

REFERENCE: SF-590165

PROJECT: BP10.R013.1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-590165	1	20

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
 SITE DESCRIPTION BRIDGE NO. 165 ON SR 5469
(SHOPTON RD.) OVER COFFEY CREEK

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND (SOIL & ROCK)
2B, 2C	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-6	CROSS SECTIONS
7-19	BORE LOG(S), CORE REPORT(S), & CORE PHOTOGRAPH(S)
20	SITE PHOTOGRAPH(S)

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DATE SEPTEMBER 2021

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NOTES:

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- 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.



DocuSigned by:

11/1/2021

[Signature]
 SIGNATURE

DATE

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**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

SF-590165

2

**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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS		
GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7				
SYMBOL															
% PASSING	#10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	50 MN 35 MX 10 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	- 6 MX	- NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	41 MN 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX							
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS										HIGHLY ORGANIC SOILS
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR	POOR	UNSATURABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

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
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL PLASTIC RANGE (PI) PL	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM SL	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR 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		DIP & DIP DIRECTION OF ROCK STRUCTURES
	SOIL SYMBOL		TEST BORING
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		AUGER BORING
	INFERRED SOIL BOUNDARY		CORE BORING
	INFERRED ROCK LINE		MONITORING WELL
	ALLUVIAL SOIL BOUNDARY		PIEZOMETER INSTALLATION
			SLOPE INDICATOR INSTALLATION
			CONE PENETROMETER TEST
			SOUNDING ROD
			TEST BORING WITH CORE
			SPT N-VALUE

RECOMMENDATION SYMBOLS

	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		

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED
CL - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ _d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACT TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HI. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL
<input type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	
<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	CORE SIZE:
<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -B <input type="checkbox"/> -H
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	<input checked="" type="checkbox"/> -NO
<input checked="" type="checkbox"/> CME-550X	<input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER	HAND TOOLS:
	<input type="checkbox"/> TRICONE _____ * STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER
	<input type="checkbox"/> TRICONE _____ * TUNG.-CARB.	<input type="checkbox"/> HAND AUGER
	<input checked="" type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD
		<input type="checkbox"/> VANE SHEAR TEST





SF-590165

2A

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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:			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, SUCH 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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
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, WOULD YIELD SPT N VALUES > 100 BPF</u>			
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>			
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 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.			
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 FOOT	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 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: BM #1: STA 20+17.29, 81.78' RT, BENCH TIE SPIKE IN 15' PINE N 519944.80, E 1422914.32	
			ELEVATION: 613.0 FEET	
NOTES:				
FIAD= FILLED IMMEDIATELY AFTER DRILLING				

