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REFERENCE: B-5140

PROJECT: 42301

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5140	1	10

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY WAKE/FRANKLIN
PROJECT DESCRIPTION BRIDGE NO. 195 ON -L-
(SR 1001) OVER MOCCASIN CREEK AT STA. 13+25

CONTENTS

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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 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

J. L. PEDRO
N. O. MOORE
A. N. KINTNER
D. G. PINTER

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



DocuSigned by:
Jaime Love Pedro/27/2017
B93571039B884B5...
SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
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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 (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, Group Class, Symbol, % Passing, Material Passing, and Usual Types of Major Materials. Includes AASHTO classification codes like A-1, A-3, A-2-4, etc.

CONSISTENCY OR DENSENESS

Table mapping Primary Soil Type (e.g., Generally Granular, Silty-Clay) to Consistency (e.g., Very Loose, Medium Dense) and Range of Standard Penetration Resistance.

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size (mm and in) and corresponding percentages for various soil fractions: Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating Soil Moisture Scale (Liquid Limit, Plastic Limit, Optimum Moisture Shrinkage Limit) with Field Moisture Description (Saturated, Wet, Moist, Dry) and Guide for Field Moisture Description.

PLASTICITY

Table showing Plasticity Index (PI) ranges (e.g., 0-5, 6-15, 16-25, 26 or more) and corresponding Dry Strength (Very Low, Slight, Medium, High).

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.

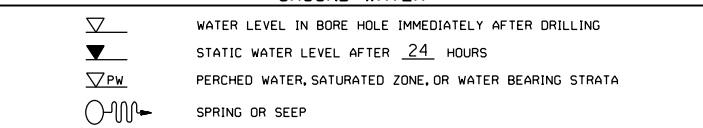
COMPRESSIBILITY

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

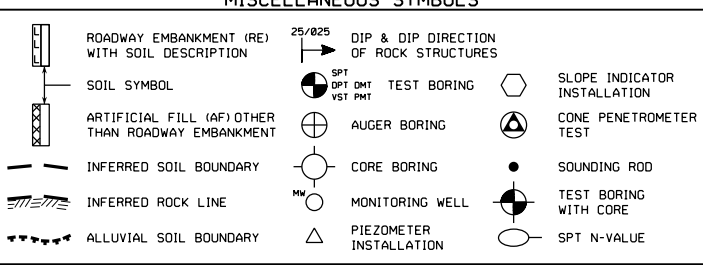
PERCENTAGE OF MATERIAL

Table showing percentages for Organic Material, Granular Soils, Silt-Clay Soils, and Other Material.

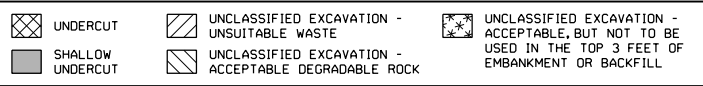
GROUND WATER



MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table of abbreviations for test types (AR, BT, CL, CPT, etc.), soil types (CSE, DMT, etc.), and other terms (MED., MICA, etc.).

EQUIPMENT USED ON SUBJECT PROJECT

Form with checkboxes for equipment used: Drill Units (CME-45C, CME-55, CME-550), Advancing Tools (Clay Bits, Augers, Auger Inserts, Casing, Tricone bits, Core bit), Hammer Type (Automatic, Manual), Core Size (B, H, N, XL), and Hand Tools (Post hole digger, Auger, Sounding rod, Vane shear test).

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.

WEATHERED ROCK (WR)

NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

CRYSTALLINE ROCK (CR)

FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.

NON-CRYSTALLINE ROCK (NCR)

FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTARY ROCK (CP)

COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

Table describing weathering levels: Fresh, Very Slight (IV SLI), Slight (SLI), Moderate (MOD), Moderately Severe (MOD. SEV.), Severe (SEV.), Very Severe (IV SEV.), and Complete. Includes descriptions of rock characteristics and test results.

ROCK HARDNESS

Table describing rock hardness levels: Very Hard, Hard, Moderately Hard, Medium Hard, Soft, and Very Soft. Includes descriptions of how the rock reacts to tests like knife pick or hammer blows.

FRACTURE SPACING

Table mapping fracture spacing (Term: Very Wide, Wide, Moderately Close, Close, Very Close) to spacing (More than 10 feet, 3 to 10 feet, 1 to 3 feet, 0.16 to 1 foot, Less than 0.16 feet).

