

REFERENCE: BR-0063

PROJECT: 67063

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0063	1	14

STRUCTURE
SUBSURFACE INVESTIGATION

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SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
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COUNTY ANSON

PROJECT DESCRIPTION REPLACEMENT OF BRIDGE
030087 OVER RICHARDSON CREEK ON NC 742

SITE DESCRIPTION BRIDGE NO. 87 -L- (NC 742) OVER
RICHARDSON CREEK AT -L- STA. 20+15

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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
CAMERON STRATTON
THOMAS PARK

INVESTIGATED BY CATLIN
DRAWN BY S. V. HUDSON, LG
CHECKED BY J. LEE STONE, LG
SUBMITTED BY S. V. HUDSON, LG
DATE JUNE 2023



DocuSigned by:
Steve V Hudson 07/12/2023
01DB238B746469... 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										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																										
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																										
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DRILL UNITS: <input checked="" type="checkbox"/> CME-45B <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> MOBILE B-57										ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input checked="" type="checkbox"/> TRICONE 2 7/8" TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT										HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input checked="" type="checkbox"/> -N Q HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										BENCH MARK: LOCATIONS OBTAINED WITH A FEEL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEM (GPS) UTILIZING THE NORTH CAROLINA STATE PLANE NORTH AMERICAN DATUM 1983 ELEVATION: NAVD88 FEET NOTES: FIAD = FILLED IMMEDIATELY AFTER DRILLING NAVD88 = NORTH AMERICAN VERTICAL DATUM 1988																																																																																																																																

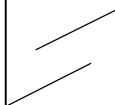
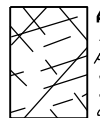
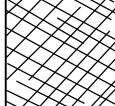
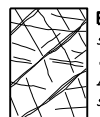
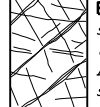

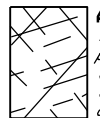
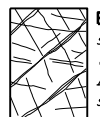


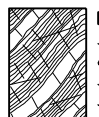



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

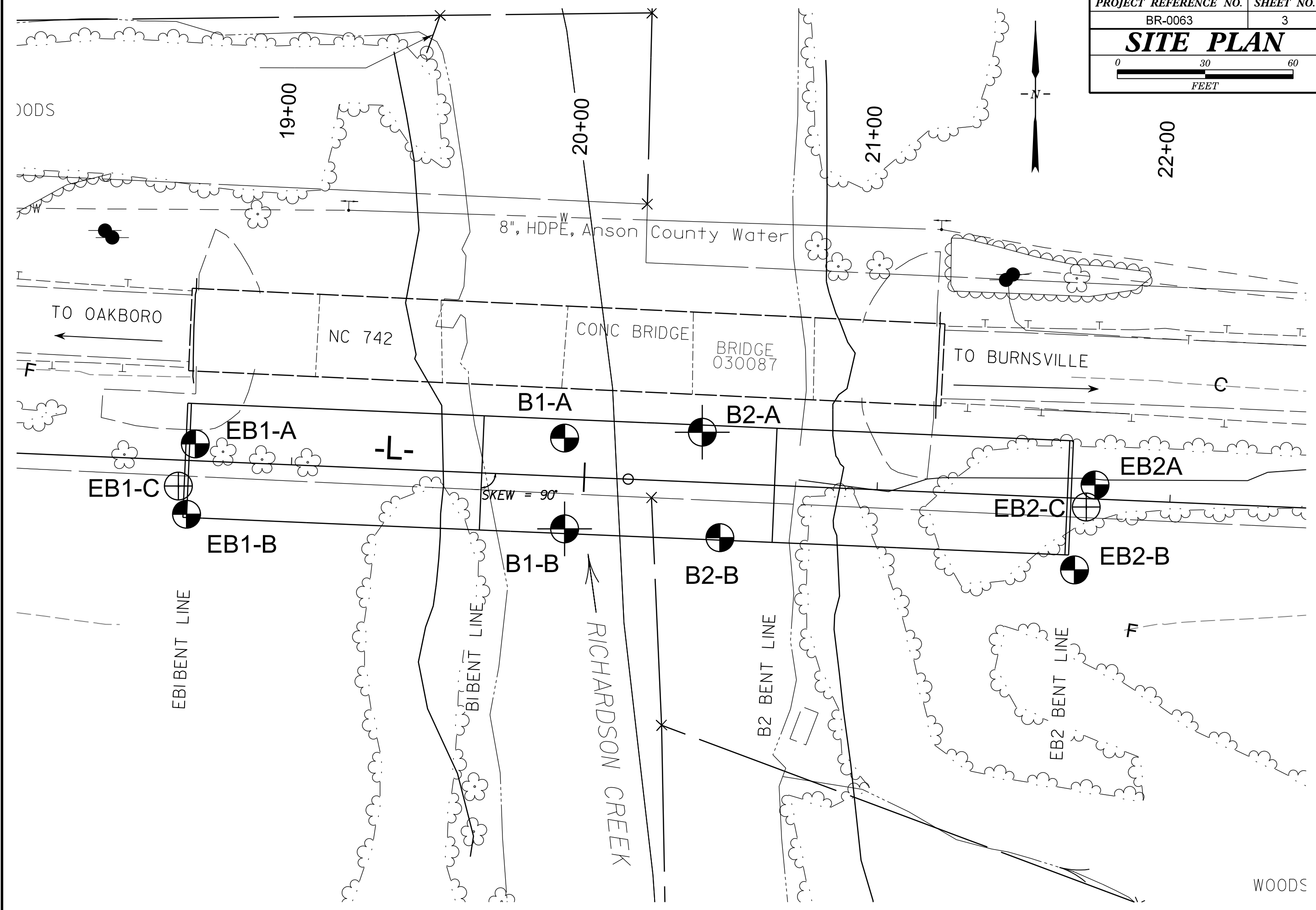
SUBSURFACE INVESTIGATION

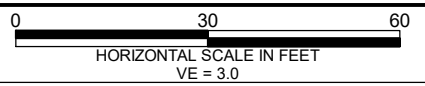
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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)

