

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	17BP.9.R.12	1A	15

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJECT 17BP.9.R.12

COUNTY ROWAN

PROJECT DESCRIPTION REPLACE STRUCTURE
NO. 790147 ON SR 2541 OVER TOWN CREEK

SITE DESCRIPTION PROPOSED BRIDGE ON
SR 2541 OVER TOWN CREEK

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT • (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

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.

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.

INVESTIGATED BY S&ME, INC. PERSONNEL N. PAGE

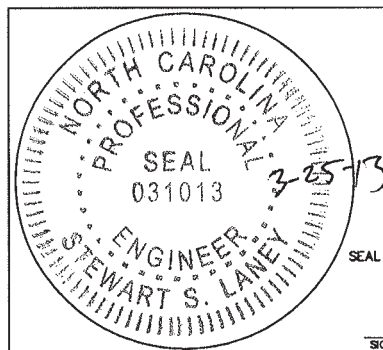
CHECKED BY STEWART S. LANEY J. WILLIAMSON

SUBMITTED BY S&ME, INC. L. CAMPOS

DATE 3/25/2013 K. HILL

C. ODOM

T. LANHAM



SIGNATURE

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TABLE OF CONTENTS

NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheets 2A & 2B
Site Vicinity Map	Sheet 3
Field Exploration Plan	Sheet 4
Cross Section at STA 12+10	Sheet 5
Test Boring Logs	Sheets 6 – 11
Site Photographs	Sheets 12 – 15

