

REFERENCE: R-2233BB

PROJECT: 34400.1.S5

CONTENTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY RUTHERFORD
PROJECT DESCRIPTION PROPOSED BRDG #0663 ON
US-64 (-Y3-) OVER PROPOSED US-221 BYPASS (-L3-)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2233BB	1	16

CAUTION NOTICE

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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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- 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

-F&R, INC.-

M. ARNOLD

S. DAVIS

-NCDOT-

DC CHEEK

CJ COFFEY

CD JOHNSON

INVESTIGATED BY NCDOT GEU/F&R, INC.

DRAWN BY DC ELLIOTT /T.T. WALKER

CHECKED BY JC KUHNE /P. ALTON

SUBMITTED BY JC KUHNE

DATE _____



DocuSigned by:
D. Clayton Elliott 8/5/2019

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. It contains detailed technical specifications, classification charts, and symbols for geotechnical engineering.

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)

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

DECREASING SURFACE QUALITY →

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

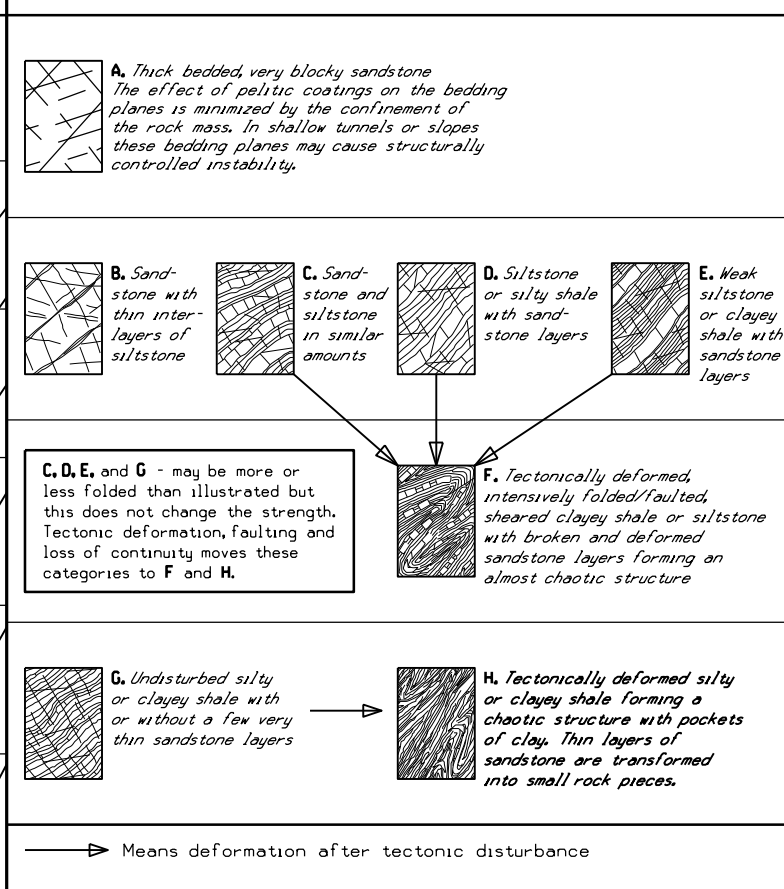
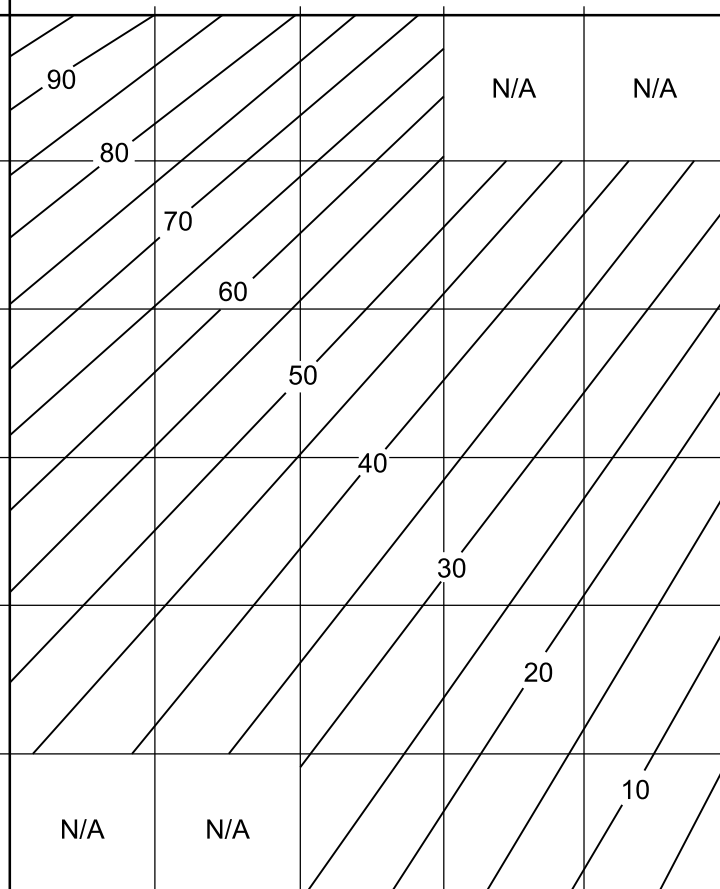
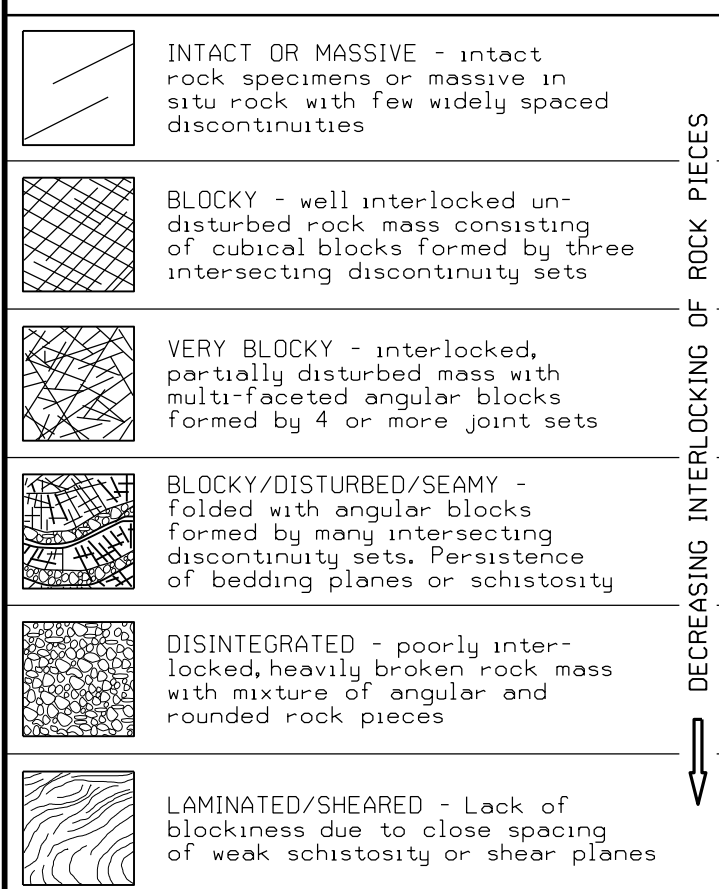
GOOD - Rough, slightly weathered surfaces

