

REFERENCE: BR-0069

PROJECT: 67069

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CASWELL  
PROJECT DESCRIPTION BRIDGE 160001 ON US 158 OVER  
COUNTRY LINE CREEK

SITE DESCRIPTION BRIDGE STRUCTURE AT -L-  
STA. 20+18.00

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0069	1	

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

P.M. WEAVER

P.B. GONZALEZ

SubTerra Exploration

INVESTIGATED BY ESP Associates, Inc.

DRAWN BY P.B. GONZALEZ

CHECKED BY P.M. WEAVER

SUBMITTED BY ESP Associates, Inc.

DATE October 2022

 **ESP**  
 ESP ASSOCIATES, INC.  
 7011 ALBERT PICK RD  
 SUITE E  
 GREENSBORO, NC 27409  
 FIRM # C-0587  
 WWW.ESPASSOCIATES.COM



DocuSigned by:  
Paul M. Weaver 03/03/2023  
 01847D3739AD49C...  
 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...

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for General Class., Group Class., Symbol, % Passing #10, #40, #200, Material Passing #40, Group Index, Usual Types of Major Materials, Gen. Rating as Subgrade, and Soil Legend patterns.

CONSISTENCY OR DENSENESS

Table showing primary soil type, compactness or consistency, range of standard penetration resistance, and range of unconfined compressive strength.

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size opening (mm) for boulder, cobble, gravel, coarse sand, fine sand, silt, and clay, along with grain size distribution curves.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating soil moisture scale (Atterberg limits), field moisture description, and guide for field moisture description.

PLASTICITY

Table showing Plasticity Index (PI) vs. Dry Strength with 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.

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

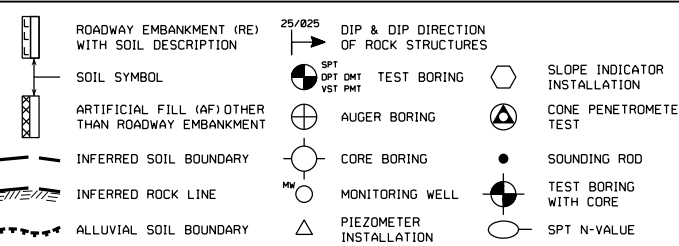
PERCENTAGE OF MATERIAL

Table showing percentages of organic material, granular soils, silt-clay soils, and other material.

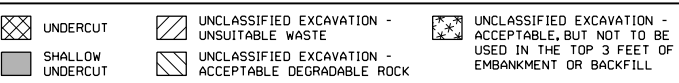
GROUND WATER

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 auger refusal, boring terminated, clay, cone penetration test, coarse, dilatometer test, dynamic penetration test, void ratio, fine, fossiliferous, fractured, fragments, highly, medium, mica, micaceous, moderately, non-plastic, organic, pressuremeter test, saprolite, sand, sandy, silt, silty, slightly, tricone refusal, moisture content, very, vane shear test, weathered, unit weight, dry unit weight, sample abbreviations, bulk, split spoon, Shelby tube, rock, recompressed triaxial, and California bearing ratio.

EQUIPMENT USED ON SUBJECT PROJECT

Form for recording equipment used on subject project, including drill units (CME-45C, CME-55, CME-550, vane shear test, portable hoist, DIEDRICH D-50), advancing tools (clay bits, continuous flight auger, hollow augers, hard faced finger bits, tung-carbide inserts, casing, auger, tricone, core bit), hammer type (automatic/manual), core size (B/H, N/Q), hand tools (post hole digger, hand 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...

Table with columns for Rock Type (Weathered, Crystalline, Non-crystalline, Coastal plain) and Rock Description.

WEATHERING

Table describing weathering degrees: Fresh, very slight, slight, moderate, moderately severe, severe, very severe, complete.

ROCK HARDNESS

Table describing rock hardness degrees: Very hard, hard, moderately hard, medium hard, soft, very soft.

FRACTURE SPACING

Table relating fracture spacing to term: very wide, wide, moderately close, close, very close.

BEDDING

Table relating bedding thickness to term: very thickly bedded, thickly bedded, thinly bedded, very thinly bedded, thickly laminated, thinly laminated.

INDURATION

Table describing induration degrees: friable, moderately indurated, indurated, extremely indurated.

TERMS AND DEFINITIONS

Table defining geological terms: Alluvium, aquifer, arenaceous, argillaceous, artesian, calcareous, colluvium, core recovery, dike, dip, dip direction, fault, fissile, float, flood plain, formation, joint, ledge, 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: NGS Marker Designation CAS 2, PID FY2340 ELEVATION: 440.98 FEET

NOTES: F.J.A.D = FILLED IMMEDIATELY AFTER DRILLING

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

# SUBSURFACE INVESTIGATION

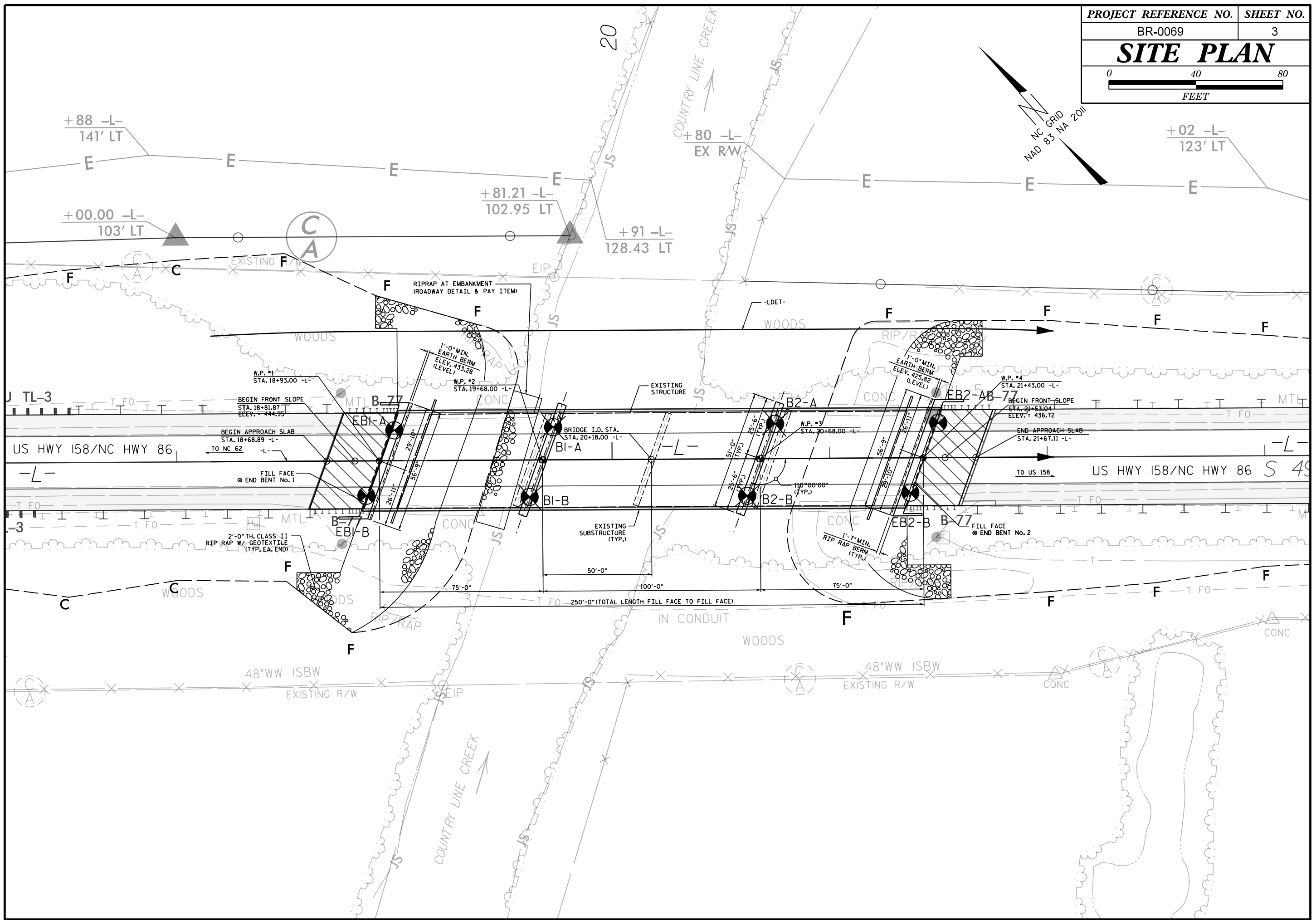
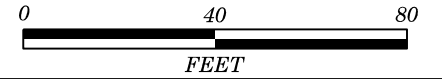
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

