

REFERENCE: B-5831

PROJECT: 45784

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY YADKINSURRY
PROJECT DESCRIPTION REPLACE BRIDGE 850006 ON
I-77 OVER NC 268, SOUTHERN RAILROAD, AND
THE YADKIN RIVER

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5831	1	

CAUTION NOTICE

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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

J. MIZE

P. FALLON

F&R PERSONNEL

TCSS PERSONNEL

YCSO PERSONNEL

INVESTIGATED BY RK&K, LLP

DRAWN BY J. MIZE

CHECKED BY B. FARMER/J. BATTS

SUBMITTED BY RK&K, LLP

DATE AUGUST 2023



P: (919) 878-9560
8601 Six Forks Road, Forum 1, Suite 700
Raleigh, North Carolina 27615-3960
NC License No. F-0112

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James W. Mize 08/30/2023
1D6BECB413BF4E7... SIGNATURE DATE

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

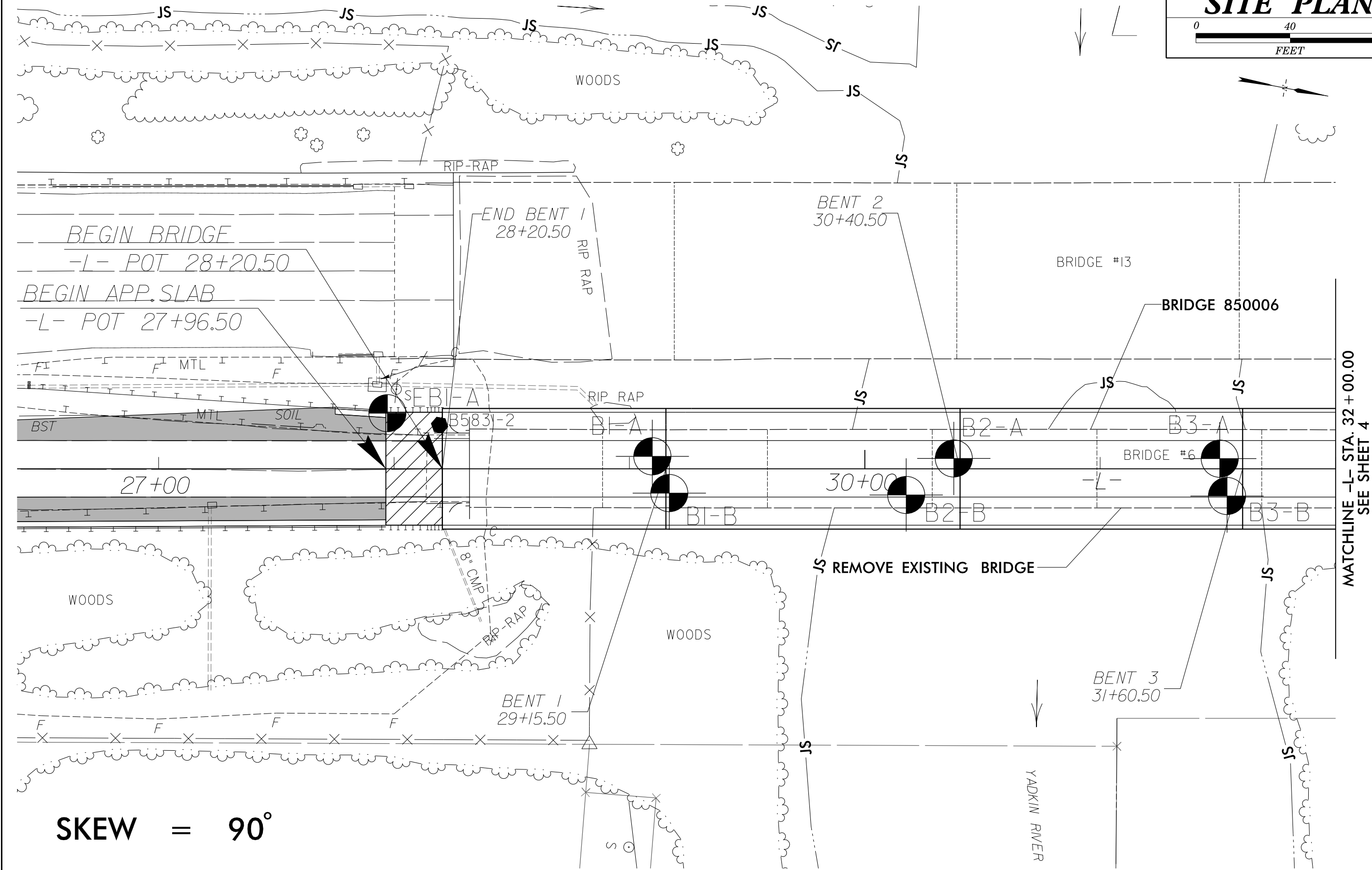
SUBSURFACE INVESTIGATION

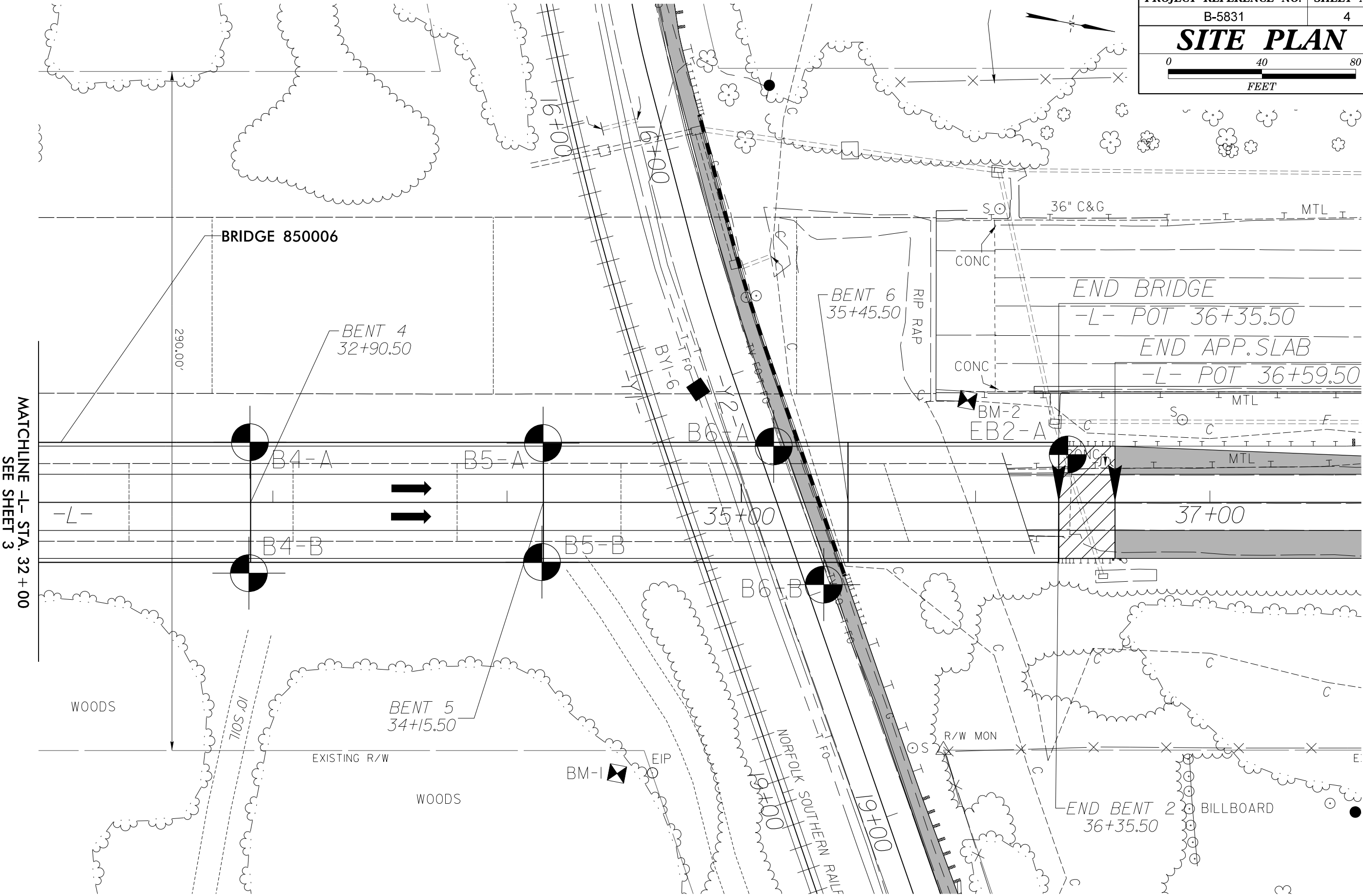
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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		DECREASING SURFACE QUALITY →	
STRUCTURE		COMPOSITION AND STRUCTURE		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	
DECREASING INTERLOCKING OF ROCK PIECES ↓		INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities		70	
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		80		60	
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70		50	
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60		40	
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces		50		30	
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes		40		20	
		30		10	
		20			
		10			
		N/A			
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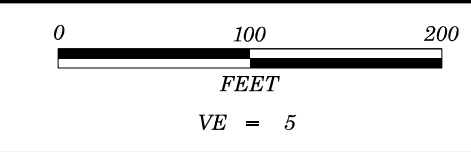


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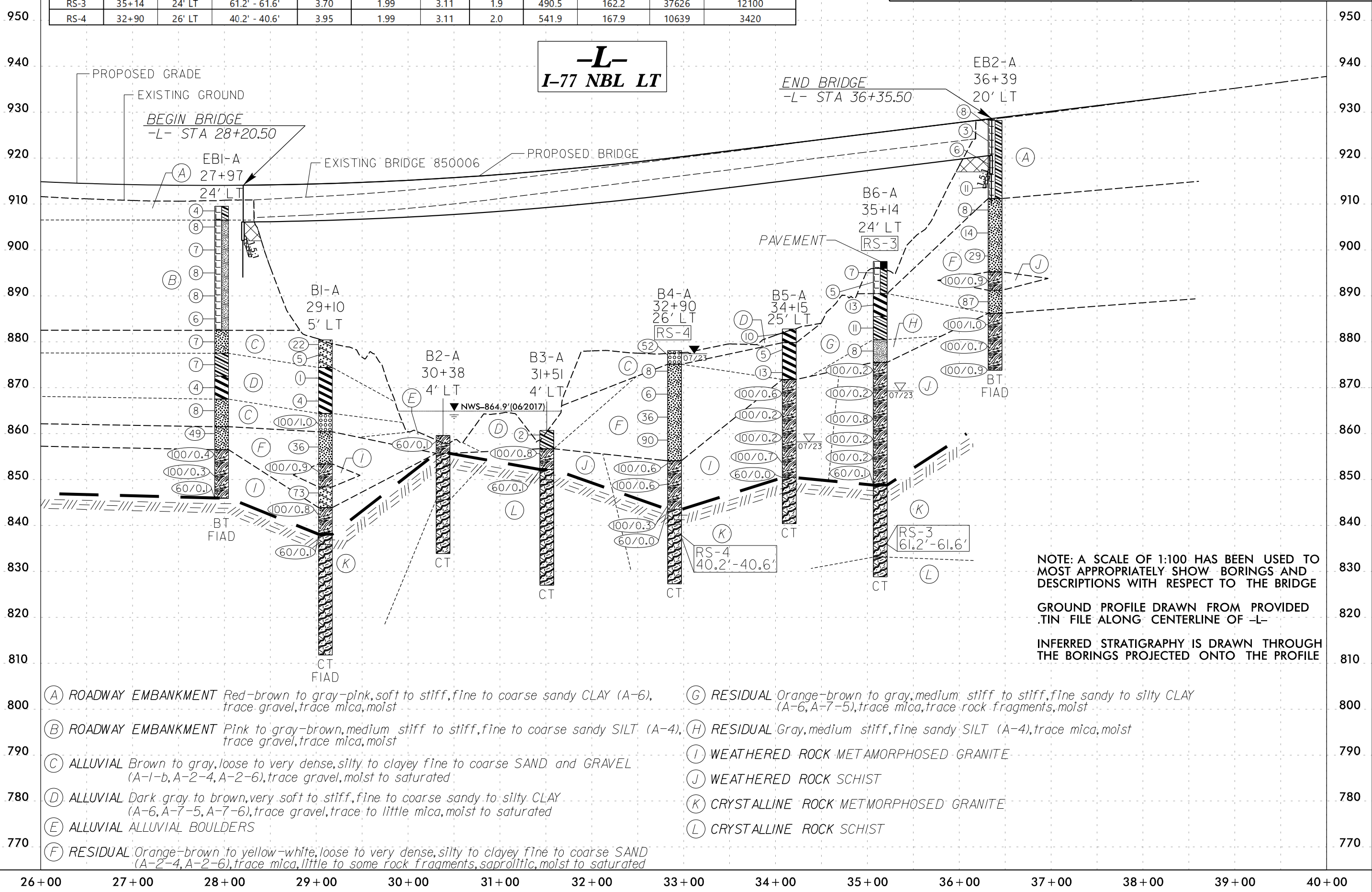
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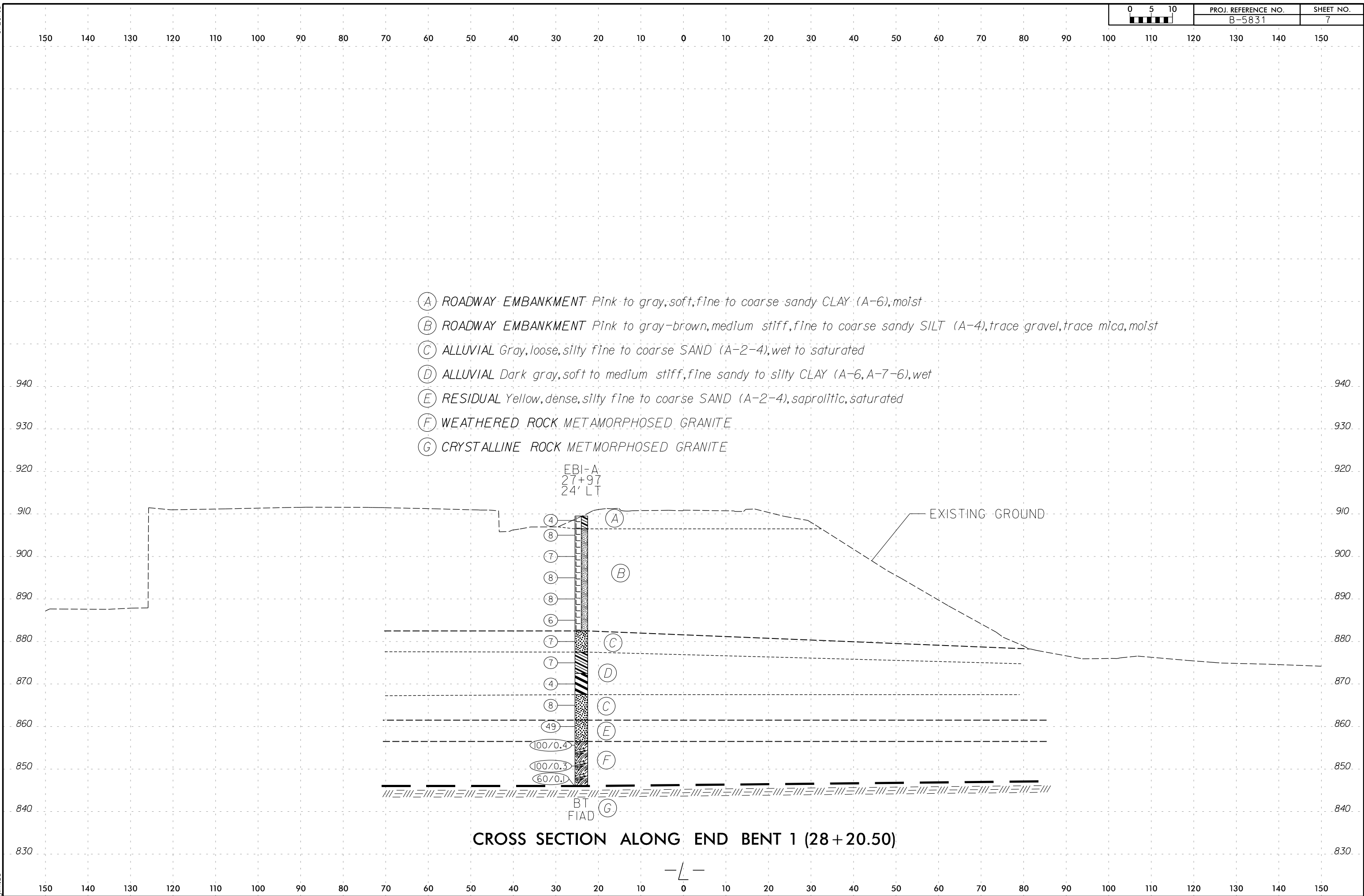
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SOIL TEST RESULTS											
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	HEIGHT (in)	DIAMETER (in)	AREA (sq in)	H:D	Mass (g)	Unit Weight (pcf)	Load (lbs)	Comp. Strength (psi)
RS-3	35+14	24' LT	61.2' - 61.6'	3.70	1.99	3.11	1.9	490.5	162.2	37626	12100
RS-4	32+90	26' LT	40.2' - 40.6'	3.95	1.99	3.11	2.0	541.9	167.9	10639	3420



