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REFERENCE: BR-0070

PROJECT: 67070

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CASWELL
PROJECT DESCRIPTION REPLACEMENT OF BRIDGE NO. 61
OVER HOGAN'S CREEK ON NC 86 BETWEEN SR
1300 AND SR 1500 AND CONSTRUCT CONNECTOR
ROADS FOR NEW BRIDGE
SITE DESCRIPTION BRIDGE NO. 61 OVER HOGANS CREEK
ON HWY NC 86

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2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
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5-6	CROSS SECTIONS
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16	SITE PHOTOGRAPH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0070	1	17

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 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.

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DATE DECEMBER 2021



STEWART

12/15/2021



DocuSign by Donald W. Brown Jr.

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SIGNATURE

DATE

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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
<p>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></p>										<p>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.</p>										<p>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:</p>										<p>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 DISLOADED 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 (RQD) - 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.</p>									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
<p>GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p>										<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>										<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>									
MINERALOGICAL COMPOSITION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)										WEATHERING									
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>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.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>										<p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV SLI.): 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. SLIGHT (SLI.): 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. MODERATE (MOD.): 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. MODERATELY SEVERE (MOD. SEV.): 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.): 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> VERY SEVERE (IV SEV.): 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> COMPLETE: 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.</p>									
COMPRESSION										PERCENTAGE OF MATERIAL										GROUND WATER										MISCELLANEOUS SYMBOLS									
<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE</p>										<p>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</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p>									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS										SOIL MOISTURE - CORRELATION OF TERMS									
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053</p>										<p>UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>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 HI. - 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 - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT Wg - DRY UNIT WEIGHT</p>										<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>									
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										FRACATURE SPACING										BEDDING									
<p>NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH</p>										<p>DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2, 15/16" STEEL TEETH TRICONE TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST</p>										<p>VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET</p>										<p>VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET</p>									
COLOR										INDURATION										NOTES:										FRACATURE SPACING									
<p>DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>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.</p>										<p>EXISTING GROUND SURFACE SHOWN WAS TAKEN FROM ELECTRONIC TIN FILE (DATED FEBRUARY 2019). FIAD: FILLED IMMEDIATELY AFTER DRILLING</p>										<p>TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET</p>									
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PLASTICITY										INDURATION																													

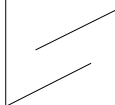
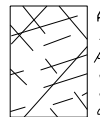
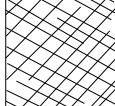
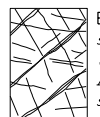
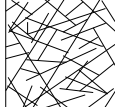