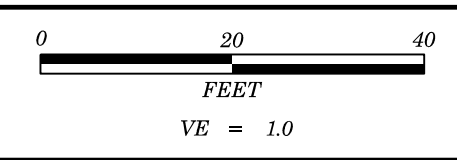
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

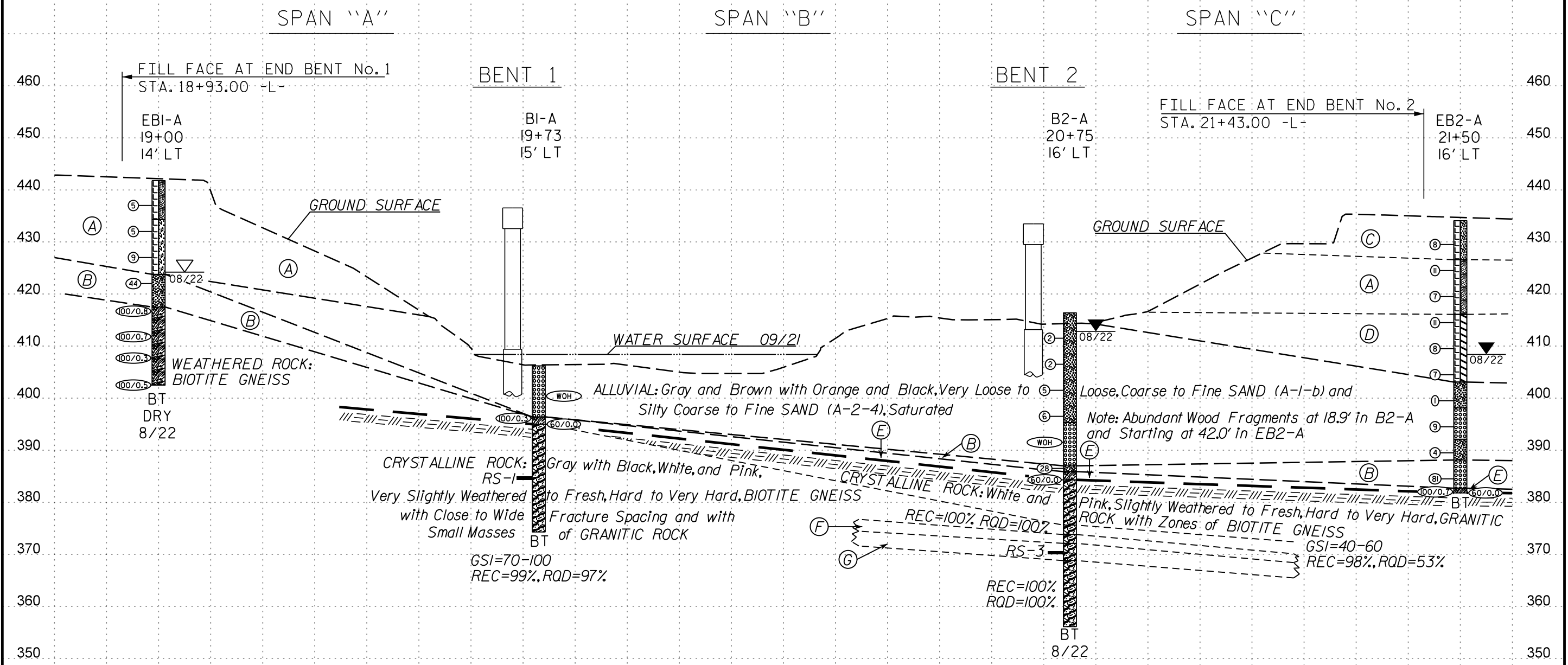
<p><b>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 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.</p> <p><b>STRUCTURE</b></p>	<p><b>SURFACE CONDITIONS</b></p>	<p><b>VERY GOOD</b> Very rough, fresh unweathered surfaces</p>	<p><b>GOOD</b> Rough, slightly weathered, iron stained surfaces</p>	<p><b>FAIR</b> Smooth, moderately weathered and altered surfaces</p>	<p><b>POOR</b> Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p>	<p><b>VERY POOR</b> Slickensided, highly weathered surfaces with soft clay coatings or fillings</p>				
<p><b>STRUCTURE</b></p>	<p><b>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</b></p>	<p><b>VERY GOOD</b> - Very Rough, fresh unweathered surfaces</p>	<p><b>GOOD</b> - Rough, slightly weathered surfaces</p>	<p><b>FAIR</b> - Smooth, moderately weathered and altered surfaces</p>	<p><b>POOR</b> - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p>	<p><b>VERY POOR</b> - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>				
<p><b>DECREASING INTERLOCKING OF ROCK PIECES</b></p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p>INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> </div> <div style="display: flex; align-items: center;"> <p>BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> </div> <div style="display: flex; align-items: center;"> <p>VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> </div> <div style="display: flex; align-items: center;"> <p>BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> </div> <div style="display: flex; align-items: center;"> <p>DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> </div> <div style="display: flex; align-items: center;"> <p>LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p> </div> </div>	<p>DECREASING SURFACE QUALITY →</p>	<p>70</p>	<p>60</p>	<p>50</p>	<p>40</p>	<p>30</p>	<p>20</p>	<p>10</p>	<p>N/A</p>	<p>N/A</p>
<p><b>COMPOSITION AND STRUCTURE</b></p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p><b>A. Thick bedded, very blocky sandstone</b> 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.</p> </div> <div style="display: flex; justify-content: space-between;"> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>B. Sandstone with thin inter-layers of siltstone</b></p> </div> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>C. Sandstone and siltstone in similar amounts</b></p> </div> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>D. Siltstone or silty shale with sandstone layers</b></p> </div> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>E. Weak siltstone or clayey shale with sandstone layers</b></p> </div> </div> <div style="display: flex; align-items: center; gap: 5px;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px;"> <p><b>C, D, E, and G</b> - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to <b>F</b> and <b>H</b>.</p> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <p><b>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</b></p> </div> </div> <div style="display: flex; align-items: center; gap: 5px;"> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</b></p> </div> <div style="display: flex; align-items: center; gap: 5px;"> <p><b>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.</b></p> </div> </div> </div>	<p>70</p>	<p>60</p>	<p>50</p>	<p>40</p>	<p>30</p>	<p>20</p>	<p>10</p>	<p>N/A</p>	<p>N/A</p>	
<p>→ Means deformation after tectonic disturbance</p>										

# SITE PLAN





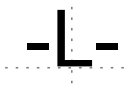
PROJECT REFERENCE NO.	SHEET NO.
BR-0069	4
BRIDGE PROFILE BORINGS PROJECTED ALONG -L-	

