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REFERENCE: B-5320

PROJECT: 46034

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-5320	1	14

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRANVILLE
PROJECT DESCRIPTION BRIDGE NO. 96 ON -L-
(SR 1139) OVER TAR RIVER AT STA. 15 + 98

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.

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 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

A. N. KINTNER

N. O. MOORE

D. G. PINTER

R. E. CLARKE

INVESTIGATED BY J. L. PEDRO
 DRAWN BY A. N. KINTNER
 CHECKED BY N. T. ROBERSON
 SUBMITTED BY N. T. ROBERSON
 DATE JANUARY 2018



DocuSigned by:
Jaime L. Love 1/29/2018
 B93571039B88485
 SIGNATURE DATE

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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

Table with 4 columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. Includes sub-sections for SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, and NOTES.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

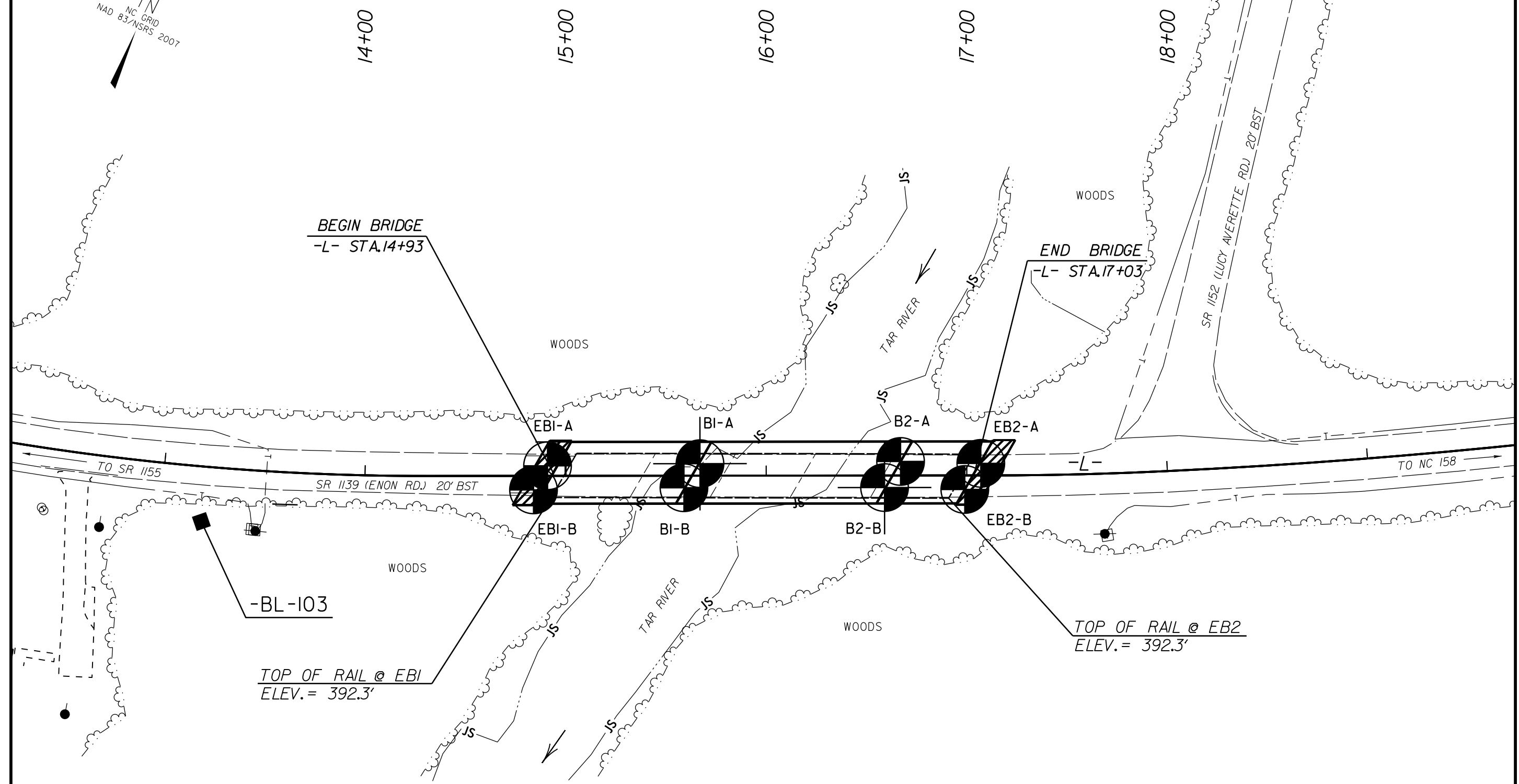
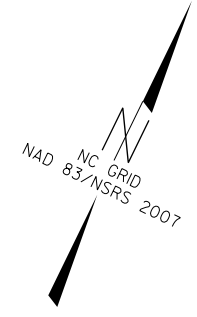
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