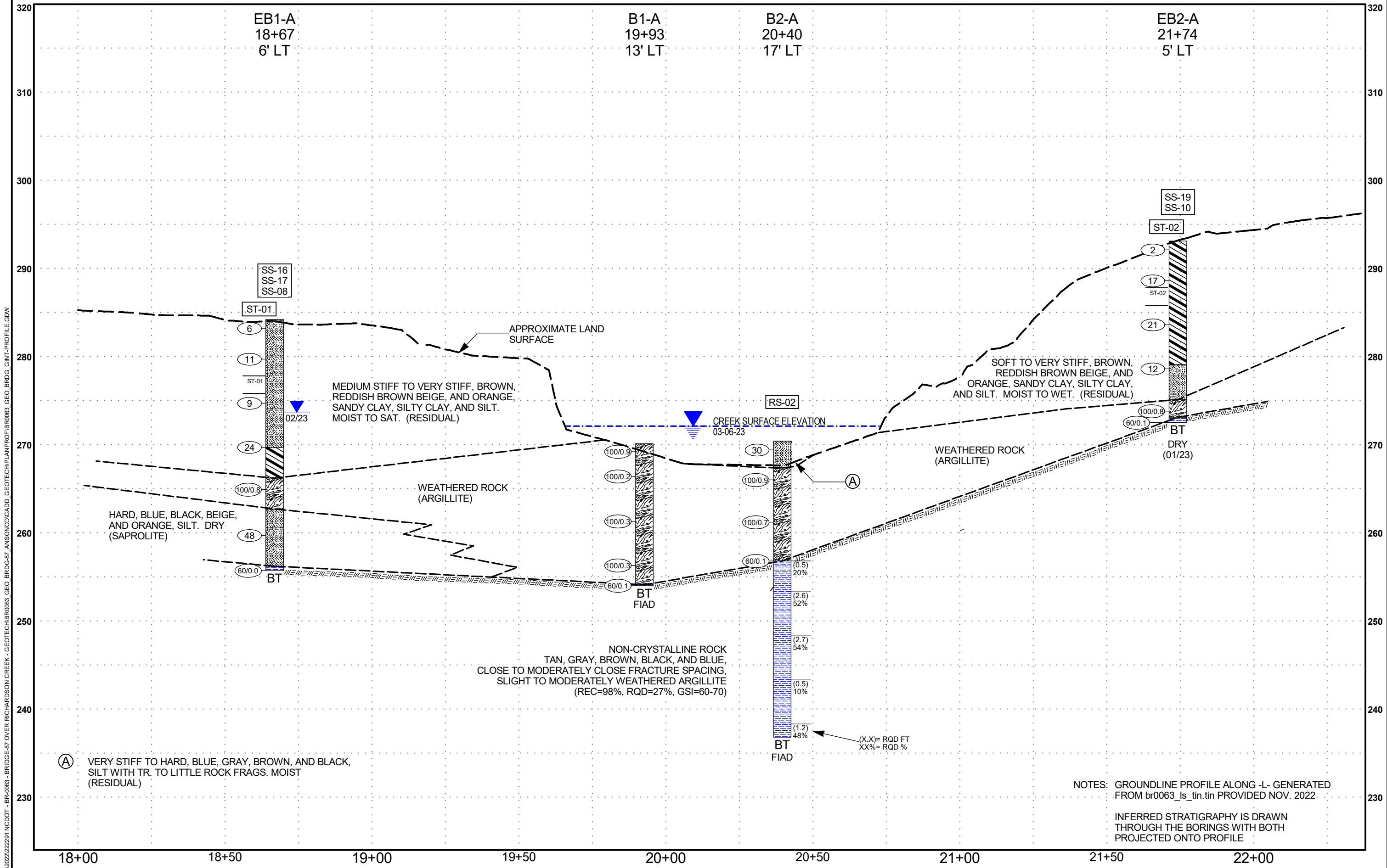
<p>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. 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>STRUCTURE</p>	<p>SURFACE CONDITIONS</p> <p>VERY GOOD Very rough, fresh unweathered surfaces</p> <p>GOOD Rough, slightly weathered, iron stained surfaces</p> <p>FAIR Smooth, moderately weathered and altered surfaces</p> <p>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</p> <p>DECREASING SURFACE QUALITY →</p>					<p>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</p> <p>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.</p> <p>COMPOSITION AND STRUCTURE</p>	<p>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</p> <p>VERY GOOD - Very Rough, fresh unweathered surfaces</p> <p>GOOD - Rough, slightly weathered surfaces</p> <p>FAIR - Smooth, moderately weathered and altered surfaces</p> <p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p> <p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>				
<p>INTERLOCKING OF ROCK PIECES</p> <p>DECREASING INTERLOCKING OF ROCK PIECES ↓</p> <p> INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p> BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p> VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p> BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p> DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p> LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	<p>90</p> <p>80</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> 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.</p> <p> B. Sandstone with thin inter-layers of siltstone</p> <p> C. Sandstone and siltstone in similar amounts</p> <p> D. Siltstone or silty shale with sandstone layers</p> <p> E. Weak siltstone or clayey shale with sandstone layers</p> <p>C, D, E, and G - 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 F and H.</p> <p> F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</p> <p> G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</p> <p> 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.</p> <p>→ Means deformation after tectonic disturbance</p>	<p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>				