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT


SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

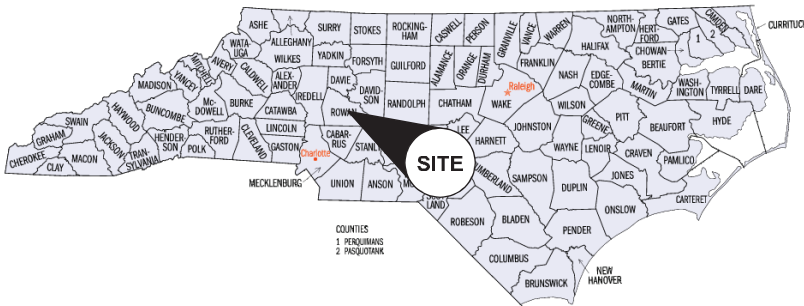
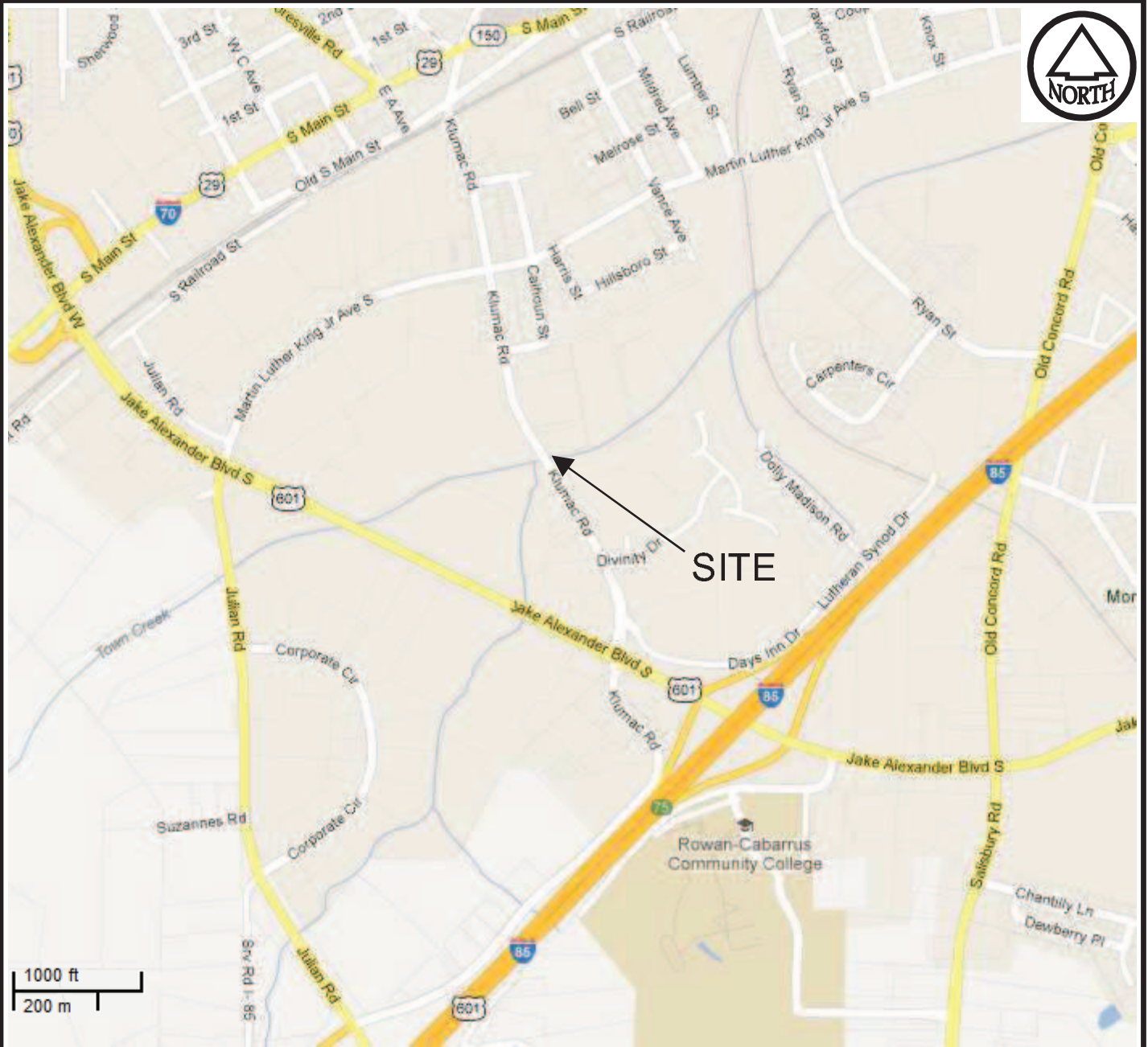
SOIL DESCRIPTION										GRADATION																																				
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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, MOIST 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 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> .																																				
										MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.																																				
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50																																				
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-4, A-5, A-6, A-7										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																																				
SYMBOL 										GROUND WATER 																																				
% PASSING # 10 # 40 # 200										PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																																				
LIQUID LIMIT PLASTIC INDEX GROUP INDEX										MISCELLANEOUS SYMBOLS 																																				
USUAL TYPES OF MAJOR MATERIALS STONE FRAGS, GRAVEL, AND SAND FINE SAND SILTY OR CLAYEY GRAVEL AND SAND SILTY SOILS CLAYEY SOILS SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS										CONSISTENCY OR DENSENESS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td><4 4 TO 10 10 TO 30 30 TO 50 >50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td><2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30</td> <td><0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4</td> </tr> </table>										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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4															
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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										ABBREVIATIONS 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 HI. - HIGHLY 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 VST - VANE SHEAR TEST WEA. - WEATHERED γ _u - 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																																				
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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.																																														

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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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.</p> <p>AQUIFER – A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS – APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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.</p> <p>CALCAREOUS (CALC.) – SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM – ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE – A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP – THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) – THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT – A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE – A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT – ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) – LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) – A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT – FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE – A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS – A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) – IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER – WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL – SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP.) – RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE – POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>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.</p> <p>STRATA CORE RECOVERY (SREC.) – TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>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 SLI.)	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 (SLI.)	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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>															
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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i>															
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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i>															
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 FINGERNAIL.															
FRACTURE SPACING		BEDDING														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">TERM</th> <th style="text-align: center;">SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table>	TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FEET	VERY CLOSE	LESS THAN 0.16 FEET			
TERM	SPACING															
VERY WIDE	MORE THAN 10 FEET															
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CLOSE	0.16 TO 1 FEET															
VERY CLOSE	LESS THAN 0.16 FEET															
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">TERM</th> <th style="text-align: center;">THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table>	TERM	THICKNESS	VERY THICKLY BEDDED	> 4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET	
TERM	THICKNESS															
VERY THICKLY BEDDED	> 4 FEET															
THICKLY BEDDED	1.5 - 4 FEET															
THINLY BEDDED	0.16 - 1.5 FEET															
VERY THINLY BEDDED	0.03 - 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.																
FRIBLE	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.															
		<p>BENCH MARK: BM 2 – RR SPIKE IN ROOT OF 18" SYCAMORE TREE</p> <p style="text-align: center;">N 694066.00 E 1558757.00 ELEVATION: 709.77 FT.</p> <p>NOTES:</p>														