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

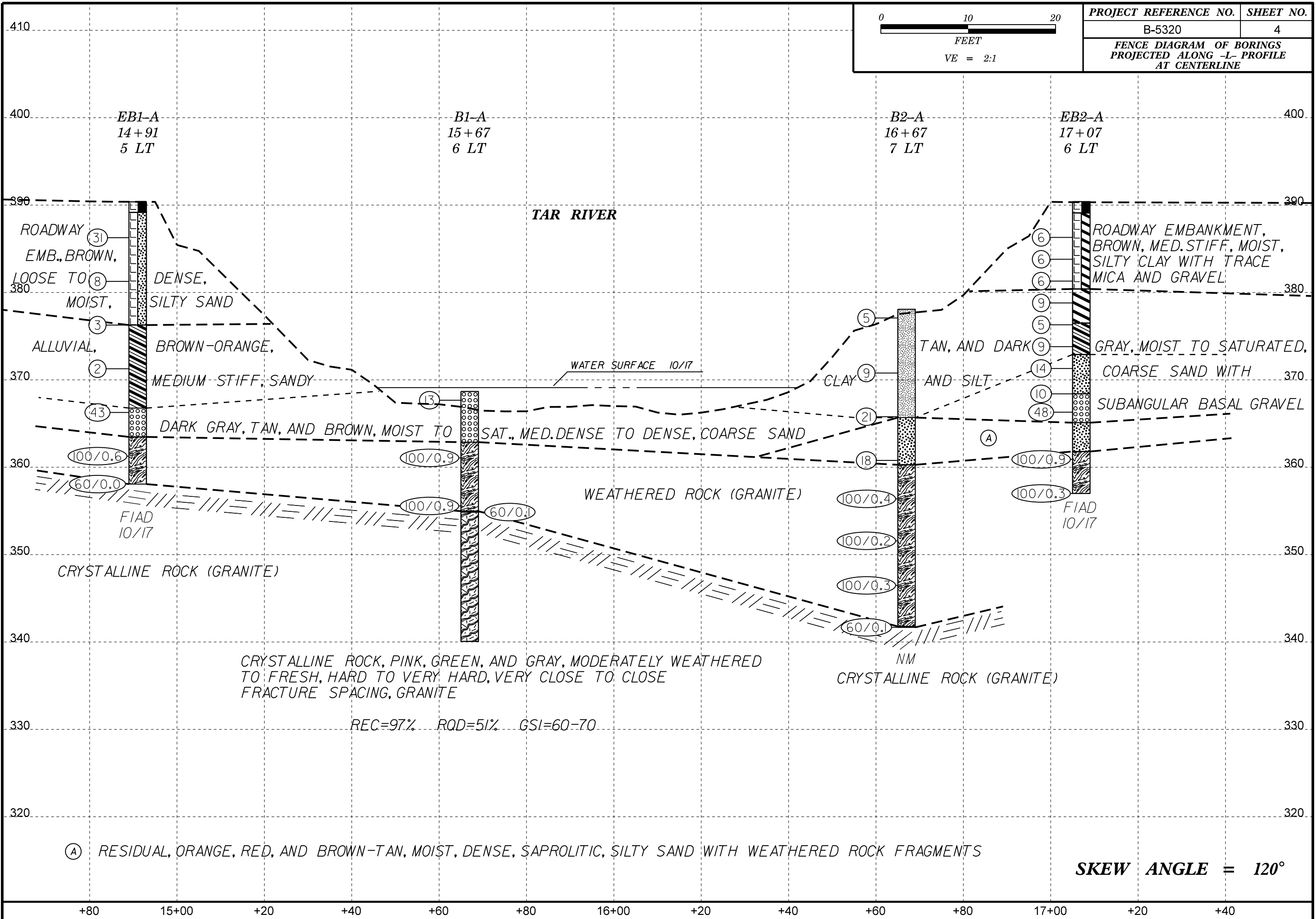
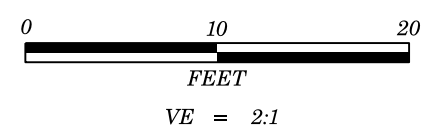
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

