

REFERENCE: BR-0063

PROJECT: 67063

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

STRUCTURE
SUBSURFACE INVESTIGATION

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

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

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

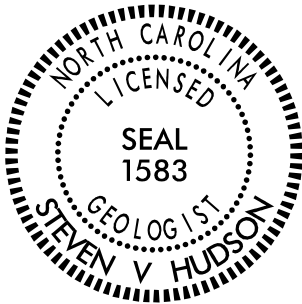
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DRAWN BY S. V. HUDSON, LG

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SUBMITTED BY S. V. HUDSON, LG

DATE JUNE 2023



DocuSigned by:

Steve V Hudson 07/12/2023

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DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS						
GROUP CLASS.	A-1		A-3		A-2		A-4		A-5		A-6		A-7		A-1, A-2		A-4, A-5		
SYMBOL	A-1-a	A-1-b	A-2-4		A-2-5		A-2-6		A-2-7		A-4		A-5		A-6		A-7		
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN	35 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT		
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX	41 MN 10 MX	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			HIGHLY ORGANIC SOILS			
GROUP INDEX	0		0		0		4 MX		8 MX		12 MX		16 MX		NO MX				
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS								
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR		POOR		UNSUITABLE		
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																			

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.75	2.00	0.42	0.25	0.075	0.053
BOULDER (BLDR.)						
COBBLE (COB.)						
GRAVEL (GR.)						
COARSE SAND (CSE. SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						
GRAIN SIZE	305 IN.	75 IN.	2.0	0.25	0.05	0.005

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL PLASTIC RANGE (PI) PL	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
	- WET - (W)	SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM SL	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY

GROUND WATER

▽

STATIC WATER LEVEL AFTER 24 HOURS

▽PW

PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA

SPRING OR SEEP

MISCELLANEOUS SYMBOLS

ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION

SOIL SYMBOL

ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT

INFERRED SOIL BOUNDARY

INFERRED ROCK LINE

ALLUVIAL SOIL BOUNDARY

25/025

DIP & DIP DIRECTION OF ROCK STRUCTURES

SPT DMT VST PMT TEST BORING

AUGER BORING

CORE BORING

MONITORING WELL

PIEZOMETER INSTALLATION

SLOPE INDICATOR INSTALLATION

CONE PENETROMETER TEST

SOUNDING ROD

TEST BORING WITH CORE

SPT N-VALUE

RECOMMENDATION SYMBOLS

UNDERCUT

SHALLOW UNDERCUT

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE

UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - CONE PENETRATION TEST
CSE - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS - FOSSILIFEROUS
FRAC - FRACTURED, FRACTURES
FRAGS - FRAGMENTS
HL - HIGHLY

MED. - MEDIUM
MICA - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRI-CONE REFUSAL
wt - MOISTURE CONTENT
V - VERY

VST - VANE SHEAR TEST
WEA. - WEATHERED
% - UNIT WEIGHT
%g - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS
S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
☒ CME-458

☐ CME-55

☐ CME-550

☐ VANE SHEAR TEST

☐ PORTABLE HOIST

☒ MOBILE B-57

☐

ADVANCING TOOLS:
☐ CLAY BITS
☐ 6" CONTINUOUS FLIGHT AUGER
☒ 8" HOLLOW AUGERS
☐ HARD FACED FINGER BITS
☐ TUNG-CARBIDE INSERTS
☒ CASING ☒ W/ ADVANCER
☐ TRICONE ☐ STEEL TEETH
☒ TRICONE 2 7/8" TUNG-CARB.
☒ 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. 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:

WEATHERED ROCK (WR)

CRYSTALLINE ROCK (CR)

NON-CRYSTALLINE ROCK (NCR)

COASTAL PLAIN SEDIMENTARY ROCK (CP)

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

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

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

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

WEATHERING

FRESH
VERY SLIGHT (V SL.)
SLIGHT (SL.)
MODERATE (MOD.)
MODERATELY SEVERE (MOD. SEV.)
SEVERE (SEV.)
VERY SEVERE (V SEV.)
COMPLETE

ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

TERMS AND DEFINITIONS

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.

BENCH MARK: LOCATIONS OBTAINED WITH A FEAL 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

DATE: 8-15-14

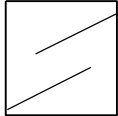
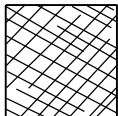
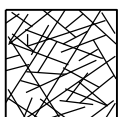
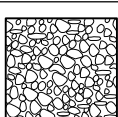
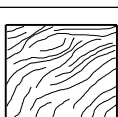
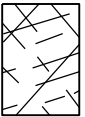
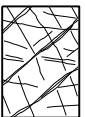
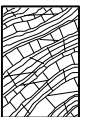
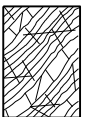
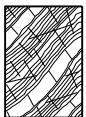
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DIVISION OF HIGHWAYS
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SUBSURFACE INVESTIGATION

