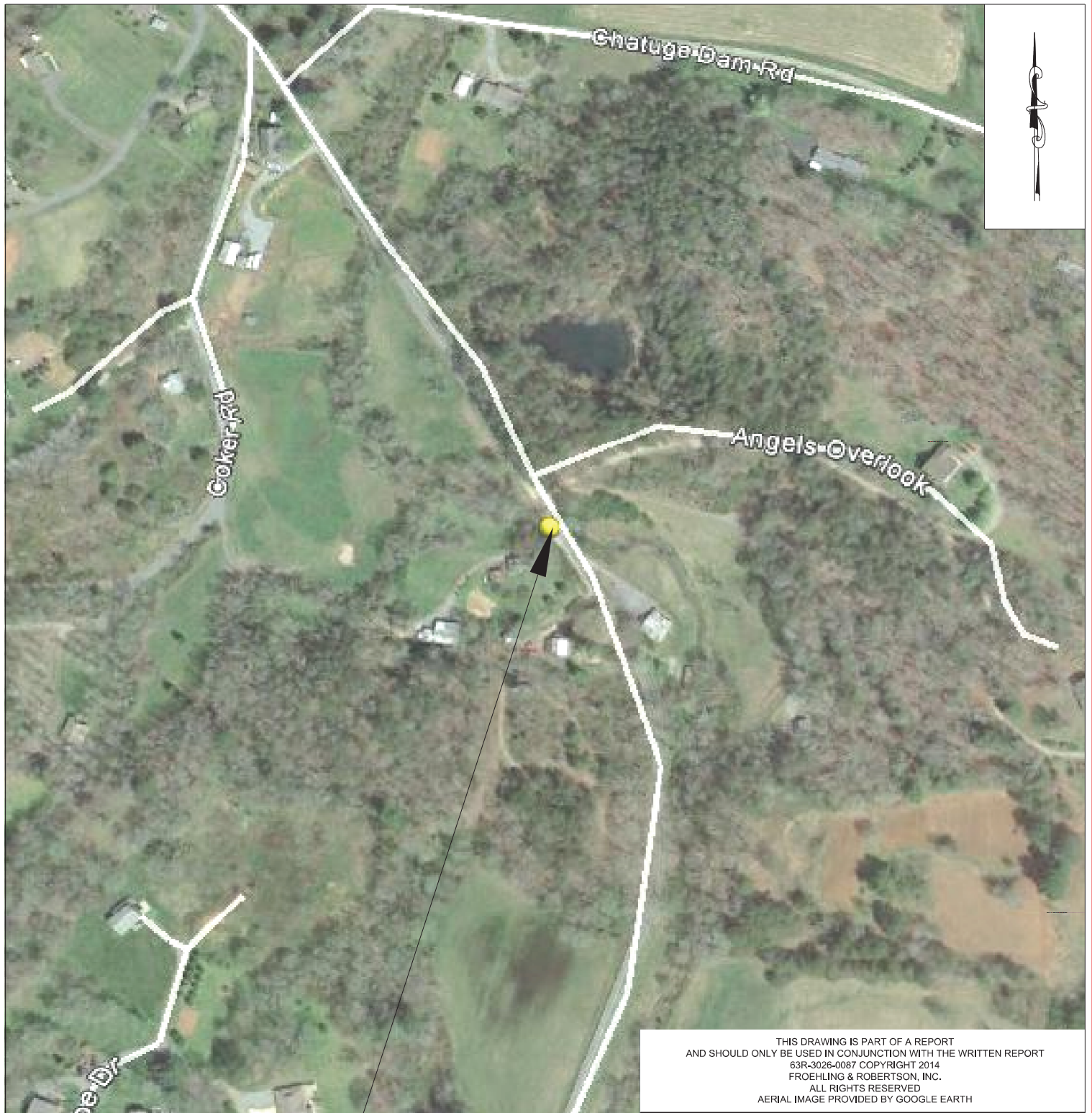
DRAWN BY: M. Brewer, E.I.