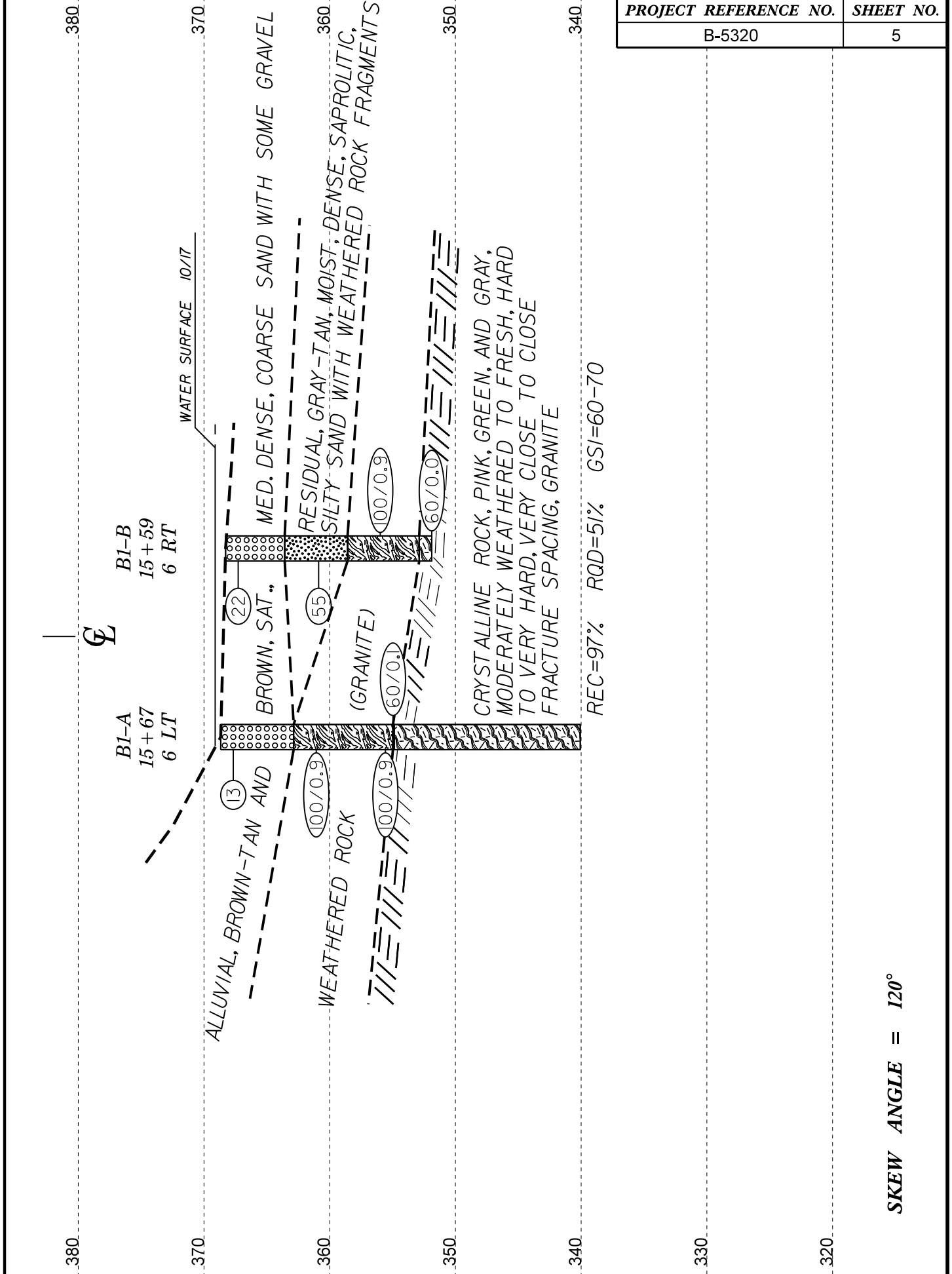
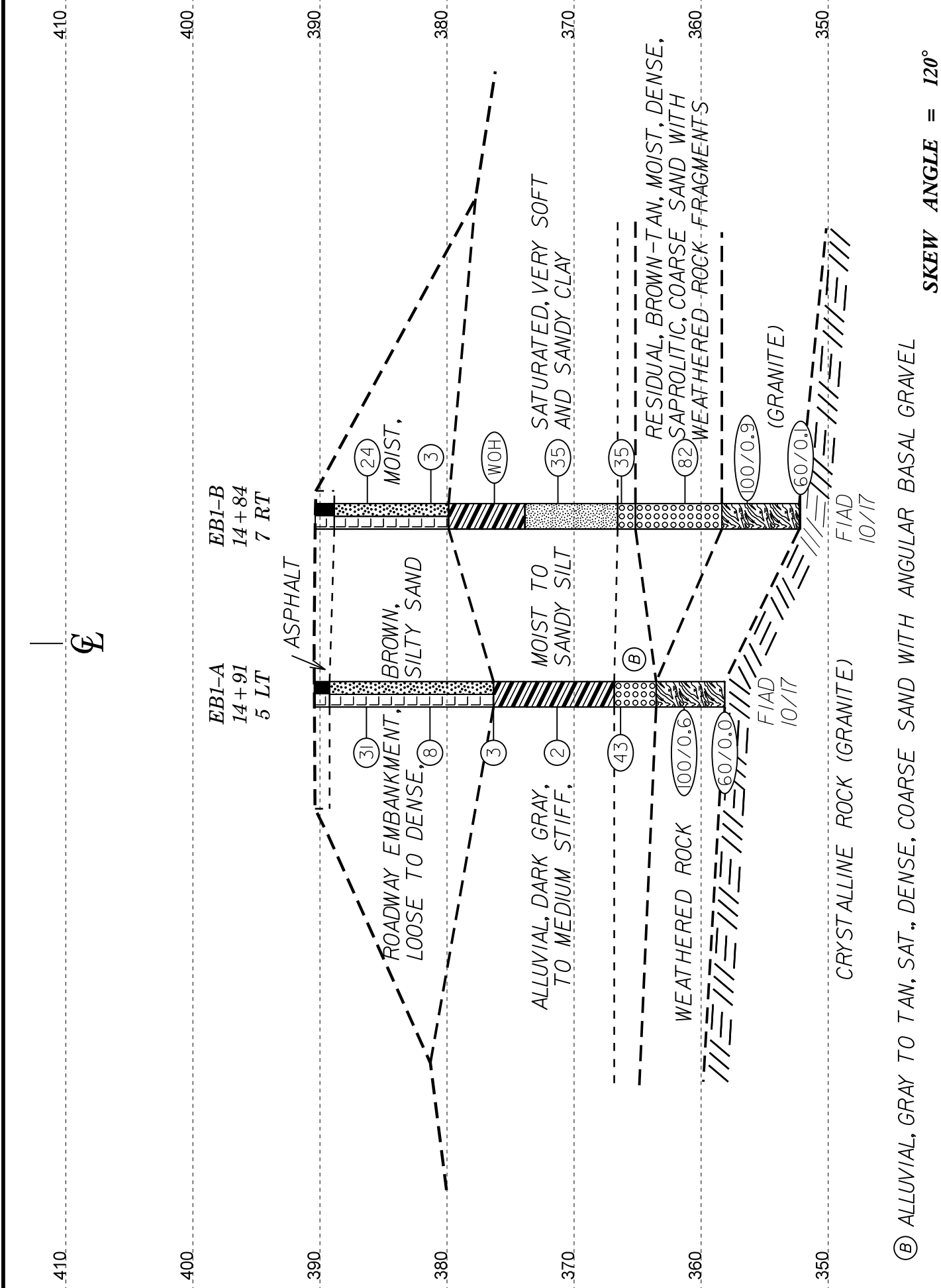
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions 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					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			70				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			60				D. Siltstone or silty shale with sandstone layers			40			
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				50			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					40		F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
					30		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
					20		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.						
					10								
		N/A	N/A										

