

PROJECT: 17BP.4.R.84 REFERENCE: 410185

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	410185	1	12

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY HALIFAX  
PROJECT DESCRIPTION BRIDGE NO. 185 ON -L-  
(SR 1616) OVER MARSH SWAMP AT STA. 15+19.5

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE(S)
5-6	CROSS SECTION(S)
7-10	BORE LOG(S) & CORE REPORT(S)
11	CORE PHOTOGRAPH(S)
12	SITE PHOTOGRAPH(S)

**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 1919 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.

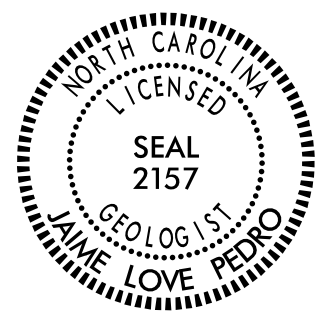
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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:
1. 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.
  2. 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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
N. T. ROBERSON  
\_\_\_\_\_  
J. L. PEDRO  
\_\_\_\_\_  
P. V. MEFFERD  
\_\_\_\_\_  
D. G. PINTER

INVESTIGATED BY J. L. PEDRO  
DRAWN BY J. L. PEDRO  
CHECKED BY N. T. ROBERSON  
SUBMITTED BY N. T. ROBERSON  
DATE SEPTEMBER 2017



DocuSigned by:  
Jaime Love Pedro 10/4/2017  
B93571039B887485 SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

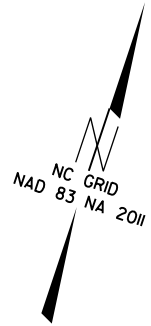
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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)

Table with 5 columns and 6 rows. Columns: SURFACE CONDITIONS, SURFACE CONDITIONS OF DISCONTINUITIES, GSI FOR JOINTED ROCKS, GSI FOR HETEROGENEOUS ROCK MASSES, COMPOSITION AND STRUCTURE. Rows: Geological Strength Index (GSI) for Jointed Rocks, Structure, Interclocking of Rock Pieces, and various rock mass types (A-H).

PROJECT REFERENCE NO.	SHEET NO.
410185	3
<b>SITE PLAN</b>	



13+00

14+00

15+00

16+00

17+00

WOODS

WOODS

BEGIN BRIDGE AT  
-L- STA. 14+76

END BRIDGE AT  
-L- STA. 15+61

WOODS

WOODS

TELEPHONE GOES  
AERIAL OVER CREEK

TELEPHONE GOES  
AERIAL OVER CREEK

Century Link

Century Link

TO SR 1613

EOI

SR 1616 (HICKORY DR.) 18' PAVED ROADWAY

TO SR 1617

HALIFAX COUNTY

EBI-B

BI-B

EB2-B

HALIFAX COUNTY 8" HDPE

TOP OF RAIL @ EBI  
ELEV. = 126.2'

54LF OF 8" DIP  
UNDER CREEK  
(DATUR)

TOP OF RAIL @ EB2  
ELEV. = 126.2'