PROJECT REFERENCE NO.	SHEET NO.
B-5831	5
PROFILE THROUGH A LINE BORINGS PROJECT ALONG -L-	





6/23/16

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

940 940

930 930

920 920

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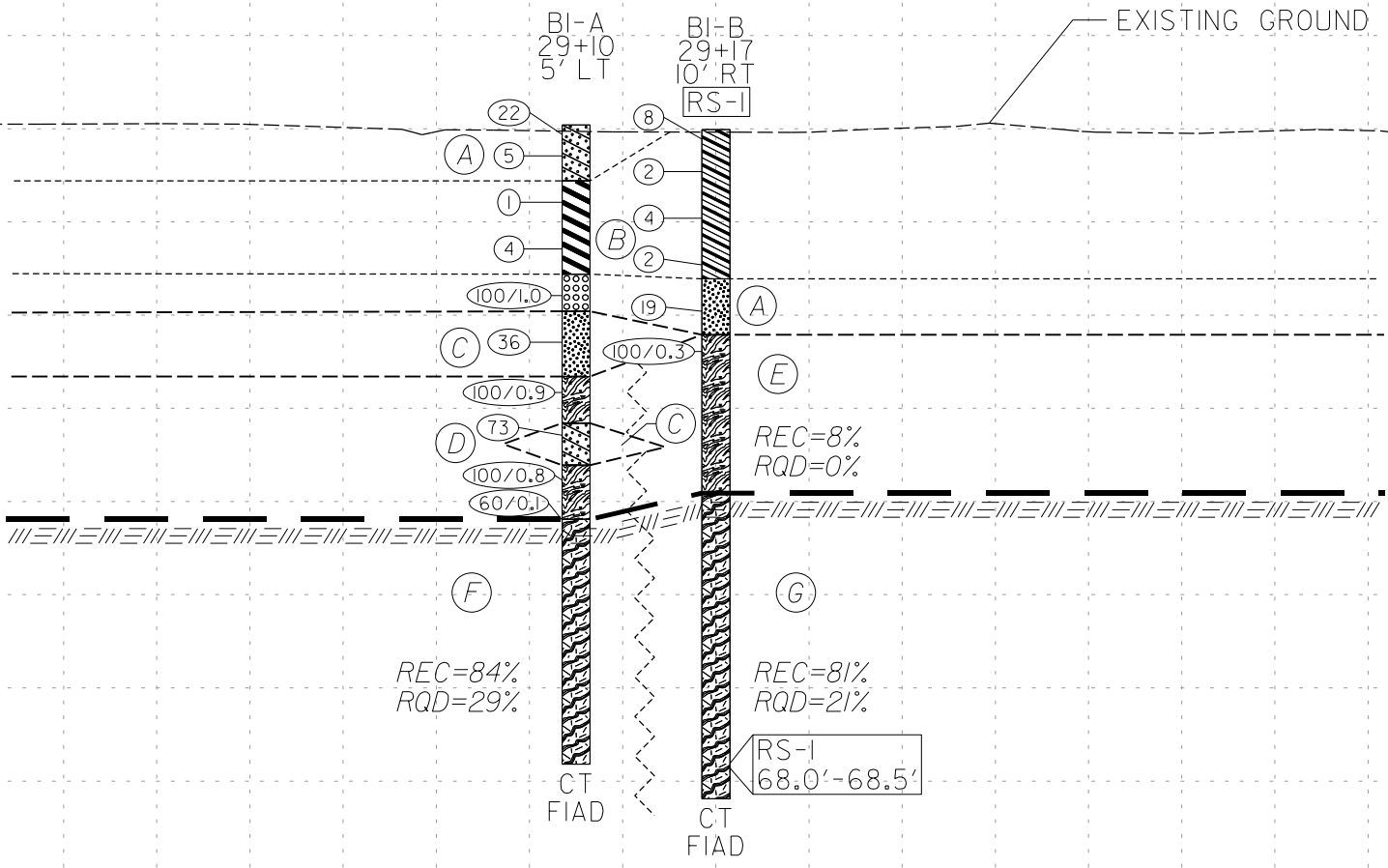
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SOIL TEST RESULTS											
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	HEIGHT (in)	DIAMETER (in)	AREA (sq in)	H:D	Mass (g)	Unit Weight (pcf)	Load (lbs)	Comp. Strength (psi)
RS-1	29+17	10' RT	68.0' - 68.5'	4.01	1.99	3.11	2.0	529.9	161.7	22149	7120

- (A) ALLUVIAL Yellow-brown, loose to medium dense, gravelly to silty to clayey fine to coarse SAND (A-1-b, A-2-4, A-2-6), trace gravel, moist to saturated
- (B) ALLUVIAL Brown to gray, very soft to soft, fine sandy to silty CLAY (A-6, A-7-6), trace roots, trace mica, moist to saturated
- (C) RESIDUAL Orange-brown, dense to very dense, silty to clayey fine to coarse SAND (A-2-4, A-2-6), saprolitic, saturated
- (D) WEATHERED ROCK METAMORPHOSED GRANITE
- (E) WEATHERED ROCK SCHIST
- (F) CRYSTALLINE ROCK METMORPHOSED GRANITE
- (G) CRYSTALLINE ROCK SCHIST



CROSS SECTION ALONG BENT 1 (29+15.50)

— L —

6/23/16

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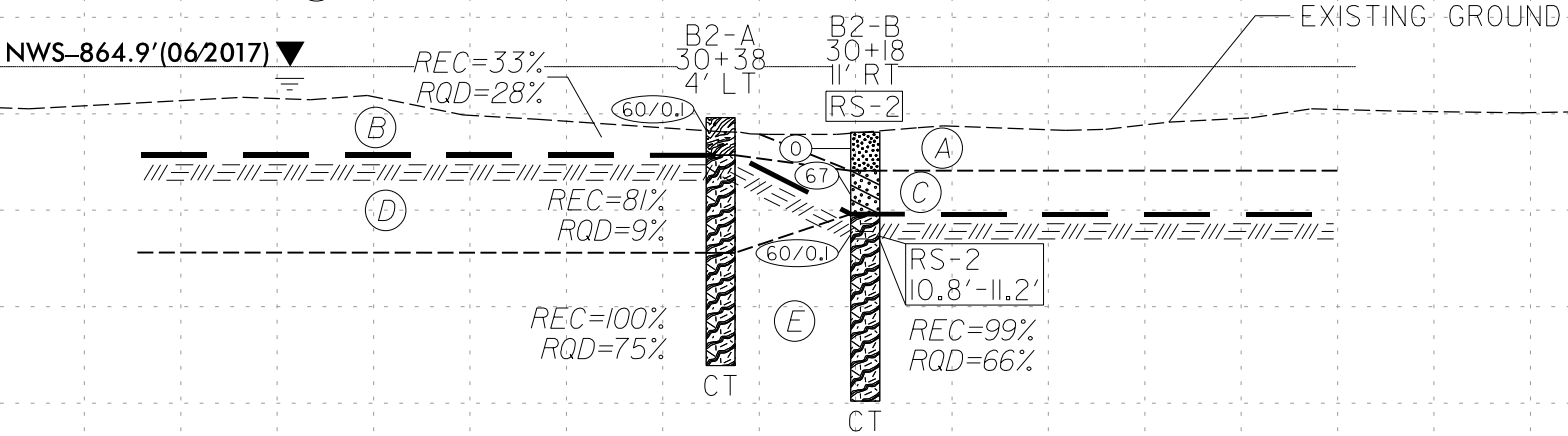
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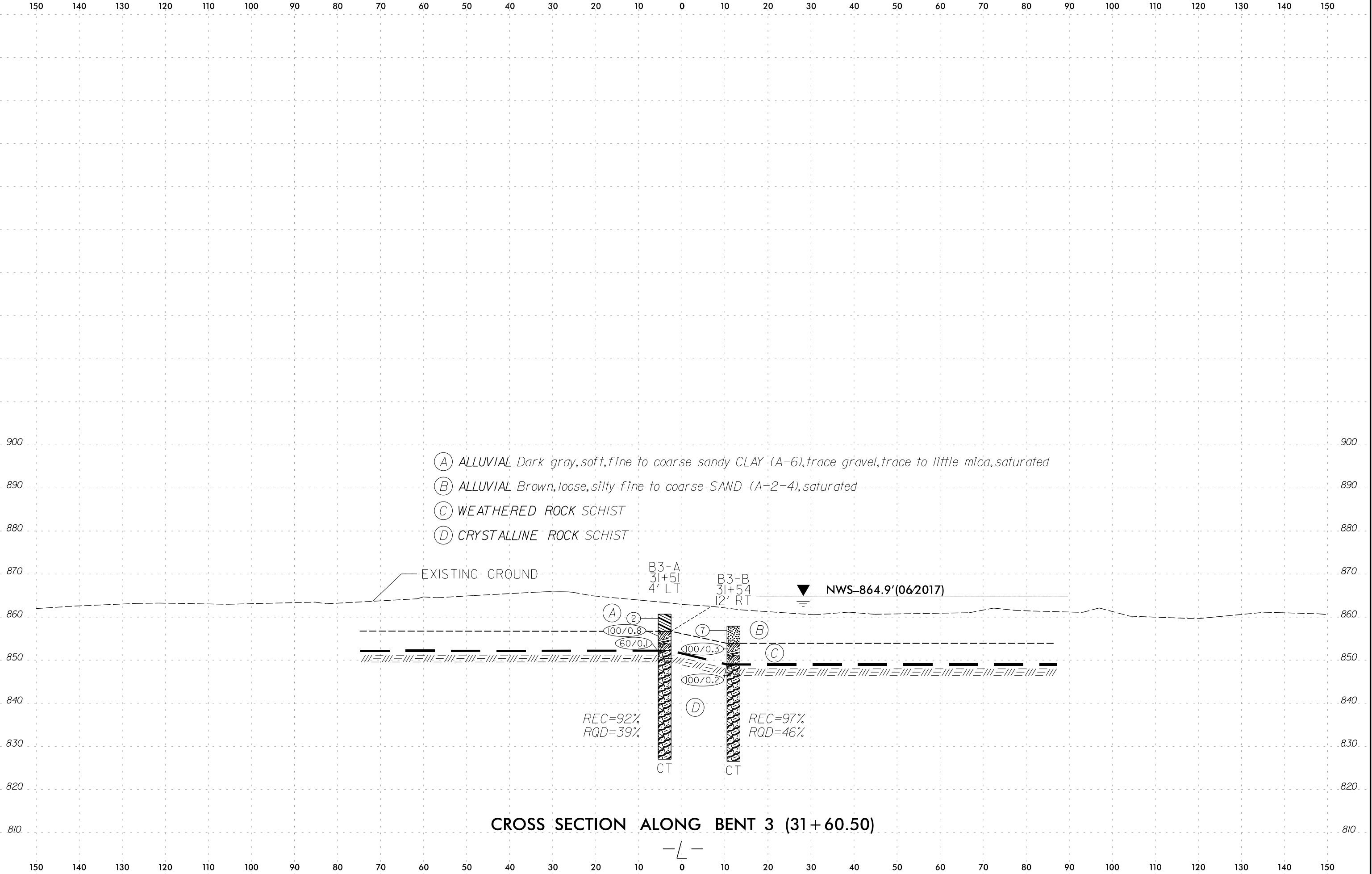
SOIL TEST RESULTS											
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	HEIGHT (in)	DIAMETER (in)	AREA (sq in)	H:D	Mass (g)	Unit Weight (pcf)	Load (lbs)	Comp. Strength (psi)
RS-2	30+18	11' RT	10.8' - 11.2'	3.44	1.99	3.11	1.7	466.7	166.0	8581	2760

