

REFERENCE: BR-0011

PROJECT: 67011

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0011	1	8

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-5	CROSS SECTIONS
6-8	BORE LOGS

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CHEROKEE
PROJECT DESCRIPTION REPLACE BRIDGE #0002
ON NC-141 OVER SLOW CREEK

SITE DESCRIPTION _____

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 1919 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. 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.

PERSONNEL

C.D. JOHNSON
D.O. CHEEK
C.J. COFFEY

INVESTIGATED BY D.M. MULLEN
DRAWN BY DMM
CHECKED BY J.C. KUHNE
SUBMITTED BY JCK
DATE 8/21/2019



DocuSigned by:
D Matt Mullen 8/21/2019
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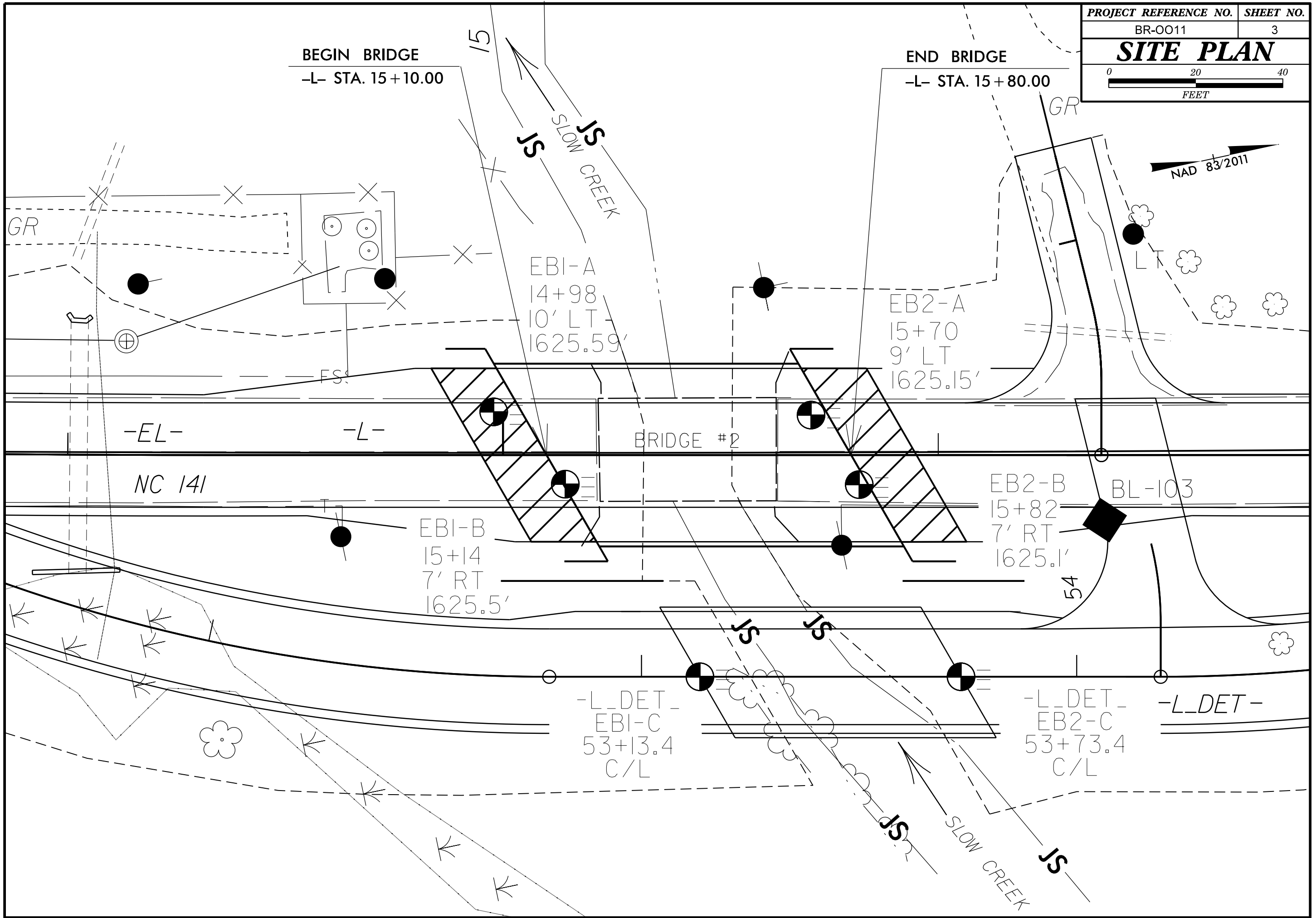
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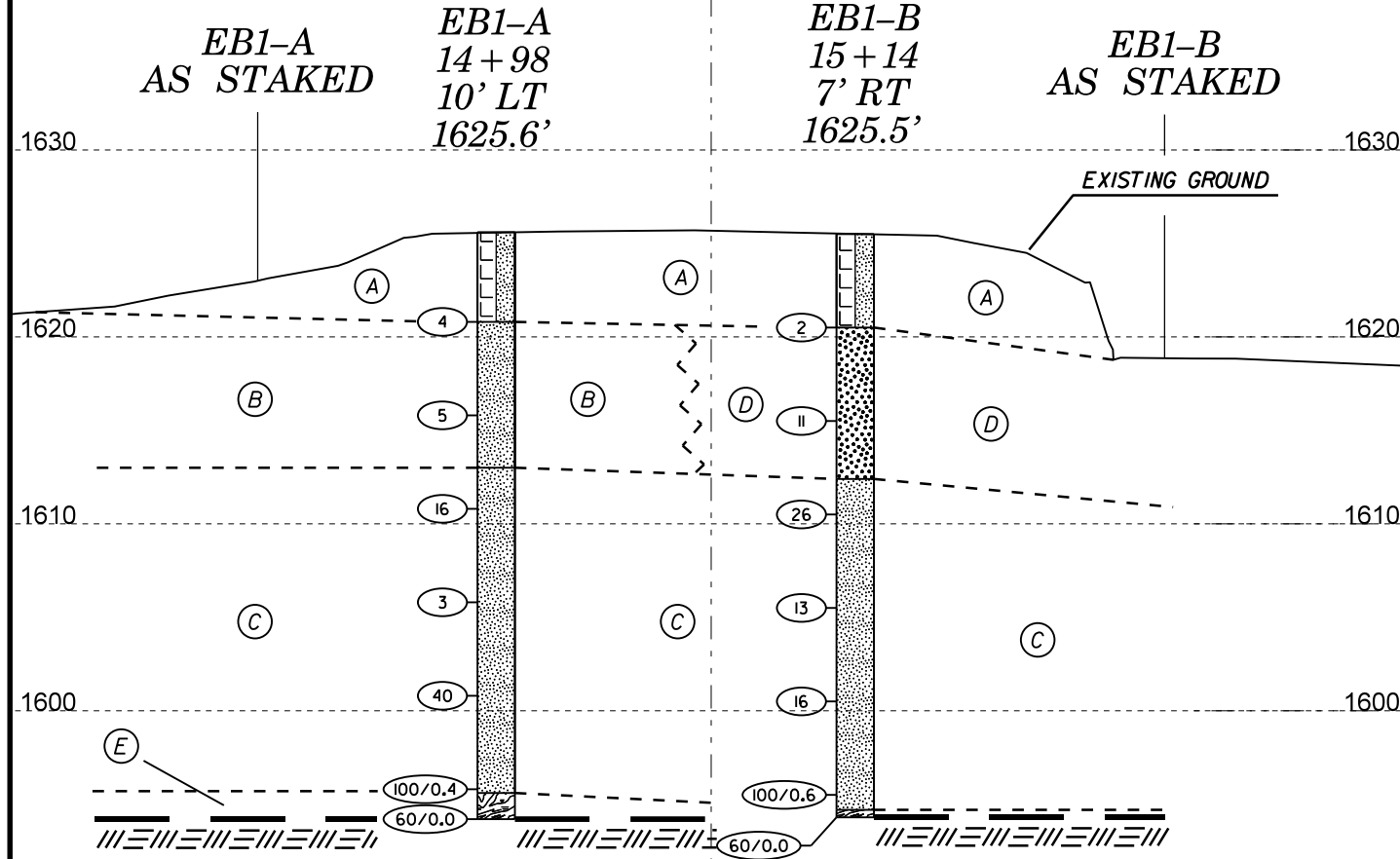
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																					
<p>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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>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.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>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:</p> <p>WEATHERED ROCK (WR) - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p> <p>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.</p> <p>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.</p> <p>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.</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, 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 DISLOADED 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 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.</p>																																																																																																					
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<p>GENERAL CLASS.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="5"></td> </tr> </table>										GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7						SYMBOL																		<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SLIGHTLY COMPRESSIBLE</td> <td>LL < 31</td> </tr> <tr> <td>MODERATELY COMPRESSIBLE</td> <td>LL = 31 - 50</td> </tr> <tr> <td>HIGHLY COMPRESSIBLE</td> <td>LL > 50</td> </tr> </table> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>										SLIGHTLY COMPRESSIBLE	LL < 31	MODERATELY COMPRESSIBLE	LL = 31 - 50	HIGHLY COMPRESSIBLE	LL > 50	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	<p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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></p> <p>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, WOULD YIELD SPT N VALUES > 100 BPF</i></p> <p>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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i></p> <p>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.</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT VST PMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p>																								
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SOIL MOISTURE SCALE	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																	
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																	
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																	
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																	
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																	
TEXTURE OR GRAIN SIZE										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING																																																																																																					
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<p>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.</p>										<p>INDURATION</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>NOTES:</p>																																																																																																															



