

REFERENCE: B-5717

PROJECT: 45673

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GUILFORD
PROJECT DESCRIPTION REPLACE BRIDGES 109 AND 121
ON SR 4240 (E. GATE CITY BLVD.) OVER SOUTH
BUFFALO CREEK
SITE DESCRIPTION DUAL STRUCTURES AT -L-
STATION 21+22.00

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5-12	CROSS SECTIONS
13-32	BORE LOGS, CORE REPORTS, & CORE PHOTOGRAPHS
33	SOIL TEST RESULTS
34-37	ROCK TEST RESULTS
38	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5717	1	39

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. 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:
- 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.
 - 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

P.M. WEAVER

C.R. PASTRANA

TRIGON EXPLORATION

INVESTIGATED BY ESP Associates, Inc.

DRAWN BY T.T. WALKER

CHECKED BY P.M. WEAVER

SUBMITTED BY ESP Associates, Inc.

DATE June 2021

 **ESP ASSOCIATES, INC.**
7011 ALBERT PICK RD
SUITE E
GREENSBORO, NC 27409
FIRM # C-0587
WWW.ESPASSOCIATES.COM



DocuSigned by:
Paul M. Weaver 6/17/2021

01847D3739A0749C SIGNATURE DATE

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

**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 208, 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>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>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 DISLOGGED 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 (ROD) - 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.</p>																																																																																																																																										
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <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-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 colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> </table>										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	[Pattern]					[Pattern]					[Pattern]					% PASSING #10 #40 #200	[Table]					[Table]					[Table]					MATERIAL PASSING #40 LL PI	[Table]					[Table]					[Table]					GROUP INDEX	[Table]					[Table]					[Table]					USUAL TYPES OF MAJOR MATERIALS	[Table]					[Table]					[Table]					GEN. RATING AS SUBGRADE	[Table]					[Table]					[Table]					<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</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>CRUSTAL PLAIN SEDIMENTARY ROCK (CP) 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>									
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	[Pattern]					[Pattern]					[Pattern]																																																																																																																																																													
% PASSING #10 #40 #200	[Table]					[Table]					[Table]																																																																																																																																																													
MATERIAL PASSING #40 LL PI	[Table]					[Table]					[Table]																																																																																																																																																													
GROUP INDEX	[Table]					[Table]					[Table]																																																																																																																																																													
USUAL TYPES OF MAJOR MATERIALS	[Table]					[Table]					[Table]																																																																																																																																																													
GEN. RATING AS SUBGRADE	[Table]					[Table]					[Table]																																																																																																																																																													
MINERALOGICAL COMPOSITION										COMPRESSION										WEATHERING										CRUSTAL PLAIN SEDIMENTARY ROCK (CP)																																																																																																																																										
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>										<p>VERY SLIGHT (IV 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.</p>																																																																																																																																										
PERCENTAGE OF MATERIAL										GROUND WATER										MODERATE (MOD.)										SEVERE (SEV.)																																																																																																																																										
<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>										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>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP</p>										<p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p>										<p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i></p>																																																																																																																						
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																																																																																																																																																																					
MISCELLANEOUS SYMBOLS										RECOMMENDATION SYMBOLS										VERY HARD										HARD																																																																																																																																										
<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p>										<p>25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT VST PMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION</p>										<p>UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>										<p>CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>																																																																																																																																
TEXTURE OR GRAIN SIZE										ABBREVIATIONS										MODERATELY HARD										MEDIUM HARD																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table>										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.75	2.00	0.42	0.25	0.075	0.053	<p>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 UNIT WEIGHT DRY UNIT WEIGHT</p>										<p>CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p>										<p>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p>																																																																																																																												
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																																																																																		
	4.75	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																		
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										SOFT										VERY SOFT																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>										SOIL MOISTURE SCALE (ATTERBERG LIMITS)	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	<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p>										<p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 15/16" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT</p>										<p>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.</p>										<p>CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>																																																																																																																	
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	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																																																																																																																																																																						
PLASTICITY										FRACTURE SPACING										VERY HARD										HARD																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td></td> <td>0-5</td> <td>6-15</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>16-25</td> <td>26 OR MORE</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td></td> <td></td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td></td> <td></td> <td>HIGH</td> </tr> </table>										NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH		0-5	6-15	VERY LOW	SLIGHTLY PLASTIC	16-25	26 OR MORE	SLIGHT	MODERATELY PLASTIC			MEDIUM	HIGHLY PLASTIC			HIGH	<p>TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET</p>										<p>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</p>										<p>FRAGILE MODERATELY INDURATED INDURATED EXTREMELY INDURATED</p>										<p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																												
NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH																																																																																																																																																																					
	0-5	6-15	VERY LOW																																																																																																																																																																					
SLIGHTLY PLASTIC	16-25	26 OR MORE	SLIGHT																																																																																																																																																																					
MODERATELY PLASTIC			MEDIUM																																																																																																																																																																					
HIGHLY PLASTIC			HIGH																																																																																																																																																																					
COLOR										INDURATION										FRAGILE										MODERATELY INDURATED																																																																																																																																										
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>										<p>INDURATED</p>										<p>INDURATED</p>																																																																																																																																										
NOTES:										INDURATION										FRAGILE										MODERATELY INDURATED																																																																																																																																										
<p>F.I.A.D = FILLED IMMEDIATELY AFTER DRILLING</p>										<p>INDURATED</p>										<p>INDURATED</p>										<p>INDURATED</p>																																																																																																																																										
BENCH MARK:										INDURATION										FRAGILE										MODERATELY INDURATED																																																																																																																																										
<p>BL-3: STA. 29+63.74, N 839124.4010, E 1781313.8740</p>										<p>INDURATED</p>										<p>INDURATED</p>										<p>INDURATED</p>																																																																																																																																										
ELEVATION:										INDURATION										FRAGILE										MODERATELY INDURATED																																																																																																																																										
<p>715.91 FEET</p>										<p>INDURATED</p>										<p>INDURATED</p>										<p>INDURATED</p>																																																																																																																																										
DATE:										INDURATION										FRAGILE										MODERATELY INDURATED																																																																																																																																										
<p>8-15-14</p>										<p>INDURATED</p>										<p>INDURATED</p>										<p>INDURATED</p>																																																																																																																																										

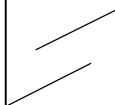
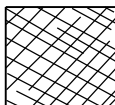


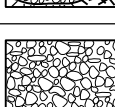
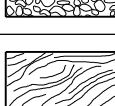
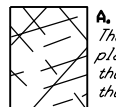


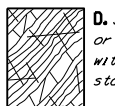


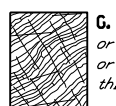

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

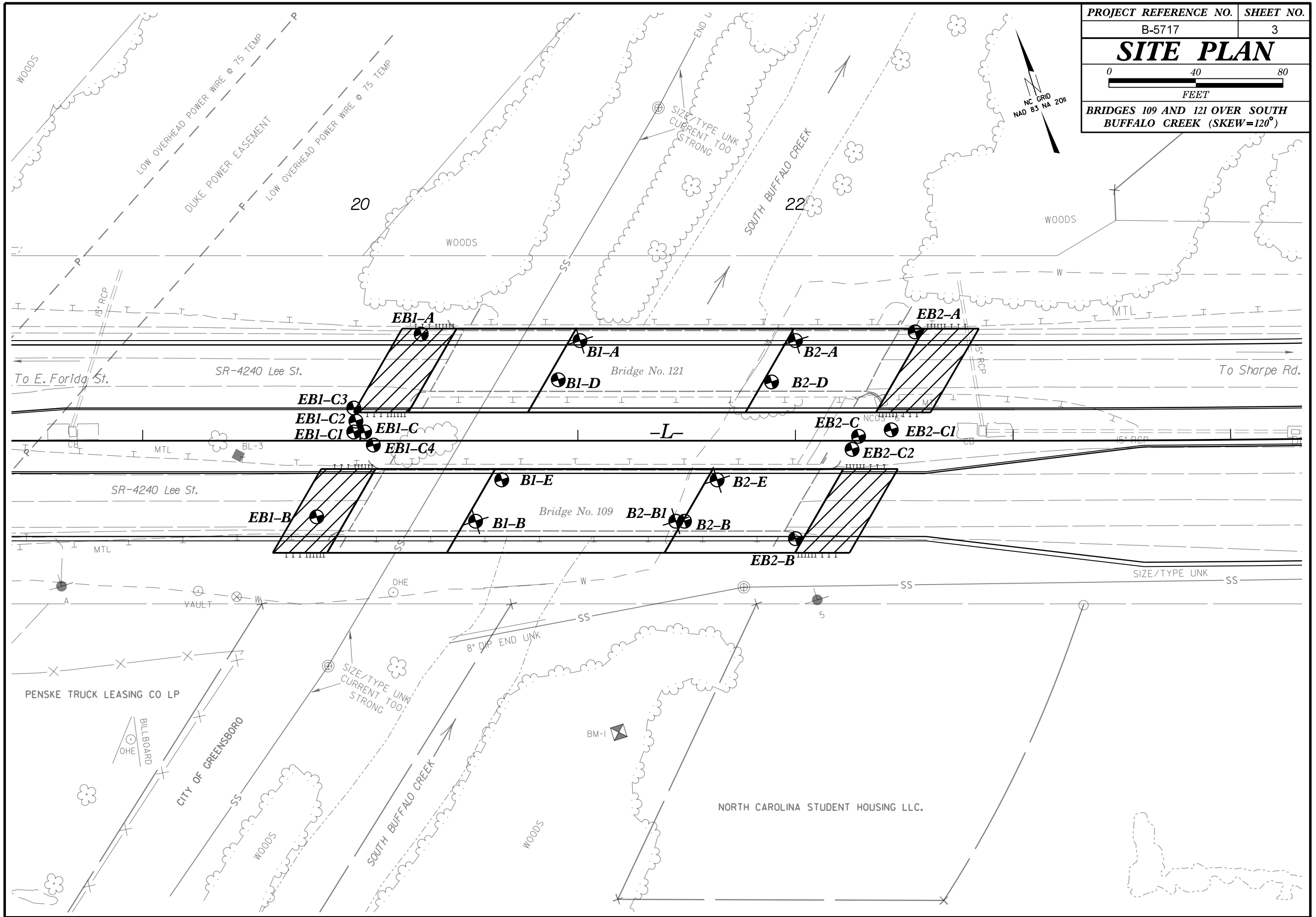
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

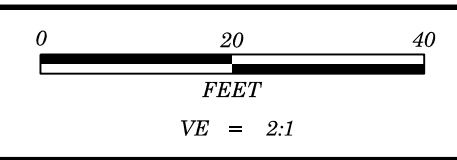
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