BEDDING

Table mapping bedding (Term: Very Thickly Bedded, Thickly Bedded, Thinly Bedded, Very Thinly Bedded, Thickly Laminated, Thinly Laminated) to thickness (4 feet, 1.5 - 4 feet, 0.16 - 1.5 feet, 0.03 - 0.16 feet, 0.008 - 0.03 feet, < 0.008 feet).

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

TERMS AND DEFINITIONS

Table of definitions for geotechnical terms: Alluvium, Aquifer, Arenaceous, Argillaceous, Artesian, Calcareous, Colluvium, Core Recovery, Dike, Dip, Dip Direction, Fault, Fissile, Float, Flood Plain, Formation, Joint, Ledger, Lens, Mottled, Perched Water, Residual Soil, Rock Quality Designation, Saprolite, Sill, Slickenside, Standard Penetration Test, Strata Core Recovery, Strata Rock Quality Designation, Topsoil, Bench Mark, and Elevation.

NOTES:

TOP OF RAIL AT EB1-L- STA. 13+06, 12' RT ELEV. = 270.4'
TOP OF RAIL AT EB2 -L- STA. 13+41, 12' RT ELEV. = 270.4'

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

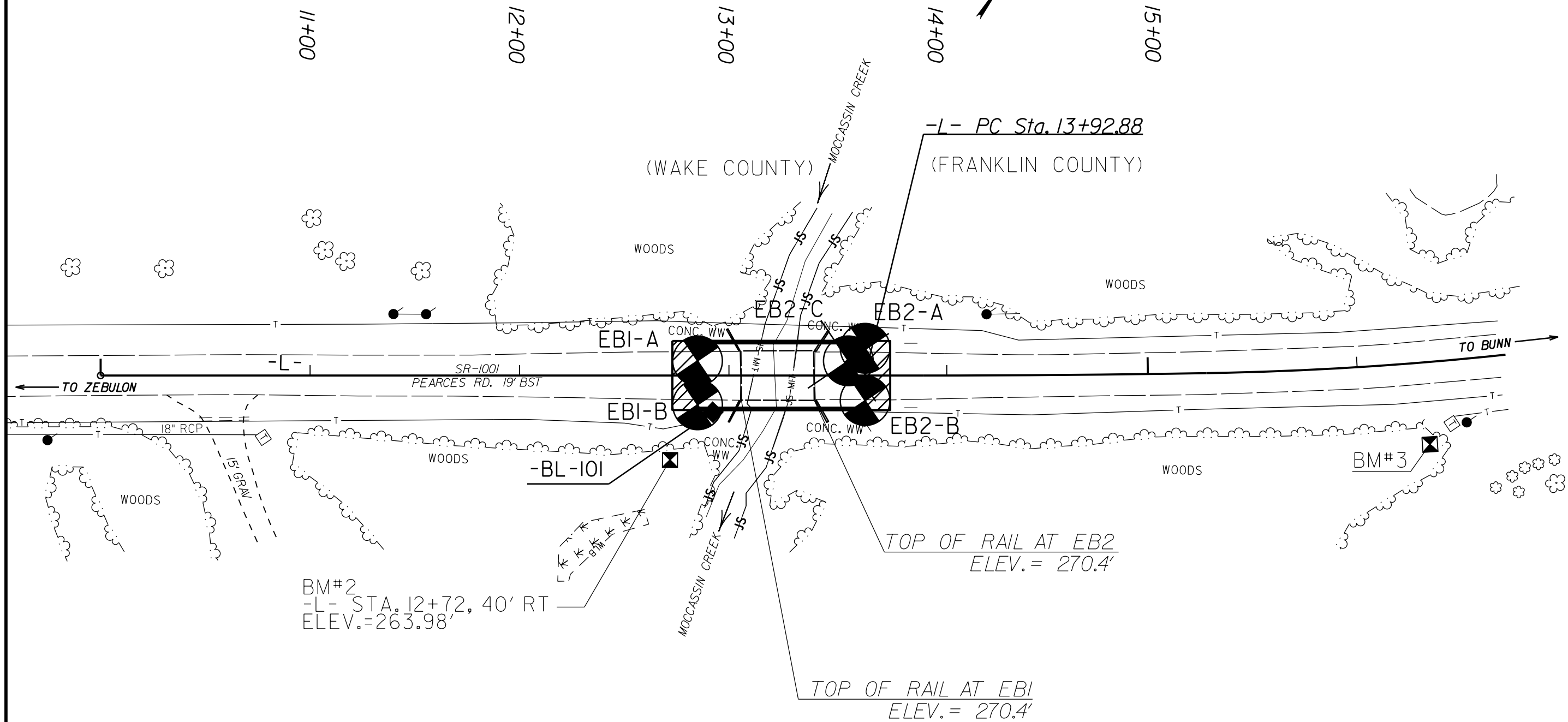
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