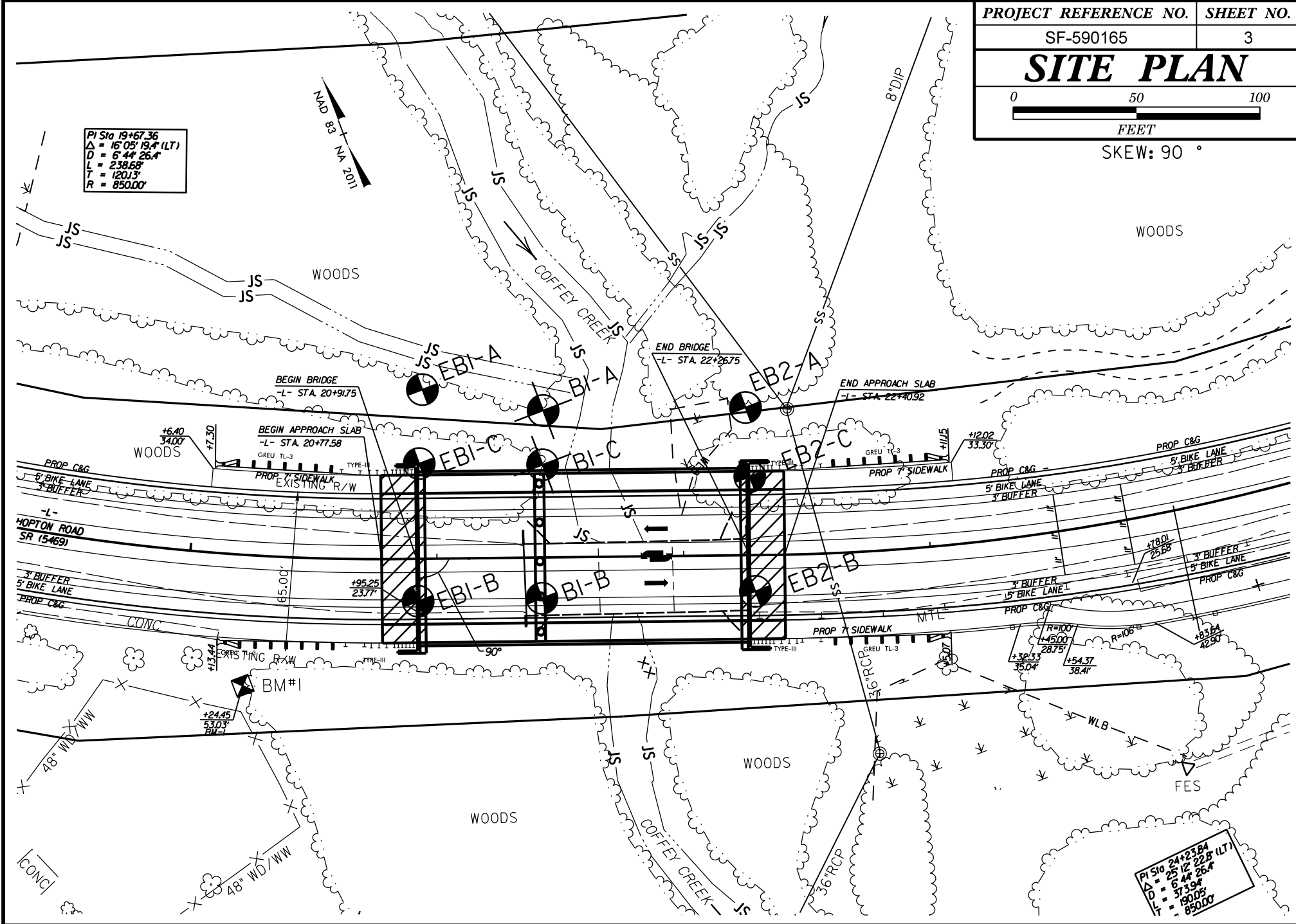
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PROJECT REFERENCE NO.	SHEET NO.
SF-590165	3
SITE PLAN	
FEET	

