

REFERENCE: BR-0043

PROJECT: 67043

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM
SITE DESCRIPTION REPLACE BRIDGE 780151 ON
US 15&NC 14 OVER US 29

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0043	1	21

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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

C. Ranieri, GIT

S. Davis

T. Beard

INVESTIGATED BY F&R, Inc.

DRAWN BY T.T. Walker

CHECKED BY P. Alton P.E.

SUBMITTED BY C. Wang, P.E.

DATE October 2022

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Cheng Wang

12/12/2022

1711224BFB39610

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

Table with 4 main columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. Includes sub-sections like SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, and COLOR.

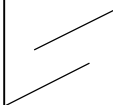
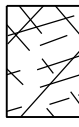
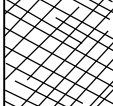
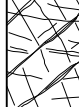



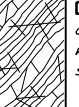

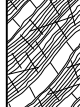


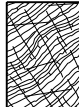

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

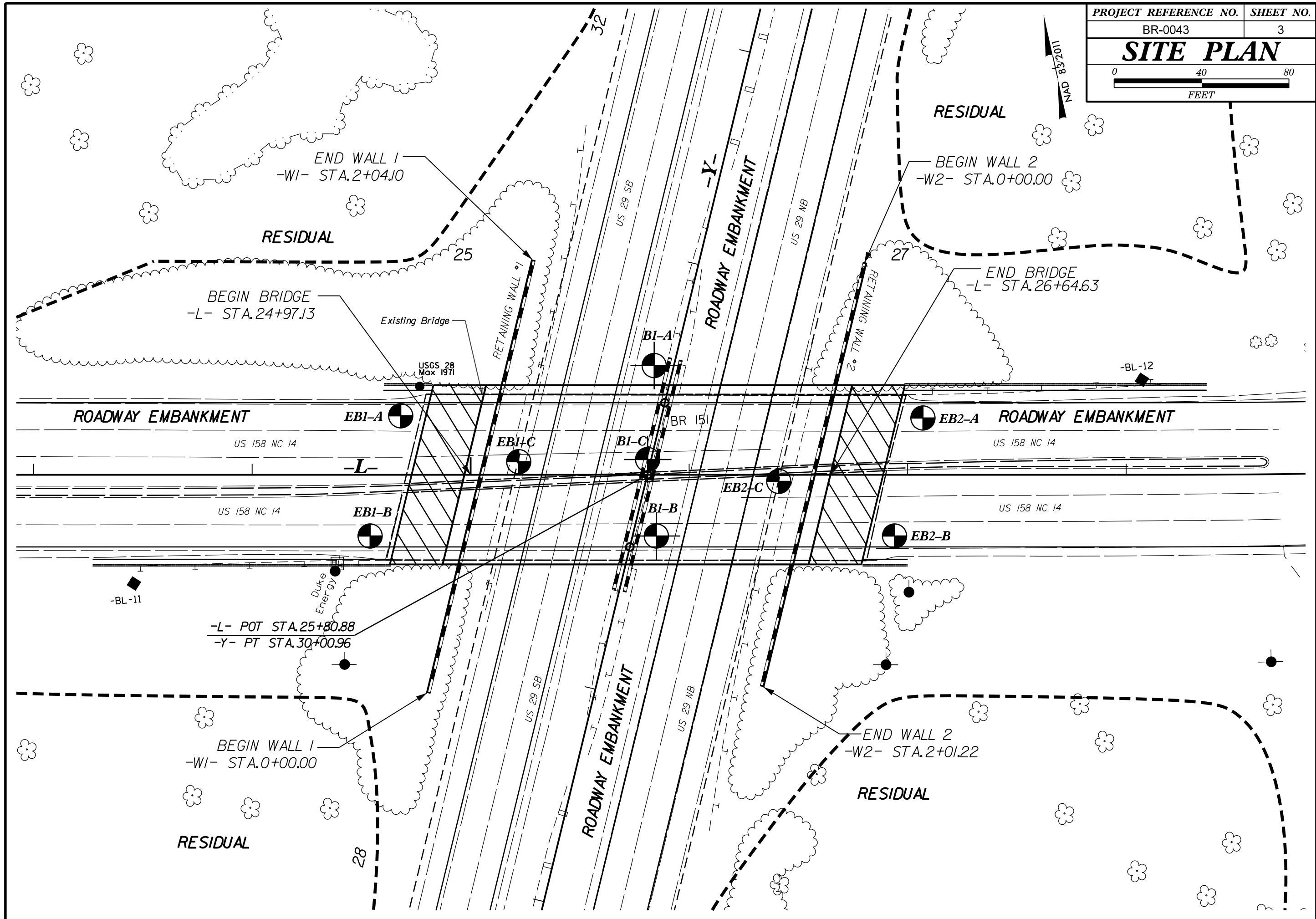
SUBSURFACE INVESTIGATION

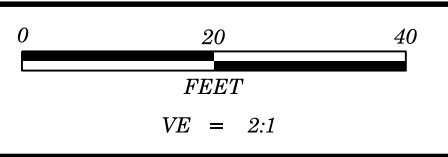
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

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

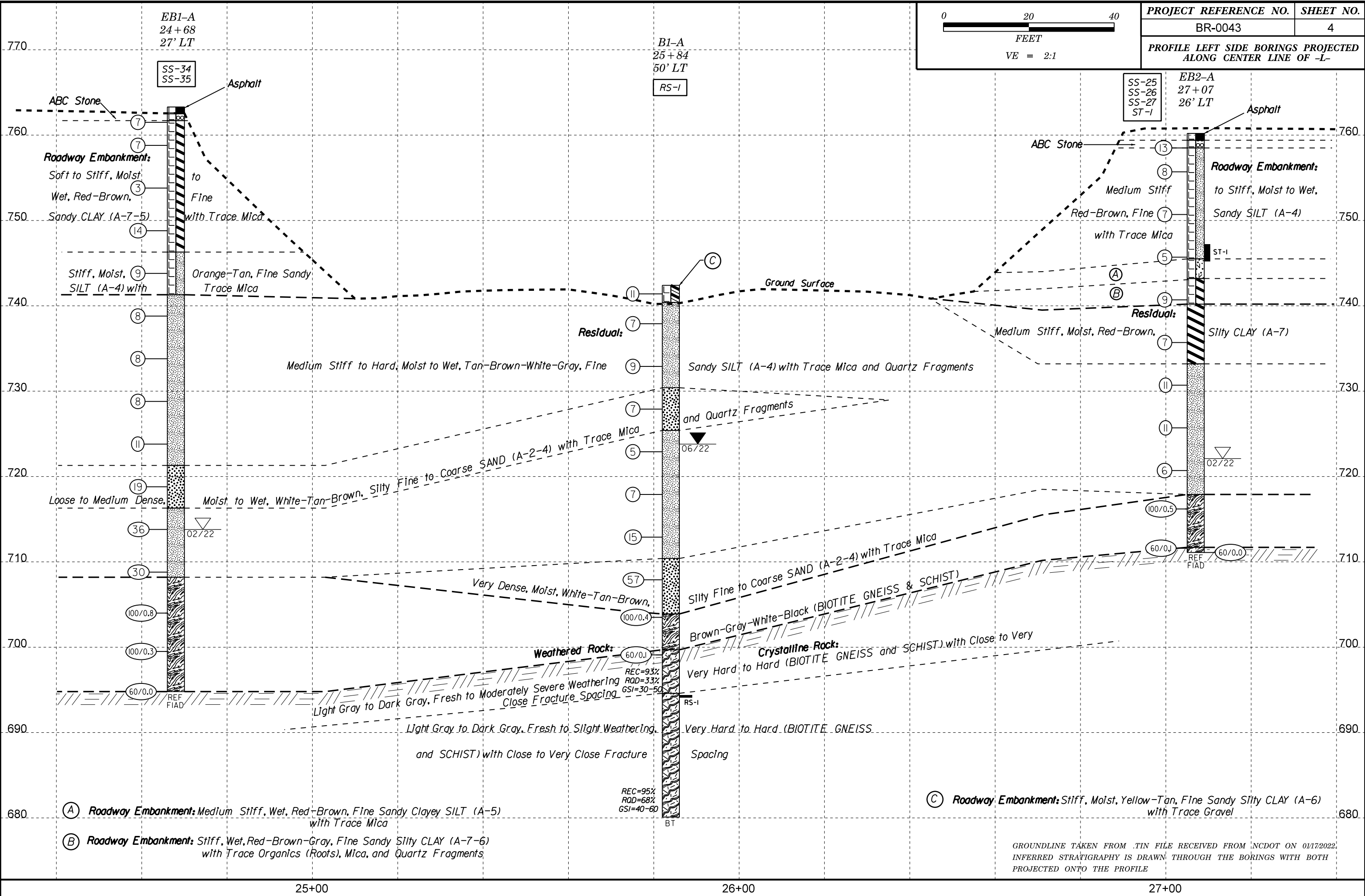
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

