

PROJECT: 17BP.4.R.71 REFERENCE: 500232

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	500232	1	13

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY JOHNSTON
PROJECT DESCRIPTION BRIDGE NO. 232 ON -L-
(SR 2110) OVER LITTLE BUFFALO CREEK AT
STA. 15 + 43.5

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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:
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

J. L. PEDRO

O. B. OTI

D. G. PINTER

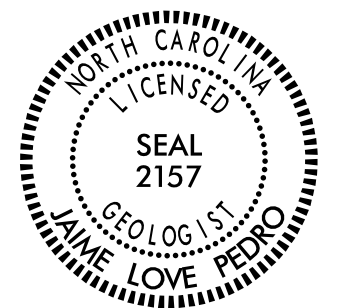
INVESTIGATED BY J. L. PEDRO

DRAWN BY J. L. PEDRO

CHECKED BY N.T ROBERSON

SUBMITTED BY N. T. ROBERSON

DATE MAY 2016



DocuSigned by:
Jaime Love Pedro 6/27/2016

B03674030884B5
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

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for GENERAL CLASS., GRANULAR MATERIALS (A-1 to A-7), SILT-CLAY MATERIALS (A-4 to A-7), ORGANIC MATERIALS (A-1, A-2 to A-3, A-4, A-5 to A-6, A-7), and SYMBOL. Includes rows for % PASSING, MATERIAL PASSING #40, #100, and GROUP INDEX.

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

Table with columns for PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), and RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²).

TEXTURE OR GRAIN SIZE

Table with columns for U.S. STD. SIEVE SIZE (4, 10, 40, 60, 200, 270) and corresponding BOUNDER, COBBLE, GRAVEL, COARSE SAND, FINE SAND, SILT, CLAY.

SOIL MOISTURE - CORRELATION OF TERMS

Table with columns for SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, and GUIDE FOR FIELD MOISTURE DESCRIPTION. Includes plasticity limits (LL, PL) and optimum moisture (OM, SL).

PLASTICITY

Table with columns for PLASTICITY INDEX (PI) and DRY STRENGTH. Includes categories for NON PLASTIC, SLIGHTLY PLASTIC, MODERATELY PLASTIC, and HIGHLY PLASTIC.

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

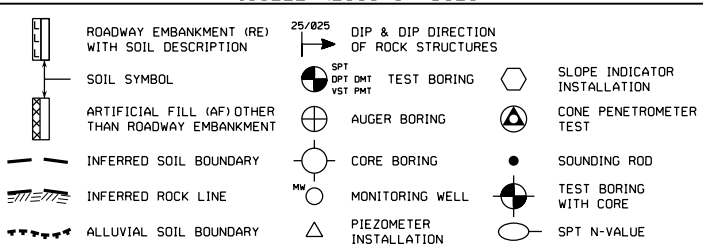
PERCENTAGE OF MATERIAL

Table with columns for ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, and OTHER MATERIAL. Includes rows for TRACE OF ORGANIC MATTER, LITTLE ORGANIC MATTER, MODERATELY ORGANIC, and HIGHLY ORGANIC.

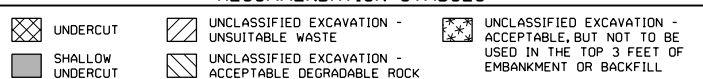
GROUND WATER

Water level symbols and descriptions: WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA, SPRING OR SEEP.

MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table listing abbreviations for AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - COARSE PENETRATION TEST, CSE - COARSE DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRAGMENTS, HI. - HIGHLY, MED. - MEDIUM, MICA - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, V - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO.

EQUIPMENT USED ON SUBJECT PROJECT

Table with columns for DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS, and PORTABLE HOIST. Includes checkboxes for various equipment items.

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

Table with columns for WEATHERED ROCK (WR), CRYSTALLINE ROCK (CR), NON-CRYSTALLINE ROCK (NCR), and COASTAL PLAIN SEDIMENTARY ROCK (CP). Includes descriptions for each rock type.

WEATHERING

Table with columns for FRESH, VERY SLIGHT (IV SLI), SLIGHT (SLI), MODERATE (MOD), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV.), VERY SEVERE (IV SEV.), and COMPLETE. Includes descriptions for each weathering stage.

ROCK HARDNESS

Table with columns for VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, and SOFT. Includes descriptions for each hardness level.

FRACTURE SPACING

Table with columns for TERM, SPACING, and BEDDING. Includes descriptions for fracture spacing and bedding types.

INDURATION

Table with columns for FRIABLE, MODERATELY INDURATED, INDURATED, and EXTREMELY INDURATED. Includes descriptions for each induration level.

TERMS AND DEFINITIONS

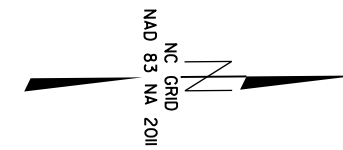
Table with columns for ALLUVIUM (ALLUV.), AQUIFER, ARENACEOUS, ARGILLACEOUS, ARTESIAN, CALCAREOUS (CALC.), COLLUVIUM, CORE RECOVERY (REC.), DIKE, DIP, DIP DIRECTION (DIP AZIMUTH), FAULT, FISSILE, FLOAT, FLOOD PLAIN (FP), FORMATION (FM), JOINT, LEDGE, LENS, MOTTLED (MOT.), PERCHED WATER, RESIDUAL (RES.) SOIL, ROCK QUALITY DESIGNATION (ROD), SAPROLITE (SAP.), SILL, SLICKENSIDE, STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT), STRATA CORE RECOVERY (SREC.), STRATA ROCK QUALITY DESIGNATION (SROD), and TOPSOIL (TS.).

