

REFERENCE: BR-0093

PROJECT: 67093

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM
PROJECT DESCRIPTION REPLACE BRIDGE 780035 ON
NC 770 OVER MAYO RIVER

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0093	1	

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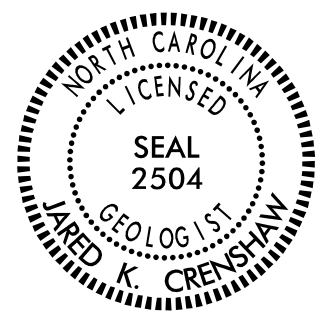
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- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR 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

R. MAFFIA
C. SWAFFORD
CATLIN ENGINEERS
& SCIENTISTS

INVESTIGATED BY C. SWAFFORD
DRAWN BY C. SWAFFORD
CHECKED BY J. CRENSHAW
SUBMITTED BY SCHNABEL ENG.
DATE JUNE 2023



DocuSigned by:
Jared Crenshaw 07/10/2023
F325B40D4C25483
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

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for General Class, Group Class, Symbol, % Passing, Material Passing #40 #200, Usual Types of Major Materials, Gen. Rating as Subgrade, and Soil Legend symbols for Granular, Silty-clay, and Organic materials.

CONSISTENCY OR DENSENESS

Table mapping Primary Soil Type (e.g., Generally Granular, Silty-clay) to Compactness or Consistency (e.g., Very Loose, Medium Dense) and Range of Standard Penetration Resistance (N-value).

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size (mm) and corresponding grain size ranges for Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating Soil Moisture Scale (Atterberg Limits), Field Moisture Description (e.g., Saturated, Wet, Moist, Dry), and Guide for Field Moisture Description (e.g., Usually liquid, Semisolid).

PLASTICITY

Table showing Plasticity Index (PI) ranges (0-5, 6-15, 16-25, 26 or more) and corresponding Dry Strength (Very Low, Slight, Medium, High).

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL

Table showing percentages for Organic Material, Granular Soils, Silty-clay Soils, and Other Material (Trace, Little, Moderately, Highly Organic).

GROUND WATER

Water level symbols: Water level in bore hole immediately after drilling, Static water level after 24 hours, Perched water, saturated zone, or water bearing strata, Spring or seep.

MISCELLANEOUS SYMBOLS

Diagrammatic symbols for Roadway Embankment, Soil Symbol, Artificial Fill, Inferred Soil Boundary, Inferred Rock Line, Alluvial Soil Boundary, Dip and Dip Direction, Test Boring, Auger Boring, Core Boring, Monitoring Well, Piezometer Installation, Sounding Rod, and SPT N-value.

RECOMMENDATION SYMBOLS

Symbols for Undercut, Shallow Undercut, Unclassified Excavation - Unsuitable Waste, and Unclassified Excavation - Acceptable Degradable Rock.

ABBREVIATIONS

- List of abbreviations: AR - Auger Refusal, BT - Boring Terminated, CL - Clay, CPT - Cone Penetration Test, CSE - Coarse, DMT - Dilatometer Test, DPT - Dynamic Penetration Test, e - Void Ratio, F - Fine, FOSS - Fossiliferous, FRAC - Fractured, FRAGS - Fragments, HI - Highly, MED - Medium, MICA - Micaceous, MOD - Moderately, NP - Non Plastic, ORG - Organic, PMT - Pressuremeter Test, SAP - Saprolitic, SD - Sand, Silty, SL - Silt, Silty, SLI - Slightly, TCR - Tricone Refusal, w - Moisture Content, V - Very, VST - Vane Shear Test, WEA - Weathered, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS (S, SS, ST, RS, RT, CBR).

EQUIPMENT USED ON SUBJECT PROJECT

Checklist for equipment used: Drill Units (CME-45C, CME-55, CME-550, Vane Shear Test, Portable Hoist), Advancing Tools (Clay Bits, Augers, Inserts, Casings, Tricone bits, Core Bit), Hammer Type (Automatic, Manual), Core Size (-B, -H, -N), Hand Tools (Post Hole Digger, Auger, Sounding Rod, Vane Shear Test).