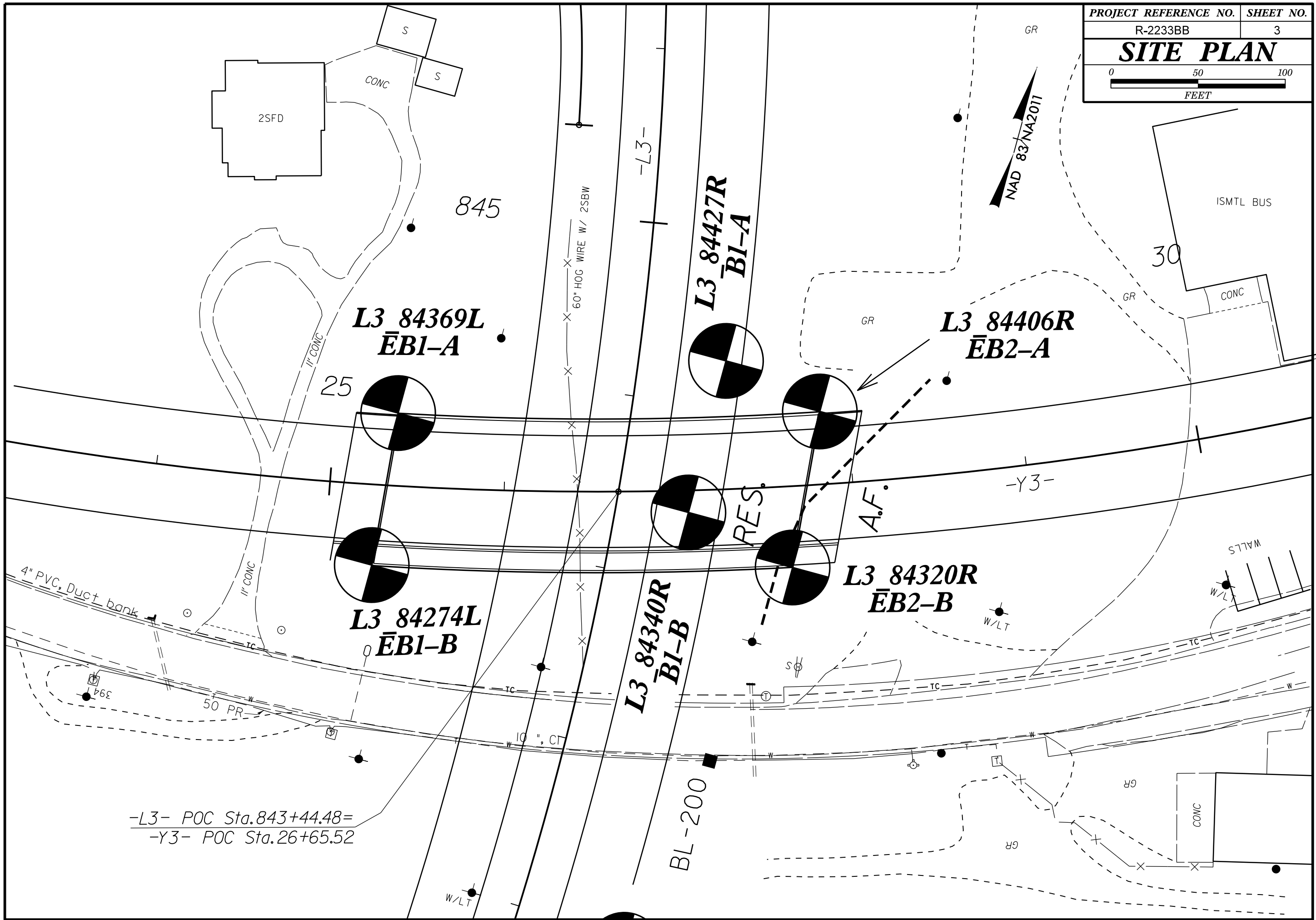
FAIR - Smooth, moderately weathered and altered surfaces