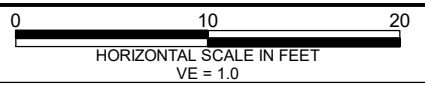


PROFILE THROUGH BORINGS PROJECTED ALONG -L-

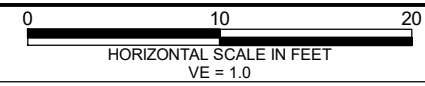
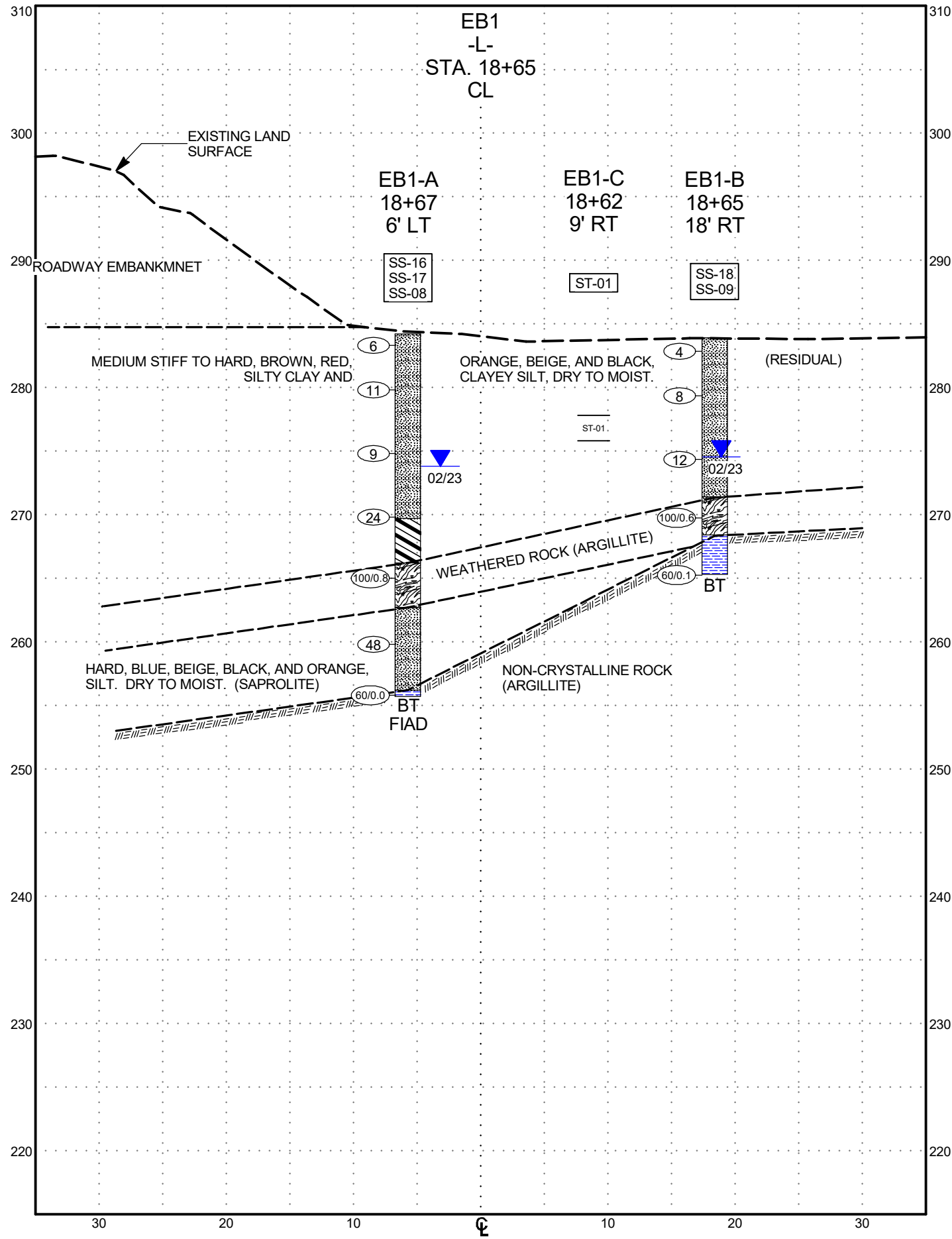
SKEW = 90°



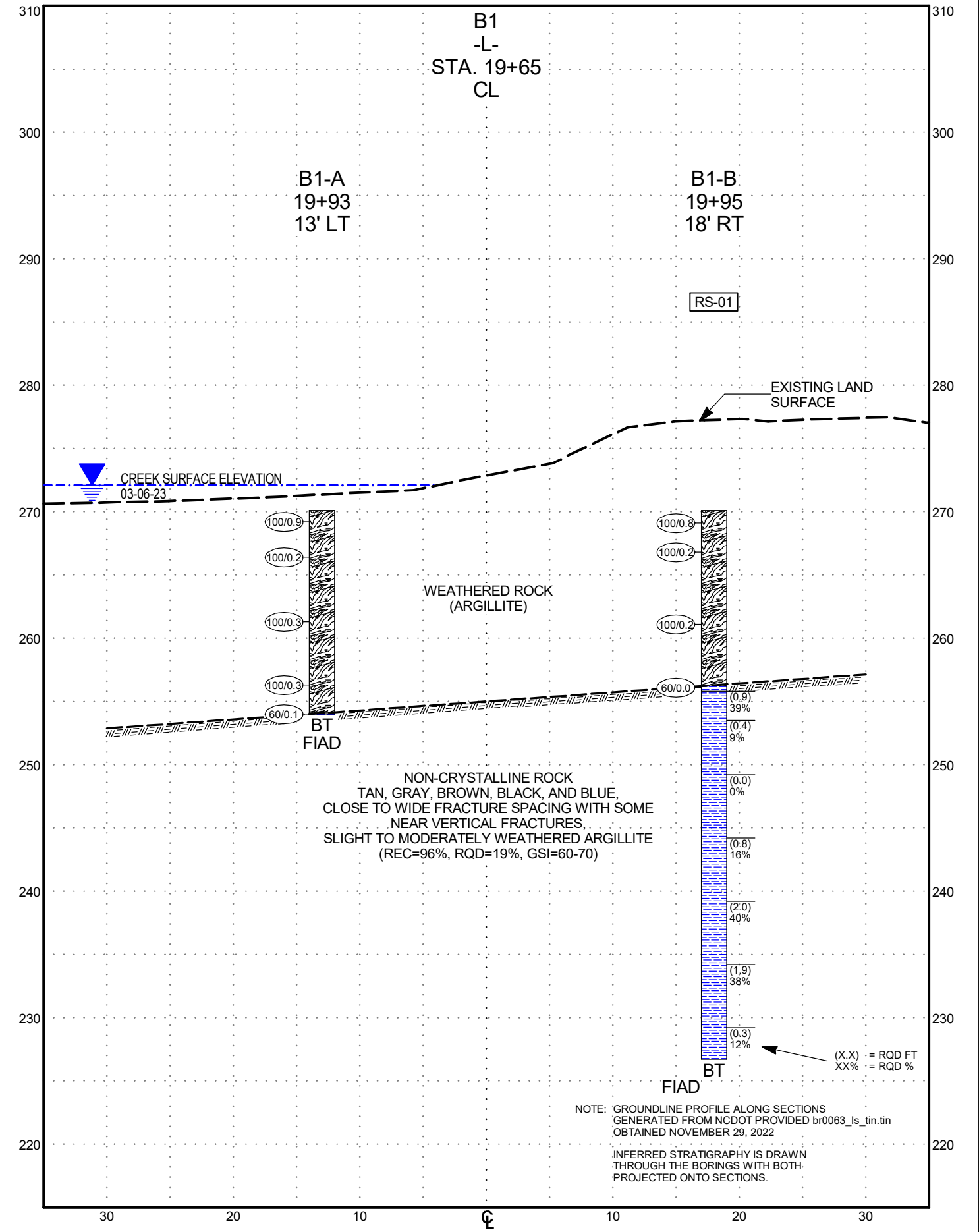
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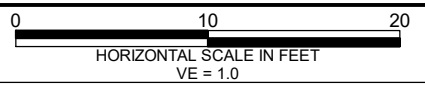
**CROSS SECTION
END BENT 1
SKEW = 90°**