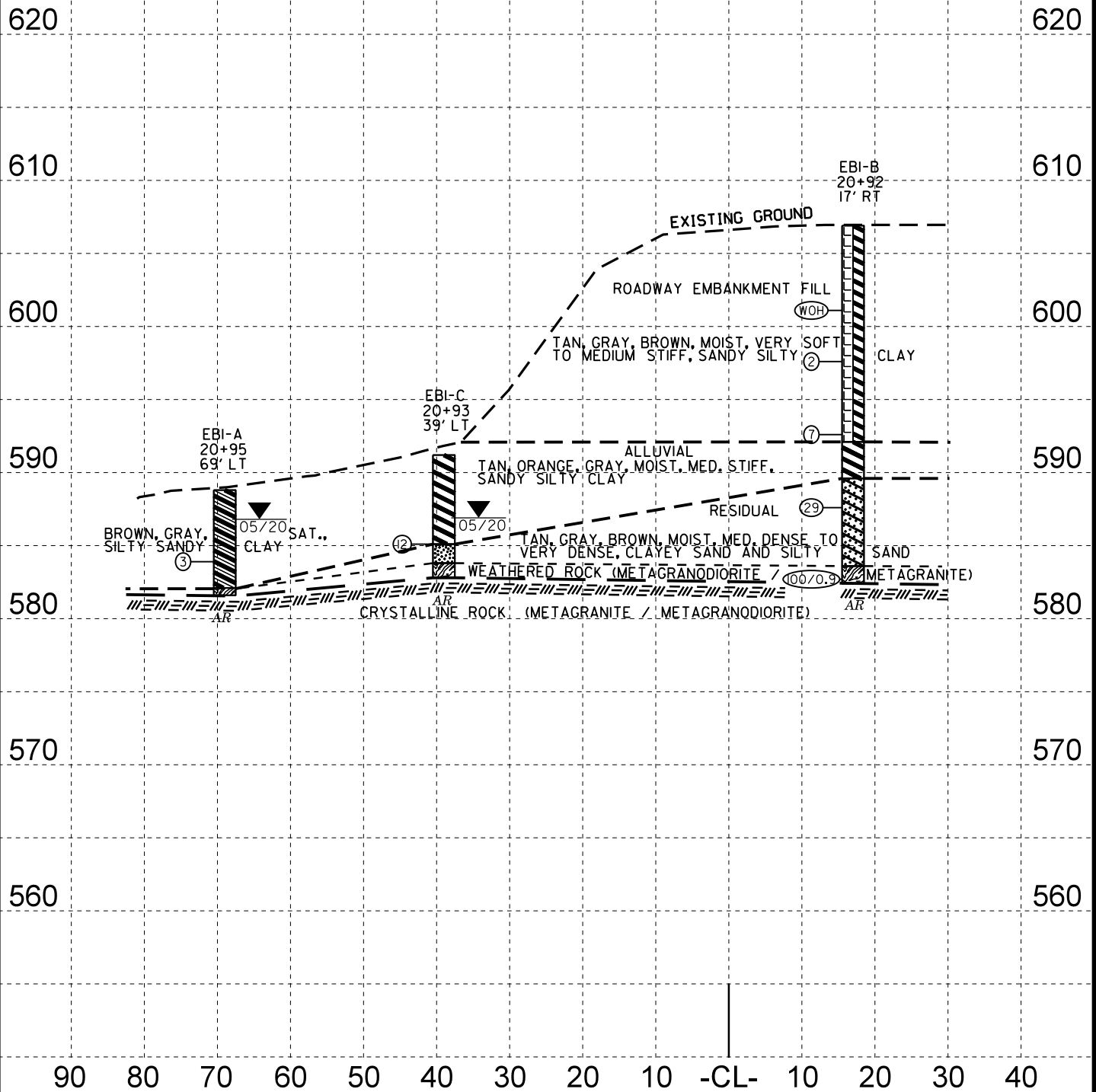
SKEW: 90 °

PI Sta 19+67.36
 $\Delta = 16^{\circ}05'19.4"$ (LT)
 $D = 6^{\circ}44'26.4"$
 $L = 238.68'$
 $T = 120.13'$
 $R = 850.00'$

NAD 83 NA 2011



PI Sta 24+23.84
 $\Delta = 25^{\circ}12'22.8"$ (LT)
 $D = 6^{\circ}44'26.4"$
 $L = 373.94'$
 $T = 190.05'$
 $R = 850.00'$



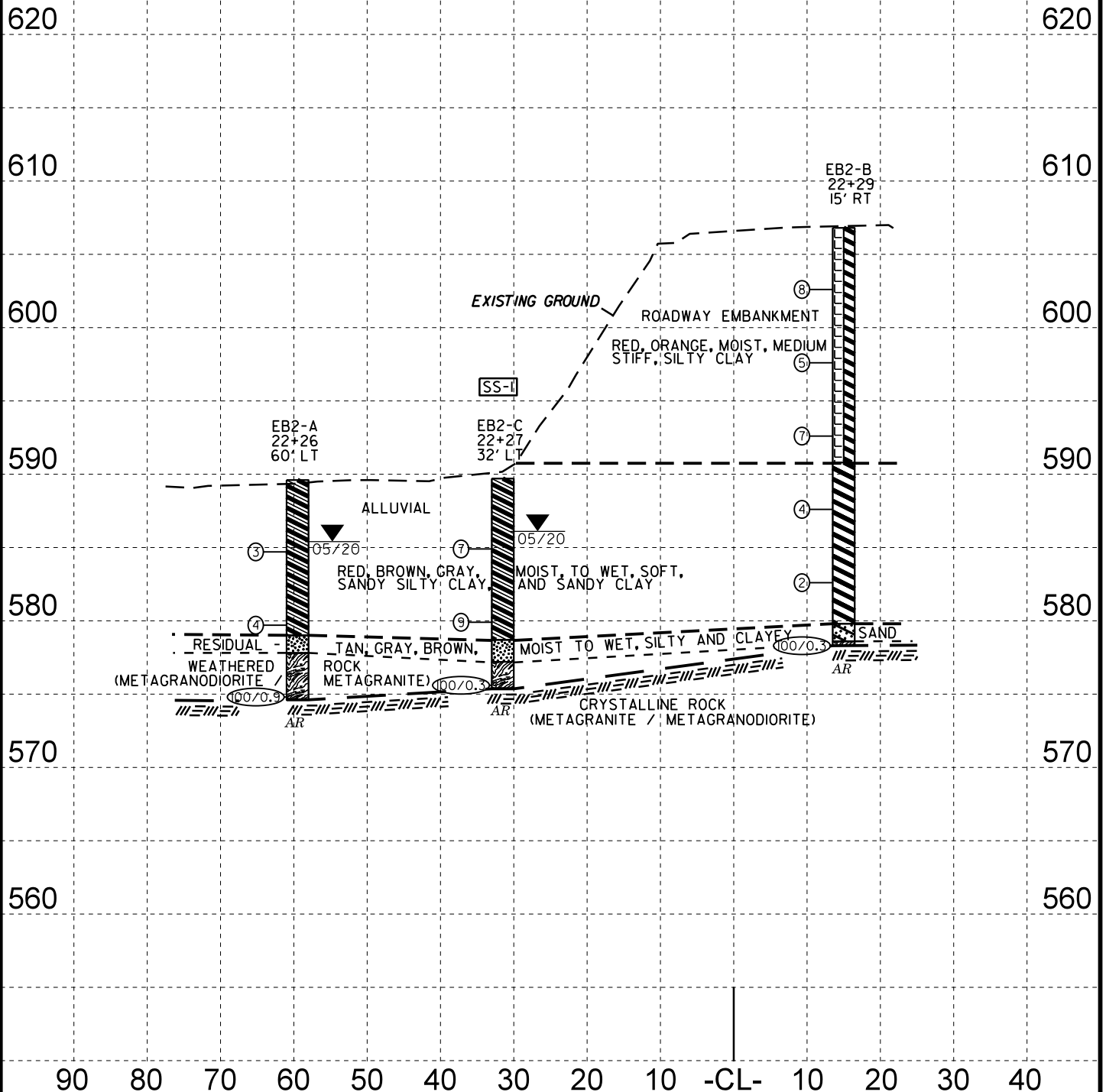
HORIZ. SCALE 0 20 40
(FEET)

