

PROJECT: 50724 REFERENCE: HB-0054

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-12	BORE LOGS, CORE REPORTS & CORE PHOTOS
13	LAB TEST RESULTS
14	SITE PHOTOGRAPH(S)

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ASHE

PROJECT DESCRIPTION BRIDGE NO. 509 ON SR 1222
(METHODIST CAMP RD) OVER SOUTH FORK
NEW RIVER

SITE DESCRIPTION FOR BRIDGE OVER SOUTH FORK
NEW RIVER ON -L- (SR 1222)
-L- STA. 12 + 99.93

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0054	1	

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.

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 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

P. TOMASIC, P.G.

CG2 EXPLORATION

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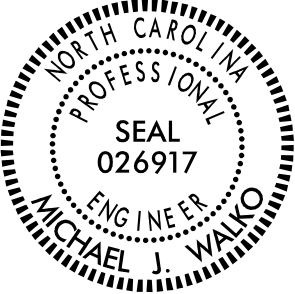
DATE MARCH 2025



Prepared in the Office of:

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42C62874D56446 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									
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>										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.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRISTALLINE ROCK (CR)									
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																						
GROUP CLASS.	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7																										
SYMBOL																																							
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS		SILT-CLAY SOILS	MUCK, PEAT																								
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS																								
GROUP INDEX	0		0		0		4 MX		8 MX		12 MX		16 MX		NO MX																								
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS				CLAYEY SOILS																										
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR		POOR		UNSUITABLE																						
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																																							
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																			
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (IN-VALUE)				RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										DIP & DIP DIRECTION OF ROCK STRUCTURES																	
GENERAL		VERY LOOSE		< 4				N/A				SOIL SYMBOL										TEST BORING																	
GRANULAR MATERIAL (NON-COHESIVE)		LOOSE		4 TO 10																																			
		MEDIUM DENSE		10 TO 30																		AUGER BORING																	
		DENSE		30 TO 50																		CORE BORING																	
		VERY DENSE		> 50																		MONITORING WELL																	
GENERAL		VERY SOFT		2 TO 4				< 0.25														PIEZOMETER INSTALLATION																	
SILT-CLAY MATERIAL (COHESIVE)		SOFT		4 TO 8				0.25 TO 0.5																															
		MEDIUM STIFF		8 TO 15				0.5 TO 1.0																															
		STIFF		15 TO 30				1 TO 2																															
		VERY STIFF		> 30				2 TO 4																															
		HARD		> 30				> 4																															
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ROCK HARDNESS																			
U.S. STD. SIEVE SIZE OPENING (MM)		4		10		40		60		200		270												CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.															
		4.76		2.00		0.42		0.25		0.075		0.053												HARD															
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE. SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)												MODERATELY HARD															
GRAIN SIZE		305 IN.		75		2.0		0.25		0.05		0.005												MEDIUM HARD															
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION						AR - AUGER REFUSAL										MED. - MEDIUM																			
										BT - BORING TERMINATED										MICA - MICACEOUS																			
										CL - CLAY										MOD. - MODERATELY																			
										CPT - CONE PENETRATION TEST										NP - NON PLASTIC																			
										CSE. - COARSE										ORG. - ORGANIC																			
										DPT - DILATOMETER TEST										PMT - PRESSUREMETER TEST																			
										DPT - DYNAMIC PENETRATION TEST										SAP. - SAPROLITIC																			
										e - VOID RATIO										SD. - SAND, SANDY																			
										F - FINE										SL. - SILTY																			
										FOSS. - FOSSILIFEROUS										SLI. - SLIGHTLY																			
										FRAC. - FRACTURED, FRACTURES										TCR - TRICONE REFUSAL																			
										FRAGS. - FRAGMENTS										w - MOISTURE CONTENT																			
										HI. - HIGHLY										v - VERY																			
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										ROCK HARDNESS																			
PLASTICITY INDEX (PI)		DRY STRENGTH								DRILL UNITS:										ADVANCING TOOLS:																			
										☐ CME-45C										☐ CLAY BITS																			
										☐ CME-55										☐ 6" CONTINUOUS FLIGHT AUGER																			
										☐ CME-550										☒ 8" HOLLOW AUGERS																			
										☐ VANE SHEAR TEST										☐ HARD FACED FINGER BITS																			
										☐ PORTABLE HOIST										☐ TUNG.-CARBIDE INSERTS																			
										☒ DIEDRICH D-50										☒ CASING ☐ W/ ADVANCER																			
																				☐ TRICONE _____ * STEEL TEETH																			
																				☐ TRICONE _____ * TUNG.-CARB.																			
																				☒ CORE BIT																			
																				☐ _____																			
COLOR										HAMMER TYPE:										ROCK HARDNESS																			
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.										☒ AUTOMATIC ☐ MANUAL										VERY HARD																			
										☐ CORE SIZE: ☐ -B ☐ -H										HARD																			
										☒ -N Q _____										MODERATELY HARD																			
										☐ HAND TOOLS:										SOFT																			
										☐ POST HOLE DIGGER										VERY SOFT																			
										☐ HAND AUGER																													
										☐ SOUNDING ROD																													
										☐ VANE SHEAR TEST																													
										☐ _____																													
										☐ _____																													
FRACTURE SPACING										BEDDING										BENCH MARK: N/A																			
TERM		SPACING								TERM										THICKNESS																			
VERY WIDE		MORE THAN 10 FEET								VERY THICKLY BEDDED										4 FEET																			
WIDE		3 TO 10 FEET								THICKLY BEDDED										1.5 - 4 FEET																			
MODERATELY CLOSE		1 TO 3 FEET								THINLY BEDDED										0.16 - 1.5 FEET																			
CLOSE		0.16 TO 1 FOOT								VERY THINLY BEDDED										0.03 - 0.16 FEET																			
VERY CLOSE		LESS THAN 0.16 FEET								THICKLY LAMINATED										0.008 - 0.03 FEET																			
										THINLY LAMINATED										< 0.008 FEET																			
INDURATION										FRIABLE										MODERATELY INDURATED																			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										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.																													