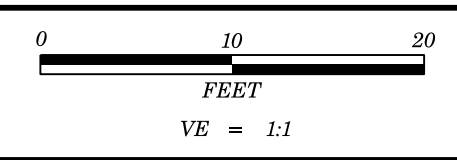
WOODS

WOODS

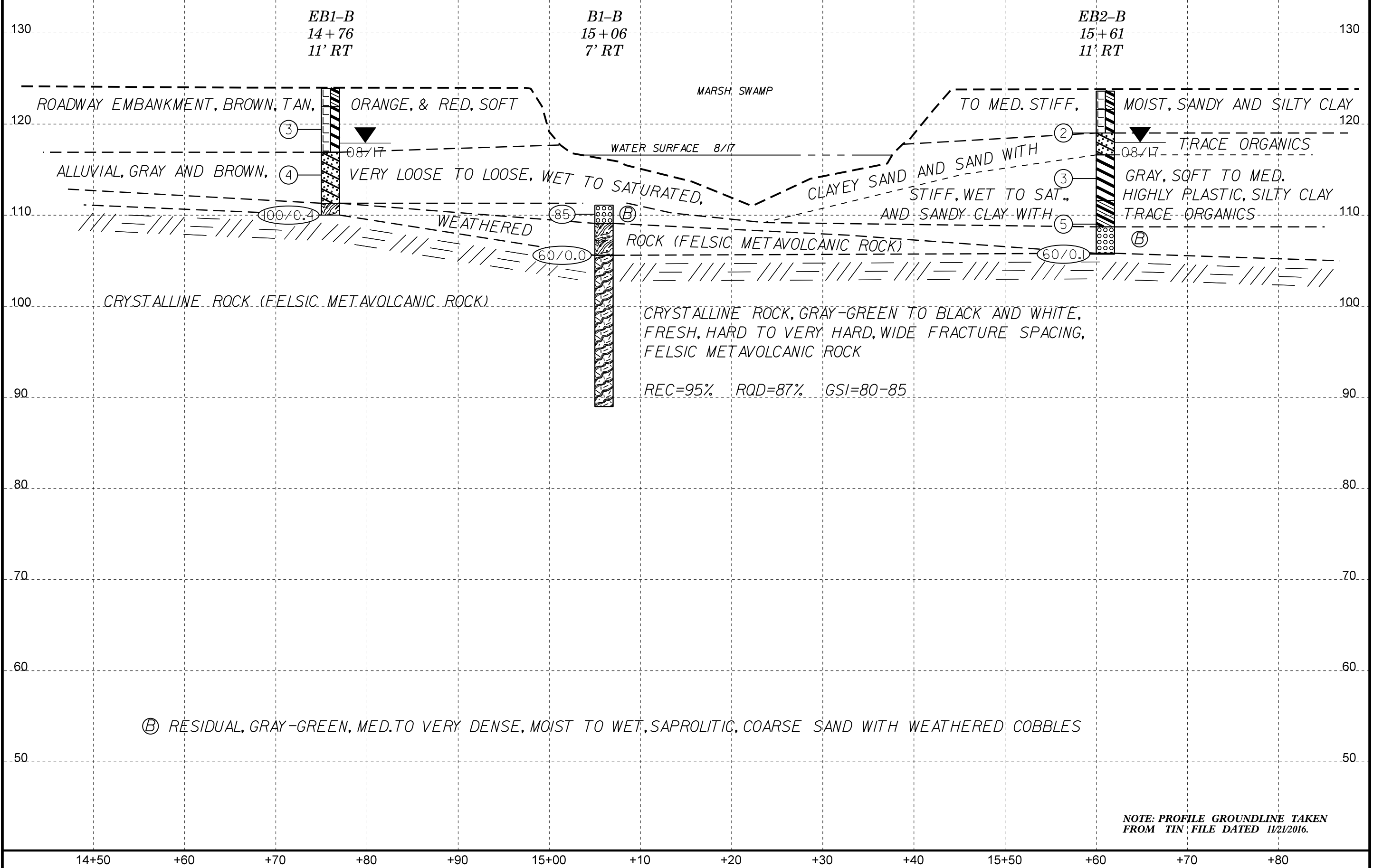
WOODS

BM#1