	SURFACE CONDITIONS						SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	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	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)	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
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.	DECREASING SURFACE QUALITY →					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.					
STRUCTURE						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	70				 B. Sandstone with thin inter-layers of siltstone	60	50	40	30	20
 VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		60	50			 C. Sandstone and siltstone in similar amounts		40	30	20	10
 BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			40	30		 D. Siltstone or silty shale with sandstone layers			30	20	10
 DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				20		 E. Weak siltstone or clayey shale with sandstone layers				20	10
 LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A				 F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure				10	
				10		 G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers					
				10		 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.					
						→ Means deformation after tectonic disturbance					





PROJECT REFERENCE NO.	SHEET NO.
BR-0043	4
PROFILE LEFT SIDE BORINGS PROJECTED ALONG CENTER LINE OF -L-	



(A) Roadway Embankment: Medium Stiff, Wet, Red-Brown, Fine Sandy Clayey SILT (A-5) with Trace Mica

(B) Roadway Embankment: Stiff, Wet, Red-Brown-Gray, Fine Sandy Silty CLAY (A-7-6) with Trace Organics (Roots), Mica, and Quartz Fragments

(C) Roadway Embankment: Stiff, Moist, Yellow-Tan, Fine Sandy Silty CLAY (A-6) with Trace Gravel

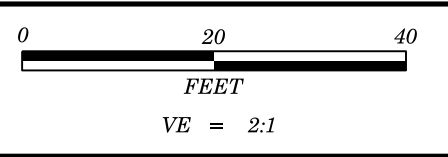
REC=95%
ROD=68%
GSI=40-60

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT ON 01/17/2022.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE PROFILE

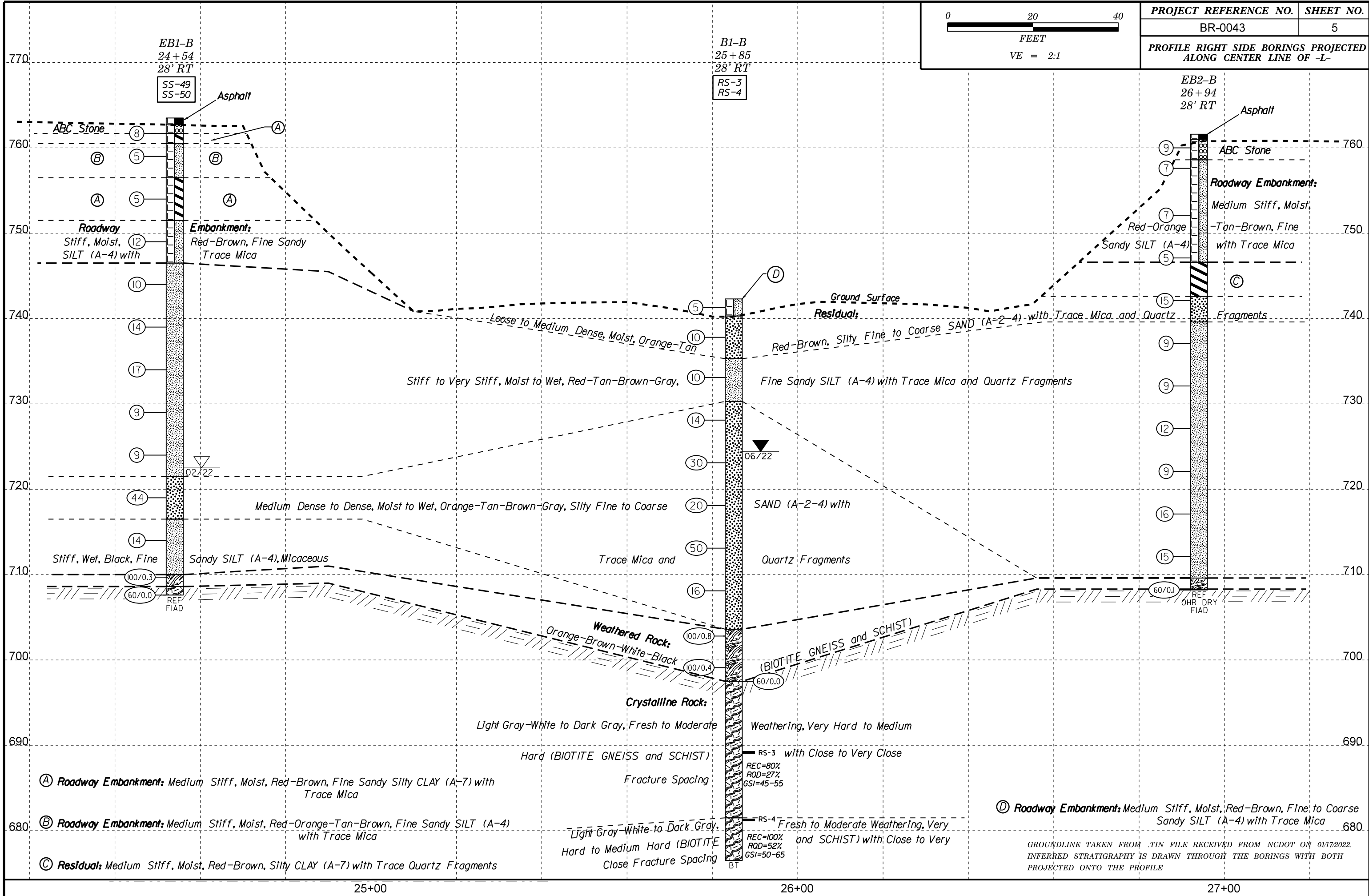
25+00

26+00

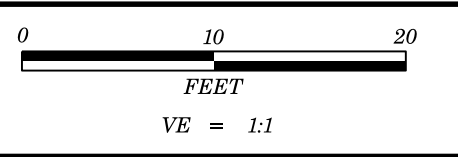
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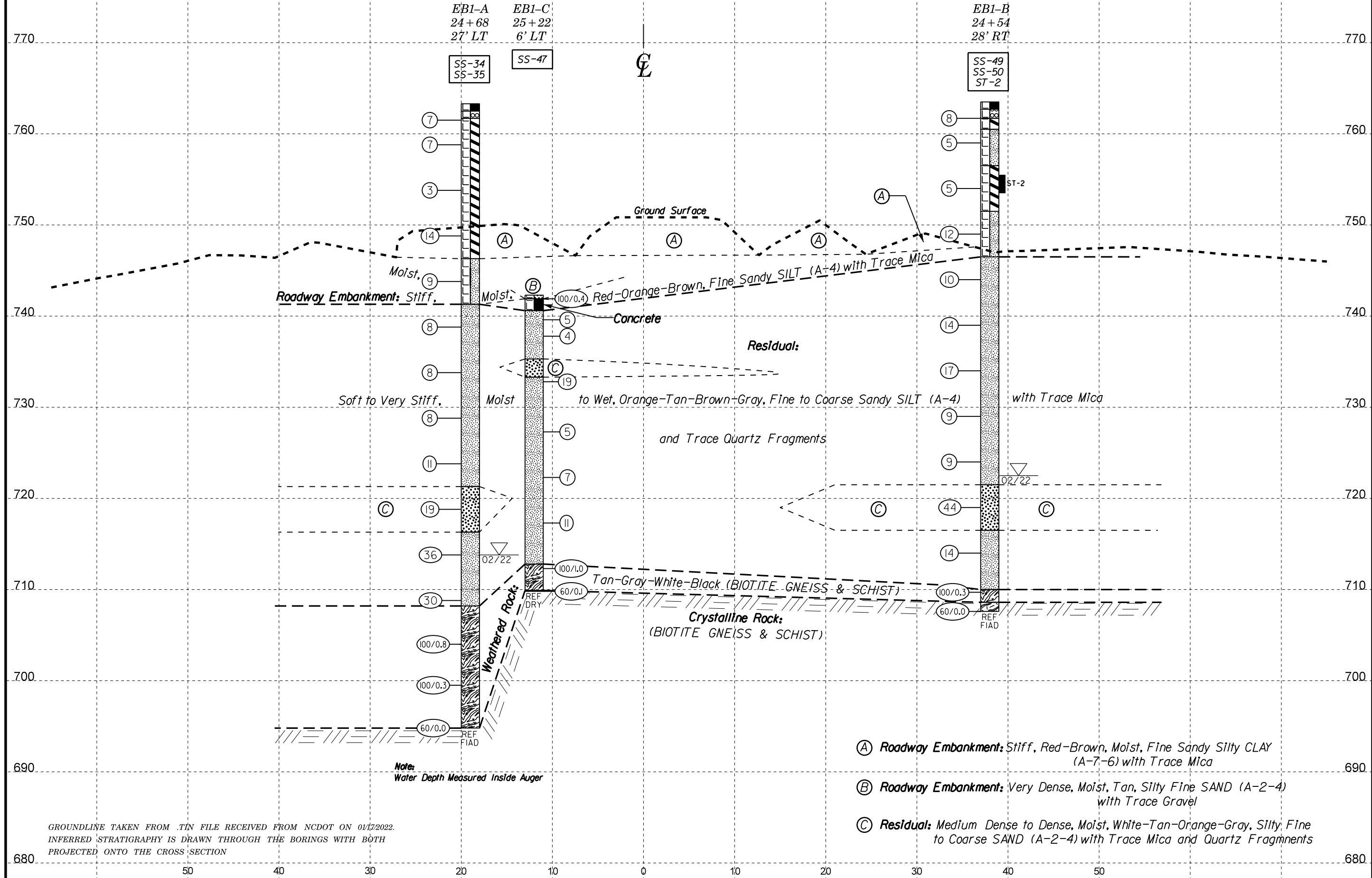
PROJECT REFERENCE NO.	SHEET NO.
BR-0043	5
PROFILE RIGHT SIDE BORINGS PROJECTED ALONG CENTER LINE OF -L-	