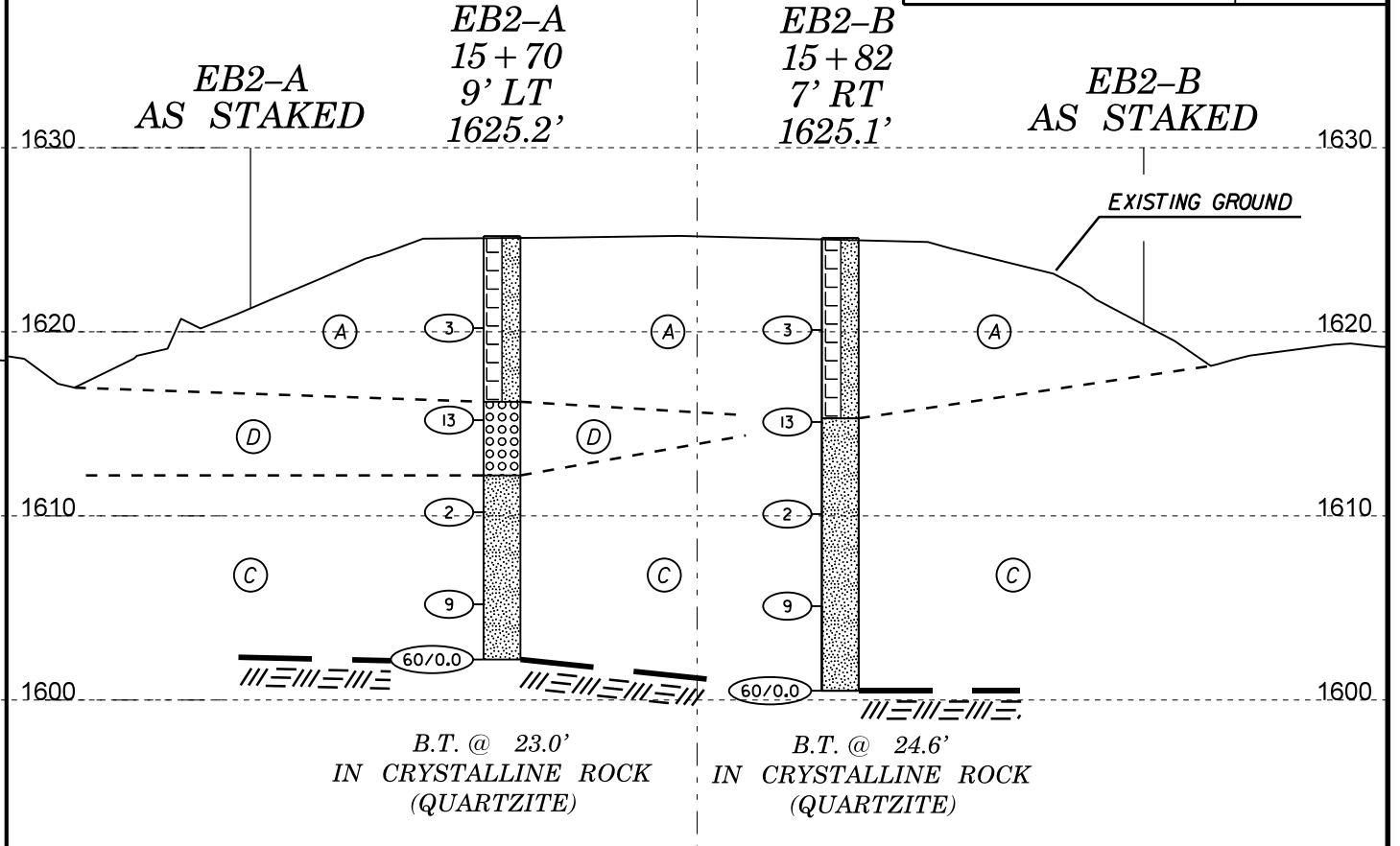


B.T. @ 31.4'
IN CRYSTALLINE ROCK (QUARTZITE)

B.T. @ 31.2'
IN CRYSTALLINE ROCK (QUARTZITE)

- (A) SLIGHTLY MICACEOUS SANDY SILT ROADWAY EMBANKMENT (A-4)
- (B) SLIGHTLY MICACEOUS, CLAYEY, SANDY SILT ALLUVIUM WITH A FEW PEBBLES AND GRAVELS (A-4)
- (C) SLIGHTLY MICACEOUS, SANDY SILT SAPROLITE WITH A FEW WEATHERED ROCK LAYERS (A-4)
- (D) SLIGHTLY MICACEOUS, CLAYEY, SILTY SAND ALLUVIUM WITH A FEW PEBBLES AND GRAVELS (A-2)
- (E) WEATHERED ROCK (SCHIST)

Ⓞ SKEW = 60 DEG.