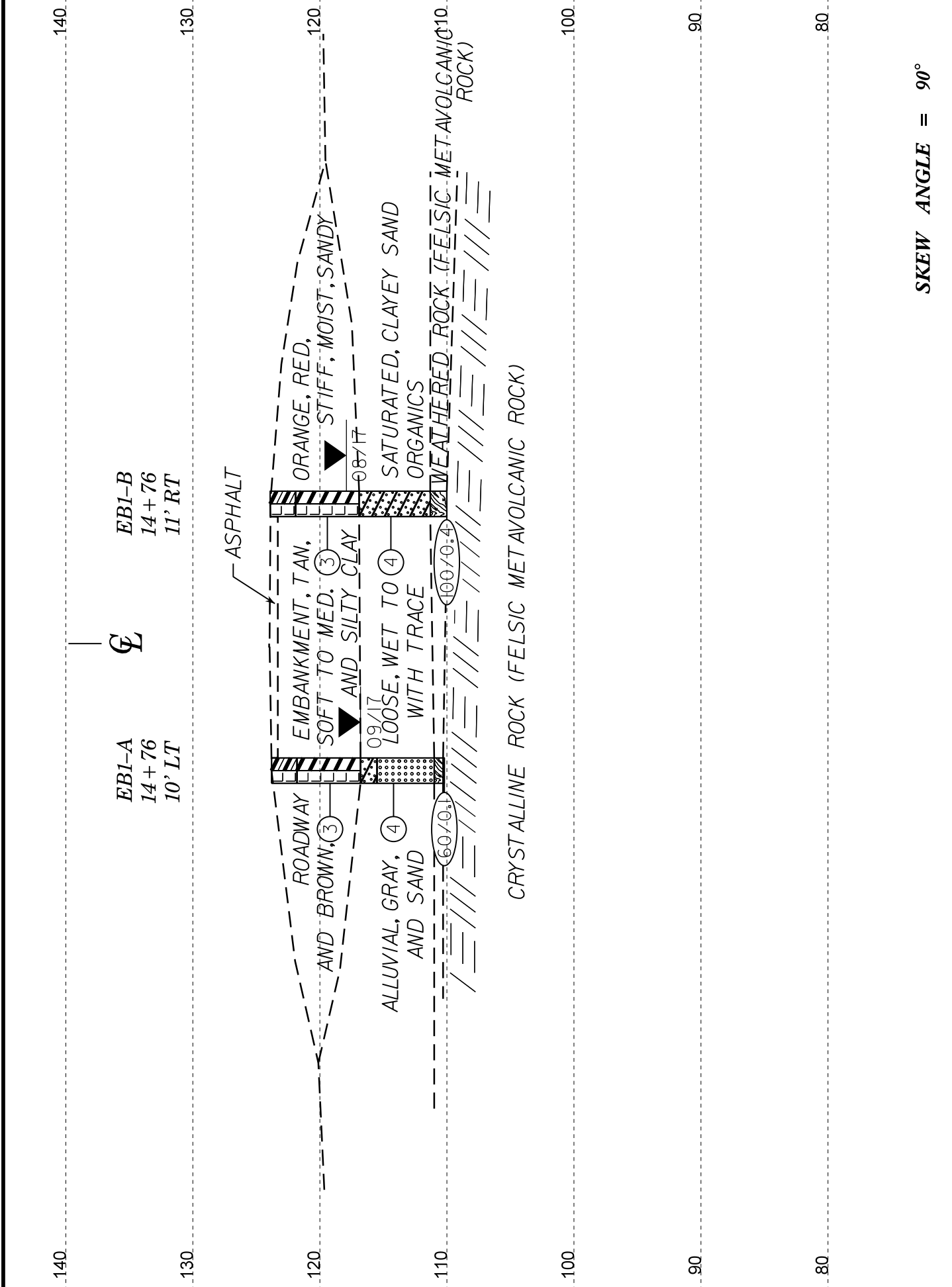
SKEW ANGLE = 90°



PROJECT REFERENCE NO.	SHEET NO.
410185	4
FENCE DIAGRAM OF BORINGS PROJECTED ALONG -L- CENTERLINE	