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT ON 01/17/2022. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE



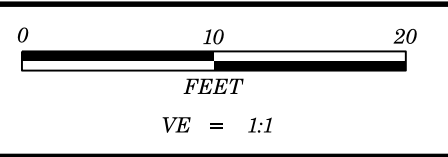
PROJECT REFERENCE NO.	SHEET NO.
BR-0043	6
CROSS SECTION THROUGH END BENT 1	
AT -L- STATION 24+97.13	
SKEW=103.64°	



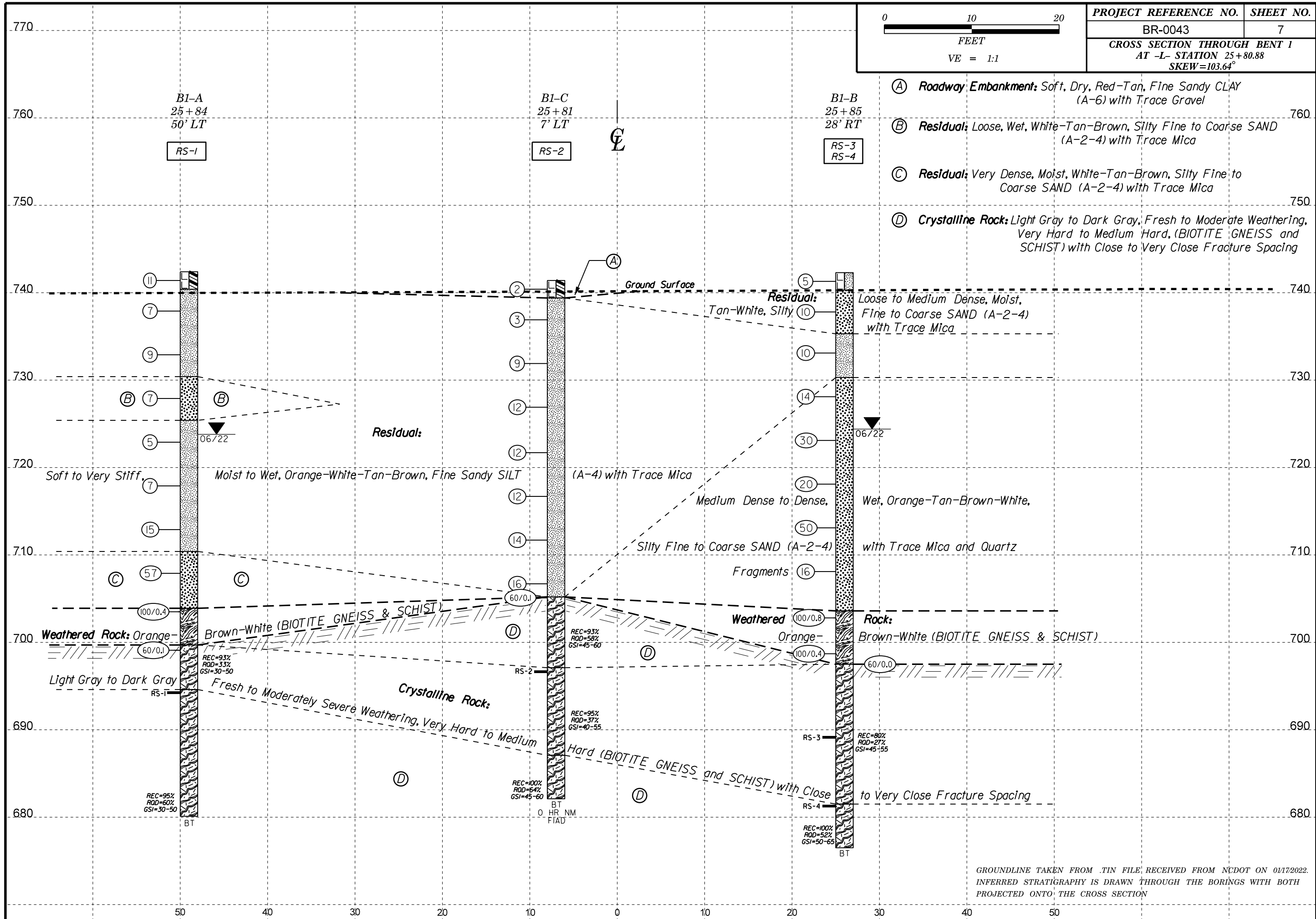
Note:
Water Depth Measured Inside Auger

- (A) **Roadway Embankment:** Stiff, Red-Brown, Moist, Fine Sandy Silty CLAY (A-7-6) with Trace Mica
- (B) **Roadway Embankment:** Very Dense, Moist, Tan, Silty Fine SAND (A-2-4) with Trace Gravel
- (C) **Residual:** Medium Dense to Dense, Moist, White-Tan-Orange-Gray, Silty, Fine to Coarse SAND (A-2-4) with Trace Mica and Quartz Fragments

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT ON 01/17/2022.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