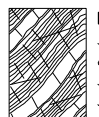


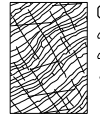

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

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

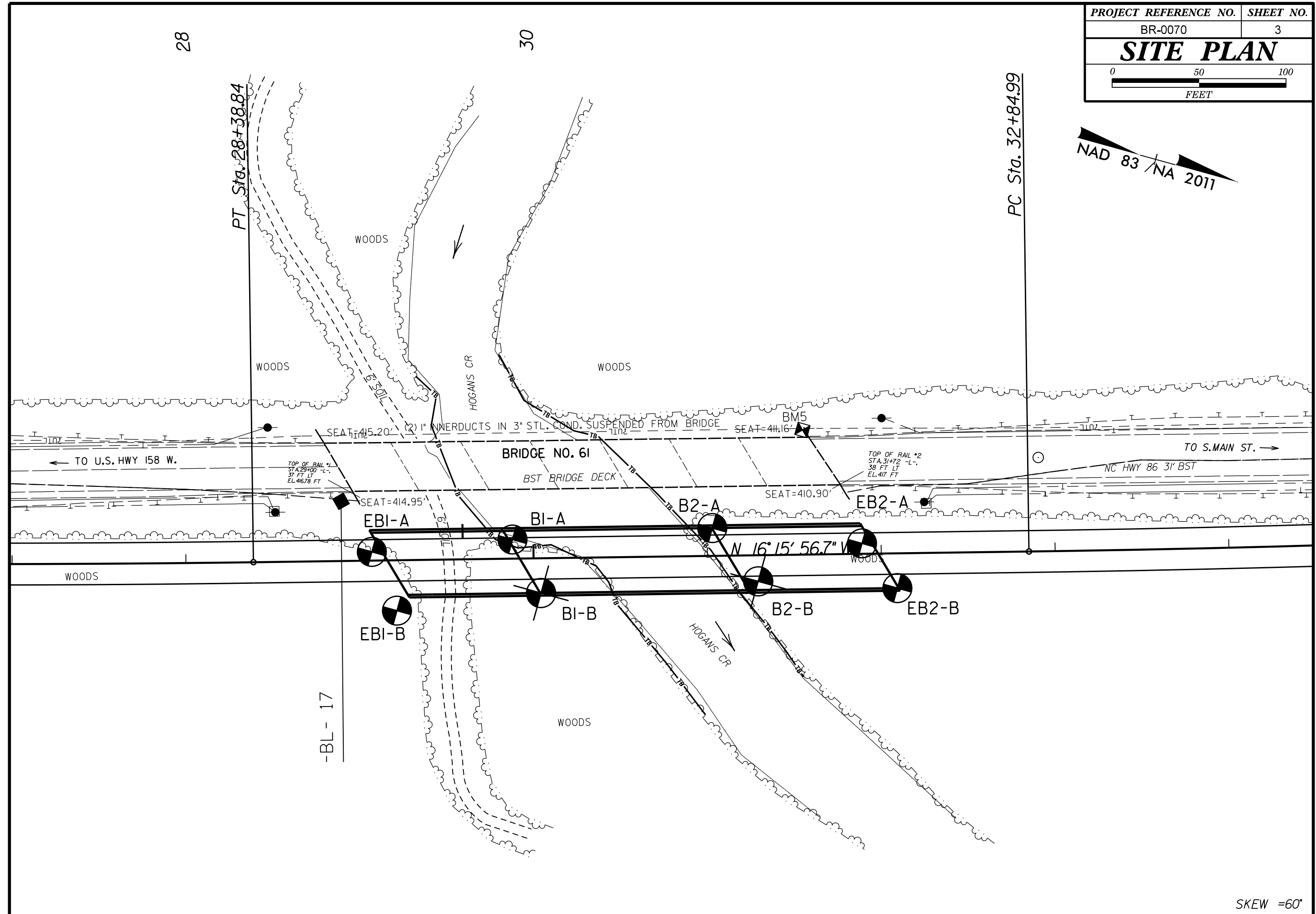
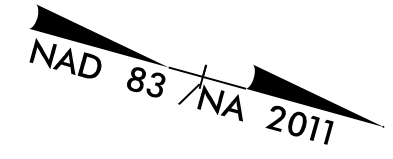
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

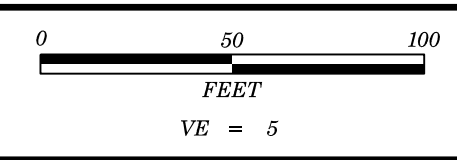
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)					
<p>From the lithology, structure and surface conditions 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>		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	<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>	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		
		Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings		Very Rough, fresh unweathered surfaces	Rough, slightly weathered surfaces	Smooth, moderately weathered and altered surfaces	Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings		
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE							
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A		A. Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70					
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80						B. Sandstone with thin inter-layers of siltstone	60					
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70					C. Sandstone and siltstone in similar amounts		50				
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60					D. Siltstone or silty shale with sandstone layers			40			
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces			50				E. Weak siltstone or clayey shale with sandstone layers				30		
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes			40				F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
				30				G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
				20				H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.						
				10										
		N/A	N/A											

