

REFERENCE: B-4838

PROJECT: 38608

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-9	BORE LOGS
10	LABORATORY TEST RESULTS
11	SITE PHOTOGRAPHS

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

STRUCTURE  
SUBSURFACE INVESTIGATION

COUNTY WAYNE

PROJECT DESCRIPTION BRIDGE NO. 20 ON US 70  
BUSINESS OVER CSX RAILROAD

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4838	1	11

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- 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

M. ARNOLD

D. TIGNOR

W. SHENBERGER

W. PESL

S. DAVIS

INVESTIGATED BY F&R, Inc.

DRAWN BY D. RACEY

CHECKED BY P. ALTON, P.E.

SUBMITTED BY P. ALTON, P.E.

DATE MARCH 2020

SINCE



1881

Prepared in the Office of:

FROEHLING & ROBERTSON, INC.

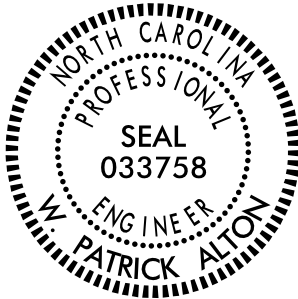
Engineering Stability Since 1881

310 Hubert Street

Raleigh, North Carolina 27603-2302| USA

T 919.828.3441| F 919.828.5751

www.fandr.com



DocuSigned by:

Patrick Alton

4/15/2020

A270EF78A69F5442

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

***NORTH CAROLINA DEPARTMENT OF TRANSPORTATION***  
***DIVISION OF HIGHWAYS***  
***GEOTECHNICAL ENGINEERING UNIT***  
***SUBSURFACE INVESTIGATION***  
***SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS***

[illegible]