- (A) ALLUVIAL Brown,very loose,silty fine to coarse SAND (A-2-4),trace gravel,saturated
- (B) ALLUVIAL BOULDERS
- (C) RESIDUAL Orange-brown,very dense,clayey fine to coarse SAND (A-2-6),saprolitic,saturated
- (D) CRYSTALLINE ROCK METMORPHOSED GRANITE
- (E) CRYSTALLINE ROCK SCHIST



CROSS SECTION ALONG BENT 2 (30+40.50)

6/23/16



6/23/16

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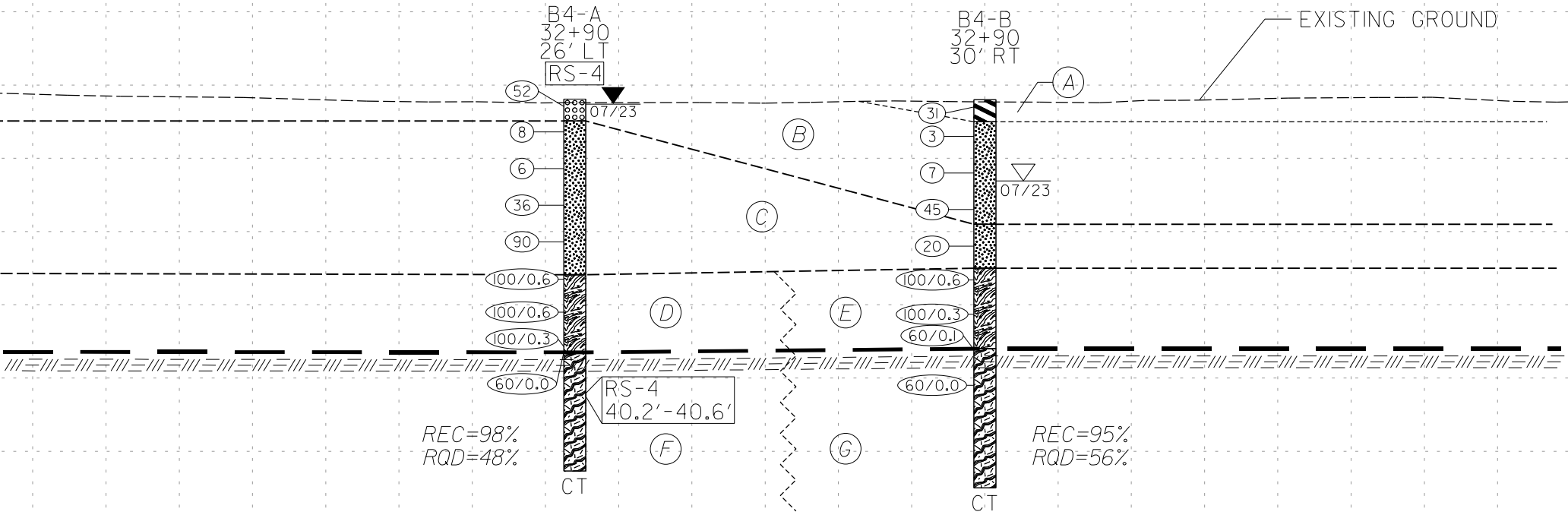
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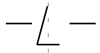
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SOIL TEST RESULTS											
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	HEIGHT (in)	DIAMETER (in)	AREA (sq in)	H:D	Mass (g)	Unit Weight (pcf)	Load (lbs)	Comp. Strength (psi)
RS-4	32+90	26' LT	40.2' - 40.6'	3.95	1.99	3.11	2.0	541.9	167.9	10639	3420

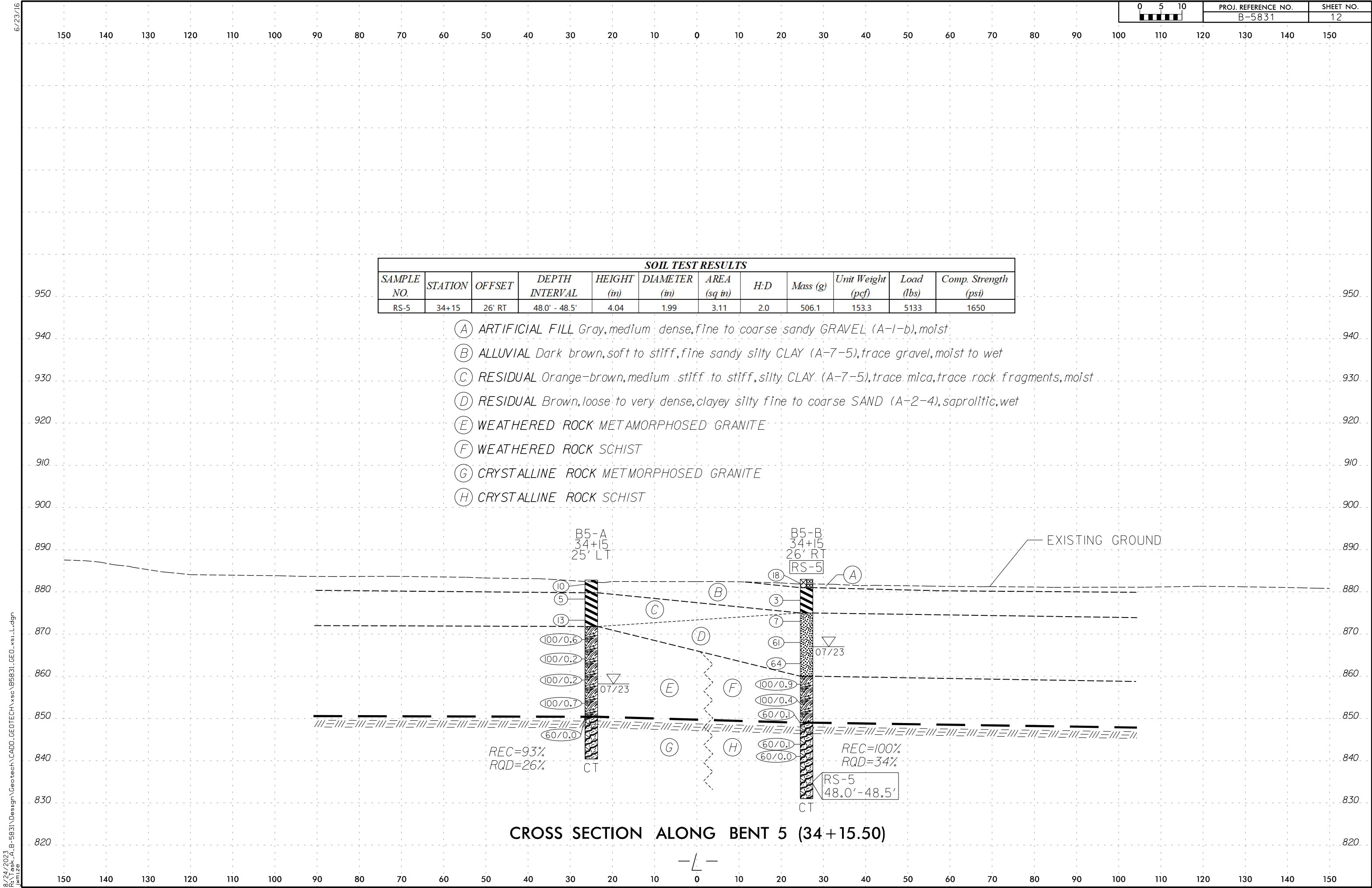
- (A) ALLUVIAL Brown, hard, silty CLAY (A-7-5), some boulders and cobbles, wet
- (B) ALLUVIAL Orange-brown to gray, very loose to very dense, clayey to silty fine to coarse SAND (A-2-4) and GRAVEL (A-I-b), moist to wet
- (C) RESIDUAL Orange-brown to gray, loose to very dense, silty fine to coarse SAND (A-2-4), trace mica, little rock fragments, saprolitic, moist to saturated
- (D) WEATHERED ROCK METAMORPHOSED GRANITE
- (E) WEATHERED ROCK SCHIST
- (F) CRYSTALLINE ROCK METAMORPHOSED GRANITE
- (G) CRYSTALLINE ROCK SCHIST



CROSS SECTION ALONG BENT 4 (32 + 90.50)

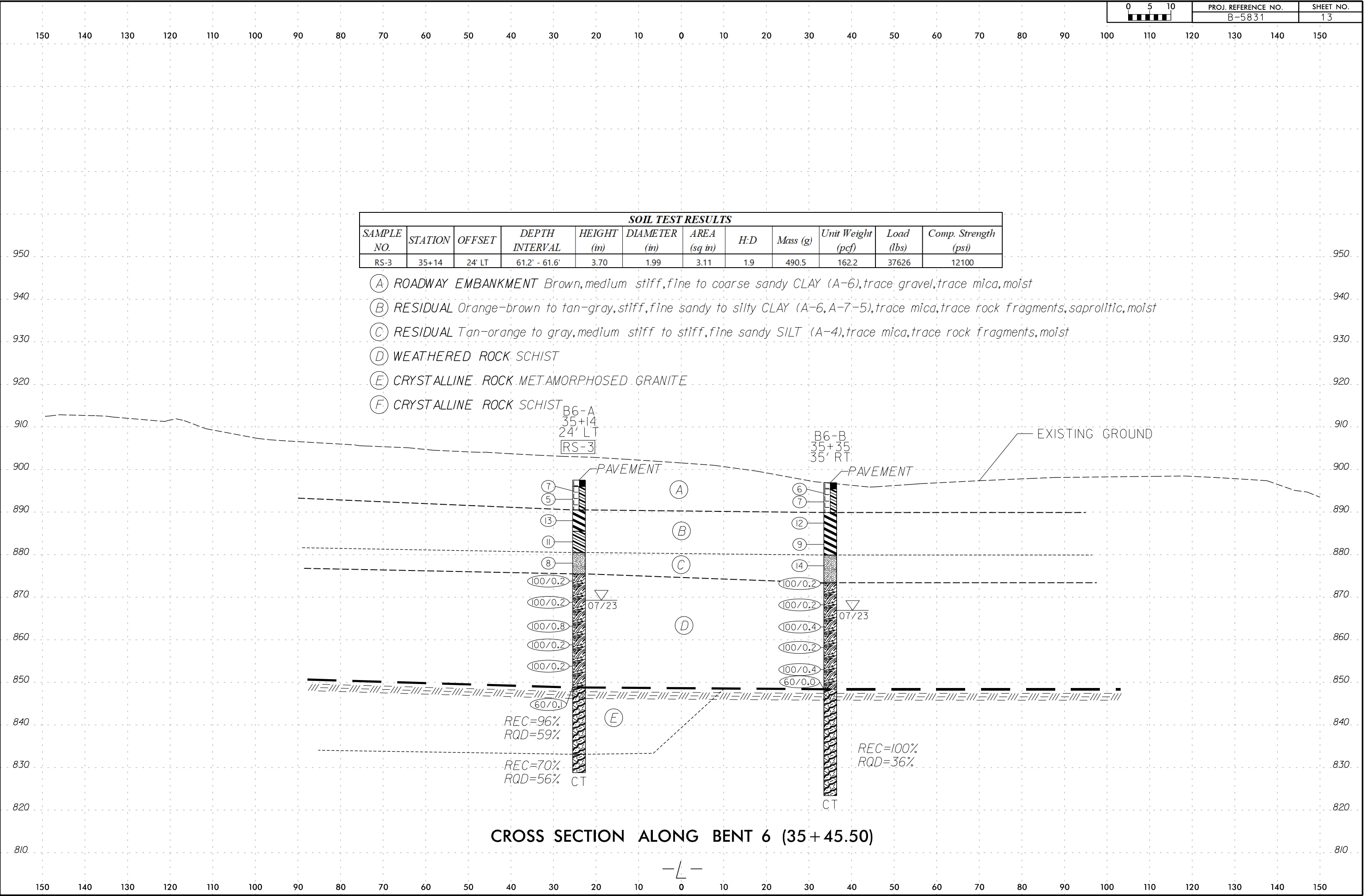


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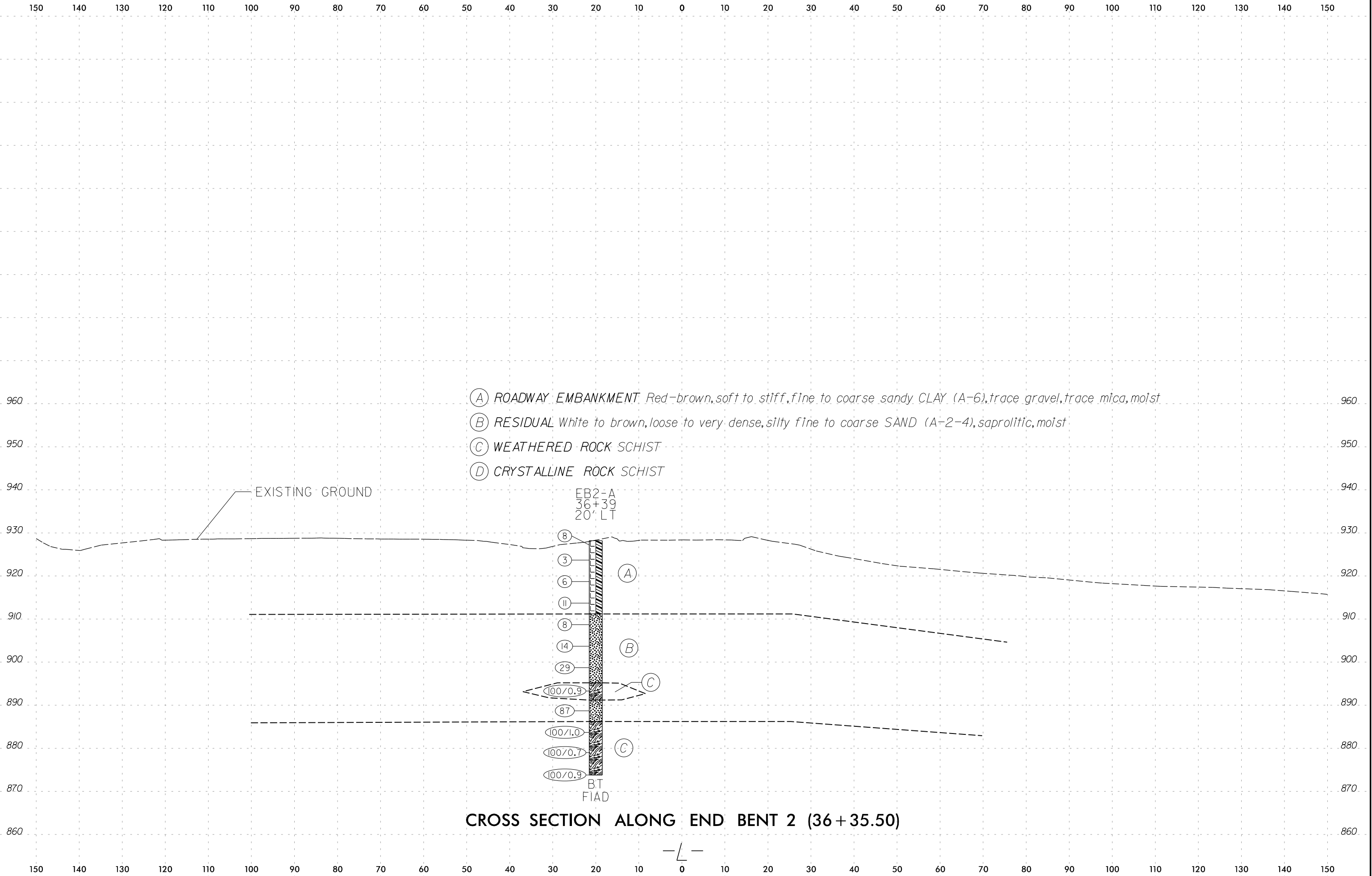