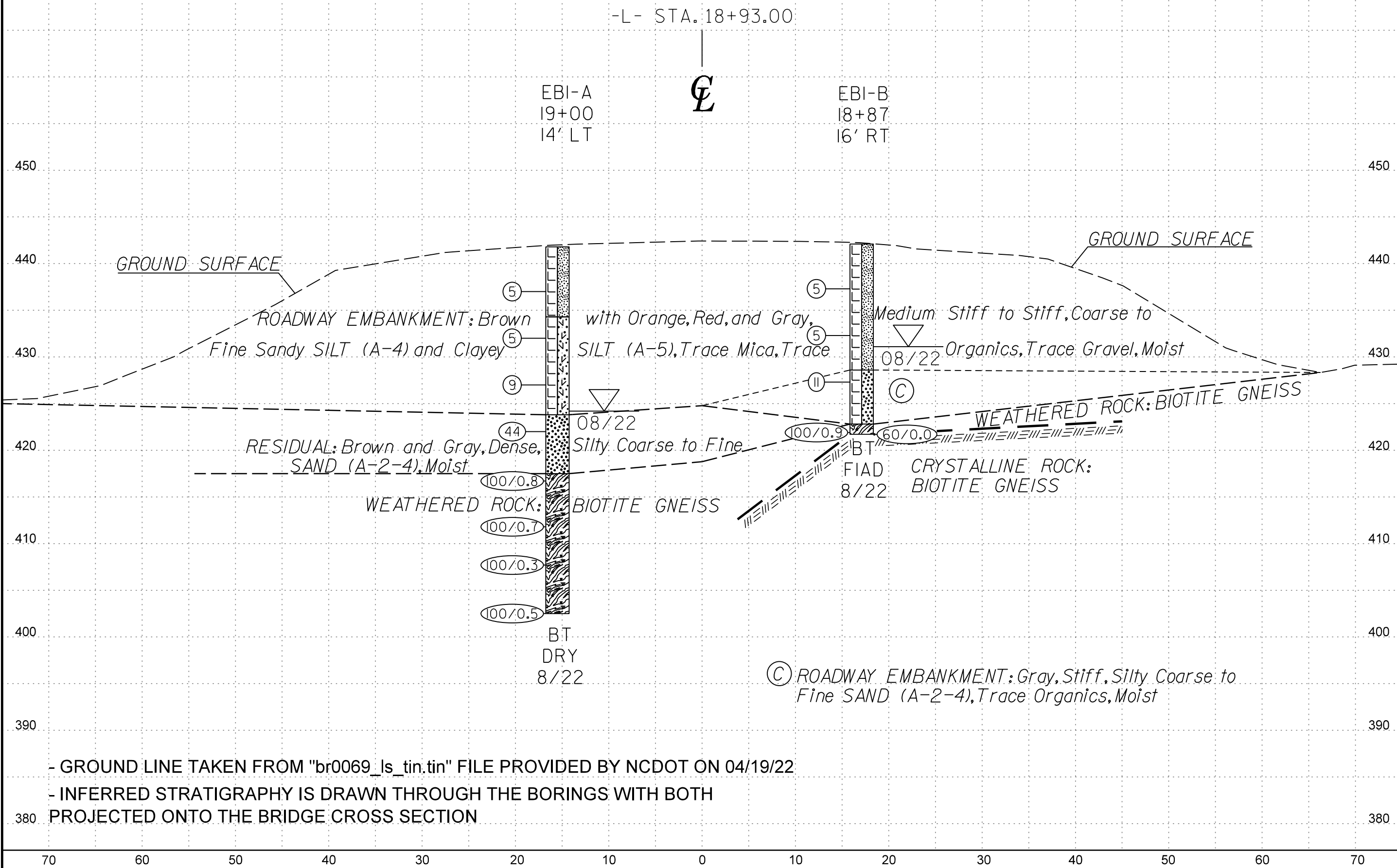


- (A) ROADWAY EMBANKMENT: Brown with Orange, Red, and Gray, Medium Stiff to Stiff, Coarse to Fine, Sandy SILT (A-4) and Clayey SILT (A-5), Trace Mica, Trace Organics, Trace Gravel, Moist
- (B) RESIDUAL: Brown and Gray with Pink, Medium Dense to Very Dense, Coarse to Fine SAND (A-1-b) and Silty Coarse to Fine SAND (A-2-4), Moist to Wet
- (C) ROADWAY EMBANKMENT: Brown, Loose, Silty Coarse to Fine SAND (A-2-4) with Gravel, Moist
- (D) ROADWAY EMBANKMENT: Brown and Gray to Dark Gray, Medium Stiff to Stiff, Silty CLAY (A-7-5), Moist, Abundant Wood Fragments at 18.6'

- (E) WEATHERED ROCK: BIOTITE GNEISS
- (F) CRYSTALLINE ROCK: Gray with Black and White, Moderately to Severely Weathered, Moderately Hard to Medium Hard, BIOTITE GNEISS with Very Close to Close Fracture Spacing  
GSI=40-60  
REC=35%, RQD=0%
- (G) CRYSTALLINE ROCK: Gray with Black and White, Moderately to Slightly Weathered, Moderately Hard to Hard, BIOTITE GNEISS with Very Close Fracture Spacing  
GSI=60-80  
REC=100%, RQD=70%

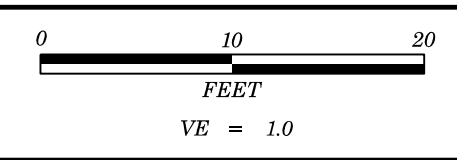
- PROFILE TAKEN FROM "BR0069\_PGD01.dgn" FILE PROVIDED BY NCDOT ON 08/30/22  
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH  
 PROJECTED ONTO THE BRIDGE PROFILE



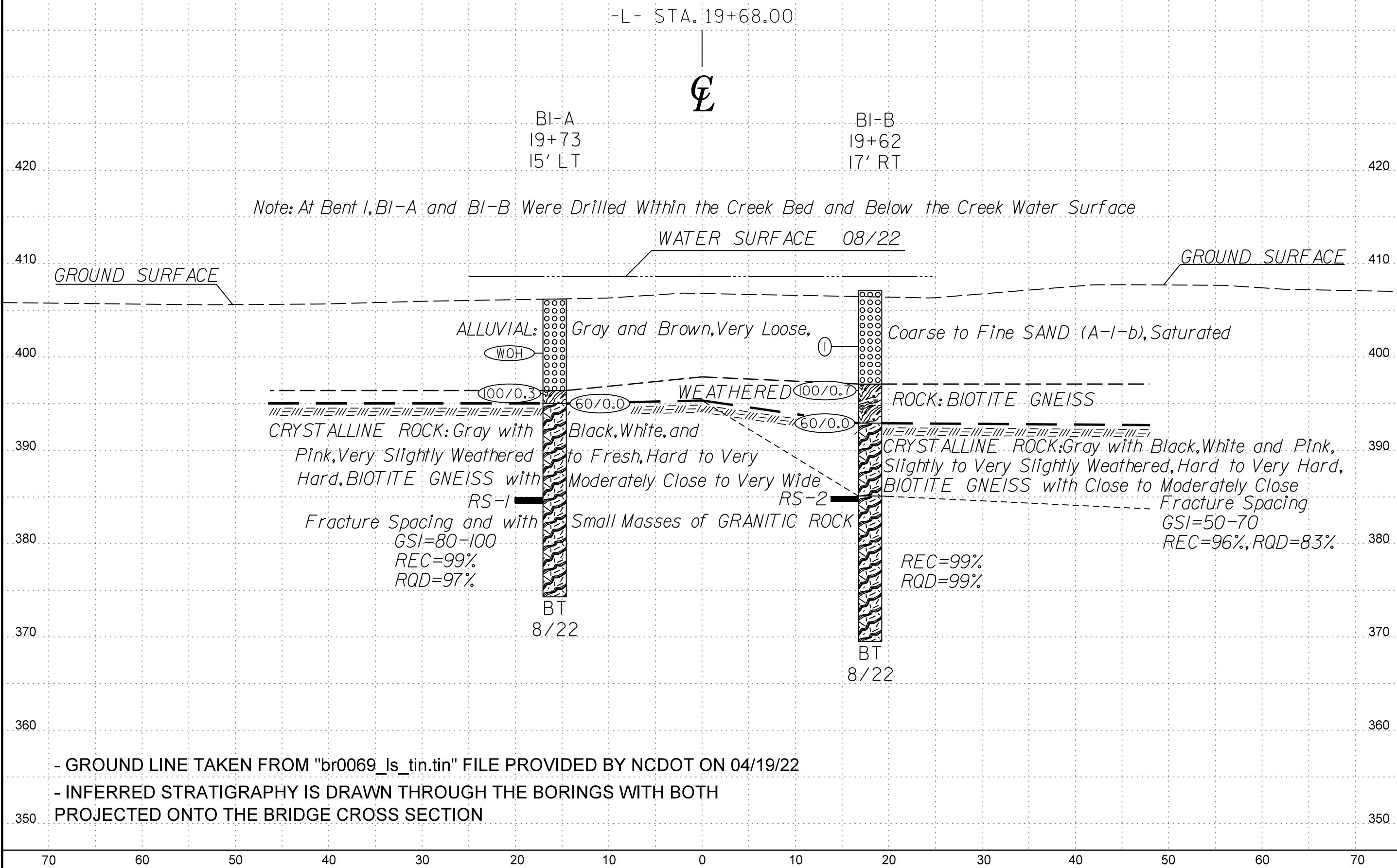


- GROUND LINE TAKEN FROM "br0069\_ls\_tin.tin" FILE PROVIDED BY NCDOT ON 04/19/22

- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION



<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
BR-0069	6
<b>CROSS SECTION AT BENT 1</b>	
-L- STATION 19+68.00	
SKEW = 110° 00' 00"	