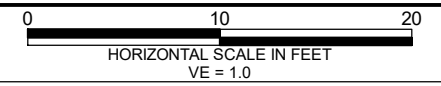
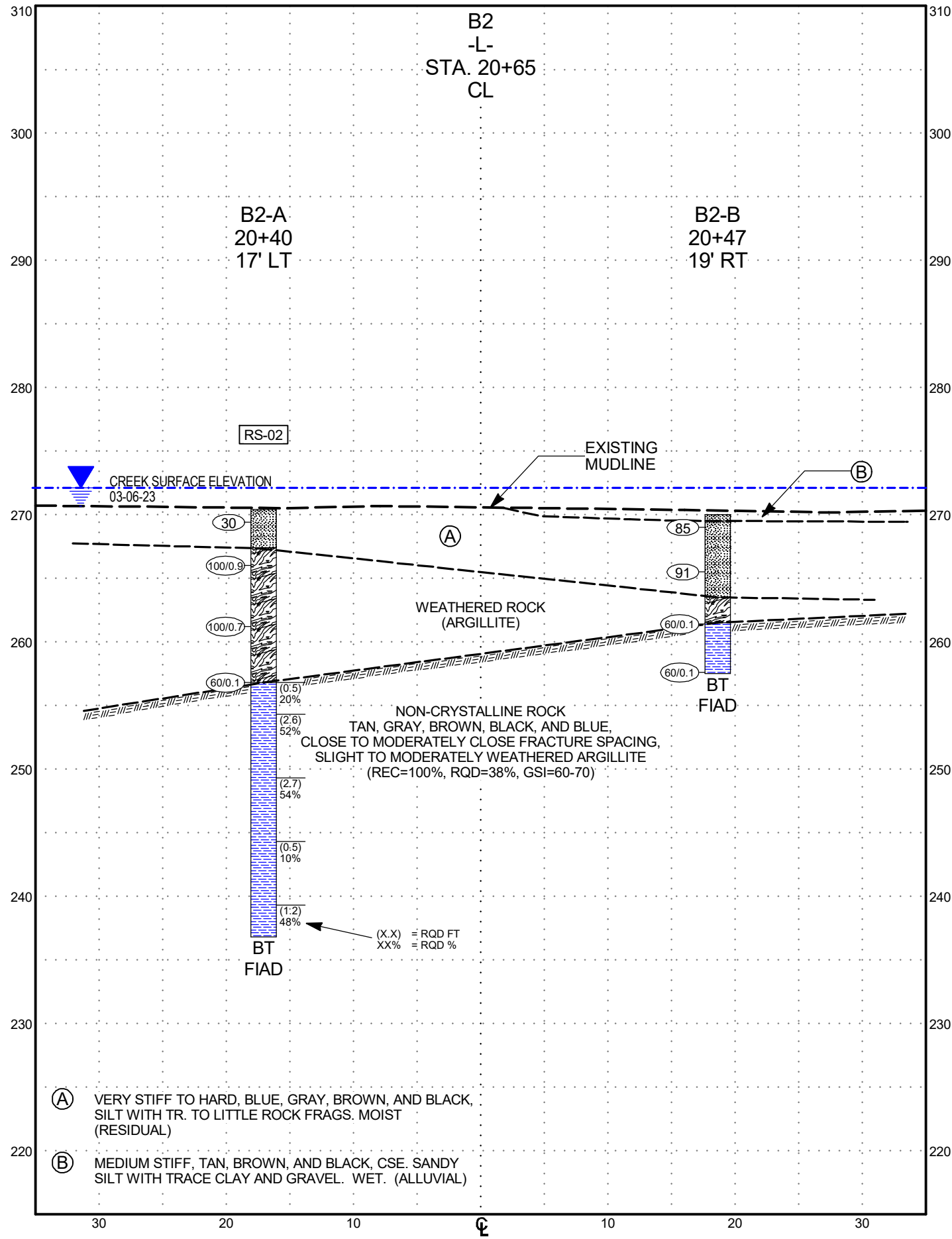
**CROSS SECTION
BENT 1
SKEW = 90°**