BENCH MARK: TBM-2, BENCHLITE NAIL IN 24" OAK AT -L- STA. 15+48.64, OFFSET - 67.66' RT

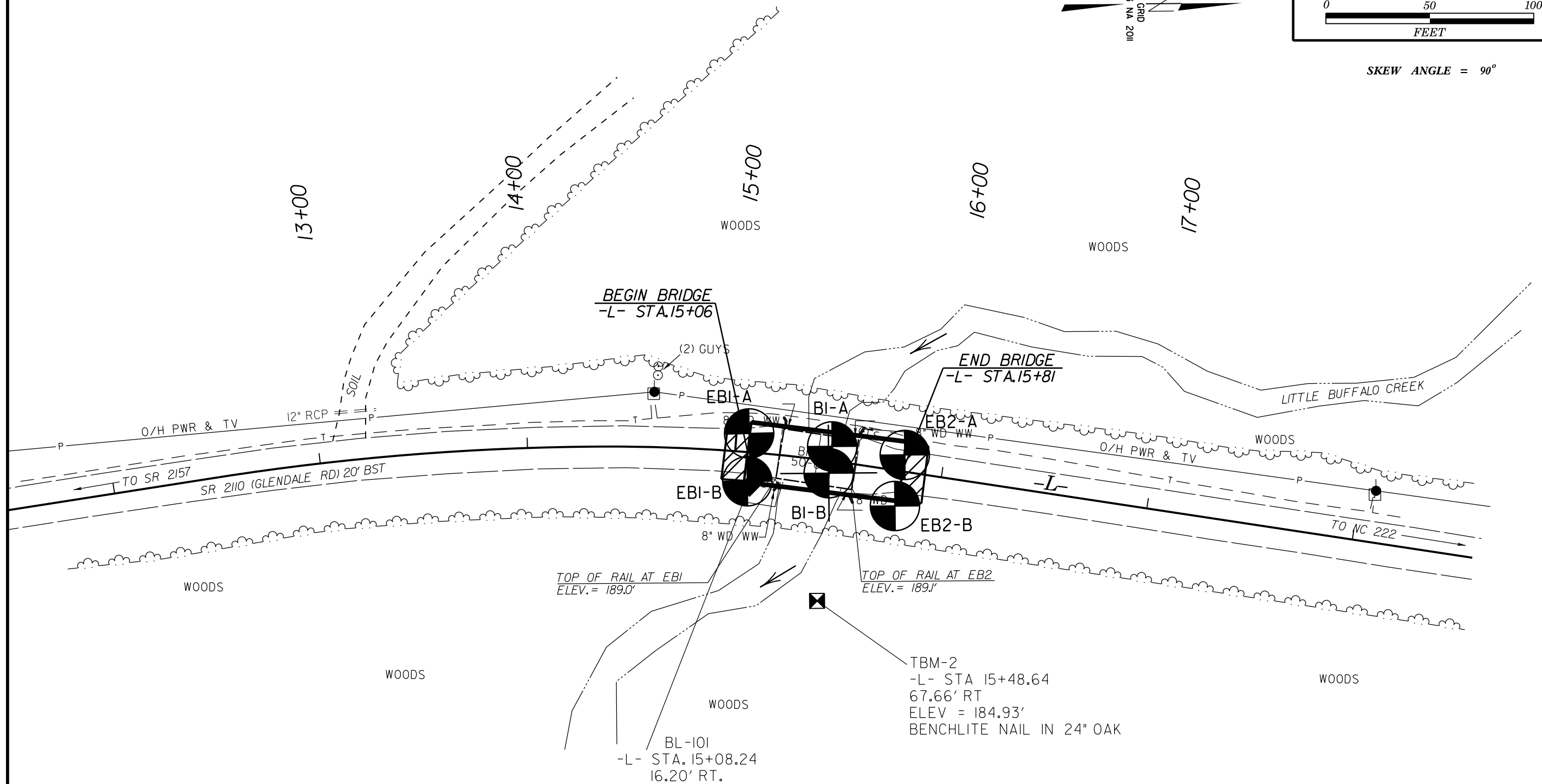
ELEVATION: 184.93 FEET

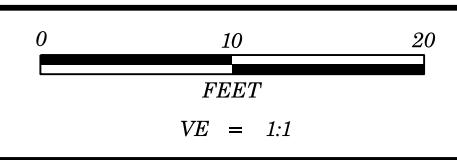
NOTES:

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

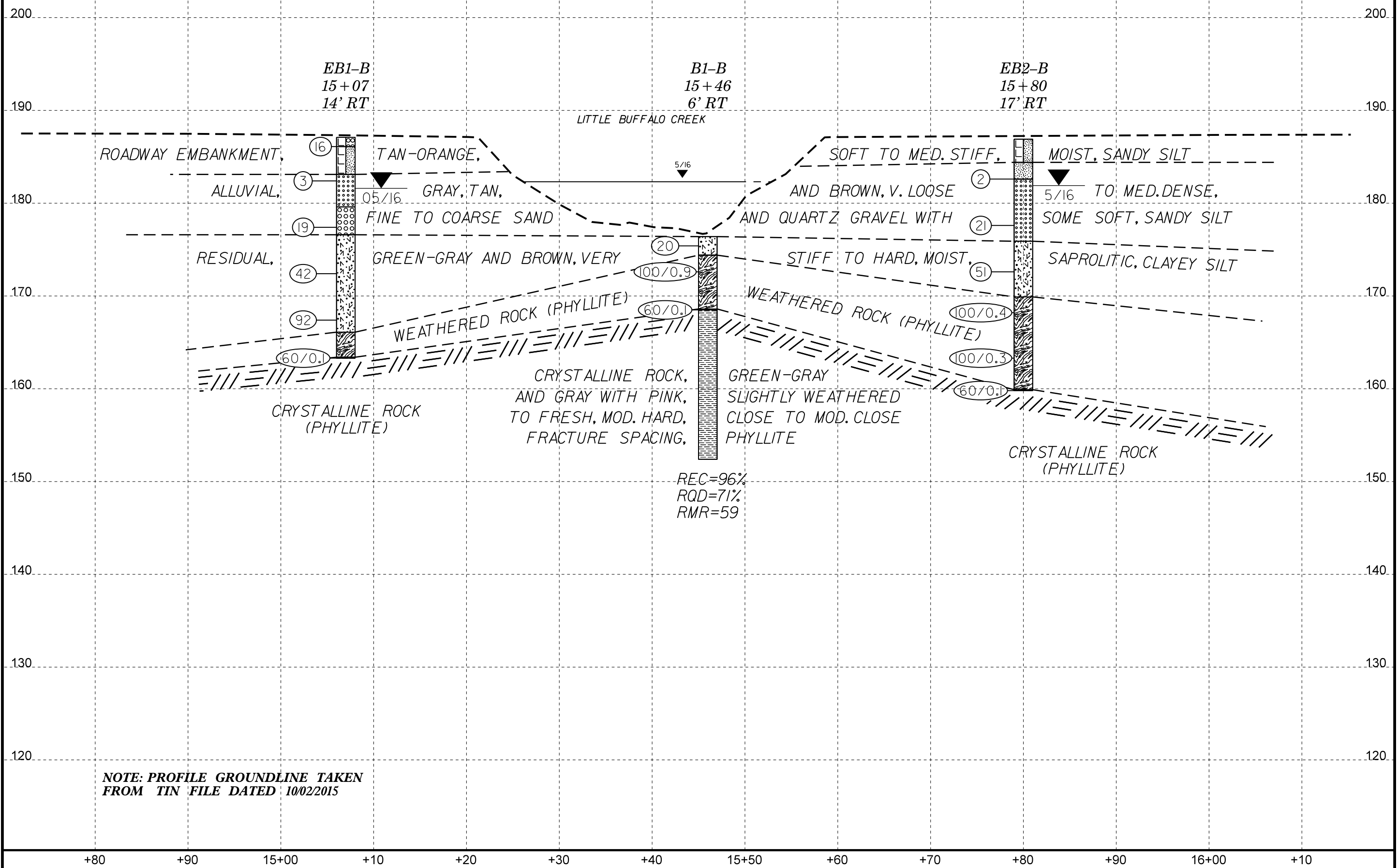


SKEW ANGLE = 90°





PROJECT REFERENCE NO.	SHEET NO.
500232	4
FENCE DIAGRAM OF BORINGS PROJECTED ALONG CENTERLINE OF -L-	



EB1-B
15+07
14' RT

B1-B
15+46
6' RT

EB2-B
15+80
17' RT

LITTLE BUFFALO CREEK

ROADWAY EMBANKMENT,
ALLUVIAL,

TAN-ORANGE,
GRAY, TAN,
FINE TO COARSE SAND

SOFT TO MED. STIFF,
AND BROWN, V. LOOSE
AND QUARTZ GRAVEL WITH

MOIST, SANDY SILT
TO MED. DENSE,
SOME SOFT, SANDY SILT

RESIDUAL,

GREEN-GRAY AND BROWN, VERY
WEATHERED ROCK (PHYLITE)

STIFF TO HARD, MOIST,
WEATHERED ROCK (PHYLITE)

SAPROLITIC, CLAYEY SILT

CRYSTALLINE ROCK
(PHYLITE)