PROJECT REFERENCE NO.  
B-4838

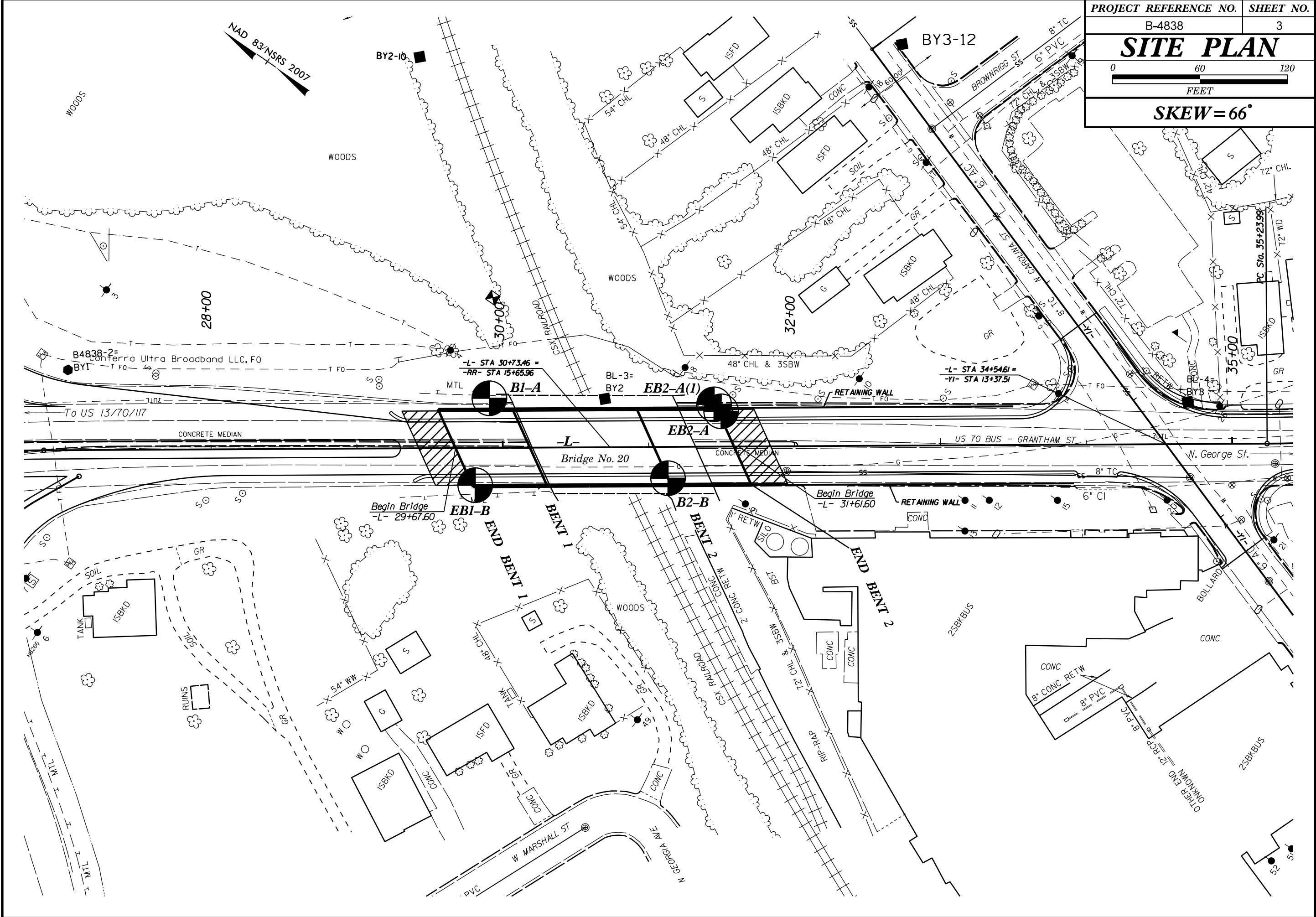
SHEET NO.  
3

SITE PLAN

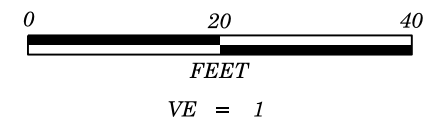
060120

FEET

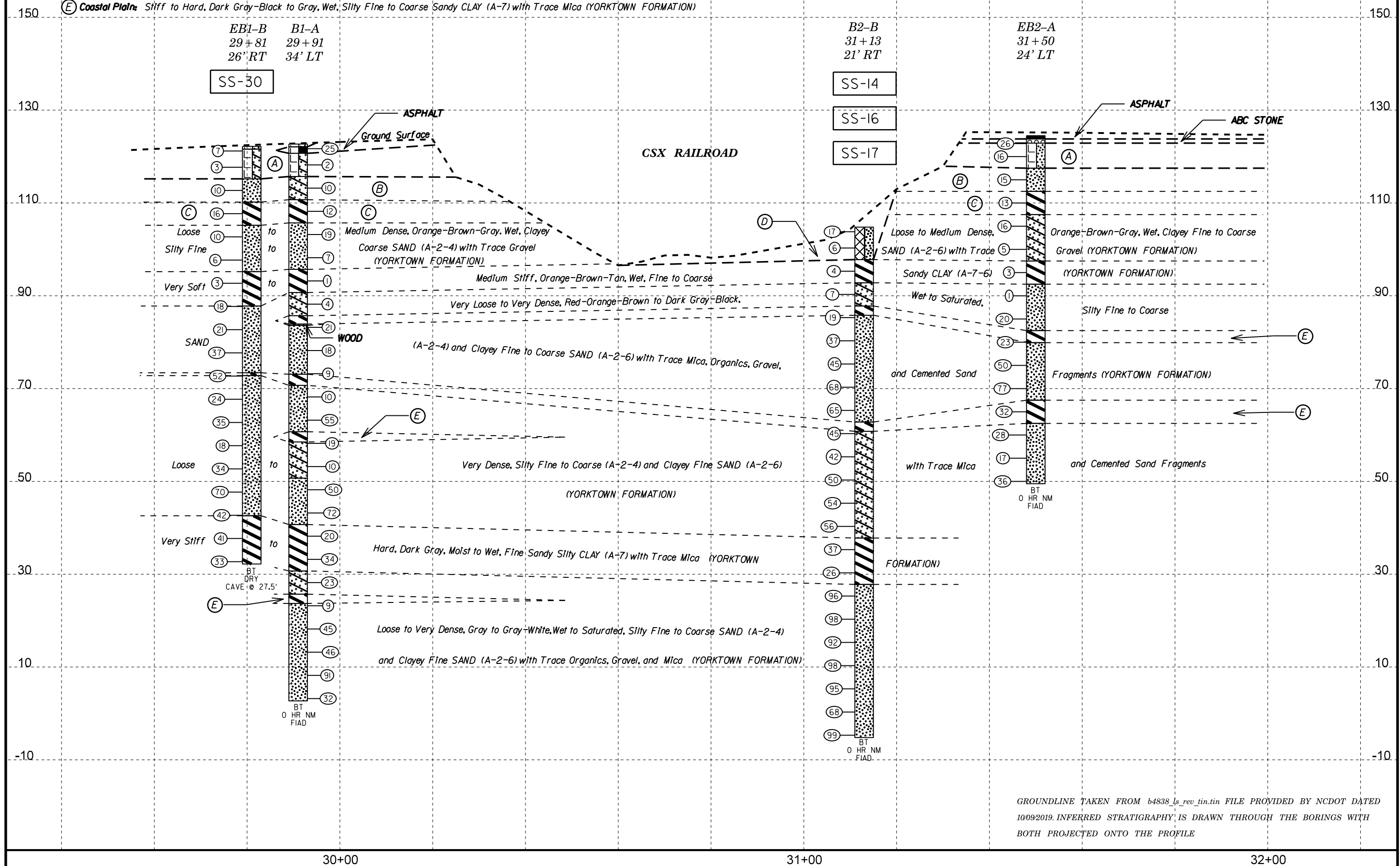
SKEW = 66°



- (A) **Roadway Embankment:** Very Loose to Medium Dense, Gray-Brown-Black to Orange-Brown, Moist to Wet, Silty Fine to Coarse SAND (A-2-4) and Clayey Fine to Coarse SAND (A-2-6) with Trace Organics and Gravel
- (B) **Coastal Plain:** Loose to Medium Dense, Gray-Brown, Wet, Silty Fine to Coarse SAND (A-2-4) and Clayey Fine to Coarse SAND (A-2-6) (YORKTOWN FORMATION)
- (C) **Coastal Plain:** Stiff to Very Stiff, Wet, Gray-Orange-Brown, Fine to Coarse Sandy CLAY (A-7-6) (YORKTOWN FORMATION)
- (D) **Artificial Fill:** Loose to Medium Dense, Brown to Orange-Brown, Moist to Saturated, Silty Fine to Coarse SAND (A-2-4) and, with Trace Gravel and Clay
- (E) **Coastal Plain:** Stiff to Hard, Dark Gray-Black to Gray, Wet, Silty Fine to Coarse Sandy CLAY (A-7) with Trace Mica (YORKTOWN FORMATION)



PROJECT REFERENCE NO.	SHEET NO.
B-4838	4
PROFILE THROUGH BORINGS PROJECTED ALONG -L-	



GROUNDLINE TAKEN FROM b4838\_ls\_rev\_tin.tin FILE PROVIDED BY NCDOT DATED 10/09/2019. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