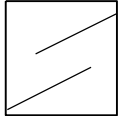
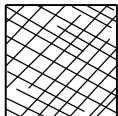
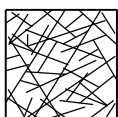
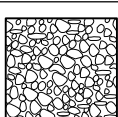
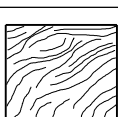
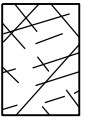
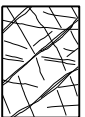
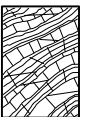
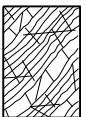
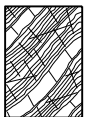
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

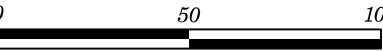
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) 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.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING SURFACE QUALITY ➡ 90 80 70 60 50 40 30 20 10 N/A N/A	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) 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.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin inter-layers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers 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. F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers 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. 70 60 50 40 30 20 10
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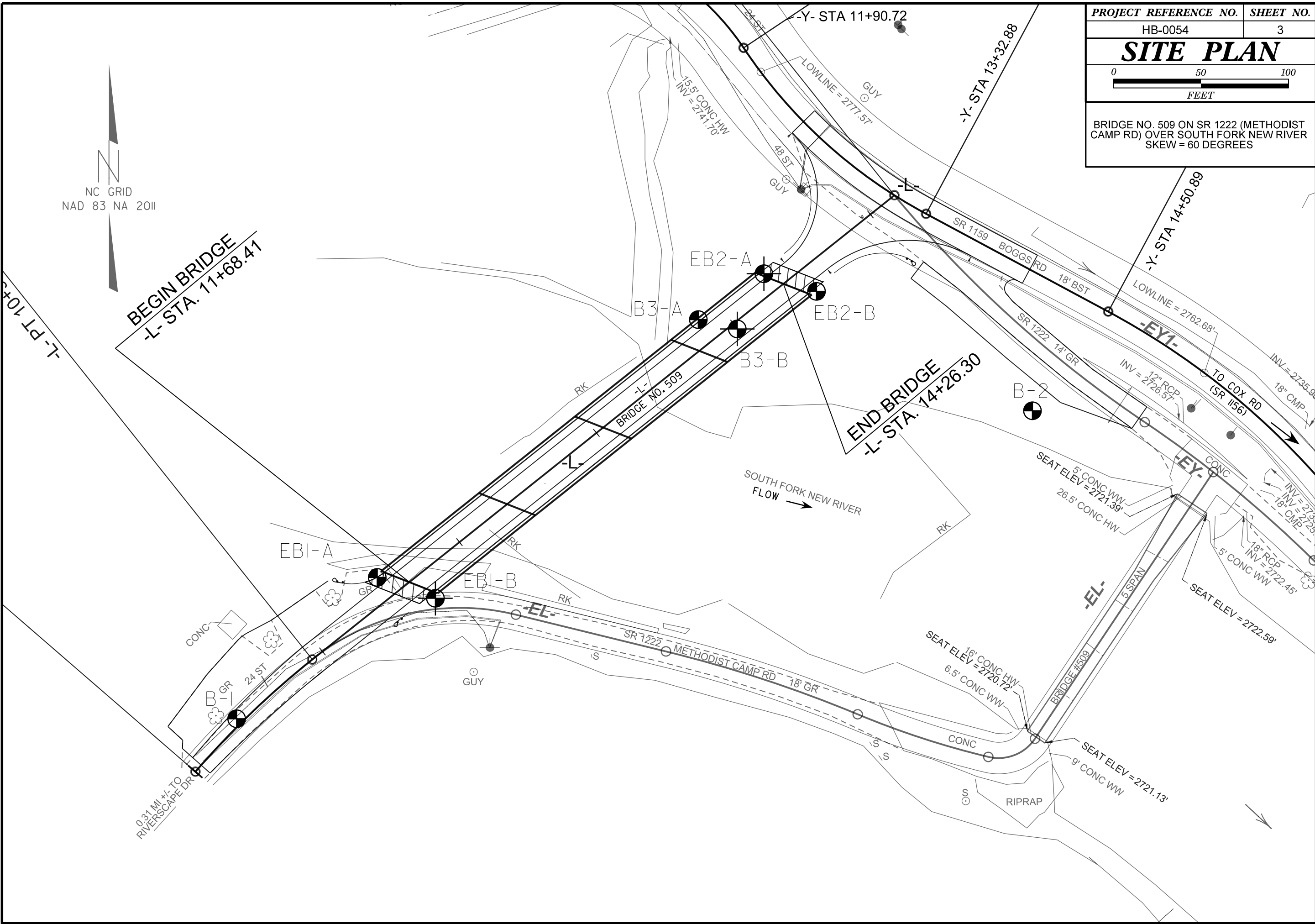
➡ Means deformation after tectonic disturbance