CRYSTALLINE ROCK,
AND GRAY WITH PINK,
TO FRESH, MOD. HARD,
FRACTURE SPACING,

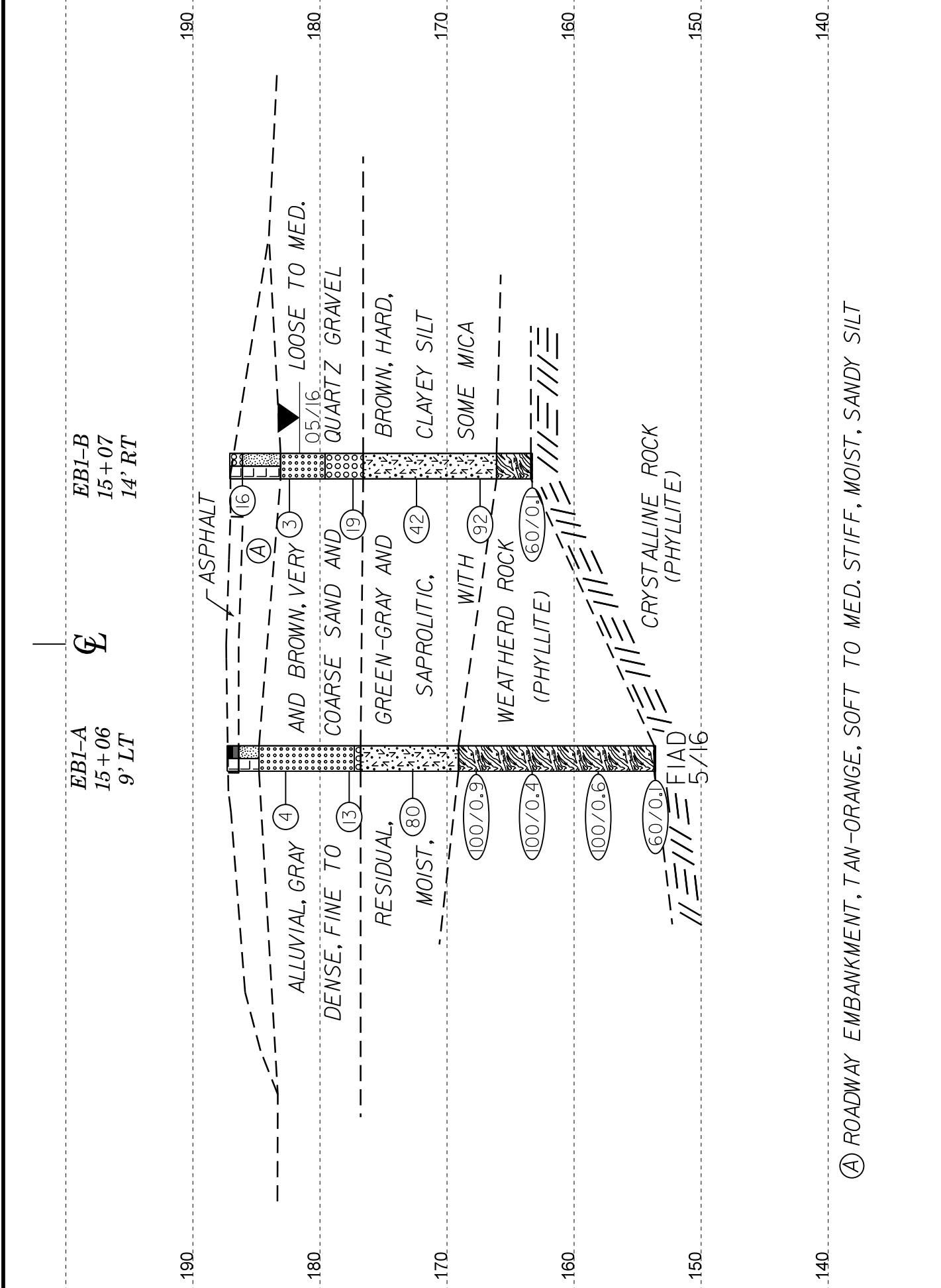
GREEN-GRAY
SLIGHTLY WEATHERED
CLOSE TO MOD. CLOSE
PHYLITE

CRYSTALLINE ROCK
(PHYLITE)