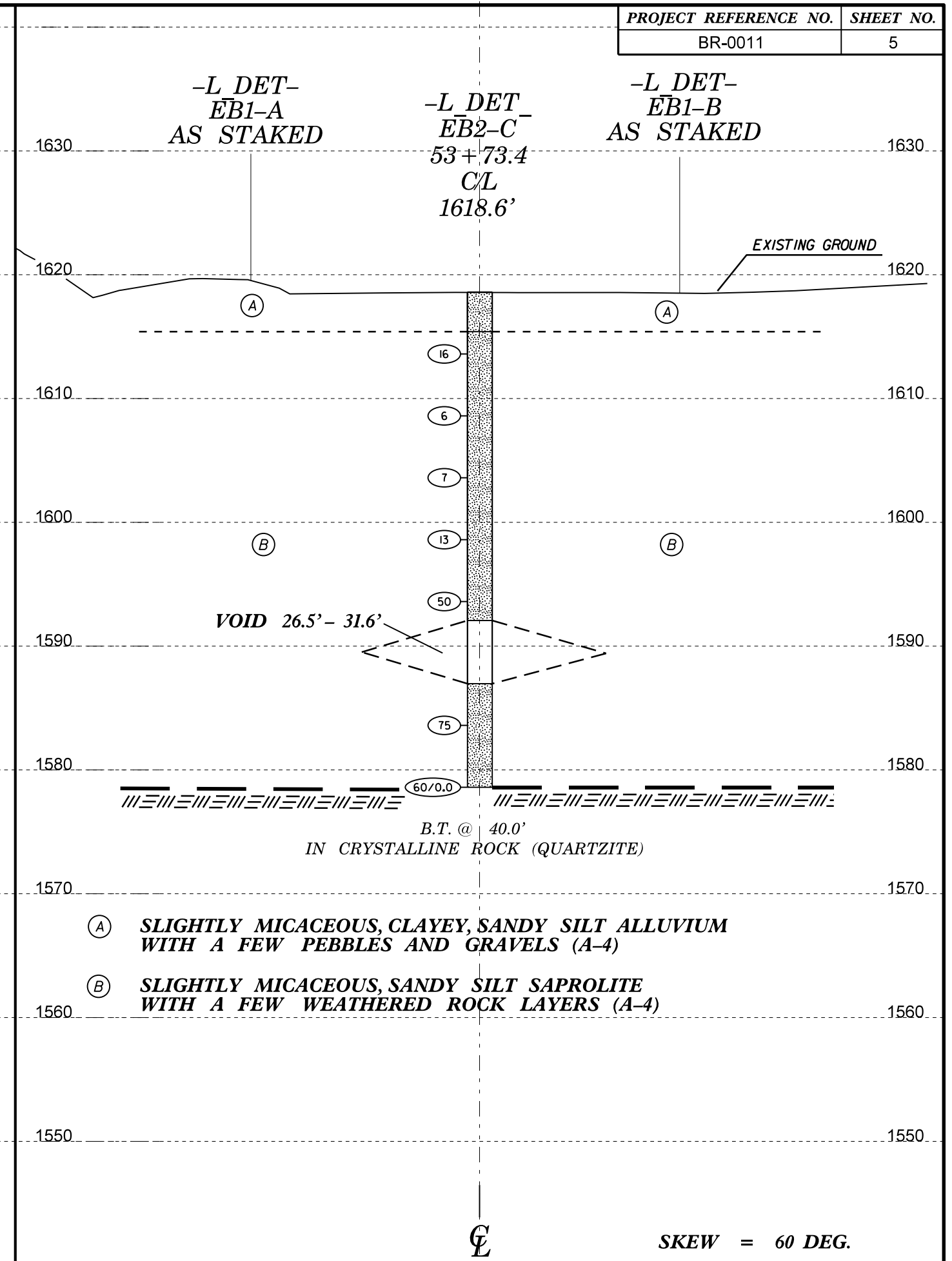