PROJECT REFERENCE NO.	SHEET NO.
HB-0054	3
SITE PLAN	
	
BRIDGE NO. 509 ON SR 1222 (METHODIST CAMP RD) OVER SOUTH FORK NEW RIVER SKEW = 60 DEGREES	



BEGIN BRIDGE
-L- STA. 11+68.41

END BRIDGE
-L- STA. 14+26.30



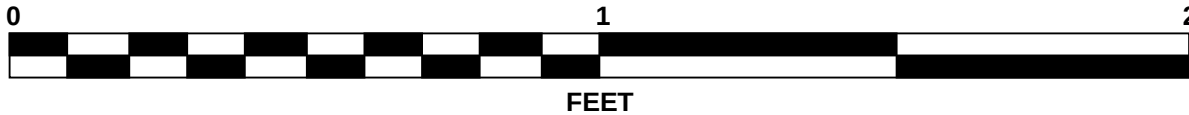
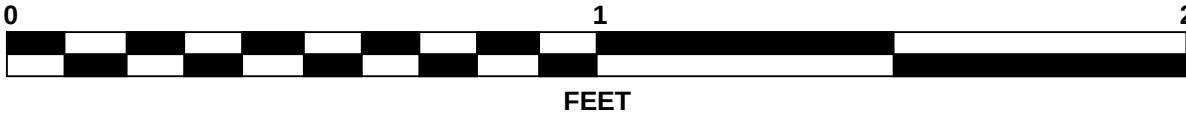
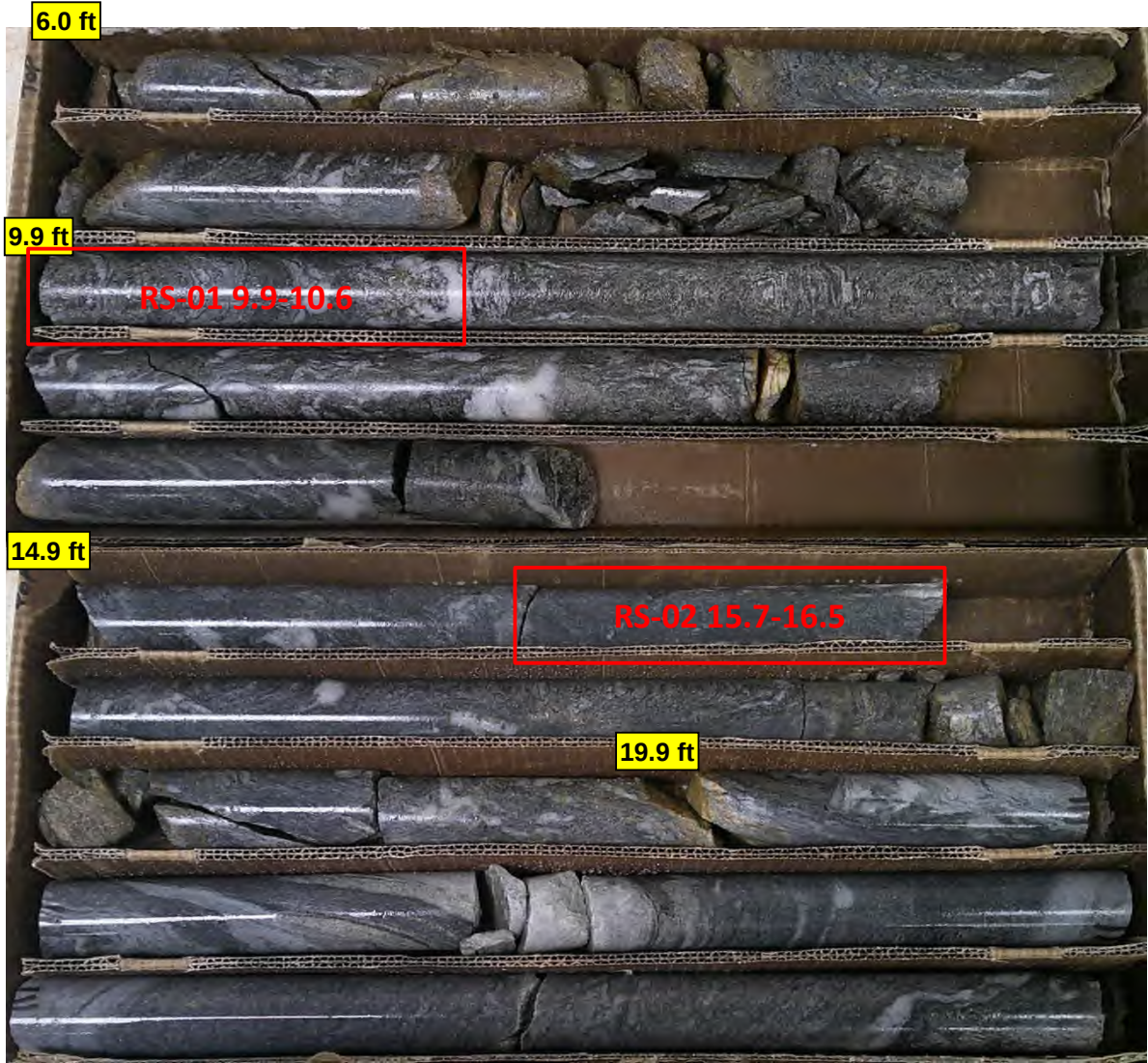
GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50724.1.1				TIP HB-0054		COUNTY ASHE		GEOLOGIST P. Tomasic								
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River												GROUND WTR (ft)				
BORING NO. B-1			STATION 10+38			OFFSET 3 ft LT			ALIGNMENT -L-			0 HR.	5.8			
COLLAR ELEV. 2,726.5 ft			TOTAL DEPTH 7.7 ft			NORTHING 961,077			EASTING 1,283,576			24 HR.	5.3			
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER C. Odom			START DATE 11/20/24			COMP. DATE 11/20/24			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	▼ MOI	L O G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
2730																
2725	2,725.5	1.0												2,726.5	GROUND SURFACE	0.0
2720	2,723.0	3.5	89	11/0.1										2,723.5	ALLUVIAL Gravelly Fine to Coarse SAND (A-1-a)	3.0
	2,720.5	6.0	22	14	11									2,720.5	RESIDUAL Very Stiff, Orange-Gray-White, Fine to Coarse Sandy SILT (A-4), with trace to little mica and gravel-sized rock fragments	6.0
	2,718.8	7.7	100/0.3											2,718.8	WEATHERED ROCK Brown-Orange-Gray, (Muscovite-Biotite Gneiss)	7.7
			60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 2,718.8 ft On Crystalline Rock (Muscovite-Biotite Gneiss)		
Notes: Possible Alluvial Boulder from 1.0-3.0 feet.																