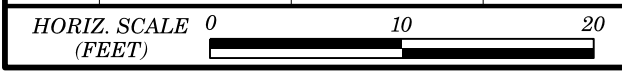
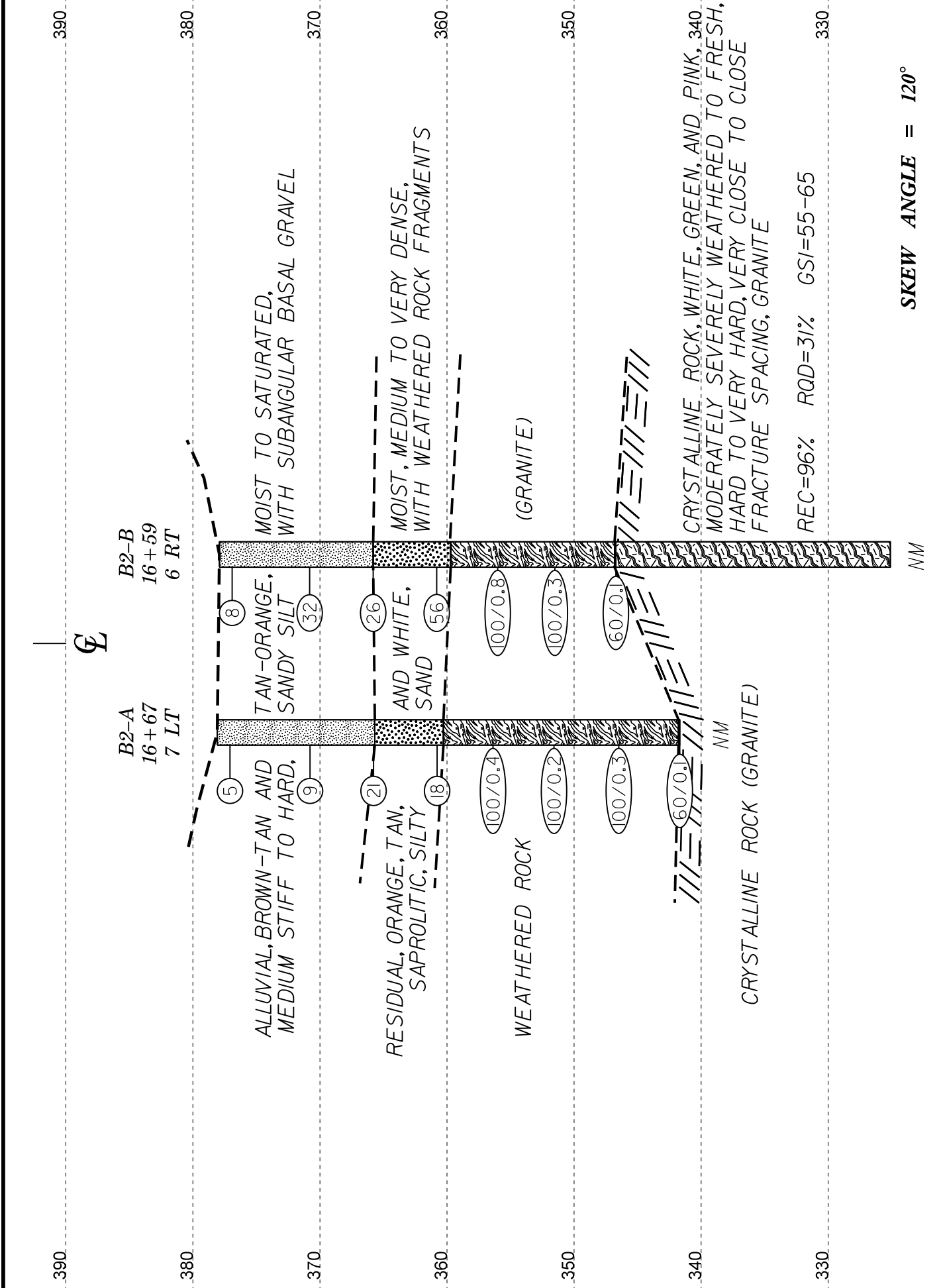
→ Means deformation after tectonic disturbance