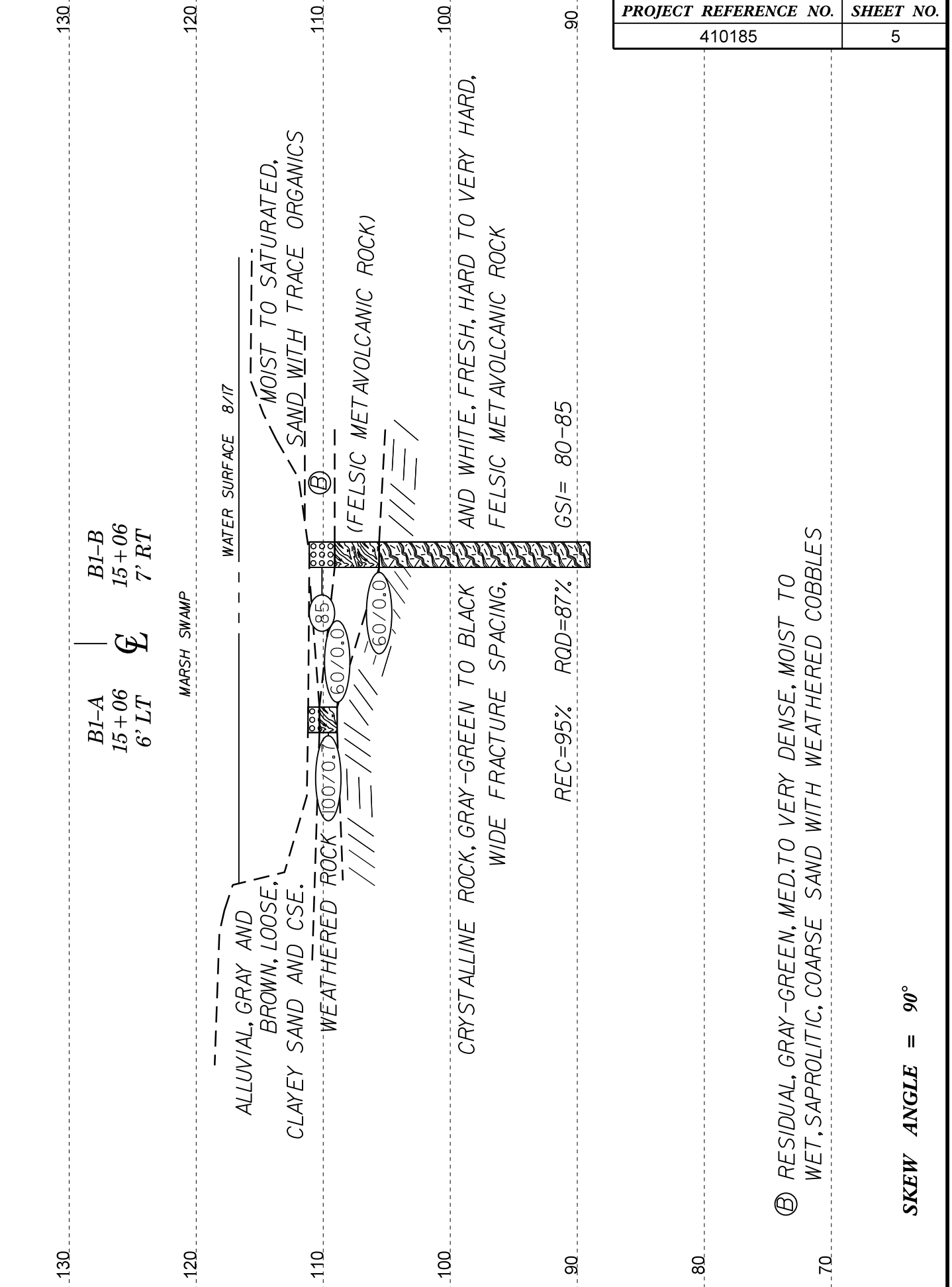


NOTE: PROFILE GROUNDLINE TAKEN FROM TIN FILE DATED 11/21/2016.