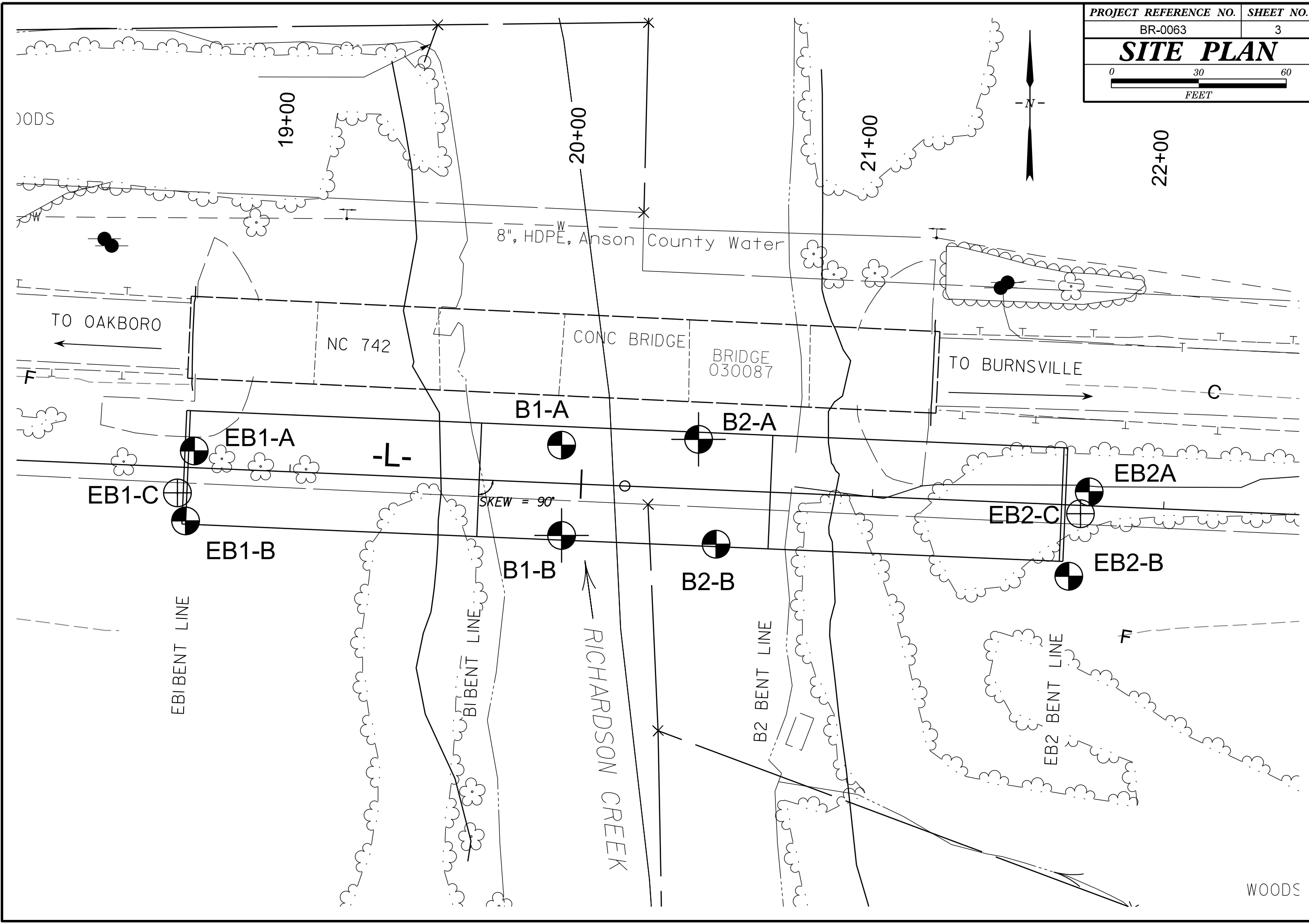
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

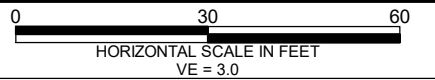
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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) 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.	SURFACE CONDITIONS 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	STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING SURFACE QUALITY ➡ 90 80 70 60 50 40 30 20 10 N/A N/A	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) 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.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) 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	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin inter-layers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers 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. F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers 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. ➡ Means deformation after tectonic disturbance	70 60 50 40 30 20 10
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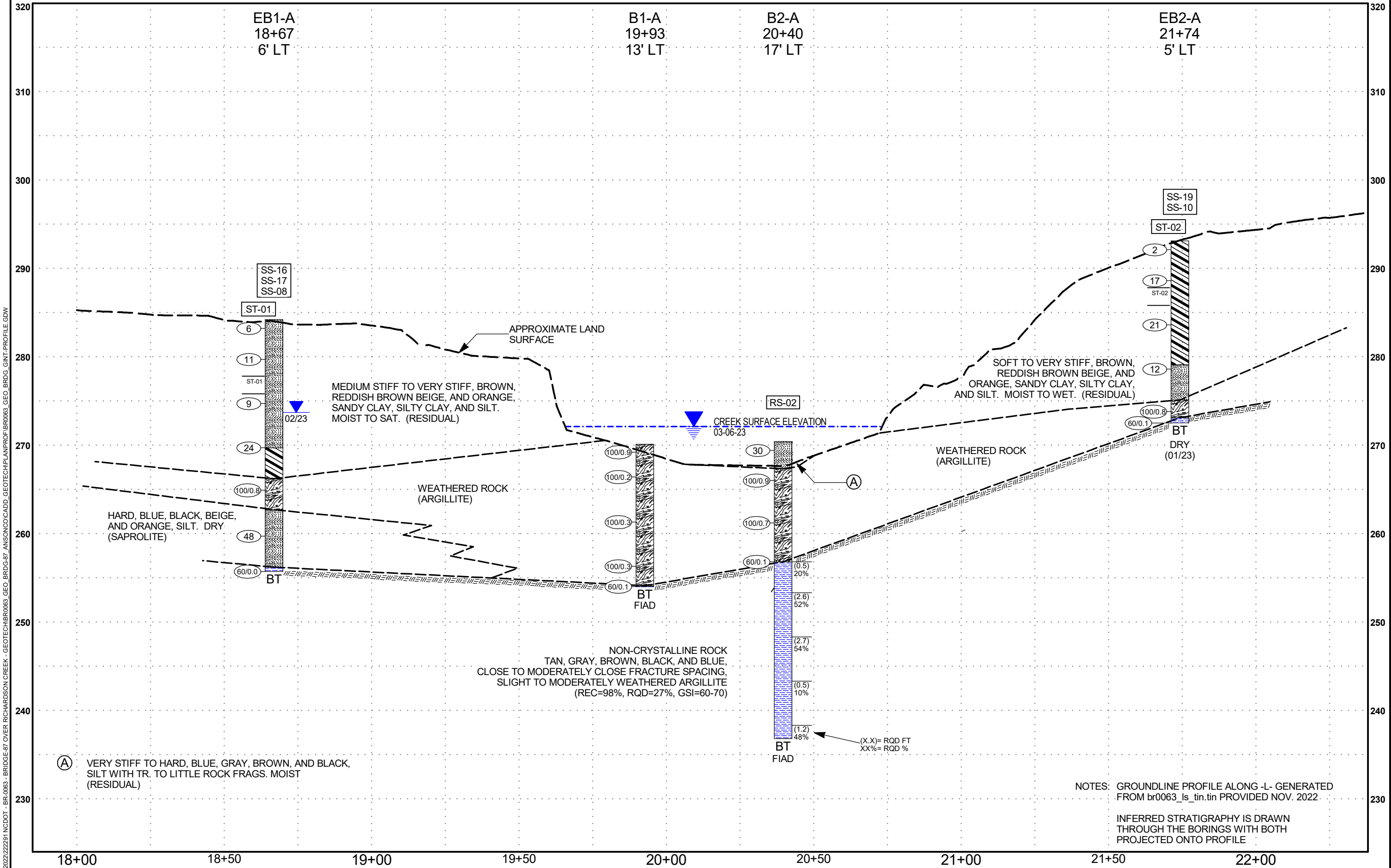
PROJECT REFERENCE NO.	SHEET NO.
BR-0063	3
SITE PLAN	
0 30 60 FEET	