ROCK DESCRIPTION

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:

Diagrams and descriptions for Weathered Rock (WR), Crystalline Rock (CR), Non-Crystalline Rock (NCR), and Coastal Plain Sedimentary Rock (CPS).

WEATHERING

Descriptions of weathering degrees: Fresh (crystals bright), Very Slight (joints stained), Slight (joints stained and discoloration), Moderate (portions of rock show discoloration), Moderately Severe (rock shows severe loss of strength), Severe (rock except quartz discolored or stained), Very Severe (rock fabric elements are discernible), Complete (rock reduced to soil).

ROCK HARDNESS

Descriptions of rock hardness: Very Hard (cannot be scratched by knife), Hard (can be scratched by knife or pick), Moderately Hard (can be scratched by knife or pick, gouges or grooves), Medium Hard (can be grooved or gouged), Soft (can be grooved or gouged readily), Very Soft (can be carved with knife).

Tables for Fracture Spacing (Term, Spacing) and Bedding (Term, Thickness).

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. Descriptions: Friable (rubbing with finger), Moderately Indurated (grains can be separated), Indurated (grains difficult to separate), Extremely Indurated (sharp hammer blows required).

TERMS AND DEFINITIONS

- DEFINITIONS: ALLUVIUM (ALLUV.) - SOILS TRANSPORTED BY WATER; AQUIFER - WATER BEARING FORMATION; ARENACEOUS - ROCKS DERIVED FROM SAND; ARGILLACEOUS - ROCKS WITH CLAY MINERALS; ARTESIAN - GROUND WATER UNDER PRESSURE; CALCAREOUS - SOILS WITH CALCIUM CARBONATE; COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL; CORE RECOVERY (REC.) - TOTAL LENGTH OF MATERIAL RECOVERED; DIKE - TABULAR BODY OF IGNEOUS ROCK; DIP - ANGLE OF STRATUM; DIP DIRECTION (DIP AZIMUTH) - DIRECTION OF BEARING; FAULT - FRACTURE ZONE; FISSILE - PROPERTY OF SPLITTING; FLOAT - ROCK FRAGMENTS ON SURFACE; FLOOD PLAIN (FP) - LAND BORDERING A STREAM; FORMATION (FM) - MAPPABLE GEOLOGIC UNIT; JOINT - FRACTURE IN ROCK; LEDGE - SHELF-LIKE RIDGE; LENS - BODY OF SOIL OR ROCK THINNING; MOTTLED (MOT.) - IRREGULARLY MARKED; PERCHED WATER - WATER MAINTAINED ABOVE NORMAL GROUND WATER LEVEL; RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE; ROCK QUALITY DESIGNATION (ROD) - MEASURE OF ROCK QUALITY; SAPROLITE (SAP.) - RESIDUAL SOIL WITH RELIC STRUCTURE; SILL - INTRUSIVE BODY OF IGNEOUS ROCK; SLICKENSIDE - POLISHED AND STRIATED SURFACE; STANDARD PENETRATION TEST (SPT) - NUMBER OF BLOWS; STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED; STRATA ROCK QUALITY DESIGNATION (SROD) - MEASURE OF ROCK QUALITY; TOPSOIL (TS) - SURFACE SOILS CONTAINING ORGANIC MATTER.