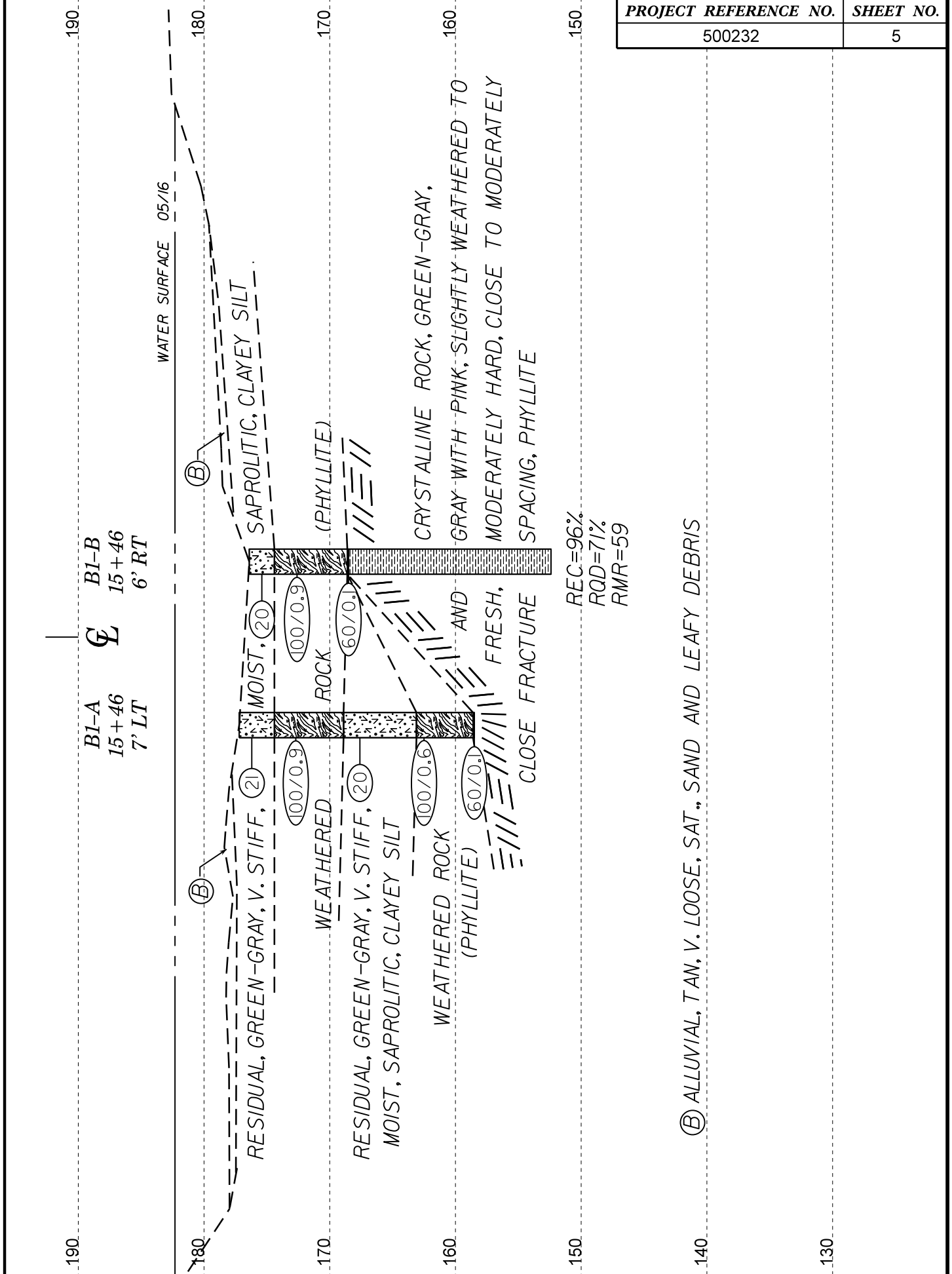
REC=96%
RQD=71%
RMR=59

NOTE: PROFILE GROUNDLINE TAKEN
FROM TIN FILE DATED 10/02/2015

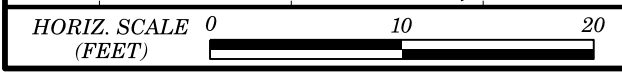
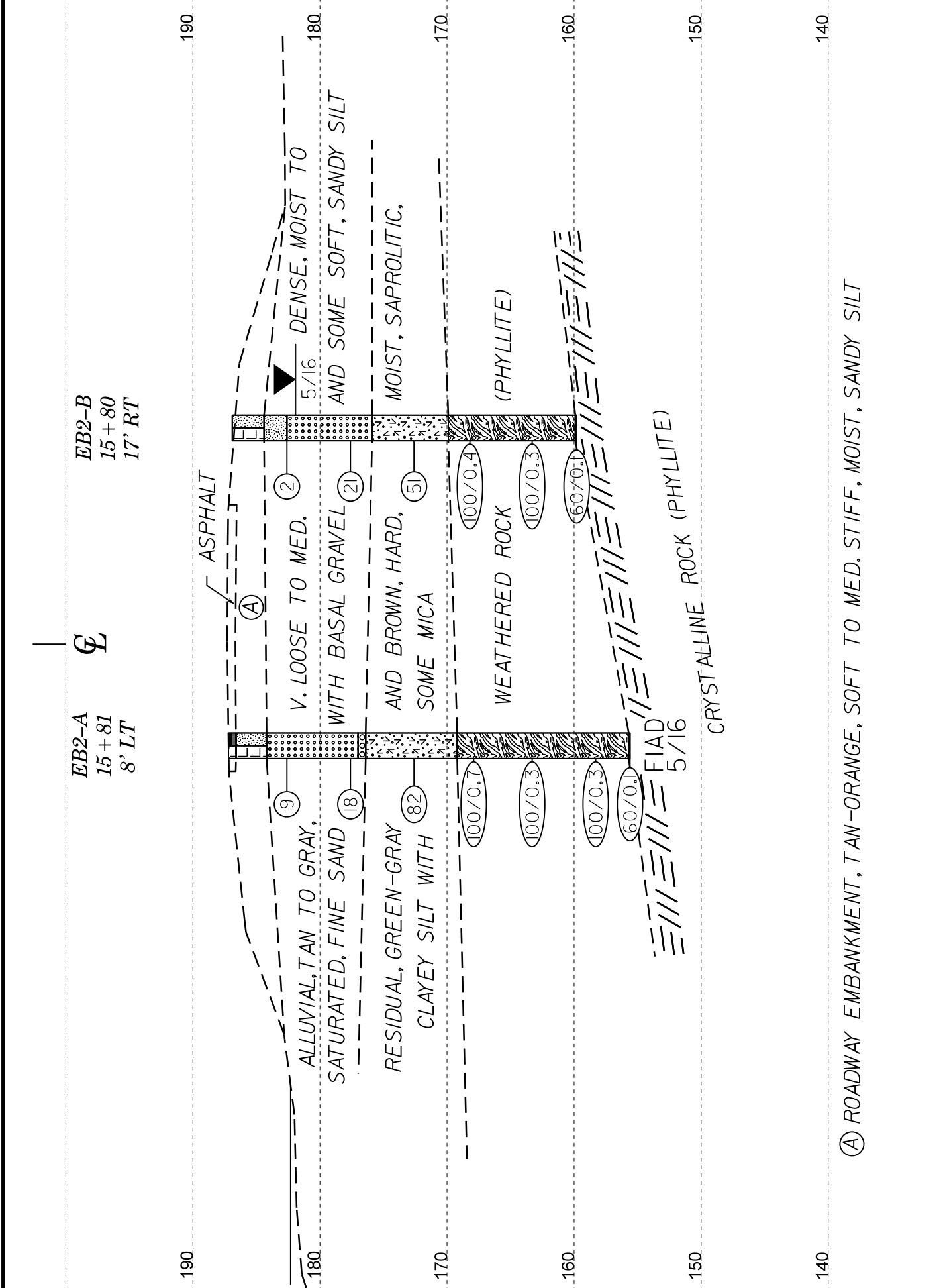
+80 +90 15+00 +10 +20 +30 +40 15+50 +60 +70 +80 +90 16+00 +10