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6/23/16



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY YADKIN			GEOLOGIST J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)					
BORING NO. EB1-A			STATION 27+97			OFFSET 24 ft LT			ALIGNMENT -L-			0 HR. Dry			
COLLAR ELEV. 909.5 ft			TOTAL DEPTH 63.6 ft			NORTHING 914,692			EASTING 1,463,139			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 06/28/23			COMP. DATE 06/29/23			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)
910															
	909.5	0.0	2	2	2									909.5	0.0
												M		GROUND SURFACE	
	906.0	3.5	1	3	5									906.5	3.0
905												M		ROADWAY EMBANKMENT Pink to gray, fine to coarse sandy CLAY (A-6)	
														Pink to gray-brown, fine to coarse sandy SILT (A-4), trace gravel, trace mica	
	901.0	8.5	2	3	4										
900												M			
	896.0	13.5	3	3	5										
895												M			
	891.0	18.5	2	2	6										
890												M			
	886.0	23.5	3	3	3										
885												M			
	881.0	28.5	2	3	4										
880												W		ALLUVIAL Gray, silty fine to coarse SAND (A-2-4)	
	876.0	33.5	4	3	4									877.5	32.0
875												W		Dark gray, fine sandy CLAY (A-6)	
	871.0	38.5	2	2	2									872.5	37.0
870												W		Dark gray, silty CLAY (A-7-6)	
	866.0	43.5	2	2	6									867.5	42.0
865												Sat.		Gray, silty fine to coarse SAND (A-2-4)	
	861.0	48.5	6	16	33									861.5	48.0
860												Sat.		RESIDUAL Yellow, silty fine to coarse SAND (A-2-4), saprolitic	
	856.0	53.5	100/0.4											856.5	53.0
855														WEATHERED ROCK METAMORPHOSED GRANITE	
	851.0	58.5	100/0.3												
850															
	846.0	63.5	60/0.1											846.0	63.5
														845.9	63.6
														CRYSTALLINE ROCK METAMORPHOSED GRANITE Boring Terminated with Standard Penetration Test Refusal at Elevation 845.9 ft in Crystalline Rock: METAMORPHOSED GRANITE	

NCDOT BORE DOUBLE B5831.GPJ NC_DOT.GDT 8/11/23

BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY YADKIN			GEOLOGIST J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)					
BORING NO. B1-A			STATION 29+10			OFFSET 5 ft LT			ALIGNMENT -L-		0 HR. N/A				
COLLAR ELEV. 880.4 ft			TOTAL DEPTH 68.6 ft			NORTHING 914,806			EASTING 1,463,136		24 HR. FIAD				
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD NW Casing w/ Core			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 07/16/23			COMP. DATE 07/17/23			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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
885															
880	880.4	0.0												880.4	0.0
	878.1	2.3	3	3	19										
875			2	2	3										
	873.1	7.3	WOH	WOH	1									874.4	6.0
870															
	868.1	12.3	1	2	2										
865														864.4	16.0
	863.1	17.3	12	88/0.5											
860														860.4	20.0
	858.1	22.3	8	5	31										
855														853.4	27.0
	853.1	27.3	21	38	62/0.4										
850														848.4	32.0
	848.1	32.3	29	21	52										
845														843.9	36.5
	843.1	37.3	57	43/0.3											
840														838.1	42.3
	838.1	42.3	60/0.1												
835															
830															
825															
820															
815															
														811.8	68.6
														Boring Terminated at Elevation 811.8 ft in Crystalline Rock: METAMORPHOSED GRANITE	

CORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY YADKIN			GEOLOGIST J. Mize		
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River									GROUND WTR (ft)		
BORING NO. B1-A			STATION 29+10			OFFSET 5 ft LT			ALIGNMENT -L-		0 HR. N/A
COLLAR ELEV. 880.4 ft			TOTAL DEPTH 68.6 ft			NORTHING 914,806			EASTING 1,463,136		24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD NW Casing w/ Core			HAMMER TYPE Automatic		
DRILLER B. Maxson			START DATE 07/16/23			COMP. DATE 07/17/23			SURFACE WATER DEPTH N/A		
CORE SIZE NQ2			TOTAL RUN 26.3 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft)
838.1	838.1	42.3	0.1	3:12/1.2	(0.7)	SPT		(22.0)	(7.6)		Begin Coring @ 42.3 ft
835	838.0	43.6	1.2	2:31/1.0	58%	(0.0)		84%	29%		CRYSTALLINE ROCK 42.3
			5.0	2:31/1.0	(4.3)	0%					Orange-brown, moderately severe weathering to fresh, moderately to very hard, close to very close fractures, METAMORPHOSED GRANITE
	831.8	48.6		2:31/1.0	86%	(0.8)					Highly fractured zone 54' - 56'
830			5.0	2:31/1.0		16%					GSI = 25 to 35
				3:05/1.0	(5.0)	(1.1)					
				3:05/1.0	100%	22%					
	826.8	53.6		3:05/1.0							
825			5.0	3:05/1.0							
				3:27/1.0	(2.6)	(0.7)					
				3:27/1.0	52%	14%					
	821.8	58.6		3:27/1.0							
820			5.0	3:27/1.0							
				2:42/1.0	(4.4)	(1.5)					
				2:42/1.0	88%	30%					
	816.8	63.6		2:42/1.0							
815			5.0	2:42/1.0							
				2:40/1.0	(5.0)	(3.5)					
				2:40/1.0	100%	70%					
	811.8	68.6		2:40/1.0							Boring Terminated at Elevation 811.8 ft in Crystalline Rock: METAMORPHOSED GRANITE

NCDOT BORE DOUBLE B5831.GPJ NC_DOT.GDT 8/11/23

CORE PHOTOGRAPHS

B1-A

BOX 1: 42.4 - 53.6 FEET



BOX 3: 65.6 - 68.6 FEET



BOX 2: 53.6 - 65.6 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

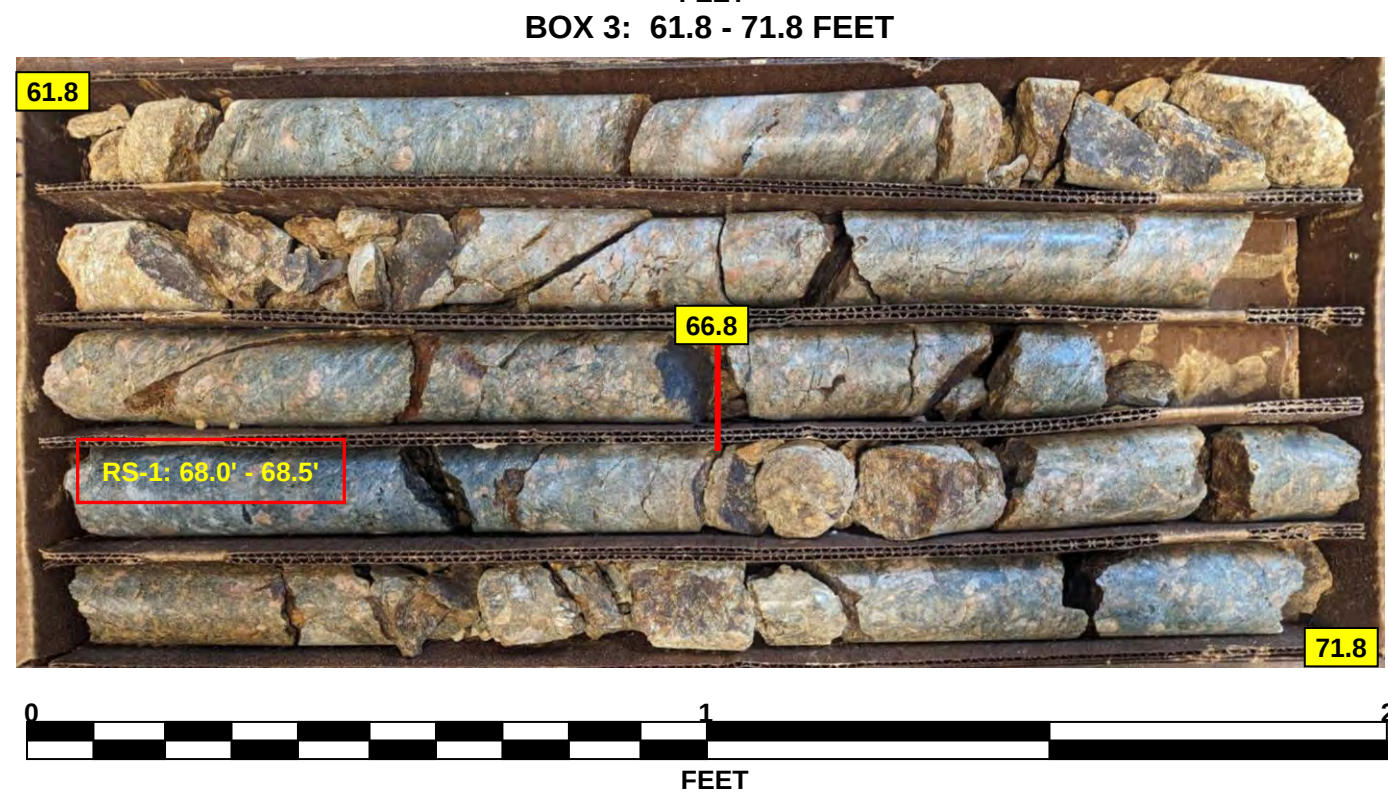
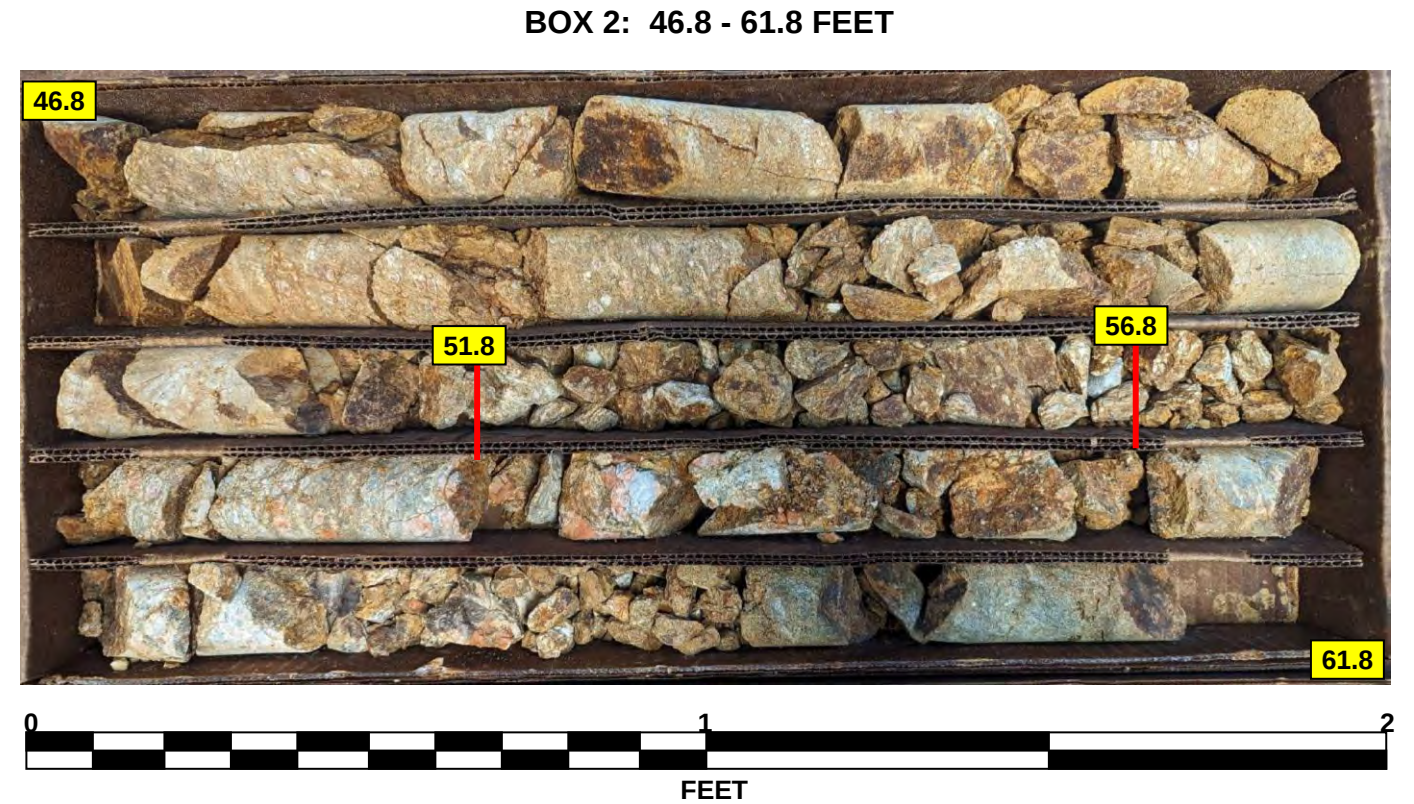
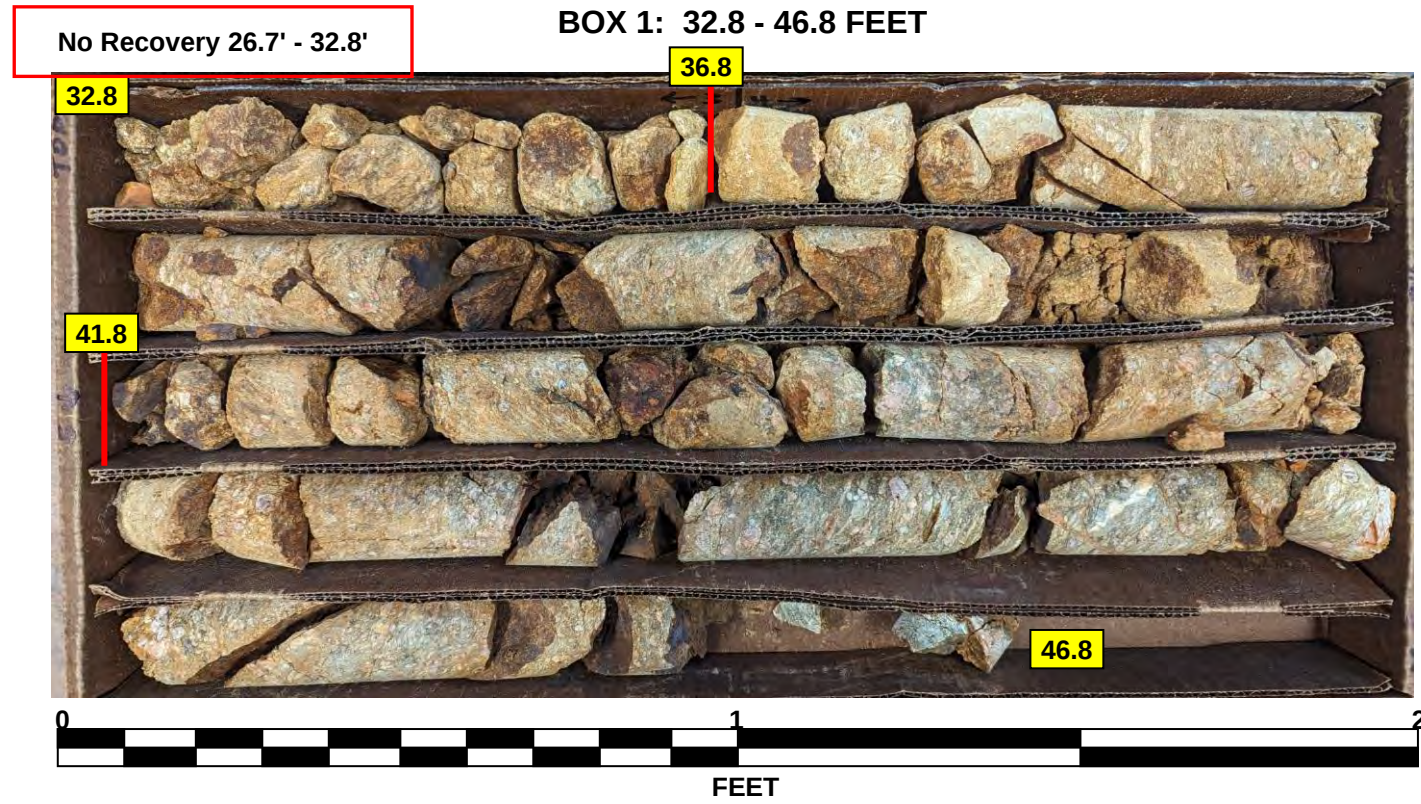
GEOTECHNICAL BORING REPORT