BENCH MARK: BL-4 N:991691.81E:1720281.74 ELEVATION: 678.66 FEET

NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING; Pavement / ABC Stone

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

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

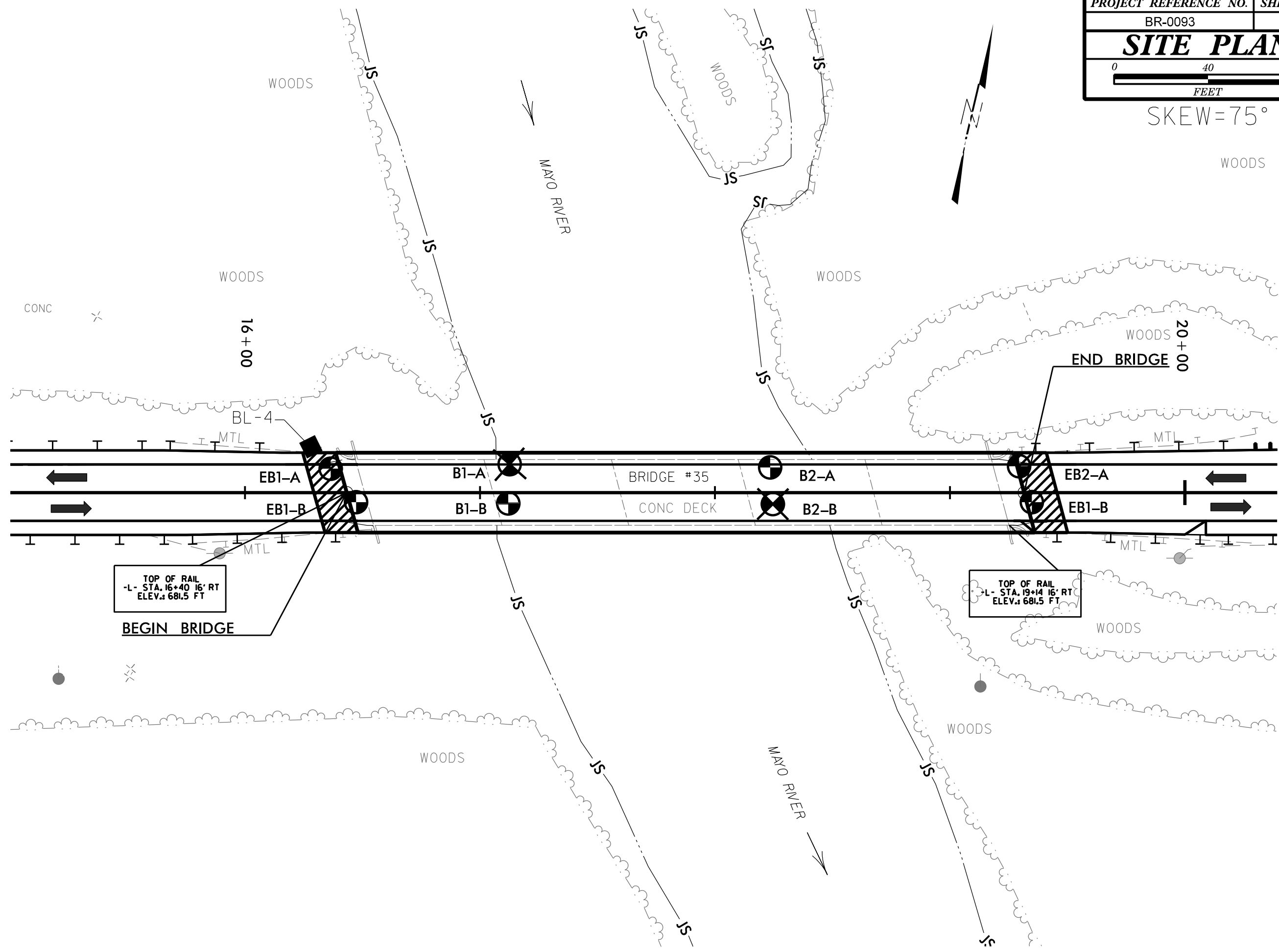
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

→ Means deformation after tectonic disturbance

SKEW=75°



TOP OF RAIL
 -L- STA. 16+40 16' RT
 ELEV.: 681.5 FT

TOP OF RAIL
 -L- STA. 19+14 16' RT
 ELEV.: 681.5 FT

BEGIN BRIDGE

END BRIDGE

BRIDGE #35
 CONC DECK

MAYO RIVER

MAYO RIVER

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

CONC

16+00

20+00

BL-4

MTL

MTL

EB1-A

B1-A

BRIDGE #35

B2-A

EB2-A

EB1-B

B1-B

CONC DECK

B2-B

EB1-B

MTL

MTL

JS

JS

JS

JS

JS

JS

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.										
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 16+36		OFFSET 10 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 679.0 ft		TOTAL DEPTH 42.3 ft		NORTHING 991,686		EASTING 1,720,293										
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Edmondson, J. M.		START DATE 04/25/23		COMP. DATE 04/25/23		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						
680															679.0 678.4	0.0 0.0
675	676.2	2.8	8	4	5										675.7	3.3
670	671.2	7.8	3	4	3											
665	666.2	12.8	2	2	3											
660	661.2	17.8	2	2	3										663.0	18.0
655	656.2	22.8	1	3	3										658.0	21.0
650	651.2	27.8	1	2	3										653.0	26.0
645	646.2	32.8	2	3	4										648.0	31.0
640	641.2	37.8	41	20	51										643.0	36.0
	636.7	42.3	60/0.0												638.5 636.7	40.5 42.3

WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.										
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 16+47		OFFSET 4 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 678.7 ft		TOTAL DEPTH 49.1 ft		NORTHING 991,676		EASTING 1,720,307										
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Edmondson, J. M.		START DATE 04/24/23		COMP. DATE 04/24/23		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						
680															678.7 678.1	0.0 0.0
675	675.3	3.4	8	5	3											
670	670.3	8.4	1	2	5											
665	665.3	13.4	2	2	3											
660	660.3	18.4	1	3	4											
655	655.3	23.4	3	2	3											
650	650.3	28.4	1	2	3											
645	645.3	33.4	3	4	4											
640	640.3	38.4	43	57/0.4												
635	635.9	42.8	100/0.2													
630	630.9	47.8	18	33	67/0.3											

NCDOT BORE DOUBLE BR-0093_ASDRILLED_FINAL_GPJ_NC_DOT_GDT 6/22/23

CORE PHOTOGRAPH
REPLACE BRIDGE 780035 ON NC 770 OVER MAYO RIVER

B1-A
BOX 1 OF 2: 3.1 - 13.1 FEET



B1-A
BOX 2 OF 2: 13.1 - 23.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.	
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)
BORING NO. B1-B		STATION 17+12		OFFSET 5 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 638.4 ft		TOTAL DEPTH 6.0 ft		NORTHING 991,696		EASTING 1,720,369	
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Edmondson, J. M.		START DATE 04/26/23		COMP. DATE 04/26/23		SURFACE WATER DEPTH 1.8ft	

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						
640													▼	WATER SURFACE (04/26/23)		
														638.4	GROUND SURFACE	0.0
	636.2	2.2											Sat.	636.4	ALLUVIAL Very loose to loose, gray, SAND (A-3), with trace silt	2.0
635																
	633.0	5.4	100/0.2											633.0	WEATHERED ROCK Gray, GNEISS, micaceous	5.4
	632.4	6.0	60/0.0											632.4	CRYSTALLINE ROCK Gray, GNEISS, micaceous	6.0
															Boring Terminated with Standard Penetration Test Refusal at Elevation 632.4 ft In Crystalline Rock (GNEISS)	
															Deck to mudline: 37.8 ft Total casing: 42.0 ft Drill bit refusal at 6.0 ft BGS.	

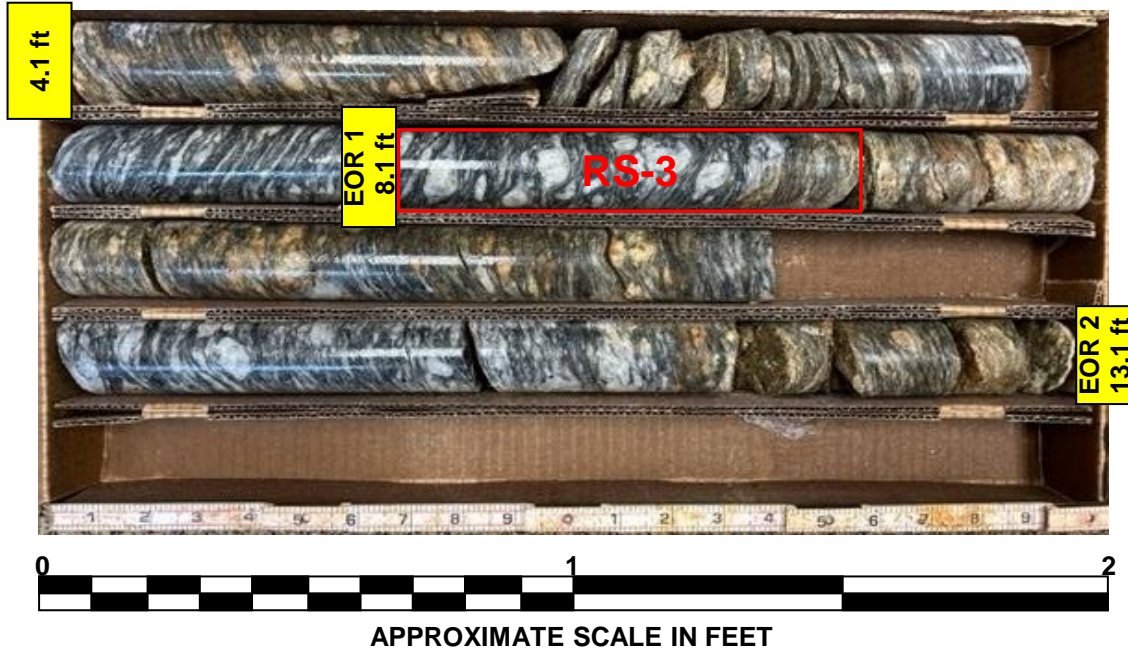
WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.	
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)
BORING NO. B2-A		STATION 18+23		OFFSET 11 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 638.3 ft		TOTAL DEPTH 5.0 ft		NORTHING 991,746		EASTING 1,720,470	
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Edmondson, J. M.		START DATE 04/26/23		COMP. DATE 04/26/23		SURFACE WATER DEPTH 2.0ft	