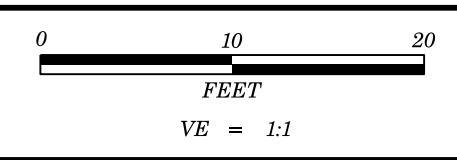
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions 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.		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	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	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	
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE						
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90				N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70					
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80		70				B. Sandstone with thin inter-layers of siltstone	60					
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets			60				C. Sandstone and siltstone in similar amounts		50				
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity				50			D. Siltstone or silty shale with sandstone layers			40			
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces					40		E. Weak siltstone or clayey shale with sandstone layers				30		
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes						30	F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
						20	G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
						10	H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.						
		N/A	N/A										

→ Means deformation after tectonic disturbance

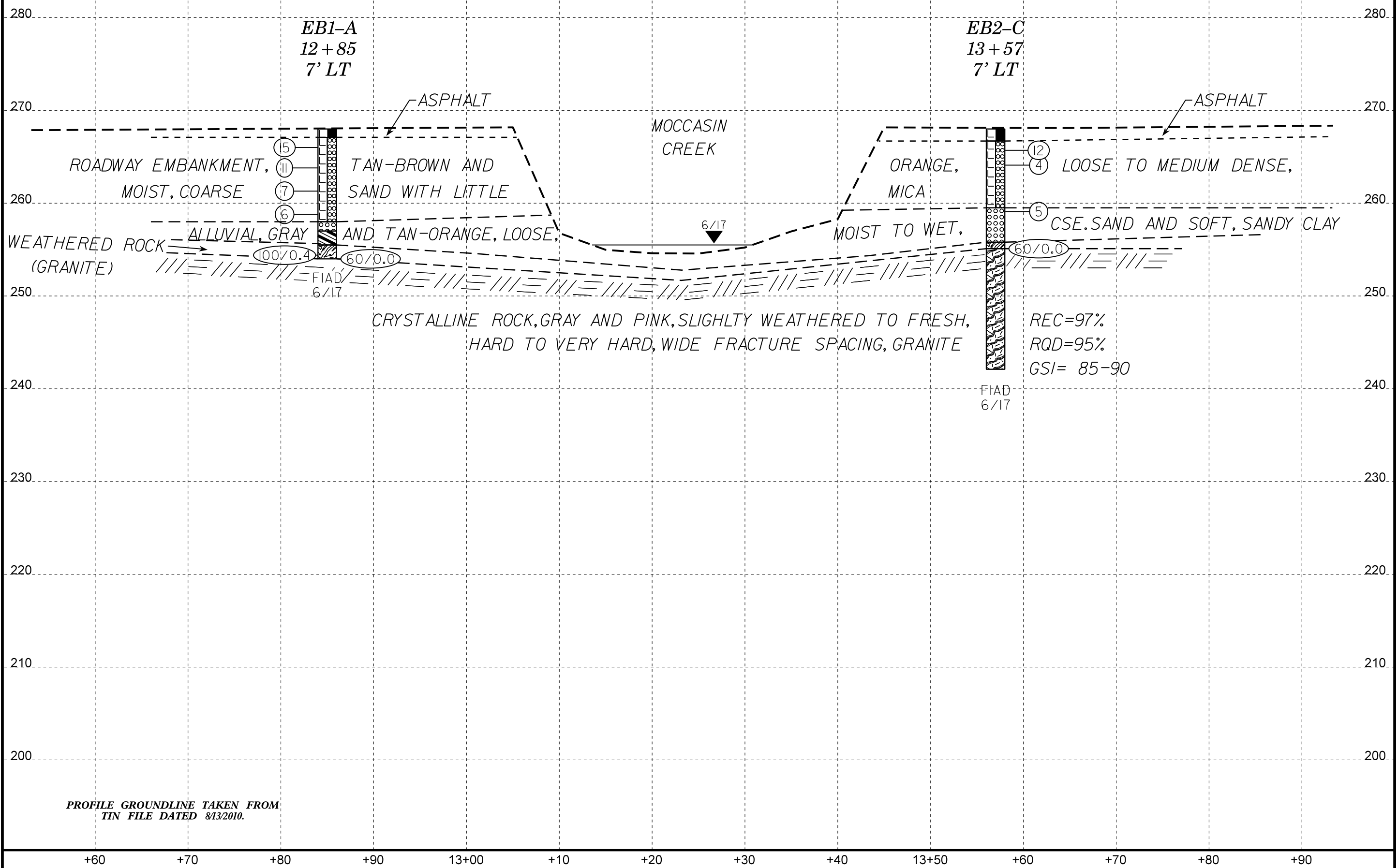
NOTE:
(CENTERLINE OF CREEK IS COUNTY LINE)