WBS 50724.1.1				TIP HB-0054		COUNTY ASHE		GEOLOGIST P. Tomasic							
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River										GROUND WTR (ft)					
BORING NO. EB1-A		STATION 11+51		OFFSET 14 ft LT		ALIGNMENT -L-		0 HR.		Dry					
COLLAR ELEV. 2,730.8 ft		TOTAL DEPTH 11.3 ft		NORTHING 961,158		EASTING 1,283,657		24 HR.		Dry					
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom			START DATE 11/20/24		COMP. DATE 11/20/24		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					
2735															
2730	2,729.8	1.0	5	3	3									2,730.8 GROUND SURFACE 0.0	
2725	2,726.7	4.1				6								M M M	ALLUVIAL Very Loose to Medium Dense, Brown-Orange, Silty Fine SAND (A-2-4), with trace organics and gravel
	2,724.8	6.0	2	1	2	3									
2720	2,721.7	9.1	2	9	11										2,721.7 9.1
	2,719.9	10.9	7	93/0.4		20									WEATHERED ROCK
	2,719.5	11.3	100/0.3 60/0.0								100/0.9 100/0.3 60/0.0				2,719.5 Brown-Orange-Gray, (Muscovite Biotite Gneiss) 11.3
															Boring Terminated with Standard Penetration Test Refusal at Elevation 2,719.5 ft On Crystalline Rock (Muscovite-Biotite Gneiss)

NCDOT BORE DOUBLE GEO_BRDG509_GTM.GPJ NC_DOT.GDT 2/10/25

Bridge No. 509 over South Fork New River on SR 1222 (Methodist Camp Road)
Ashe County, North Carolina
Rock Core Photographs
Boring: EB1-B
6.0 to 24.9 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 50724.1.1						TIP HB-0054				COUNTY ASHE				GEOLOGIST P. Tomasic							
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River																		GROUND WTR (ft)			
BORING NO. B3-A						STATION 13+86				OFFSET 14 ft LT				ALIGNMENT -L-				0 HR. Dry			
COLLAR ELEV. 2,724.2 ft						TOTAL DEPTH 5.4 ft				NORTHING 961,305				EASTING 1,283,840				24 HR. Dry			
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024										DRILL METHOD H.S. Augers						HAMMER TYPE Automatic					
DRILLER C. Odom						START DATE 11/25/24				COMP. DATE 11/25/24				SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION							
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft) DEPTH (ft)							
2725														2,724.2 GROUND SURFACE 0.0							
	2,723.2	1.0	11	6	4							M		ALLUVIAL Stiff, Brown, Fine Sandy SILT (A-4), with trace mica, gravel, and organics							
2720	2,719.7	4.5												2,719.7 4.5							
	2,718.8	5.4	4	96	0.2									2,718.8 5.4							
			60	0.0										WEATHERED ROCK (Muscovite-Biotite Gneiss) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,718.8 ft On Crystalline Rock (Muscovite-Biotite Gneiss) Surficial Organics ~ 0.0' - 0.3'							