→ Means deformation after tectonic disturbance

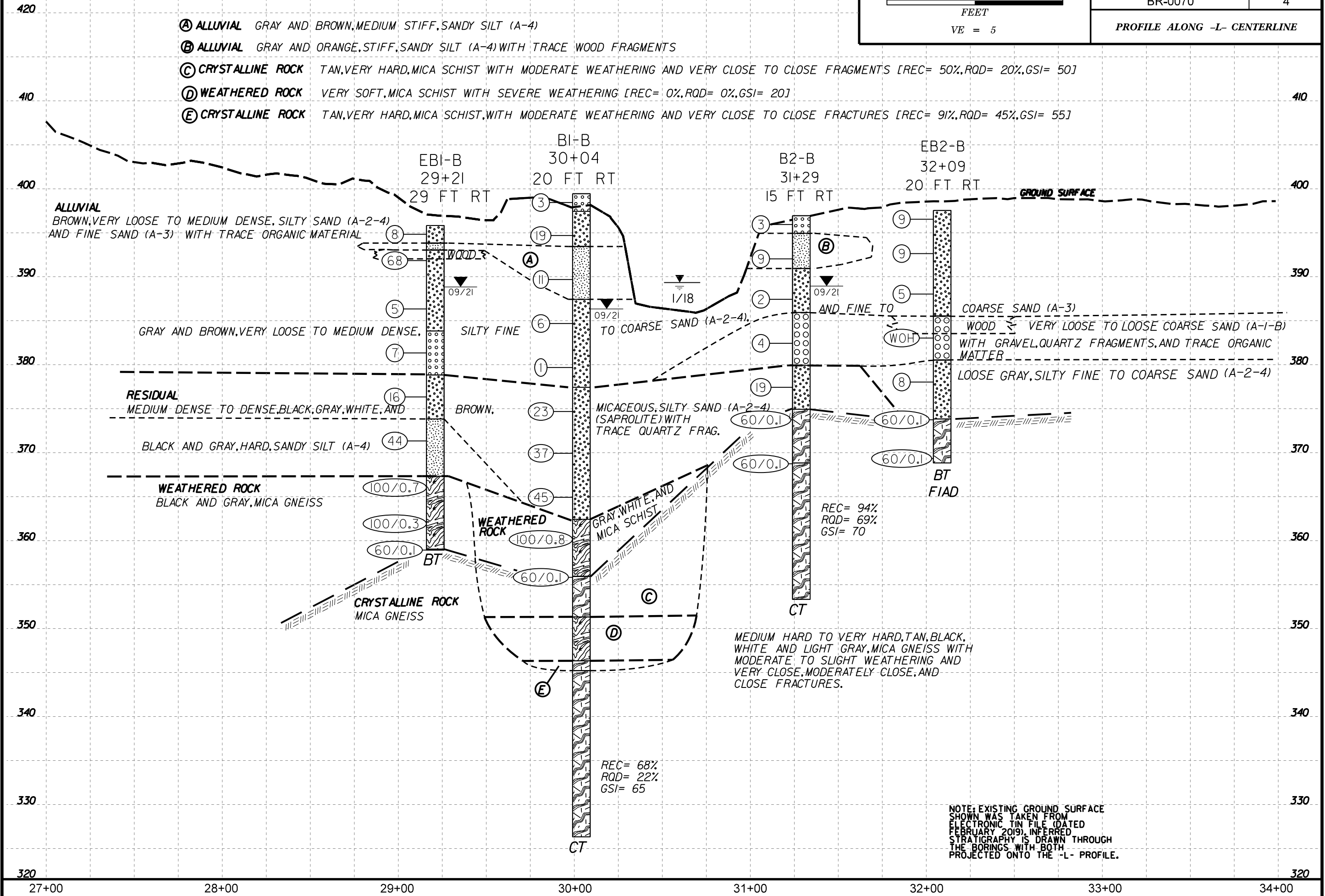
PROJECT REFERENCE NO.	SHEET NO.
BR-0070	3
SITE PLAN	
 0 50 100 FEET	