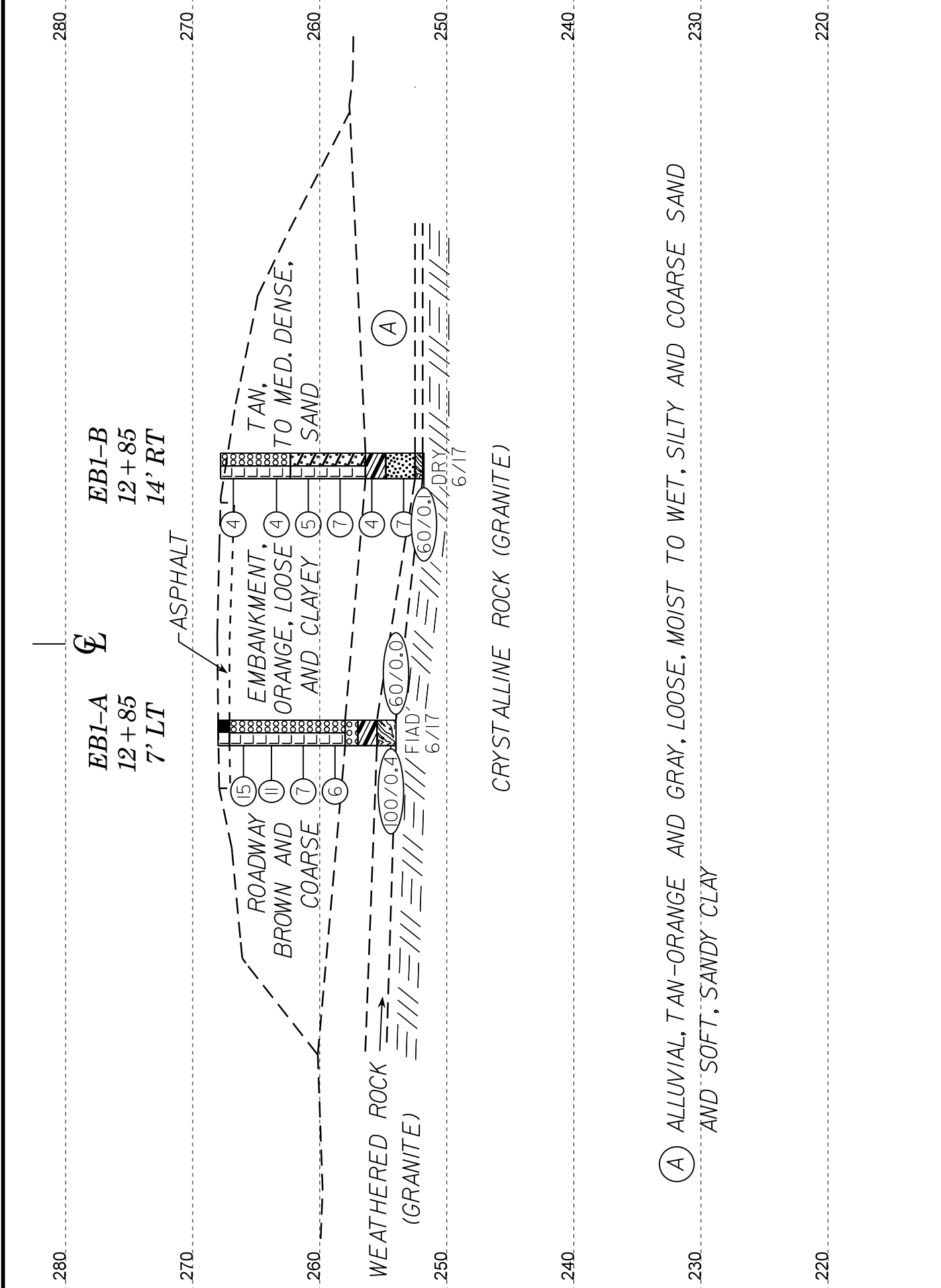
SKEW ANGLE = 90°



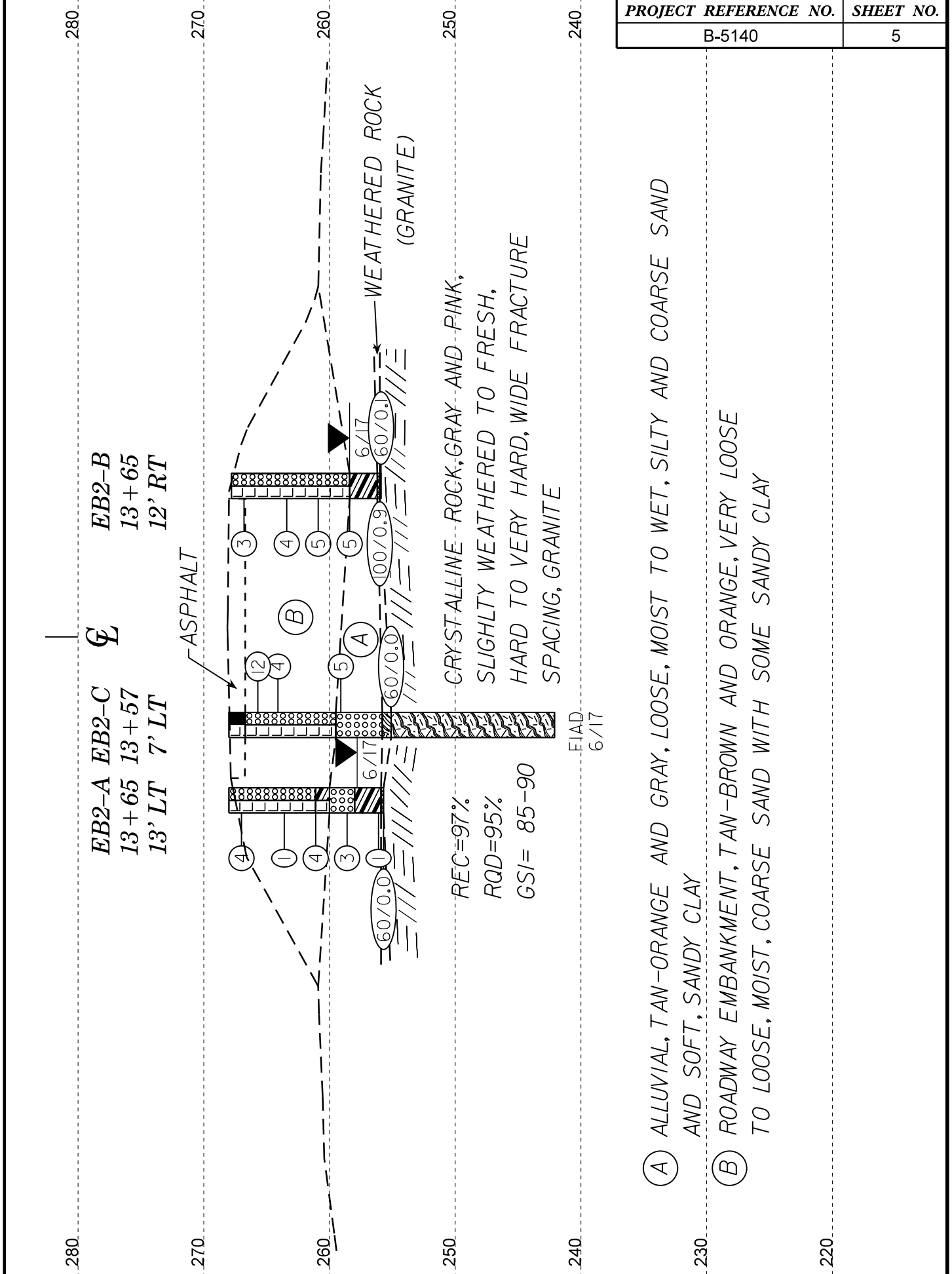
PROJECT REFERENCE NO.	SHEET NO.
B-5140	4
FENCE DIAGRAM OF BORINGS PROJECTED ONTO -L- CENTERLINE	



PROFILE GROUNDLINE TAKEN FROM:
TIN FILE DATED 8/13/2010.