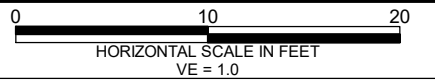




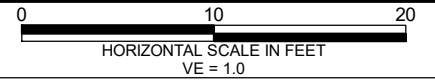
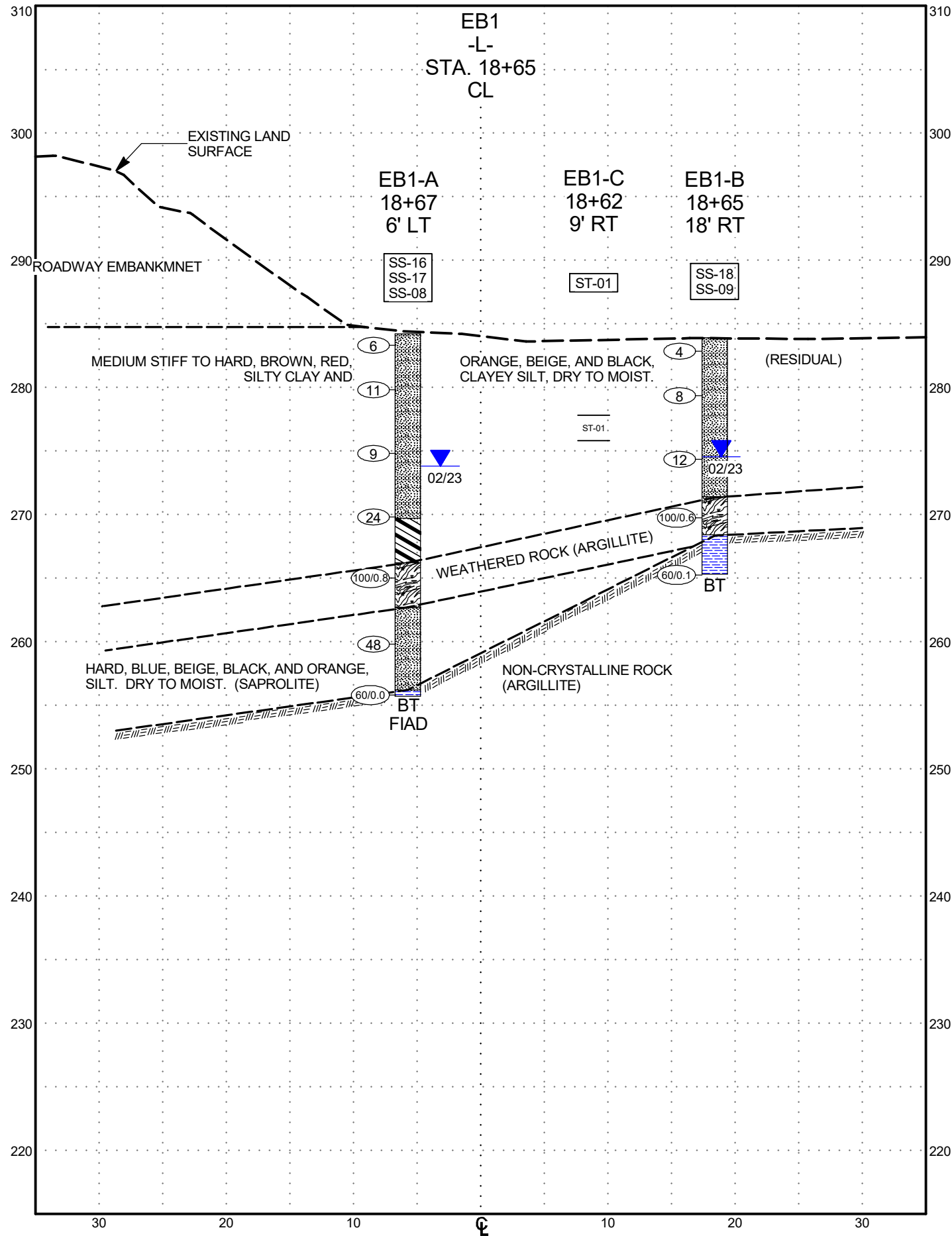
PROFILE THROUGH BORINGS PROJECTED ALONG -L-