VE = 2:1

SECTION THRU EBI (STA. 20+91.75)

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	5.0' LT	22+22	3.8-5.3'	A-6(9)	39	14	9.6	26.1	30.1	34.1	100	96	71		



HORIZ. SCALE 0 20 40
(FEET)

VE = 2:1

SECTION THRU EB2 (STA. 22 + 26.75)

SHEET 7

NC DOT BORE SINGLE 590165 GEO_BRDG0165 MECK.GPJ NC DOT.GDT 9/28/21

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 8

WBS BP10.R013.1			TIP SF-590165			COUNTY MECKLENBURG			GEOLOGIST Stickney, J. K.		
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)	
BORING NO. EB1-C			STATION 20+93			OFFSET 39 ft LT			ALIGNMENT -L-		
COLLAR ELEV. 591.2 ft			TOTAL DEPTH 8.4 ft			NORTHING 520,004			EASTING 1,423,013		
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic		
DRILLER B.E. Foster			START DATE 05/11/20			COMP. DATE 05/11/20			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)	
595																
590															591.2	GROUND SURFACE 0.0
																ALLUVIAL
																TAN-ORANGE, WET, SANDY SILTY CLAY
585	586.1	5.1	4	5	7										585.1	6.1
															583.8	7.4
															582.8	8.4
																RESIDUAL
																BROWN, GRAY, MOIST, SILTY SAND
																WEATHERED ROCK
																(METAGRANODIORITE / METAGRANITE)
																Boring Terminated by Auger Refusal at Elevation 582.8 ft on Crystalline Rock (Metagranodiorite / Metagranite)