**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, MOST WITH INTERBEDDED FINE SAND LENSES, 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.									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b> 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> .									
<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE									
<b>PERCENTAGE OF MATERIAL</b>										<b>GROUND WATER</b>									
<b>CONSISTENCY OR DENSENESS</b>										<b>MISCELLANEOUS SYMBOLS</b>									
<b>TEXTURE OR GRAIN SIZE</b>										<b>ABBREVIATIONS</b>									
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>									
<b>PLASTICITY</b>										<b>DRILL UNITS:</b>									
<b>COLOR</b>										<b>ADVANCING TOOLS:</b>									
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.										<b>HAMMER TYPE:</b> <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL									
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY										<b>CORE SIZE:</b> <input type="checkbox"/> -B <input checked="" type="checkbox"/> -N02 <input type="checkbox"/> -H									
PLASTICITY INDEX (PI)										<b>HAND TOOLS:</b> <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST									
DRY STRENGTH										CORE BIT									

		PROJECT REFERENCE NO. I4SP.2022I.2	SHEET NO. 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	
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:		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 (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 (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.	
WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	
CRYSTALLINE ROCK (CR)		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	
NON-CRYSTALLINE ROCK (NCR)		FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	
COASTAL PLAIN SEDIMENTARY ROCK (CP)		COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	
WEATHERING			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		
VERY SLIGHT (V SL.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.		
SLIGHT (SL.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.		
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.		
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>		
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <u>IF TESTED, YIELDS SPT N VALUES &gt; 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 &lt; 100 BPF</u>		
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		
ROCK HARDNESS			
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.		
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.		
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.		
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.		
SOFT	CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.		
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.		
FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	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: Survey Information provided by Vaughn & Melton, Inc.	
		ELEVATION: _____ FT.	
		NOTES:	



SITE

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# **SITE LOCATION PLAN** Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek

Scale: N.T.S.	DR. DMB	CHK. MJW	REV.
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Prepared For:  
NCDOT WBS No.: 14SP.20221.2



Froehling & Robertson, Inc.  
2505 Hutchison-McDonald Road  
Charlotte, North Carolina



NAD 83/NSRS 2007



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## TEST SITE PLAN

PROJECT REFERENCE NO.: 14SP.20221.2	F&R PROJECT NO.: 63R-3026-0087
I.D. NO.: N/A	F.A. PROJECT NO.: N/A
COUNTY: CLAY	
PROJECT DESCRIPTION: Structure No. 210087 on SR 1140 (Myers Chapel Rd.) over Hyatt Mill Creek	
SITE DESCRIPTION: Structure No. 210087 on SR 1140 (Myers Chapel Rd.) over Hyatt Mill Creek	
DRAWN BY: M. Brewer, E.I.	CHECKED BY: M. Walko, P.E.
DATE: February 2014	SCALE: 1"=30'

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SHEET 5

NCDOT BORE SINGLE 63R-3026-0087 CULVERT 210087 BORELOGS.GPJ NC DOT.GDT 11/13/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## CORE BORING REPORT

SHEET 6

WBS 14SP.20221.2		TIP N/A		COUNTY CLAY		GEOLOGIST M.Brewer						
SITE DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek							GROUND WTR (ft)					
BORING NO. B-1		STATION 15+46		OFFSET 9 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 1,818.3 ft		TOTAL DEPTH 21.0 ft		NORTHING 498,962		EASTING 563,073						
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 86% 10/05/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic						
DRILLER J. Fowler		START DATE 09/26/13		COMP. DATE 09/26/13		SURFACE WATER DEPTH N/A						
CORE SIZE NQ2		TOTAL RUN 5.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
1802.3											Begin Coring @ 16.0 ft	
1800	1,802.3	16.0	5.0	N=60/0.0 3:24/1.0 5:22/1.0 5:13/1.0 5:54/1.0 5:04/1.0	(4.7) 94%	(2.9) 58%		(4.7) 94%	(2.9) 58%		CRISTALLINE ROCK	16.0
											Slightly weathered, moderately hard to hard, white-gray-black, (BIOTITE GNEISS), with very close to close fracture spacing.	
	1,797.3	21.0									Boring Terminated at Elevation 1,797.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	21.0

NCDOT CORE SINGLE 63R-3026-0087 CULVERT 210087 BORELOGS.GPJ NC\_DOT.GDT 10/23/13



WBS 14SP.20221.2				TIP N/A				COUNTY CLAY				GEOLOGIST M. Brewer					
SITE DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek												GROUND WTR (ft)					
BORING NO. B-2				STATION 15+85				OFFSET 14 ft RT				ALIGNMENT -L-				0 HR. 10.8	
COLLAR ELEV. 1,819.1 ft				TOTAL DEPTH 25.8 ft				NORTHING 499,007				EASTING 563,073				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/05/2012								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER C. Boyce				START DATE 09/17/13				COMP. DATE 09/17/13				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)		
1820																	
	1,819.1	0.0												1,819.1	0.0		
			3	4	4							M					
1815	1,815.6	3.5															
			3	3	3						SS-2	9%					
1810	1,810.6	8.5															
			12	19	11							M					
1805	1,805.6	13.5												1,805.6	13.5		
			100/0.5														
	1,803.3	15.8												1,803.3	15.8		
			60/0.0														
1800														1,801.6	17.5		
1795																	
														1,793.3	25.8		
														Boring Terminated at Elevation 1,793.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)			



# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

SHEET 8

WBS 14SP.20221.2		TIP N/A		COUNTY CLAY		GEOLOGIST M. Brewer						
SITE DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek						GROUND WTR (ft)						
BORING NO. B-2		STATION 15+85		OFFSET 14 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 1,819.1 ft		TOTAL DEPTH 25.8 ft		NORTHING 499,007		EASTING 563,073						
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/05/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic						
DRILLER C. Boyce		START DATE 09/17/13		COMP. DATE 09/17/13		SURFACE WATER DEPTH N/A						
CORE SIZE NQ2		TOTAL RUN 10.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
1803.3											Begin Coring @ 15.8 ft	
	1,803.3	15.8	5.0	2:46/1.0	(4.9)	(3.2)		(1.6)	(0.0)		1,803.3	15.8
1800				1:57/1.0	98%	64%		94%	0%		1,801.6	17.5
				1:55/1.0								
	1,798.3	20.8		2:17/1.0				(8.3)	(8.3)			
			5.0	2:59/1.0				100%	100%			
				2:54/1.0	(5.0)	(5.0)						
1795				2:46/1.0	100%	100%						
				2:24/1.0								
	1,793.3	25.8		2:53/1.0							1,793.3	25.8
				3:29/1.0								
Boring Terminated at Elevation 1,793.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)												



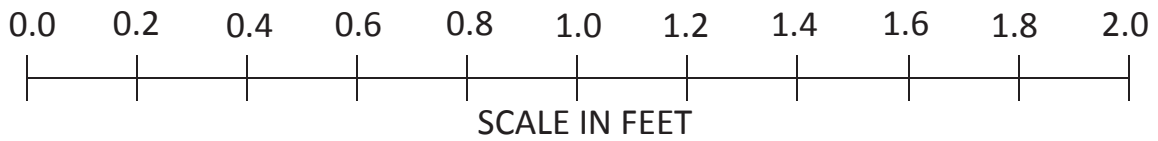
# Structure No. 087 on SR 1140 over Hyatt Mill Creek

## CORE PHOTOGRAPHS: B-1: Station 15+46, 9' LT

Begin Run 1  
16.0 feet



End Run 1  
21.0 feet





# Structure No. 087 on SR 1140 over Hyatt Mill Creek

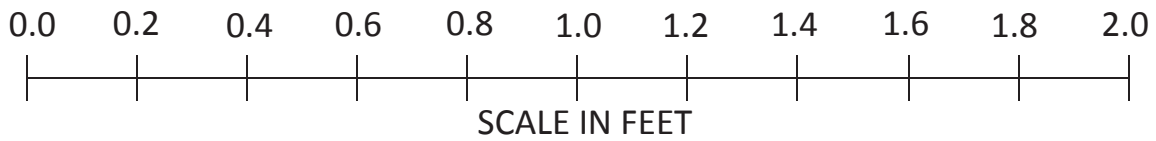
## CORE PHOTOGRAPHS: B-2: Station 15+85, 14' RT

Begin Run 1  
15.8 feet



Begin Run 2  
20.8 feet

End Run 2  
25.8 feet





**APPENDIX C**

**LABORATORY TEST RESULTS**



North Carolina Department of Transportation  
Division of Highways  
Materials and Test Unit  
Soils Laboratory

M&T Form 503

T.I.P. ID NO.: 14SP.20221.2

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: Bridge 210087  
DATE SAMPLED: 9-17-2013; 9-26-2013  
SAMPLED FROM: On Site  
SUBMITTED BY: Froehling & Robertson, Inc.

COUNTY: Clay  
RECEIVED: 10-22-2013  
REPORTED: 11-4-2013  
BY: M. Grabski

TEST RESULTS

PROJ. SAMPLE NO.	B1	B2					
LAB SAMPLE NO.	SS-1	SS-2					
Retained #4 Sieve %	0.0	9.6					
Passing #10 Sieve %	100.0	84.1					
Passing #40 Sieve %	84.1	63.7					
Passing #200 Sieve %	42.6	26.9					

MINUS #10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60 %	31.0	38.2					
Fine Sand Ret - #270 %	29.7	37.0					
Silt 0.053 - 0.010 mm %	20.8	17.4					
Clay < 0.010 mm %	18.5	7.4					
L.L.	29	24					
P.L.	22	23					
P.I.	7	1					
AASHTO Classification	A-4(0)	A-2-4(0)					
Station	15+46	15+85					
Offset from Center Line	9' LT	14' RT					
Depth (in.)	8.5	3.5					
to	10.0	5.0					
Moisture Content	26.4	9.3					
Organic Content	NT	NT					