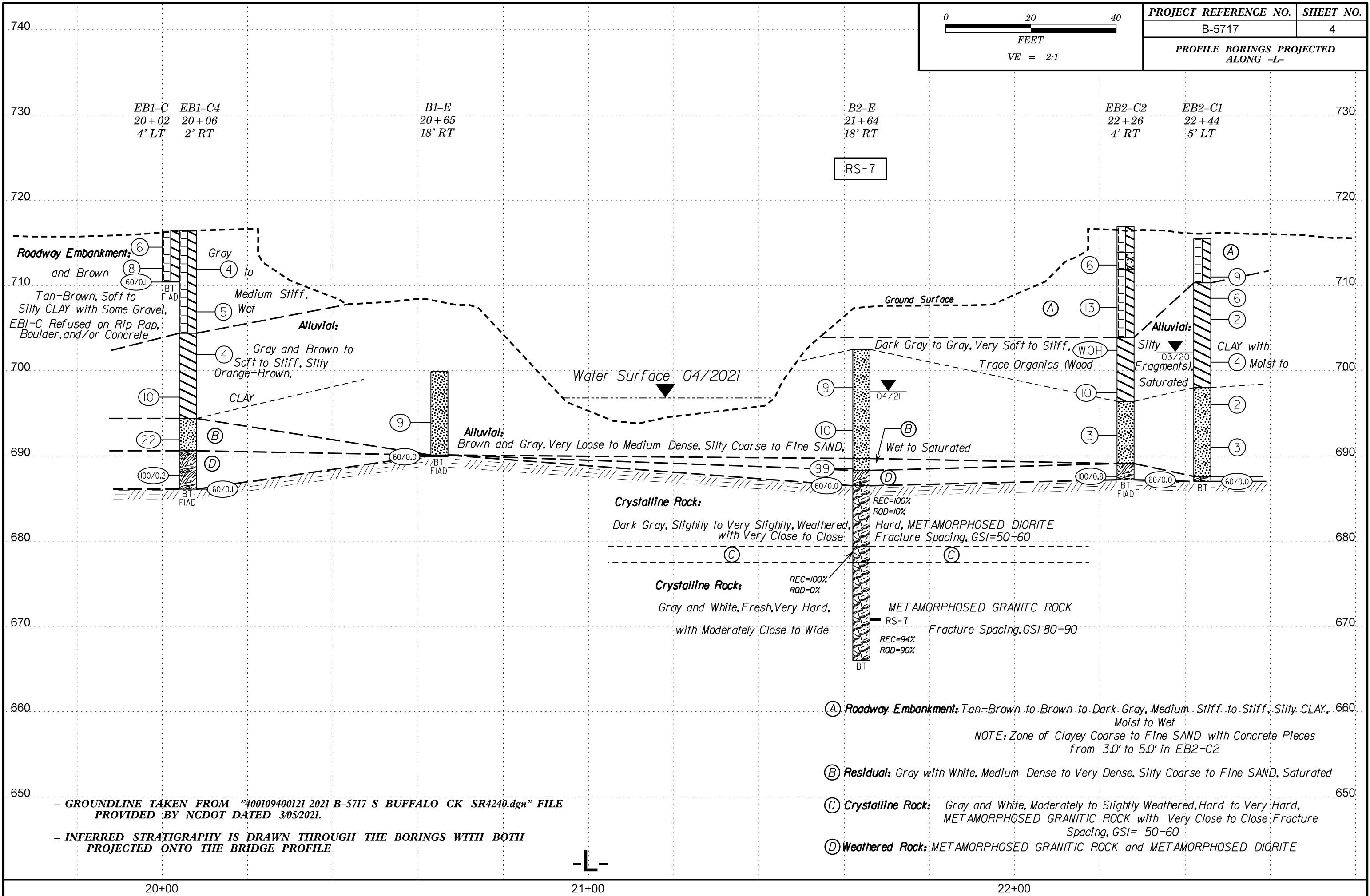
<p>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p> <p>STRUCTURE</p>	<p>SURFACE CONDITIONS</p> <p>VERY GOOD Very rough, fresh unweathered surfaces</p> <p>GOOD Rough, slightly weathered, iron stained surfaces</p> <p>FAIR Smooth, moderately weathered and altered surfaces</p> <p>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</p> <p>DECREASING SURFACE QUALITY →</p>					<p>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</p> <p>From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.</p> <p>COMPOSITION AND STRUCTURE</p>	<p>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</p> <p>VERY GOOD - Very Rough, fresh unweathered surfaces</p> <p>GOOD - Rough, slightly weathered surfaces</p> <p>FAIR - Smooth, moderately weathered and altered surfaces</p> <p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p> <p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>																		
<p>INTERLOCKING OF ROCK PIECES</p> <p>DECREASING INTERLOCKING OF ROCK PIECES ↓</p> <p> INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p> BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p> VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p> BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p> DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p> LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	90	80	70	60	50	N/A	N/A	N/A	N/A	N/A	<p> A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.</p> <p> B. Sandstone with thin inter-layers of siltstone</p> <p> C. Sandstone and siltstone in similar amounts</p> <p> D. Siltstone or silty shale with sandstone layers</p> <p> E. Weak siltstone or clayey shale with sandstone layers</p> <p>C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.</p> <p> F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</p> <p> G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</p> <p> H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</p> <p>→ Means deformation after tectonic disturbance</p>	70	60	50	40	30	A	B	C	D	E	F	G	H	10

PROJECT REFERENCE NO.	SHEET NO.
B-5717	3
SITE PLAN	
 0 40 80 FEET	
BRIDGES 109 AND 121 OVER SOUTH BUFFALO CREEK (SKEW=120°)	





PROJECT REFERENCE NO.	SHEET NO.
B-5717	4
PROFILE BORINGS PROJECTED ALONG -L-	

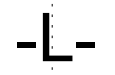


EB1-C 20+02 4' LT
 EB1-C4 20+06 2' RT
 B1-E 20+65 18' RT
 B2-E 21+64 18' RT
 EB2-C2 22+26 4' RT
 EB2-C1 22+44 5' LT

Roadway Embankment: and Brown Tan-Brown, Soft to Silty CLAY with Some Gravel. EBI-C Refused on Rip Rap, Boulder, and/or Concrete
 Gray to Medium Stiff, Wet
 Gray and Brown to Soft to Stiff, Silty Orange-Brown, CLAY
Alluvial: Brown and Gray, Very Loose to Medium Dense, Silty Coarse to Fine SAND, Wet to Saturated
Crystalline Rock: Dark Gray, Slightly to Very Slightly, Weathered, with Very Close to Close Fracture Spacing, GSI=50-60
Crystalline Rock: Gray and White, Fresh, Very Hard, with Moderately Close to Wide Fracture Spacing, GSI 80-90
Weathered Rock: METAMORPHOSED GRANITIC ROCK and METAMORPHOSED DIORITE

(A) **Roadway Embankment:** Tan-Brown to Brown to Dark Gray, Medium Stiff to Stiff, Silty CLAY, Moist to Wet
 NOTE: Zone of Clayey Coarse to Fine SAND with Concrete Pieces from 3.0' to 5.0' in EB2-C2
 (B) **Residual:** Gray with White, Medium Dense to Very Dense, Silty Coarse to Fine SAND, Saturated
 (C) **Crystalline Rock:** Gray and White, Moderately to Slightly Weathered, Hard to Very Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing, GSI= 50-60
 (D) **Weathered Rock:** METAMORPHOSED GRANITIC ROCK and METAMORPHOSED DIORITE

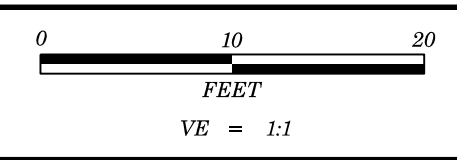
- GROUNDLINE TAKEN FROM "400109400121 2021 B-5717 S BUFFALO CK SR4240.dgn" FILE PROVIDED BY NCDOT DATED 3/05/2021.
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE PROFILE



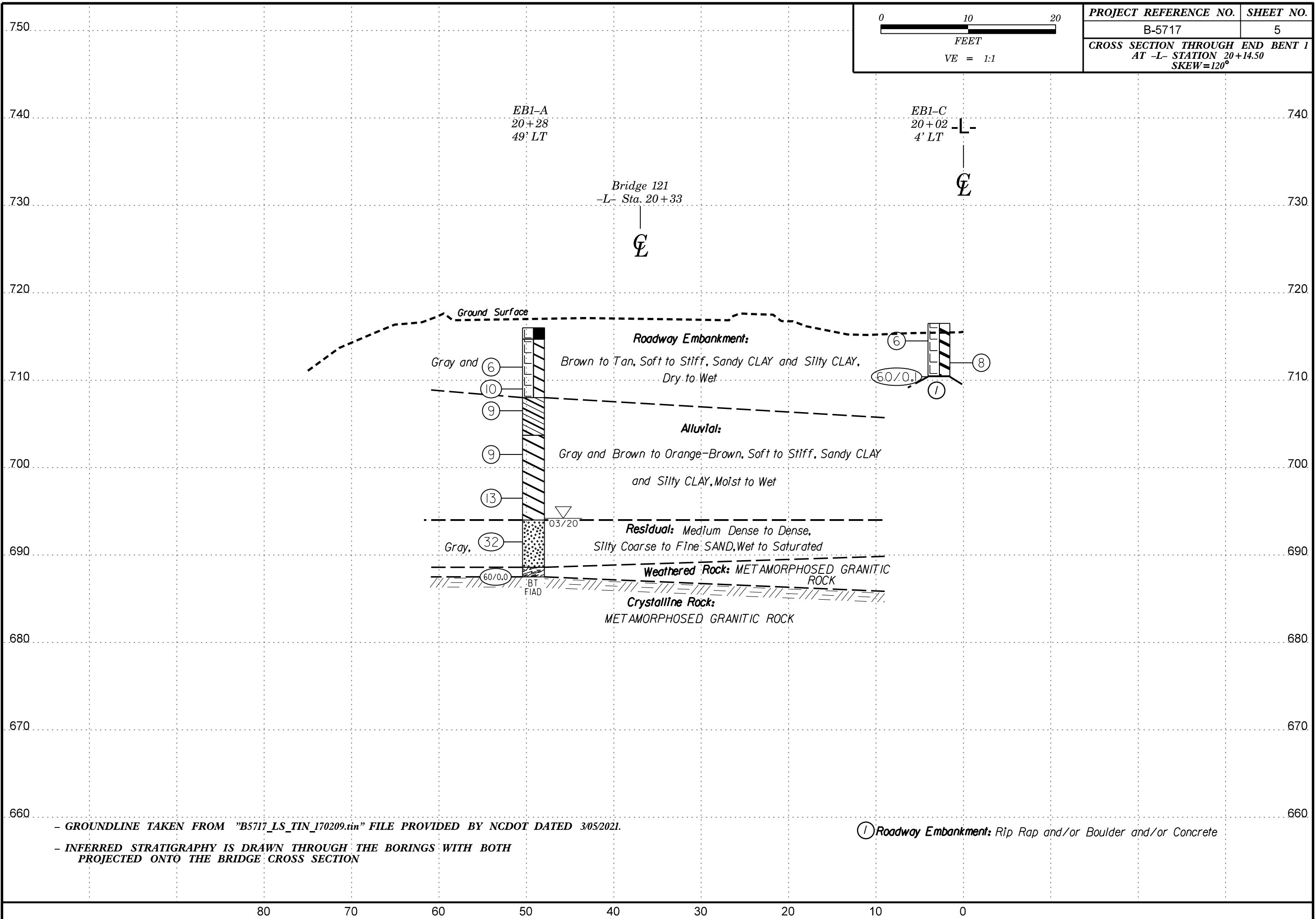
20+00

21+00

22+00

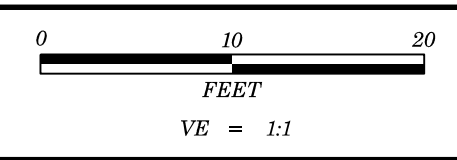


PROJECT REFERENCE NO.	SHEET NO.
B-5717	5
CROSS SECTION THROUGH END BENT 1 AT -L- STATION 20+14.50 SKEW=120°	

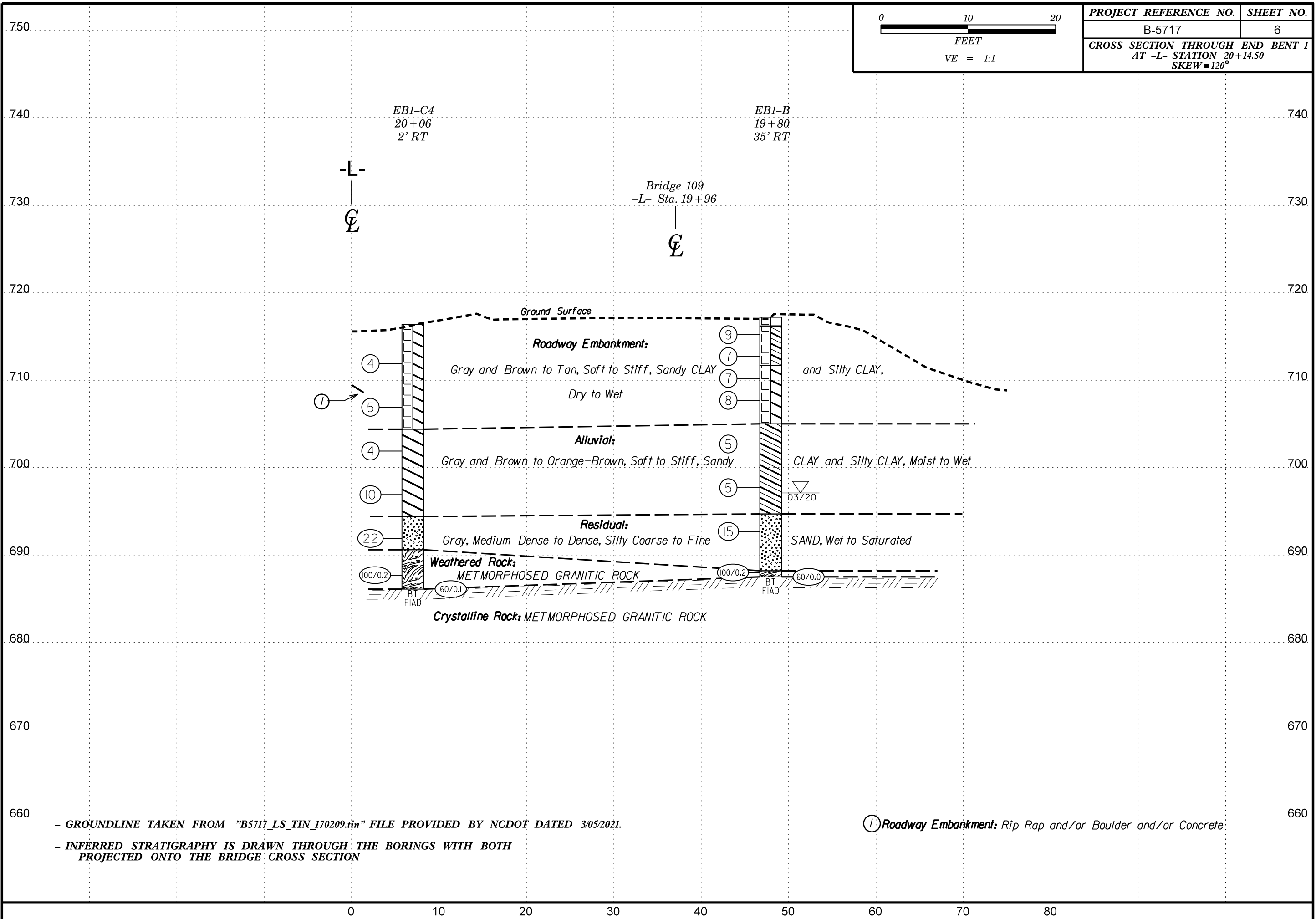


- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

① Roadway Embankment: Rip Rap and/or Boulder and/or Concrete



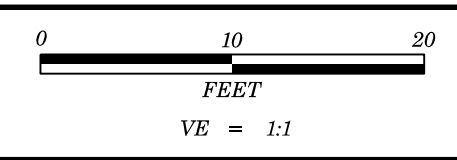
PROJECT REFERENCE NO.	SHEET NO.
B-5717	6
CROSS SECTION THROUGH END BENT 1	
AT -L- STATION 20+14.50	
SKEW=120°	