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



VE = 1:1

CROSS SECTION THROUGH EB2

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.										
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 15+06		OFFSET 9 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 187.3 ft		TOTAL DEPTH 33.7 ft		NORTHING 693,937		EASTING 2,243,091										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 05/11/16		COMP. DATE 05/11/16		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						
190																
185	183.7	3.6	3	2	2									187.3	GROUND SURFACE	0.0
														186.4	ROADWAY EMBANKMENT ASPHALT AND ABC	0.9
														184.8	TAN-ORANGE, SANDY SILT WITH WOOD (0.9'-1.4')	2.5
															ALLUVIAL GRAY, SAND WITH TRACE COARSE SAND WITH PEA GRAVEL AT BASE	
180	178.7	8.6	4	6	7											
175	173.7	13.6	17	32	48									177.3	QUARTZ GRAVEL	10.0
														176.8	RESIDUAL GREEN-GRAY, SAPROLITIC, CLAYEY SILT WITH SOME MICA	10.5
170	168.7	18.6	34	35	65/0.4									169.1	WEATHERED ROCK (PHYLLITE)	18.2
165	163.7	23.6	100/0.4													
160	158.7	28.6	55	45/0.1												
155	153.7	33.6	60/0.1											153.7	NON-CRYSTALLINE ROCK (PHYLLITE)	33.6
														153.6	Boring Terminated with Standard Penetration Test Refusal at Elevation 153.6 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	33.7

WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.										
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 15+07		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 187.1 ft		TOTAL DEPTH 23.8 ft		NORTHING 693,935		EASTING 2,243,114										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 05/12/16		COMP. DATE 05/12/16		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						
190																
	187.1	0.0	4	9	7									187.1	GROUND SURFACE	0.0
														186.1	ROADWAY EMBANKMENT BROWN, SAND AND GRAVEL	1.0
185	183.4	3.7	3	1	2									183.1	TAN-ORANGE, SANDY SILT	4.0
															ALLUVIAL BROWN, SAND	
180	178.4	8.7	9	13	6									179.6	GRAY-BROWN, COARSE SAND WITH QUARTZ GRAVEL	7.5
														176.6	RESIDUAL GREEN AND BROWN, SAPROLITIC, CLAYEY SILT WITH SOME MICA	10.5
175	173.4	13.7	19	19	23											
170	168.4	18.7	11	19	73									166.1	WEATHERED ROCK (PHYLLITE)	21.0
165	163.4	23.7	60/0.1											163.4	NON-CRYSTALLINE ROCK (PHYLLITE)	23.7
														163.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 163.3 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	23.8

NCDOT BORE DOUBLE 500232_GEO_BH.GPJ NC_DOT.GDT 5/23/16

WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.								
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)							
BORING NO. B1-A		STATION 15+46		OFFSET 7 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 177.2 ft		TOTAL DEPTH 18.7 ft		NORTHING 693,976		EASTING 2,243,098								
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic								
DRILLER Pinter, D. G.		START DATE 05/12/16		COMP. DATE 05/12/16		SURFACE WATER DEPTH 5.1ft								
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				
														WATER SURFACE (05/12/16)
180	177.2	0.0	4	8	13									177.2 GROUND SURFACE 0.0
175	173.6	3.6	50	50/0.4										174.4 RESIDUAL GREEN-GRAY TO TAN-BROWN, SAPROLITIC, CLAYEY SILT 2.8
170	168.6	8.6	7	10	10									168.9 WEATHERED ROCK (PHYLLITE) 8.3
165	163.6	13.6	15	44	56/0.1									163.1 RESIDUAL GREEN AND BROWN, SAPROLITIC, CLAYEY SILT 14.1
160	158.6	18.6	60/0.1											158.6 WEATHERED ROCK (PHYLLITE) 14.1
														158.5 NON-CRYSTALLINE ROCK (PHYLLITE) 18.6
														18.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 158.5 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