SCALE: AS SHOWN

DRAWN BY: JRW

CHECKED BY: SSL

DATE: 3/25/2013



SITE VICINITY MAP
REPLACE STRUCTURE NO 790147
ON SR 2541 OVER TOWN CREEK
ROWAN COUNTY, NORTH CAROLINA

PROJECT NO.: 17BP.9.R.12

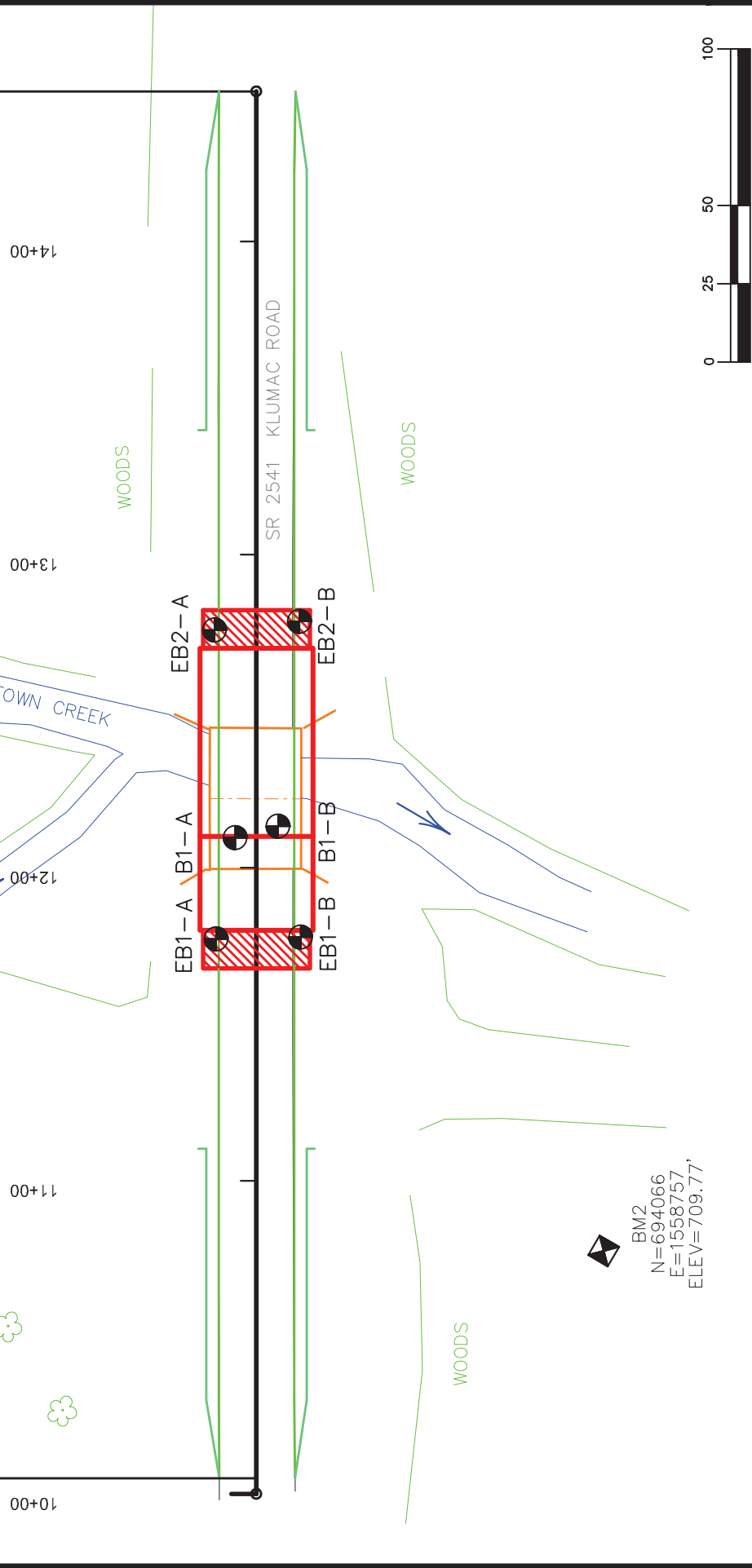
SHEET NO.