SKEW = 90°

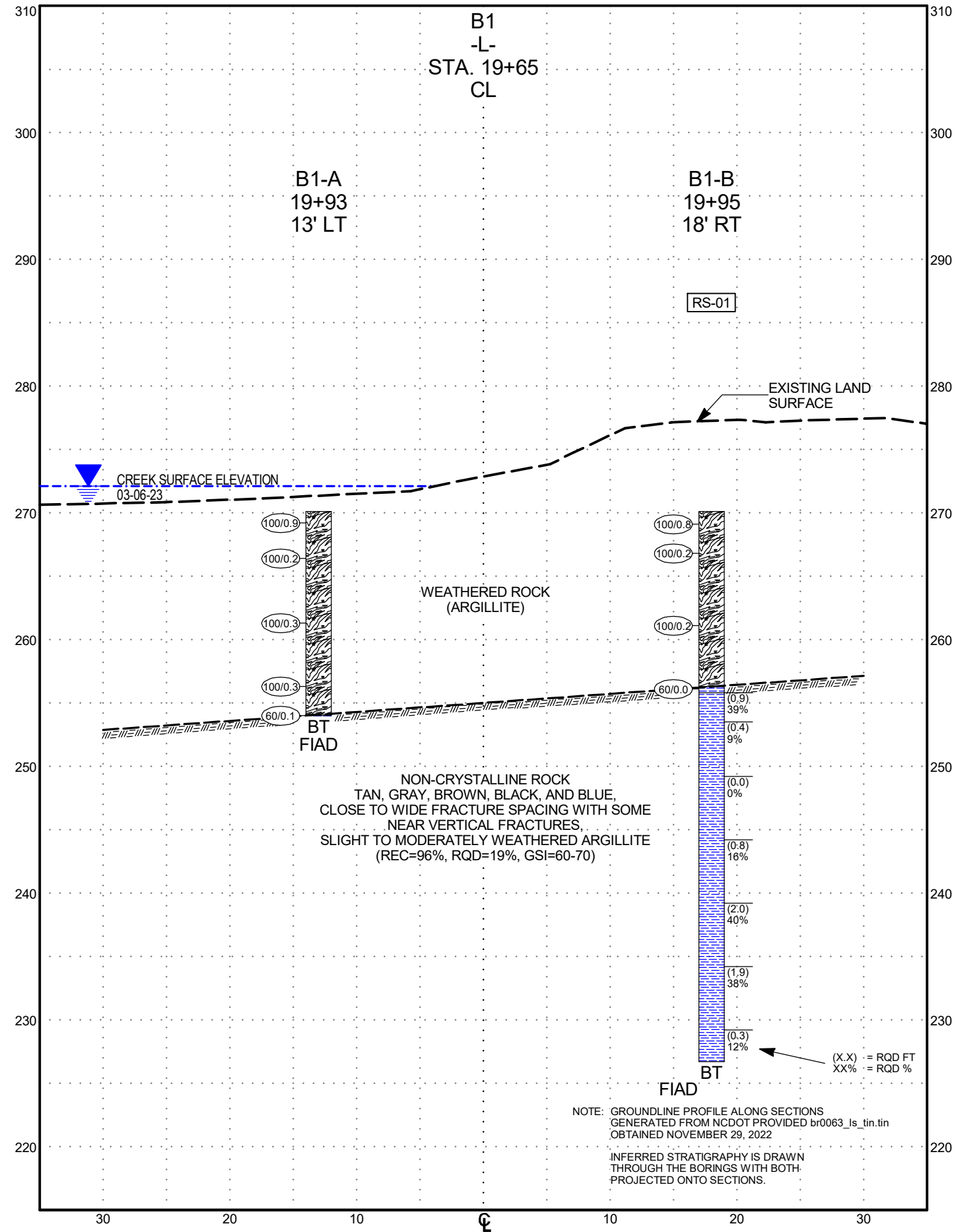




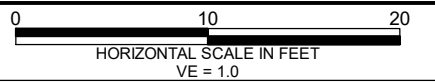
CROSS SECTION
END BENT 1
SKEW = 90°



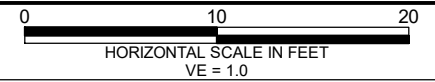
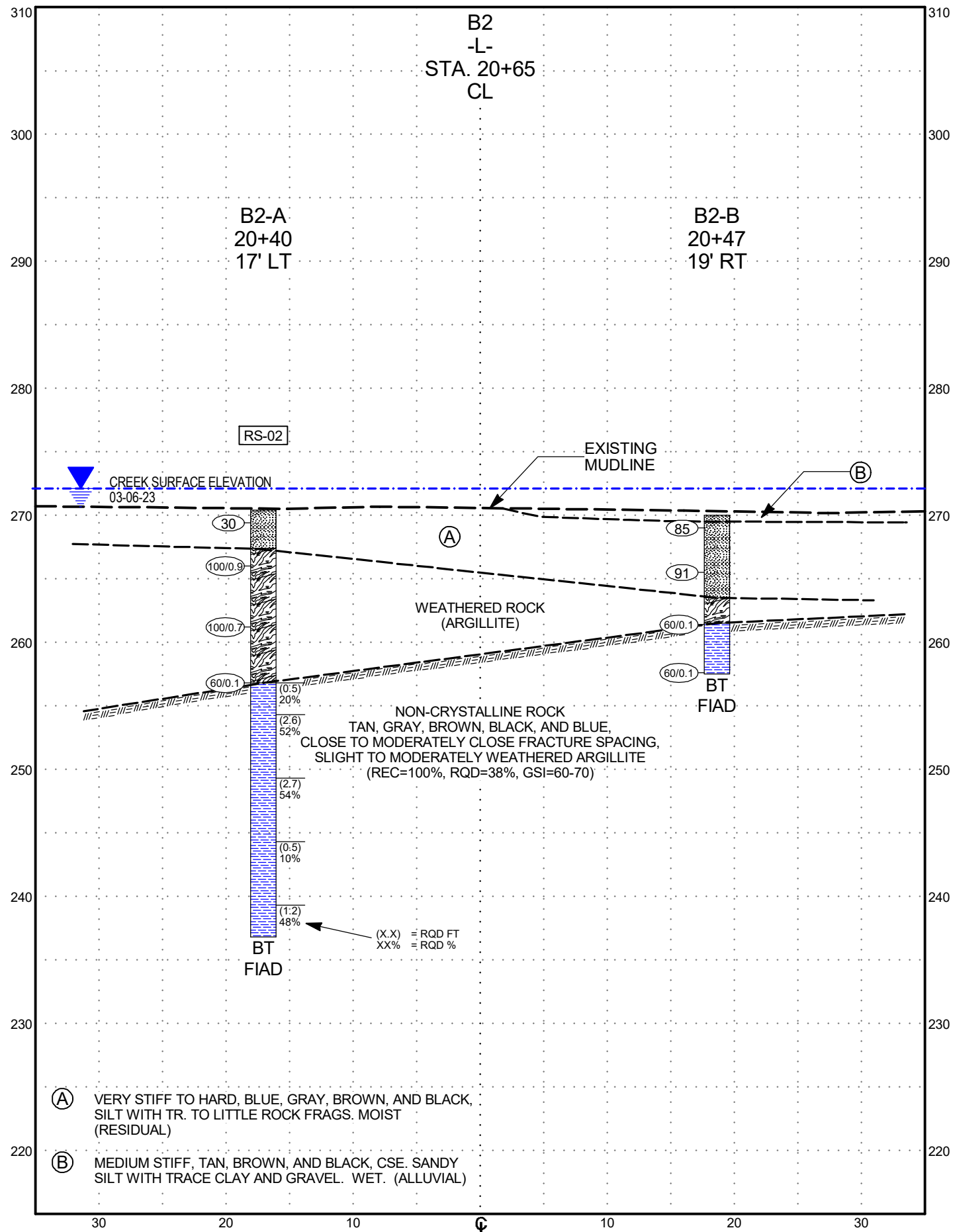
CROSS SECTION
BENT 1
SKEW = 90°