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

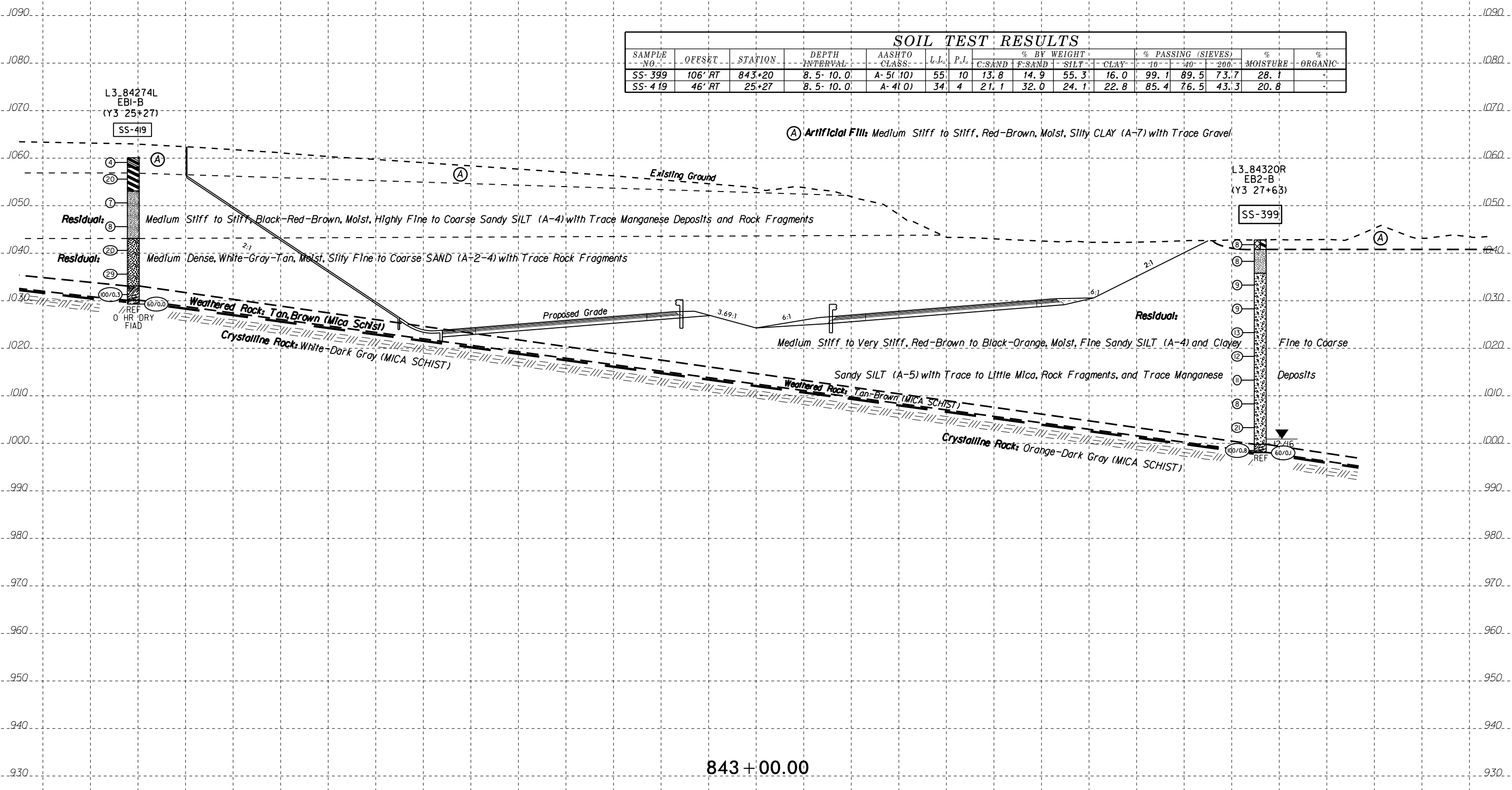
COMPOSITION AND STRUCTURE





-L3- POC Sta. 843+44.48=
 -Y3- POC Sta. 26+65.52

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.L.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C-SAND	F-SAND	SILT	CLAY	-10-	-40-	-200-		
SS-399	106' RT	843+20	8.5-10.0'	A-5(10)	55	10	13.8	14.9	55.3	16.0	99.1	89.5	73.7	28.1	-
SS-419	46' RT	25+27	8.5-10.0'	A-4(0)	34	4	21.1	32.0	24.1	22.8	85.4	76.5	43.3	20.8	-