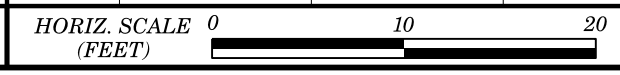
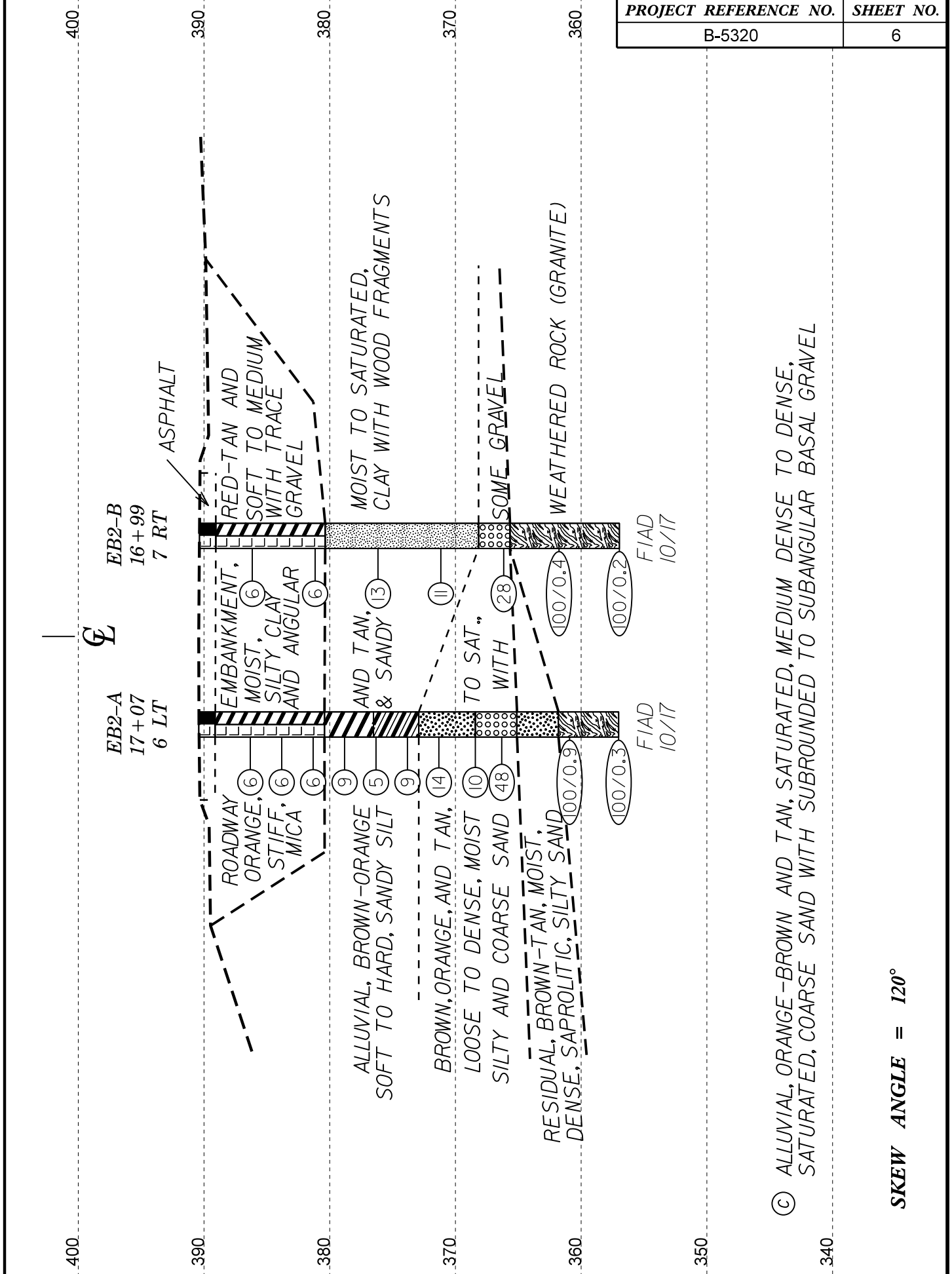
SKREW ANGLE = 120°







CROSS SECTION THROUGH B2



CROSS SECTION THROUGH EB2

© ALLUVIAL, ORANGE-BROWN AND TAN, SATURATED, MEDIUM DENSE TO DENSE, SATURATED, COARSE SAND WITH SUBROUNDED TO SUBANGULAR BASAL GRAVEL

SKEW ANGLE = 120°

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.									
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 14+91		OFFSET 5 ft LT		ALIGNMENT -L-									
0 HR. Dry		TOTAL DEPTH 32.3 ft		NORTHING 918,940		EASTING 2,090,704									
COLLAR ELEV. 390.4 ft		DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 10/17/17		COMP. DATE 10/17/17		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					
395															
390															
387.3	387.3	3.1	11	15	16										
385															
382.3	382.3	8.1	5	4	4										
380															
377.3	377.3	13.1	2	1	2										
375															
372.3	372.3	18.1	1	1	1										
370															
367.3	367.3	23.1	6	20	23										
365															
362.3	362.3	28.1	81	19/0.1											
360															
358.1	358.1	32.3	60/0.0												

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.									
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 14+84		OFFSET 7 ft RT		ALIGNMENT -L-									
0 HR. 7.5		TOTAL DEPTH 38.2 ft		NORTHING 918,927		EASTING 2,090,703									
COLLAR ELEV. 390.4 ft		DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 10/17/17		COMP. DATE 10/17/17		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					
395															
390															
387.3	387.3	3.1	10	12	12										
385															
382.3	382.3	8.1	2	2	1										
380															
377.3	377.3	13.1	WOH	WOH	WOH										
375															
372.3	372.3	18.1	6	17	18										
370															
367.3	367.3	23.1	6	17	18										
365															
362.3	362.3	28.1	21	50	32										
360															
357.3	357.3	33.1	56	44/0.4											
355															
352.3	352.3	38.1	60/0.1												

NCDOT BORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/17/17

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)									
BORING NO. B1-A		STATION 15+67		OFFSET 6 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 368.7 ft		TOTAL DEPTH 28.6 ft		NORTHING 918,975		EASTING 2,090,772										
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 10/20/17		COMP. DATE 10/20/17		SURFACE WATER DEPTH 0.8ft										
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			ELEV. (ft)	DEPTH (ft)		
370	368.7	0.0	3	3	10						SS-12	Sat.		368.7	0.0	WATER SURFACE (10/20/17) GROUND SURFACE
365														362.9	5.8	ALLUVIAL BROWN-TAN, COARSE SAND
360	362.0	6.7	59	41/0.4												WEATHERED ROCK (GRANITE)
355	357.0	11.7	13	38	62/0.4									355.0	13.7	CRYSTALLINE ROCK (GRANITE)
350	355.0	13.7	60/0.1											354.9	13.8	PINK, GREEN, AND GRAY, MODERATELY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSE TO CLOSE FRACTURE SPACING, GRANITE
345											RS-2			340.1	28.6	REC=97% RQD=51% GSI=60-70
																Boring Terminated at Elevation 340.1 ft IN CRYSTALLINE ROCK (GRANITE)