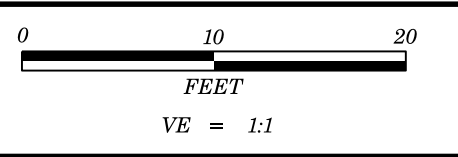


PROJECT REFERENCE NO.	SHEET NO.
BR-0043	7
CROSS SECTION THROUGH BENT 1	
AT -L- STATION 25+80.88	
SKEW=103.64°	

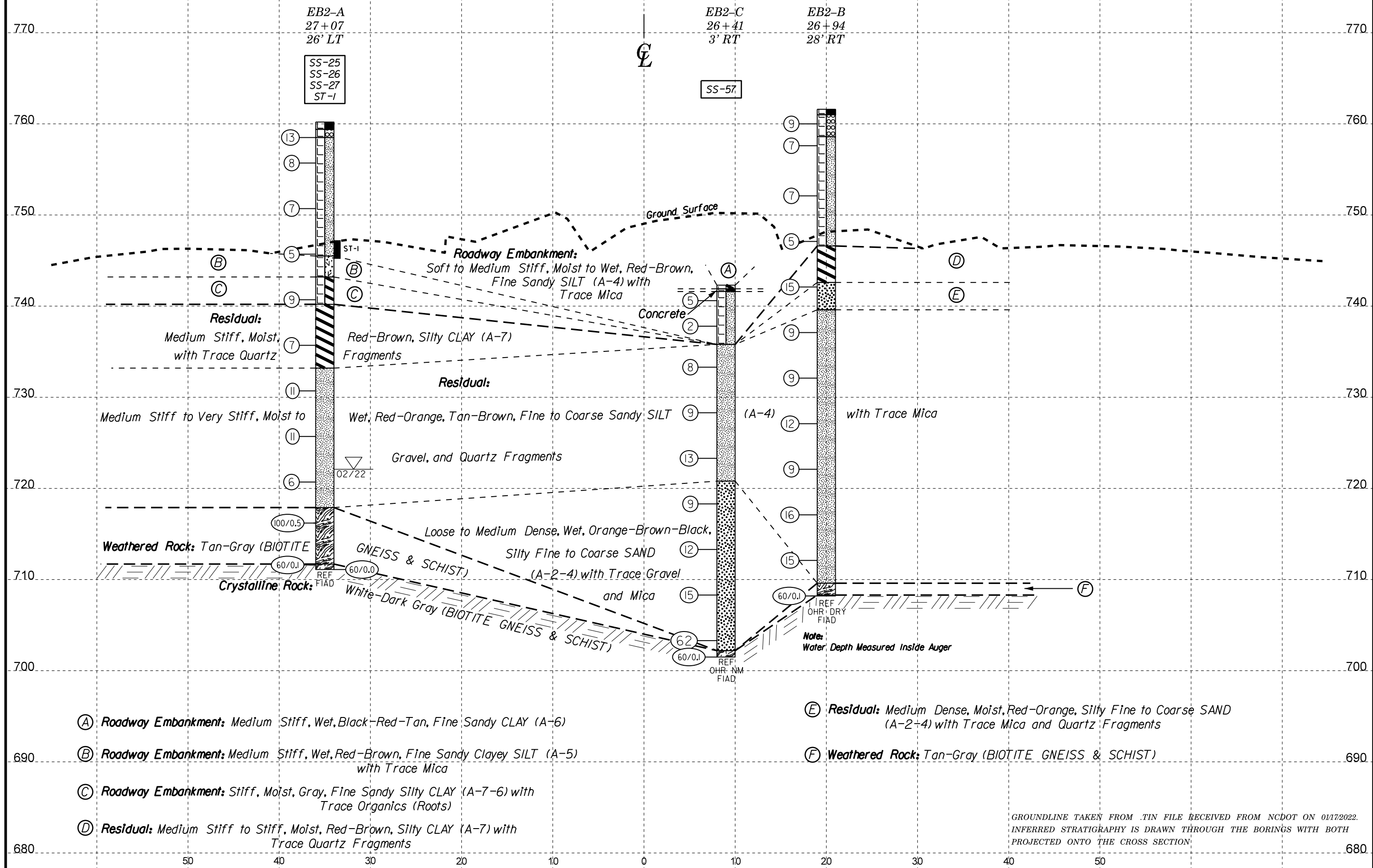


- (A) **Roadway Embankment:** Soft, Dry, Red-Tan, Fine Sandy CLAY (A-6) with Trace Gravel
- (B) **Residual:** Loose, Wet, White-Tan-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica
- (C) **Residual:** Very Dense, Moist, White-Tan-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica
- (D) **Crystalline Rock:** Light Gray to Dark Gray, Fresh to Moderate Weathering, Very Hard to Medium Hard, (BIOTITE GNEISS and SCHIST) with Close to Very Close Fracture Spacing

GROUNDLINE TAKEN FROM .TIN FILE, RECEIVED FROM NCDOT ON 01/17/2022. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION



PROJECT REFERENCE NO.	SHEET NO.
BR-0043	8
CROSS SECTION THROUGH END BENT 2	
AT -L- STATION 26+64.63	
SKEW=103.64°	



- (A) **Roadway Embankment:** Medium Stiff, Wet, Black-Red-Tan, Fine Sandy CLAY (A-6)
- (B) **Roadway Embankment:** Medium Stiff, Wet, Red-Brown, Fine Sandy Clayey SILT (A-5) with Trace Mica
- (C) **Roadway Embankment:** Stiff, Moist, Gray, Fine Sandy Silty CLAY (A-7-6) with Trace Organics (Roots)
- (D) **Residual:** Medium Stiff to Stiff, Moist, Red-Brown, Silty CLAY (A-7) with Trace Quartz Fragments

- (E) **Residual:** Medium Dense, Moist, Red-Orange, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Quartz Fragments
- (F) **Weathered Rock:** Tan-Gray (BIOTITE GNEISS & SCHIST)

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT ON 01/17/2022. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri										
SITE DESCRIPTION Bridge No. 151 on US 158 over US 29							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 24+68		OFFSET 27 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 763.3 ft		TOTAL DEPTH 68.5 ft		NORTHING 950,680		EASTING 1,815,122										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 02/01/22		COMP. DATE 02/01/22		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						
765																
	762.5	0.8	14	4	3											
760	759.8	3.5	2	3	4											
755	754.8	8.5	1	1	2											
750	749.8	13.5	4	6	8											
745	744.8	18.5	3	4	5											
740	739.8	23.5	3	3	5											
735	734.8	28.5	3	4	4											
730	729.8	33.5	3	3	5											
725	724.8	38.5	3	5	6											
720	719.8	43.5	2	7	12											
715	714.8	48.5	8	17	19											
710	709.8	53.5	14	13	17											
705	704.8	58.5	60	40/0.3												
700	699.8	63.5	100/0.3													
695	694.8	68.5	60/0.0													

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri										
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29							GROUND WTR (ft)									
BORING NO. EB1-C		STATION 25+22		OFFSET 6 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 742.3 ft		TOTAL DEPTH 32.5 ft		NORTHING 950,648		EASTING 1,815,170										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 06/27/22		COMP. DATE 06/27/22		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						
745																
	742.3	0.0														
740	740.6	1.7	100/0.4													
735	738.8	3.5	2	2	2											
730	733.8	8.5	9	9	10											
725	728.3	14.0	2	2	3											
720	723.3	19.0	2	3	4											
715	718.3	24.0	3	4	7											
710	713.3	29.0	19	27	73/0.5											
	709.9	32.4	60/0.1													

NCDOT BORE DOUBLE BR0043_GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

Notes:
 1. Concrete: 0.4'-1.7'
 2. Hard Drilling Indicated by Driller at 26.5'
 3. Tricone Bit Refusal at 32.4'
 4. Casing Advancer was used to Break Through Concrete Footing Near Ground Surface

Notes:
 1. Harder drilling indicated by driller at 55.1'
 2. Water observed in auger at 49.5' immediately after drilling

GEOTECHNICAL BORING REPORT BORE LOG

WBS 67043.1.1	TIP BR-0043	COUNTY ROCKINGHAM	GEOLOGIST C. Ranieri
SITE DESCRIPTION Bridge No. 151 on US 158 over US 29			GROUND WTR (ft)
BORING NO. EB1-B	STATION 24+54	OFFSET 28 ft RT	ALIGNMENT -L-
COLLAR ELEV. 763.5 ft	TOTAL DEPTH 55.9 ft	NORTHING 950,629	EASTING 1,815,096
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	START DATE 02/02/22	COMP. DATE 02/02/22	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)
765															
	762.7	0.8	6	5	3	8						M	763.5 GROUND SURFACE 0.0		
													762.7 ASPHALT 0.8		
													761.7 ROADWAY EMBANKMENT 1.8		
760	760.0	3.5	2	2	3	5						SS-49 29%	760.5 ABC Stone 3.0		
													756.5 Red-Brown, Fine Sandy Silty CLAY (A-7) with Trace Mica 7.0		
755	755.0	8.5	3	2	3	5						ST-2 32%	756.5 Red-Brown, Fine to Coarse Sandy SILT (A-4) with Trace Mica 7.0		
												SS-50 W	751.5 Red-Brown, Fine to Coarse Sandy Silty CLAY (A-7-5) with Trace Mica 12.0		
750	750.0	13.5	4	5	7	12						M	751.5 Red-Brown, Fine Sandy SILT (A-4) with Trace Mica 12.0		
													746.5 RESIDUAL 17.0		
745	745.0	18.5	2	5	5	10						M	Tan-Brown-Gray, Fine Sandy SILT (A-4) with Trace Mica		
740	740.0	23.5	3	6	8	14						M			
735	735.0	28.5	6	8	9	17						M			
730	730.0	33.5	4	4	5	9						M			
725	725.0	38.5	3	4	5	9						M			
720	720.0	43.5	16	19	25	44						M	721.5 Tan-Orange-Gray, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Quartz Fragments 42.0		
													716.5 Black, Fine Sandy SILT (A-4), Micaceous 47.0		
715	715.0	48.5	5	6	8	14						W			
710	710.0	53.5	100/0.3										710.0 WEATHERED ROCK 53.5		
	707.6	55.9	60/0.0										708.6 Black (BIOTITE GNEISS and SCHIST) 54.9		
													707.6 CRYSTALLINE ROCK (BIOTITE GNEISS and SCHIST) 55.9		

NCDOT BORE DOUBLE BR0043_GEO_BH_BRDGG.PJ_NC_DOT.GDT 8/4/22

Notes:
 1. Harder drilling indicated by driller at 54.9'
 2. Auger refusal at 55.9'
 3. Shelby Tube (ST-2) Obtained at 24+52, 28' RT

Other Samples:
 ST-2 (8.0 - 10.0)