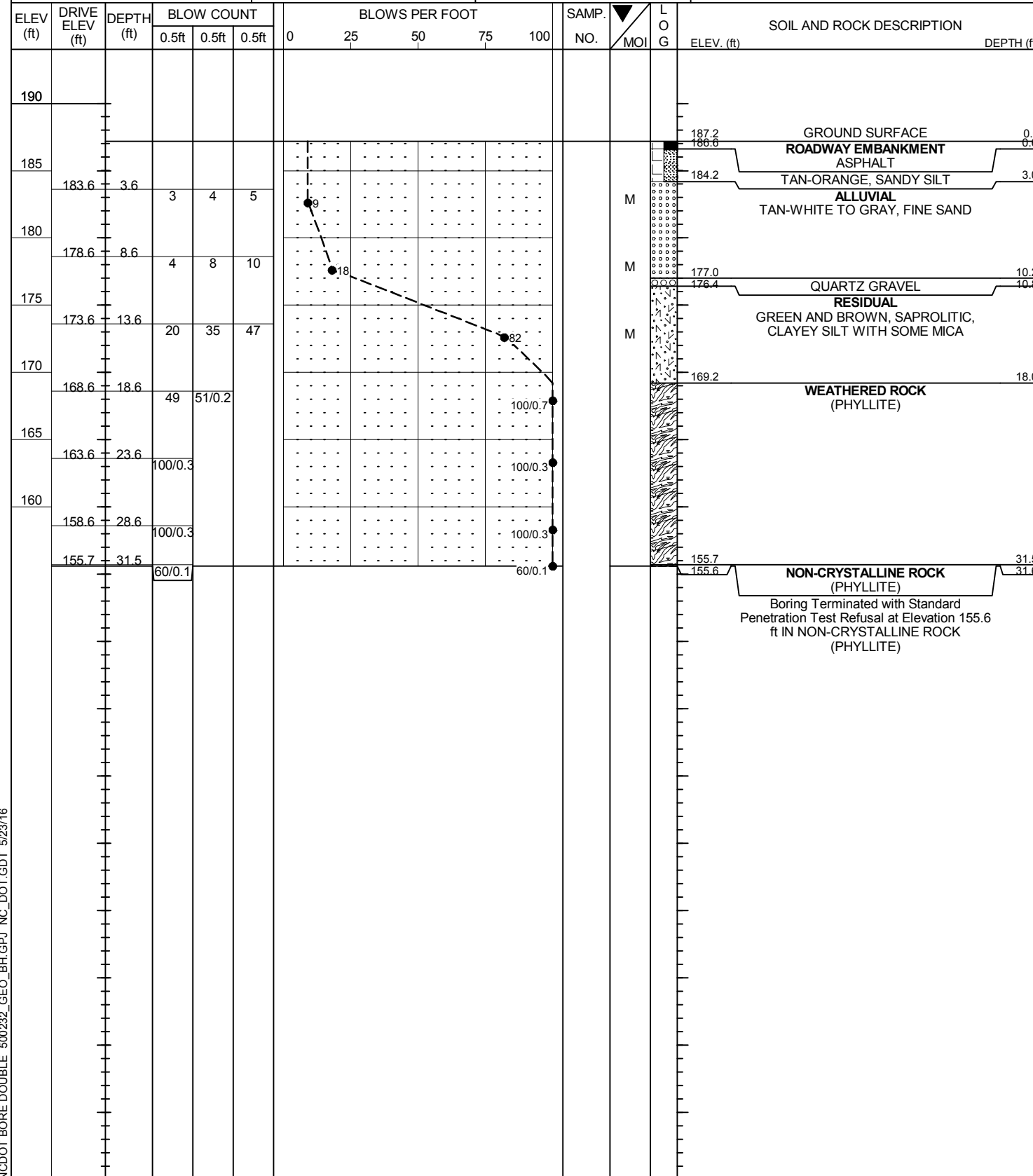
WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.									
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)								
BORING NO. B1-B		STATION 15+46		OFFSET 6 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 176.4 ft		TOTAL DEPTH 24.0 ft		NORTHING 693,975		EASTING 2,243,111									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 05/12/16		COMP. DATE 05/12/16		SURFACE WATER DEPTH 6.0ft									
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					
180															
175	176.4	0.0	1	8	12									176.4	GROUND SURFACE
	173.6	2.8	40	60/0.4										174.4	RESIDUAL GREEN-GRAY, SAPROLITIC, CLAYEY SILT WITH SOME MICA WEATHERED ROCK (PHYLLITE)
170	168.6	7.8	60/0.1											168.6	NON-CRYSTALLINE ROCK (PHYLLITE)
165														168.5	GREEN-GRAY AND GRAY WITH PINK, SLIGHTLY WEATHERED TO FRESH, MODERATELY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING, PHYLLITE
160														168.5	RECEIVED: 96% RQD=71% RMR=59
155														152.4	Boring Terminated at Elevation 152.4 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.						
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)					
BORING NO. B1-B		STATION 15+46		OFFSET 6 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 176.4 ft		TOTAL DEPTH 24.0 ft		NORTHING 693,975		EASTING 2,243,111						
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic						
DRILLER Pinter, D. G.		START DATE 05/12/16		COMP. DATE 05/12/16		SURFACE WATER DEPTH 6.0ft						
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 (%)			
168.5	168.5	7.9	1.6	1:02/0.6	(1.3)	(0.9)		(15.4)	(11.4)		Begin Coring @ 7.9 ft	7.9
165	166.9	9.5	5.0	1:37/1.0	81%	56%		96%	71%		GREEN-GRAY AND GRAY WITH PINK, SLIGHTLY WEATHERED TO FRESH, MODERATELY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING, PHYLLITE	
160	161.9	14.5	5.0	1:43/1.0	(4.8)	(4.0)	RS-1				RMR=59	
155	156.9	19.5	4.5	1:59/1.0	96%	80%						
	152.4	24.0		1:16/1.0	(4.9)	(4.1)						
				1:12/1.0	98%	82%						
				1:21/1.0								
				1:22/1.0								
				1:28/1.0	(4.4)	(2.4)						
				1:46/1.0	98%	53%						
				1:23/1.0								
				0:51/1.0								
				0:47/0.5								
											Boring Terminated at Elevation 152.4 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	24.0