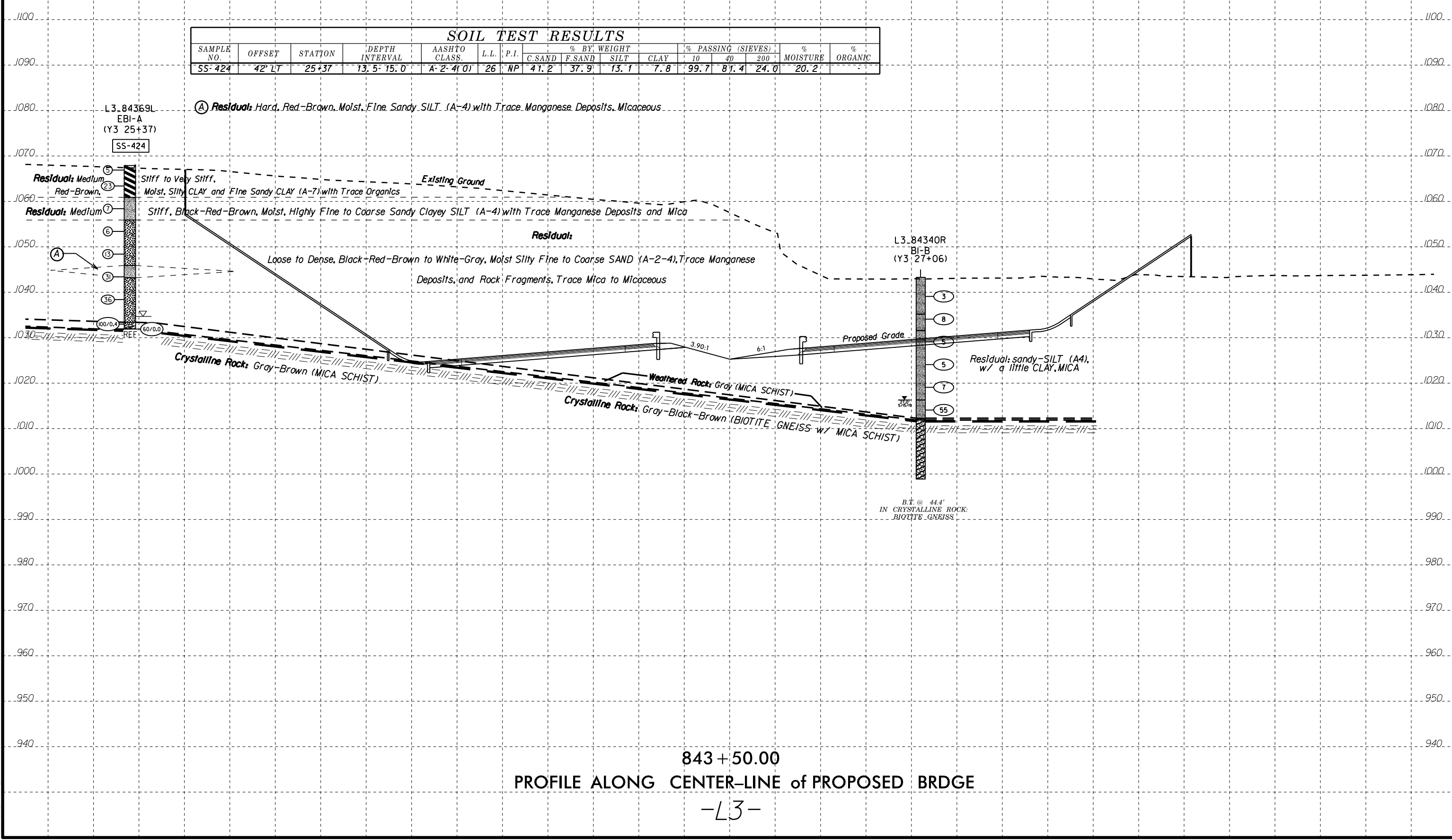


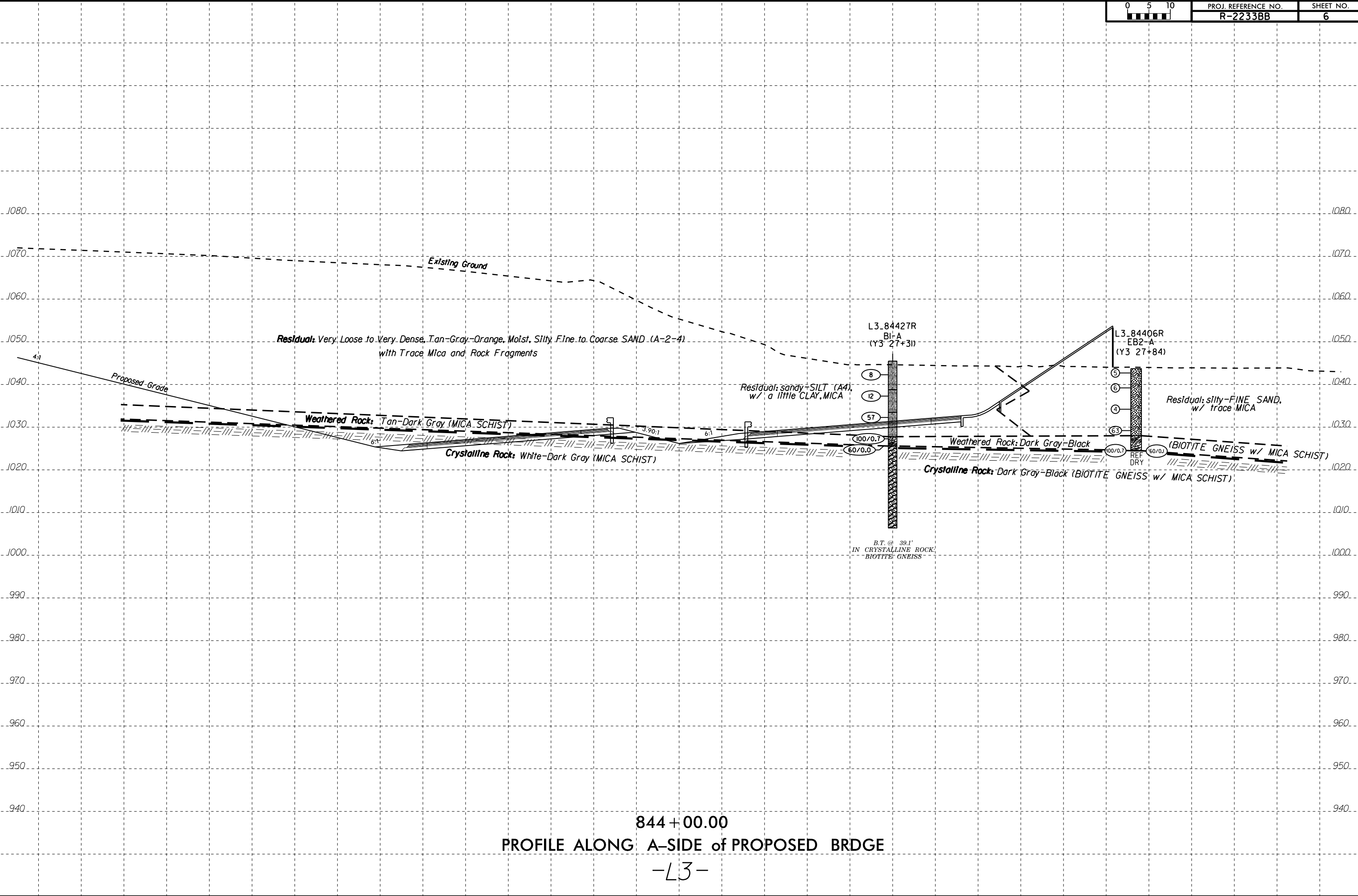
843 + 00.00
PROFILE ALONG B-SIDE of PROPOSED BRIDGE
 -L3-

30-MAY-2019 09:29
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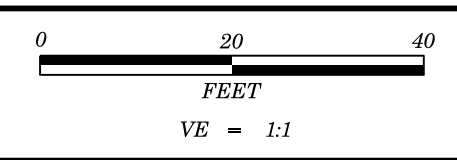
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-424	42' LT	25+37	13.5-15.0	A-2-4(0)	26	NP	41.2	37.9	13.1	7.8	99.7	81.4	24.0	20.2	-