3



BEGIN PROJECT
17BP.9.R.12
POT Sta. 10+05.00


END PROJECT
17BP.9.R.12
POT Sta. 14+47.86

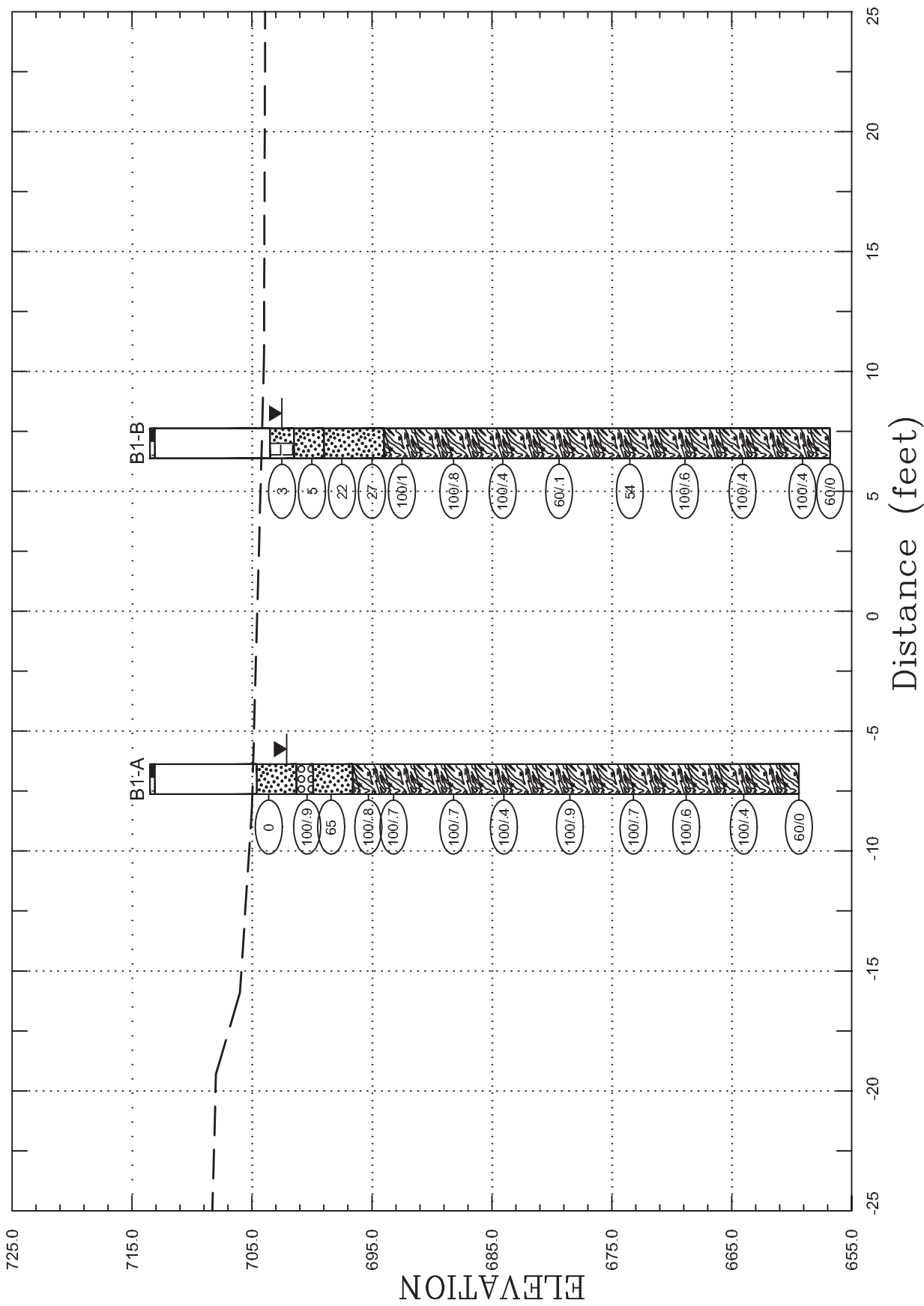


BM2
N=694066
E=1558757
ELEV=709.77'