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1

**CROSS SECTION THROUGH EBI**

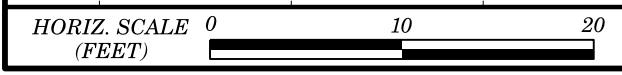
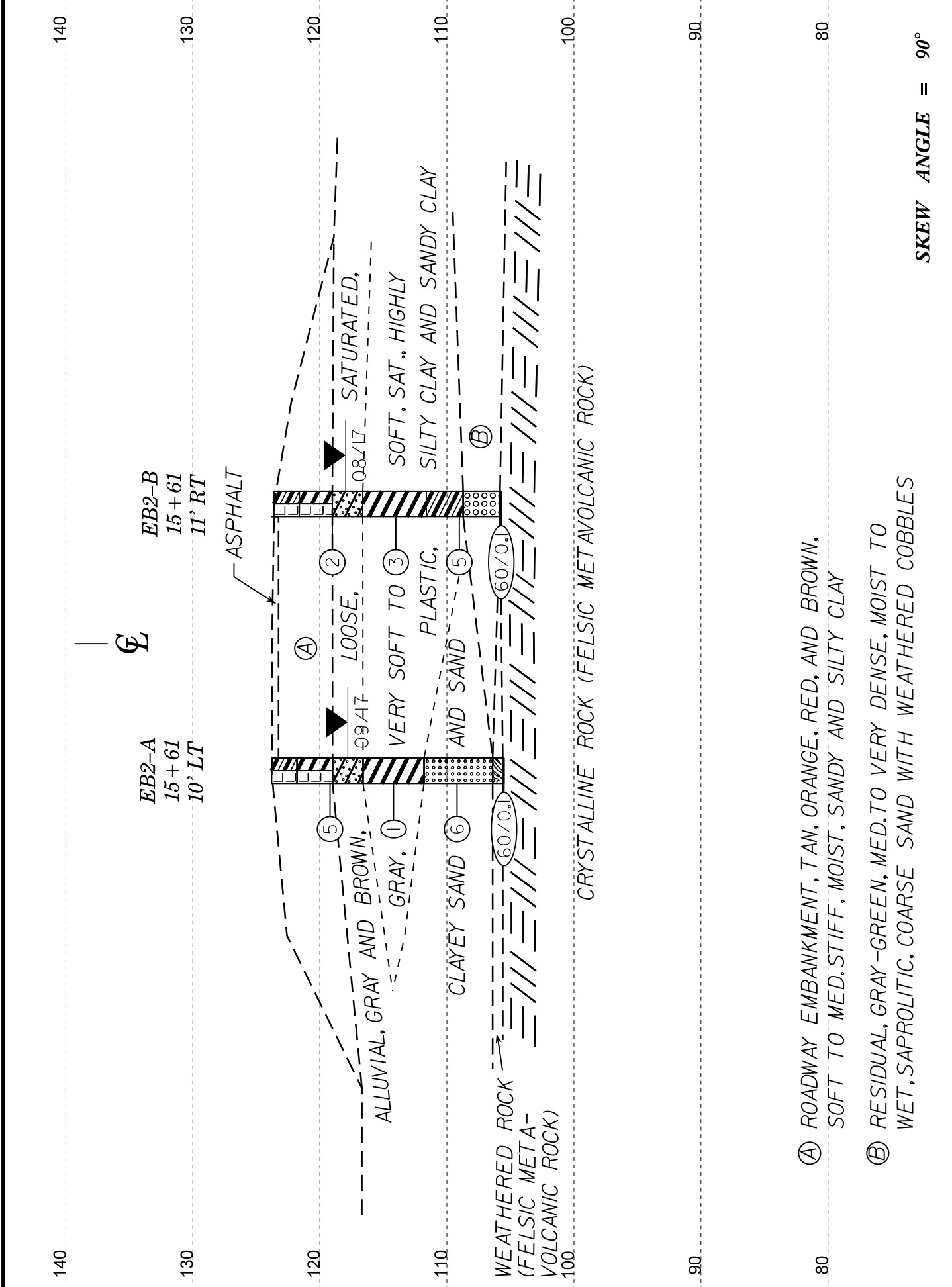


HORIZ. SCALE 0 10 20 (FEET) VE = 1:1

**CROSS SECTION THROUGH BI**

ⓑ RESIDUAL, GRAY-GREEN, MED. TO VERY DENSE, MOIST TO WET, SAPROLITIC, COARSE SAND WITH WEATHERED COBBLES

REC=95% RQD=87% GSI= 80-85



VE = 1:1

CROSS SECTION THROUGH EB2

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 17BP.4.R.84		TIP 410185		COUNTY HALIFAX		GEOLOGIST Pedro, J. L.	
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP							GROUND WTR (ft)
BORING NO. EB1-A		STATION 14+76		OFFSET 10 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 123.8 ft		TOTAL DEPTH 13.6 ft		NORTHING 947,675		EASTING 2,389,452	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic			
DRILLER Pinter, D. G.		START DATE 08/31/17		COMP. DATE 08/31/17		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						
125														123.8	0.0	GROUND SURFACE
														121.8	2.0	ROADWAY EMBANKMENT TAN-ORANGE, SANDY CLAY WITH ROUND QUARTZ GRAVEL RED-ORANGE, SILTY CLAY
120	120.2	3.6	2	1	2									116.8	7.0	
														115.5	8.3	ALLUVIAL GRAY, CLAYEY SAND WITH TRACE LEAF DEBRIS TAN, SAND
115	115.2	8.6	2	1	3									111.0	12.8	
														110.3	13.5	WEATHERED ROCK (FELSIC METAVOLCANIC ROCK)
														110.2	13.6	CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 110.2 ft IN CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)