SHEET 9

NC DOT BORE SINGLE 590165 GEO_BRDG0165 MECK.GPJ NC_DOT.GDT 9/28/21

GEOTECHNICAL BORING REPORT

CORE LOG

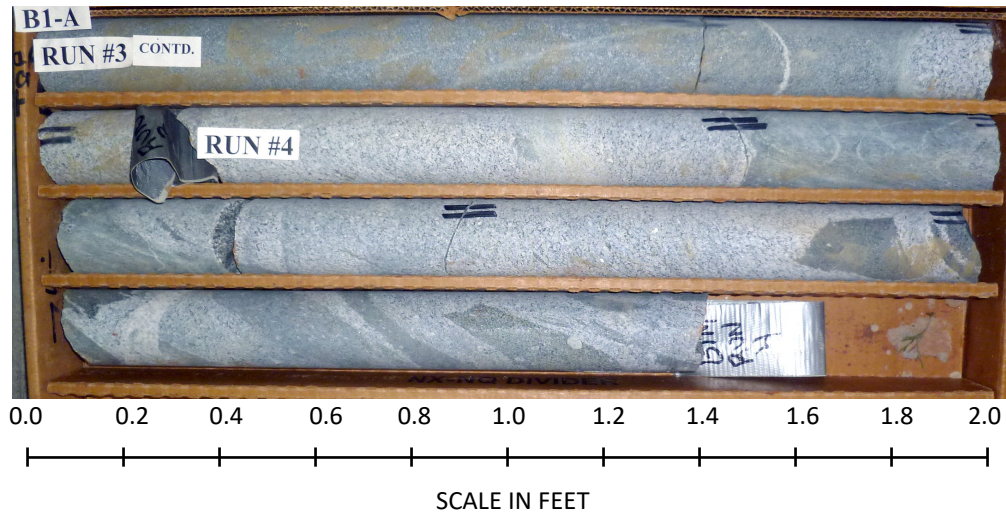
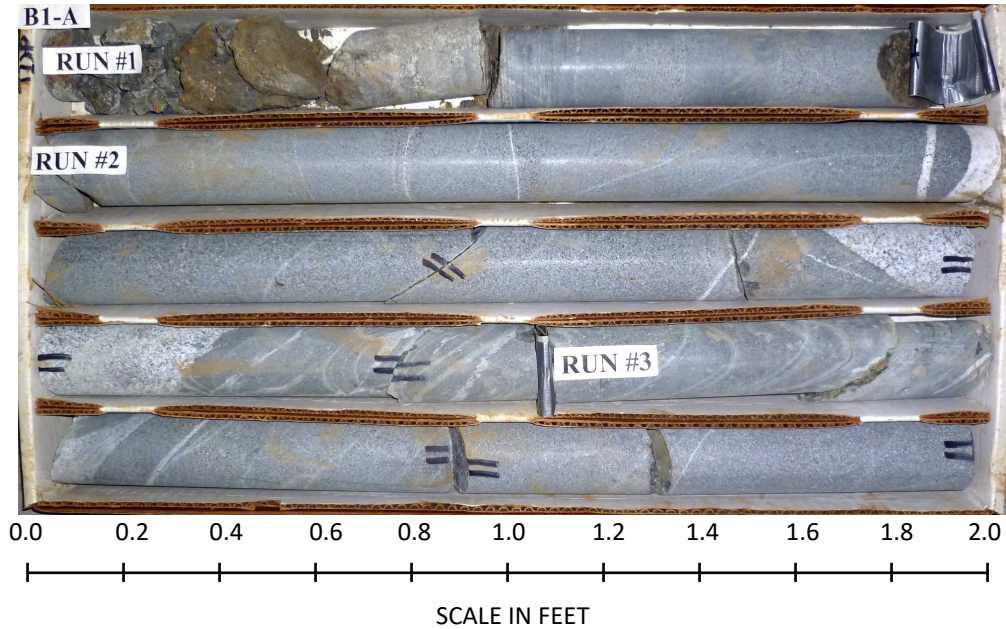
SHEET 11

WBS 17BP.10.R.138				TIP SF-590165		COUNTY MECKLENBURG				GEOLOGIST Stickney, J. K.			
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)			
BORING NO. B1-A				STATION 21+44		OFFSET 59 ft LT				ALIGNMENT -L-		0 HR. 2.9	
COLLAR ELEV. 588.7 ft				TOTAL DEPTH 25.9 ft		NORTHING 520,006				EASTING 1,423,068		24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD NW Casing w/ Core				HAMMER TYPE Automatic			
DRILLER B.E. Foster				START DATE 05/12/20		COMP. DATE 05/12/20				SURFACE WATER DEPTH N/A			
CORE SIZE NQ				TOTAL RUN 19.2 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %				
582	582.0	6.7	4.2		(1.9) 45%	(0.8) 19%		(16.7) 87%	(14.9) 78%		582.0	6.7	
580	577.8	10.9	5.0		(5.0) 100%	(4.9) 98%					GRAY-WHITE, VERY SLIGHTLY WEATHERED TO FRESH, VERY HARD, METAGRANODIORITE TO METAGRANITE, WITH VERY CLOSE TO WIDE FRACTURE SPACING GSI=92		
575	572.8	15.9	5.0		(5.0) 100%	(4.5) 90%							
570	567.8	20.9	5.0		(4.8) 96%	(4.7) 94%							
565	562.8	25.9											
											Boring Terminated at Elevation 562.8 ft in Crystalline Rock (Metagranodiorite / Metagranite)	25.9	