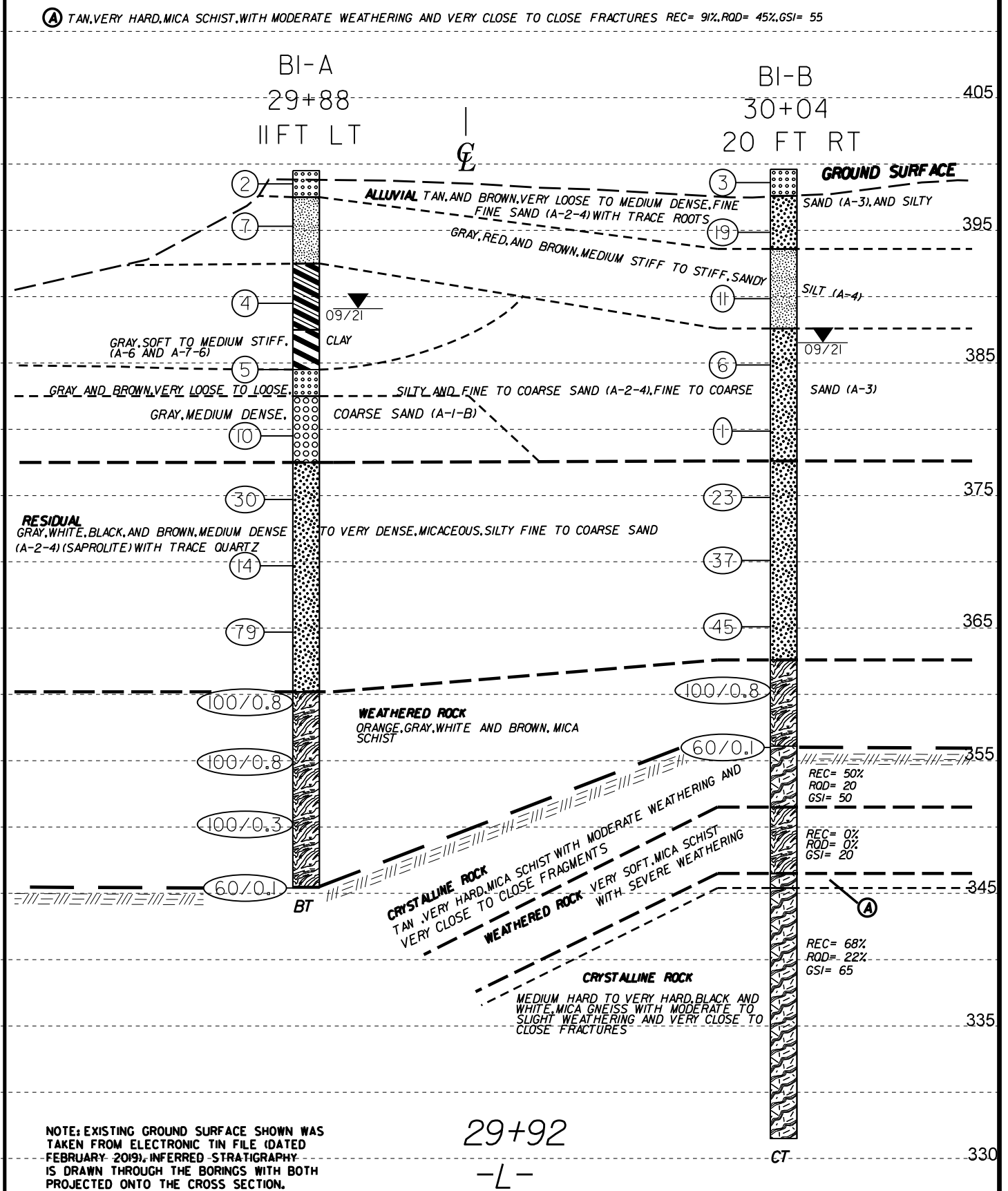