WBS 17BP.4.R.84		TIP 410185		COUNTY HALIFAX		GEOLOGIST Pedro, J. L.	
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP							GROUND WTR (ft)
BORING NO. EB1-B		STATION 14+76		OFFSET 10 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 123.9 ft		TOTAL DEPTH 13.9 ft		NORTHING 947,656		EASTING 2,389,458	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic			
DRILLER Pinter, D. G.		START DATE 08/30/17		COMP. DATE 08/30/17		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						
125														123.9	0.0	GROUND SURFACE
														121.9	2.0	ROADWAY EMBANKMENT TAN-ORANGE, SANDY CLAY WITH ROUND QUARTZ GRAVEL RED-ORANGE, SILTY CLAY WITH TRACE MICA
120	120.4	3.5	1	2	1									116.9	7.0	
														115.4	8.5	ALLUVIAL GRAY, CLAYEY SAND WITH TRACE ORGANICS
115	115.4	8.5	1	1	3									111.3	12.6	
														110.4	13.5	WEATHERED ROCK (FELSIC METAVOLCANIC ROCK)
														110.0	13.9	CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 110.0 ft ON CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)



WBS 17BP.4.R.84			TIP 410185			COUNTY HALIFAX			GEOLOGIST Pedro, J. L.					
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP										GROUND WTR (ft)				
BORING NO. B1-A			STATION 15+06			OFFSET 6 ft LT			ALIGNMENT -L-		0 HR. N/A			
COLLAR ELEV. 111.2 ft			TOTAL DEPTH 2.3 ft			NORTHING 947,681			EASTING 2,389,481		24 HR. N/A			
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016							DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic				
DRILLER Pinter, D. G.			START DATE 08/31/17			COMP. DATE 08/31/17			SURFACE WATER DEPTH 5.5ft					
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				
115														WATER SURFACE (08/31/17)
														GROUND SURFACE 111.2 0.0
110	110.3	0.9												ALLUVIAL 110.3 0.9
	108.9	2.3	80	20/0.2						100/0.7				WHITE-TAN, COARSE SAND AND QUARTZ PEA-GRAVEL WITH LEAF DEBRIS 108.9 2.3
			60/0.0							60/0.0				WEATHERED ROCK (FELSIC METAVOLCANIC ROCK)
														Boring Terminated with Standard Penetration Test Refusal at Elevation 108.9 ft ON CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)

## GEOTECHNICAL BORING REPORT BORE LOG

## GEOTECHNICAL BORING REPORT CORE LOG

WBS 17BP.4.R.84			TIP 410185			COUNTY HALIFAX			GEOLOGIST Pedro, J. L.								
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP								GROUND WTR (ft)									
BORING NO. B1-B			STATION 15+06			OFFSET 7 ft RT			ALIGNMENT -L-								
COLLAR ELEV. 111.1 ft			TOTAL DEPTH 22.1 ft			NORTHING 947,669			EASTING 2,389,485								
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016						DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic								
DRILLER Pinter, D. G.			START DATE 08/30/17			COMP. DATE 08/30/17			SURFACE WATER DEPTH 5.5ft								
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							
115																	
110	111.1	0.0	14	22	63								W	111.1	GROUND SURFACE	0.0	
105	105.6	5.5	60/0.0											109.1	RESIDUAL GRAY-GREEN, SAPROLITIC, COARSE SAND WITH WEATHERED COBBLES	2.0	
100														105.6	WEATHERED ROCK (FELSIC METAVOLCANIC ROCK)	5.5	
95															CRYSTALLINE ROCK GRAY-GREEN TO BLACK AND WHITE, FRESH, HARD TO VERY HARD, WIDE FRACTURE SPACING, FELSIC METAVOLCANIC ROCK		
90															REC=95% RQD=87% GSI-80-85		
																Boring Terminated at Elevation 89.0 ft IN CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)	22.1

WBS 17BP.4.R.84			TIP 410185			COUNTY HALIFAX			GEOLOGIST Pedro, J. L.				
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP								GROUND WTR (ft)					
BORING NO. B1-B			STATION 15+06			OFFSET 7 ft RT			ALIGNMENT -L-				
COLLAR ELEV. 111.1 ft			TOTAL DEPTH 22.1 ft			NORTHING 947,669			EASTING 2,389,485				
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016						DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic				
DRILLER Pinter, D. G.			START DATE 08/30/17			COMP. DATE 08/30/17			SURFACE WATER DEPTH 5.5ft				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %				
105.6	105.6	5.5	1.6	N=60/0.0 1:17/1.0 1:11/0.6	(1.3) 81%	(1.2) 75%		(15.7) 95%	(14.5) 87%		Begin Coring @ 5.5 ft CRYSTALLINE ROCK	5.5	
100	99.0	12.1	5.0	1:53/1.0 2:02/1.0 1:36/1.0 1:45/1.0 1:57/1.0	(5.0) 100%	(5.0) 100%	RS-1				GRAY-GREEN, FRESH, HARD TO VERY HARD, WIDE FRACTURE SPACING, FELSIC METAVOLCANIC ROCK		
95	94.0	17.1	5.0	1:46/1.0 1:47/1.0 1:38/1.0 1:52/1.0 1:43/1.0	(4.4) 88%	(4.4) 88%					GSI-80-85		
90	89.0	22.1	5.0	1:52/1.0 1:56/1.0 1:38/1.0 1:51/1.0 1:10/1.0	(5.0) 100%	(3.9) 78%						Boring Terminated at Elevation 89.0 ft IN CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)	22.1