(IN FEET)

SCALE: 1" = 50'	DATE: 3/25/2013	 WWW.SMEINC.COM <small>ENGINEERING LICENSE NO: F-0176</small>	FIELD EXPLORATION PLAN REPLACE STRUCTURE No. 790147 ON SR 2541 OVER TOWN CREEK ROWAN COUNTY, NORTH CAROLINA	SHEET NO. 4
PROJECT NO. 17BP.9.R.12	DRAWN BY: JRW			
CHECKED BY: SSL				



GENERALIZED SUBSURFACE CROSS SECTION
INTERIOR BENT No. 1 STA 12+10 -L-
 REPLACE STRUCTURE 790147
 ON SR 2941 OVER TOWN CREEK
 ROWAN COUNTY, NORTH CAROLINA

S&ME
 WWW.SMEINC.COM
 ENGINEERING LICENSE NO: F-0176

SCALE:	AS SHOWN	DATE:	3/25/2013
PROJECT NO.	17BP.9.R.12	DRAWN BY:	LAC
CHECKED BY:	SSL		

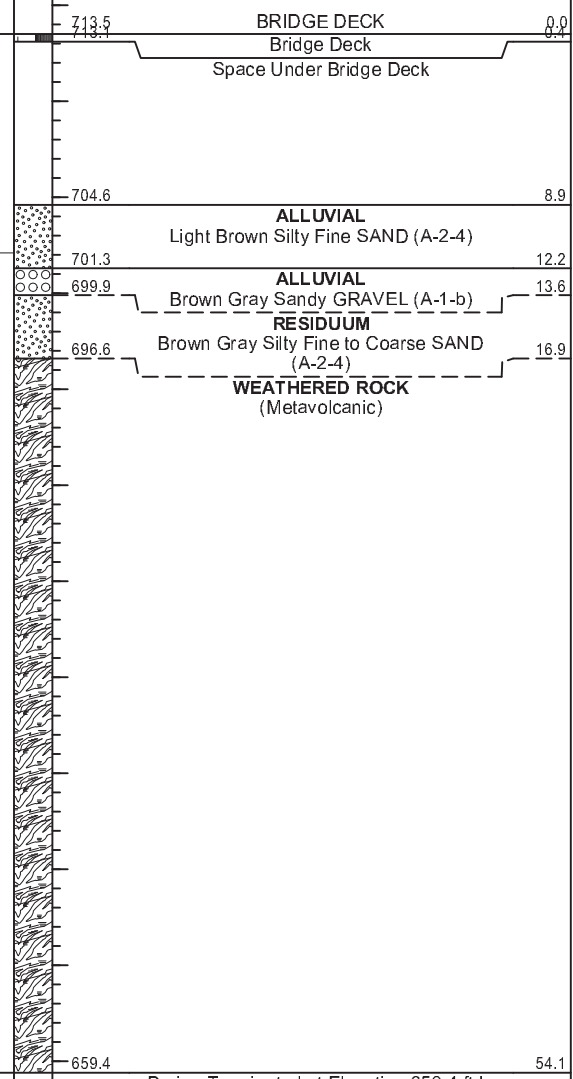


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS N/A	TIP 17BP.9.R.12	COUNTY Rowan	GEOLOGIST L. Campos
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek			GROUND WTR (ft)
BORING NO. B1-A	STATION 12+10	OFFSET 7 ft LT	ALIGNMENT -L-
COLLAR ELEV. 713.5 ft	TOTAL DEPTH 54.1 ft	NORTHING 694,121	EASTING 1,558,589
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER C. Odom	START DATE 11/09/12	COMP. DATE 11/09/12	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				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
715																	
710																	
705	704.6	8.9	WOH	WOH	WOH												
700	701.8	11.7	WOH	9	91/4												
	699.4	14.1	20	34	31												
695	696.6	16.9	21	31	69/3												
	694.4	19.1	35	54	46/2												
690	689.4	24.1	35	56	44/2												
685	684.4	29.1	100/4														
680	679.4	34.1	27	73/4													
675	674.4	39.1	20	51	49/2												
670	669.4	44.1	60	40/1													
665	664.4	49.1	100/4														
660	659.4	54.1	60/0														