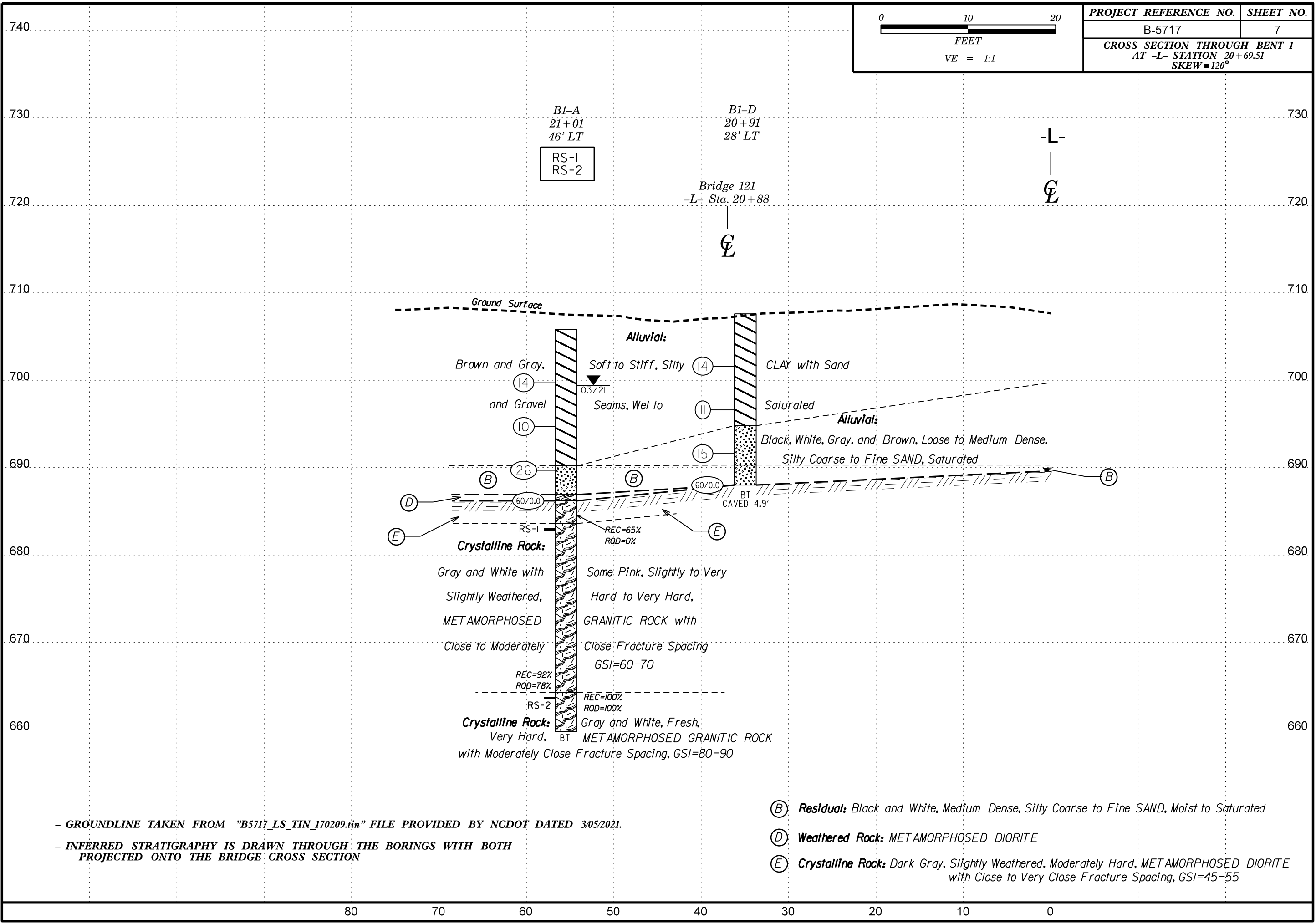
- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.

- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

① **Roadway Embankment:** Rip Rap and/or Boulder and/or Concrete.

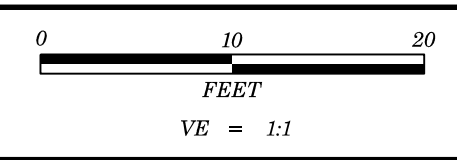


PROJECT REFERENCE NO.	SHEET NO.
B-5717	7
CROSS SECTION THROUGH BENT 1 AT -L- STATION 20+69.51 SKEW=120°	

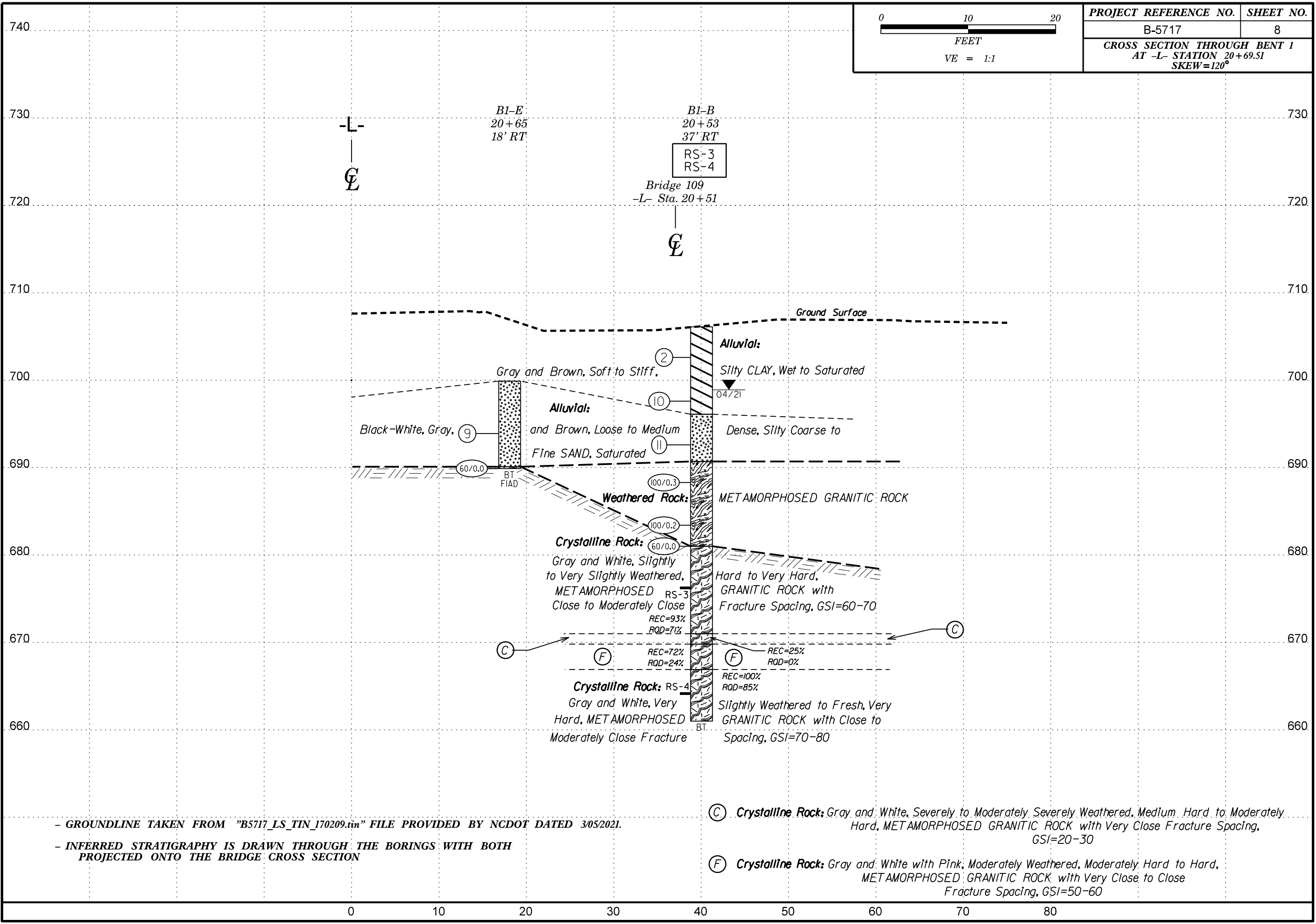


- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

- (B) **Residual:** Black and White, Medium Dense, Silty Coarse to Fine SAND, Moist to Saturated
- (D) **Weathered Rock:** METAMORPHOSED DIORITE
- (E) **Crystalline Rock:** Dark Gray, Slightly Weathered, Moderately Hard, METAMORPHOSED DIORITE with Close to Very Close Fracture Spacing, GSI=45-55

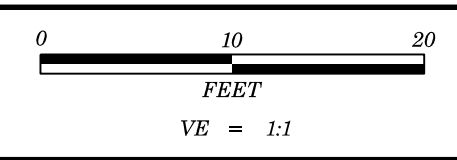


PROJECT REFERENCE NO.	SHEET NO.
B-5717	8
CROSS SECTION THROUGH BENT 1 AT -L- STATION 20+69.51 SKEW=120°	

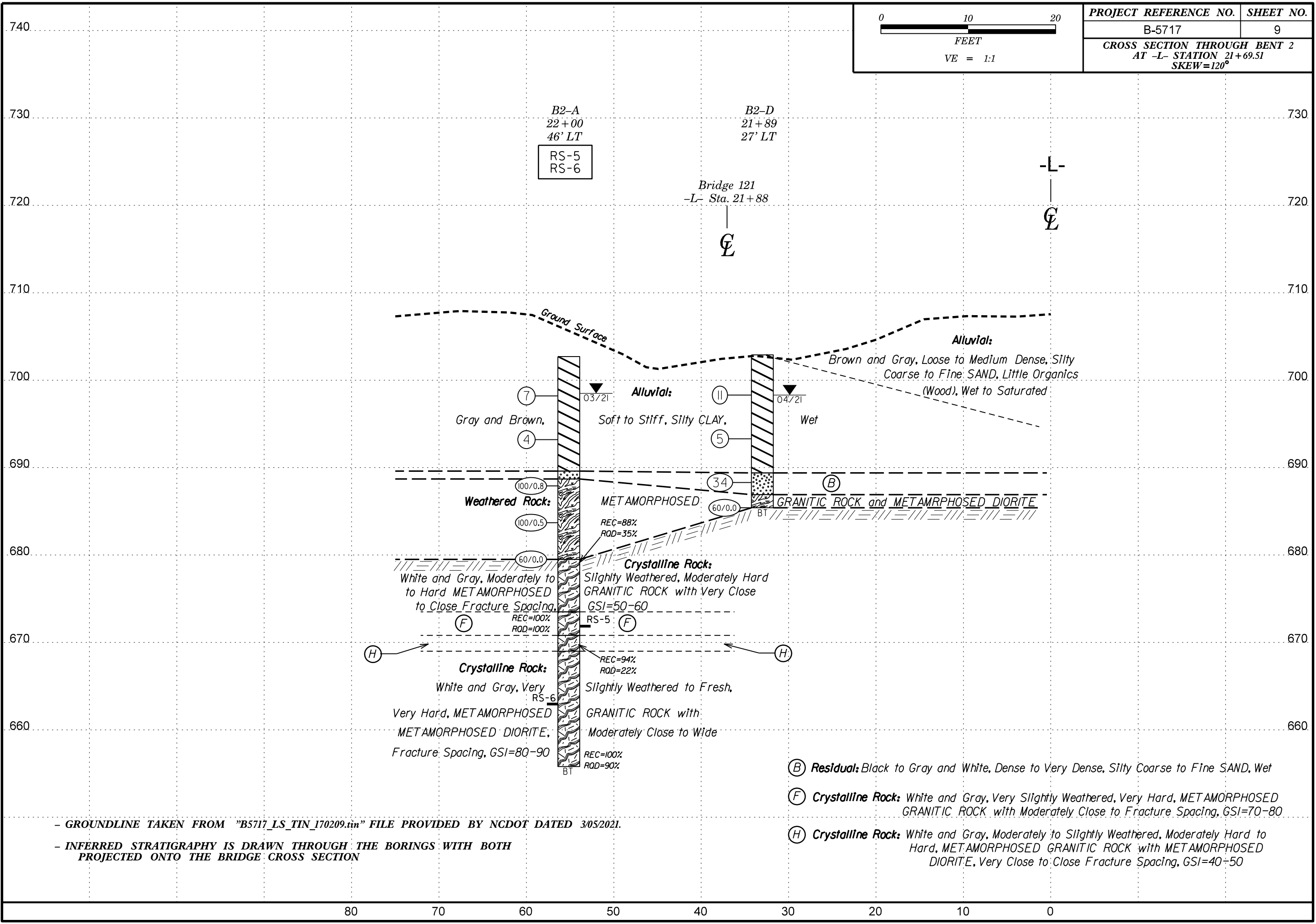


- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

(C) **Crystalline Rock:** Gray and White, Severely to Moderately Severely Weathered, Medium Hard to Moderately Hard, METAMORPHOSED GRANITIC ROCK with Very Close Fracture Spacing, GSI=20-30
 (F) **Crystalline Rock:** Gray and White with Pink, Moderately Weathered, Moderately Hard to Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing, GSI=50-60