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri											
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29							GROUND WTR (ft)										
BORING NO. B1-A		STATION 25+84		OFFSET 50 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 742.4 ft		TOTAL DEPTH 62.3 ft		NORTHING 950,677		EASTING 1,815,240											
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic											
DRILLER S. Davis		START DATE 06/21/22		COMP. DATE 06/21/22		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
745																	
	742.4	0.0	4	5	6										742.4	0.0	GROUND SURFACE
															740.4	2.0	ROADWAY EMBANKMENT Yellow-Tan, Fine Sandy Silty CLAY (A-6) with Trace Gravel
740	738.9	3.5	3	3	4												RESIDUAL Yellow-Tan, Fine Sandy SILT (A-4) with Trace Roots and Mica
735	733.9	8.5	3	4	5												
730	728.9	13.5	2	3	4												White-Tan-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica
725	723.9	18.5	2	2	3												White-Tan-Brown, Fine Sandy SILT (A-4) with Trace Mica
720	718.9	23.5	2	3	4												
715	713.9	28.5	4	6	9												
710	708.9	33.5	13	21	36												White-Tan-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica
705	703.9	38.5	100/0.4														WEATHERED ROCK Orange-Brown-White (BIOTITE GNEISS and SCHIST)
700	699.2	43.2	60/0.1														CRYSTALLINE ROCK Light Gray-White to Dark Gray (BIOTITE GNEISS and SCHIST)
695																	Light Gray-White to Dark Gray (BIOTITE GNEISS and SCHIST)
690																	
685																	
																	Boring Terminated at Elevation 680.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS & SCHIST)

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri					
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29							GROUND WTR (ft)				
BORING NO. B1-A		STATION 25+84		OFFSET 50 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 742.4 ft		TOTAL DEPTH 62.3 ft		NORTHING 950,677		EASTING 1,815,240					
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic					
DRILLER S. Davis		START DATE 06/21/22		COMP. DATE 06/21/22		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 19.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (%)	ROD (%)		REC. (%)	ROD (%)		
699.1	699.1	43.3	4.0	1:40/1.0 1:30/1.0 1:10/1.0 1:32/1.0	(3.8) 95%	(1.5) 38%		(4.2) 93%	(1.5) 33%		Begin Coring @ 43.3 ft
695	695.1	47.3	5.0	1:10/1.0 1:39/1.0 1:50/1.0 1:47/1.0	(4.4) 88%	(3.1) 62%	RS-1	(13.8) 95%	(9.9) 68%		Light Gray to Dark Gray, Fresh to Moderately Severe Weathering, Very Hard to Hard (BIOTITE GNEISS) with Close to Very Close Fracture Spacing GSI=30-50
690	690.1	52.3	5.0	1:37/1.0 1:49/1.0 1:58/1.0 1:55/1.0	(4.8) 96%	(3.5) 70%					Light Gray to Dark Gray, Fresh to Slight Weathering, Very Hard to Hard (BIOTITE GNEISS and SCHIST) with Close to Very Close Fracture Spacing RS-1: 48.0'-48.3', qu=5,015 psi, GSI=40-60
685	685.1	57.3	5.0	1:43/1.0 1:42/1.0 1:43/1.0 1:52/1.0 2:28/1.0	(5.0) 100%	(3.3) 66%					
	680.1	62.3									Boring Terminated at Elevation 680.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS & SCHIST)

NCDOT BORE DOUBLE BR0043_GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

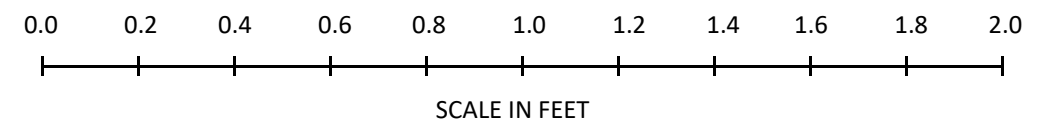
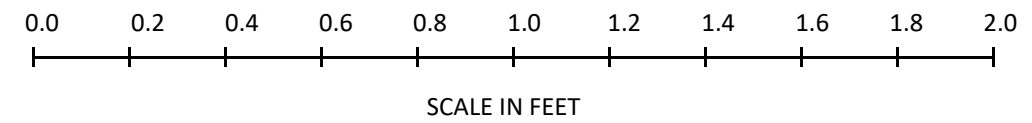
NCDOT BORE DOUBLE BR0043_GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

- Notes:
1. Surficial Organic Soil: 0.0-0.2'
 2. Harder Drilling indicated by driller at 42.7'
 3. Auger Refusal at 43.2'
 4. Start Coring at 43.3'
 5. 0 HR Water Level Not Measured due to Water being introduced for coring

- Notes:
1. Surficial Organic Soil: 0.0-0.2'
 2. Harder Drilling indicated by driller at 42.7'
 3. Auger Refusal at 43.2'
 4. Start Coring at 43.3'
 5. 0 HR Water Level Not Measured due to Water being introduced for coring

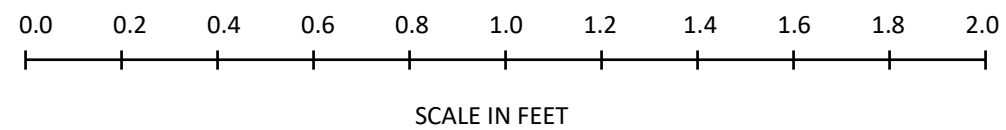
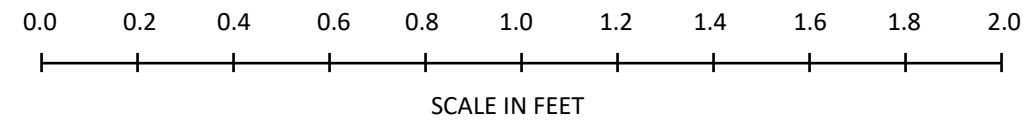
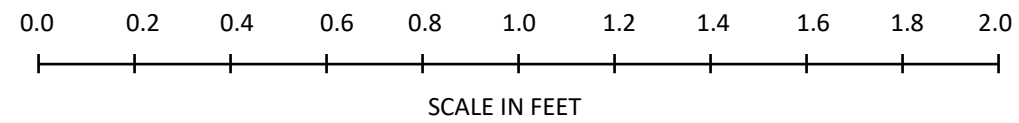


**CORE PHOTOGRAPHS:
BR-0043 | 67043.1.1
B1-A: -L- Station 25+84, 50' LT**





**CORE PHOTOGRAPHS:
BR-0043 | 67043.1.1
B1-C : -L- Station 25+81, 7' LT**



GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67043.1.1			TIP BR-0043			COUNTY ROCKINGHAM			GEOLOGIST C. Ranieri						
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29								GROUND WTR (ft)							
BORING NO. B1-B		STATION 25+85		OFFSET 28 ft RT		ALIGNMENT -L-		0 HR. NM							
COLLAR ELEV. 742.3 ft		TOTAL DEPTH 65.8 ft		NORTHING 950,601		EASTING 1,815,224		24 HR. 17.9							
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021				DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic							
DRILLER S. Davis			START DATE 06/28/22			COMP. DATE 06/28/22			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					
745															
740	742.3	0.0	1	2	3	5							M	742.3	0.0
740	738.8	3.5	3	5	5	10							M	740.3	2.9
735	734.1	8.2	3	4	6	10							M	735.3	7.0
730	729.1	13.2	4	6	8	14							W	730.3	12.0
725	724.1	18.2	5	14	16	30							W		
720	719.1	23.2	6	8	12	20							W		
715	714.1	28.2	21	27	23	50							W		
710	709.1	33.2	7	7	9	16							W		
705	704.1	38.2	28	50	50/0.3										
700	699.1	43.2				100/0.8									
	697.5	44.8	100/0.4			100/0.4									
			60/0.0			60/0.0									
695															
690															
685															
680															

WBS 67043.1.1			TIP BR-0043			COUNTY ROCKINGHAM			GEOLOGIST C. Ranieri			
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29										GROUND WTR (ft)		
BORING NO. B1-B		STATION 25+85		OFFSET 28 ft RT		ALIGNMENT -L-		0 HR. NM				
COLLAR ELEV. 742.3 ft		TOTAL DEPTH 65.8 ft		NORTHING 950,601		EASTING 1,815,224		24 HR. 17.9				
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021				DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic				
DRILLER S. Davis			START DATE 06/28/22			COMP. DATE 06/28/22			SURFACE WATER DEPTH N/A			
CORE SIZE NQ			TOTAL RUN 21.0 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. (%)	ROD (%)		REC. (%)	ROD (%)			
697.5	697.5	44.8	1.0	N=60/0.0 1:40/1.0	(1.0)	(0.0)		(12.8)	(4.3)		697.5	44.8
	686.5	45.8	5.0	1:22/1.0 1:22/1.0 1:20/1.0 1:59/1.0 2:31/1.0	100%	0%		80%	27%			
695												
	691.5	50.8	5.0	1:58/1.0 1:31/1.0 1:24/1.0 1:24/1.0 1:46/1.0	(4.3)	(1.8)	RS-3					
690												
	686.5	55.8	5.0	1:26/1.0 1:30/1.0 1:12/1.0 1:24/1.0 3:55/1.0	(2.9)	(1.1)						
685												
	681.5	60.8	5.0	2:11/1.0 1:57/1.0 2:07/1.0 1:59/1.0 2:09/1.0	(5.0)	(2.6)	RS-4	(5.0)	(2.6)		681.5	60.8
680												
	676.5	65.8									676.5	65.8