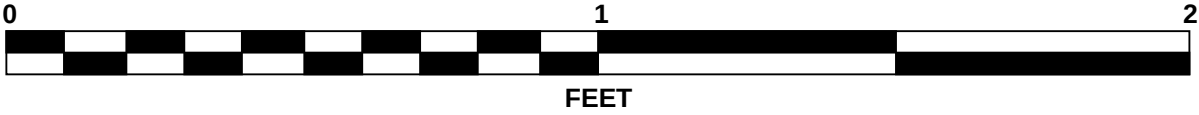
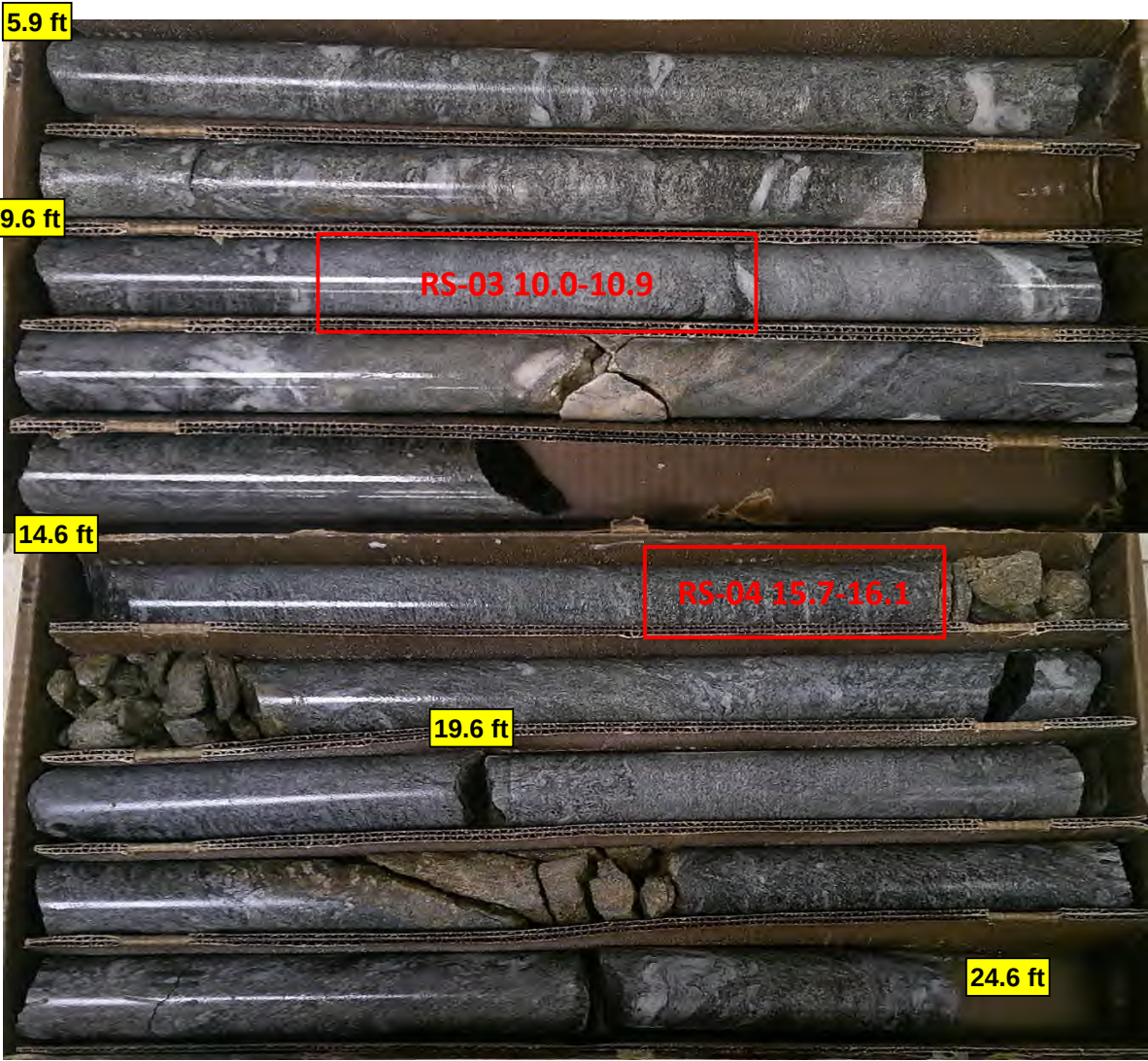
GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50724.1.1			TIP HB-0054			COUNTY ASHE			GEOLOGIST P. Tomasic				
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River									GROUND WTR (ft)				
BORING NO. B3-B			STATION 14+00			OFFSET 4 ft RT			ALIGNMENT -L-			0 HR. N/A	
COLLAR ELEV. 2,724.5 ft			TOTAL DEPTH 24.6 ft			NORTHING 961,299			EASTING 1,283,862			24 HR. 4.3	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024						DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic				
DRILLER C. Odom			START DATE 11/22/24			COMP. DATE 11/25/24			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)
2725													
	2,723.5	1.0											2,724.5 GROUND SURFACE 0.0
			1	1	1								ALLUVIAL Soft to Medium Stiff, Brown-Orange, Fine Sandy CLAY (A-6), with trace organics and gravel
2720	2,721.0	3.5	2	2	3								
	2,718.6	5.9	60/0.0										
2715													2,718.6 CRYSTALLINE ROCK 5.9
											RS-03		CRYSTALLINE ROCK Gray-White-Black, (Muscovite-Biotite Gneiss) REC = 97% RQD = 87% GSI = 70-75
2710													
											RS-04		
2705													
2700													2,699.9 24.6
													Boring Terminated at Elevation 2,699.9 ft In Crystalline Rock (Muscovite-Biotite Gneiss)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50724.1.1				TIP HB-0054				COUNTY ASHE				GEOLOGIST P. Tomasic												
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River												GROUND WTR (ft)												