Boring Terminated at Elevation 659.4 ft In Weathered Rock (Metavolcanic)

- 1) Tricone Advanced to 54.1 Feet
- 2) Standard Penetration Test Refusal Encountered at 54.1 Feet
- 3) NW Casing Advanced to 24.0 Feet

NCDOT BORE SINGLE 790147.GPJ NC_DOT.GDT 3/22/13

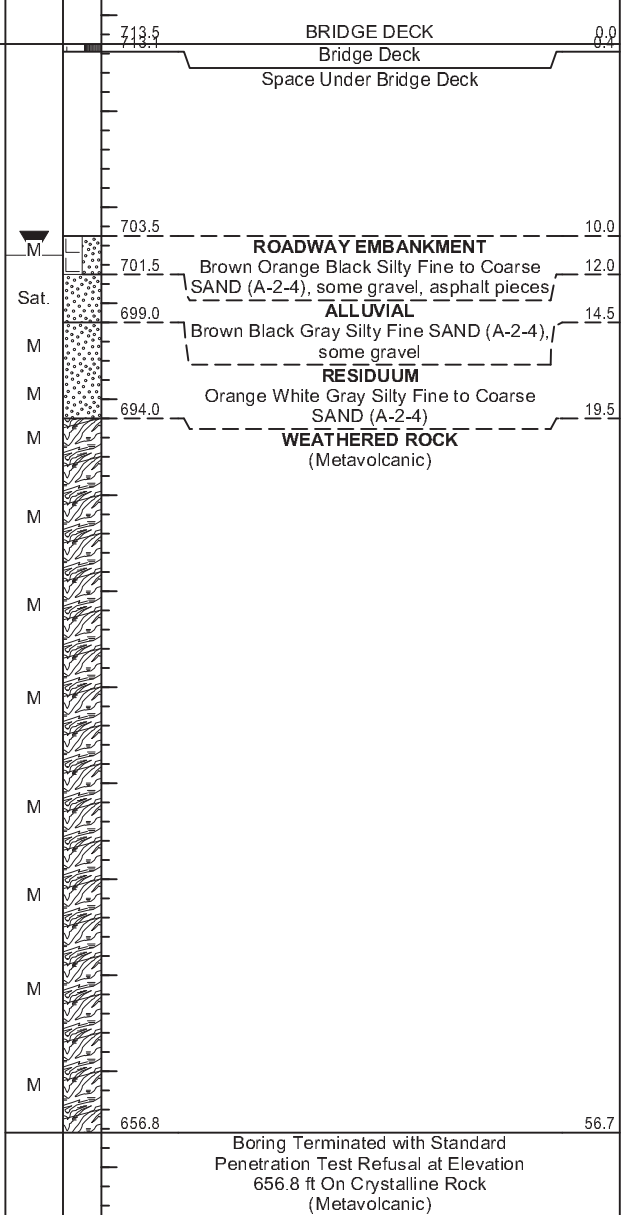


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS N/A	TIP 17BP.9.R.12	COUNTY Rowan	GEOLOGIST N. Page
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek			GROUND WTR (ft)
BORING NO. B1-B	STATION 12+13	OFFSET 7 ft RT	ALIGNMENT -L-
COLLAR ELEV. 713.5 ft	TOTAL DEPTH 56.7 ft	NORTHING 694,131	EASTING 1,558,599
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER C. Odom	START DATE 11/12/12	COMP. DATE 11/12/12	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)	
715																
710																
705																
700	703.5	10.0														
	701.0	12.5	3	1	4											
	698.5	15.0	10	10	12											
	696.0	17.5	11	12	15											
	693.5	20.0	32	68/5												
	689.5	24.0	32	45	55/3											
	684.5	29.0	100/4													
	679.5	34.0	60/1													
	674.5	39.0	13	26	28											
	669.5	44.0	78	22/1												
	664.5	49.0	100/4													
	659.5	54.0	100/4													
	656.8	56.7	60/0													