GEOTECHNICAL BORING REPORT  
BORE LOG

WBS 38608.1.1				TIP B-4838				COUNTY WAYNE				GEOLOGIST M. Arnold					
SITE DESCRIPTION Bridge No. 20 on US 70 over CSX Railroad												GROUND WTR (ft)					
BORING NO. EB1-B				STATION 29+81				OFFSET 26 ft RT				ALIGNMENT -L-				0 HR. NM	
COLLAR ELEV. 122.2 ft				TOTAL DEPTH 90.0 ft				NORTHING 600,347				EASTING 2,297,961				24 HR.Dry/Cave@27.5	
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019								DRILL METHOD Mud Rotary				HAMMER TYPE Automatic					
DRILLER D. Tignor				START DATE 10/30/19				COMP. DATE 10/30/19				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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
130																	
125																	
120	122.2	0.0	2	4	3	7								122.2	0.0	GROUND SURFACE	
115	118.7	3.5	2	1	2	3								121.6	0.6	ROADWAY EMBANKMENT Gray-Black, Silty Fine to Coarse SAND (A-2-4) with Trace Organics	
110	113.7	8.5	6	8	2	10								115.2	7.0	Orange-Brown, Clayey Fine to Coarse SAND (A-2-6)	
105	108.7	13.5	7	6	10	16								110.2	12.0	COASTAL PLAIN Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Clay (YORKTOWN FORMATION)	
100	103.7	18.5	7	6	4	10								105.2	17.0	Orange-Gray, Fine to Coarse Sandy CLAY (A-7-6) (YORKTOWN FORMATION)	
95	98.7	23.5	3	3	3	6								105.2	17.0	Orange-Brown, Clayey Silty Fine to Coarse SAND (A-2-4) (YORKTOWN FORMATION)	
90	93.7	28.5	1	2	1	3								95.2	27.0	Orange-Brown to Dark Gray-Black, Fine to Coarse Sandy CLAY (A-7) (YORKTOWN FORMATION)	
85	88.7	33.5	5	7	11	18								87.8	34.4	Dark Gray-Black to Red-Orange-Brown, Silty Fine SAND (A-2-4) with Trace Clay and Mica (YORKTOWN FORMATION)	
80	83.7	38.5	12	10	11	21											
75	78.7	43.5	9	12	25	37											
70	73.7	48.5	11	22	30	52								73.4	48.8	Dark Gray-Black, Silty Fine Sandy CLAY (A-7) with Trace Mica (YORKTOWN FORMATION)	
65	68.7	53.5	12	11	13	24								72.8	49.4	Gray to Red-Orange-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Clay (YORKTOWN FORMATION)	
60	63.7	58.5	12	17	18	35											
55	58.7	63.5	7	8	10	18											
50	53.7	68.5	10	14	20	34											

WBS 38608.1.1		TIP B-4838		COUNTY WAYNE		GEOLOGIST M. Arnold						
SITE DESCRIPTION Bridge No. 20 on US 70 over CSX Railroad							GROUND WTR (ft)					
BORING NO. EB1-B		STATION 29+81		OFFSET 26 ft RT		ALIGNMENT -L-	0 HR. NM					
COLLAR ELEV. 122.2 ft		TOTAL DEPTH 90.0 ft		NORTHING 600,347		EASTING 2,297,961	24 HR.Dry/Cave@27.5					
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER D. Tignor		START DATE 10/30/19		COMP. DATE 10/30/19		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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		
50						Match Line						
	48.7	73.5				70						
45			22	32	38						Sat.	Gray to Red-Orange-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Clay (YORKTOWN FORMATION) (continued)
	43.7	78.5				42					Sat.	42.6 79.6
40			20	26	16							Dark Gray, Fine Sandy Silty CLAY (A-7) with Trace Mica (YORKTOWN FORMATION)
	38.7	83.5				41					W	
35			13	19	22							
	33.7	88.5				33					W	32.2 90.0
			9	15	18							
Boring Terminated at Elevation 32.2 ft in CLAY (COASTAL PLAIN- YORKTOWN FORMATION)												
Notes: 1. Surficial Organic Soil: 0.0-0.1' 2. NM=Not Measured due to Mud Rotary Techniques 3. Boring cave-in at 27.5' after 24 hours												

NCDOT BORE DOUBLE 66X-0299\_BRDG0020\_BORELOGS.GPJ NC\_DOT.GDT 3/25/20

NCDOT BORE DOUBLE 66X-0299\_BRDG0020\_BORELOGS.GPJ NC\_DOT.GDT 3/24/20

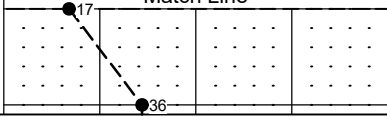

[illegible]