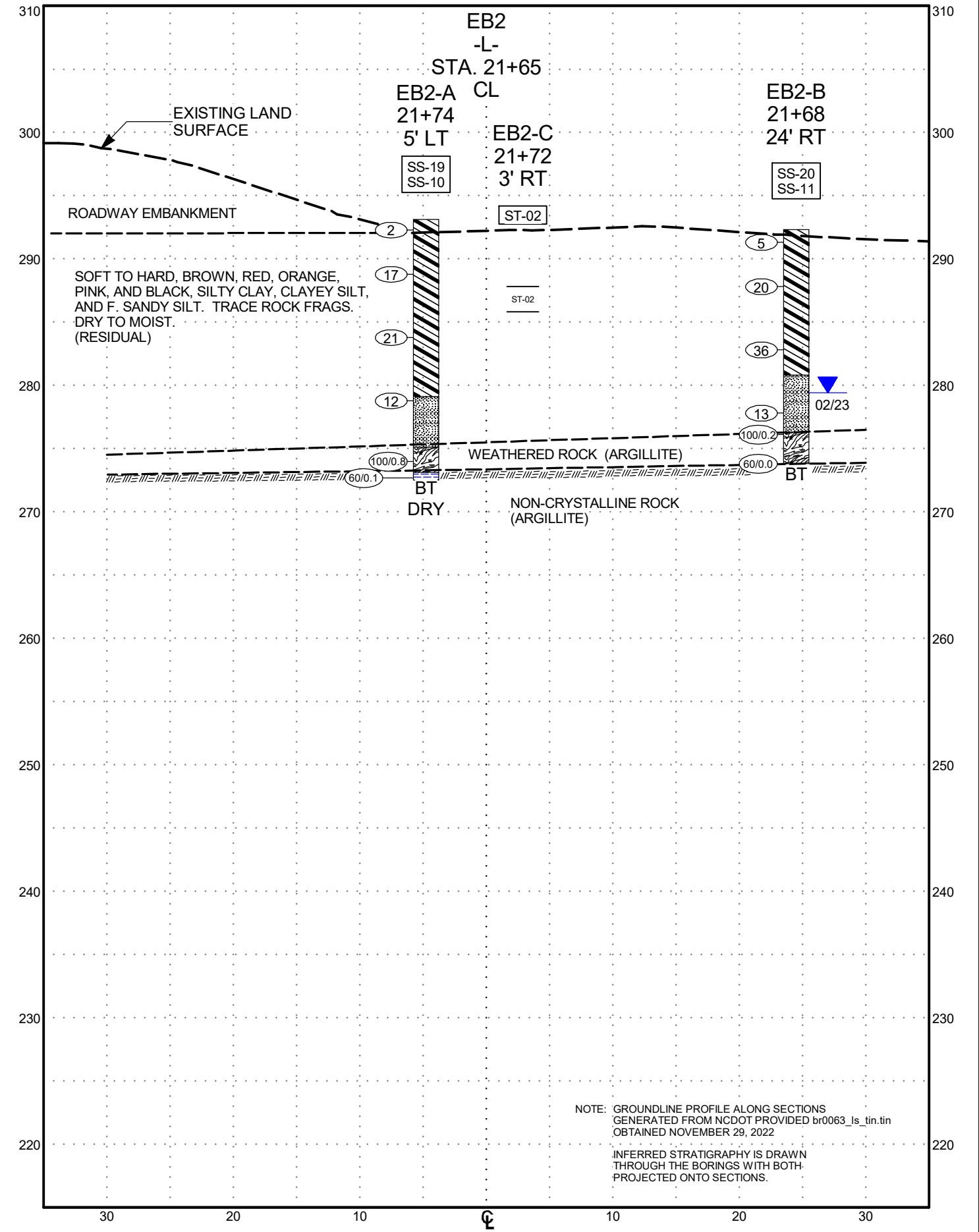
NOTE: GROUNDLINE PROFILE ALONG SECTIONS
GENERATED FROM NCDOT PROVIDED br0063_ls_tin.tin
OBTAINED NOVEMBER 29, 2022
INFERRED STRATIGRAPHY IS DRAWN
THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO SECTIONS.



**CROSS SECTION
BENT 2
SKEW = 90°**



**CROSS SECTION
END BENT 2
SKEW = 90°**



GEOTECHNICAL BORING REPORT BORE LOG

WBS: 67063.1.1	TIP: BR-0063	COUNTY: ANSON	GEOLOGIST: Cameron Stratton
SITE DESCRIPTION: BRIDGE NO. 87 ON NC 742 OVER RICHARDSON CREEK AT -L- STA. 20+15			GROUND WTR (ft)
BORING NO.: EB1-A	STATION: 18+67	OFFSET: 6 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 284.2 ft	TOTAL DEPTH: 28.5 ft	NORTHING: 511,072	EASTING: 1,619,073
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22			DRILL METHOD: H.S. AUGERS
DRILLER: T. Jason White			HAMMER TYPE: AUTOMATIC
START DATE: 02/01/23	COMP. DATE: 02/01/23	SURFACE WATER DEPTH: N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
295																
290																
285	284.2	0.0													284.2	LAND SURFACE
280	280.7	3.5	WOH	2	4											RESIDUAL REDDISH BROWN, LIGHT BROWN, LIGHT BLUE, GRAY, AND BLACK, SANDY SILT
275	275.7	8.5		1	3											
270	270.7	13.5		37	13	11										
265	265.7	18.5		15	85/0.3											ORANGE, BLUE, BIEGE, BROWN, SILTY CLAY, TR. ROCK FRAGS.
260	260.7	23.5		46	23	25										WEATHERED ROCK (ARGILLITE)
	255.7	28.5		60/0.0												NON-CRYSTALLINE ROCK (ARGILLITE)

WBS: 67063.1.1	TIP: BR-0063	COUNTY: ANSON	GEOLOGIST: Cameron Stratton
SITE DESCRIPTION: BRIDGE NO. 87 ON NC 742 OVER RICHARDSON CREEK AT -L- STA. 20+15			GROUND WTR (ft)
BORING NO.: EB1-B	STATION: 18+65	OFFSET: 18 ft RT	ALIGNMENT: -L-
COLLAR ELEV.: 283.9 ft	TOTAL DEPTH: 18.6 ft	NORTHING: 511,048	EASTING: 1,619,070
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22			DRILL METHOD: H.S. AUGERS
DRILLER: T. Jason White			HAMMER TYPE: AUTOMATIC
START DATE: 02/01/23	COMP. DATE: 02/01/23	SURFACE WATER DEPTH: N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
295																
290																
285	283.9	0.0													283.9	LAND SURFACE
280	280.4	3.5		1	2	2										RESIDUAL RED BROWN TO LIGHT BROWN, FINE, SANDY SILT
275	275.4	8.5		3	4	4										
270	270.4	13.5		11	8	4										
	265.4	18.5		80	20/0.1											WEATHERED ROCK (ARGILLITE)
				60/0.1												NON-CRYSTALLINE ROCK (ARGILLITE)
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 265.3 ft IN NON-CRYSTALLINE ROCK (ARGILLITE)