NCDOT CORE SINGLE 590165 GEO_BRDG0165_MECK.GPJ NC_DOT.GDT 7/14/20

CORE PHOTOGRAPHS:
Bridge No. 165 on SR 5469 (Shopton Rd.) over
Coffey Creek
B1-A: -L- Station 21+44, 59' LT

Begin Core
6.7 feet



End Core
25.9 feet

WBS BP10.R013.1			TIP SF-590165			COUNTY MECKLENBURG			GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek									GROUND WTR (ft)						
BORING NO. B1-C			STATION 21+43			OFFSET 38 ft LT			ALIGNMENT -L-			0 HR. 3.7			
COLLAR ELEV. 589.1 ft			TOTAL DEPTH 27.1 ft			NORTHING 519,985			EASTING 1,423,060			24 HR. 0.0			
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD NW Casing w/ Core			HAMMER TYPE Automatic						
DRILLER B.E. Foster			START DATE 05/11/20			COMP. DATE 05/11/20			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)
590															
585	584.0	5.1	3	5	11									589.1	GROUND SURFACE 0.0
580														583.0	ALLUVIAL TAN, BROWN, GRAY, SANDY SILTY CLAY 6.1
575														581.5	RESIDUAL TAN, YELLOW, GRAY, CLAYEY SAND 7.6
570														580.5	WEATHERED ROCK (METAGRANITE / METAGRANODIORITE) 8.6
565															
														562.0	Boring Terminated at Elevation 562.0 ft in Crystalline Rock (Metagranodiorite / Metagranite) 27.1

GEOTECHNICAL BORING REPORT

CORE LOG

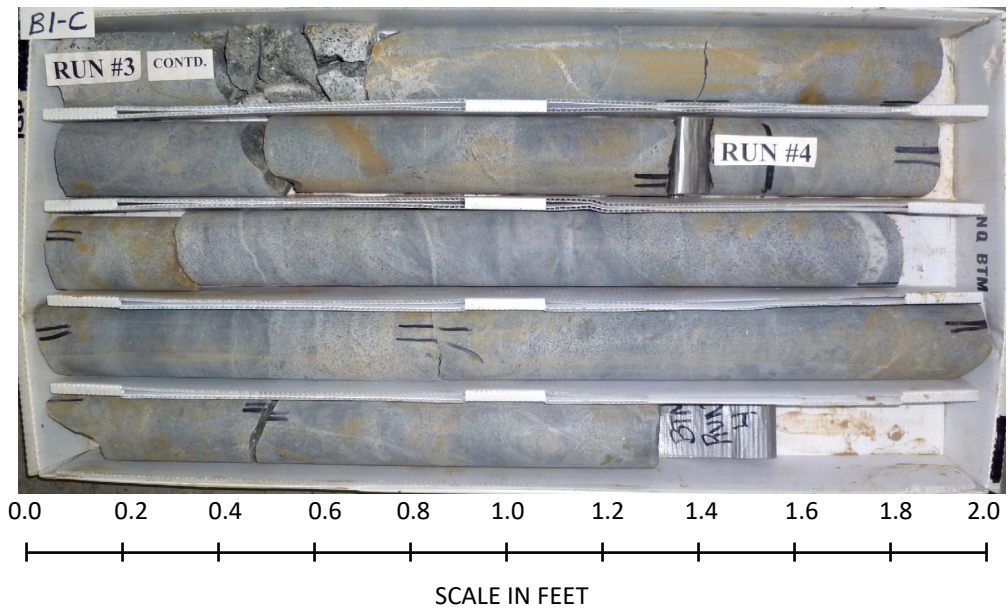
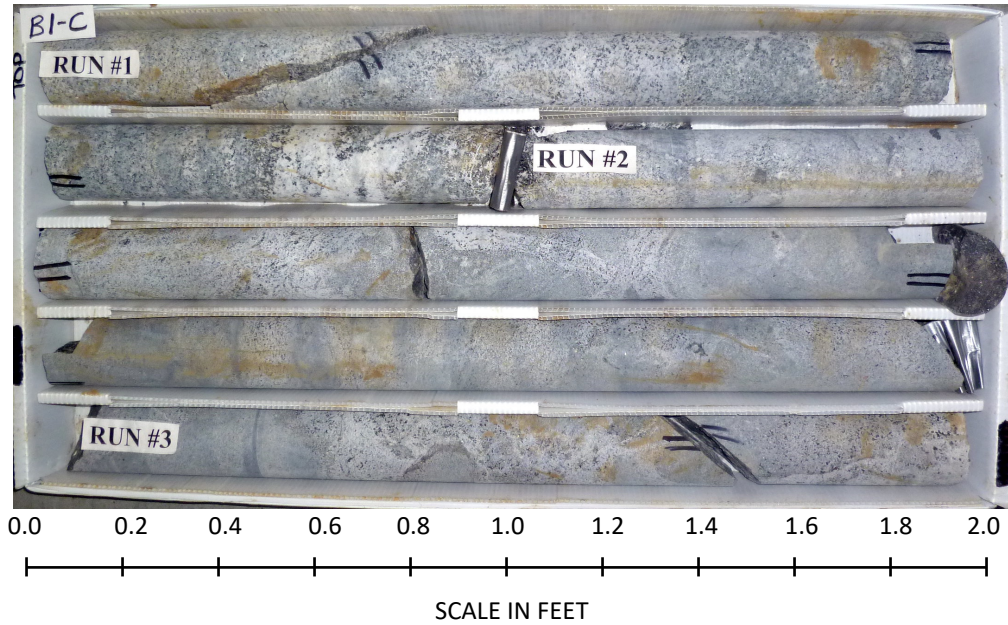
SHEET 14