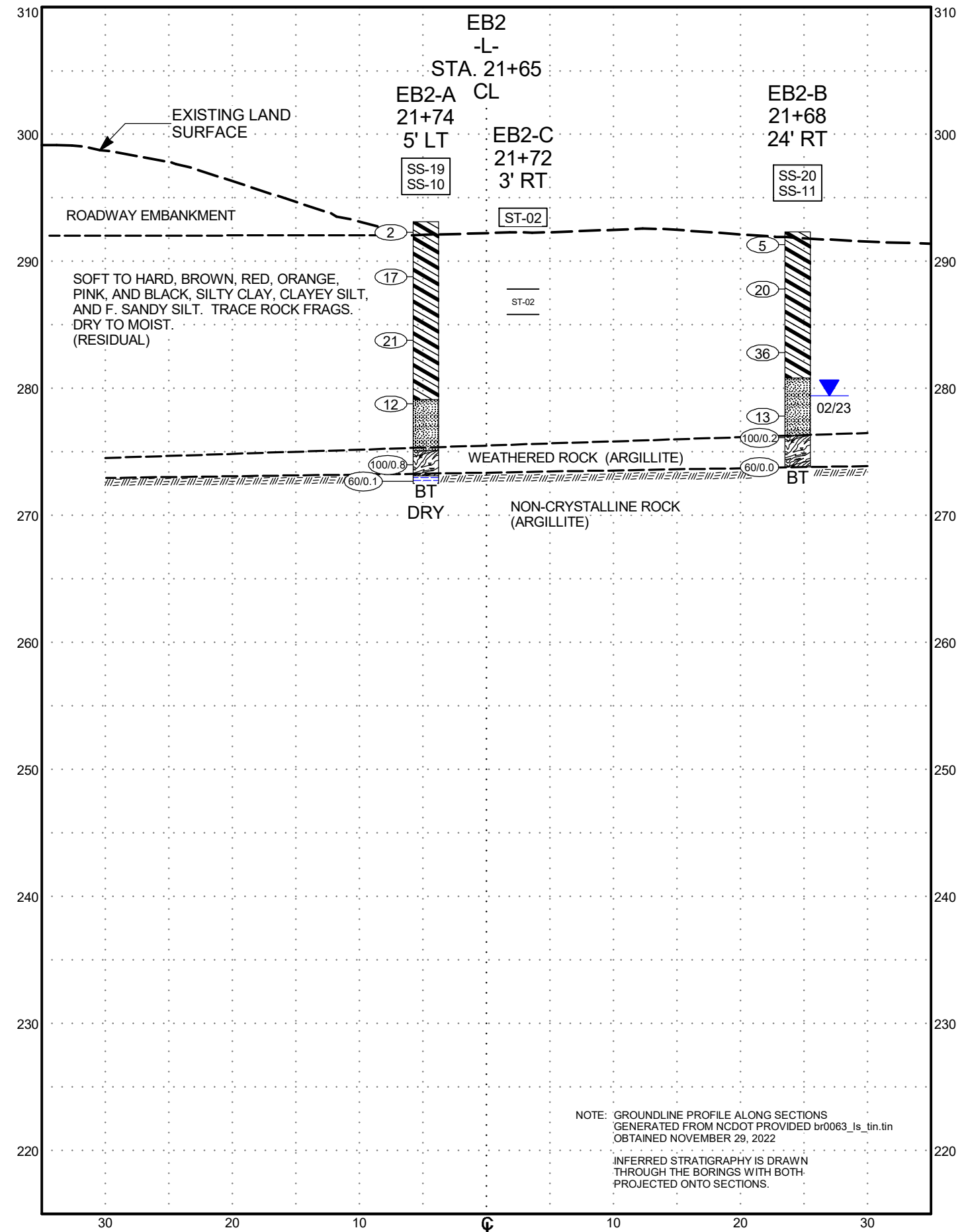
NOTE: GROUNDLINE PROFILE ALONG SECTIONS
GENERATED FROM NCDOT PROVIDED br0063_Is_tin.tin
OBTAINED NOVEMBER 29, 2022
INFERRED STRATIGRAPHY IS DRAWN
THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO SECTIONS.