Boring Terminated with Standard Penetration Test Refusal at Elevation 656.8 ft On Crystalline Rock (Metavolcanic)

- 1) Tricone Advanced to 56.7 Feet
- 2) Standard Penetration Test Refusal Encountered at 56.7 Feet
- 3) NW Casing Advanced to 16.0 Feet

NCDOT BORE SINGLE 790147.GPJ NC_DOT.GDT 3/22/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS N/A	TIP 17BP.9.R.12	COUNTY Rowan	GEOLOGIST N. Page
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 11+77	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 713.3 ft	TOTAL DEPTH 30.8 ft	NORTHING 694,090	EASTING 1,558,600
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013		DRILL METHOD 3 1/4" HSA	HAMMER TYPE Automatic
DRILLER C. Odom	START DATE 11/08/12	COMP. DATE 11/08/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
715																
	712.3	1.0														
	709.8	3.5	3	3	4											
	707.3	6.0	3	3	3											
	704.8	8.5	3	5	5											
	700.8	13.5	4	5	7											
	699.8	13.5	5	11	8											
	694.8	18.5	17	22	30											
	689.8	23.5	9	9	23											
	684.8	28.5	100/4													
	682.5	30.8	60/0													

NCDOT BORE SINGLE 790147.GPJ NC_DOT.GDT 3/22/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS N/A	TIP 17BP.9.R.12	COUNTY Rowan	GEOLOGIST N. Page
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 11+78	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 713.4 ft	TOTAL DEPTH 37.6 ft	NORTHING 694,104	EASTING 1,558,623
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013		DRILL METHOD 3 1/4" HSA	HAMMER TYPE Automatic
DRILLER C. Odom	START DATE 11/08/12	COMP. DATE 11/08/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
715															
	712.4	1.0	3	5	5									GROUND SURFACE	0.0
	710.4													ROADWAY EMBANKMENT	
	710.4													Brown Silty Fine SAND (A-2-4)	3.0
	709.9	3.5	3	3	4									ROADWAY EMBANKMENT	
	707.4	6.0	2	3	4									Red Brown Sandy CLAY (A-6)	5.5
	707.9													RESIDUUM	
	704.9	8.5	2	2	4									Gray Orange Sandy CLAY (A-6), manganese staining	
	704.9													RESIDUUM	
	700.9	13.5	7	11	10									Gray Brown Orange Silty Fine SAND (A-2-4)	12.5
	699.9													RESIDUUM	
	694.9	18.5	16	23	44									Gray Brown Orange Silty Fine SAND (A-2-4)	
	694.9													RESIDUUM	
	689.9	23.5	18	10	11									Gray Brown Orange Silty Fine SAND (A-2-4)	
	689.9													RESIDUUM	
	684.9	28.5	58	42/2										WEATHERED ROCK (Metavolcanic)	27.5
	684.9													WEATHERED ROCK	
	685.9													(Metavolcanic)	
	679.9	33.5	100/4											WEATHERED ROCK	27.5
	679.9													(Metavolcanic)	
	675.8	37.6	60/0											WEATHERED ROCK	37.6
	675.8													(Metavolcanic)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 675.8 ft On Crystalline Rock (Metavolcanic)	
														1) 3 1/4" Hollow Stem Augers Advanced to 37.6 Feet	
														2) Standard Penetration Test Refusal Encountered at 37.6 Feet	