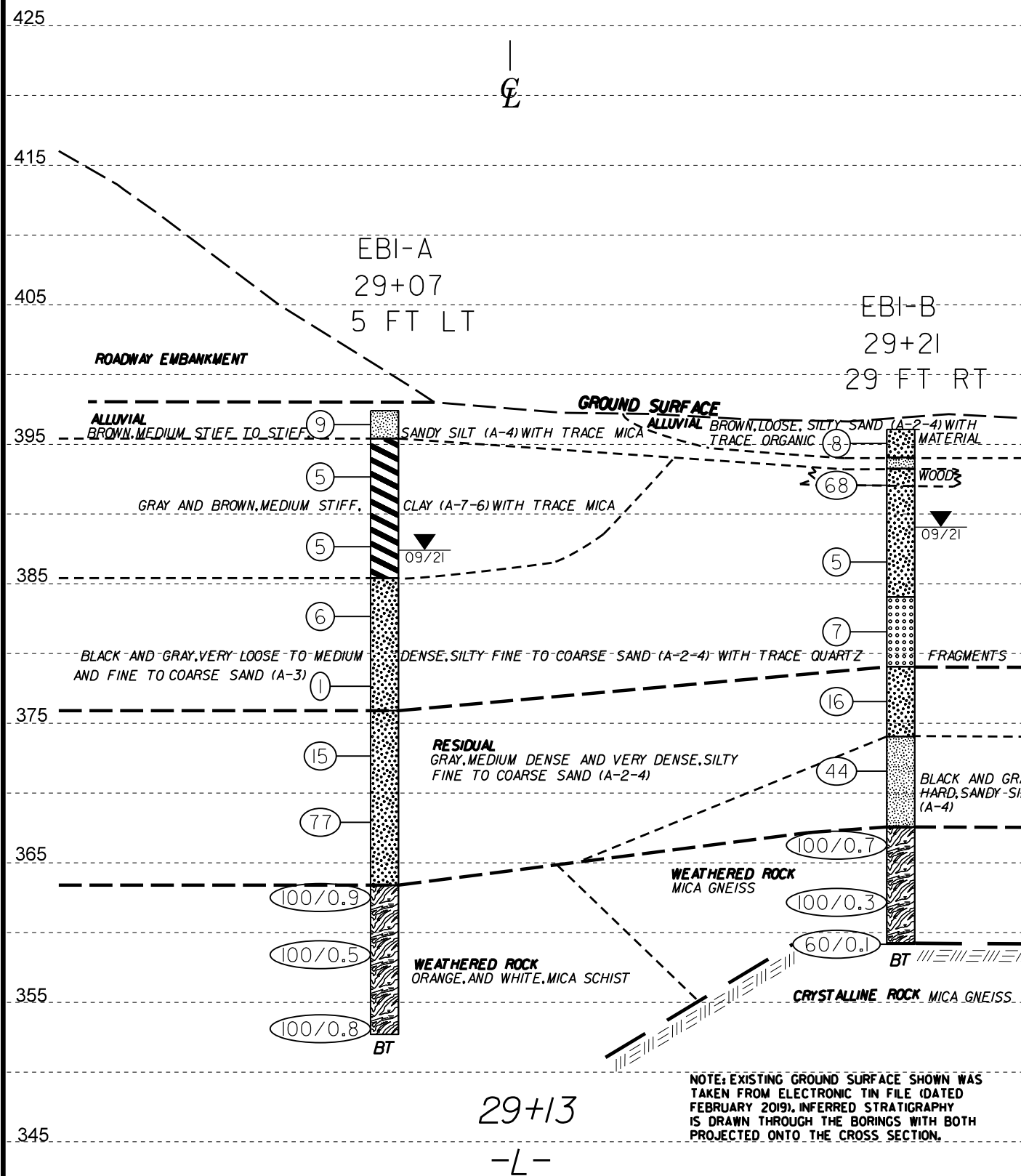
SKEW =60°