CROSS SECTION
BENT 2
SKEW = 90°



CROSS SECTION
END BENT 2
SKEW = 90°



222291		<i>PROJECT REFERENCE</i>	<i>SHEET</i>
		BR-0063	7

NCDOT BORE DOUBLE BR0063 GEO BRDG87 CATLIN.GPJ NCDOT_CATLIN.GDT 04/05/23

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-		0 HR. 11.2		
COLLAR ELEV.: 283.9 ft			TOTAL DEPTH: 18.6 ft			NORTHING: 511,048			EASTING: 1,619,070		24 HR. 9.3		
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22						DRILL METHOD: H.S. AUGERS			HAMMER TYPE: AUTOMATIC				
DRILLER: T. Jason White			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. #	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100	RESULT		
295													
290													
285													
	283.9	0.0	1	2	2								283.9 LAND SURFACE 0.0
280	280.4	3.5	3	4	4						SS-18 A-4(9)	M	RESIDUAL RED BROWN TO LIGHT BROWN, FINE, SANDY SILT
275	275.4	8.5	11	8	4						SS-09 A-4(2)		
270	270.4	13.5	80	20/0.1							100/0.6		271.4 WEATHERED ROCK (ARGILLITE) 12.5
	265.4	18.5	60/0.1								60/0.1		268.4 NON-CRYSTALLINE ROCK (ARGILLITE) 15.5
													265.3 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 265.3 ft IN NON-CRYSTALLINE ROCK (ARGILLITE) 18.6