CORE LOG

RS-1

CORE PHOTOGRAPHS

B1-B



GEOTECHNICAL BORING REPORT

CORE LOG

NCDOT BORE DOUBLE B5831.GPJ NC DOT.GDT 8/25/23

CORE PHOTOGRAPHS

B2-A

BOX 1: 1.9 - 13.9 FEET



BOX 2: 13.9 - 22.7 FEET



BOX 3: 22.7 - 25.7 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

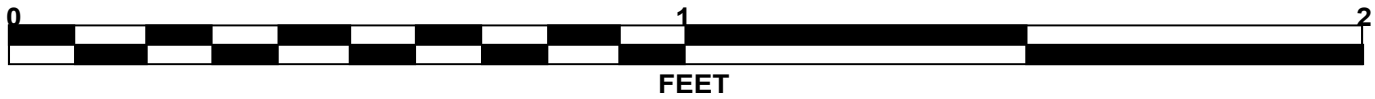
GEOTECHNICAL BORING REPORT

CORE LOG

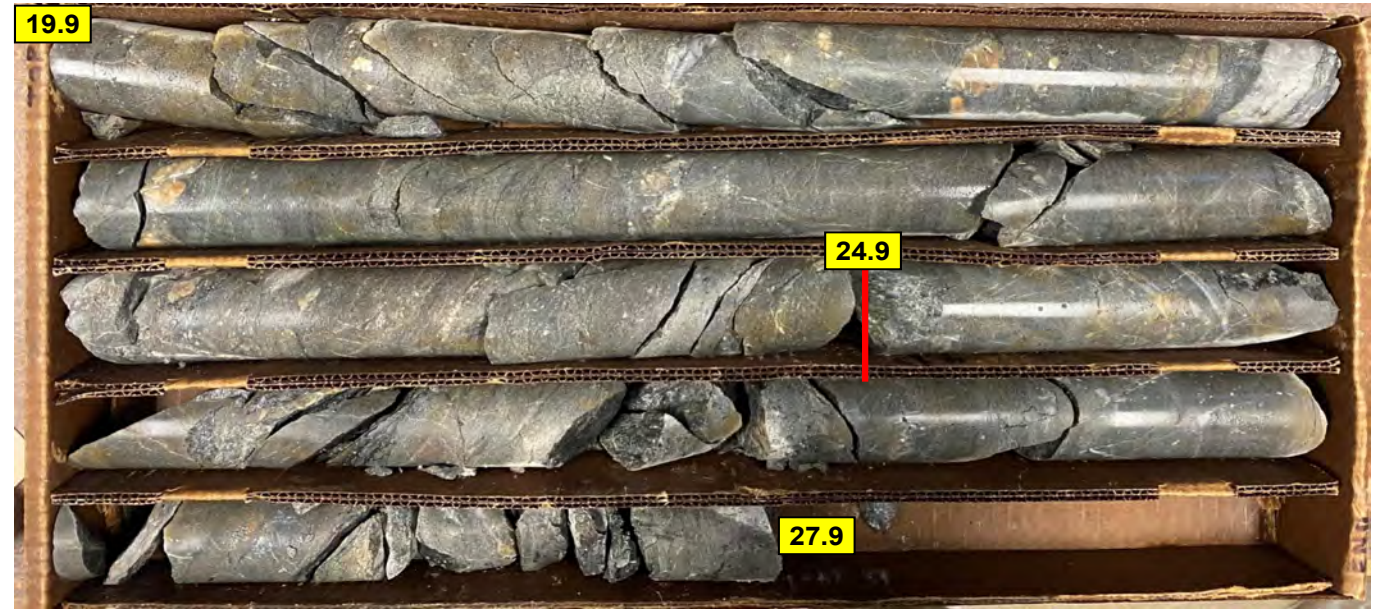
CORE PHOTOGRAPHS

B2-B

BOX 1: 10.6 - 19.9 FEET



BOX 2: 19.9 - 27.9 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 45784.1.2				TIP B-5831		COUNTY SURRY		GEOLOGIST J. Mize					
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)			
BORING NO. B3-A				STATION 31+51		OFFSET 4 ft LT		ALIGNMENT -L-		0 HR.	N/A		
COLLAR ELEV. 860.7 ft				TOTAL DEPTH 33.7 ft		NORTHING 915,043		EASTING 1,463,092		24 HR.	N/A		
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic				
DRILLER B. Maxson				START DATE 07/13/23		COMP. DATE 07/14/23		SURFACE WATER DEPTH 4.5ft					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
870													
865													
860	860.7	0.0											
			1	0	2								
855	856.4	4.3	50	50/0.3									
850	852.2	8.5	60/0.1										
845													
840													
835													
830													

GEOTECHNICAL BORING REPORT
CORE LOG

SHEET 24

WBS 45784.1.2				TIP B-5831		COUNTY SURRY		GEOLOGIST J. Mize			
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)	
BORING NO. B3-A				STATION 31+51			OFFSET 4 ft LT		ALIGNMENT -L-		0 HR. N/A
COLLAR ELEV. 860.7 ft				TOTAL DEPTH 33.7 ft			NORTHING 915,043		EASTING 1,463,092		24 HR. N/A
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021							DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic	
DRILLER B. Maxson				START DATE 07/13/23			COMP. DATE 07/14/23		SURFACE WATER DEPTH 4.5ft		
CORE SIZE NQ2				TOTAL RUN 25.2 ft							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
852.2	852.2	8.5	0.2	3:50/1.0	(4.3)	SPT		(23.0)	(9.8)		Begin Coring @ 8.5 ft
850	852.0	8.7	5.0	3:50/1.0	86%	(0.7)		92%	39%		CRYSTALLINE ROCK
				3:50/1.0		14%					Gray to brown, slight to moderately severe weathering, medium hard to hard, very close to moderately close fractures, SCHIST
	847.0	13.7		3:50/1.0							Highly fractured zone 8.7' - 9.7'
845			5.0	3:08/1.0	(4.7)	(0.9)					GSI = 30 to 40
				3:08/1.0	94%	18%					
	842.0	18.7		3:08/1.0							
840			5.0	3:26/1.0	(4.0)	(0.5)					
				3:26/1.0	80%	10%					
				3:26/1.0							
	837.0	23.7		3:26/1.0							
835			5.0	4:17/1.0	(5.0)	(3.5)					
				4:17/1.0	100%	70%					
				4:17/1.0							
	832.0	28.7		4:17/1.0							
830			5.0	3:52/1.0	(5.0)	(4.2)					
				3:52/1.0	100%	84%					
				3:52/1.0							
	827.0	33.7		3:52/1.0							
											Boring Terminated at Elevation 827.0 ft in Crystalline Rock: SCHIST

CORE PHOTOGRAPHS

B3-A

BOX 1: 8.7 - 18.7 FEET



BOX 3: 28.7 - 33.7 FEET



BOX 2: 18.7 - 28.7 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY SURRY			GEOLOGIST J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River									GROUND WTR (ft)						
BORING NO. B3-B			STATION 31+54			OFFSET 12 ft RT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 857.9 ft			TOTAL DEPTH 31.4 ft			NORTHING 915,049			EASTING 1,463,107			24 HR. N/A			
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 07/18/23			COMP. DATE 07/19/23			SURFACE WATER DEPTH 9.0ft						
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)
870															
865															
860															
855	857.9	0.0	3	2	5	7	.	.	.	.	.	.	.	857.9	0.0
850	852.9	5.0	100/0.3			.	.	.	.	100/0.3	.	.	.	853.9	4.0
845	849.4	8.5	100/0.2			.	.	.	.	100/0.2	.	.	.	849.0	8.9
840						.	.	.	.	.	.	.	.		
835						.	.	.	.	.	.	.	.		
830						.	.	.	.	.	.	.	.	826.5	31.4
														Boring Terminated at Elevation 826.5 ft in Crystalline Rock: SCHIST	

WBS 45784.1.2				TIP B-5831				COUNTRY SURRY				GEOLOGIST J. Mize			
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River												GROUND WTR (ft)			
BORING NO. B3-B				STATION 31+54				OFFSET 12 ft RT				ALIGNMENT -L-		0 HR. N/A	
COLLAR ELEV. 857.9 ft				TOTAL DEPTH 31.4 ft				NORTHING 915,049				EASTING 1,463,107		24 HR. N/A	
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021								DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic			
DRILLER B. Maxson				START DATE 07/18/23				COMP. DATE 07/19/23				SURFACE WATER DEPTH 9.0ft			
CORE SIZE NQ2				TOTAL RUN 22.5 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %RQD (ft) %		SAMP. NO.	STRATA REC. (ft) %RQD (ft) %		L O G	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft)				
849											Begin Coring @ 8.9 ft				
845	849.0	8.9	2.5	1:57/0.5	(2.3)	(0.0)		(21.9)	(10.4)		849.0	8.9			
	846.5	11.4		3:54/1.0	92%	0%			97%		46%	Gray, severe weathering to fresh, medium hard to hard, very close to moderately close fractures, SCHIST			
			5.0	3:26/1.0	(4.7)	(0.0)					GSI = 35 to 50				
840				3:26/1.0	94%	0%									
				3:26/1.0											
	841.5	16.4		3:26/1.0											
835				3:26/1.0											
			5.0	3:14/1.0	(5.0)	(3.3)									
				3:14/1.0	100%	66%									
830				3:14/1.0											
	836.5	21.4		3:14/1.0											
			5.0	3:19/1.0	(5.0)	(3.7)									
				3:19/1.0	100%	74%									
				3:19/1.0											
	831.5	26.4		3:19/1.0											
				3:19/1.0											
			5.0	3:03/1.0	(4.9)	(3.4)									
				3:03/1.0	98%	68%									
				3:03/1.0											
				3:03/1.0											
	826.5	31.4		3:03/1.0							826.5	31.4			
Boring Terminated at Elevation 826.5 ft in Crystalline Rock: SCHIST															