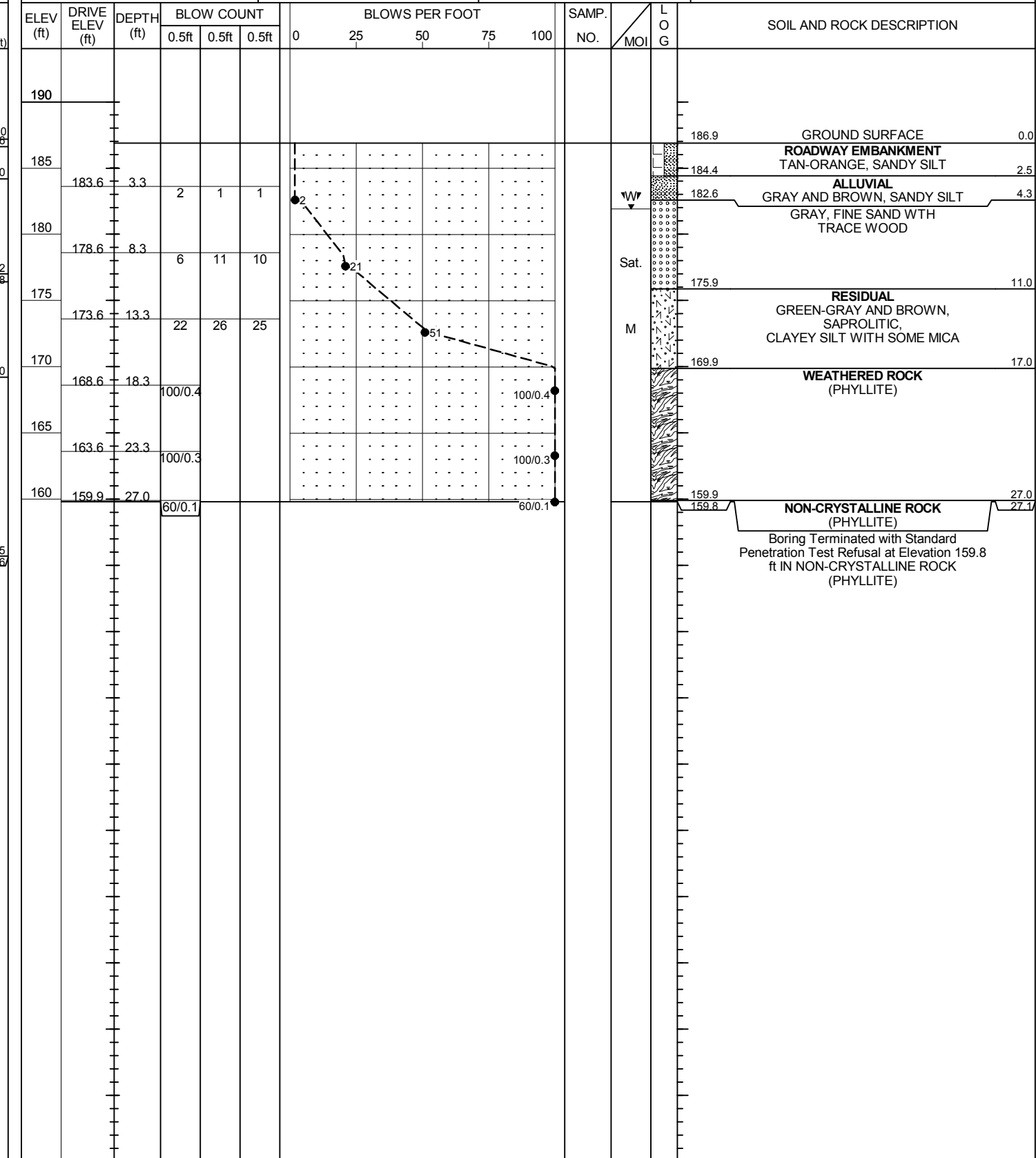
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.	
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)
BORING NO. EB2-A		STATION 15+81		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 187.2 ft		TOTAL DEPTH 31.6 ft		NORTHING 694,011		EASTING 2,243,102	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic	
DRILLER Pinter, D. G.		START DATE 05/11/16		COMP. DATE 05/11/16		SURFACE WATER DEPTH N/A	



WBS 17BP.4.R.71		TIP 500232		COUNTY JOHNSTON		GEOLOGIST Pedro, J. L.	
SITE DESCRIPTION BRIDGE NO. 232 ON -L- (SR 2110) OVER LITTLE BUFFALO CREEK							GROUND WTR (ft)
BORING NO. EB2-B		STATION 15+80		OFFSET 17 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 186.9 ft		TOTAL DEPTH 27.1 ft		NORTHING 694,006		EASTING 2,243,127	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic	
DRILLER Pinter, D. G.		START DATE 05/11/16		COMP. DATE 05/11/16		SURFACE WATER DEPTH N/A	



NCDOT BORE DOUBLE 500232_GEO_BH.GPJ NC_DOT.GDT 5/23/16

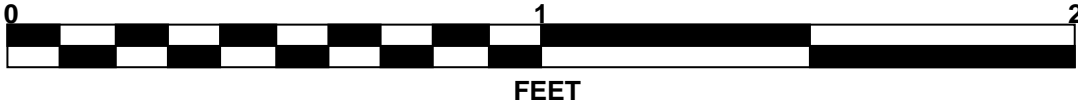
PROJ. NO. - 17BP.4.R.71
ID NO. - 500232
COUNTY - JOHNSTON

BL-B -L-

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT ³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-1	6' RT	15+46	12.9-13.4	PHYLLITE	165.5	7.53	3.02

CORE PHOTOGRAPHS

B1-B
BOXES 1 - 3: 7.9 - 24.0 FEET



SITE PHOTOGRAPH

Bridge No. 232 on -L- (SR 2110) over Little Buffalo Creek



Looking South towards End Bent 1