 222291	<i>PROJECT REFERENCE</i>	<i>SHEET</i>
	BR-0063	8

NCDOT BORE DOUBLE BR0063 GEO BRD87 CATLIN.GPJ NCDOT CATLIN.GDT 03/21/23

B1-B
DEPTH: 14.3 to 43.4 ft

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-

0 HR. N/A

COLLAR ELEV.: 270.1 ft

TOTAL DEPTH: 43.4 ft

NORTHING: 511,043

EASTING: 1,619,199

24 HR. FIAD

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

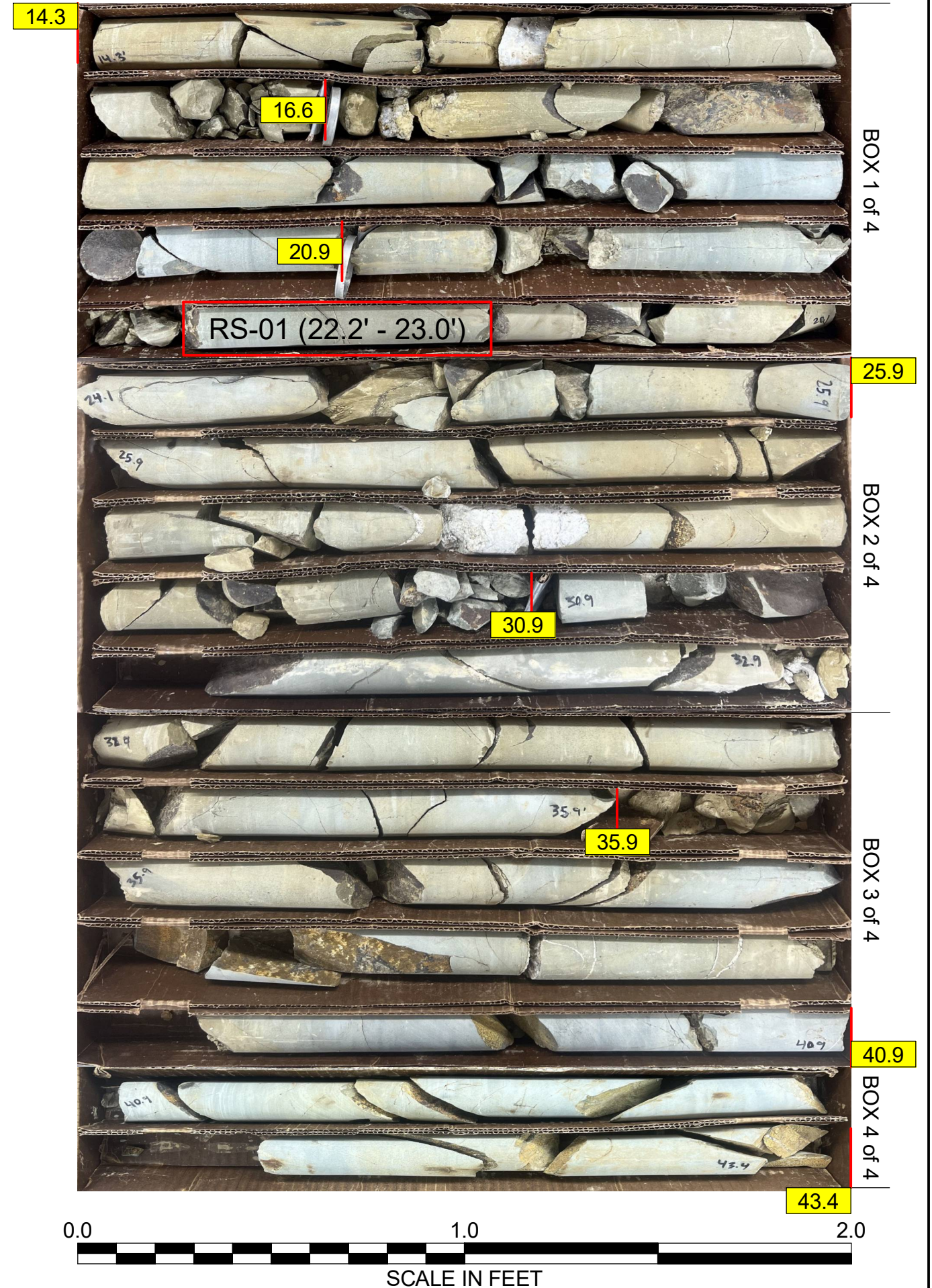
COMP. DATE: 02/28/23

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		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	ROD (ft) %		REC. (ft) %	ROD (ft) %			
255.8											Begin Coring @ 14.3 ft	
255	255.8	14.3	2.3	2:09/1.0	(2.3)	(0.9)	RS-01	(28.7)	(6.3)		255.8	14.3
	253.5	16.6		2:41/1.0	100%	39%					TAN, GRAY, BROWN, BLACK, AND BLUE, SLIGHT TO MODERATELY WEATHERED, CLOSE TO WIDE FRACTURES WITH SOME NEAR VERTICAL FRACTURES. HARD ARGILLITE	
		4.3	0:29/0.3	(4.1)	(0.4)							
			0:51/1.0	95%	9%							
250			2:46/1.0									
	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%						
245				3:14/1.0								
	244.2	25.9		3:22/1.0								
			5.0	3:01/1.0								
				3:51/1.0								
240				3:24/1.0	(5.0)	(0.8)						
			5.0	3:37/1.0	100%	16%						
	239.2	30.9		4:02/1.0								
			5.0	2:04/1.0								
				2:40/1.0								
235				1:19/1.0	(5.0)	(2.0)						
			5.0	2:03/1.0	100%	40%						
	234.2	35.9		2:05/1.0								
			5.0	2:13/1.0								
				1:51/1.0								
230				1:58/1.0	(5.0)	(1.9)						
			5.0	1:39/1.0	100%	38%						
	229.2	40.9		2:09/1.0								
			2.5	2:32/1.0								
	226.7	43.4		2:45/1.0								
				1:49/1.0	(2.5)	(0.3)						
				1:41/1.0	100%	12%						
				0:51/0.5								



GEOTECHNICAL BORING REPORT BORE LOG															222291 Catlin Engineers and Scientists		PROJECT REFERENCE BR-0063		SHEET 10
WBS: 67063.1.1				TIP: BR-0063			COUNTY: ANSON			GEOLOGIST: Cameron Stratton									
SITE DESCRIPTION: Replace Bridge Number 87 on NC 742 over Richardson Creek										GROUND WTR (ft)									
BORING NO.: B2-A				STATION: 20+40			OFFSET: 17 ft LT			ALIGNMENT: -L-			0 HR. 0.0						
COLLAR ELEV.: 270.4 ft				TOTAL DEPTH: 33.6 ft			NORTHING: 511,076			EASTING: 1,619,246			24 HR. FIAD						
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									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)					
			0.5ft	0.5ft	0.5ft	0	25	50	75	100									
295																			
290																			
285																			
280																			
275																			
270	270.4	0.0													270.4 MUDLINE 0.0				
265	266.9	3.5													267.4 WEATHERED ROCK (ARGILLITE) 3.0				
260	261.9	8.5													256.8 NON-CRYSTALLINE ROCK 13.6				
255	256.9	13.5													236.8 Boring Terminated at Elevation 236.8 ft IN NONCRYSTALLINE ROCK (ARGILLITE) 33.6				
250																			
245																			
240																			