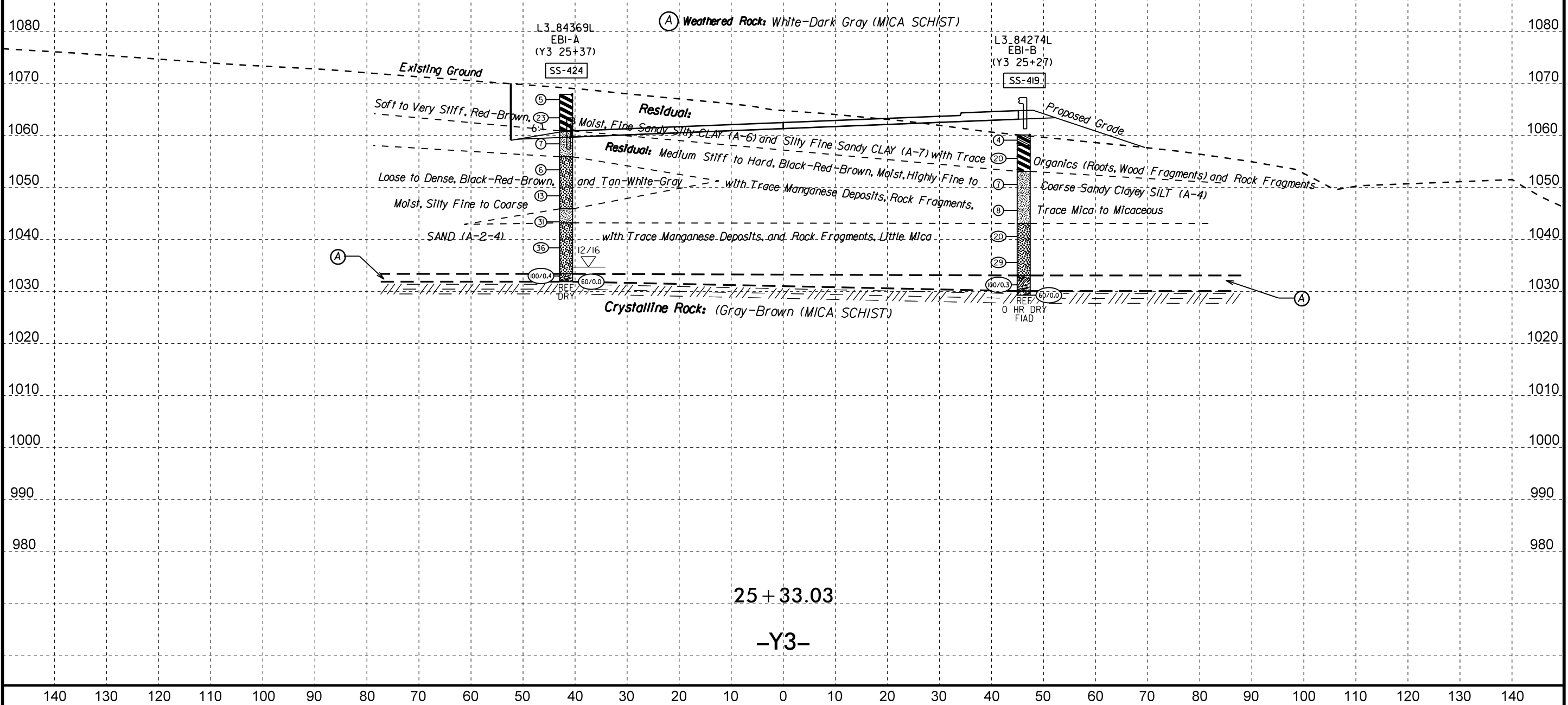




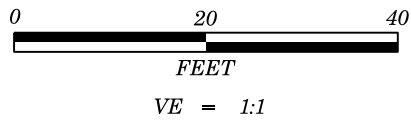
844 + 00.00
 PROFILE ALONG A-SIDE of PROPOSED BRDGE
 -L3-



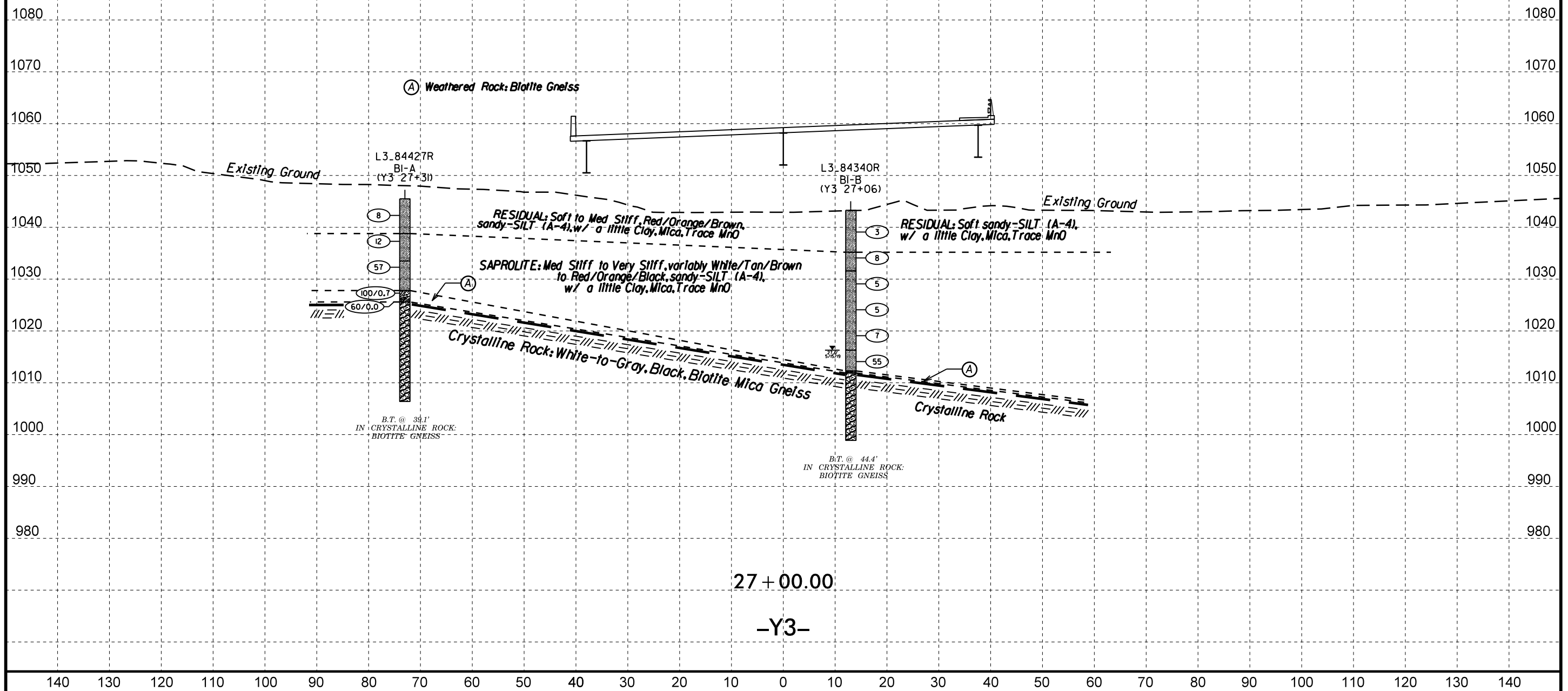
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	#10	#40	#200		
SS-424	42' LT.	25+37	13.5-15.0	A-2-4(0)	26	NP	41.2	37.9	13.1	7.8	99.7	81.4	24.0	20.2	-
SS-419	46' RT.	25+27	8.5-10.0	A-4(0)	34	4	21.1	32.0	24.1	22.8	85.4	76.5	43.3	20.8	-