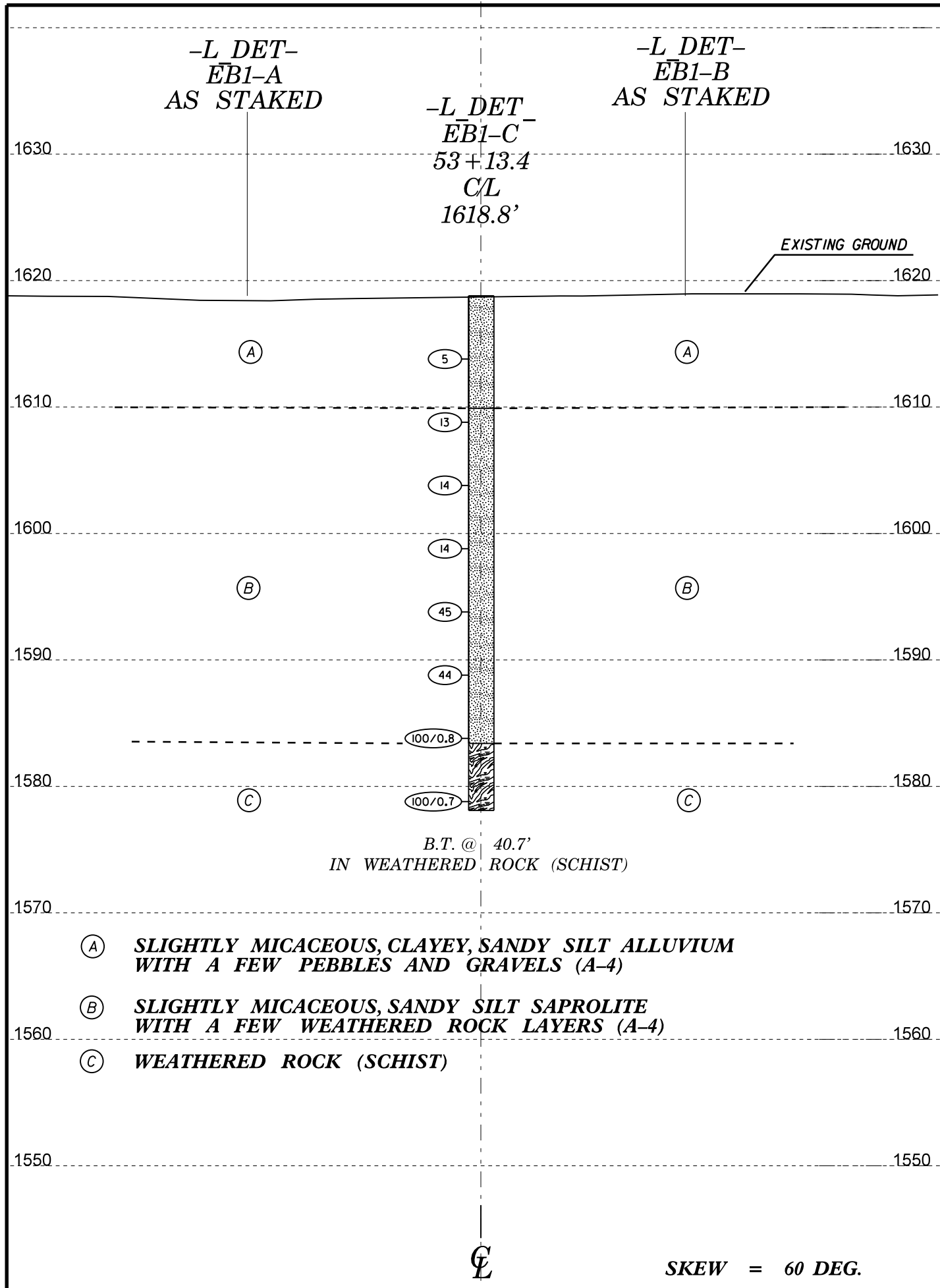