PROJECT REFERENCE NO.	SHEET NO.
BR-0070	4
PROFILE ALONG -L- CENTERLINE	



NOTE: EXISTING GROUND SURFACE SHOWN WAS TAKEN FROM ELECTRONIC TIN FILE (DATED FEBRUARY 2019). INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE -L- PROFILE.



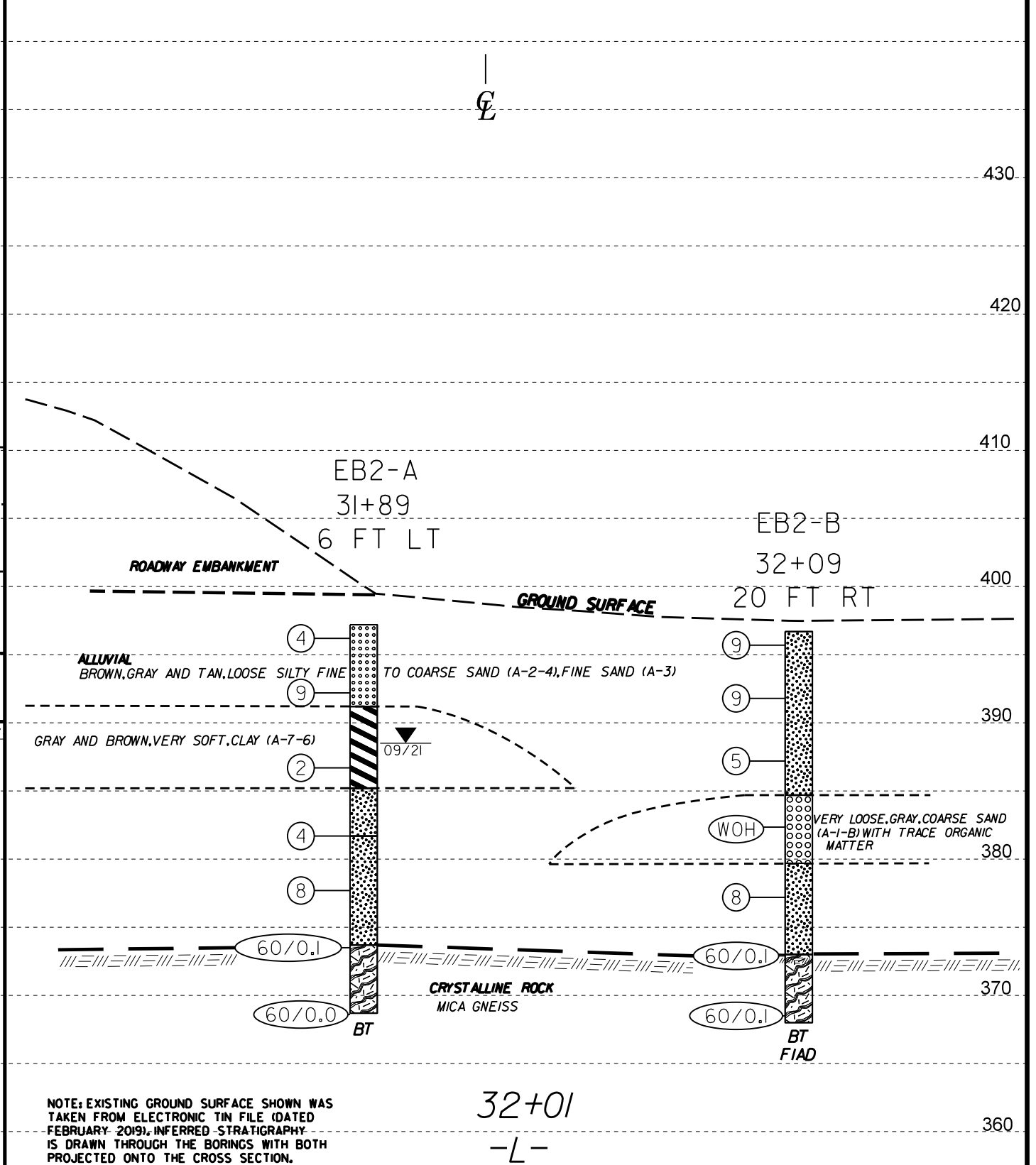
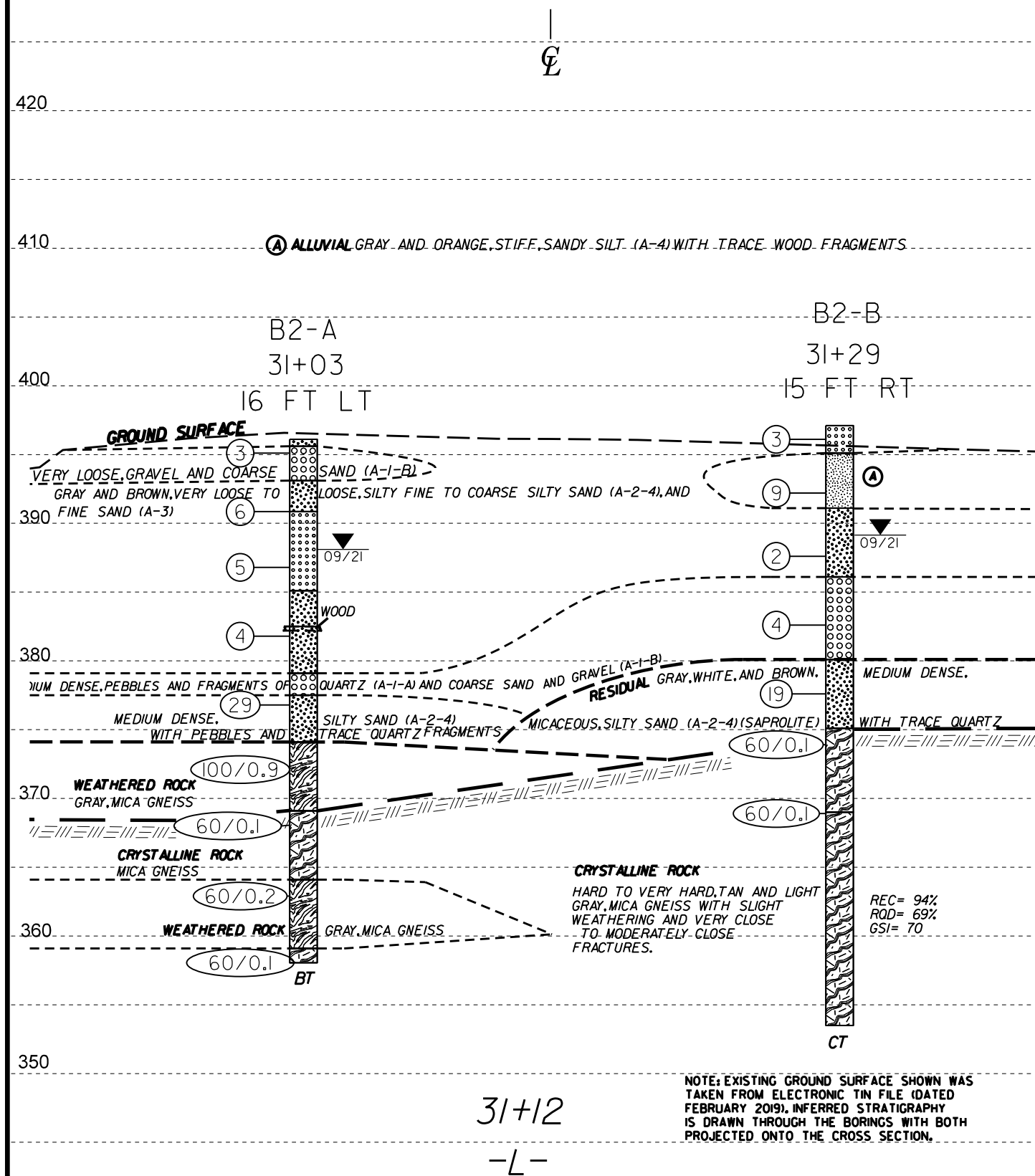
VE = 1.0