WBS 17BP.10.R.138				TIP SF-590165		COUNTY MECKLENBURG				GEOLOGIST Stickney, J. K.			
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)			
BORING NO. B1-C				STATION 21+43		OFFSET 38 ft LT				ALIGNMENT -L-		0 HR. 3.7	
COLLAR ELEV. 589.1 ft				TOTAL DEPTH 27.1 ft		NORTHING 519,985				EASTING 1,423,060		24 HR. 0.0	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD NW Casing w/ Core				HAMMER TYPE Automatic			
DRILLER B.E. Foster				START DATE 05/11/20		COMP. DATE 05/11/20				SURFACE WATER DEPTH N/A			
CORE SIZE NQ				TOTAL RUN 18.5 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %				
580.5	580.5	8.6	3.2		(2.9) 91%	(2.9) 91%		(18.0) 97%	(17.1) 92%		Begin Coring @ 8.6 ft	8.6	
	577.3	11.8	5.0		(4.8) 96%	(4.4) 88%					CRYSTALLINE ROCK GRAY-WHITE, VERY SLIGHTLY WEATHERED TO FRESH, VERY HARD, METAGRANODIORITE TO METAGRANITE, WITH CLOSE TO WIDE FRACTURE SPACING GSI=95		
575	572.3	16.8	5.0		(5.0) 100%	(4.6) 92%							
570	567.3	21.8	5.3		(5.3) 100%	(5.2) 98%							
565	562.0	27.1											
											Boring Terminated at Elevation 562.0 ft in Crystalline Rock (Metagranodiorite / Metagranite)	27.1	

NCDOT CORE SINGLE 590165_GEO_BRDG0165_MECK.GPJ NC_DOT.GDT 7/14/20

CORE PHOTOGRAPHS:
Bridge No. 165 on SR 5469 (Shopton Rd.) over
Coffey Creek
B1-C: -L- Station 21+43, 38 ft LT

Begin Core
8.6 feet



End Core
27.1 feet

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 16

WBS BP10.R013.1			TIP SF-590165			COUNTY MECKLENBURG			GEOLOGIST Stickney, J. K.		
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)	
BORING NO. B1-B			STATION 21+42			OFFSET 17 ft RT			ALIGNMENT -L-		
COLLAR ELEV. 601.5 ft			TOTAL DEPTH 45.1 ft			NORTHING 519,935			EASTING 1,423,040		
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic		
DRILLER B.E. Foster			START DATE 08/12/21			COMP. DATE 08/12/21			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						
605																
600																
	598.2	3.3	1	2	1											
595																
	593.2	8.3	2	1	1											
590																
	588.2	13.3	2	2	2											
585																
	581.5	20.0	WOH	WOH	WOH											
580																
	576.5	25.0	100/0.3													
575																
	571.5	30.0	100/0.2													
570																
	566.5	35.0	60/0.1													
565																
	561.5	40.0	60/0.1													
560																
	556.5	45.0	60/0.1													