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.							
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)						
BORING NO. B1-A		STATION 15+67		OFFSET 6 ft LT		ALIGNMENT -L-							
COLLAR ELEV. 368.7 ft		TOTAL DEPTH 28.6 ft		NORTHING 918,975		EASTING 2,090,772							
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 10/20/17		COMP. DATE 10/20/17		SURFACE WATER DEPTH 0.8ft							
CORE SIZE NXWL			TOTAL RUN 14.8 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS		
					REC. (%)	RQD (%)		REC. (%)	RQD (%)		ELEV. (ft)	DEPTH (ft)	
354.9	354.9	13.8	4.8	2:39/1.0 3:06/1.0 1:47/1.0 2:07/1.0 1:24/0.8	(4.4) 92%	(2.0) 42%		(14.4) 97%	(7.6) 51%		354.9	13.8	Begin Coring @ 13.8 ft PINK, GREEN, AND GRAY, MODERATELY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSE TO CLOSE FRACTURE SPACING, GRANITE
350	350.1	18.6	5.0	2:41/1.0 3:08/1.0 2:08/1.0 2:00/1.0 1:41/1.0	(5.0) 100%	(3.0) 60%							GSI=60-70
345	345.1	23.6	5.0	1:23/1.0 1:34/1.0 1:41/1.0 1:58/1.0 2:01/1.0	(5.0) 100%	(2.6) 52%	RS-2						
	340.1	28.6									340.1	28.6	Boring Terminated at Elevation 340.1 ft IN CRYSTALLINE ROCK (GRANITE)

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NCDOT CORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/9/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)								
BORING NO. B1-B		STATION 15+59		OFFSET 6 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 368.3 ft		TOTAL DEPTH 16.4 ft		NORTHING 918,960		EASTING 2,090,770									
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 10/18/17		COMP. DATE 10/18/17		SURFACE WATER DEPTH 0.8ft									
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					
370	368.3	0.0	13	10	12									WATER SURFACE (10/18/17) GROUND SURFACE	0.0
365	361.9	6.4	17	34	21								Sat.	ALLUVIAL GRAY-BROWN, COARSE SAND WITH SUBROUNDED TO SUBANGULAR GRAVEL	4.7
360	356.9	11.4	31	69/0.4									SS-11 M	RESIDUAL GRAY-TAN, SILTY SAND	9.7
355	351.9	16.4	60/0.0											WEATHERED ROCK (GRANITE)	15.4
														CRYSTALLINE ROCK (GRANITE)	16.4
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 351.9 ft IN CRYSTALLINE ROCK (GRANITE)															

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.									
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)								
BORING NO. B2-A		STATION 16+67		OFFSET 7 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 378.1 ft		TOTAL DEPTH 36.4 ft		NORTHING 919,020		EASTING 2,090,862									
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 10/20/17		COMP. DATE 10/20/17		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					
380	378.1	0.0	3	2	3									GROUND SURFACE	0.0
375	371.8	6.3	WOH	4	5								M	ALLUVIAL BROWN-TAN, BROWN-ORANGE, AND TAN-GRAY, SANDY SILT WITH SUBANGULAR GRAVEL AND TRACE ORGANICS	
370	366.8	11.3	15	12	9								Sat.	RESIDUAL ORANGE, TAN, AND WHITE, WITH RED AND TAN MOTTLING, SILTY SAND WITH ANGULAR GRAVEL	12.4
365	361.8	16.3	17	12	6								Sat.	WEATHERED ROCK (GRANITE)	17.8
360	356.8	21.3	100/0.4										M	CRYSTALLINE ROCK (GRANITE)	36.3
355	351.8	26.3	100/0.2												36.4
350	346.8	31.3	100/0.3												
345	341.8	36.3	60/0.1												
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 341.7 ft IN CRYSTALLINE ROCK (GRANITE)															

NCDOT BORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/17/17

**GEOTECHNICAL BORING REPORT
BORE LOG**

**GEOTECHNICAL BORING REPORT
CORE LOG**

WBS 46034.1.1	TIP B-5320	COUNTY GRANVILLE	GEOLOGIST Kintner, A. N.
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+59	OFFSET 6 ft RT	ALIGNMENT -L-
COLLAR ELEV. 377.9 ft	TOTAL DEPTH 52.8 ft	NORTHING 919,004	EASTING 2,090,860
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 10/19/17	COMP. DATE 10/19/17
SURFACE WATER DEPTH N/A			

WBS 46034.1.1	TIP B-5320	COUNTY GRANVILLE	GEOLOGIST Kintner, A. N.
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+59	OFFSET 6 ft RT	ALIGNMENT -L-
COLLAR ELEV. 377.9 ft	TOTAL DEPTH 52.8 ft	NORTHING 919,004	EASTING 2,090,860
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 10/19/17	COMP. DATE 10/19/17
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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
380																
	377.9	0.0	WOH	2	6									377.9	GROUND SURFACE	0.0
375												M	ALLUVIAL TAN-ORANGE, SANDY SILT WITH SUBANGULAR TO SUBROUNDED BASAL GRAVEL			
370	371.8	6.1		9	17							M				
365	366.8	11.1		11	13							Sat.				
360	361.8	16.1		19	23							M	RESIDUAL ORANGE, WHITE, AND BLACK, SAPROLITIC, SILTY SAND	12.1		
355	356.8	21.1		65	35/0.3										18.2	
350	351.8	26.1		100/0.3									WEATHERED ROCK (GRANITE)	359.7		
345	346.8	31.1		60/0.1											31.1	
340												RS-1	CRYSTALLINE ROCK (GRANITE) WHITE, GREEN, AND PINK, MODERATELY SEVERLY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSE TO CLOSE FRACTURE SPACING, GRANITE REC=96% RQD=31% GSI=55-65	346.8		
335															346.7	
330																