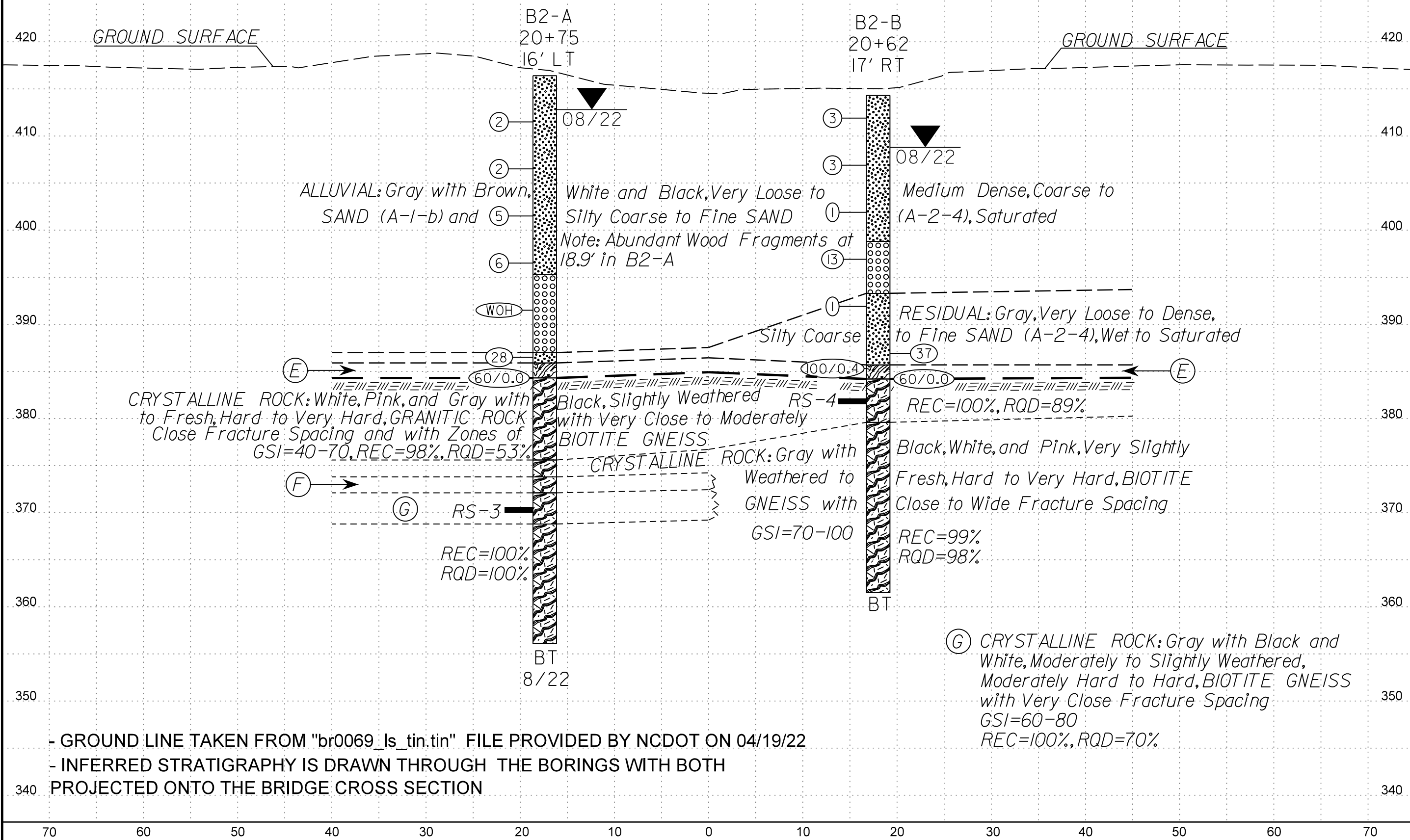
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

Ⓔ WEATHERED ROCK: BIOTITE GNEISS

Ⓕ CRYSTALLINE ROCK: Gray with Black and White, Moderately to Severely Weathered, Moderately Hard to Medium Hard, BIOTITE GNEISS with Very Close to Close Fracture Spacing GSI=40-60, REC=35%, RQD=0%

-L- STA. 20+68.00

	PROJECT REFERENCE NO.	SHEET NO.
	BR-0069	7
CROSS SECTION AT BENT 2 -L- STATION 20+68.00 SKEW = 110° 00' 00"		



ALLUVIAL: Gray with Brown, White and Black, Very Loose to Silty Coarse to Fine SAND (A-1-b) and (A-2-4), Saturated  
 Note: Abundant Wood Fragments at 18.9' in B2-A

RESIDUAL: Gray, Very Loose to Dense, to Fine SAND (A-2-4), Wet to Saturated

CRYSTALLINE ROCK: White, Pink, and Gray with to Fresh, Hard to Very Hard, GRANITIC ROCK with Very Close to Moderately Close Fracture Spacing and with Zones of BIOTITE GNEISS  
 GSI=40-70, REC=98%, RQD=53%

CRYSTALLINE ROCK: Gray with Black, Slightly Weathered BIOTITE GNEISS with Very Close to Moderately Close Fracture Spacing  
 GSI=70-100

CRYSTALLINE ROCK: Gray with Black, White, and Pink, Very Slightly Fresh, Hard to Very Hard, BIOTITE GNEISS with Close to Wide Fracture Spacing  
 REC=99%, RQD=98%

Ⓖ CRYSTALLINE ROCK: Gray with Black and White, Moderately to Slightly Weathered, Moderately Hard to Hard, BIOTITE GNEISS with Very Close Fracture Spacing  
 GSI=60-80  
 REC=100%, RQD=70%

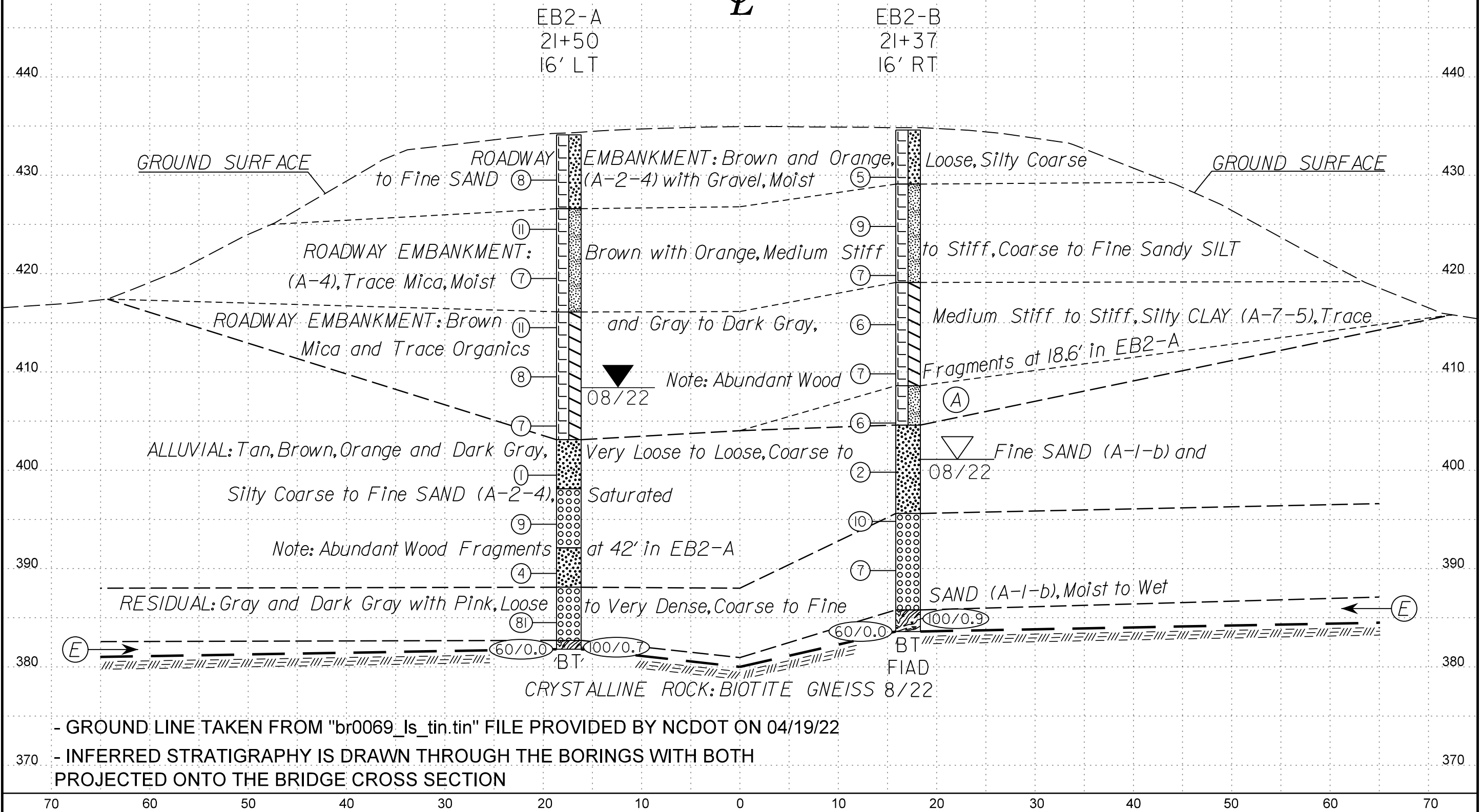
- GROUND LINE TAKEN FROM "br0069\_ls\_tin.tin" FILE PROVIDED BY NCDOT ON 04/19/22  
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION



-L- STA. 21+43.00



- (A) ROADWAY EMBANKMENT: Brown and Gray, Medium Stiff, Coarse to Fine Sandy SILT (A-4), Moist
- (E) WEATHERED ROCK: BIOTITE GNEISS



- GROUND LINE TAKEN FROM "br0069\_Is\_tin.tin" FILE PROVIDED BY NCDOT ON 04/19/22  
 - INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.										
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 19+00		OFFSET 14 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 441.8 ft		TOTAL DEPTH 39.3 ft		NORTHING 966,309		EASTING 1,912,283										
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Brown, M.		START DATE 08/03/22		COMP. DATE 08/03/22		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						
445														441.8	0.0	GROUND SURFACE
440	438.0	3.8	2	2	3							M		441.8	0.0	ROADWAY EMBANKMENT Brown with Orange and Gray, Coarse to Fine Sandy SILT, Trace Mica
435	433.0	8.8	2	2	3							M		434.3	7.5	Brown with Orange and Red to Dark Gray, Clayey SILT, Trace Mica, Trace Organics, Trace Gravel
430	428.0	13.8	2	4	5							M		423.8	18.0	RESIDUAL Brown and Gray, Silty Coarse to Fine SAND
425	423.0	18.8	12	21	23							M		417.5	24.3	WEATHERED ROCK BIOTITE GNEISS
420	418.0	23.8	21	65	35/0.3									402.5	39.3	Boring Terminated at Elevation 402.5 ft in Weathered Rock: BIOTITE GNEISS
415	413.0	28.8	30	52	48/0.2											
410	408.0	33.8	100/0.3													
405	403.0	38.8	100/0.5													

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.										
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 18+87		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 442.1 ft		TOTAL DEPTH 20.4 ft		NORTHING 966,295		EASTING 1,912,253										
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Brown, M.		START DATE 08/08/22		COMP. DATE 08/08/22		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						
445														442.1	0.0	GROUND SURFACE
440	438.3	3.8	2	2	3							M		442.1	0.0	ROADWAY EMBANKMENT Brown and Orange, Coarse to Fine Sandy SILT, Trace Mica
435	433.3	8.8	2	2	3							M		428.6	13.5	Gray, Silty Coarse to Fine SAND, Trace Organics
430	428.3	13.8	3	5	6							M		422.8	19.3	WEATHERED ROCK BIOTITE GNEISS
425	423.3	18.8	21	44	56/0.4									421.7	20.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 421.7 ft on Crystalline Rock: BIOTITE GNEISS
	421.7	20.4	60/0.0													

NCDOT BORE DOUBLE BR0069 GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# GEOTECHNICAL BORING REPORT BORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.									
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)								
BORING NO. B1-A		STATION 19+73		OFFSET 15 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 406.2 ft		TOTAL DEPTH 31.9 ft		NORTHING 966,262		EASTING 1,912,338									
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic											
DRILLER Brown, M.		START DATE 08/02/22		COMP. DATE 08/02/22		SURFACE WATER DEPTH 2.3ft									
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)
410															
405														406.2	GROUND SURFACE 0.0
400	401.4	4.8	WOH	WOH	0							Sat.			
395	396.4	9.8	100/0.3											396.4	9.8
395	395.0	11.2	60/0.0											395.0	11.2
390															
385															
380															
375														374.3	31.9
													Boring Terminated at Elevation 374.3 ft in Crystalline Rock: BIOTITE GNEISS		

NCDOT BORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

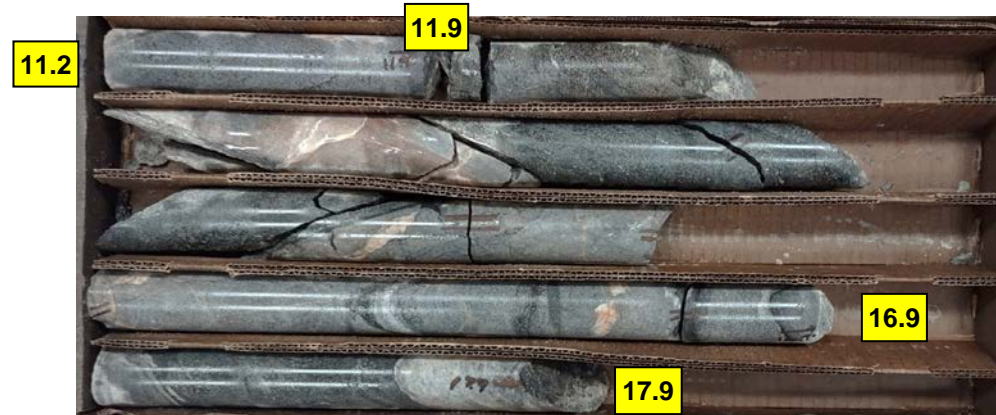
# GEOTECHNICAL BORING REPORT CORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.						
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)					
BORING NO. B1-A		STATION 19+73		OFFSET 15 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 406.2 ft		TOTAL DEPTH 31.9 ft		NORTHING 966,262		EASTING 1,912,338						
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Brown, M.		START DATE 08/02/22		COMP. DATE 08/02/22		SURFACE WATER DEPTH 2.3ft						
CORE SIZE NQ			TOTAL RUN 20.7 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (%)	RQD (%)	SAMP. NO.	STRATA REC. (%)	RQD (%)	LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
395	395.0	11.2	0.7	5:16/0.7	(0.7)	(0.7)		(20.5)	(20.1)		Begin Coring @ 11.2 ft	11.2
390	389.3	16.9	5.0	3:21/1.0 3:20/1.0 5:58/1.0 6:56/1.0 3:10/1.0	100% 100% 96% 88%	100% 100%		99% 97%			CRystalline Rock Gray with Black and White, Very Slightly Weathered to Fresh, Hard to Very Hard BIOTITE GNEISS with Moderately Close to Wide Fracture Spacing and with Small Masses of Granitic Rock Variably foliated with foliation angles of 50 degrees to 80 degrees 4 fractures in upper 3.5' at 50 degrees to 80 degrees parallel to foliation GSI=80 to 100	
385	384.3	21.9	5.0	2:33/1.0 2:21/1.0 2:18/1.0 2:20/1.0 2:20/1.0	(5.0) 100% 100%	(5.0) 100%	RS-1					
380	379.3	26.9	5.0	2:06/1.0 2:14/1.0 2:14/1.0 2:39/1.0 1:46/1.0	(5.0) 100% 100%	(5.0) 100%						
375	374.3	31.9	5.0	1:58/1.0 1:45/1.0 2:25/1.0 1:57/1.0 2:00/1.0	(5.0) 100% 100%	(5.0) 100%						
											Boring Terminated at Elevation 374.3 ft in Crystalline Rock: BIOTITE GNEISS	