CORE PHOTOGRAPHS

B3-B

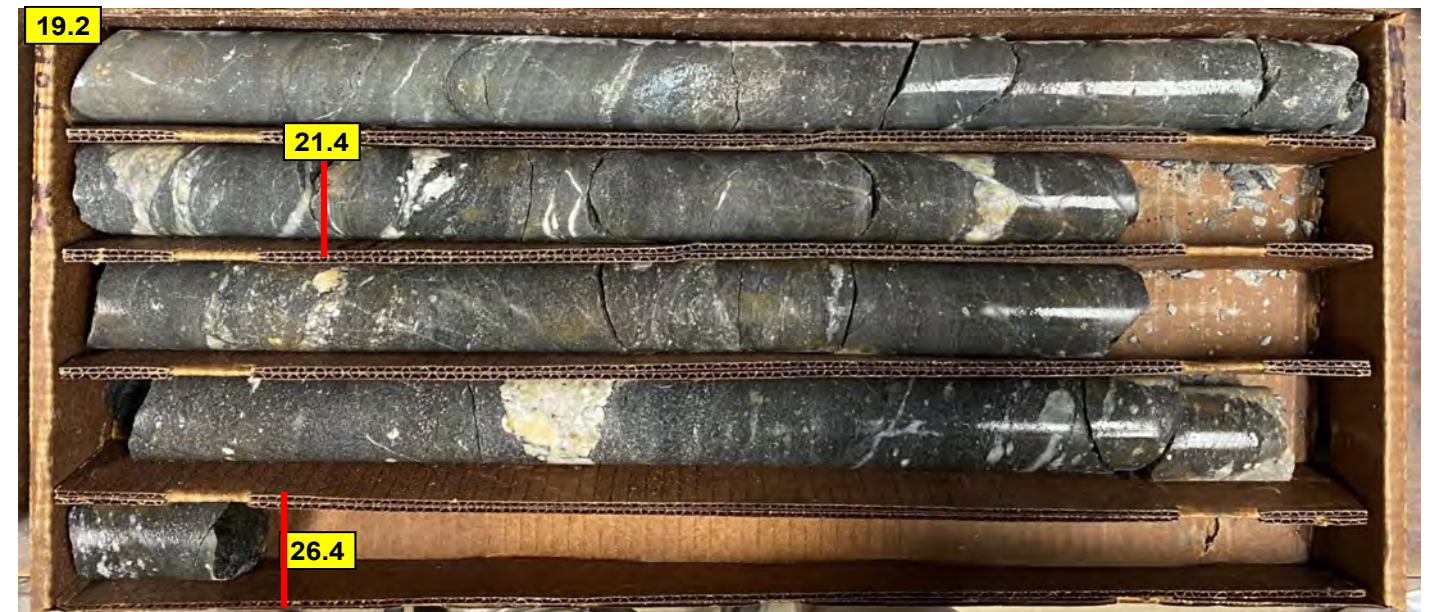
BOX 1: 8.9 - 19.2 FEET



BOX 3: 26.4 - 31.4 FEET



BOX 2: 19.2 - 26.4 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY SURRY			GEOLOGIST P. Fallon & J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River									GROUND WTR (ft)						
BORING NO. B4-A			STATION 32+90			OFFSET 26 ft LT			ALIGNMENT -L-			0 HR. 17.9			
COLLAR ELEV. 878.1 ft			TOTAL DEPTH 50.8 ft			NORTHING 915,176			EASTING 1,463,045			24 HR. 0.7 Caved			
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers & Core			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 07/07/23			COMP. DATE 07/20/23			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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
880															
	878.1	0.0	2	15	37									878.1	0.0
875	874.6	3.5	3	4	4									875.1	3.0
870	869.6	8.5	2	3	3										
865	864.6	13.5	9	16	20										
860	859.6	18.5	20	40	50										
855	854.6	23.5	20	42	58/0.1									854.1	24.0
850	849.6	28.5	84	16/0.1											
845	844.6	33.5													
	843.5	34.6	100/0.3											843.5	34.6
			60/0.0												
840															
835															
830															

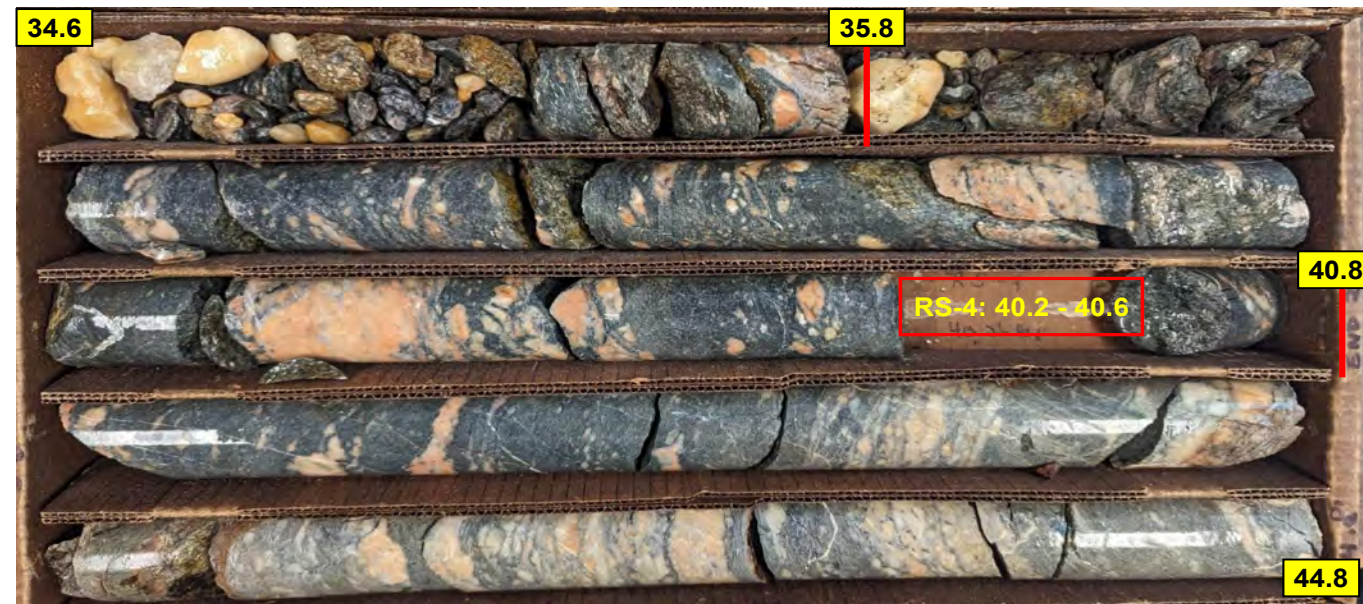
GEOTECHNICAL BORING REPORT CORE LOG

WBS 45784.1.2				TIP B-5831		COUNTY SURRY		GEOLOGIST P. Fallon & J. Mize								
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)						
BORING NO. B4-A				STATION 32+90		OFFSET 26 ft LT		ALIGNMENT -L-		0 HR. 17.9						
COLLAR ELEV. 878.1 ft				TOTAL DEPTH 50.8 ft		NORTHING 915,176		EASTING 1,463,045		24 HR. 0.7 Caved						
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers & Core			HAMMER TYPE Automatic							
DRILLER B. Maxson				START DATE 07/07/23		COMP. DATE 07/20/23		SURFACE WATER DEPTH N/A								
CORE SIZE NQ2				TOTAL RUN 16.2 ft												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %		RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %		RQD (ft) %	L O G	DESCRIPTION AND REMARKS		DEPTH (ft)	
843.5	843.5	34.6	1.2	4:35/1.2	(1.2)	(0.0)				(15.9)	(7.8)		843.5	34.6		
840	842.3	35.8	5.0	6:42/1.0	100%	0%				98%	48%		843.5	34.6		
				6:42/1.0	(4.7)	(2.6)										
	837.3	40.8		6:42/1.0	94%	52%										
			5.0	6:42/1.0				RS-4								
835				9:38/1.0	(5.0)	(3.0)										
				9:38/1.0	100%	60%										
	832.3	45.8		9:38/1.0												
			5.0	9:38/1.0												
830				4:12/1.0	(5.0)	(2.2)										
				4:12/1.0	100%	44%										
				4:12/1.0												
	827.3	50.8		4:12/1.0									827.3	50.8		
Boring Terminated at Elevation 827.3 ft in Crystalline Rock: METAMORPHOSED GRANITE																

CORE PHOTOGRAPHS

B4-A

BOX 1: 34.6 - 44.8 FEET



BOX 2: 44.8 - 50.8 FEET



GEOTECHNICAL BORING REPORT

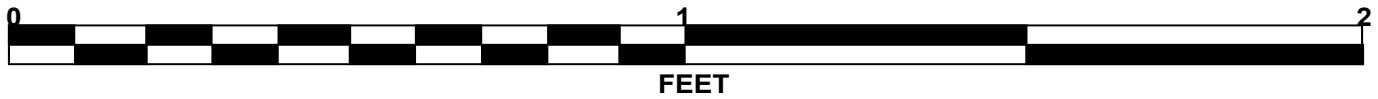
CORE LOG

WBS 45784.1.2				TIP B-5831				COUNTY SURRY				GEOLOGIST J. Mize							
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River												GROUND WTR (ft)							
BORING NO. B4-B				STATION 32+90				OFFSET 30 ft RT				ALIGNMENT -L-				0 HR. 11.1			
COLLAR ELEV. 878.0 ft				TOTAL DEPTH 53.0 ft				NORTHING 915,186				EASTING 1,463,100				24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021								DRILL METHOD H.S. Augers & Core				HAMMER TYPE Automatic							
DRILLER B. Maxson				START DATE 07/19/23				COMP. DATE 07/21/23				SURFACE WATER DEPTH N/A							
CORE SIZE NQ2				TOTAL RUN 19.0 ft															
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %		RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %		RQD (ft) %	L O G	DESCRIPTION AND REMARKS						
													ELEV. (ft)	DEPTH (ft)					
844	844.0	34.0	5.0			SPT			(13.3) 95%	(7.9) 56%			844.0	34.0					
840	839.0	39.0												Begin Coring @ 34.0 ft					
	838.0	40.0	1.0	2:37/1.0	(0.9) 90%	(0.5) 50%								CRYSTALLINE ROCK					
			5.0	3:11/1.0	(4.5) 90%	(2.4) 48%								Gray, fresh to slight weathering, very close to moderately close fractures, hard, SCHIST					
835				3:11/1.0										GSI = 45 to 55					
	833.0	45.0		3:11/1.0															
830			5.0	4:17/1.0	(4.9) 98%	(2.1) 42%													
				4:17/1.0															
	828.0	50.0		4:17/1.0															
			3.0	4:55/1.0	(3.0) 100%	(2.9) 97%													
825	825.0	53.0		4:55/1.0									825.0	53.0					
Boring Terminated at Elevation 825.0 ft in Crystalline Rock: SCHIST																			

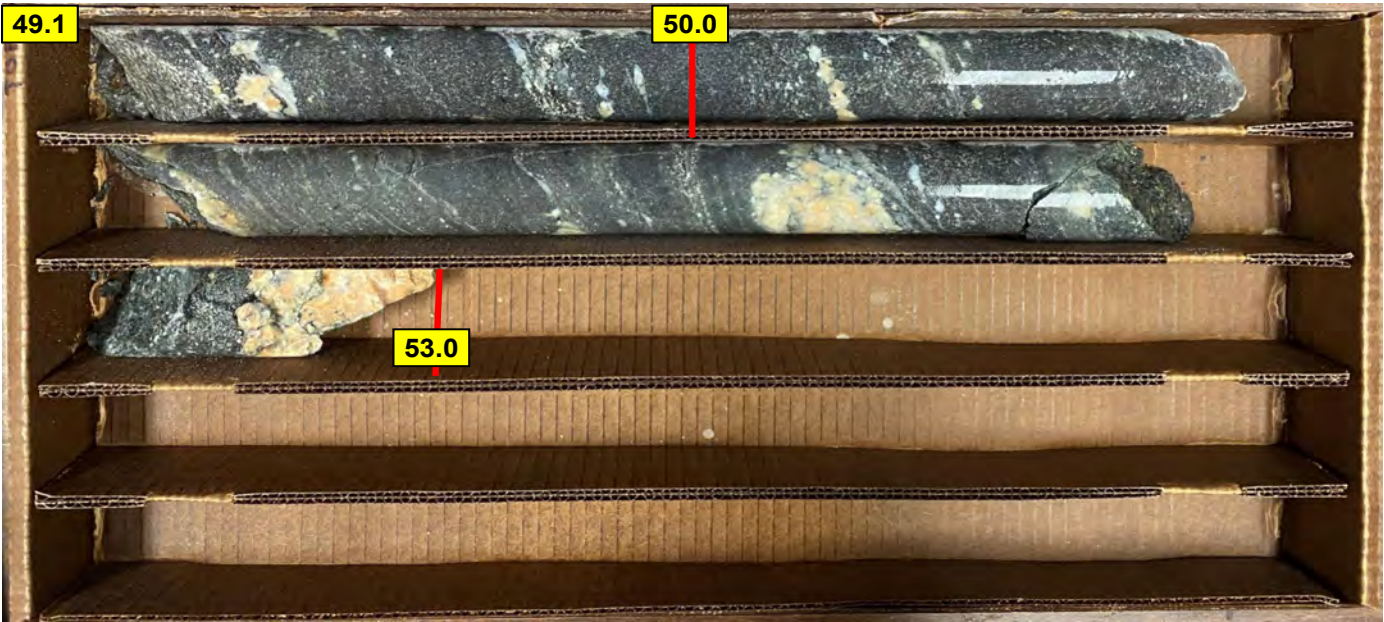
CORE PHOTOGRAPHS

B4-B

BOX 1: 39.0 - 49.1 FEET



BOX 2: 49.1 - 53.0 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY SURRY			GEOLOGIST P. Fallon & J. Mize								
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)							
BORING NO. B5-A			STATION 34+15			OFFSET 25 ft LT			ALIGNMENT -L-		0 HR. 24.6						
COLLAR ELEV. 882.8 ft			TOTAL DEPTH 42.4 ft			NORTHING 915,299			EASTING 1,463,022		24 HR. Caved						
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers & Core			HAMMER TYPE Automatic								
DRILLER B. Maxson			START DATE 07/07/23			COMP. DATE 07/20/23			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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
885																	
	882.8	0.0		4	6	4									882.8	GROUND SURFACE	0.0
880	879.3	3.5		2	2	3									879.8	ALLUVIAL Dark brown, fine sandy silty CLAY (A-7-5), trace gravel	3.0
875	874.3	8.5		2	6	7										RESIDUAL Orange-brown, silty CLAY (A-7-5), trace mica, trace rock fragments	
870	869.3	13.5		72	28/0.1										871.8	WEATHERED ROCK Brown to gray, METAMORPHOSED GRANITE	11.0
865	864.3	18.5		100/0.2													
860	859.3	23.5		100/0.2													
855	854.3	28.5		59	41/0.2												
850	850.4	32.4		60/0.0											850.4	CRYSTALLINE ROCK METAMORPHOSED GRANITE	32.4
845															840.4	Boring Terminated at Elevation 840.4 ft in Crystalline Rock: METAMORPHOSED GRANITE	42.4