B.T. @ 23.0'
IN CRYSTALLINE ROCK (QUARTZITE)

B.T. @ 24.6'
IN CRYSTALLINE ROCK (QUARTZITE)

- (A) SLIGHTLY MICACEOUS SANDY SILT ROADWAY EMBANKMENT (A-4)
- (B) SLIGHTLY MICACEOUS, CLAYEY, SANDY SILT ALLUVIUM WITH A FEW PEBBLES AND GRAVELS (A-4)
- (C) SLIGHTLY MICACEOUS, SANDY SILT SAPROLITE WITH A FEW WEATHERED ROCK LAYERS (A-4)
- (D) SLIGHTLY MICACEOUS, CLAYEY, SILTY SAND ALLUVIUM WITH A FEW PEBBLES AND GRAVELS (A-2)

Ⓞ SKEW = 60 DEG.



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 14+98		OFFSET 10 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,625.6 ft		TOTAL DEPTH 31.4 ft		NORTHING 526,949		EASTING 521,303										
DRILL RIG/HAMMER EFF./DATE AFC6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 07/08/19		COMP. DATE 07/08/19		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						
1630																
1625														1,625.6	GROUND SURFACE	0.0
1620	1,620.8	4.8	1	2	2									1,620.8	ROADWAY EMBANKMENT ASPHALT, BASE MATERIAL TO RED-BROWN, SL MIC, SND-SLT	4.8
1615	1,615.8	9.8	1	3	2										ALLUVIAL GREY-BROWN, MOTTLED CL-SND-SLT, SL MIC w/FEW PEBS/GRVLS	
1610	1,610.8	14.8	5	8	8									1,613.0	SAPROLITE RED-BROWN, SL MIC, SND-SLT w/WEA RK LAYERS THROUGHOUT	12.6
1605	1,605.8	19.8	1	2	1											
1600	1,600.8	24.8	14	18	22											
1595	1,595.8	29.8	100/0.4											1,595.6	WEATHERED ROCK BROWN PHYLLITE/SCHIST WEA RK	30.0
	1,594.2	31.4	60/0.0											1,594.2	CRYSTALLINE ROCK GREY QUARTZITE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,594.2 ft ON CRYSTALLINE ROCK (QUARTZITE)	31.4

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 15+14		OFFSET 7 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,625.5 ft		TOTAL DEPTH 31.2 ft		NORTHING 526,962		EASTING 521,322										
DRILL RIG/HAMMER EFF./DATE AFC6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 07/08/19		COMP. DATE 07/08/19		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						
1630																
1625														1,625.5	GROUND SURFACE	0.0
1620	1,620.5	5.0	1	1	1									1,620.5	ROADWAY EMBANKMENT ASPHALT/BASE MATERIAL, RED-BROWN, SND-SLT, SOME GRAVELS	5.0
1615	1,615.5	10.0	2	6	5										ALLUVIAL GREY-TAN, MOTTLED, CL-SLT (A-4) TO LOOSE GREY, SLT-SND, PEBS/GRVLS, SL MIC (A-2)	
1610	1,610.5	15.0	8	13	13									1,612.4	SAPROLITE GREY-BRN, SL MIC, SND-SLT	13.1
1605	1,605.5	20.0	13	8	5											
1600	1,600.5	25.0	3	7	9											
1595	1,595.5	30.0	22	50	50/0.1									1,594.7	WEATHERED ROCK GREY WEA QUARTZITE	30.8
	1,594.3	31.2	60/0.0											1,594.3	CRYSTALLINE ROCK CRYSTALLINE ROCK (QUARTZITE) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,594.3 ft ON CRYSTALLINE ROCK (QUARTZITE)	31.2

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.									
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 15+70		OFFSET 9 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,625.2 ft		TOTAL DEPTH 23.0 ft		NORTHING 527,020		EASTING 521,318									
DRILL RIG/HAMMER EFF./DATE AFC6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Cheek, D. O.		START DATE 07/08/19		COMP. DATE 07/08/19		SURFACE WATER DEPTH N/A									
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					
1630															
1625														1,625.2	0.0
1620	1,620.2	5.0	1	2	1								M	ROADWAY EMBANKMENT DK ORANGE, SL MIC, SLT-CL w/FEW GRVLS, TR MnO	
1615	1,615.2	10.0	4	6	7								M	ALLUVIAL GREY, PEBS/GRVLS W/SND, TR SLT	9.0
1610	1,610.2	15.0	1	1	1								M	SAPROLITE RED-BROWN TO BRN-BLACK, SND-SLT w/FEW PEBS, TR V. PLASTIC CL LAYERS	13.0
1605	1,605.2	20.0	2	3	6								M		
	1,602.2	23.0											M	CRYSTALLINE ROCK CRYSTALLINE ROCK (QUARTZITE) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,602.2 ft ON CRYSTALLINE ROCK (QUARTZITE)	23.0