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) %			
TOTAL RUN 21.6 ft												
346.7	346.7	31.2	1.6	0:36/0.6	(1.3)	(0.0)		(20.8)	(6.7)		Begin Coring @ 31.2 ft WHITE, GREEN, AND PINK, MODERATELY SEVERLY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSE TO CLOSE FRACTURE SPACING, GRANITE GSI=55-65	31.2
345	345.1	32.8	5.0	1:03/1.0	81%	0%		96%	31%			
				1:11/1.0	(4.5)	(1.7)						
340	340.1	37.8	5.0	1:01/1.0	90%	34%	RS-1					
				1:04/1.0								
				1:07/1.0								
335	335.1	42.8	5.0	1:13/1.0	(5.0)	(1.9)						
				1:19/1.0	100%	38%						
				1:18/1.0								
330	330.1	47.8	5.0	1:21/1.0	(5.0)	(1.9)						
				1:20/1.0	100%	38%						
				1:21/1.0								
				1:24/1.0								
				1:35/1.0								
				1:30/1.0								
				3:19/1.0								
				1:12/1.0	(5.0)	(1.2)						
				1:14/1.0	100%	24%						
				1:01/1.0								
				1:07/1.0								
				1:32/1.0								
											Boring Terminated at Elevation 325.1 ft IN CRYSTALLINE ROCK (GRANITE)	52.8

NCDOT BORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/9/17

NCDOT BORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/9/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Kintner, A. N.										
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 17+07		OFFSET 6 ft LT		ALIGNMENT -L-	0 HR. 13.0									
COLLAR ELEV. 390.4 ft		TOTAL DEPTH 33.4 ft		NORTHING 919,036		EASTING 2,090,898										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Pinter, D. G.		START DATE 10/17/17		COMP. DATE 10/17/17		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)	
395																
390																390.4 GROUND SURFACE 0.0
																389.1 ROADWAY EMBANKMENT ASPHALT 1.3
385	387.3	3.1	3	3	3	1										6. RED-TAN, SILTY CLAY, WITH TRACE MICA AND ANGULAR GRAVEL
	384.8	5.6	2	3	3											
	382.3	8.1	2	3	3											
380	379.8	10.6	3	4	5											10.0 ALLUVIAL RED-TAN, SILTY CLAY
	377.3	13.1	2	2	3											13.9 BROWN-RED, SANDY CLAY WITH WOOD FRAGMENTS AND ANGULAR BASAL GRAVEL
375	374.8	15.6	4	5	4											17.5 BROWN-ORANGE-TAN, SILTY SAND WITH ANGULAR BASAL GRAVEL
	372.3	18.1	4	4	10											22.0 TAN, COARSE SAND WITH ANGULAR BASAL GRAVEL
370	369.8	20.6	3	4	6											25.3 RESIDUAL RED-TAN, SILTY SAND
	367.3	23.1	9	23	25											28.6 WEATHERED ROCK (GRANITE)
365	362.3	28.1	26	26	74/0.4											33.4 Boring Terminated at Elevation 357.0 ft IN WEATHERED ROCK (GRANITE)
360	357.3	33.1	100/0.3													

WBS 46034.1.1		TIP B-5320		COUNTY GRANVILLE		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR 1139) OVER TAR RIVER							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 16+99		OFFSET 7 ft RT		ALIGNMENT -L-	0 HR. 24.6									
COLLAR ELEV. 390.4 ft		TOTAL DEPTH 33.4 ft		NORTHING 919,021		EASTING 2,090,896										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Pinter, D. G.		START DATE 10/18/17		COMP. DATE 10/18/17		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)	
395																
390																390.4 GROUND SURFACE 0.0
																389.1 ROADWAY EMBANKMENT ASPHALT 1.3
385	387.2	3.2	2	3	3	1										6. RED, ORANGE, AND WHITE, SILTY CLAY
	382.2	8.2	3	3	3											
380	377.2	13.2	4	6	7											10.0 ALLUVIAL PALE ORANGE AND BROWN, SANDY SILT WITH WOOD FRAGMENTS
	372.2	18.2	7	5	6											22.2 ORANGE BROWN, COARSE SAND WITH SUBROUNDED TO SUBANGULAR GRAVEL
370	367.2	23.2	8	12	16											24.7 WEATHERED ROCK (GRANITE)
	362.2	28.2	100/0.4													33.4 Boring Terminated at Elevation 357.0 ft IN WEATHERED ROCK (GRANITE)
365	357.2	33.2	100/0.2													

NCDOT BORE DOUBLE B5320_GEO_BH.GPJ NC_DOT.GDT 11/17/17

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	5 LT	14+91	14.1-14.6	A-6(7)	-	11	8.7	15.9	41.2	34.2	100	94.4	79.9	-	-
SS-7	5 LT	14+91	23.6-24.6	A-1-a(0)	-	NP	63.6	22.4	8	6	48	26.2	8.3	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	7 RT	14+84	18.1-19.6	A-4(6)	28	10	2.2	24.2	35.3	38.3	100	99.2	79.1	-	-
SS-9A	7 RT	14+84	28.1-29.6	A-1-b(0)	-	NP	67.9	19.5	10.6	2	64	29.1	10.3	-	-

BL-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-12	6 RT	15+67	0.0-1.5	A-1-b(0)	-	NP	85.6	9.3	3.1	2	95	27	6.2	-	-