GROUND SURFACE	601.5		0.0
ROADWAY EMBANKMENT RED, ORANGE, MOIST, SOFT, SILTY CLAY			
585.0			16.5
ALLUVIAL GRAY, WET, VERY SOFT, SANDY SILTY CLAY			
576.9			24.6
576.5			25.0
RESIDUAL TAN, GRAY, MOIST, VERY DENSE, CLAYEY SAND			
WEATHERED ROCK GRAY, BLACK, WHITE, WEATHERED METAGRANITE / METAGRANODIORITE			
569.5			32.0
CRYSTALLINE ROCK GRAY, WHITE, BLACK, VERY HARD, METAGRANITE / METAGRANODIORITE			
NOTE: THIS BORING DRILLED WITH NEW CASING BIT CAPABLE OF CUTTING HARD CRYSTALLINE ROCK (NO CORE)			
556.4			45.1
Boring Terminated at Elevation 556.4 ft in Crystalline Rock (Metagranodiorite / Metagranite)			

SHEET 17

NCNDOT BORE SINGLE 590165_GEO_BRDG0165_MECK.GPJ NC_DOT.GDT 9/28/21

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 18

WBS BP10.R013.1			TIP SF-590165			COUNTY MECKLENBURG			GEOLOGIST Stickney, J. K.		
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)	
BORING NO. EB2-C			STATION 22+27			OFFSET 32 ft LT			ALIGNMENT -L-		
COLLAR ELEV. 589.7 ft			TOTAL DEPTH 14.3 ft			NORTHING 519,951			EASTING 1,423,137		
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic		
DRILLER B.E. Foster			START DATE 05/06/20			COMP. DATE 05/06/20			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						
590															GROUND SURFACE	0.0
585	585.9	3.8	2	3	4							SS-1	M		ALLUVIAL RED, BROWN, GRAY, MOIST, SANDY SILTY CLAY	
580	580.9	8.8	3	3	6							W				
	575.9	13.8														
															578.7	11.0
															577.2	12.5
															575.4	14.3
															RESIDUAL GRAY, MOIST TO WET, CLAYEY SILTY SAND	
															WEATHERED ROCK (METAGRANODIORITE / METAGRANITE) Boring Terminated by Auger Refusal at Elevation 575.4 ft on Crystalline Rock (Metagranodiorite / Metagranite)	

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 19

WBS BP10.R013.1			TIP SF-590165			COUNTY MECKLENBURG			GEOLOGIST Stickney, J. K.		
SITE DESCRIPTION Replace Bridge No. 165 on SR 5469 (Shopton Rd) over Coffey Creek										GROUND WTR (ft)	
BORING NO. EB2-B			STATION 22+29			OFFSET 15 ft RT			ALIGNMENT -L-		
COLLAR ELEV. 606.8 ft			TOTAL DEPTH 28.5 ft			NORTHING 519,907			EASTING 1,423,122		
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019						DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic		
DRILLER B.E. Foster			START DATE 08/11/21			COMP. DATE 08/11/21			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						
610																
605	603.6	3.2	5	4	4										606.8	0.0
600	598.6	8.2	2	3	2											
595	593.6	13.2	6	3	4											
590	588.6	18.2	2	2	2										590.8	16.0
585	583.6	23.2	1	1	1											
580	578.6	28.2													579.8	27.0
															578.6	28.2
															578.3	28.5

GROUND SURFACE

ROADWAY EMBANKMENT

RED, ORANGE, MOIST, MEDIUM STIFF, SILTY CLAY

ALLUVIAL

GRAY, MOIST, SOFT, SANDY SILTY CLAY

RESIDUAL

TAN, GRAY, BROWN, MOIST, STIFF TO HARD, SILTY CLAYEY SAND

WEATHERED ROCK

WEATHERED METAGRANITE / METAGRANODIORITE

Boring Terminated by Auger Refusal at Elevation 578.3 ft on Crystalline Rock (Metagranodiorite / Metagranite)

Bridge No. 165 on SR 5469 (Shopton Rd.) over Coffey Creek
SITE PHOTOGRAPHS



Photograph No. 1: View looking EB1 to EB2



Photograph No. 2: View looking downstream