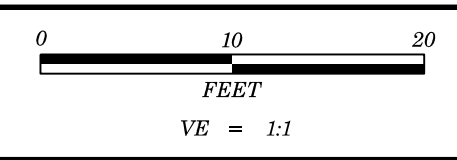
PROJECT REFERENCE NO.	SHEET NO.
B-5717	9
CROSS SECTION THROUGH BENT 2	
AT -L- STATION 21+69.51	
SKEW=120°	



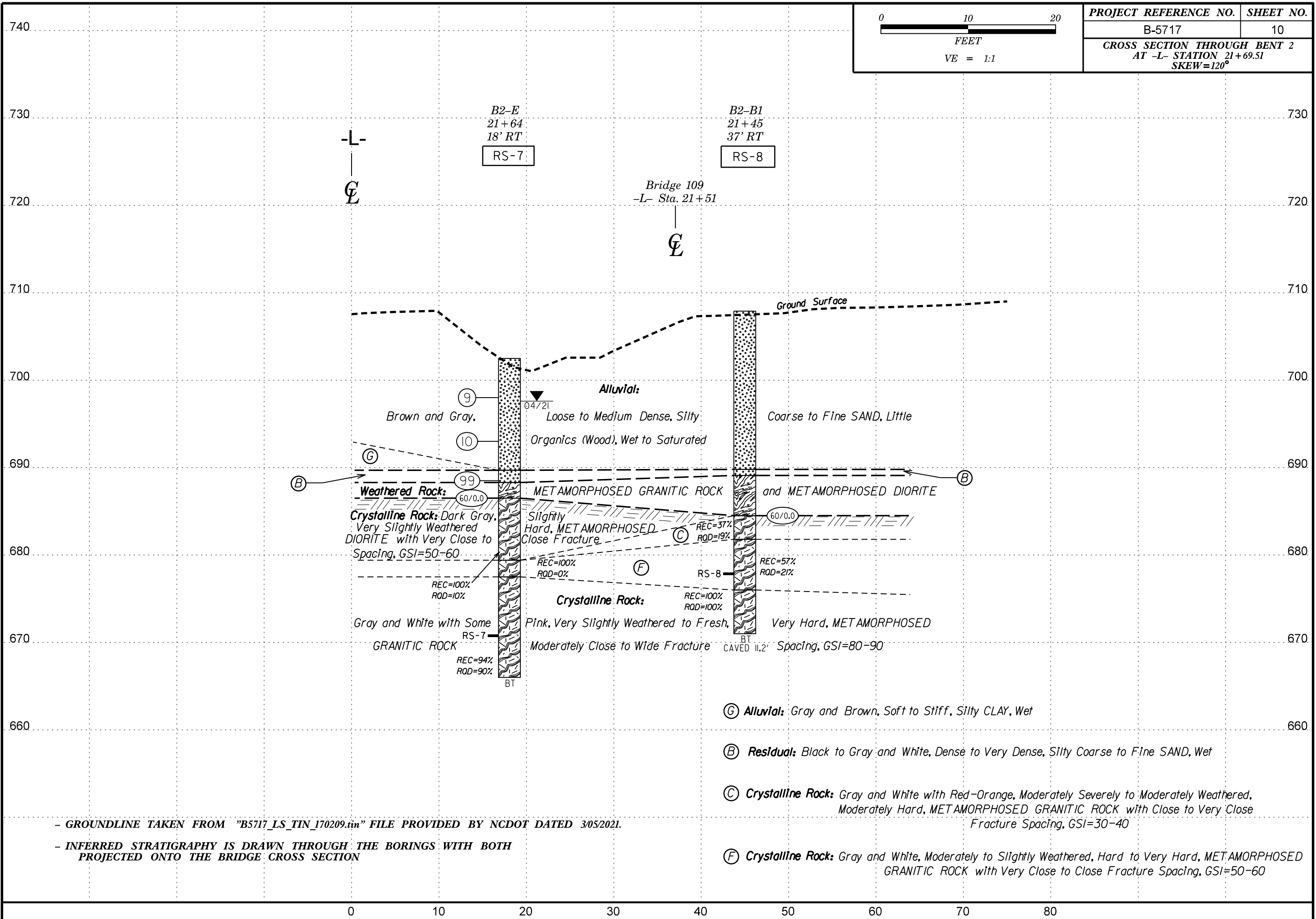
- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.

- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

80 70 60 50 40 30 20 10 0

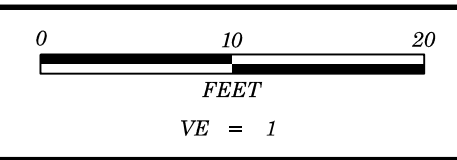


PROJECT REFERENCE NO.	SHEET NO.
B-5717	10
CROSS SECTION THROUGH BENT 2	
AT -L- STATION 21+69.51	
SKEW=120°	

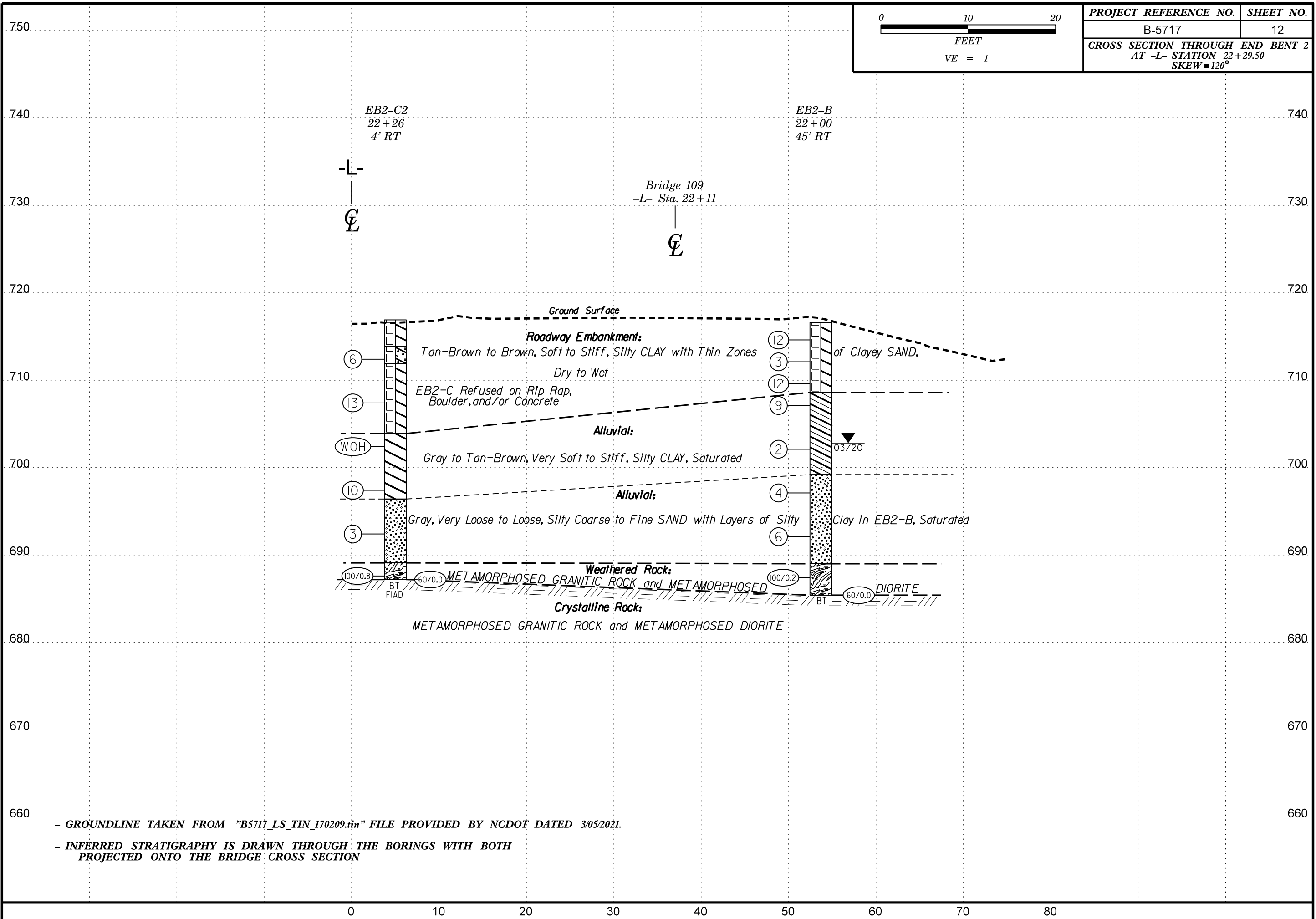


- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

- Ⓒ Alluvial: Gray and Brown, Soft to Stiff, Silty CLAY, Wet
- Ⓑ Residual: Black to Gray and White, Dense to Very Dense, Silty Coarse to Fine SAND, Wet
- Ⓒ Crystalline Rock: Gray and White with Red-Orange, Moderately Severely to Moderately Weathered, Moderately Hard, METAMORPHOSED GRANITIC ROCK with Close to Very Close Fracture Spacing, GSI=30-40
- Ⓔ Crystalline Rock: Gray and White, Moderately to Slightly Weathered, Hard to Very Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing, GSI=50-60



PROJECT REFERENCE NO.	SHEET NO.
B-5717	12
CROSS SECTION THROUGH END BENT 2 AT -L- STATION 22+29.50 SKEW=120°	



- GROUNDLINE TAKEN FROM "B5717_LS_TIN_170209.tin" FILE PROVIDED BY NCDOT DATED 3/05/2021.
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

GEOTECHNICAL BORING REPORT BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.									
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)								
BORING NO. B1-A		STATION 21+01		OFFSET 46 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 705.8 ft		TOTAL DEPTH 46.0 ft		NORTHING 839,128		EASTING 1,781,480									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 03/29/21		COMP. DATE 03/30/21		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		
			0.5ft	0.5ft	0.5ft	0	25	50	75				100	ELEV. (ft)	DEPTH (ft)
710														705.8	0.0
705															
700	700.7	5.1	4	6	8										
695	695.7	10.1	3	3	7										
690	690.7	15.1	8	12	14										
685	686.2	19.6	60/0.0												
680															
675															
670															
665															
660															

NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

GEOTECHNICAL BORING REPORT CORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.						
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)					
BORING NO. B1-A		STATION 21+01		OFFSET 46 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 705.8 ft		TOTAL DEPTH 46.0 ft		NORTHING 839,128		EASTING 1,781,480						
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER Toothman, R.		START DATE 03/29/21		COMP. DATE 03/30/21		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 26.4 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) %			
686.2	686.2	19.6	1.4	2:15/0.4	(0.5)	(0.0)		(1.7)	(0.0)		Begin Coring @ 19.6 ft	19.6
685	684.8	21.0	5.0	5:01/1.0	36%	0%		65%	0%		CRYSTALLINE ROCK	22.2
				8:04/1.0	(4.8)	(3.3)	RS-1	(17.7)	(15.0)		Dark Gray, Slightly Weathered, Moderately Hard, METAMORPHOSED DIORITE with Close to Very Close Fracture Spacing	
				4:35/1.0	96%	66%		92%	78%		Abundant low and high angle fractures	
680	679.8	26.0	5.0	4:20/1.0							Gray and White with Some Pink, Slightly to Very Slightly Weathered, Hard to Very Hard, METAMORPHOSED GRANITIC ROCK with Close to Moderately Close Fracture Spacing	
				5:03/1.0							GS=45 to 55	
				4:58/1.0	(4.7)	(4.6)					GS=60 to 70	
				4:44/1.0	94%	92%					Joints range from 0 degrees to 90 degrees with isolated iron staining	
675	674.8	31.0	5.0	5:06/1.0	(5.0)	(5.0)					Note: Low RQD in run no. 5 due to numerous high angle fractures	
				5:19/1.0	100%	100%						
				6:57/1.0								
670	669.8	36.0	5.0	6:19/1.0	(4.7)	(2.4)						
				6:23/1.0	94%	48%						
				4:39/1.0								
665	664.8	41.0	5.0	4:38/1.0	(4.2)	(4.2)	RS-2	(4.5)	(4.5)		Gray and White, Fresh, Very Hard, METAMORPHOSED GRANITIC ROCK with Moderately Close Fracture Spacing	41.5
				8:10/1.0	84%	84%		100%	100%		Two joints at 10 degrees	
				4:33/1.0							GS=80-90	
660	659.8	46.0	5.0	3:34/1.0							Note: Last 0.8 feet of core could not be retrieved from the borehole	46.0
				3:23/1.0							Boring Terminated at Elevation 659.8 ft in Crystalline Rock: METAMORPHOSED GRANITIC ROCK	
				4:00/1.0								

NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

CORE PHOTOGRAPHS

B1-A

BOX 1 & 2: 19.6 - 37.3 FEET

18.0

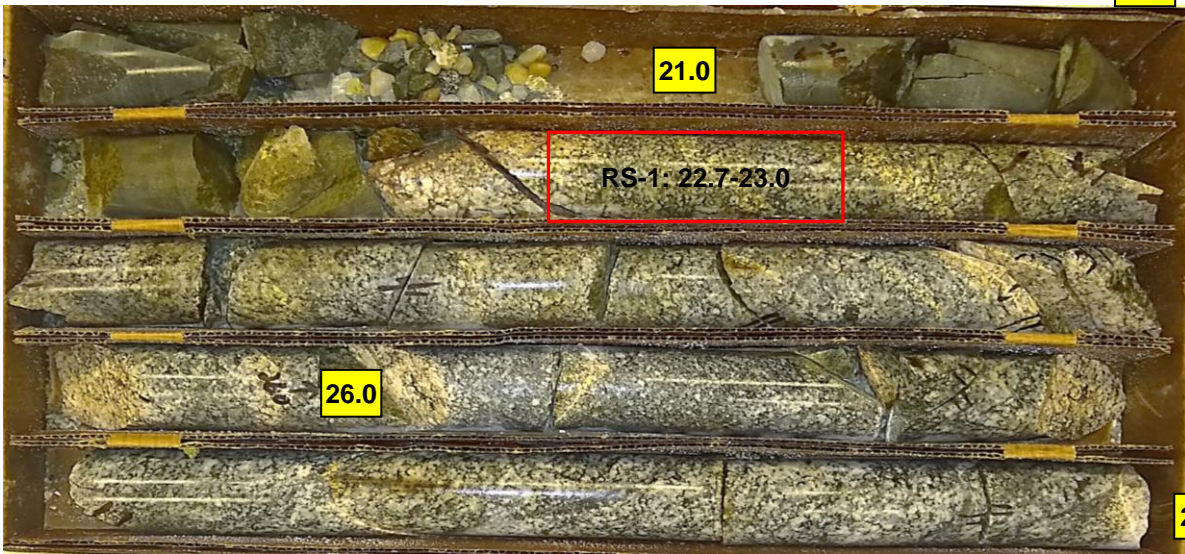
19.6

21.0

RS-1: 22.7-23.0

26.0

29.0



B1-A

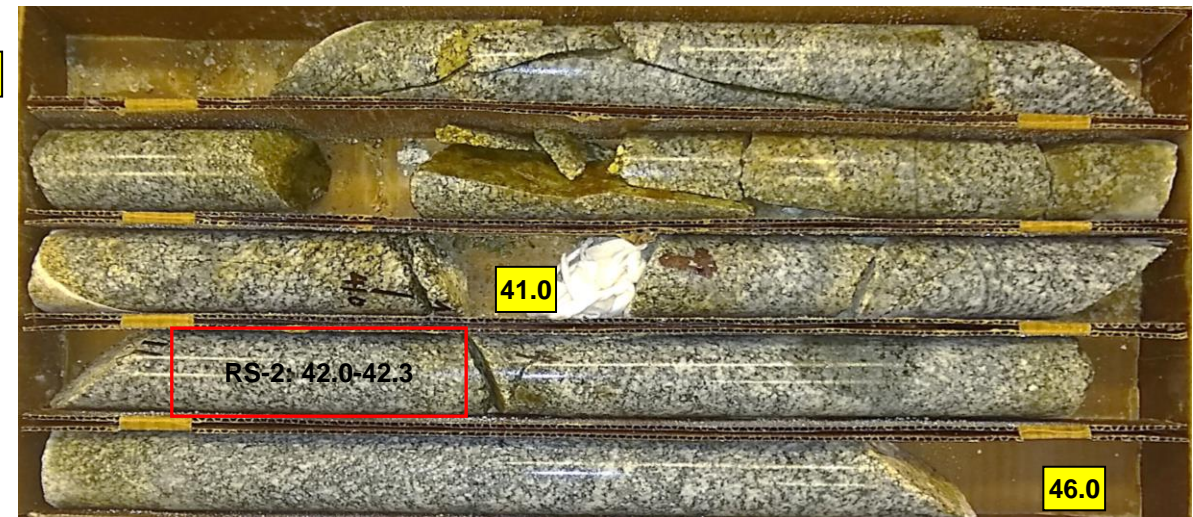
BOX 3: 37.3 - 46.0 FEET

37.3

41.0

RS-2: 42.0-42.3

46.0

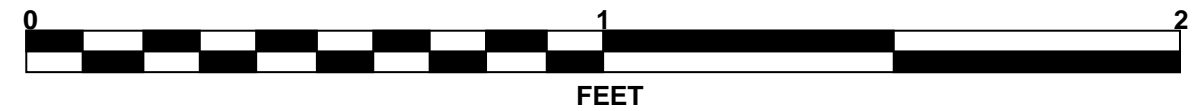
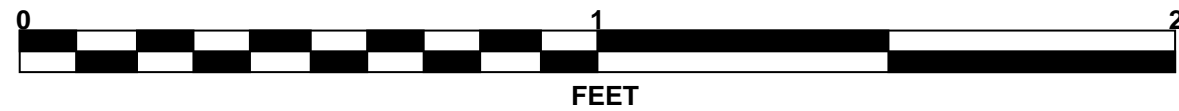


29.0

31.0

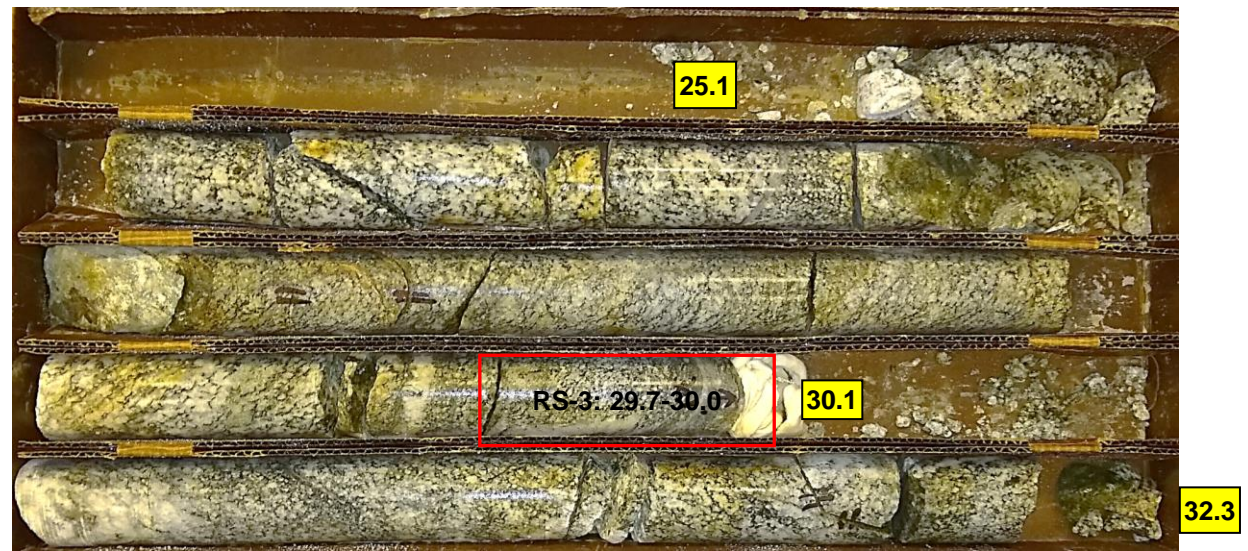
36.0

37.3

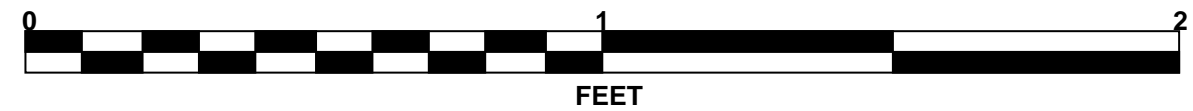
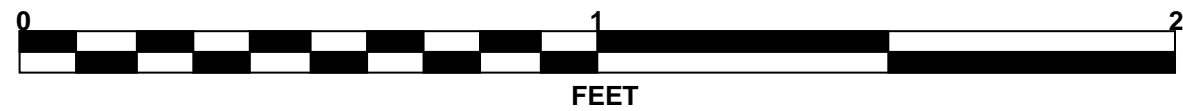
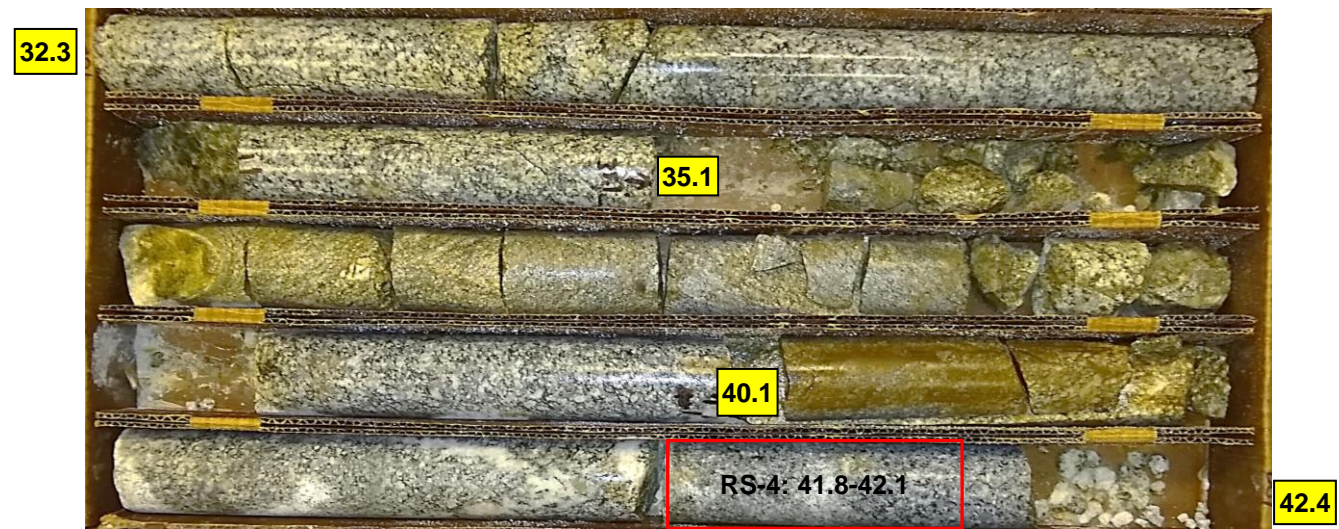
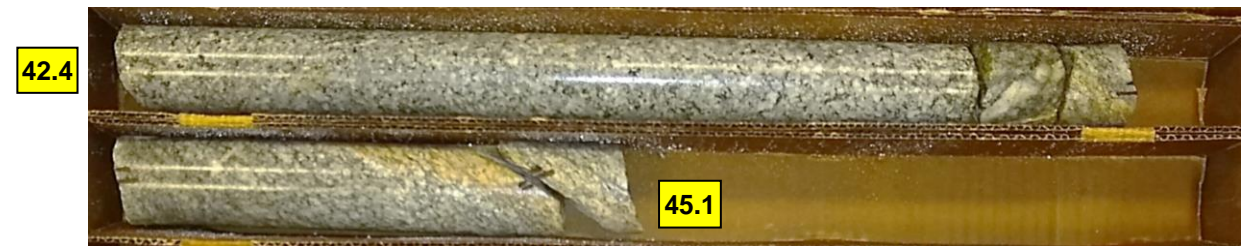