NCDOT BORE SINGLE 790147.GPJ NC_DOT.GDT 3/22/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS N/A		TIP 17BP.9.R.12		COUNTY Rowan		GEOLOGIST N. Page											
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek							GROUND WTR (ft)										
BORING NO. EB2-A		STATION 12+76		OFFSET 13 ft LT		ALIGNMENT -L-	0 HR. 12.1										
COLLAR ELEV. 713.3 ft		TOTAL DEPTH 49.0 ft		NORTHING 694,175		EASTING 1,558,550	24 HR. 11.5										
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013				DRILL METHOD 3 1/4" HSA		HAMMER TYPE Automatic											
DRILLER C. Odom		START DATE 11/08/12		COMP. DATE 11/08/12		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							
715														713.3	GROUND SURFACE	0.0	
	712.3	1.0	2	2	2							M		710.3	ROADWAY EMBANKMENT Brown Sandy CLAY (A-6)	3.0	
710	709.8	3.5	WOH	1	2							M		707.8	ROADWAY EMBANKMENT Brown Silty Fine SAND (A-2-4)	5.5	
	707.3	6.0	2	3	3							M		705.3	RESIDUUM Brown Gray Orange Sandy CLAY (A-6), manganese staining	8.0	
705	704.8	8.5	2	2	2							M			RESIDUUM Gray Orange White Silty Fine to Coarse SAND (A-2-4)		
700	699.8	13.5	5	7	60							M					
	694.8	18.5	100/3									D		695.8	WEATHERED ROCK (Metavolcanic)	17.5	
695														691.3	RESIDUUM Red Orange Brown Silty Fine to Coarse SAND (A-2-4), trace gravel	22.0	
690	689.8	23.5	10	18	25							D					
	684.8	28.5	13	16	13							D					
685												D					
680	679.8	33.5	22	35	44							D					
	674.8	38.5	55	45/1								M		675.8	WEATHERED ROCK (Metavolcanic)	37.5	
675												M					
670	669.8	43.5	100/3									M					
	664.8	48.5	60/1									M		664.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 664.3 ft On Crystalline Rock (Metavolcanic)	49.0	
665	664.4	48.9	60/0									M			1) 3 1/4" Hollow Stem Augers Advanced to 49.0 Feet 2) Standard Penetration Test Refusal Encountered at 49.0 Feet		

NCDOT BORE SINGLE 790147.GPJ NC_DOT.GDT 3/22/13



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS N/A		TIP 17BP.9.R.12		COUNTY Rowan		GEOLOGIST N. Page	
SITE DESCRIPTION Replace Bridge 790147 on SR 2541 Over Town Creek							GROUND WTR (ft)
BORING NO. EB2-B		STATION 12+79		OFFSET 14 ft RT		ALIGNMENT -L-	0 HR. 11.7
COLLAR ELEV. 713.1 ft		TOTAL DEPTH 50.4 ft		NORTHING 694,191		EASTING 1,558,572	24 HR. 11.5
DRILL RIG/HAMMER EFF./DATE CME-550X 85% 1/12/2013				DRILL METHOD 3 1/4" HSA		HAMMER TYPE Automatic	
DRILLER C. Odom		START DATE 11/13/12		COMP. DATE 11/13/12		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)		
715															713.1	0.0	GROUND SURFACE
710	712.1	1.0	2	2	3	5							M		713.1		ROADWAY EMBANKMENT Orange Brown Sandy CLAY (A-6)
	709.6	3.5	2	2	3	5							M		707.6	5.5	
	707.1	6.0	WOH	1	2	3							M				ALLUVIAL Gray Orange CLAY (A-7-6)
705	704.6	8.5	WOH	WOH	WOH	3							M				
700	699.6	13.5	4	7	11	18							M		700.6	12.5	RESIDUUM Orange White Gray Silty Fine to Coarse SAND (A-2-4)
695	694.6	18.5	10	9	17	26							M				
690	689.6	23.5	43	29	30	59							M				
685	684.6	28.5	30	70/4		100/9							M		685.6	27.5	WEATHERED ROCK (Metavolcanic)
680	679.6	33.5	53	47/2		100/7							M				
675	674.6	38.5	100/4			100/4							M				
670	669.6	43.5	100/3			100/3							M				
665	664.6	48.5	60/1			60/1							M				
	662.7	50.4	60/0			60/0							M		662.7	50.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 662.7 ft On Crystalline Rock (Metavolcanic)

- 1) 3 1/4" Hollow Stem Augers Advanced to 50.4 Feet
- 2) Standard Penetration Test Refusal Encountered at 50.4 Feet



Photograph No. 1:
View looking north up-station from south approach



Photograph No. 2:
View looking south down-station from north approach



Photograph No. 3:
View looking west upstream from bridge deck



Photograph No. 4:
View looking east downstream from bridge deck



Photograph No. 5:
View looking east along End Bent 1



Photograph No. 6:
View looking west along End Bent 1



Photograph No. 7:
View looking east along End Bent 2



Photograph No. 8:
View looking west along End Bent 2