NCDOT CORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# CORE PHOTOGRAPHS

**B1-A**  
BOXES 1 & 2: 11.2 - 26.9 FEET



**B1-A**  
BOX 3: 26.9 - 31.9 FEET



# GEOTECHNICAL BORING REPORT BORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.									
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)								
BORING NO. B1-B		STATION 19+62		OFFSET 17 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 407.1 ft		TOTAL DEPTH 37.6 ft		NORTHING 966,245		EASTING 1,912,309									
0 HR. N/A		24 HR. N/A													
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic									
DRILLER Brown, M.		START DATE 08/04/22		COMP. DATE 08/05/22		SURFACE WATER DEPTH 1.6ft									
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
410															
													407.1	GROUND SURFACE	0.0
405														<b>ALLUVIAL</b> Gray with Brown, Coarse to Fine SAND	
400	402.1	5.0	WOH	WOH	1							Sat.			
395	397.1	10.0											397.1	<b>WEATHERED ROCK</b> BIOTITE GNEISS	10.0
390	392.9	14.2	69	31/0.2									392.9	<b>CRYSTALLINE ROCK</b> Gray with Black, White, and Pink, Slightly to Very Slightly Weathered, Hard to Very Hard BIOTITE GNEISS with Close to Moderately Close Fracture Spacing	14.2
385			60/0.0										385.1		22.0
380												RS-2		Gray with Black, White, and Pink, Very Slightly Weathered to Fresh, Hard to Very Hard BIOTITE GNEISS with Very Wide Fracture Spacing and with Small Masses of Granitic Rock	
375															
370															
													369.5	Boring Terminated at Elevation 369.5 ft in Crystalline Rock: BIOTITE GNEISS	37.6

NCDOT BORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# GEOTECHNICAL BORING REPORT CORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.						
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)					
BORING NO. B1-B		STATION 19+62		OFFSET 17 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 407.1 ft		TOTAL DEPTH 37.6 ft		NORTHING 966,245		EASTING 1,912,309						
0 HR. N/A		24 HR. N/A										
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Brown, M.		START DATE 08/04/22		COMP. DATE 08/05/22		SURFACE WATER DEPTH 1.6ft						
CORE SIZE NQ				TOTAL RUN 23.4 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %				
392.9	392.9	14.2	3.4	2:38/1.0 2:31/1.0 2:43/1.0	(3.2) 94%	(2.9) 85%	(7.5) 96%	(6.5) 83%				
390	389.5	17.6	5.0	5:57/0.4 1:28/1.0 1:46/1.0 1:56/1.0 2:17/1.0	(4.9) 98%	(4.2) 84%				392.9	Begin Coring @ 14.2 ft <b>CRYSTALLINE ROCK</b> Gray with Black, White, and Pink, Slightly to Very Slightly Weathered, Hard to Very Hard BIOTITE GNEISS with Close to Moderately Close Fracture Spacing Variably foliated with foliation angles of 70 degrees to 80 degrees 5 fractures at 70 degrees to 80 degrees parallel to foliation 3 fractures at 10 degrees to 20 degrees Vuggy texture 17.6' to 18.3' GSI=50-70	14.2
385	384.5	22.6	5.0	2:22/1.0 2:18/1.0 2:30/1.0 2:19/1.0 2:42/1.0	(5.0) 100%	(5.0) 100%	RS-2	(15.4) 99%	(15.4) 99%	385.1	Gray with Black, White, and Pink, Very Slightly Weathered to Fresh, Hard to Very Hard BIOTITE GNEISS with Very Wide Fracture Spacing and with Small Masses of Granitic Rock Variably foliated with foliation angles of 50 degrees to 70 degrees No natural fractures GSI=80-100	22.0
380	379.5	27.6	5.0	2:17/1.0 2:29/1.0 3:23/1.0 2:49/1.0 3:01/1.0	(4.9) 98%	(4.9) 98%						
375	374.5	32.6	5.0	2:42/1.0 3:17/1.0 1:53/1.0 3:01/1.0 2:42/1.0	(4.9) 98%	(4.9) 98%						
370	369.5	37.6								369.5	Boring Terminated at Elevation 369.5 ft in Crystalline Rock: BIOTITE GNEISS	37.6

NCDOT CORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# CORE PHOTOGRAPHS

**B1-B**  
BOXES 1 & 2: 14.2 - 31.0 FEET



**B1-B**  
BOX 3: 31.0 - 37.6 FEET



# GEOTECHNICAL BORING REPORT BORE LOG

SHEET 14

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.	
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)
BORING NO. B2-A		STATION 20+75		OFFSET 16 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 416.4 ft		TOTAL DEPTH 60.3 ft		NORTHING 966,196		EASTING 1,912,416	
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic			
DRILLER Brown, M.		START DATE 08/01/22		COMP. DATE 08/01/22		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)			
420															416.4	GROUND SURFACE	0.0	
415																<b>ALLUVIAL</b> Gray with Brown and Black, Silty Coarse to Fine SAND, Abundant Wood Fragments in Sample at 18.9 feet		
410	412.5	3.9	WOH	WOH	2									Sat.				
405	407.5	8.9	1	WOH	2									Sat.				
400	402.5	13.9	2	2	3									Sat.				
395	397.5	18.9	1	2	4									Sat.				
390	392.5	23.9	WOH	WOH	0									Sat.				
385	387.5	28.9	2	6	22									W				
380	384.3	32.1	60/0.0															
																<b>RESIDUAL</b> Gray, Silty Coarse to Fine SAND	32.1	
																<b>WEATHERED ROCK</b> BIOTITE GNEISS		
																<b>CRYSTALLINE ROCK</b> White and Pink, Very Slightly Weathered to Fresh, Hard to Very Hard GRANITIC ROCK with Zones of Black and Gray, Moderately to Slightly Weathered, Moderately Hard to Hard BIOTITE GNEISS; Close to Moderately Close Fracture Spacing with Small Sections of Very Close Fracture Spacing	40.8	
																		42.6
																		44.3
																		47.6
																		60.3

NCDOT BORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# GEOTECHNICAL BORING REPORT CORE LOG

SHEET 14

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.	
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)
BORING NO. B2-A		STATION 20+75		OFFSET 16 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 416.4 ft		TOTAL DEPTH 60.3 ft		NORTHING 966,196		EASTING 1,912,416	
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 81% 07/26/2022		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic			
DRILLER Brown, M.		START DATE 08/01/22		COMP. DATE 08/01/22		SURFACE WATER DEPTH N/A	

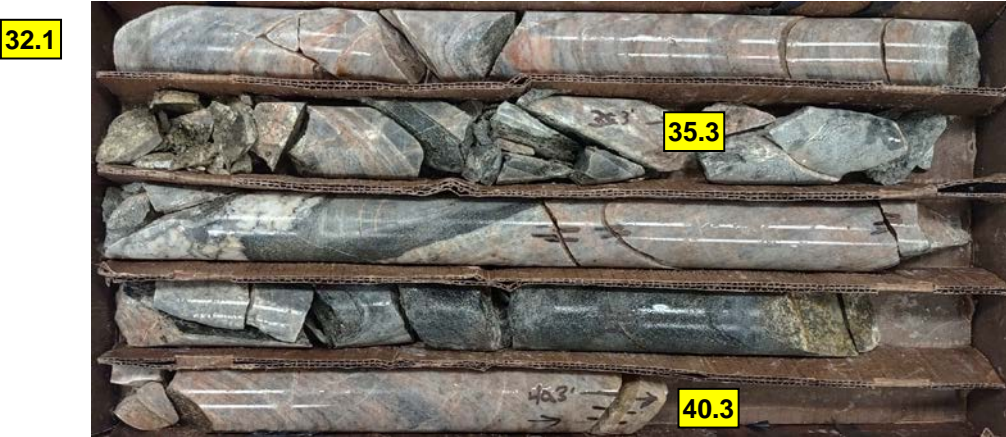
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
384.3	384.3	32.1	3.2	2:20/1.0 2:39/1.0 3:19/1.0	(3.0) 94%	(0.6) 19%		(8.5) 98%	(4.6) 53%		Begin Coring @ 32.1 ft	32.1
380	381.1	35.3	5.0	1:13/0.2 2:24/1.0 3:59/1.0 4:51/1.0 5:16/1.0 6:08/1.0	(5.0) 100%	(3.5) 70%					White and Pink, Very Slightly Weathered to Fresh, Hard to Very Hard GRANITIC ROCK with Zones of Black and Gray, Moderately to Slightly Weathered, Moderately Hard to Hard BIOTITE GNEISS; Close to Moderately Close Fracture Spacing with Small Sections of Very Close Fracture Spacing Fracture angles at 0 degrees to 70 degrees GSI=40-60	
375	376.1	40.3	5.0	5:57/1.0 4:10/1.0 2:28/1.0 2:02/1.0 2:35/1.0	(3.9) 78%	(3.0) 60%		(1.8) 100%	(1.8) 100%		Gray with White and Black, Very Slightly Weathered to Fresh, Hard to Very Hard BIOTITE GNEISS with Close to Moderately Close Fracture Spacing 2 fractures at 10 degrees GSI=70-90	40.8
370	371.1	45.3	5.0	1:28/1.0 2:24/1.0 2:15/1.0 3:43/1.0 5:58/1.0	(5.0) 100%	(4.3) 86%	RS-3	(3.3) 100%	(2.3) 70%		Gray with Black and White, Moderately to Severely Weathered, Moderately Hard to Medium Hard BIOTITE GNEISS with Very Close to Close Fracture Spacing Fractures at 70 degrees GSI=40-60	42.6
365	366.1	50.3	5.0	4:41/1.0 5:12/1.0 5:43/1.0 5:04/1.0 6:05/1.0	(5.0) 100%	(5.0) 100%		(12.7) 100%	(12.7) 100%		Gray with Black and White, Moderately to Slightly Weathered, Moderately Hard to Hard BIOTITE GNEISS with Very Close to Close Fracture Spacing 1 fracture at 20 degrees and 2 fractures at 70 degrees GSI=60-80	44.3
360	361.1	55.3	5.0	8:18/1.0 6:05/1.0 8:18/1.0 7:51/1.0 7:06/1.0	(5.0) 100%	(5.0) 100%					Gray with Black, White, and Pink, Very Slightly Weathered to Fresh, Hard to Very Hard BIOTITE GNEISS with Moderately Close to Wide Fracture Spacing 3 fractures at 10 degrees GSI=80-100	47.6
	356.1	60.3									Boring Terminated at Elevation 356.1 ft in Crystalline Rock: BIOTITE GNEISS	60.3