NCDDOT BORE DOUBLE - BR0063_GEO_BRDG87_CATLIN.GPJ_NCDOT_CATLIN.GDT 04/05/23

GEOTECHNICAL BORING REPORT CORE LOG

B1-B
DEPTH: 14.3 to 43.4 ft



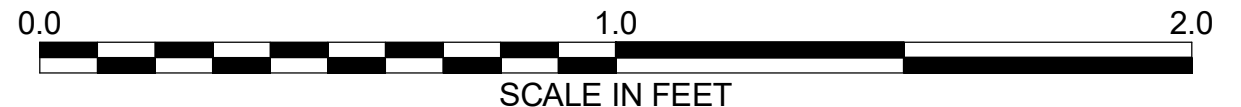
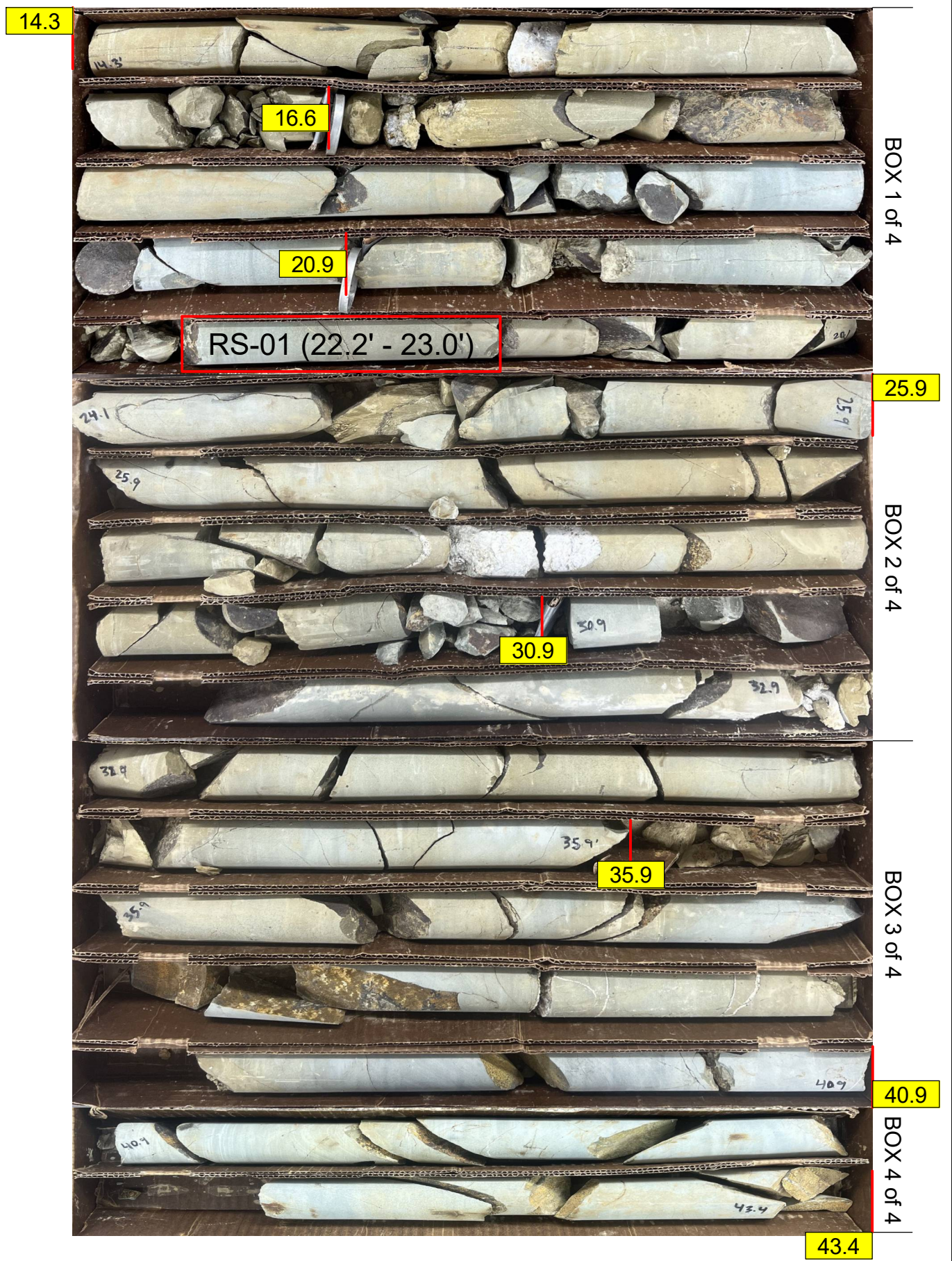
PROJECT REFERENCE	SHEET
BR-0063	9

WBS: 67063.1.1		TIP: BR-0063		COUNTY: ANSON		GEOLOGIST: Thomas Park						
SITE DESCRIPTION: Bridge No. 87 on NC 742 over Richardson Creek at -L- Station 20+15							GROUND WTR (ft)					
BORING NO.: B1-B		STATION: 19+95		OFFSET: 18 ft RT		ALIGNMENT: -L-						
COLLAR ELEV.: 270.1 ft		TOTAL DEPTH: 43.4 ft		NORTHING: 511,043		EASTING: 1,619,199						
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 85.8% 02/15/2022				DRILL METHOD: NW Casing W/SPT & Core		HAMMER TYPE: AUTOMATIC						
DRILLER: Jordan Edmondson		START DATE: 02/27/23		COMP. DATE: 02/28/23		SURFACE WATER DEPTH: 3.7ft						
CORE SIZE: NQ		TOTAL RUN: 29.1 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (%)	RQD (%)	REC. (%)	RQD (%)				
255.8	255.8	14.3	2.3	2:09/1.0	(2.3)	(0.9)	(28.7)	(6.3)	LOG	Begin Coring @ 14.3 ft NON-CRYSTALLINE ROCK TAN, GRAY, BROWN, BLACK, AND BLUE, SLIGHT TO MODERATELY WEATHERED, CLOSE TO WIDE FRACTURES WITH SOME NEAR VERTICAL FRACTURES. HARD ARGILLITE	14.3	
	253.5	16.6		2:41/1.0	100%	39%						
			4.3	0:29/0.3	(4.1)	(0.4)						
				0:51/1.0								
				2:46/1.0	95%	9%						
250	249.2	20.9		1:02/1.0								
			5.0	1:32/1.0								
				2:01/0.3	(4.8)	(0.0)						
				3:02/1.0	96%	0%						
				3:14/1.0								
245	244.2	25.9		3:22/1.0								
			5.0	3:01/1.0								
				3:51/1.0								
				3:24/1.0	(5.0)	(0.8)						
				3:37/1.0	100%	16%						
				4:02/1.0								
240	239.2	30.9		2:04/1.0								
			5.0	2:40/1.0								
				1:19/1.0	(5.0)	(2.0)						
				2:03/1.0	100%	40%						
				2:05/1.0								
235	234.2	35.9		2:13/1.0								
			5.0	1:51/1.0								
				1:58/1.0	(5.0)	(1.9)						
				1:39/1.0	100%	38%						
				2:09/1.0								
230	229.2	40.9		2:32/1.0								
			2.5	2:45/1.0	(2.5)	(0.3)						
				1:49/1.0	100%	12%						
	226.7	43.4		0:51/0.5								