NT = Not Tested  
NP = Not Plastic  
NA = Not Applicable

Michael J. Walko, P.E.  
Soils Engineer



## **APPENDIX D**

### **SUPPORTING CALCULATIONS**



WBS 14SP.20221.2		TIP N/A		COUNTY CLAY		GEOLOGIST M.Brewer							
SITE DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek							GROUND WTR (ft)						
BORING NO. B-1		STATION 15+46		OFFSET 9 ft LT		ALIGNMENT -L-		0 HR. 15.0					
COLLAR ELEV. 1,818.3 ft		TOTAL DEPTH 21.0 ft		NORTHING 498,962		EASTING 563,073		24 HR. FIAD					
DRILL RIG/HAMMER EFF./DATE F&R4637 CME-75 86% 10/05/2012				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER J. Fowler		START DATE 09/26/13		COMP. DATE 09/26/13		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)	
1820													
	1,818.3	0.0	4	4	9								1,818.3 GROUND SURFACE 0.0
1815	1,814.8	3.5	8	10	27						M		1,816.3 ROADWAY EMBANKMENT
													Brown, fine to coarse sandy SILT (A-4), with trace gravel & trace clay.
											M		Brown, silty fine to coarse SAND (A-2-4), with trace gravel
1810	1,809.8	8.5	8	1	1						SS-1	26%	1,811.3 Brown, highly fine to coarse sandy SILT (A-4(0)), with some clay.
1805	1,804.8	13.5	27	50	48								1,806.3 RESIDUAL
	1,802.3	16.0									W		Gray-orange-black, silty fine to coarse SAND (A-2-4), with some gravel-sized rock fragments.
1800		60/0.0											1,802.3
													CRYSTALLINE ROCK
													White-gray-black, (BIOTITE GNEISS)
													Bottom of EXCAVATION
													1,797.3
													Boring Terminated at Elevation 1,797.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)
<p>⊕ Invert = 1802.7'</p> <p>1' of Foundation Conditioning</p> <p>= 1801.7' = Bottom of Excavation. Some Rock Removal is Anticipated to Reach Bottom of Excavation Elevation</p> <p>0.6' of Rock EXCAVATION.</p> <p>≈ 15cyd for this Side of the culvert</p>													



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 7

WBS 14SP.20221.2		TIP N/A		COUNTY CLAY		GEOLOGIST M. Brewer	
SITE DESCRIPTION Structure No. 210087 on SR 1140 (Myers Chapel Road) over Hyatt Mill Creek						GROUND WTR (ft)	
BORING NO. B-2		STATION 15+85		OFFSET 14 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 1,819.1 ft		TOTAL DEPTH 25.8 ft		NORTHING 499,007		EASTING 563,073	
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/05/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic		0 HR. 10.8	
DRILLER C. Boyce		START DATE 09/17/13		COMP. DATE 09/17/13		SURFACE WATER DEPTH N/A	
24 HR. FIAD							

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1820	1,819.1	0.0											1,819.1	GROUND SURFACE	0.0
			3	4	4									ROADWAY EMBANKMENT	
1815	1,815.6	3.5	3	3	3								1,817.1	Brown, fine sandy SILT (A-4), with trace gravel	2.0
														Brown-orange, silty fine to coarse SAND (A-2-4(0)), with trace gravel & clay.	
1810	1,810.6	8.5	12	19	11										
1805	1,805.6	13.5											1,805.6	WEATHERED ROCK	13.5
	1,803.3	15.8	100/0.5										1,803.3	Gray-orange-black, (BIOTITE GNEISS)	15.8
			60/0.0										1,801.6	CRYSTALLINE ROCK	17.5
														White-orange-gray, (BIOTITE GNEISS)	
1800														White-gray-black, (BIOTITE GNEISS)	
														Bottom of EXCAVATION	
1795													1,793.3	Boring Terminated at Elevation 1,793.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	25.8

⊕ Invert = 1802.7'

1' of Foundation Conditioning = 1801.7' = Bottom of EXCAVATION. Some Rock Removal is Anticipated to Reach Bottom of EXCAVATION Elevation

1.6' of Rock Excavation ≈ 40cyd for this Side of the culvert.



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HQ: 3015 DUMBARTON ROAD RICHMOND, VIRGINIA 23228 T 804.264.2701 F 804.264.1202 [www.fandr.com](http://www.fandr.com)

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