# **GEOTECHNICAL BORING REPORT**

## **BORE LOG**

[illegible]

WBS 38608.1.1			TIP B-4838			COUNTY WAYNE			GEOLOGIST M. Arnold					
SITE DESCRIPTION Bridge No. 20 on US 70 over CSX Railroad									GROUND WTR (ft)					
BORING NO. EB2-A			STATION 31+50			OFFSET 24 ft LT			ALIGNMENT -L-			0 HR. NM		
COLLAR ELEV. 124.5 ft			TOTAL DEPTH 75.0 ft			NORTHING 600,237			EASTING 2,298,099			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER D. Tignor			START DATE 10/29/19			COMP. DATE 10/29/19			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		MOI		
55						Match Line								
	51.0	73.5										W		Gray, Silty Fine SAND (A-2-4) with Trace Clay, Mica, and Cemented Sand Fragments (YORKTOWN FORMATION) (continued)
50			9	16	20							W		49.5
Boring Terminated at Elevation 49.5 ft in SAND (COASTAL PLAIN- YORKTOWN FORMATION)														
Notes: 1. NM=Not Measured due to Mud Rotary Techniques 2. FIAD=Filled Immediately After Drilling due to boring location in roadway														

NCDOT BORE DOUBLE 66X-0299\_BRDG0020\_BORELOGS.GPJ NC\_DOT.GDT 3/13/20



WBS 38608.1.1				TIP B-4838		COUNTY WAYNE		GEOLOGIST M. Arnold							
SITE DESCRIPTION Bridge No. 20 on US 70 over CSX Railroad								GROUND WTR (ft)							
BORING NO. EB2-A (1)		STATION 31+45		OFFSET 29 ft LT		ALIGNMENT -L-		0 HR. 28.0							
COLLAR ELEV. 125.0 ft		TOTAL DEPTH 38.0 ft		NORTHING 600,243		EASTING 2,298,100		24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER D. Tignor		START DATE 11/01/19		COMP. DATE 11/01/19		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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
125														125.0	GROUND SURFACE 0.0
120														Augered from 0.0-32.0' to obtain Shelby tube, no tube attempted due to sandy soils.	
115															
110															
105															
100															
95															
	93.0	32.0												93.0	32.0
	91.5	33.5	3	4	2									91.5	33.5
	90.0	35.0	1	1	1									COASTAL PLAIN	
	88.5	36.5	3	4	5									Orange-Brown to Gray, Clayey Fine to Coarse SAND (A-2-6) (YORKTOWN FORMATION)	
			6	8	13									Gray, Silty Fine SAND (A-2-4) with Trace Gravel and Organics (YORKTOWN FORMATION)	
														Boring Terminated at Elevation 87.0 ft in SAND (COASTAL PLAIN- YORKTOWN FORMATION)	
														Notes:	
														1. Offset of EB2-A for Shelby tube attempt.	
														2. Auger Probe: 0.0-32.0'	
														3. FIAD=Filled Immediately After Drilling	

North Carolina Department of Transportation  
Division of Highways  
Materials and Test Unit  
Soils Laboratory

T.I.P. ID NO.: B-4838  
DESCRIPTION: Bridge No. 20 on US 70 over CSX Railroad

REPORT ON SAMPLES OF: SOIL FOR QUALITY

F&R PROJECT #: 66X-0299  
DATE SAMPLED: 10/19  
SAMPLED FROM: -L-  
SUBMITTED BY: D. Racey

COUNTY: Wayne  
RECEIVED: 11/19  
REPORTED: 11/19  
BY: D. Council  
Certification No.: 101-02-0603