BORING NO. B3-B				STATION 14+00				OFFSET 4 ft RT				ALIGNMENT -L-				0 HR. N/A								
COLLAR ELEV. 2,724.5 ft				TOTAL DEPTH 24.6 ft				NORTHING 961,299				EASTING 1,283,862				24 HR. 4.3								
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic												
DRILLER C. Odom				START DATE 11/22/24				COMP. DATE 11/25/24				SURFACE WATER DEPTH N/A												
CORE SIZE N/A				TOTAL RUN 18.7 ft																				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) % ROD (ft) %		SAMP. NO.	STRATA REC. (ft) % ROD (ft) %		L O G	DESCRIPTION AND REMARKS													
											ELEV. (ft)	DEPTH (ft)												
2718.6													Begin Coring @ 5.9 ft											
	2,718.6	5.9	3.7	N=60/0.0 2:26/1.0 2:07/1.0 2:13/1.0 1:30/0.7	(3.6) 97%	(3.6) 97%			(18.1) 97%		(16.2) 87%		2,718.6	5.9 CRYSTALLINE ROCK Slightly Weathered to Fresh, Moderately Hard to Very Hard, Gray-White-Black, (Muscovite-Biotite Gneiss), with Close to to Wide Fracture Spacing										
2715	2,714.9	9.6	5.0	2:57/1.0 3:51/1.0 3:52/1.0 3:34/1.0 3:49/1.0	(4.9) 98%	(4.7) 94%		RS-03						RS-03: 10.0-10.9' Unit Weight: Unconfined Compressive Strength:										
2710	2,709.9	14.6	5.0	3:08/1.0 2:33/1.0 2:00/1.0 2:24/1.0 2:27/1.0	(4.8) 96%	(3.7) 74%	RS-04					RS-04: 15.7-16.1' Unit Weight: Unconfined Compressive Strength:												
2705	2,704.9	19.6	5.0	2:52/1.0 2:13/1.0 2:19/1.0 1:41/1.0 2:36/1.0	(4.8) 96%	(4.2) 84%						GSI = 70-75												
2700	2,699.9	24.6									2,699.9	24.6 Boring Terminated at Elevation 2,699.9 ft In Crystalline Rock (Muscovite-Biotite Gneiss)												