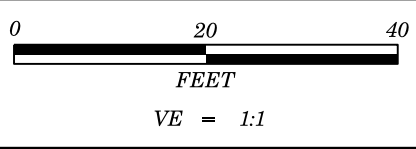


25 + 33.03
-Y3-

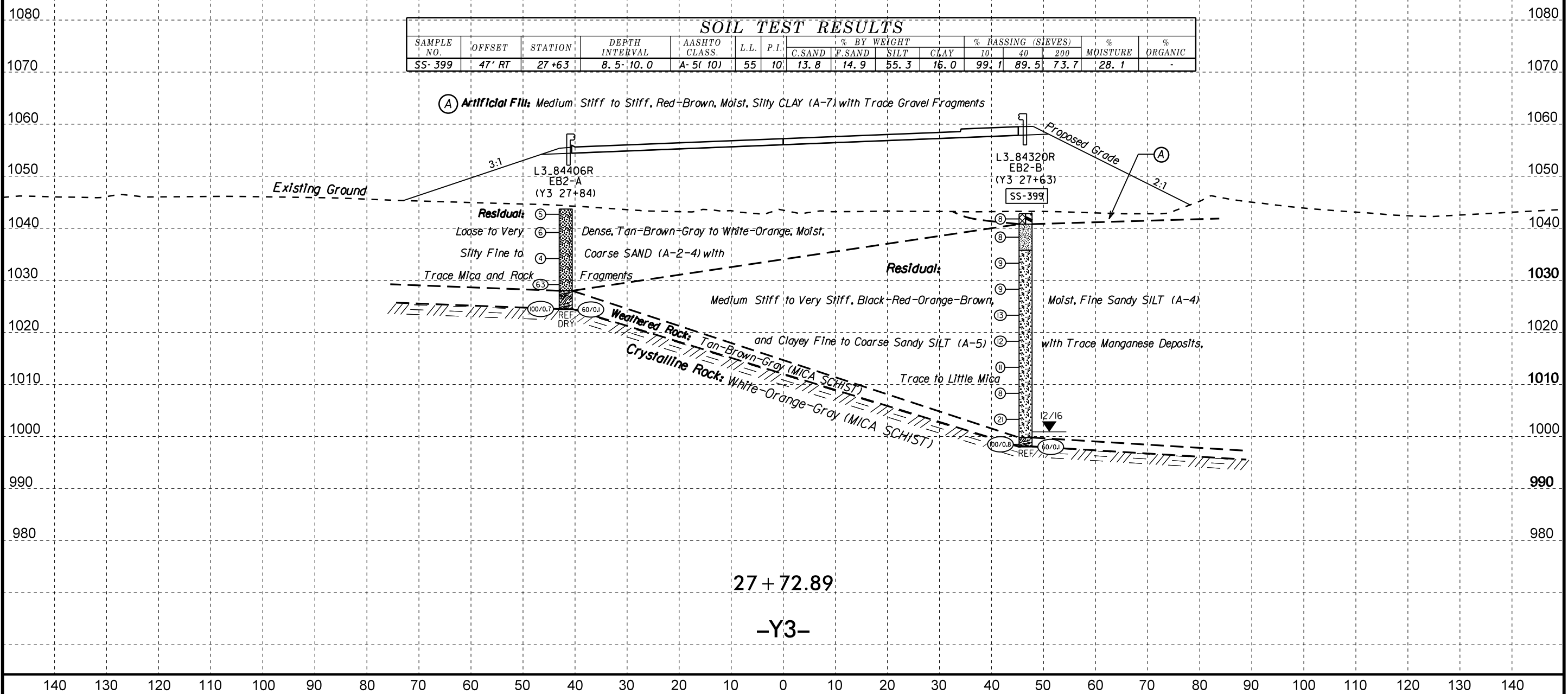


PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	8
CROSS-SECTION ALONG -Y3-	





SOIL TEST RESULTS															
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		
SS-399	47' RT	27+63	8.5-10.0	A-5(10)	55	10	13.8	14.9	55.3	16.0	99.1	89.5	73.7	28.1	-



(A) Artificial Fill: Medium Stiff to Stiff, Red-Brown, Moist, Silty CLAY (A-7) with Trace Gravel Fragments

Residual:
 5 Loose to Very
 6 Silty Fine to
 4 Coarse SAND (A-2-4) with
 6.5 Trace Mica and Rock
 Fragments

Residual:
 5 Dense, Tan-Brown-Gray to White-Orange, Moist,
 6 Coarse SAND (A-2-4) with
 Fragments
 9 Medium Stiff to Very Stiff, Black-Red-Orange-Brown,
 10 and Clayey Fine to Coarse Sandy SILT (A-5)
 11 Trace to Little Mica
 12 Moist, Fine Sandy SILT (A-4)
 13 with Trace Manganese Deposits,

Weathered Rock: Tan-Brown-Gray (MICA SCHIST)
 Crystalline Rock: White-Orange-Gray (MICA SCHIST)

27 + 72.89

-Y3-

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST M. Arnold										
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)									
BORING NO. L3_84369L (EB1-A)		STATION 843+69		OFFSET 132 ft LT		ALIGNMENT -L3-										
COLLAR ELEV. 1,067.9 ft		TOTAL DEPTH 36.0 ft		NORTHING 607,444		EASTING 1,120,744										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 12/19/16		COMP. DATE 12/19/16		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						
1070																
	1,067.9	0.0	2	2	3									1,067.9	GROUND SURFACE	0.0
1065	1,064.4	3.5	8	10	13										RESIDUAL RED/BROWN, MED STIFF TO VERY STIFF, SILTY-CLAY w/ trace ORGANICS	
1060	1,059.4	8.5	3	3	4									1,060.9	SAPROLITE	7.0
1055	1,054.4	13.5	2	2	4									1,055.9	BLACK/RED/BROWN, MED STIFF, FINE-TO-COURSE SANDY-SILT, w/ some CLAY, trace MICA & MANGANESE	12.0
1050	1,049.4	18.5	4	5	8									1,045.9	BLACK/RED/BROWN TO GRAY/WHITE, LOOSE, SILTY, FINE-TO-COURSE SAND, w/ MANGANESE & MICA	22.0
1045	1,044.4	23.5	5	4	27									1,043.2	RED/BROWN, DENSE, FINE SANDY-SILT, w/ trace MANGANESE & MICA	24.7
1040	1,039.4	28.5	7	10	26										GRAY/BROWN, DENSE, SILTY, FINE-TO-COURSE SANDY, w/ trace MICA, some ROCK FRAGS: several V HARD LAYERS b/twn 28.5' - 33.5'	
1035	1,034.4	33.5	15	13	100/0.4									1,033.4	WEATHERED ROCK	34.5
	1,031.9	36.0	60/0.0											1,031.9	GRAY (MICA SCHIST)	36.0
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,031.9 ft ON CRYSTALLINE ROCK	