GEOTECHNICAL BORING REPORT
CORE LOG

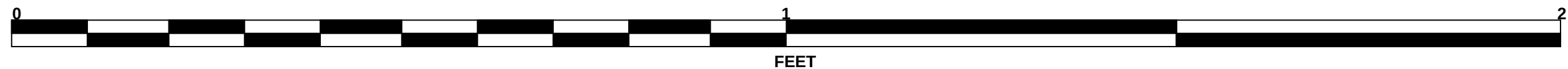
SHEET 32

WBS 45784.1.2					TIP B-5831			COUNTY SURRY			GEOLOGIST P. Fallon & J. Mize					
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River											GROUND WTR (ft)					
BORING NO. B5-A				STATION 34+15				OFFSET 25 ft LT				ALIGNMENT -L-			0 HR.	24.6
COLLAR ELEV. 882.8 ft				TOTAL DEPTH 42.4 ft				NORTHING 915,299				EASTING 1,463,022			24 HR.	Caved
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021								DRILL METHOD H.S. Augers & Core				HAMMER TYPE Automatic				
DRILLER B. Maxson				START DATE 07/07/23				COMP. DATE 07/20/23				SURFACE WATER DEPTH N/A				
CORE SIZE NQ2				TOTAL RUN 10.0 ft												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS					
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %							ELEV. (ft)
850.4	850.4	32.4	5.0	6:56/1.0 6:56/1.0 6:56/1.0 6:56/1.0	(4.3) 86%	(2.2) 44%		(9.3) 93%	(2.6) 26%		850.4	Begin Coring @ 32.4 ft			32.4	
												CRYSTALLINE ROCK				
												Gray, fresh to very slight weathering, very hard, close to moderately close fractures, METAMORPHOSED GRANITE				
												Highly fractured zone 35' - 36'				
845	845.4	37.4	5.0	3:14/1.0 3:14/1.0 3:14/1.0 3:14/1.0	(5.0) 100%	(0.4) 8%						GSI = 35 to 55				
	840.4	42.4									840.4	Boring Terminated at Elevation 840.4 ft in Crystalline Rock: METAMORPHOSED GRANITE			42.4	

CORE PHOTOGRAPHS

B5-A

BOX 1: 32.4 - 42.4 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY SURRY			GEOLOGIST J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River										GROUND WTR (ft)					
BORING NO. B5-B			STATION 34+15			OFFSET 26 ft RT			ALIGNMENT -L-			0 HR. 16.0			
COLLAR ELEV. 883.0 ft			TOTAL DEPTH 52.0 ft			NORTHING 915,308			EASTING 1,463,072			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers & Core			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 07/19/23			COMP. DATE 07/20/23			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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
885															
	883.0	0.0	8	11	7									883.0	0.0
880												M	XXXX	GROUND SURFACE	
	879.0	4.0	2	0	3									881.0	2.0
875												W		ARTIFICIAL FILL Gray, fine to coarse sandy GRAVEL (A-1-b)	
	874.0	9.0	2	2	5										
870												W		ALLUVIAL Brown, silty CLAY (A-7-5)	
	869.0	14.0	38	31	30									875.0	8.0
865															
	864.0	19.0	8	32	32										
860															
	859.0	24.0	21	79/0.4											
855															
	854.0	29.0	100/0.4												
850															
	849.0	34.0	60/0.1												
845															
	844.0	39.0	60/0.1												
840															
	841.0	42.0	60/0.0												
835															
												RS-5			
														831.0	52.0
														Boring Terminated at Elevation 831.0 ft in Crystalline Rock: SCHIST	

GEOTECHNICAL BORING REPORT
CORE LOG

SHEET 34

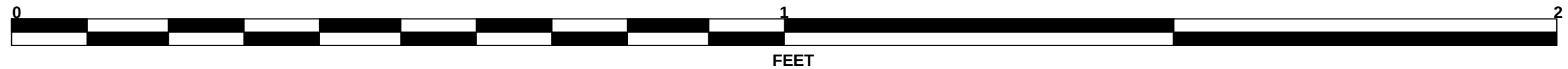
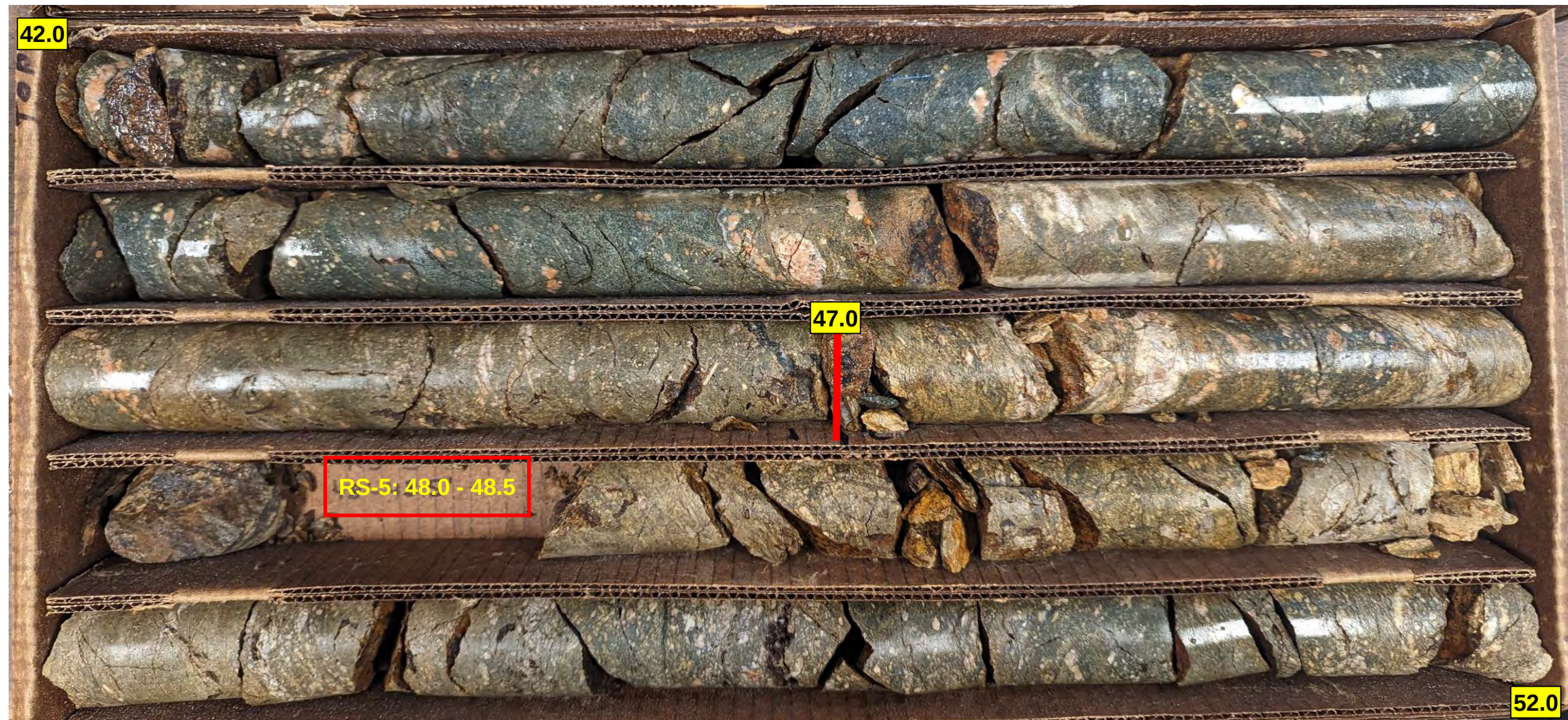
WBS 45784.1.2				TIP B-5831				COUNTY SURRY				GEOLOGIST J. Mize												
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River												GROUND WTR (ft)												
BORING NO. B5-B				STATION 34+15				OFFSET 26 ft RT				ALIGNMENT -L-				0 HR. 16.0								
COLLAR ELEV. 883.0 ft				TOTAL DEPTH 52.0 ft				NORTHING 915,308				EASTING 1,463,072				24 HR. FIAD								
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021								DRILL METHOD H.S. Augers & Core				HAMMER TYPE Automatic												
DRILLER B. Maxson				START DATE 07/19/23				COMP. DATE 07/20/23				SURFACE WATER DEPTH N/A												
CORE SIZE NQ2				TOTAL RUN 18.0 ft																				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS													
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %														ELEV. (ft)	DEPTH (ft)
849											Begin Coring @ 34.0 ft													
	849.0	34.0	8.0			SPT		(10.0) 100%	(3.4) 34%		849.0	CRYSTALLINE ROCK										34.0		
845											Dark gray, very slight to moderate weathering, hard, close to very close fractures, SCHIST													
											GSI = 35 to 45													
840	841.0	42.0		5.0	3:13/1.0 3:13/1.0 3:13/1.0 3:13/1.0	(5.0) 100%	(2.3) 46%																	
835	836.0	47.0		5.0	3:26/1.0 3:26/1.0 3:26/1.0 3:26/1.0	(5.0) 100%	(1.1) 22%	RS-5																
	831.0	52.0		5.0	3:26/1.0 3:26/1.0 3:26/1.0 3:26/1.0	(5.0) 100%	(1.1) 22%				831.0	Boring Terminated at Elevation 831.0 ft in Crystalline Rock: SCHIST										52.0		