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						
640													▼	WATER SURFACE (04/26/23)		
														638.3	GROUND SURFACE	0.0
													Sat.	635.8	ALLUVIAL Very loose to loose, brown, SAND (A-3), with trace to little silt and mica	2.5
635																
	635.4	2.9	100/0.2											633.3	WEATHERED ROCK Gray and brown, GNEISS	5.0
	633.3	5.0	60/0.0												Boring Terminated with Standard Penetration Test Refusal at Elevation 633.3 ft On Crystalline Rock (GNEISS)	
															Deck to mudline: 36.0 ft Total casing: 42.0 ft Drill bit refusal at 5.0 ft BGS.	

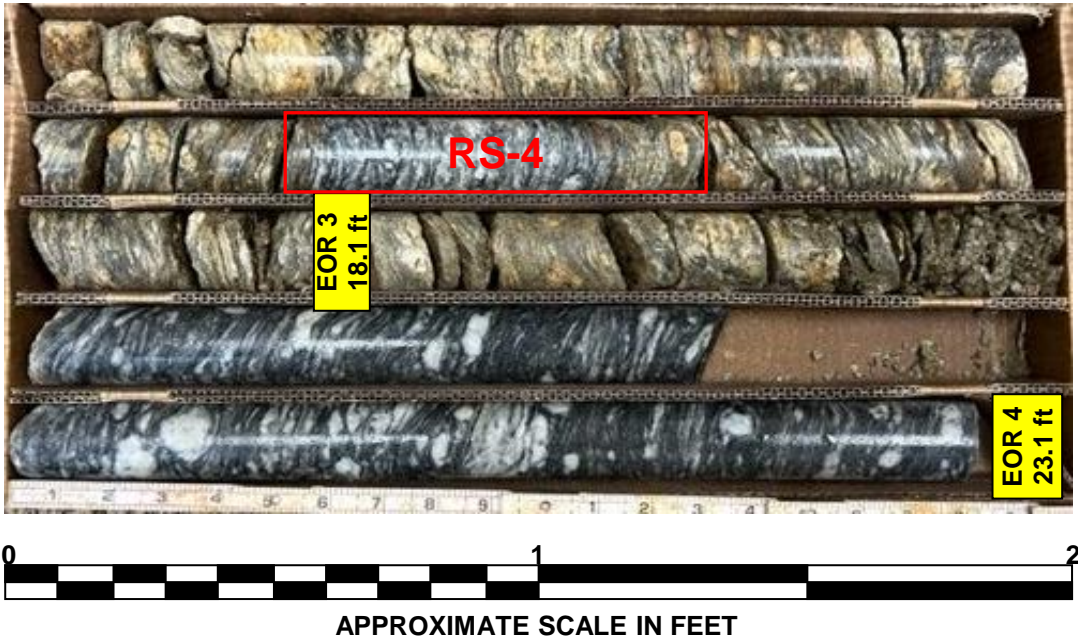
NCDOT BORE DOUBLE BR-0093_ASDRILLED_FINAL_GPJ_NC_DOT_GDT 6/22/23