CORE PHOTOGRAPHS

B1-B
BOX 1 & 2: 25.1 - 42.4 FEET

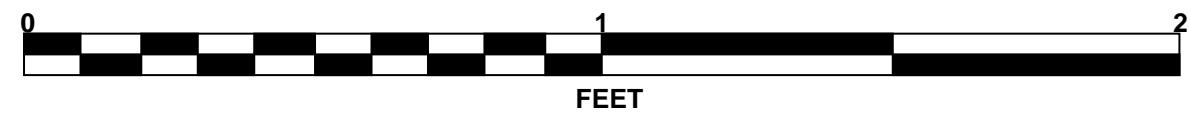
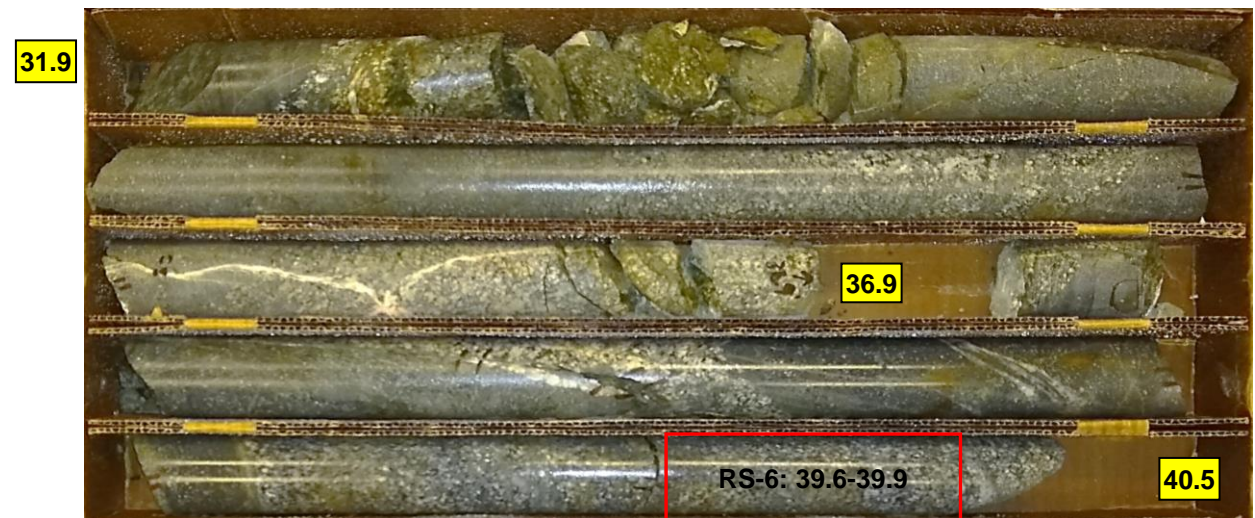


B1-B
BOX 3: 42.4 - 45.1 FEET

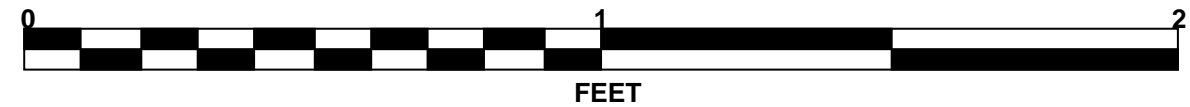
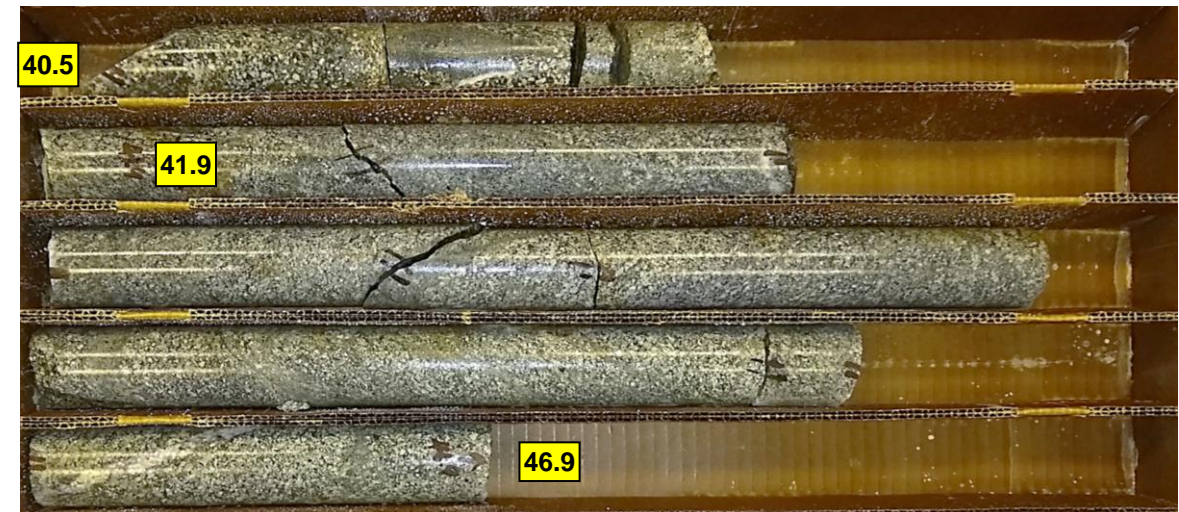


CORE PHOTOGRAPHS

B2-A
BOX 1 & 2: 23.2 - 40.5 FEET



B2-A
BOX 3: 40.5 - 46.9 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.											
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)										
BORING NO. B2-D		STATION 21+89		OFFSET 27 ft LT		ALIGNMENT -L-	0 HR. N/A										
COLLAR ELEV. 702.9 ft		TOTAL DEPTH 17.5 ft		NORTHING 839,083		EASTING 1,781,558	24 HR. 4.6										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 03/30/21		COMP. DATE 03/31/21		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)			
705																	
														702.9	GROUND SURFACE	0.0	
700	699.3	3.6	2	6	5										ALLUVIAL Gray and Brown, Silty CLAY		
695	694.3	8.6	1	2	3												
690	689.3	13.6	9	13	21												
	685.4	17.5	60/0.0														
														689.4	RESIDUAL	13.5	
														686.9	Black and White, Silty Coarse to Fine SAND	16.0	
														685.4	WEATHERED ROCK METAMORPHOSED GRANITIC ROCK	17.5	
															Boring Terminated with Standard Penetration Test Refusal at Elevation 685.4 ft on Crystalline Rock: METAMORPHOSED GRANITIC ROCK		

NCDOT BORE DOUBLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

GEOTECHNICAL BORING REPORT BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Weaver, P.M.										
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)									
BORING NO. B2-E		STATION 21+64		OFFSET 18 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 702.5 ft		TOTAL DEPTH 36.5 ft		NORTHING 839,048		EASTING 1,781,521										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic										
DRILLER Toothman, R.		START DATE 04/13/21		COMP. DATE 04/14/21		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			
			0.5ft	0.5ft	0.5ft	0	25	50	75				100	ELEV. (ft)	DEPTH (ft)	
705														702.5	0.0	GROUND SURFACE
700	699.0	3.5	4	4	5											ALLUVIAL Brown to Light Gray, Silty Coarse to Fine SAND Note: 2.4' of Rip Rap with Sand Was Hand Cleared Before Drilling Began
695	694.0	8.5	2	4	6											
690	689.0	13.5	26	26	73											RESIDUAL Gray with White, Silty Coarse to Fine SAND
685	686.5	16.0	60/0.0													WEATHERED ROCK METAMORPHOSED DIORITE
680																CRYSTALLINE ROCK Dark Gray, Slightly to Very Slightly Weathered, Hard, METAMORPHOSED DIORITE with Very Close to Close Fracture Spacing
675																Gray and White, Moderately to Slightly Weathered, Hard to Very Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing
670																Gray and White, Fresh, Very Hard, METAMORPHOSED GRANITIC ROCK with Moderately Close to Wide Fracture Spacing
																Boring Terminated at Elevation 666.0 ft in Crystalline Rock: METAMORPHOSED GRANITIC ROCK

NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 6/8/21

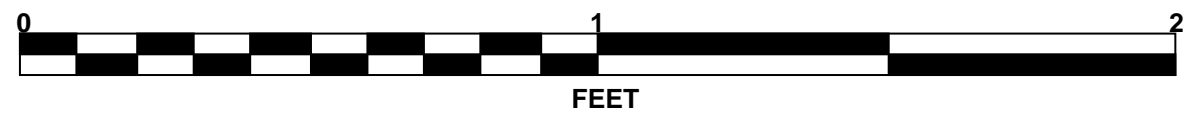
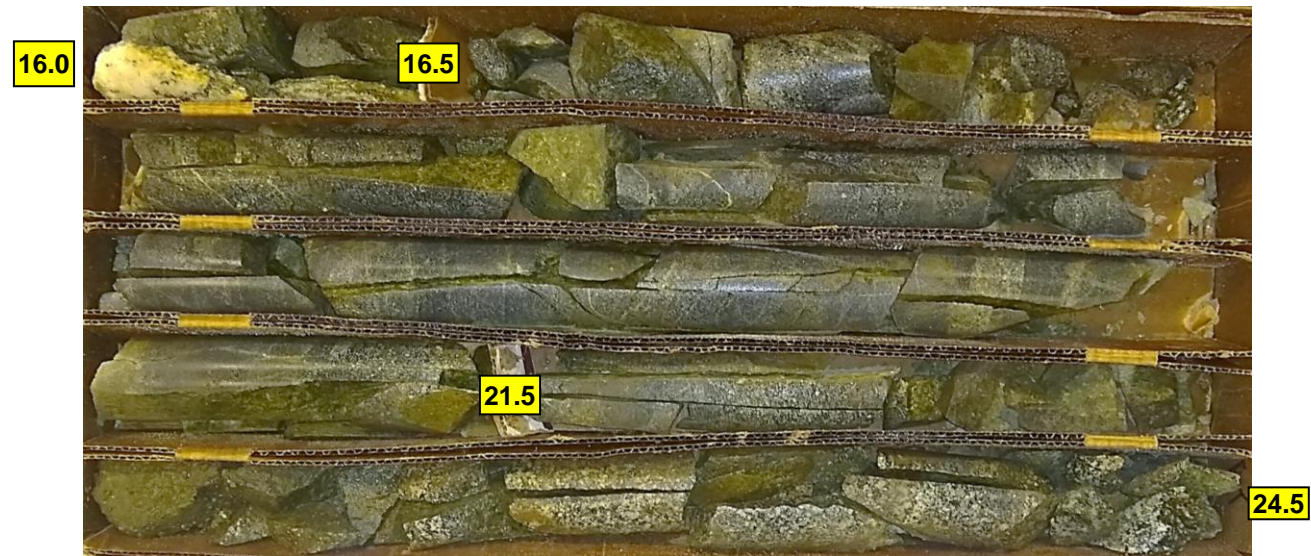
GEOTECHNICAL BORING REPORT CORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Weaver, P.M.						
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)					
BORING NO. B2-E		STATION 21+64		OFFSET 18 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 702.5 ft		TOTAL DEPTH 36.5 ft		NORTHING 839,048		EASTING 1,781,521						
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic						
DRILLER Toothman, R.		START DATE 04/13/21		COMP. DATE 04/14/21		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 20.5 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) %			
686.5	686.5	16.0	0.5	4:31/0.5	(0.5)	(0.0)		(7.1)	(0.7)		Begin Coring @ 16.0 ft	
685	686.0	16.5	5.0	2:07/1.0 2:14/1.0 3:09/1.0 2:58/1.0 3:21/1.0	100%	0%		100%	10%		CRYSTALLINE ROCK Dark Gray, Slightly to Very Slightly Weathered, Hard, METAMORPHOSED DIORITE with Very Close to Close Fracture Spacing Near vertical to vertical fractures throughout with light iron and epidote infilling of some fractures GSI=50-60	16.0
680	681.0	21.5	5.0	3:01/1.0 2:55/1.0 3:28/1.0 3:06/1.0 2:45/1.0	(5.0)	(1.1)		(1.9)	(0.0)			23.1
675	676.0	26.5	5.0	2:53/1.0 3:37/1.0 4:11/1.0 4:35/1.0 5:03/1.0	100%	22%		100%	0%			25.0
670	671.0	31.5	5.0	2:04/1.0 2:55/1.0 4:16/1.0 5:23/1.0 7:01/1.0	(4.3)	(4.2)	RS-7	(10.8)	(10.3)	94%	90%	
	666.0	36.5										36.5
Boring Terminated at Elevation 666.0 ft in Crystalline Rock: METAMORPHOSED GRANITIC ROCK												

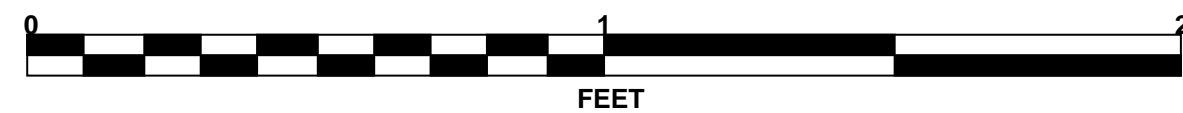
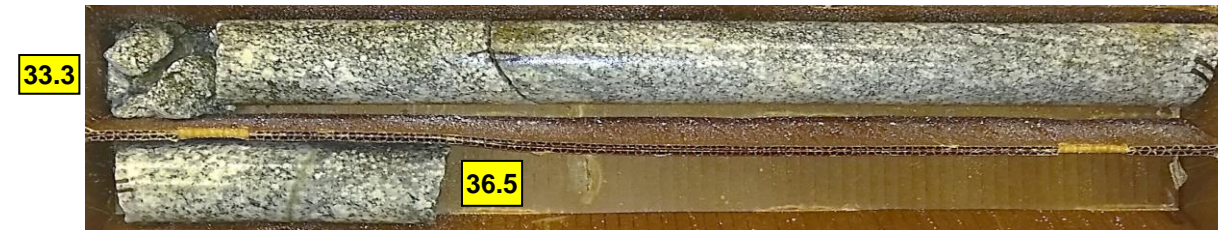
NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 6/8/21

CORE PHOTOGRAPHS

B2-E
BOX 1 & 2: 16.0 - 33.3 FEET



B2-E
BOX 3: 33.3 - 36.5 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.										
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)									
BORING NO. B2-B		STATION 21+49		OFFSET 37 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 707.6 ft		TOTAL DEPTH 23.7 ft		NORTHING 839,034		EASTING 1,781,501										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Toothman, R.		START DATE 04/01/21		COMP. DATE 04/01/21		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)		
710														707.6	0.0	GROUND SURFACE
705	704.1	3.5	11	3	2	5						W				ALLUVIAL Gray, Silty Coarse to Fine SAND, Little Organics (Wood) Note: Blow count influenced by wood piece(s)
700	699.1	8.5	4	4	6	10						Sat.				
695	694.1	13.5	3	3	3	6						Sat.				
690	689.1	18.5	6	17	100/0.4								689.5	18.1		RESIDUAL
685	684.1	23.5	100/0.2										688.1	19.5		Black and White, Silty Coarse to Fine SAND
													683.9	23.7		WEATHERED ROCK METAMORPHOSED GRANITIC ROCK
Boring Terminated at Elevation 683.9 ft in Weathered Rock: METAMORPHOSED GRANITIC ROCK Caved In at 6.2 feet Note: Casing advancer fell off and blocked hole. Boring was offset 5 feet downstation with offset boring (B2-B1) advanced to 23.4 feet at which point coring was commenced.																