NCDOT BORE DOUBLE B5831.GPJ NC_DOT.GDT 8/11/23

CORE PHOTOGRAPHS

B5-B

BOX 1: 42.0 - 52.0 FEET



GEOTECHNICAL BORING REPORT

CORE LOG

NCDOT BORE DOUBLE B5831.GPJ NC DOT.GDT 8/25/23

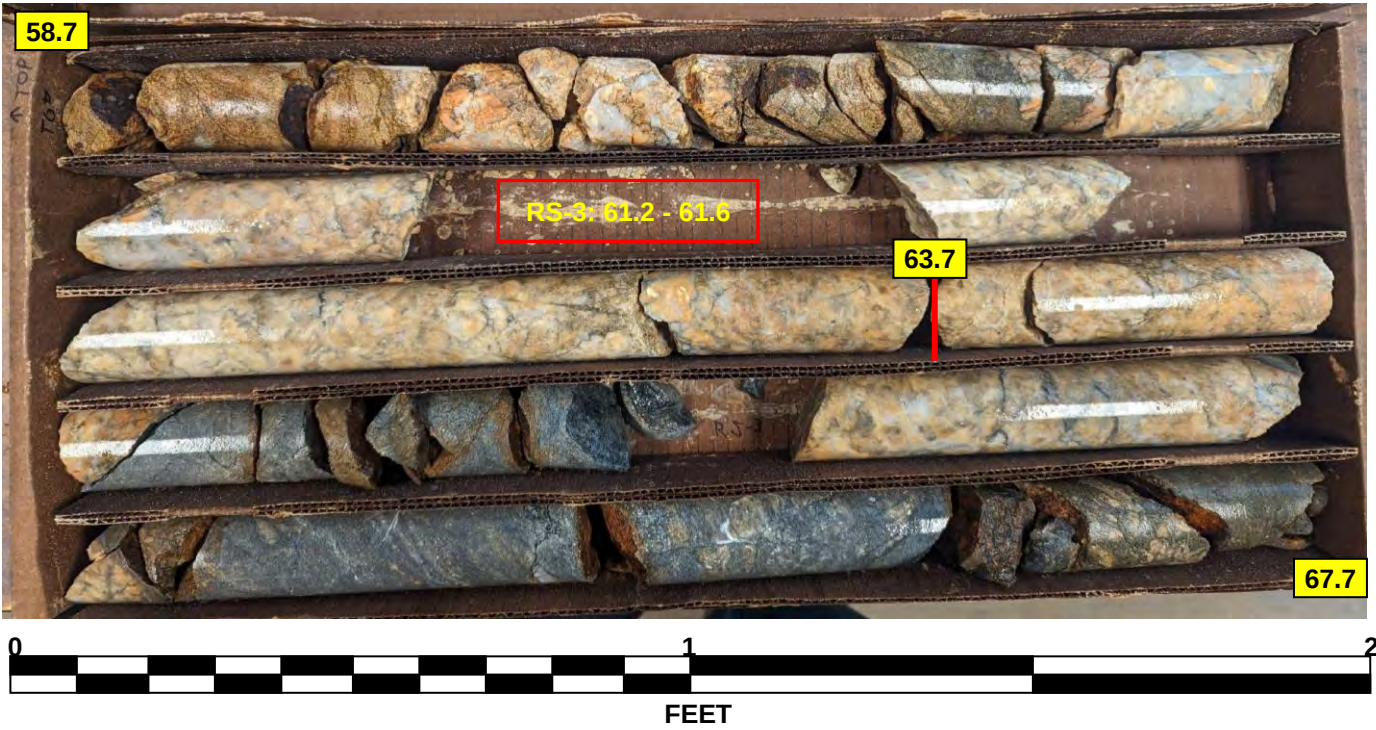
CORE PHOTOGRAPHS

B6-A

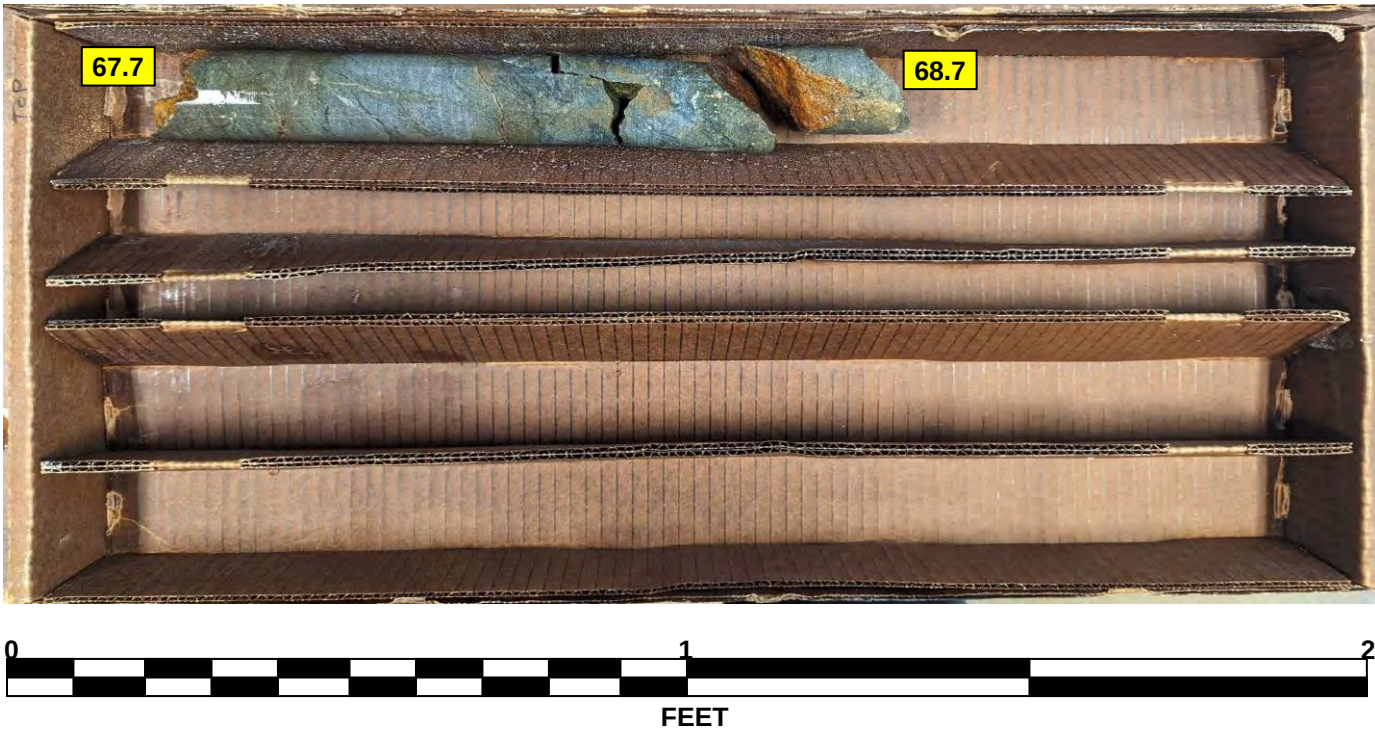
BOX 1: 48.7 - 58.7 FEET



BOX 2: 58.7 - 67.7 FEET



BOX 3: 67.7 - 68.7 FEET



GEOTECHNICAL BORING REPORT

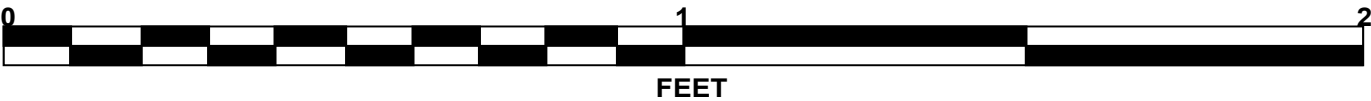
CORE LOG

NCDOT BORE DOUBLE B5831.GPJ NC DOT.GDT 8/11/23

CORE PHOTOGRAPHS

B6-B

BOX 1: 48.5 - 58.5 FEET



BOX 2: 58.5 - 68.5 FEET



BOX 3: 68.5 - 73.5 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 45784.1.2			TIP B-5831			COUNTY SURRY			GEOLOGIST J. Mize						
SITE DESCRIPTION Replace Bridge 850006 on I-77 over NC 268, Southern Railroad, and the Yadkin River												GROUND WTR (ft)			
BORING NO. EB2-A			STATION 36+39			OFFSET 20 ft LT			ALIGNMENT -L-			0 HR.	Dry		
COLLAR ELEV. 928.2 ft			TOTAL DEPTH 54.4 ft			NORTHING 915,520			EASTING 1,462,985			24 HR.	FIAD		
DRILL RIG/HAMMER EFF./DATE F&R7078 Diedrich D50 85% 08/30/2021						DRILL METHOD H.S. Augers,			HAMMER TYPE Automatic						
DRILLER B. Maxson			START DATE 06/29/23			COMP. DATE 06/29/23			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)
930															
	928.2	0.0	4	3	5									928.2	0.0
925	924.7	3.5	2	1	2									GROUND SURFACE ROADWAY EMBANKMENT Red-brown, fine to coarse sandy CLAY (A-6), trace gravel, trace mica	
920	919.7	8.5	2	2	4										
915	914.7	13.5	5	5	6										
910	909.7	18.5	3	4	4									911.2	17.0
														RESIDUAL White to brown, silty fine to coarse SAND (A-2-4), saprolitic	
905	904.7	23.5	5	7	7										
900	899.7	28.5	7	10	19										
895	894.7	33.5	18	38	62/0.4									895.2	33.0
														WEATHERED ROCK SCHIST	
890	889.7	38.5	20	31	56										
														891.2	37.0
885	884.7	43.5	42	58/0.5										886.2	42.0
														WEATHERED ROCK SCHIST	
880	879.7	48.5	60	40/0.2											
875	874.7	53.5	30	70/0.4										873.8	54.4
														Boring Terminated at Elevation 873.8 ft in Weathered Rock: SCHIST	

NCDOT BORE DOUBLE B5831.GPJ NC_DOT.GDT 8/11/23

ASTM D7012 - 14e1 Test Report

Unconfined Compression Test

Client: RK&K
Report Date: 8/1/2023

Project:
F&R Project No.:

B-5831, Bridge 850006 on I-77
66B-01110

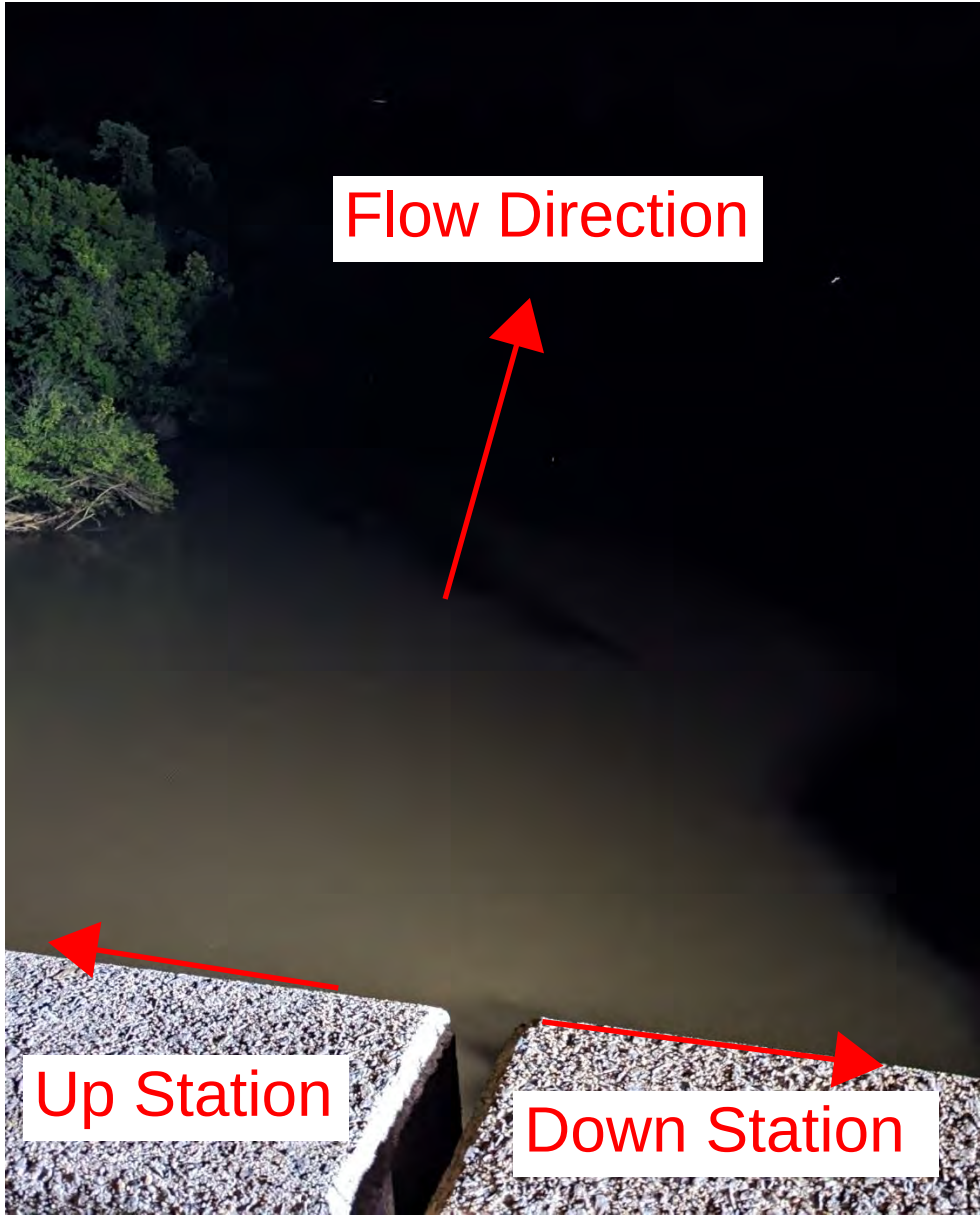
Specimen ID	Diameter (in.)	Height (in.)	Height/Diameter Ratio	Area (in. ²)	Volume (in. ³)	Specimen Wt (gm)	Unit Weight (pcf)	Maximum Axial Load (lbs)	Maximum Unconfined Compressive Strength (psi)
B1-B; RS-1; 68.0'-68.5'	1.990	4.010	2.0	3.110	12.472	529.90	161.712	22149	7120
B2-B; RS-2; 10.8'-11.2'	1.990	3.440	1.7	3.110	10.699	466.70	166.024	8581	2760
B6-A; RS-3; 61.2'-61.6'	1.990	3.700	1.9	3.110	11.508	490.50	162.229	37626	12100
B4-A; RS-4; 40.2'-40.6'	1.990	3.950	2.0	3.110	12.286	541.90	167.886	10639	3420
B5-B; RS-5; 48.0'-48.5'	1.990	4.040	2.0	3.110	12.565	506.10	153.302	5133	1650





Up
Station

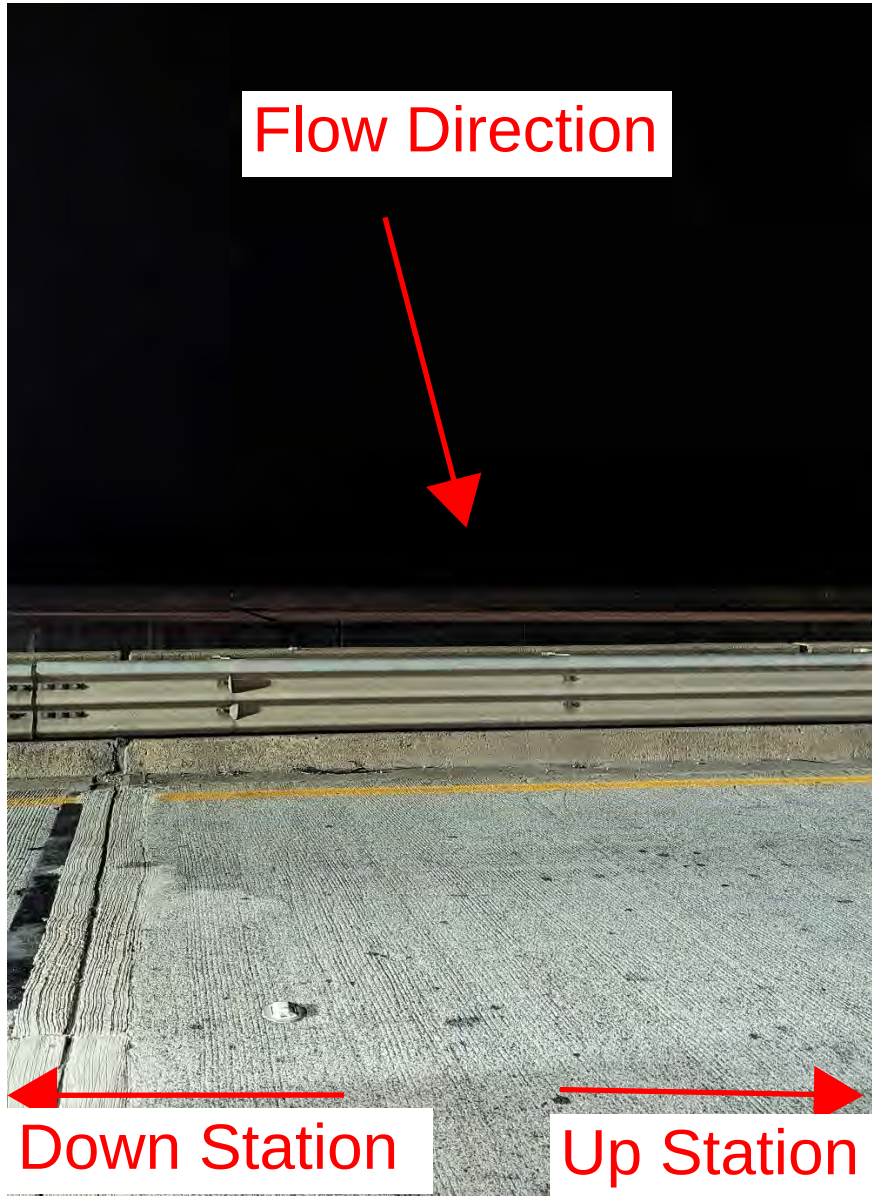
Flow Direction



Flow Direction

Up Station

Down Station



Flow Direction

Down Station

Up Station

Drill Rig Photo on Bridge Deck (-L-)

Yadkin River Downstream

Yadkin River Upstream