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST M. Arnold										
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)									
BORING NO. L3_84274L (EB1-B)		STATION 842+74		OFFSET 131 ft LT		ALIGNMENT -L3-										
COLLAR ELEV. 1,060.1 ft		TOTAL DEPTH 30.8 ft		NORTHING 607,356		EASTING 1,120,752										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 12/19/16		COMP. DATE 12/19/16		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						
1065																
	1,060.1	0.0	2	3	1									1,060.1	GROUND SURFACE	0.0
1060	1,056.6	3.5	4	9	11									1,058.1	RESIDUAL BROWN, SOFT, SILTY-CLAY, w/ little FINE SAND, trace of ORGANICS & ROCK FRAGS.	2.0
1055	1,051.6	8.5	2	4	3									1,053.1	RED/BROWN, VERY STIFF, FINE SANDY-CLAY	7.0
1050	1,046.6	13.5	5	4	4										SAPROLITE	
1045	1,041.6	18.5	15	12	8									1,043.1	BLACK/RED/BROWN, MED STIFF, FINE-TO-COURSE SANDY-SILT, w/ trace CLAY, trace MANGANESE DEPOSITS & w/ ROCK FRAGS.	17.0
1040	1,036.6	23.5	3	8	21										WHITE/GRAY, VERY STIFF, SILTY, FINE-TO-COURSE SAND, w/ ROCK FRAGS: several V HARD layers b/twn 23.5' - 28.5'	
1035	1,031.6	28.5	100/0.3											1,033.1	WEATHERED ROCK	27.0
1030	1,029.3	30.8	60/0.0											1,030.1	DARK GRAY/WHITE	30.0
														1,029.3	CRYSTALLINE ROCK	30.8
															GRAY/BROWN	
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,029.3 ft IN CRYSTALLINE ROCK	

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.									
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)								
BORING NO. L3_84427R (B1-A)		STATION 843+87		OFFSET 50 ft RT		ALIGNMENT -L3-									
COLLAR ELEV. 1,045.2 ft		TOTAL DEPTH 39.1 ft		NORTHING 607,523		EASTING 1,120,917									
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic									
DRILLER Cheek, D. O.		START DATE 05/14/19		COMP. DATE 05/14/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1050															
1045														1,045.2	0.0
1040	1,042.3	3.2	3	3	5										
1035	1,037.3	8.2	4	5	7										
1030	1,032.3	13.2	10	24	33										
1025	1,027.3	18.2	54	46/0.2											
	1,025.6	19.9	60/0.0												
1020															
1015															
1010															
														1,006.4	39.1
Boring Terminated at Elevation 1,006.4 ft IN CRYSTALLINE ROCK															

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.						
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)					
BORING NO. L3_84427R (B1-A)		STATION 843+87		OFFSET 50 ft RT		ALIGNMENT -L3-						
COLLAR ELEV. 1,045.2 ft		TOTAL DEPTH 39.1 ft		NORTHING 607,523		EASTING 1,120,917						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic						
DRILLER Cheek, D. O.		START DATE 05/14/19		COMP. DATE 05/14/19		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
1025.59												
1025	1,025.6	19.9	4.2	N=60/0.0 1:15/0.2 2:45/1.0 2:57/1.0 2:51/1.0 2:50/1.0	(3.7) 88%	(0.5) 12%					Begin Coring @ 19.9 ft	
1020	1,021.4	24.1	5.0	2:41/1.0 3:14/1.0 2:16/1.0 2:01/1.0 1:43/1.0	(5.0) 100%	(4.5) 90%					CRYSTALLINE ROCK	19.9
1015	1,016.4	29.1	5.0	2:45/1.0 2:42/1.0 3:58/1.0 2:44/1.0 2:57/1.0	(5.0) 100%	(4.7) 94%						
1010	1,011.4	34.1	5.0	3:07/1.0 3:11/1.0 3:20/1.0 1:40/1.0 2:15/1.0	(5.0) 100%	(5.0) 100%						
	1,006.4	39.1									Boring Terminated at Elevation 1,006.4 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	39.1
GSI : 19.1' - 21.9' : 45 - 55 21.9' - 29.1' : 75 - 85 29.1' - 39.1' : 80 - 90												

NCDOT BORE DOUBLE R2233BB GEO_BH_BRDG0663_Y3.GPJ NC_DOT.GDT 5/30/19

NCDOT CORE DOUBLE R2233BB GEO_BH_BRDG0663_Y3.GPJ NC_DOT.GDT 5/30/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.											
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)										
BORING NO. L3_84340R (B1-B)		STATION 842+97		OFFSET 42 ft RT		ALIGNMENT -L3-											
COLLAR ELEV. 1,043.3 ft		TOTAL DEPTH 44.4 ft		NORTHING 607,433		EASTING 1,120,919											
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic											
DRILLER Cheek, D. O.		START DATE 05/15/19		COMP. DATE 05/15/19		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							
1045															1,043.3	GROUND SURFACE	0.0
1040	1,039.1	4.2	1	1	2								M	RESIDUAL RED/ORANGE, SOFT, SANDY-SILT, w/ little CLAY, trace MICA			
1035	1,034.1	9.2	4	4	4								M	SAPROLITE WHITE/TAN/BROWN, MED STIFF, SANDY-SILT, w/ trace MICA & ROCK FRAGS, trace MANGANESE DEPOSITS	8.1		
1030	1,029.1	14.2	1	2	3								M	RED/BROWN/BLACK, MED STIFF, SANDY-SILT, w/ trace CLAY & MANGANESE SEAMS	11.7		
1025	1,024.1	19.2	2	2	3								M				
1020	1,019.1	24.2	4	3	4								W				
1015	1,014.1	29.2	3	5	50								M	BLACK/DARK BROWN, HARD, SANDY-SILT, w/ ROCK FRAGS	27.0		
1010														WEATHERED ROCK CRYSTALLINE ROCK DARK GREY/BLACK to WHITE/TAN (BIOTITE GNEISS)	31.0		
1005																	
1000															998.9	Boring Terminated at Elevation 998.9 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	44.4