NCDOT CORE W-PHOTO BR0063_GEO_BRD687_CATLIN.GPJ_CATLIN.GDT_03/21/23

ROCK TEST RESULTS

SAMPLE NUMBER	DEPTH INTERVAL	ROCK TYPE	UNIT WT. (lb/ft ³)	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-01	22.2' - 23.0'	ARGILLITE	162.9	14,720



GEOTECHNICAL BORING REPORT CORE LOG

B2-A
DEPTH: 13.6 to 33.6 ft



PROJECT REFERENCE
BR-0063

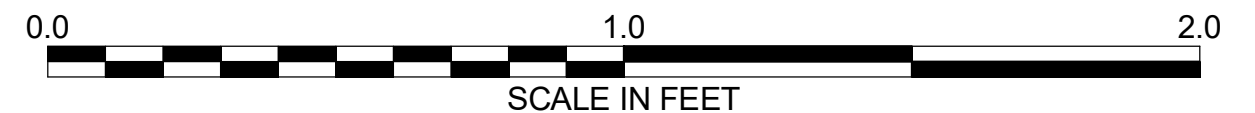
SHEET
11

WBS: 67063.1.1		TIP: BR-0063		COUNTY: ANSON		GEOLOGIST: Cameron Stratton	
SITE DESCRIPTION: Bridge No. 87 on NC 742 over Richardson Creek at -L- Station 20+15							GROUND WTR (ft)
BORING NO.: B2-A		STATION: 20+40		OFFSET: 17 ft LT		ALIGNMENT: -L-	
COLLAR ELEV.: 270.4 ft		TOTAL DEPTH: 33.6 ft		NORTHING: 511,076		EASTING: 1,619,246	
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 85.8% 02/15/2022				DRILL METHOD: NW Casing W/SPT & Core		HAMMER TYPE: AUTOMATIC	
DRILLER: Austin Fowler		START DATE: 03/03/23		COMP. DATE: 03/03/23		SURFACE WATER DEPTH: 3.7ft	
CORE SIZE: NQ		TOTAL RUN: 20.0 ft					

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) %			
256.8	256.8	13.6	2.5	1:52/1.0	(2.5)	(0.5)		(20.0)	(7.5)		Begin Coring @ 13.6 ft	13.6
255	254.3	16.1		2:34/1.0	100%	20%		100%	38%		NON-CRYSTALLINE ROCK	
			5.0	2:05/0.5	(5.0)	(2.6)	RS-02				BEIGE, ORANGE, LIGHT BLUE, GRAY, AND BLACK, MODERATE TO SLIGHTLY WEATHERED WITH SOME OXIDIZED ZONES, CLOSE TO MODERATELY CLOSE FRACTURE SPACING. HARD ARGILLITE	
				2:25/1.0								
				2:54/1.0								
				3:04/1.0								
				3:40/1.0								
				3:44/1.0								
250	249.3	21.1		2:45/1.0	(5.0)	(2.7)						
			5.0	3:30/1.0	100%	54%						
				3:23/1.0								
				2:43/1.0								
				3:01/1.0								
245	244.3	26.1		2:34/1.0	(5.0)	(0.5)						
			5.0	2:23/1.0	100%	10%						
				2:55/1.0								
				2:23/1.0								
				2:27/1.0								
240	239.3	31.1		2:33/1.0	(2.5)	(1.2)						
			2.5	3:47/1.0	100%	48%						
				1:07/0.5								
	236.8	33.6									Boring Terminated at Elevation 236.8 ft IN NON-CRYSTALLINE ROCK (ARGILLITE)	33.6

ROCK TEST RESULTS

SAMPLE NUMBER	DEPTH INTERVAL	ROCK TYPE	UNIT WT. (lb/ft ³)	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-02	16.1' - 16.6'	ARGILLITE	161.0	14,720



NCDOT CORE W-PHOTO BR0063_GEO_BRD687_CATLIN.GPJ_CATLIN.GDT_03/21/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS: 67063.1.1	TIP: BR-0063	COUNTY: ANSON	GEOLOGIST: Cameron Stratton
SITE DESCRIPTION: BRIDGE NO. 87 ON NC 742 OVER RICHARDSON CREEK AT -L- STA. 20+15			GROUND WTR (ft)
BORING NO.: EB2-A	STATION: 21+74	OFFSET: 5 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 293.1 ft	TOTAL DEPTH: 20.6 ft	NORTHING: 511,058	EASTING: 1,619,380
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22		DRILL METHOD: H.S. AUGERS	
DRILLER: T. Jason White		HAMMER TYPE: AUTOMATIC	
START DATE: 01/31/23	COMP. DATE: 01/31/23	SURFACE WATER DEPTH: N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
295	293.1	0.0	3	1	1									LAND SURFACE	0.0
290	289.6	3.5	6	6	11						SS-19 A-6(11)	M		RESIDUAL TAN, RED, BLACK, BROWN, SILTY CLAY	
285	284.6	8.5	6	9	12						SS-10 A-6(11)	M			
280	279.6	13.5	5	5	7							D		BLUE/GRAY SILT, TRACE ROCK FRAGS.	14.0
275	274.6	18.5	52	48	0.3							D		WEATHERED ROCK (ARGILLITE)	18.0
	272.6	20.5	60	0.1								D		NON-CRYSTALLINE ROCK (ARGILLITE)	20.6
														Boring Terminated BY AUGER REFUSAL at Elevation 272.5 ft IN NON-CRYSTALLINE ROCK (ARGILLITE)	