CORE PHOTOGRAPH
REPLACE BRIDGE 780035 ON NC 770 OVER MAYO RIVER

B2-B
BOX 1 OF 2: 4.1 - 13.1 FEET



B2-B
BOX 2 OF 2: 13.1 - 23.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.									
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 19+29		OFFSET 11 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 672.3 ft		TOTAL DEPTH 39.0 ft		NORTHING 991,780		EASTING 1,720,570									
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Edmondson, J. M.		START DATE 04/25/23		COMP. DATE 04/25/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
675															
670	668.8	3.5	7	3	4									672.3 674.8	0.0 0.9
665	663.8	8.5	2	3	3									665.3	7.0
660	658.8	13.5	2	2	3										
655	653.8	18.5	1	1	3										
650	648.8	23.5	2	2	3									650.3	22.0
645	643.8	28.5	1	2	2										
640	638.8	33.5	12	16	23										
635	633.8 633.3	38.5 39.0	60/0.0 60/0.0											633.8 633.3	38.5 39.0

WBS 67093.1.1		TIP BR-0093		COUNTY ROCKINGHAM		GEOLOGIST Swafford, C.									
SITE DESCRIPTION Replace Bridge 780035 On NC 770 Over Mayo River							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 19+35		OFFSET 4 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 672.3 ft		TOTAL DEPTH 38.1 ft		NORTHING 991,767		EASTING 1,720,580									
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 84% 04/01/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Edmondson, J. M.		START DATE 04/24/23		COMP. DATE 04/24/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
675															
670	671.7	0.6	13	10	6									672.3 671.7	0.0 0.6
665	668.6	3.7	8	4	3									667.4	4.9
660	663.6	8.7	3	3	4										
655	658.6	13.7	1	1	2										
650	653.6	18.7	2	3	5										
645	648.6	23.7	2	3	4									650.3	22.0
640	643.6	28.7	2	2	1										
635	638.6 634.3	33.7 38.0	22 60/0.1	61	39/0.4									638.8	33.5

NCDOT BORE DOUBLE BR-0093_ASDRILLED_FINAL_GPJ_NC_DOT_GDT 6/22/23

SOIL TEST RESULTS

BORING ID	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C.SAND	F.SAND	SILT	CLAY	10	40	200		
EB1- A	SS- 25	7' LT	16+23	27.8- 29.3	A- 6(6)	35	14	8.7	38.8	24.1	28.5	100	97	61	26	-
EB1- A	SS- 26	7' LT	16+23	32.8- 34.3	A- 4(1)	33	4	11.2	45.3	29.3	14.1	99	94	53	32	-
EB1- B	SS- 15	8' RT	16+26	28.4- 29.9	A- 6(5)	33	12	7.8	40.8	24.4	27.0	95	93	57	25	-
EB2- B	SS- 7	7' RT	19+25	28.7- 30.3	A- 4(0)	28	3	4.4	58.9	22.5	14.2	100	100	47	32	-

REPORT ON SAMPLES OF: Rock for Quality (ASTM D 7012-14e1 Method C)
 T.I.P. ID NO.: BR-0093
 DESCRIPTION: Replace Bridge 780035 On NC 770 Over Mayo River
 PROJECT: BR-0093
 COUNTY: Rockingham
 DATE SAMPLED: 4/25/2023

BORING NO	SAMPLE NO	DEPTH (FT)	ROCK TYPE	LENGTH (IN)	DIAMETER (IN)	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (PSI)	SPLITTING TENSILE STRENGTH (PSI)	REMARKS
B1-A-b	RS-1	9.5-10.2	Gneiss	4.59	1.99	165.9	5,940	--	--	--
B1-A-b	RS-2	19.6-20.4	Gneiss	4.58	1.99	167.9	12,150	--	--	--
B2-B	RS-3	8.1-9.1	Gneiss	4.55	1.99	165.5	3,690	--	--	--
B2-B	RS-4	15.6-16.3	Gneiss	4.33	1.99	164.9	7,280	--	--	--

SITE PHOTOGRAPH
REPLACE BRIDGE 780035 ON NC 770 OVER MAYO RIVER