Bridge No. 509 over South Fork New River on SR 1222 (Methodist Camp Road)
Ashe County, North Carolina
Rock Core Photographs
Boring: B3-B
5.9 to 24.6 Feet



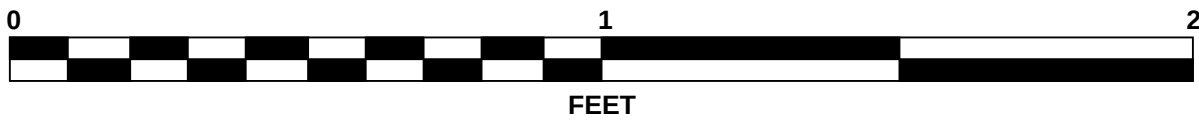
NCDOT BORE DOUBLE GEO_BRDG509_GTM.GPJ NC_DOT_GDT 2/10/25

GEOTECHNICAL BORING REPORT

CORE LOG

NCDOT CORE DOUBLE GEO_BRDG509_GTM.GPJ NC_DOT_GDT 2/10/25

Bridge No. 509 over South Fork New River on SR 1222 (Methodist Camp Road)
Ashe County, North Carolina
Rock Core Photographs
Boring: EB2-A
7.8 to 24.6 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS		50724.1.1		TIP		HB-0054		COUNTY		ASHE		GEOLOGIST		P. Tomasic																																			
SITE DESCRIPTION													Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River			GROUND WTR (ft)																																	
BORING NO.			EB2-B			STATION			14+49			OFFSET			15 ft RT			ALIGNMENT			-L-			0 HR.		Dry																							
COLLAR ELEV.			2,727.5 ft			TOTAL DEPTH			17.0 ft			NORTHING			961,321			EASTING			1,283,907			24 HR.		9.0																							
DRILL RIG/HAMMER EFF./DATE										CG20446 Diedrich D-50 97% 04/30/2024										DRILL METHOD				H.S. Augers				HAMMER TYPE				Automatic																	
DRILLER					C. Odom					START DATE					11/21/24					COMP. DATE					11/21/24					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)																													
2730																																																	
		2,726.5		1.0		1 1 1														2,727.5 GROUND SURFACE 0.0																													
2725																				ALLUVIAL Very Loose to Medium Dense, Brown-Orange, Silty Fine SAND (A-2-4), with trace organics																													
		2,723.3		4.2		3 4 7														2,722.0 5.5																													
2720						5 8 33														RESIDUAL Hard, Brown-Gray-Orange, Fine Sandy SILT (A-4), with trace to little mica and gravel-sized rock fragments																													
		2,721.5		6.0																																													
		2,718.3		9.2		31 31 25																																											
2715																																																	
		2,714.3		13.2		66 34/0.1														2,714.3 13.2																													
		2,713.7		13.8		60/0.1														2,713.7 13.8																													
		2,710.5		17.0		60/0.0														2,710.5 17.0																													
																				WEATHERED ROCK Gray-Brown, (Muscovite-Biotite Gneiss)																													
																				CRYSTALLINE ROCK (Muscovite-Biotite Gneiss) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,710.5 ft In Crystalline Rock (Muscovite-Biotite Gneiss)																													

WBS 50724.1.1				TIP HB-0054			COUNTY ASHE			GEOLOGIST P. Tomasic				
SITE DESCRIPTION Bridge No. 509 on SR 1222 (Methodist Camp Road) over South Fork New River										GROUND WTR (ft)				
BORING NO. B-2				STATION 14+40			OFFSET 70 ft RT			ALIGNMENT -Y-			0 HR. Dry	
COLLAR ELEV. 2,725.6 ft				TOTAL DEPTH 9.5 ft			NORTHING 961,253			EASTING 1,284,030			24 HR. 5.5	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024							DRILL METHOD H.S. Augers				HAMMER TYPE Automatic			
DRILLER C. Odom				START DATE 11/25/24			COMP. DATE 11/25/24			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				
2730														
2725	2,724.6	1.0	1	2	1									2,725.6 GROUND SURFACE 0.0
	2,722.1	3.5	5	5	1									ALLUVIAL Soft to Medium Stiff, Brown, Fine Sandy SILT (A-4), with trace mica, organics, and gravel
2720	2,719.6	6.0	6	50	50/0.4									2,719.1 6.5
	2,716.1	9.5	60/0.0											2,716.1 9.5
														WEATHERED ROCK Gray-Brown-Orange, (Muscovite-Biotite Gneiss)
														Boring Terminated with Standard Penetration Test Refusal at Elevation 2,716.1 ft On Crystalline Rock (Muscovite-Biotite Gneiss)
														Surficial Organics ~ 0.0' - 0.3'

ROCK TEST RESULTS							
SAMPLE NO.	BORING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS-01	EB1-B	11+52 -L-	16' RT	9.9 - 10.6'	MUSCOVITE-BIOTITE GNEISS	173.5	5,790 psi /834 ksf
RS-02	EB1-B	11+52 -L-	16' RT	15.7 - 16.5'	MUSCOVITE-BIOTITE GNEISS	172.4	5,750 psi /828 ksf
RS-03	B3-B	14+00 -L-	4' RT	10.0 - 10.9'	MUSCOVITE-BIOTITE GNEISS	167.7	15,840 psi /2,282 ksf
RS-04	B3-B	14+00 -L-	4' RT	15.7 - 16.1'	MUSCOVITE-BIOTITE GNEISS	175.9	4,720 psi /680 ksf
RS-05	EB2-A	14+31 -L-	12' LT	18.3 - 18.9'	MUSCOVITE-BIOTITE GNEISS	164.2	8,730 psi /1,257 ksf



AUTHORIZED SIGNATURE
NCDOT CERT NO. 130-04-0212

Prepared in the Office of:
F&ME CONSULTANTS, INC.
COLUMBIA, SOUTH CAROLINA
NCDOT LAB CERT. NO. 130-0212



PHOTO #1: END BENT NO. 1 OF NEW BRIDGE ALIGNMENT LOOKING NORTHEAST (UPSTATION).



PHOTO #2: BENT NO. 3 OF NEW BRIDGE ALIGNMENT LOOKING SOUTHWEST (DOWNSTATION).



PHOTO #3: DOWNSTREAM OF NEW BRIDGE ALIGNMENT.



PHOTO #4: UPSTREAM OF DAMAGED EXISTING BRIDGE.