NCDOT BORE DOUBLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 6/9/21

GEOTECHNICAL BORING REPORT BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.											
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)										
BORING NO. B2-B1		STATION 21+45		OFFSET 37 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 707.9 ft		TOTAL DEPTH 36.9 ft		NORTHING 839,035		EASTING 1,781,497											
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic													
DRILLER Gonzales, L.		START DATE 04/02/21		COMP. DATE 04/05/21		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							
710															707.9	GROUND SURFACE	0.0
705																ALLUVIAL Gray, Silty Coarse to Fine SAND, Little Organics (Wood) Note: Blow count influenced by wood piece(s)	
700																	
695																	
690																	
685	684.5	23.4													689.8 689.1	RESIDUAL Black and White, Silty Coarse to Fine SAND	18.1 18.8
680															684.5	WEATHERED ROCK METAMORPHOSED GRANITIC ROCK	23.4
675															681.8	CRYSTALLINE ROCK Gray and White with Red-Orange, Moderately Severely to Moderately Weathered, Moderately Hard, METAMORPHOSED GRANITIC ROCK with Close to Very Close Fracture Spacing	26.1
															676.0	CRYSTALLINE ROCK Gray and White, Moderately to Slightly Weathered, Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing	31.9
															671.0	CRYSTALLINE ROCK Gray and White with Some Pink, Very Slightly Weathered to Fresh, Very Hard, METAMORPHOSED GRANITIC ROCK with Moderately Close to Wide Fracture Spacing Boring Terminated at Elevation 671.0 ft in Crystalline Rock: METAMORPHOSED GRANITIC ROCK Caved In at 11.2 feet	36.9
Note: Core barrel became stuck in hole. Drill crew afraid to core deeper and issue continue. B2-E was cored to get 10 feet of sound rock along this bent of the bridge.																	

NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

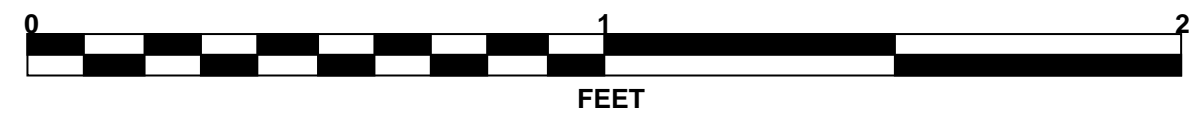
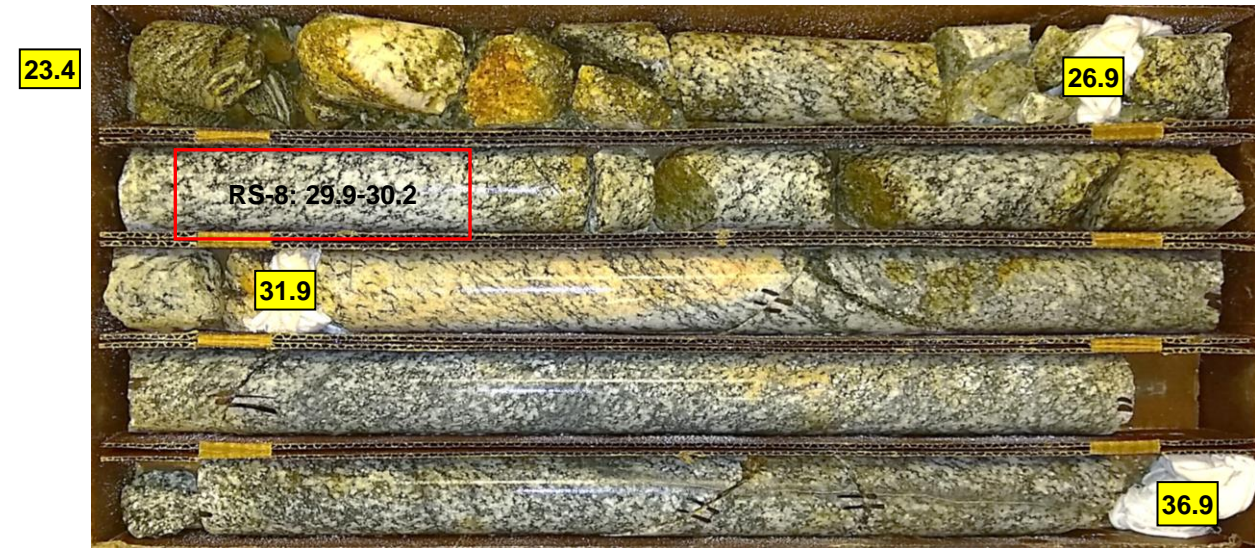
GEOTECHNICAL BORING REPORT CORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.					
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)				
BORING NO. B2-B1		STATION 21+45		OFFSET 37 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 707.9 ft		TOTAL DEPTH 36.9 ft		NORTHING 839,035		EASTING 1,781,497					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic							
DRILLER Gonzales, L.		START DATE 04/02/21		COMP. DATE 04/05/21		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 13.5 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (ft)	REC. (ft)	RQD (ft)			
684.5	684.5	23.4	3.5	59/0.5 1:26/1.0 4:09/1.0 6:26/1.0	(1.8) 51%	(0.5) 14%	(1.0) 37%	(0.5) 19%		Begin Coring @ 23.4 ft	23.4
680	681.0	26.9	5.0	2:46/1.0 2:25/1.0 1:33/1.0 3:42/1.0	(2.5) 50%	(1.2) 24%	(3.3) 57%	(1.2) 21%		Gray and White with Red-Orange, Moderately Severely to Moderately Weathered, Moderately Hard, METAMORPHOSED GRANITIC ROCK with Close to Very Close Fracture Spacing Majority of core is very broken GSI=30-40	26.1
675	676.0	31.9	5.0	4:35/1.0 4:52/1.0 3:05/1.0 3:04/1.0 3:40/1.0	(5.0) 100%	(5.0) 100%	(5.0) 100%	(5.0) 100%	RS-8	CRYSTALLINE ROCK Gray and White, Moderately to Slightly Weathered, Hard, METAMORPHOSED GRANITIC ROCK with Very Close to Close Fracture Spacing Joints generally at 10 degrees to 30 degrees GSI=50-60	31.9
	671.0	36.9								CRYSTALLINE ROCK Gray and White with Some Pink, Very Slightly Weathered to Fresh, Very Hard, METAMORPHOSED GRANITIC ROCK with Moderately Close to Wide Fracture Spacing One joint at 45 degrees GSI=80-90 Boring Terminated at Elevation 671.0 ft in Crystalline Rock: METAMORPHOSED GRANITIC ROCK Caved In at 11.2 feet	36.9

NCDOT BORE SINGLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

CORE PHOTOGRAPHS

B2-B1 BOX 1: 23.4 - 36.9 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.									
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 22+55		OFFSET 50 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 716.9 ft		TOTAL DEPTH 28.6 ft		NORTHING 839,086		EASTING 1,781,628									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Gonzales, L.		START DATE 03/09/20		COMP. DATE 03/09/20		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)
720															
715	715.9	1.0	13	8	7								D	716.9 716.1	0.0 0.8
	713.4	3.5	5	5	6								D	ROADWAY EMBANKMENT 0.8' Asphalt	
	710.9	6.0	3	3	3								D	ROADWAY EMBANKMENT Brown to Dark Gray, Sandy CLAY, Trace Gravel	
710	708.4	8.5	2	3	2								SS-8	17%	
	703.4	13.5	1	2	2								M		
705	703.4	13.5	1	2	2								M	705.2	11.7
	698.4	18.5	5	5	3								W	699.4	17.5
	693.4	23.5	2	1	1								Sat.		
690	688.4	28.5	60/0.0											688.7 688.3	28.2 28.6
														CRYSTALLINE ROCK METAMORPHOSED DIORITE Boring Terminated with Standard Penetration Test Refusal at Elevation 688.3 ft in Cystalline Rock: METAMORPHOSED DIORITE	

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.									
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)								
BORING NO. EB2-C		STATION 22+29		OFFSET 2 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 716.6 ft		TOTAL DEPTH 4.5 ft		NORTHING 839,048		EASTING 1,781,589									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Gonzales, L.		START DATE 03/11/20		COMP. DATE 03/11/20		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)
720															
715	715.6	1.0	4	4	5								D	716.6	0.0
	713.1	3.5	4	4	60/0.0								D	ROADWAY EMBANKMENT Tan-Brown to Brown, Silty CLAY	
														712.1	4.5
														Boring Terminated with Standard Penetration Test Refusal at Elevation 712.1 ft in Roadway Embankment: Rip Rap and/or Boulders and/or Concrete	

NCDOT BORE DOUBLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 6/8/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.	
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)
BORING NO. EB2-C1		STATION 22+44		OFFSET 5 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 715.5 ft		TOTAL DEPTH 28.5 ft		NORTHING 839,046		EASTING 1,781,604	
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic	
DRILLER Gonzales, L.		START DATE 03/11/20		COMP. DATE 03/11/20		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					
720															
715														715.5	GROUND SURFACE
															ROADWAY EMBANKMENT Tan-Brown to Brown to Dark Gray, Silty CLAY
710	712.0	3.5	3	5	4									710.3	ALLUVIAL Dark Gray to Gray, Silty CLAY, Trace Organics (Wood Fragments)
	709.5	6.0	3	3	3										
	707.0	8.5	2	1	1										
	702.0	13.5	2	2	2										
	697.0	18.5	2	1	1									698.0	Gray, Silty SAND
	692.0	23.5	1	1	2										
	687.0	28.5												687.6	WEATHERED ROCK METAMORPHOSED DIORITE Boring Terminated with Standard Penetration Test Refusal at Elevation 687.0 ft on Crystalline Rock: METAMORPHOSED DIORITE

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Weaver, P.M.	
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)
BORING NO. EB2-C2		STATION 22+26		OFFSET 4 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 716.9 ft		TOTAL DEPTH 29.7 ft		NORTHING 839,043		EASTING 1,781,584	
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER Toothman, R.		START DATE 04/15/21		COMP. DATE 04/15/21		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					
720															
715														716.9	GROUND SURFACE
															ROADWAY EMBANKMENT Tan-Brown to Brown, Silty CLAY
	713.4	3.5	4	3	3									713.9	Tan and Brown, Clayey Coarse to Fine SAND with Concrete Pieces
														711.9	Dark Gray, Silty CLAY Note: Hard layer from 5.0'-5.2'
	708.4	8.5	3	6	7										
	703.4	13.5	WOH	WOH	WOH									703.9	ALLUVIAL Gray to Light Gray, Silty CLAY
	698.4	18.5	2	5	5										
	693.4	23.5	2	2	1									696.4	Gray, Silty Coarse to Fine SAND
	688.4	28.5	12	88/0.3										689.1	WEATHERED ROCK METAMORPHOSED DIORITE
	687.2	29.7												687.2	Boring Terminated with Standard Penetration Test Refusal at Elevation 687.2 ft on Crystalline Rock: METAMORPHOSED GRANITIC ROCK