WBS: 67063.1.1	TIP: BR-0063	COUNTY: ANSON	GEOLOGIST: Cameron Stratton
SITE DESCRIPTION: BRIDGE NO. 87 ON NC 742 OVER RICHARDSON CREEK AT -L- STA. 20+15			GROUND WTR (ft)
BORING NO.: EB2-B	STATION: 21+68	OFFSET: 24 ft RT	ALIGNMENT: -L-
COLLAR ELEV.: 292.3 ft	TOTAL DEPTH: 18.5 ft	NORTHING: 511,029	EASTING: 1,619,373
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22		DRILL METHOD: H.S. AUGERS	
DRILLER: T. Jason White		HAMMER TYPE: AUTOMATIC	
START DATE: 01/31/23	COMP. DATE: 01/31/23	SURFACE WATER DEPTH: N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
295	292.3	0.0	2	2	3									LAND SURFACE	0.0
290	288.8	3.5	8	10	10						SS-20 A-8(12)	M		RESIDUAL RED, LIGHT BLUE, BROWN, AND GRAY, OXIDIZED SILTY TO SANDY CLAY	
285	283.8	8.5	8	15	21							D			
280	278.8	13.5	5	6	7							M		RED, BLUE, ORANGE, PINK, AND BLACK, CLAYEY SILT WITH TR. ROCK FRAGS. AND SAND	11.5
275	276.3	16.0	100	0.2							SS-11 A-4(5)	M		WEATHERED ROCK (ARGILLITE)	16.0
	273.8	18.5	60	0.0								M		WEATHERED ROCK (ARGILLITE)	18.5
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 273.8 ft ON NON-CRYSTALLINE ROCK (ARGILLITE)	

NCDOT BORE DOUBLE - BR0063_GEO_BRD87_CATLIN.GPJ NCDOT_CATLIN.GDT 04/05/23

LABORATORY SUMMARY SHEET

AASHTO Standard Specifications
(As modified by NCDOT, Material and Tests Unit, 2000.)

TEST RESULTS

Proj. Sample Number	ST-01	ST-02	SS-16	SS-17	SS-08	SS-18	SS-09	SS-19	SS-10	SS-20	SS-11			
Lab Sample Number	ST-01	ST-02	SS-16	SS-17	SS-08	SS-18	SS-09	SS-19	SS-10	SS-20	SS-11			
Retained #4 Sieve %	0	1.3	0.1	0.4	0	0.1	1.5	0	5.4	18.2	10.4			
Passing #10 Sieve %	99.8	97.4	99.4	98.4	100	99.9	97.9	97.5	90.1	62.3	85.7			
Passing #40 Sieve %	91	96	98	96	100	99	85	95	85	55	80			
Passing #200 Sieve %	58	88	90	89	99	93	61	92	78	52	68			
MINUS NUMBER 10 FRACTION														
SOIL MORTAR - 100%														
Coarse Sand Ret.-#60 %	23.7	2.9	3.0	3.9	0.5	2.3	26.4	2.9	8.0	12.9	11.5			
Fine Sand Ret.-#270 %	21.1	8.3	9.9	9.1	2.6	8.4	14.0	4.9	7.6	5.1	11.4			
Silt 0.05 - 0.005mm %	29.0	53.0	45.7	50.5	65.9	50.3	35.2	54.1	49.1	55.0	47.1			
Clay <0.005mm %	26.3	35.8	41.4	36.5	31.0	39.0	24.4	38.0	35.3	27.0	30.0			
Liquid Limit (LL)	25	36	32	36	32	33	25	33	36	38	29			
Plasticity Index (PI)	7	17	9	9	6	9	7	11	12	14	7			
AASHTO Classification /Group Index	A-4(2)	A-6(15)	A-4(8)	A-4(9)	A-4(7)	A-4(9)	A-4(2)	A-6(11)	A-6(11)	A-6(12)	A-4(5)			
Organic Content %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
Station	18+62	21+72	18+67	18+67	18+67	18+65	18+65	21+74	21+74	21+68	21+68			
Offset	9ft RT	3ft RT	6ft LT	6ft LT	6ft LT	18ft RT	18ft RT	5ft LT	5ft LT	24ft RT	24ft RT			
Alignment	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-			
Boring Identification	EB1-C	EB2-C	EB1-A	EB1-A	EB1-A	EB1-B	EB1-B	EB2-A	EB2-A	EB2-B	EB2-B			
Depth (FT)	6.0	5.0	0.0	3.5	23.5	3.5	8.5	3.5	8.5	0.0	13.5			
to	8.0	7.0	1.5	5.0	25.0	5.0	10.0	5.0	10.0	1.5	15.0			
Field Moist. Content %														
Tested By	Geotechnics	Geotechnics	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON			
Submitted By	C. Stratton	C. Stratton	S.V. HUDSON	S.V. HUDSON	CDFUTRAL	S.V. HUDSON	CDFUTRAL	S.V. HUDSON	CDFUTRAL	S.V. HUDSON	CDFUTRAL			
Date Submitted	04/04/23	04/04/23	03/23/23	03/23/23	02/13/23	03/23/23	02/13/23	03/23/23	02/13/23	03/23/23	02/13/23			

NP = Non-Plastic
NEM = Not Enough Material for Analysis
N/A = Not Applicable / Not Analyzed


Laboratory Manager

Report Date: 6/14/2023
Laboratory Report Page 1 of 1

SITE PHOTOGRAPHS



RIG ON EB1-C
FACING UP STATION



EB2 IN FOREGROUND
FACING DOWN STATION



NEAR EB2 FACING DOWN STATION