TEST RESULTS

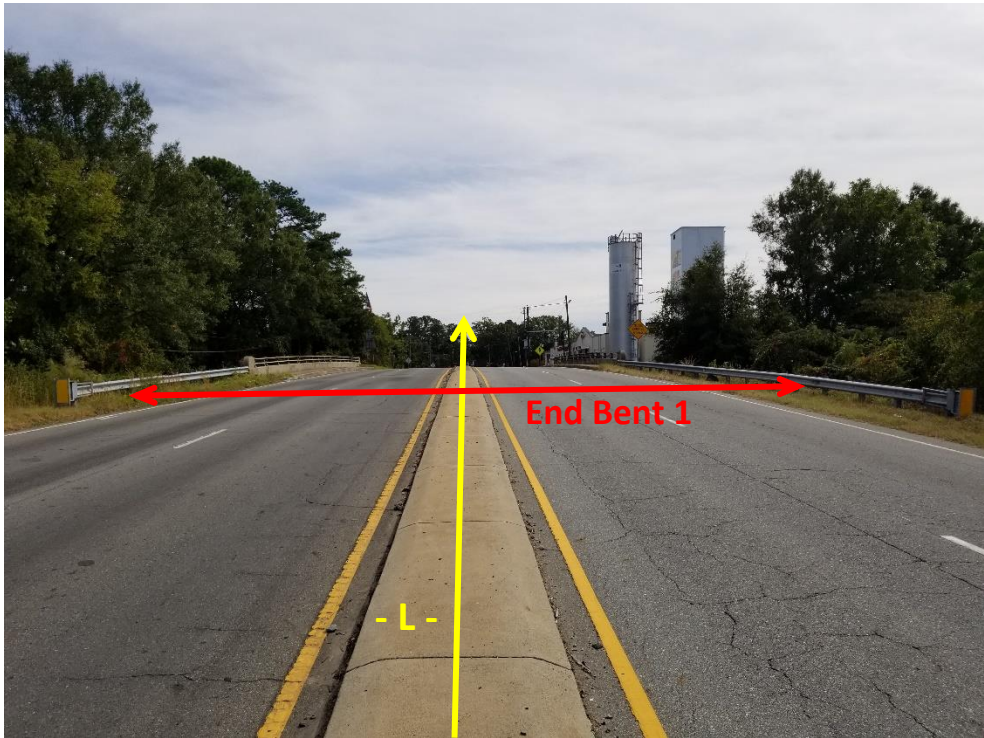
PROJ. SAMPLE NO.	SS-30	SS-14	SS-16	SS-17											
BORING NO.	EB1-B	EB2-A	EB2-A	EB2-A											
Retained #4 Sieve %	0.0	0.0	0.0	4.1											
Passing #10 Sieve %	99.9	99.5	100.0	94.4											
Passing #40 Sieve %	74.5	80.1	95.7	88.0											
Passing #200 Sieve %	37.3	48.6	40.2	30.8											

SOIL MORTAR - 100%															
Coarse Sand Ret - #60 %	47.9	36.6	13.7	21.0											
Fine Sand Ret - #270 %	15.7	16.6	47.0	47.9											
Silt 0.053 - 0.010 mm %	0.2	3.1	2.8	8.3											
Clay < 0.010 mm %	36.2	43.7	36.5	22.8											
L.L.	57	63	43	NP											
P.L.	21	21	25	NP											
P.I.	36	42	18	NP											
AASHTO Classification	A-7-6(7)	A-7-6(15)	A-7-6(3)	A-2-4(0)											
Station	29+81	31+50	31+50	31+50											
Offset	26' RT.	24' LT.	24' LT.	24' LT.											
Depth (ft)	13.5	13.5	28.5	33.5											
to	15.0	15.0	30.0	35.0											
Alignment	-L-	-L-	-L-	-L-											
Moisture Content (%)	16.2	17.9	36.4	53.1											
Organic Content (%)	NT	NT	NT	NT											





Bridge No. 20 on US 70 over CSX Railroad  
SITE PHOTOGRAPHS



Photograph No. 1: View looking southeast at End Bent 1



Photograph No. 3: View looking south-southeast at bridge



Photograph No. 2: View looking northwest at End Bent 2



Photograph No. 4: View looking southeast at Bent 2 (behind crash barrier)