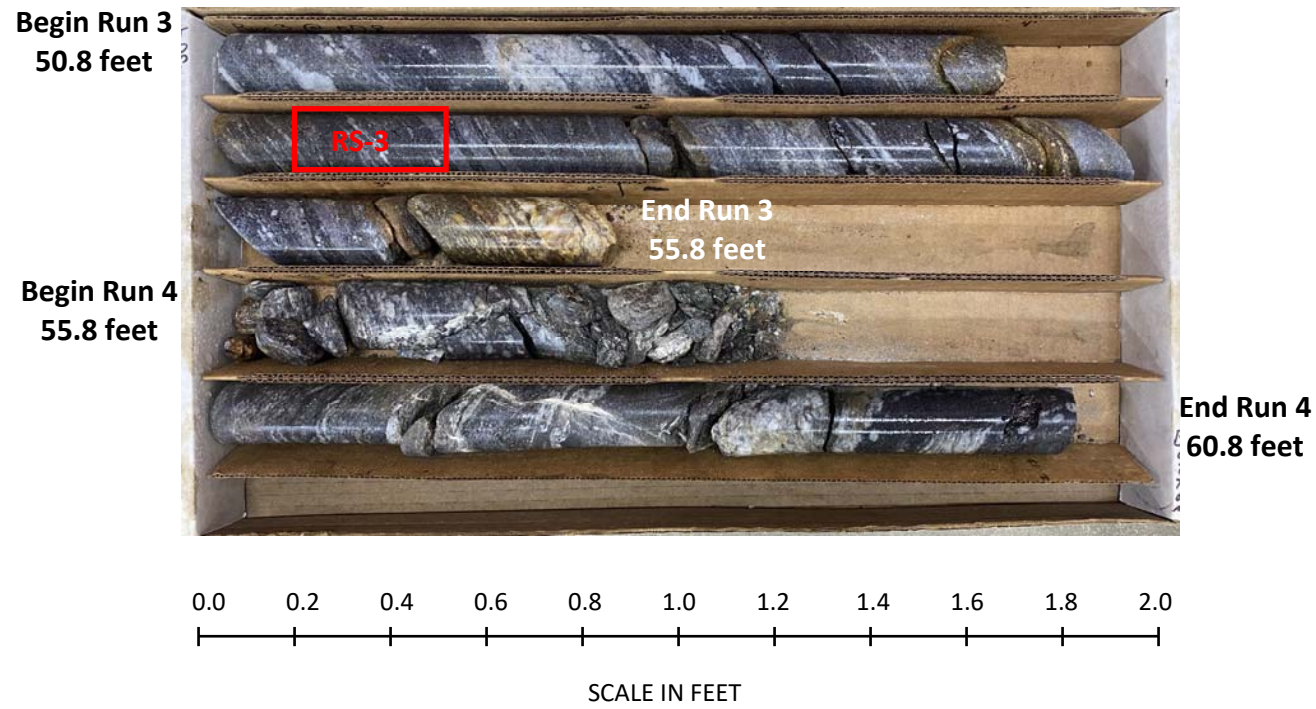
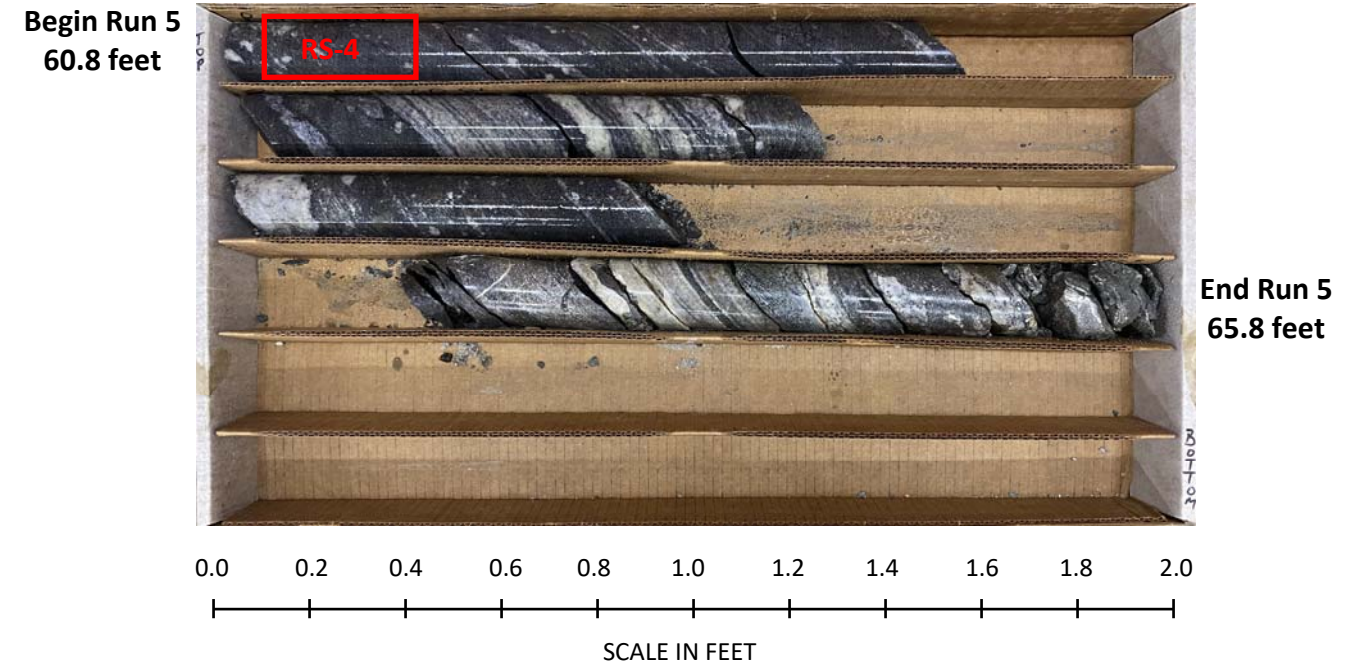
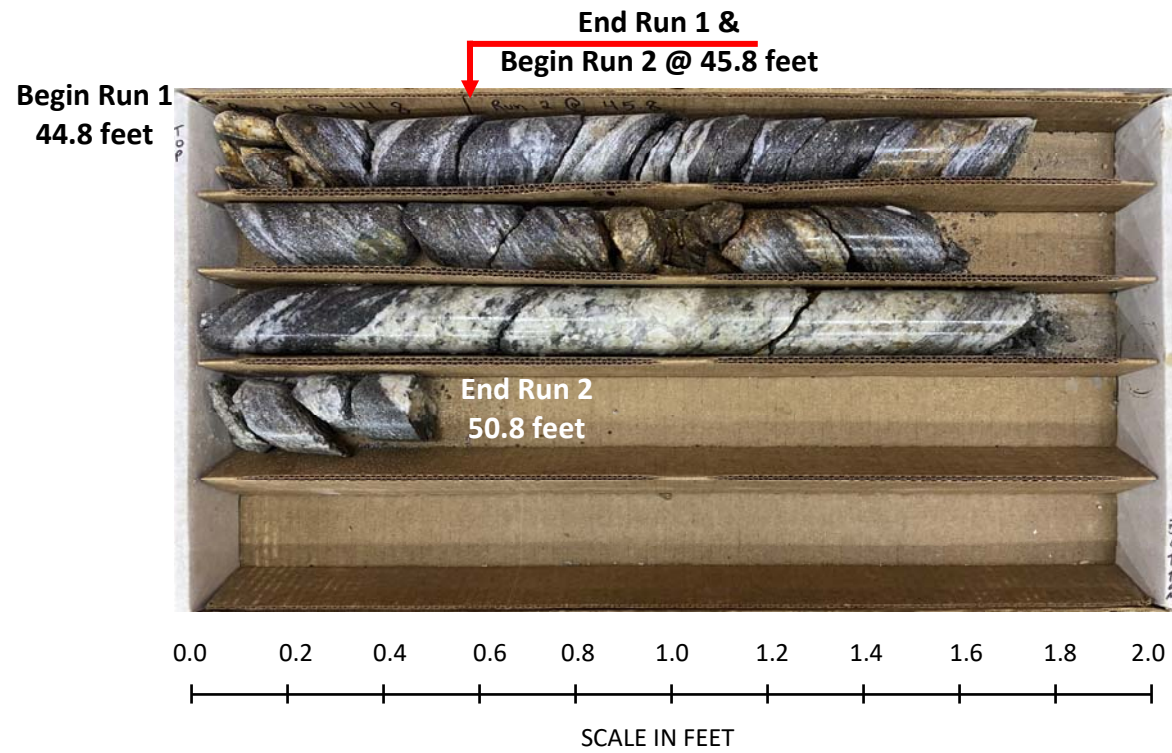
NCDOT BORE DOUBLE BR0043_GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