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.									
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 15+82		OFFSET 7 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,625.1 ft		TOTAL DEPTH 24.6 ft		NORTHING 527,028		EASTING 521,336									
DRILL RIG/HAMMER EFF./DATE AFC6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Cheek, D. O.		START DATE 07/08/19		COMP. DATE 07/08/19		SURFACE WATER DEPTH N/A									
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					
1630															
1625														1,625.1	0.0
1620	1,620.1	5.0	1	2	1								M	ROADWAY EMBANKMENT ASPHALT/BASE MATERIAL, RED-BRN, SL MIC, SND-SLT, w/TR CL, FEW PEBS	
1615	1,615.1	10.0	WOH	4	5								M	SAPROLITE BROWN-BLACK, SL MIC, SND-SLT	9.8
1610	1,610.1	15.0		4	5								M		
1605	1,605.1	20.0		6	5								M		
	1,600.5	24.6											M	CRYSTALLINE ROCK CRYSTALLINE ROCK (QUARTZITE) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,600.5 ft ON CRYSTALLINE ROCK (QUARTZITE)	24.6

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)									
BORING NO. -LDET- EB1-C		STATION 53+13.4		OFFSET C/L		ALIGNMENT -L_DET-										
COLLAR ELEV. 1,618.8 ft		TOTAL DEPTH 40.7 ft		NORTHING 526,983		EASTING 521,372										
DRILL RIG/HAMMER EFF./DATE AFO6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 07/09/19		COMP. DATE 07/09/19		SURFACE WATER DEPTH N/A										
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						
1620														1,618.8	0.0	GROUND SURFACE
1615	1,613.8	5.0	5	2	3								M			ALLUVIAL BROWN, SL MIC, SND-SLT, SOME PEBS
1610	1,608.8	10.0											M			SAPROLITE BROWN-BLK, SL MIC, SND-SLT, w/TR CL THROUGHOUT
1605	1,603.8	15.0	6	6	8								M			
1600	1,598.8	20.0	3	6	8								M			
1595	1,593.8	25.0	8	18	27								M			
1590	1,591.8	27.0	12	20	24								M			
1585	1,588.8	30.0	NO DRIVE										M			
1580	1,583.8	35.0	48	52/0.3									M			WEATHERED ROCK BLACK-GREY WEA SCHIST
	1,578.8	40.0	51	49/0.2												Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,578.1 ft IN WEATHERED ROCK (GREY SCHIST)

WBS 67011.1.1		TIP BR-0011		COUNTY CHEROKEE		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION REPLACE BRDG #0002 ON NC-141 OVER SLOW CREEK							GROUND WTR (ft)									
BORING NO. -L_DET- EB2-C		STATION 53+73.4		OFFSET C/L		ALIGNMENT -L_DET-										
COLLAR ELEV. 1,618.6 ft		TOTAL DEPTH 40.0 ft		NORTHING 527,042		EASTING 521,384										
DRILL RIG/HAMMER EFF./DATE AFO6744 CME - 45C 92% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 07/09/19		COMP. DATE 07/09/19		SURFACE WATER DEPTH N/A										
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						
1620														1,618.6	0.0	GROUND SURFACE
1615	1,613.6	5.0	4	8	8								M			ALLUVIAL BROWN, SND-SLT w/GRVLS, CBLS
1610	1,608.6	10.0	3	3	3								M			SAPROLITE BROWN-BLK, SL MIC, SND-SLT w/TR MnO
1605	1,603.6	15.0	3	3	4								M			
1600	1,598.6	20.0	3	6	7								M			
1595	1,593.6	25.0	8	28	22								M			
1590	1,588.6	30.0	NO DRIVE										M			IN/OUT V. SOFT MATERIAL/VOID 26.5'-31.6'
1585	1,584.8	33.8	16	38	37								M			
1580	1,578.6	40.0	NO DRIVE													CRYSTALLINE ROCK CRYSTALLINE ROCK (SCHIST) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,578.6 ft ON CRYSTALLINE ROCK (QUARTZITE)

NCDOT BORE DOUBLE BR0011_GEO_CHEROKEE_BH.GPJ NC_DOT.GDT 8/19/19