NCDOT BORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

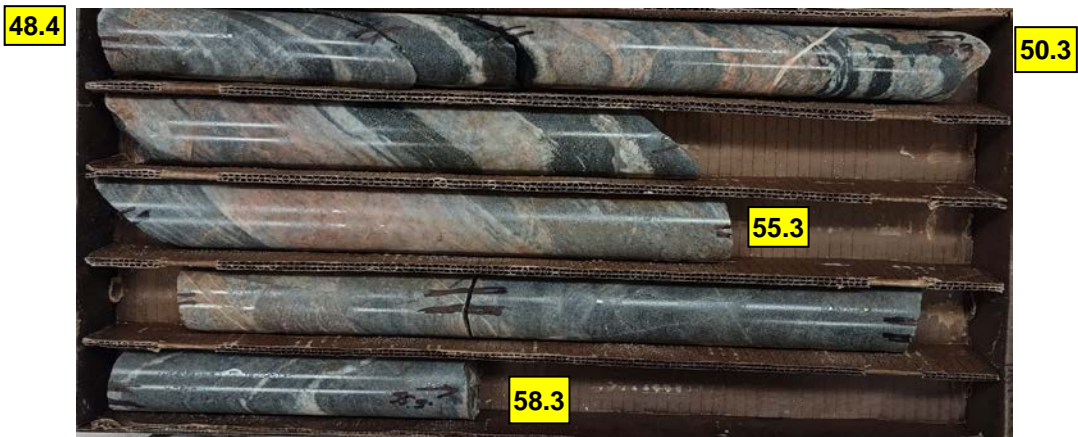
NCDOT BORE SINGLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22

# CORE PHOTOGRAPHS

**B2-A**  
BOXES 1 & 2: 32.1 - 48.4 FEET



**B2-A**  
BOXES 3 & 4: 48.4 - 60.3 FEET





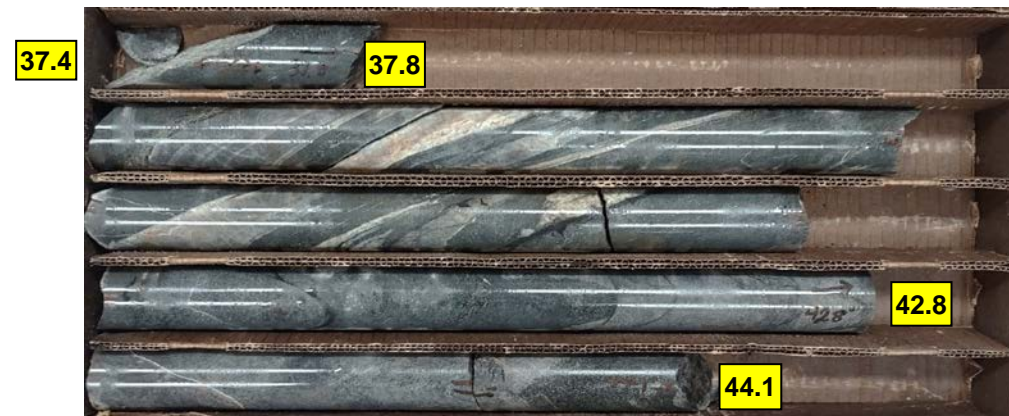


# CORE PHOTOGRAPHS

**B2-B**  
BOXES 1 & 2: 30.1 - 44.1 FEET



**B2-B**  
BOX 3: 44.1 - 52.8 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.										
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 21+50		OFFSET 16 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 434.1 ft		TOTAL DEPTH 52.3 ft		NORTHING 966,147		EASTING 1,912,473										
DRILL RIG/HAMMER EFF./DATE SEL1975 DIETRICH D-50 81% 07/26/2022			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Brown, M.		START DATE 08/02/22		COMP. DATE 08/03/22		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						
435														434.1	GROUND SURFACE	0.0
430	430.5	3.6	8	4	4								M	ROADWAY EMBANKMENT Brown, Silty Coarse to Fine SAND with Gravel		
425	425.5	8.6	3	4	7								M	426.6	Brown with Orange, Coarse to Fine Sandy SILT, Trace Mica	7.5
420	420.5	13.6	4	3	4								M			
415	415.5	18.6	5	5	6								M	416.1	Brown and Gray to Dark Gray, Silty CLAY, Abundant Wood Fragments in Sample at 18.6 Feet	18.0
410	410.5	23.6	3	3	5								M			
405	405.5	28.6	4	3	4								M			
400	400.5	33.6	3	1	0								Sat.	403.1	ALLUVIAL Brown with Orange, Silty Coarse to Fine SAND	31.0
395	395.5	38.6	2	4	5								Sat.	398.1	Brown, Coarse to Fine SAND	36.0
390	390.5	43.6	1	1	3								Sat.	392.1	Dark Gray with Brown, Silty Coarse to Fine SAND, Abundant Wood Fragments	42.0
385	385.5	48.6	16	23	58								M	388.1	RESIDUAL Gray and Dark Gray with Pink, Coarse to Fine SAND	46.0
	382.7	51.4	6	94/0.2										382.7		51.4
	381.8	52.3	60/0.0											381.8	WEATHERED ROCK BIOTITE GNEISS	52.3
															Boring Terminated with Standard Penetration Test Refusal at Elevation 381.8 ft on Crystalline Rock: BIOTITE GNEISS	

WBS 67069.1.1		TIP BR-0069		COUNTY CASWELL		GEOLOGIST Gonzalez, P.B.										
SITE DESCRIPTION Replace Bridge 160001 on US 158 Over Country Line Creek							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 21+37		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 434.6 ft		TOTAL DEPTH 51.0 ft		NORTHING 966,131		EASTING 1,912,442										
DRILL RIG/HAMMER EFF./DATE SEL1975 DIETRICH D-50 81% 07/26/2022			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Brown, M.		START DATE 08/08/22		COMP. DATE 08/08/22		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						
435														434.6	GROUND SURFACE	0.0
430	430.8	3.8	4	2	3								M	ROADWAY EMBANKMENT Brown and Orange, Silty Coarse to Fine SAND with Gravel		
425	425.8	8.8	4	4	5								M	429.1	Brown, Coarse to Fine Sandy SILT, Trace Mica	5.5
420	420.8	13.8	4	3	4								M			
415	415.8	18.8	1	2	4								M	419.1	Brown and Gray, Silty CLAY, Trace Mica and Trace Organics	15.5
410	410.8	23.8	3	4	3								M			
405	405.8	28.8	2	3	3								M	408.6	Brown and Gray, Coarse to Fine Sandy SILT	26.0
400	400.8	33.8	1	1	1								Sat.	404.6	ALLUVIAL Tan and Brown, Silty Coarse to Fine SAND	30.0
395	395.8	38.8	3	4	6								W	395.6	RESIDUAL Gray, Coarse to Fine SAND	39.0
390	390.8	43.8	WOH	3	4								W			
385	385.8	48.8	17	83/0.4										385.8	WEATHERED ROCK BIOTITE GNEISS	48.8
	383.6	51.0	60/0.0											383.6	Boring Terminated with Standard Penetration Test Refusal at Elevation 383.6 ft on Crystalline Rock: BIOTITE GNEISS	