NCDOT BORE DOUBLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45673.1.2		TIP B-5717		COUNTY GUILFORD		GEOLOGIST Pastrana, C.R.										
SITE DESCRIPTION Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 22+00		OFFSET 45 ft RT		ALIGNMENT -L-	0 HR. 19.8									
COLLAR ELEV. 716.6 ft		TOTAL DEPTH 31.2 ft		NORTHING 839,011		EASTING 1,781,547	24 HR. 13.8									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 93% 11/18/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Gonzales, L.		START DATE 03/11/20		COMP. DATE 03/11/20		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)		
720																
715	715.6	1.0	6	7	5									716.6	0.0	GROUND SURFACE
	713.1	3.5	1	1	2											ROADWAY EMBANKMENT Tan-Brown to Brown, Silty CLAY, Trace Gravel
710	710.6	6.0	10	6	6											
	708.1	8.5	3	3	6											ALLUVIAL Dark Gray to Gray to Tan-Brown, Sandy CLAY
705																
	703.1	13.5	2	1	1											
700																
	698.1	18.5	2	2	2									699.2	17.4	Dark Gray, Silty SAND, with Layers of Silty CLAY
695																
	693.1	23.5	3	2	4											
690																
	688.1	28.5	41	59/0.2										689.0	27.6	WEATHERED ROCK METAMORPHOSED DIORITE
	685.4	31.2	60/0.0											685.4	31.2	Boring Terminated with Standard Penetration Test Refusal at Elevation 685.4 ft on Crystalline Rock: METAMORPHOSED DIORITE

NCDOT BORE DOUBLE B5717_BRDG_109_121.GPJ NC_DOT.GDT 5/10/21

SOILS LABORATORY TESTS RESULTS


WBS NO.: 45673.1.2

TIP NO.: B-5717

COUNTY: Guilford

SITE DESCRIPTION: Replace Bridges 109 and 121 on SR 4240 (E. Gate City Blvd.) over South Buffalo Creek

BORING NO.	SAMPLE NO.	BORING LOCATION	DEPTH INTERVAL (FT)	AASHTO CLASS	N	L.L	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
								CSE. SAND	F. SAND	SILT	CLAY	10	40	200		
EB1-A	SS-5	-L- STA. 20+28, 49' LT	3.5-5.0	A-7-6 (9)	6	41	23	23	21	40	16	88	77	53	23.7	-
EB1-C	SS-6	-L- STA. 20+02, 4' LT	1.0-2.5	A-7-6 (16)	6	49	27	17	21	44	18	98	89	65	24.3	-
EB1-B	SS-7	-L- STA. 19+80, 35' RT	13.5-15.0	A-6 (8)	5	28	13	1	29	55	15	100	100	81	21.6	-
EB2-A	SS-8	-L- STA. 22+55, 50' LT	6.0-7.5	A-6 (2)	6	28	12	25	31	35	9	92	81	46	17.2	-
EB2-C1	SS-9	-L- STA. 22+44, 5' LT	18.5-20.0	A-2-4 (0)	2	NP	NP	50	34	7	9	97	77	18	-	-
EB2-B	SS-10	-L- STA. 22+00, 45' RT	8.5-10.0	A-6 (4)	9	33	12	18	30	44	8	92	84	54	21.8	-


 Certification No. 121-01-1108



UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-001

Boring No.: B1-A
 Depth (ft): 22.7-23.0
 Sample ID: RS-1
 Moisture Condition: As received

Specimen Weight (g): 638.93

SPECIMEN LENGTH (in)

Reading 1: 4.69
 Reading 2: 4.70
 Reading 3: 4.70
Average: 4.70

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.08
 L/D: 2.37

MOISTURE CONTENT

Tare Number: X-11
 Wt. of Tare & Wet Sample (g): 757.64
 Wt. of Tare & Dry Sample (g): 756.97
 Weight of Tare (g): 142.71
 Weight of Wet Sample (g): 614.93
 Sample Volume (cm³): 236.95
 Moisture Content (%): 0.11
 Unit Wet Weight (g/cm³): 2.697
 Unit Wet Weight (pcf): 168.3
Unit Dry Weight (g/cm³): 2.694
Unit Dry Weight (pcf): 168.1

Total Load (lb): 32,140
Uniaxial Compressive Strength (psi): 10,440

Fracture Type: **Shear**

Rate of Loading (lb/sec): 238
 Time to Break (min:sec): 2:15.00
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-002

Boring No.: B1-A
 Depth (ft): 42.0-42.3
 Sample ID: RS-2
 Moisture Condition: As received

Specimen Weight (g): 657.69

SPECIMEN LENGTH (in)

Reading 1: 4.81
 Reading 2: 4.81
 Reading 3: 4.82
Average: 4.81

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.09
 L/D: 2.43

MOISTURE CONTENT

Tare Number: SS-4
 Wt. of Tare & Wet Sample (g): 720.45
 Wt. of Tare & Dry Sample (g): 719.93
 Weight of Tare (g): 99.29
 Weight of Wet Sample (g): 621.16
 Sample Volume (cm³): 243.43
 Moisture Content (%): 0.08
 Unit Wet Weight (g/cm³): 2.702
 Unit Wet Weight (pcf): 168.6
Unit Dry Weight (g/cm³): 2.700
Unit Dry Weight (pcf): 168.4

Total Load (lb): 43,960
Uniaxial Compressive Strength (psi): 14,240

Fracture Type: **Shear**

Rate of Loading (lb/sec): 253
 Time to Break (min:sec): 2:53.46
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21



UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-003

Boring No.: B1-B
 Depth (ft): 29.7-30.0
 Sample ID: RS-3
 Moisture Condition: As received

Specimen Weight (g): 581.80

SPECIMEN LENGTH (in)

Reading 1: 4.31
 Reading 2: 4.31
 Reading 3: 4.31
Average: 4.31

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.09
 L/D: 2.17

MOISTURE CONTENT

Tare Number: TB-04
 Wt. of Tare & Wet Sample (g): 713.83
 Wt. of Tare & Dry Sample (g): 712.95
 Weight of Tare (g): 134.67
 Weight of Wet Sample (g): 579.16
 Sample Volume (cm³): 218.04
 Moisture Content (%): 0.15
 Unit Wet Weight (g/cm³): 2.668
 Unit Wet Weight (pcf): 166.5
Unit Dry Weight (g/cm³): 2.664
Unit Dry Weight (pcf): 166.3

Total Load (lb): 23,540
Uniaxial Compressive Strength (psi): 7,630

Fracture Type: **Shear**

Rate of Loading (lb/sec): 266
 Time to Break (min:sec): 1:28.50
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-004

Boring No.: B1-B
 Depth (ft): 41.8-42.1
 Sample ID: RS-4
 Moisture Condition: As received

Specimen Weight (g): 638.12

SPECIMEN LENGTH (in)

Reading 1: 4.67
 Reading 2: 4.67
 Reading 3: 4.66
Average: 4.67

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.09
 L/D: 2.35

MOISTURE CONTENT

Tare Number: 860
 Wt. of Tare & Wet Sample (g): 755.33
 Wt. of Tare & Dry Sample (g): 754.81
 Weight of Tare (g): 135.14
 Weight of Wet Sample (g): 620.19
 Sample Volume (cm³): 236.42
 Moisture Content (%): 0.08
 Unit Wet Weight (g/cm³): 2.699
 Unit Wet Weight (pcf): 168.4
Unit Dry Weight (g/cm³): 2.697
Unit Dry Weight (pcf): 168.3

Total Load (lb): 32,360
Uniaxial Compressive Strength (psi): 10,470

Fracture Type: **Shear**

Rate of Loading (lb/sec): 200
 Time to Break (min:sec): 2:42.19
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

Physical Description: Gray and White Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21



UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-005

Boring No.: B2-A
 Depth (ft): 30.7-31.0
 Sample ID: RS-5
 Moisture Condition: As received

Specimen Weight (g): 633.92

SPECIMEN LENGTH (in)

Reading 1: 4.45
 Reading 2: 4.44
 Reading 3: 4.44
Average: 4.44

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.08
 L/D: 2.24

MOISTURE CONTENT

Tare Number: X-13
 Wt. of Tare & Wet Sample (g): 749.15
 Wt. of Tare & Dry Sample (g): 748.50
 Weight of Tare (g): 143.38
 Weight of Wet Sample (g): 605.77
 Sample Volume (cm³): 224.35
 Moisture Content (%): 0.11
 Unit Wet Weight (g/cm³): 2.826
 Unit Wet Weight (pcf): 176.3
Unit Dry Weight (g/cm³): 2.823
Unit Dry Weight (pcf): 176.1

Total Load (lb): 23,150
Uniaxial Compressive Strength (psi): 7,510

Fracture Type: **Shear**

Rate of Loading (lb/sec): 225
 Time to Break (min:sec): 1:43.01
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-006

Boring No.: B2-A
 Depth (ft): 39.6-39.9
 Sample ID: RS-6
 Moisture Condition: As received

Specimen Weight (g): 600.08

SPECIMEN LENGTH (in)

Reading 1: 4.06
 Reading 2: 4.06
 Reading 3: 4.06
Average: 4.06

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.08
 L/D: 2.05

MOISTURE CONTENT

Tare Number: X-17
 Wt. of Tare & Wet Sample (g): 691.98
 Wt. of Tare & Dry Sample (g): 691.71
 Weight of Tare (g): 143.50
 Weight of Wet Sample (g): 548.48
 Sample Volume (cm³): 205.17
 Moisture Content (%): 0.05
 Unit Wet Weight (g/cm³): 2.925
 Unit Wet Weight (pcf): 182.5
Unit Dry Weight (g/cm³): 2.923
Unit Dry Weight (pcf): 182.4

Total Load (lb): 29,100
Uniaxial Compressive Strength (psi): 9,440

Fracture Type: **Shear**

Rate of Loading (lb/sec): 190
 Time to Break (min:sec): 2:32.84
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

Physical Description: Dark Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21



UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-007

Boring No.: B2-E
 Depth (ft): 31.6-31.9
 Sample ID: RS-7
 Moisture Condition: As received

Specimen Weight (g): 667.80

SPECIMEN LENGTH (in)

Reading 1: 4.69
 Reading 2: 4.68
 Reading 3: 4.69
Average: 4.69

SPECIMEN DIAMETER (in):

Reading 1: 1.99
 Reading 2: 1.99
 Average: **1.99**
 Area (in²): 3.10
 L/D: 2.36

MOISTURE CONTENT

Tare Number: X-5
 Wt. of Tare & Wet Sample (g): 809.02
 Wt. of Tare & Dry Sample (g): 808.35
 Weight of Tare (g): 143.44
 Weight of Wet Sample (g): 665.58
 Sample Volume (cm³): 238.10
 Moisture Content (%): 0.10
 Unit Wet Weight (g/cm³): 2.805
 Unit Wet Weight (pcf): 175.0
Unit Dry Weight (g/cm³): 2.802
Unit Dry Weight (pcf): 174.8

Total Load (lb): 8,860
Uniaxial Compressive Strength (psi): 2,860

Fracture Type: **Shear**

Rate of Loading (lb/sec): 168
 Time to Break (min:sec): 0:52.83
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates, Inc.
 Client Project: B-5717
 Project No.: R-2021-116-001
 Lab ID No.: R-2021-116-001-008

Boring No.: B2-B1
 Depth (ft): 29.9-30.2
 Sample ID: RS-8
 Moisture Condition: As received

Specimen Weight (g): 607.93

SPECIMEN LENGTH (in)

Reading 1: 4.49
 Reading 2: 4.49
 Reading 3: 4.49
Average: 4.49

SPECIMEN DIAMETER (in):

Reading 1: 1.98
 Reading 2: 1.98
 Average: **1.98**
 Area (in²): 3.07
 L/D: 2.27

MOISTURE CONTENT

Tare Number: TB-02
 Wt. of Tare & Wet Sample (g): 725.23
 Wt. of Tare & Dry Sample (g): 724.51
 Weight of Tare (g): 133.78
 Weight of Wet Sample (g): 591.45
 Sample Volume (cm³): 225.93
 Moisture Content (%): 0.12
 Unit Wet Weight (g/cm³): 2.691
 Unit Wet Weight (pcf): 167.9
Unit Dry Weight (g/cm³): 2.688
Unit Dry Weight (pcf): 167.7

Total Load (lb): 26,900
Uniaxial Compressive Strength (psi): 8,760

Fracture Type: **Shear**

Rate of Loading (lb/sec): 248
 Time to Break (min:sec): 1:48.53
 Deviation From Straightness²: Pass

AXIAL: Pass TOP: Pass BOTTOM: Pass

Physical Description: Dark Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21

Physical Description: Dark Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
 R176 Compression Machine,
 R525 Digital Calipers,
 R148 Feeler Gauge, R419 Scale
 R512 Rock Saw
 R148 Straight Edge
 R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411 5/6/21 Checked By: AES Date: 5/7/21

SITE PHOTOGRAPHS
Bridge Nos. 109 and 121 on -L- (SR 4240) over South Buffalo Creek

View Along Bridge 109 Looking Upstation from End Bent 1



View Looking Downstream from Bridge 109



View of Along Bridge 121 Looking Upstation from End Bent 1



View Looking Downstream from Bridge 121