BL-A

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-2	6 LT	15+67	25.6-26.1	GRANITE	164.3	21.5	0.406

BL-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-11	6 LT	15+59	6.4-7.9	A-2-4(0)	-	NP	44.7	30.4	18.8	6	87	61.2	27.9	-	-

B2-B

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	16+59	35.1-35.6	GRANITE	162.9	2.1	0.369

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9B	7 RT	16+99	3.2-4.7	A-7-6(16)	44	25	25.4	16.5	21.9	36.3	97	80.8	69.3	-	-
SS-10	7 RT	16+99	13.2-14.7	A-4(3)	30	10	14.5	35	24.3	26.2	94	88.2	54.6	-	-

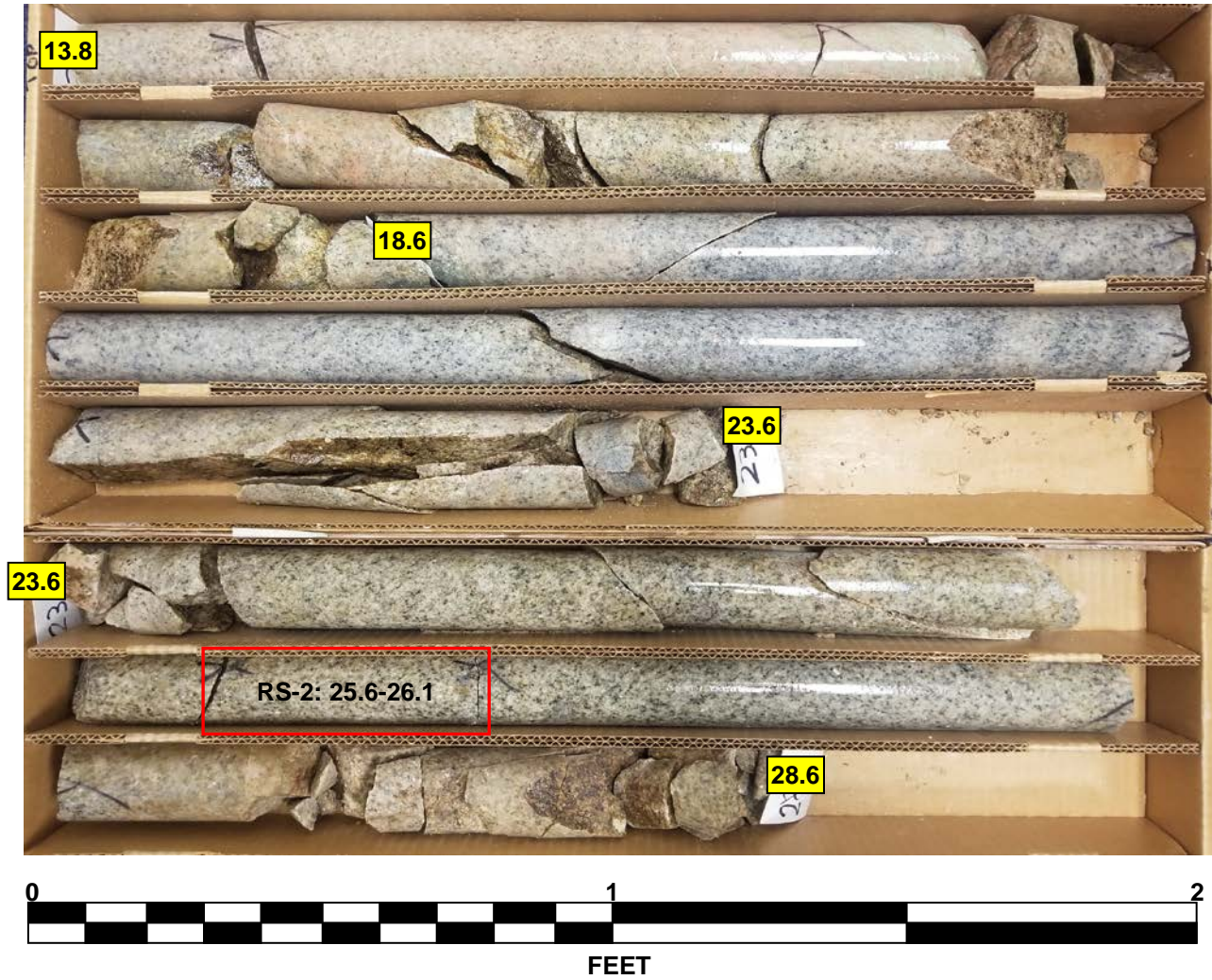
EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	6 LT	17+07	3.1-4.6	A-7-6(6)	45	19	32	18.7	21	28.2	90	71	47.6	-	-
SS-2	6 LT	17+07	15.6-17.1	A-6(2)	30	11	19.7	34.6	19.4	26.2	93	86.3	48.4	-	-
SS-3	6 LT	17+07	18.1-19.6	A-2-4(0)	-	NP	28.6	43.9	13.4	14.1	98	91.6	32.2	-	-
SS-4	6 LT	17+07	20.6-22.0	A-2-4(0)	-	NP	49.7	29	9.2	12.1	81	64.6	19.7	-	-
SS-5	6 LT	17+07	23.1-24.6	A-1-a(0)	-	NP	50.8	22.2	17	10.1	40	25.2	12.6	-	-

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 13.8 - 28.6 FEET



B2-B

BOXES 1 & 2: 31.2 - 52.8 FEET



SITE PHOTOGRAPH

Bridge No. 96 on -L- (SR 1139) over Tar River



Looking Southwest towards End Bent 1