NCDOT BORE DOUBLE BR0043_GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

Notes:
 1. Tricone Bit Refusal at 44.8'
 2. Start Coring at 44.8'
 3. 0hr water level not measured due to water being introduced for coring



**CORE PHOTOGRAPHS:
BR-0043 | 67043.1.1
B1-B : -L- Station 25+85, 28' RT**



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri										
SITE DESCRIPTION Bridge No. 151 on US 158 over US 29							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 27+07		OFFSET 26 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 760.2 ft		TOTAL DEPTH 49.1 ft		NORTHING 950,628		EASTING 1,815,355										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 02/01/22		COMP. DATE 02/01/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
765																
760	759.5	0.7	15	9	4										760.2	GROUND SURFACE
															759.4	ASPHALT
	756.7	3.5	2	3	5										758.5	ROADWAY EMBANKMENT ABC Stone
755																Red-Brown, Fine to Coarse Sandy SILT (A-4) with Trace Mica
	751.7	8.5	3	3	4											
750																
	746.7	13.5	2	2	3											
745															745.5	Red-Brown, Fine Sandy Clayey SILT (A-5) with Trace Mica
	741.7	18.5	3	4	5										743.2	Red-Brown-Gray, Fine to Coarse Sandy Silty CLAY (A-7-6) with Trace Organics (Roots), Mica, and Quartz Fragments
740															740.2	RESIDUAL Red-Brown, Silty CLAY (A-7)
	736.7	23.5	2	3	4											
735																
	731.7	28.5	8	5	6										733.2	Red-Tan-Brown, Fine Sandy SILT (A-4) with Trace Mica and Gravel
730																
	726.7	33.5	3	4	7											
725																
	721.7	38.5	1	2	4											
720																
	716.7	43.5	100/0.5												717.9	WEATHERED ROCK Tan-Gray (BIOTITE GNEISS and SCHIST)
715																
	711.7	48.5	60/0.1												711.7	CRYSTALLINE ROCK Dark Gray (BIOTITE GNEISS and SCHIST)
	711.1	49.1	60/0.0												711.1	CRYSTALLINE ROCK Dark Gray (BIOTITE GNEISS and SCHIST)

WBS 67043.1.1		TIP BR-0043		COUNTY ROCKINGHAM		GEOLOGIST C. Ranieri										
SITE DESCRIPTION Replace Bridge 780151 on US 158/NC14 over US 29							GROUND WTR (ft)									
BORING NO. EB2-C		STATION 26+41		OFFSET 3 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 742.3 ft		TOTAL DEPTH 40.8 ft		NORTHING 950,613		EASTING 1,815,284										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 97% 04/30/2021				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 06/29/22		COMP. DATE 06/29/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
745																
	741.6	0.7	3	2	3										742.3	GROUND SURFACE
740															741.6	ROADWAY EMBANKMENT Black-Red-Tan, Fine Sandy CLAY (A-6)
	738.8	3.5	WOH	1	1											CONCRETE Brown-Red, Fine to Coarse Sandy SILT (A-4) with Trace Mica
735																
	734.3	8.0	3	3	5											
730																
	729.3	13.0	4	4	5											
725																
	724.3	18.0	6	5	8											
720																
	719.3	23.0	3	3	6											
715																
	714.3	28.0	4	5	7											
710																
	709.3	33.0	6	5	10											
705																
	704.3	38.0	21	28	34											
	701.6	40.7	60/0.1												702.2	CRYSTALLINE ROCK White (BIOTITE GNEISS AND SCHIST)
															701.5	CRYSTALLINE ROCK White (BIOTITE GNEISS AND SCHIST)

NCDOT BORE DOUBLE BR0043 GEO_BH_BRDG.GPJ NC_DOT.GDT 8/4/22

Notes:
 1. Harder drilling indicated by driller at 42.3'
 2. Auger refusal at 49.1'
 3. Shelby Tube (ST-1) obtained at 27+09, 26' LT

Other Samples:
 ST-1 (13.0 - 15.0)

Notes:
 1. Hard Drilling Indicated by Driller from 40.1'-40.7'
 2. Tricone Bit Refusal at 40.7'
 3. Casing Advancer was used to Break Through Concrete Near Ground Surface



PROJECT REFERENCE NO.	SHEET NO.
67043.1.1	19

County: Rockingham

Description: Bridge No. 151 on US 158 over US 29

SOIL TEST RESULTS																
SAMPLE NO.	-L- STATION	LOCATION	OFFSET *	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-34	24+68	EB1-A	27' LT	3.5-5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	24.7	NT
SS-35	24+68	EB1-A	27' LT	8.5-10.0	A-7-5 (13)	61	20	17.7	26.0	18.5	37.8	99.9	95.5	61.6	NT	NT
SS-47	25+22	EB1-C	6' LT	3.5-5.0	A-4 (0)	NP	NP	22.4	30.7	18.6	28.3	94.8	81.7	51.0	37.2	NT
SS-49	24+54	EB1-B	28' RT	3.5-5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	28.6	NT
SS-50	24+54	EB1-B	28' RT	8.5-10.0	A-7-5 (16)	60	25	16.5	25.1	14.7	43.7	99.7	91.0	62.7	NT	NT
ST-2	24+52	EB1-B	28' RT	8.0-10.0	A-7-5 (13)	61	17	9.9	32.8	20.8	36.5	100.0	95.5	64.0	31.6	NT
SS-25	27+07	EB2-A	26' LT	3.5-5.0	A-4 (0)	NP	NP	15.5	40.9	21.9	21.7	99.2	91.6	51.5	24.9	NT
SS-26	27+07	EB2-A	26' LT	14.7-15.0	ND	55	9	NT	NT	NT	NT	NT	NT	NT	32.9	NT
SS-27	27+07	EB2-A	26' LT	18.5-20.0	A-7-6 (8)	44	21	19.8	30.9	13.0	36.3	96.6	86.3	51.9	26.4	NT
ST-1	27+09	EB2-A	26' LT	13.0-15.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SS-57	26+41	EB2- C	3' RT	3.5-5.0	A-4 (0)	NP	NP	27.7	25.3	19.4	27.6	96.1	77.3	48.9	35.6	NT

NP = Not Plastic
 NT = Not Tested
 ND = Not Determined

D. Council
 Lab Manager, Certification No. 101-02-0603

C.Wang, P.E.
 Soils Engineer



PROJECT REFERENCE NO.	SHEET NO.
67043.1.1	20

County: Rockingham

Description: Bridge No. 151 on US 158 over US 29

ROCK TEST RESULTS														
SAMPLE NO.	BORING NO.	ALIGNMENT	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus E (ksi)	GSI
RS-1	B1-A	-L-	25+84	50' Lt.	48.0 - 48.3	Biotite Gneiss and Schist	CZbg	62%	3.94	1.77	172.5	5,015	700	40-60
RS-2	B1-C	-L-	25+81	7' Lt.	44.6 - 44.9	Biotite Gneiss and Schist	CZbg	36%	4.03	1.76	162.4	6,566	1,000	40-55
RS-3	B1-B	-L-	25+85	28' Rt.	53.0 - 53.3	Biotite Gneiss and Schist	CZbg	36%	4.17	1.77	169.5	8,452	850	45-55
RS-4	B-1B	-L-	25+85	28' Rt.	60.9 - 61.2	Biotite Gneiss and Schist	CZbg	52%	3.96	1.77	171.2	6,608	900	50-65