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 EB2**

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42301.1.1		TIP B-5140		COUNTY WAKE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 195 ON -L- (SR1001) OVER MOCCASIN CREEK							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 12+85		OFFSET 7 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 268.0 ft		TOTAL DEPTH 14.0 ft		NORTHING 781,860		EASTING 2,204,187										
DRILL RIG/HAMMER EFF./DATE HFO0065 CME-45C 87% 05/23/2017			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 06/22/17		COMP. DATE 06/22/17		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						
270																
	267.0	1.0	8	8	7										268.0	GROUND SURFACE
	264.8	3.2	4	5	6										267.1	ROADWAY EMBANKMENT ASPHALT
	262.3	5.7	3	4	3											TAN-BROWN AND ORANGE, COARSE SAND WITH LITTLE MICA
	259.8	8.2	4	3	3											
	254.8	13.2													258.0	ALLUVIAL TAN-ORANGE, COARSE SAND
	254.0	14.0	100/0.4												257.0	GRAY, SANDY CLAY
			60/0.0												255.5	WEATHERED ROCK (GRANITE)
															254.0	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 254.0 ft ON CRYSTALLINE ROCK (GRANITE)

WBS 42301.1.1		TIP B-5140		COUNTY WAKE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 195 ON -L- (SR1001) OVER MOCCASIN CREEK							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 12+85		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 267.8 ft		TOTAL DEPTH 16.0 ft		NORTHING 781,848		EASTING 2,204,205										
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 85% 07/12/2016			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 06/20/17		COMP. DATE 06/20/17		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						
270																
	267.8	0.0	2	2	2										267.8	GROUND SURFACE
	264.4	3.4	2	2	2											ROADWAY EMBANKMENT BROWN-TAN-ORANGE, COARSE SAND WITH TRACE MICA AND ORGANICS (3.4-3.6)
	261.9	5.9	3	2	3										262.3	TAN-BROWN-ORANGE, CLAYEY COARSE SAND WITH LITTLE MICA
	259.4	8.4	4	3	4											
	256.9	10.9	1	2	2										256.4	ALLUVIAL GRAY, SANDY CLAY
	254.4	13.4	4	3	4										254.8	GRAY, SILTY SAND
	251.9	15.9													252.5	WEATHERED ROCK (GRANITE)
			60/0.1												251.8	CRYSTALLINE ROCK (GRANITE)
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 251.8 ft IN CRYSTALLINE ROCK (GRANITE)

NCDOT BORE DOUBLE B5140_GEO_BH.GPJ NC_DOT.GDT 7/20/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 42301.1.1		TIP B-5140		COUNTY WAKE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 195 ON -L- (SR1001) OVER MOCCASIN CREEK							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 13+65		OFFSET 13 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 268.0 ft		TOTAL DEPTH 12.3 ft		NORTHING 781,930		EASTING 2,204,227										
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 85% 07/12/2016			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 06/20/17		COMP. DATE 06/20/17		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						
270	268.0	0.0	1	3	1									268.0	0.0	GROUND SURFACE
																ROADWAY EMBANKMENT
																TAN-BROWN, COARSE SAND
265	264.6	3.4	WOH	WOH	1											
	262.1	5.9														
260	259.6	8.4	2	1	2									261.1	6.9	TAN-ORANGE WITH BLACK, SANDY CLAY
	257.1	10.9												260.0	8.0	ALLUVIAL
	255.7	12.3	WOH	1	0									258.0	10.0	TAN-ORANGE, COARSE SAND
														255.9	12.1	GRAY, SANDY CLAY
														255.7	12.3	WEATHERED ROCK (GRANITE)
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 255.7 ft ON CRYSTALLINE ROCK (GRANITE)