NCDOT BORE DOUBLE BR0069\_GEO\_BRDG\_GINT.GPJ NC\_DOT.GDT 9/1/22



### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates Boring No.: B1-A  
 Client Project: IS14.321 Depth (ft): 21.2-21.9  
 Project No.: R-2022-191-001 Sample ID: RS-1  
 Lab ID No.: R-2022-191-001-001 Moisture Condition: As received

**Specimen Weight (g): 604.11**

SPECIMEN LENGTH (in)

Reading 1: 4.40  
 Reading 2: 4.40  
 Reading 3: 4.40  
**Average: 4.40**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
 Average: **1.99**  
 Area (in<sup>2</sup>): 3.11  
 L/D: 2.21

MOISTURE CONTENT

Tare Number: 441 Total Load (lb): 80,140  
 Wt. of Tare & Wet Sample (g): 184.37 **Uniaxial Compressive Strength (psi): 25,770**  
 Wt. of Tare & Dry Sample (g): 184.32  
 Weight of Tare (g): 98.17 Fracture Type: **Shear**  
 Weight of Wet Sample (g): 86.20  
 Sample Volume (cm<sup>3</sup>): 224.28 Rate of Loading (lb/sec): 219  
 Moisture Content (%): 0.06 Time to Break (min:sec): 6:05.90  
 Unit Wet Weight (g/cm<sup>3</sup>): 2.694 Deviation From Straightness<sup>2</sup>: Pass  
 Unit Wet Weight (pcf): 168.1  
**Unit Dry Weight (g/cm<sup>3</sup>): 2.692** AXIAL: Pass TOP: Pass BOTTOM: Pass  
**Unit Dry Weight (pcf): 168.0**

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:  
R176 Compression Machine,  
R525 Digital Calipers,  
R148 Feeler Gauge, R419 Scale  
R512 Rock Saw  
R148 Straight Edge  
R582 V-Block, R585 Dial Gauge

Tested By: NS Date: 8/29/22 Checked By: GEM Date: 8/30/22



### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates Boring No.: B1-B  
 Client Project: IS14.321 Depth (ft): 22.0-22.6  
 Project No.: R-2022-191-001 Sample ID: RS-2  
 Lab ID No.: R-2022-191-001-002 Moisture Condition: As received

**Specimen Weight (g): 582.30**

SPECIMEN LENGTH (in)

Reading 1: 4.38  
 Reading 2: 4.38  
 Reading 3: 4.38  
**Average: 4.38**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
 Average: **1.99**  
 Area (in<sup>2</sup>): 3.12  
 L/D: 2.20

MOISTURE CONTENT

Tare Number: 427 Total Load (lb): 38,250  
 Wt. of Tare & Wet Sample (g): 325.80 **Uniaxial Compressive Strength (psi): 12,270**  
 Wt. of Tare & Dry Sample (g): 325.36  
 Weight of Tare (g): 99.27 Fracture Type: **Shear**  
 Weight of Wet Sample (g): 226.53  
 Sample Volume (cm<sup>3</sup>): 223.60 Rate of Loading (lb/sec): 240  
 Moisture Content (%): 0.19 Time to Break (min:sec): 2:39.64  
 Unit Wet Weight (g/cm<sup>3</sup>): 2.604 Deviation From Straightness<sup>2</sup>: Pass  
 Unit Wet Weight (pcf): 162.5  
**Unit Dry Weight (g/cm<sup>3</sup>): 2.599** AXIAL: Pass TOP: Pass BOTTOM: Pass  
**Unit Dry Weight (pcf): 162.2**

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:  
R176 Compression Machine,  
R525 Digital Calipers,  
R148 Feeler Gauge, R419 Scale  
R512 Rock Saw  
R148 Straight Edge  
R582 V-Block, R585 Dial Gauge

Tested By: NS Date: 8/29/22 Checked By: GEM Date: 8/30/22



### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates Boring No.: B2-A  
 Client Project: IS14.321 Depth (ft): 45.8-46.4  
 Project No.: R-2022-191-001 Sample ID: RS-3  
 Lab ID No.: R-2022-191-001-003 Moisture Condition: As received

**Specimen Weight (g): 637.30**

SPECIMEN LENGTH (in)

Reading 1: 4.35  
 Reading 2: 4.35  
 Reading 3: 4.35  
**Average: 4.35**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
 Average: **1.99**  
 Area (in<sup>2</sup>): 3.11  
 L/D: 2.18

MOISTURE CONTENT

Tare Number:	488	Total Load (lb):	2,310
Wt. of Tare & Wet Sample (g):	531.79	<b>Uniaxial Compressive Strength (psi):</b>	<b>740</b>
Wt. of Tare & Dry Sample (g):	531.38	Fracture Type:	<b>Shear</b>
Weight of Tare (g):	99.12	Rate of Loading (lb/sec):	100
Weight of Wet Sample (g):	432.67	Time to Break (min:sec):	0:23
Sample Volume (cm <sup>3</sup> ):	221.81	Deviation From Straightness <sup>2</sup> :	Pass
Moisture Content (%):	0.09		
Unit Wet Weight (g/cm <sup>3</sup> ):	2.873		
Unit Wet Weight (pcf):	179.3		
<b>Unit Dry Weight (g/cm<sup>3</sup>):</b>	2.870	AXIAL: Pass	TOP: Pass BOTTOM: Pass
<b>Unit Dry Weight (pcf):</b>	179.1		

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:  
R176 Compression Machine,  
R525 Digital Calipers,  
R148 Feeler Gauge, R419 Scale  
R512 Rock Saw  
R148 Straight Edge  
R582 V-Block, R585 Dial Gauge

Tested By: NS Date: 8/29/22 Checked By: GEM Date: 8/30/22



### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: ESP Associates Boring No.: B2-B  
 Client Project: IS14.321 Depth (ft): 32.2-32.8  
 Project No.: R-2022-191-001 Sample ID: RS-4  
 Lab ID No.: R-2022-191-001-004 Moisture Condition: As received

**Specimen Weight (g): 580.85**

SPECIMEN LENGTH (in)

Reading 1: 4.40  
 Reading 2: 4.40  
 Reading 3: 4.40  
**Average: 4.40**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
 Average: **1.99**  
 Area (in<sup>2</sup>): 3.11  
 L/D: 2.21

MOISTURE CONTENT

Tare Number:	475	Total Load (lb):	6,630
Wt. of Tare & Wet Sample (g):	328.09	<b>Uniaxial Compressive Strength (psi):</b>	<b>2,130</b>
Wt. of Tare & Dry Sample (g):	324.16	Fracture Type:	<b>Shear</b>
Weight of Tare (g):	98.30	Rate of Loading (lb/sec):	80
Weight of Wet Sample (g):	229.79	Time to Break (min:sec):	1:23.20
Sample Volume (cm <sup>3</sup> ):	224.43	Deviation From Straightness <sup>2</sup> :	Pass
Moisture Content (%):	1.74		
Unit Wet Weight (g/cm <sup>3</sup> ):	2.588		
Unit Wet Weight (pcf):	161.5		
<b>Unit Dry Weight (g/cm<sup>3</sup>):</b>	2.544	AXIAL: Pass	TOP: Pass BOTTOM: Pass
<b>Unit Dry Weight (pcf):</b>	158.7		

Physical Description: Gray Rock Core

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:  
R176 Compression Machine,  
R525 Digital Calipers,  
R148 Feeler Gauge, R419 Scale  
R512 Rock Saw  
R148 Straight Edge  
R582 V-Block, R585 Dial Gauge

Tested By: NS Date: 8/29/22 Checked By: GEM Date: 8/31/22

**SITE PHOTOGRAPHS**  
Bridge No.160001 on US 158 over Country Line Creek

View Along Bridge 0001 Looking Upstation



View Looking Upstream from Bridge 0001



View of Along Bridge 0001 Looking Downstation



View Looking Downstream from Bridge 0001