WBS: 67063.1.1				TIP: BR-0063			COUNTY: ANSON			GEOLOGIST: Cameron Stratton					
SITE DESCRIPTION: Replace Bridge Number 87 on NC 742 over Richardson Creek										GROUND WTR (ft)					
BORING NO.: B2-B				STATION: 20+47			OFFSET: 19 ft RT			ALIGNMENT: -L-			0 HR. 0.0		
COLLAR ELEV.: 270.0 ft				TOTAL DEPTH: 12.5 ft			NORTHING: 511,040			EASTING: 1,619,252			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 85.8% 02/15/2022							DRILL METHOD: NW Casing w/ SPT			HAMMER TYPE: AUTOMATIC					
DRILLER: Austin Fowler				START DATE: 03/02/23			COMP. DATE: 03/02/23			SURFACE WATER DEPTH: 3.7ft					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
295															
290															
285															
280															
275															
270	270.0	0.0													270.0 MUDLINE 0.0
265	266.5	3.5													269.5 ALLUVIAL TAN, BROWN, AND BLACK, CSE. SANDY SILT W/TR. CLAY AND GRAVEL 6.5
260	261.5	8.5													263.5 RESIDUAL TAN, BEIGE, AND BLACK, SILT W/LITTLE ROCK FRAGS. 6.5
															261.5 WEATHERED ROCK (ARGILLITE) 8.5
															257.5 NON-CRYSTALLINE ROCK (ARGILLITE) 12.5
															Boring Terminated WITH STANDARD PENETRATION TEST AND TRICONE REFUSAL at Elevation 257.5 ft IN NONCRYSTALLINE ROCK (ARGILLITE)

B2-A
DEPTH: 13.6 to 33.6 ft

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-

0 HR. 0.0

COLLAR ELEV.: 270.4 ft

TOTAL DEPTH: 33.6 ft

NORTHING: 511,076

EASTING: 1,619,246

24 HR. FIAD

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

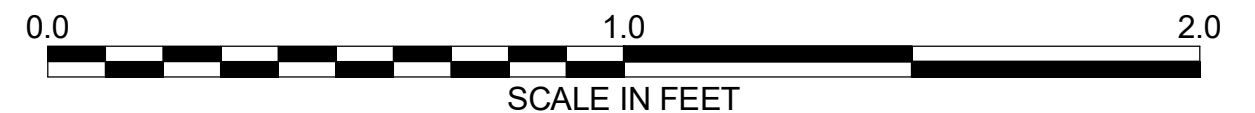
TOTAL RUN: 20.0 ft

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	ROD (ft) %		REC. (ft) %	ROD (ft) %				
256.8											Begin Coring @ 13.6 ft		
255	256.8	13.6	2.5	1:52/1.0	(2.5)	(0.5)		(20.0)	(7.5)		256.8	13.6	
	254.3	16.1		2:34/1.0	100%	20%		100%	38%		NON-CRYSTALLINE ROCK		
			5.0	2:05/0.5			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	(5.0)	(2.6)							
				2:54/1.0	100%	52%							
				3:04/1.0									
250	249.3	21.1		3:40/1.0									
				3:44/1.0									
			5.0	2:45/1.0	(5.0)	(2.7)							
				3:30/1.0	100%	54%							
245	244.3	26.1		3:23/1.0									
				2:43/1.0									
				3:01/1.0									
			5.0	2:34/1.0	(5.0)	(0.5)							
				2:23/1.0	100%	10%							
				2:55/1.0									
240	239.3	31.1		2:23/1.0									
				2:27/1.0									
	236.8	33.6	2.5	2:33/1.0	(2.5)	(1.2)							
				3:47/1.0	100%	48%							
				1:07/0.5							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/ft3)	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-02	16.1' - 16.6'	ARGILLITE	161.0	14,720

ICDOT CORE W-PHOTO_BR0063_GEO_BRD087_CATLIN.GPJ_CATLIN.GDT_03/21/23



222291		<i>PROJECT REFERENCE</i>	<i>SHEET</i>
		BR-0063	12

NCDOT BORE DOUBLE BR0063 GEO BRDG87 CATLIN,GPJ NCDOT CATLIN,GDT 04/05/23

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-		0 HR.	15.8		
COLLAR ELEV.: 292.3 ft			TOTAL DEPTH: 18.5 ft			NORTHING: 511,029			EASTING: 1,619,373		24 HR.	12.9		
DRILL RIG/HAMMER EFF./DATE: CAT2002 MOBILE B-57 92.3% 12/23/22						DRILL METHOD: H.S. AUGERS			HAMMER TYPE: AUTOMATIC					
DRILLER: T. Jason White			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. #	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100	RESULT			
295														
	292.3	0.0												292.3 LAND SURFACE 0.0
290			2	2	3						SS-20	M		RESIDUAL RED, LIGHT BLUE, BROWN, AND GRAY, OXIDIZED SILTY TO SANDY CLAY
	288.8	3.5									A-6(12)	M		
			8	10	10									
285														
	283.8	8.5												
			8	15	21									
280														
	278.8	13.5												280.8 RED, BLUE, ORANGE, PINK, AND BLACK, CLAYEY SILT WITH TR. ROCK FRAGS. AND SAND 11.5
	276.3	16.0	5	6	7						SS-11	M		276.3 16.0
											A-4(5)	M		
275			100/0.2											273.8 WEATHERED ROCK (ARGILLITE) 18.5
	273.8	18.5												
			60/0.0											Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 273.8 ft ON NON-CRYSTALLINE ROCK (ARGILLITE)

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) to	6.0	5.0	0.0	3.5	23.5	3.5	8.5	3.5	8.5	0.0	13.5				
	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

Michael S. Hudson

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