WBS 42301.1.1		TIP B-5140		COUNTY WAKE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 195 ON -L- (SR1001) OVER MOCCASIN CREEK							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 13+65		OFFSET 12 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 267.8 ft		TOTAL DEPTH 11.9 ft		NORTHING 781,916		EASTING 2,204,248										
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 85% 07/12/2016			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 06/20/17		COMP. DATE 06/20/17		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						
270	267.8	0.0	1	2	1									267.8	0.0	GROUND SURFACE
																ROADWAY EMBANKMENT
																TAN-BROWN-ORANGE, COARSE SAND WITH TRACE MICA
265	264.4	3.4	2	2	2											
	261.9	5.9														
260	259.4	8.4	4	3	2									258.4	9.4	ALLUVIAL
	256.9	10.9												256.2	11.6	GRAY, SANDY CLAY
	256.0	11.8	WOH	100/0.4										256.0	11.8	WEATHERED ROCK (GRANITE)
														255.9	11.9	CRYSTALLINE ROCK (GRANITE)
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 255.9 ft ON CRYSTALLINE ROCK (GRANITE)

NCDOT BORE DOUBLE B5140_GEO_BH.GPJ NC_DOT.GDT 7/20/17

GEOTECHNICAL BORING REPORT BORE LOG

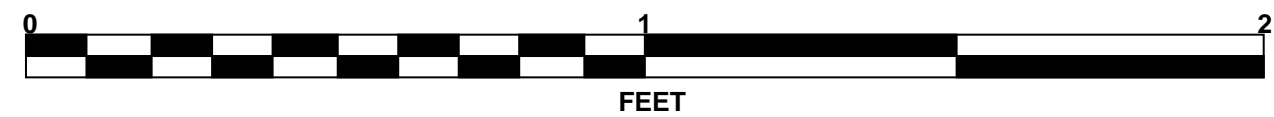
GEOTECHNICAL BORING REPORT CORE LOG

WBS 42301.1.1		TIP B-5140		COUNTY WAKE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 195 ON -L- (SR1001) OVER MOCCASIN CREEK							GROUND WTR (ft)									
BORING NO. EB2-C		STATION 13+57		OFFSET 7 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 268.0 ft		TOTAL DEPTH 25.9 ft		NORTHING 781,920		EASTING 2,204,228										
DRILL RIG/HAMMER EFF./DATE HFO0065 CME-45C 87% 05/23/2017		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Pinter, D. G.		START DATE 06/22/17		COMP. DATE 06/22/17		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						
270																
	266.7	1.3												268.0	GROUND SURFACE	0.0
	265.1	2.9	10	6	6									266.7	ROADWAY EMBANKMENT ASPHALT	1.3
265			3	2	2										TAN-ORANGE-BROWN, COARSE SAND	
	260.1	7.9														
260			1	2	3									259.5	ALLUVIAL TAN-BROWN, COARSE SAND WITH TRACE ORGANICS	8.5
	255.1	12.9												255.8	WEATHERED ROCK (GRANITE)	12.2
255			60/0.0											255.1	CRYSTALLINE ROCK LIGHT TO DARK GRAY-PINK, VERY SLIGHTLY WEATHERED TO FRESH, VERY HARD, VERY WIDE FRACTURE SPACING, GRANITE REC=97% RQD=95% GSI=85-90	12.9
250																
245														242.1	Boring Terminated at Elevation 242.1 ft IN CRYSTALLINE ROCK (GRANITE)	25.9

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DRILLER Pinter, D. G.		START DATE 06/22/17		COMP. DATE 06/22/17		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
255.1	253.6	12.9	1.5	N=60/0.0 3.27/1.0 1.37/0.5	(1.5)	(1.5)		(12.6)	(12.3)		Begin Coring @ 12.9 ft	
252.1	252.1	15.9	1.5	3.41/1.0 2.07/0.5	100%	100%		97%	95%		CRYSTALLINE ROCK LIGHT TO DARK GRAY-PINK, FRESH TO VERY WEATHERED, VERY HARD, VERY WIDE FRACTURE SPACING, GRANITE	12.9
250			5.0	5.41/1.0 7.53/1.0 10.15/1.0 5.29/1.0	100%	100%					GSI=85-90	
245			5.0	1.05/1.0 1.14/1.0 0.55/1.0 1.00/1.0 1.05/1.0	92%	86%						
242.1	242.1	25.9		0.37/1.0							Boring Terminated at Elevation 242.1 ft IN CRYSTALLINE ROCK (GRANITE)	25.9

CORE PHOTOGRAPHS

EB2-C BOXES 1 & 2: 12.9 - 25.9 FEET



SITE PHOTOGRAPH

Bridge No. 195 on -L- (SR 1001) over Moccasin Creek



Looking South towards End Bent 1