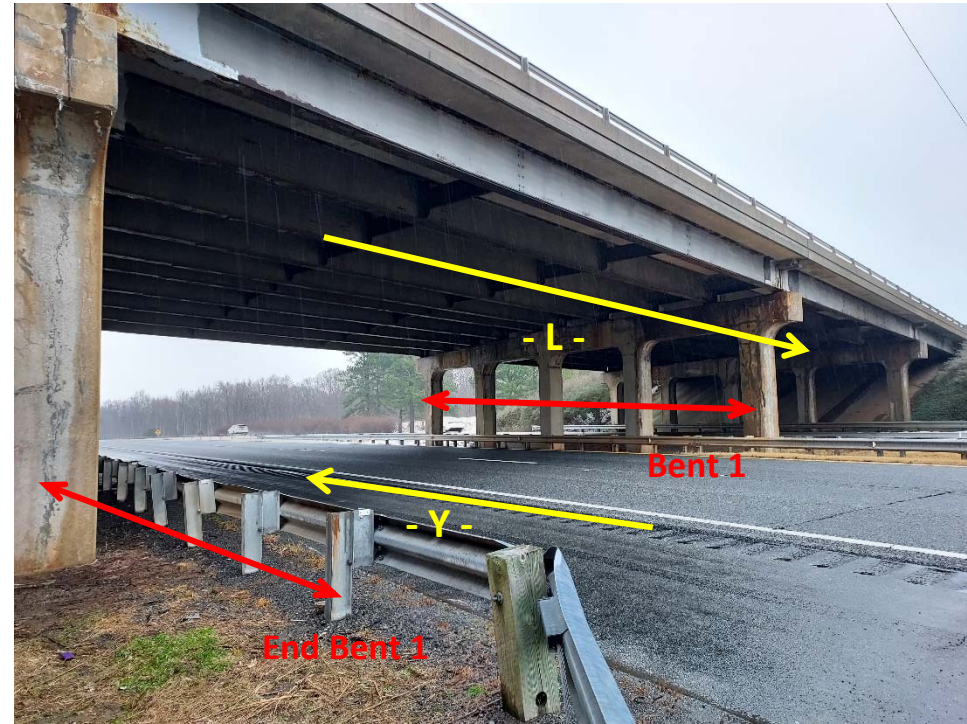
NP = Not Plastic
 NT = Not Tested
 ND = Not Determined

D. Council
 Lab Manager, Certification No. 101-02-0603

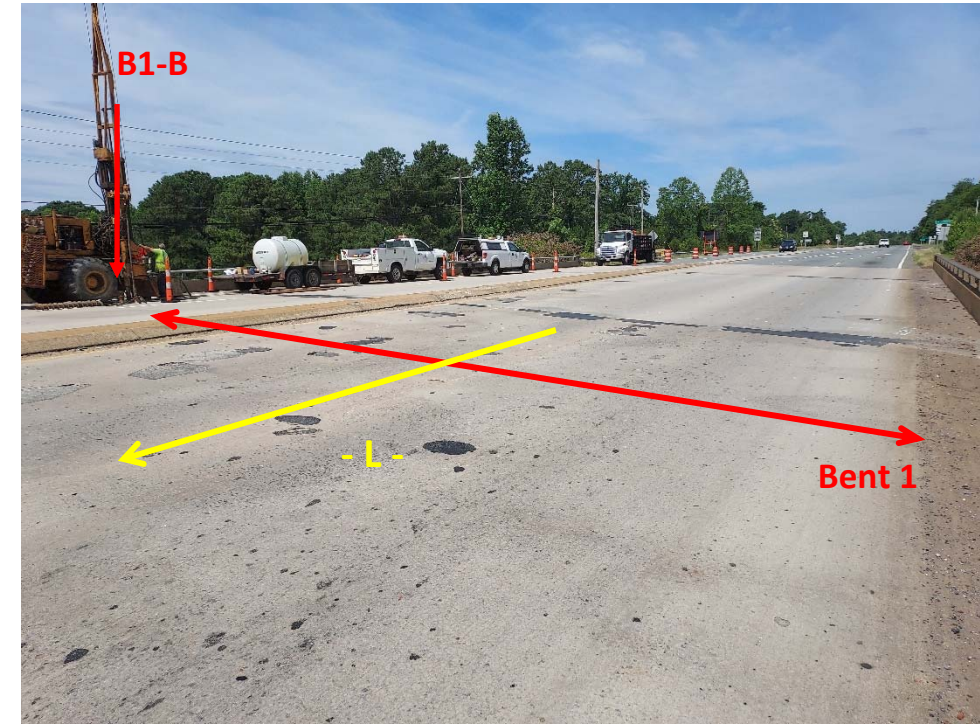
C.Wang, P.E.
 Soils Engineer



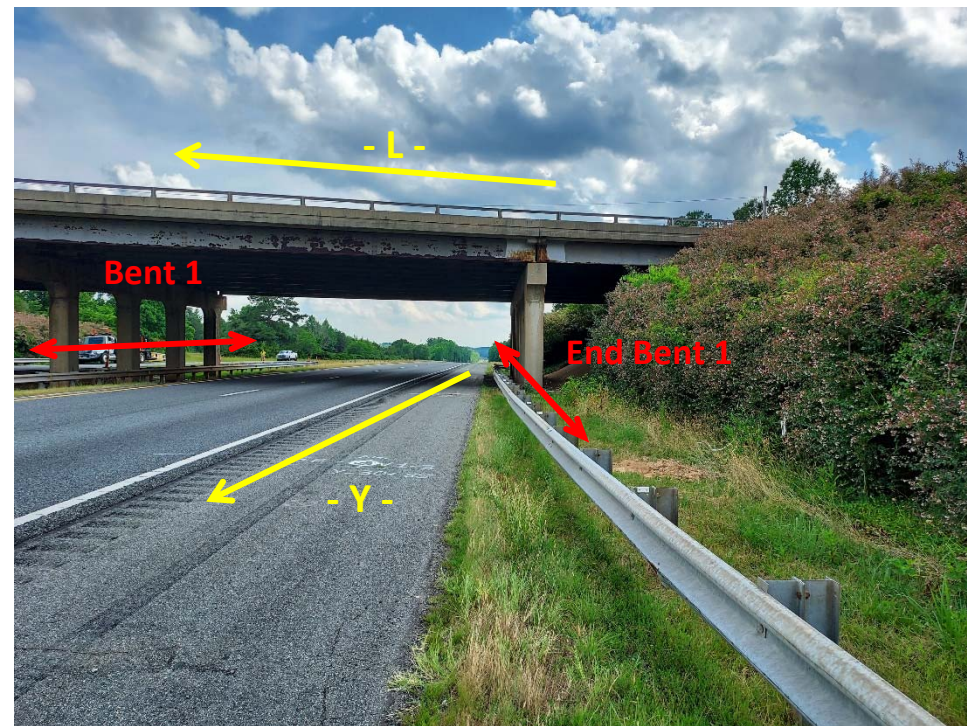
Replace Bridge 780151 on US 158/NC 14 over US 29 SITE PHOTOGRAPHS



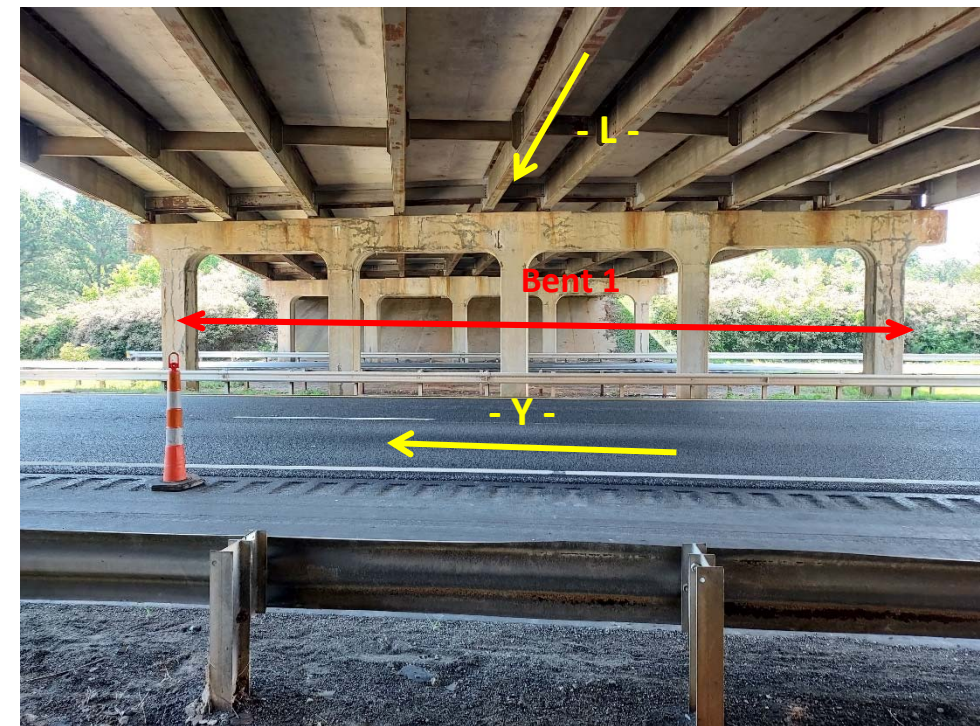
Photograph No. 1: View looking northeast at Bent 1



Photograph No. 3: View looking south-southwest at bent 1 on bridge deck



Photograph No. 2: View looking south along End Bent 1



Photograph No. 4: Below bridge deck, looking at Bent 1