NCDOT BORE DOUBLE R2233BB GEO_BH_BRDG0663_Y3.GPJ NC_DOT.GDT 5/30/19

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.						
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)					
BORING NO. L3_84340R (B1-B)		STATION 842+97		OFFSET 42 ft RT		ALIGNMENT -L3-						
COLLAR ELEV. 1,043.3 ft		TOTAL DEPTH 44.4 ft		NORTHING 607,433		EASTING 1,120,919						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic						
DRILLER Cheek, D. O.		START DATE 05/15/19		COMP. DATE 05/15/19		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
1012.19	1,012.2	31.1	3.3	0:45/0.3 1:37/1.0 2:30/1.0 2:12/1.0	(3.1) 94%	(2.7) 82%					Begin Coring @ 31.1 ft CRYSTALLINE ROCK	31.1
1010	1,008.9	34.4	5.0	1:12/1.0 1:45/1.0 2:09/1.0 2:07/1.0 3:37/1.0	(4.8) 96%	(4.6) 92%						
1005	1,003.9	39.4	5.0	2:44/1.0 1:57/1.0 1:54/1.0 1:55/1.0 3:28/1.0	(4.9) 98%	(4.5) 90%						
1000	998.9	44.4									Boring Terminated at Elevation 998.9 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	44.4
GSI : 31.1' - 44.4' : 80 - 90												

NCDOT CORE DOUBLE R2233BB GEO_BH_BRDG0663_Y3.GPJ NC_DOT.GDT 5/30/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST M. Arnold								
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)							
BORING NO. L3_84406R (EB2-A)		STATION 844+06		OFFSET 107 ft RT		ALIGNMENT -L3-								
COLLAR ELEV. 1,043.7 ft		TOTAL DEPTH 19.3 ft		NORTHING 607,509		EASTING 1,120,977								
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER S. Davis		START DATE 12/15/16		COMP. DATE 12/15/16		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				
1045	1,043.7	0.0	3	3	2							M	GROUND SURFACE	0.0
1040	1,040.2	3.5	3	3	3							M	SAPROLITE TAN/BROWN, LOOSE, SILTY-FINE SAND, w/ trace MICA	
1035	1,035.2	8.5	3	2	2							M		
1030	1,030.2	13.5	6	22	41							M	SAPROLITE WHITE/ORANGE, becoming VERY DENSE, SILTY, FINE-to-COURSE SAND, w/ ROCK FRAGS & a few HARD LAYERS	12.0
1025	1,025.2	18.5	45	55/0.2								M	WEATHERED ROCK TAN/DARK GRAY (MICA SCHIST)	15.7
	1,024.5	19.2										M	CRYSTALLINE ROCK WHITE/DARK GRAY (MICA SCHIST)	19.2
	1,024.4	19.3										M	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,024.4 ft IN CRYSTALLINE ROCK	19.3

WBS 34400.1.S5		TIP R-2233BB		COUNTY RUTHERFORD		GEOLOGIST M. Arnold								
SITE DESCRIPTION US 221 South of Business (Charlotte Rd.) to SR 1366 (Roper Loop Rd.)							GROUND WTR (ft)							
BORING NO. L3_84320R (EB2-B)		STATION 843+20		OFFSET 106 ft RT		ALIGNMENT -L3-								
COLLAR ELEV. 1,042.8 ft		TOTAL DEPTH 44.8 ft		NORTHING 607,418		EASTING 1,120,985								
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER S. Davis		START DATE 12/15/16		COMP. DATE 12/15/16		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				
1045	1,042.8	0.0										M	GROUND SURFACE	0.0
1040	1,039.3	3.5	3	4	4							M	ARTIFICIAL FILL RED/BROWN, MED STIFF, SILTY-CLAY, w/ trace GRAVELS	2.0
1035	1,034.3	8.5	2	4	4							M	RESIDUAL RED/BROWN, MED STIFF, FINE SANDY-SILT, w/ trace MICA & QUARTZ ROCK FRAGS	7.0
1030	1,029.3	13.5	3	4	5							SS-399	SAPROLITE BLACK/ORANGE/BROWN, STIFF, CLAYEY-SILT, & highly FINE-to-COURSE SANDY throughout, & w/ trace MICA	28%
1025	1,024.3	18.5	3	6	7							M		
1020	1,019.3	23.5	4	5	7							M		
1015	1,014.3	28.5	4	4	7							M		
1010	1,009.3	33.5	3	3	5							M		
1005	1,004.3	38.5	7	10	11							M		
1000	999.3	43.5	66	34/0.3								M	WEATHERED ROCK TAN/BROWN (MICA SCHIST)	43.0
	998.1	44.7										M	CRYSTALLINE ROCK ORANGE/DARK GRAY	44.7
	998.0	44.8										M	Boring Terminated with Standard Penetration Test Refusal at Elevation 998.0 ft IN CRYSTALLINE ROCK	44.8

CORE PHOTOGRAPHS

B1-A

BOX 1 of 3 : 19.9 - 29.1 FEET



GEOLOGICAL STRENGTH INDEX: GSI
19.1' - 21.9' : 45 - 55
21.9' - 29.1' : 75 - 85

B1-A

BOX 2 of 3 : 29.1 - 38.3 FEET



GEOLOGICAL STRENGTH INDEX: GSI
29.1' - 38.3' : 80 - 90

CORE PHOTOGRAPHS

B1-A

BOX 3 of 3 : 38.3 - 39.1 FEET



GEOLOGICAL STRENGTH INDEX: GSI
38.3' - 39.1' : 80 - 90

CORE PHOTOGRAPHS

B1-B

BOX 1 of 2 : 31.1 - 39.4 FEET



GEOLOGICAL STRENGTH INDEX: GSI
80 - 90

B1-B

BOX 2 of 2 : 39.4 - 44.4 FEET



GEOLOGICAL STRENGTH INDEX: GSI
80 - 90