# GEOTECHNICAL BORING REPORT

## BORE LOG

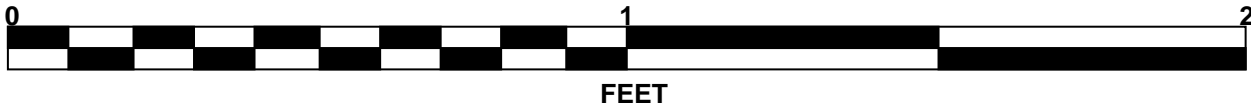
WBS 17BP.4.R.84		TIP 410185		COUNTY HALIFAX		GEOLOGIST Pedro, J. L.										
SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 15+61		OFFSET 10 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 123.8 ft		TOTAL DEPTH 18.3 ft		NORTHING 947,702		EASTING 2,389,532										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic												
DRILLER Pinter, D. G.		START DATE 08/31/17		COMP. DATE 08/31/17		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						
125														123.8	0.0	GROUND SURFACE
														121.8	2.0	ROADWAY EMBANKMENT TAN-ORANGE, SANDY CLAY WITH ROUND QUARTZ GRAVEL
120	120.2	3.6	2	2	3									119.0	4.8	RED-ORANGE, SILTY CLAY
														116.6	7.2	ALLUVIAL GRAY-BROWN, CLAYEY SAND
115	115.2	8.6	WOH	WOH	1									111.8	12.0	DARK GRAY, HIGHLY PLASTIC, SILTY CLAY WITH TRACE WOOD DEBRIS
110	110.2	13.6	2	2	4									106.4	17.4	TAN-BROWN, SAND WITH TRACE ORGANICS (SILT)
														105.6	18.2	WEATHERED ROCK (FELSIC METAVOLCANIC ROCK)
														105.5	18.3	CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 105.5 ft IN CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)

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SITE DESCRIPTION BRIDGE NO. 185 ON -L- (SR 1616) OVER MARSH SWAMP							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 15+61		OFFSET 10 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 123.6 ft		TOTAL DEPTH 17.9 ft		NORTHING 947,683		EASTING 2,389,539										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic												
DRILLER Pinter, D. G.		START DATE 08/30/17		COMP. DATE 08/30/17		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						
125														123.6	0.0	GROUND SURFACE
														121.6	2.0	ROADWAY EMBANKMENT TAN-ORANGE, SANDY CLAY WITH ROUND QUARTZ GRAVEL
120	120.0	3.6	1	1	1									119.0	4.6	RED-ORANGE, SILTY CLAY
														116.6	7.0	ALLUVIAL GRAY-BROWN, CLAYEY SAND WITH TRACE ORGANICS
115	115.0	8.6	WOH	1	2									111.6	12.0	GRAY, HIGHLY PLASTIC, SILTY CLAY
110	110.0	13.6	WOH	2	3									108.7	14.9	DARK GRAY, SANDY CLAY WITH MODERATE ORGANICS
														105.8	17.8	RESIDUAL GRAY-GREEN, SAPROLITIC, COARSE SAND
														105.7	17.9	WITH WEATHERED COBBLES CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 105.7 ft IN CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK)

NCDOT BORE DOUBLE 410185\_GEO\_BH.GPJ NC\_DOT.GDT 9/14/17

# CORE PHOTOGRAPHS

**B1-B**  
BOXES 1 & 2: 5.5 - 22.1 FEET



# SITE PHOTOGRAPH

Bridge No. 185 on -L- (SR 1616) over Marsh Swamp



Looking North towards End Bent 2