CROSS SECTION AT END BENT #1



VE = 1.0

CROSS SECTION AT BENT #1



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.	
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)
BORING NO. EB1-A		STATION 29+07		OFFSET 5 ft LT		ALIGNMENT L	
COLLAR ELEV. 397.4 ft		TOTAL DEPTH 44.7 ft		NORTHING 1,002,650		EASTING 1,885,815	
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER McCain, P.		START DATE 09/24/21		COMP. DATE 09/24/21		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
400	397.4	0.0												397.4	GROUND SURFACE	0.0
395	393.7	3.8	3	3	6	9						M	ALLUVIAL STIFF, BROWN, SANDY SILT (A-4) WITH TRACE MICA	2.0		
390	388.7	8.8	2	2	3	5						Sat.	SOFT, GRAY AND BROWN, CLAY (A-7-6) WITH TRACE MICA			
385	383.7	13.8	WOH	2	3	5						Sat.				
380	378.7	18.8	3	3	3	6						Sat.	VERY LOOSE TO LOOSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	12.0		
375	373.7	23.8	3	1	0	1						Sat.	RESIDUAL MEDIUM DENSE AND VERY DENSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	21.5		
370	368.9	28.5	4	7	8	15						M				
365	363.9	33.5	31	31	46	77						M				
360	358.9	38.5	22	41	59/0.4	100/0.9							WEATHERED ROCK WHITE AND ORANGE, MICA SCHIST, SAMPLED AS SILTY SAND (A-2-4) WITH TRACE MICA	34.0		
355	353.9	43.5	100/0.5			100/0.5										
			100/0.8			100/0.8										
														352.7	Boring Terminated at Elevation 352.7 ft in Weathered Rock (Mica Schist)	44.7

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.	
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)
BORING NO. EB1-B		STATION 29+21		OFFSET 29 ft RT		ALIGNMENT L	
COLLAR ELEV. 396.0 ft		TOTAL DEPTH 36.9 ft		NORTHING 1,002,674		EASTING 1,885,829	
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER McCain, P.		START DATE 09/23/21		COMP. DATE 09/23/21		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
400	396.0	0.0												396.0	GROUND SURFACE	0.0
395	393.0	3.0	0	4	4	8						W	ALLUVIAL LOOSE, BROWN, SILTY SAND (A-2-4) WITH TRACE ORGANIC MATERIAL	2.0		
390	388.5	8.5	24	24	44	68						W	MEDIUM STIFF, BROWN, SANDY SILT (A-4)	3.7		
385	387.5	8.5	2	3	2	5						W	WOOD	5.0		
380	382.5	13.5	3	3	4	7						Sat.	LOOSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)			
375	377.5	18.5	10	10	6	16						Sat.	RESIDUAL MEDIUM DENSE, BLACK AND GRAY, SILTY SAND (A-2-4) WITH TRACE QUARTZ FRAGMENTS	17.0		
370	372.5	23.5	4	10	34	44						Sat.	HARD, BLACK AND GRAY, SANDY SILT (A-4)	22.0		
365	367.5	28.5	78	22/0.2		100/0.7							WEATHERED ROCK BLACK AND GRAY, MICA GNEISS, SAMPLED AS SILTY SAND (A-2-4) WITH TRACE CLAY	28.5		
360	362.4	33.6	100/0.3			100/0.3										
	359.2	36.8	60/0.1			60/0.1										
														359.1	CRYSTALLINE ROCK MICA GNEISS, NO RECOVERY	36.9
															Boring Terminated with Standard Penetration Test Refusal at Elevation 359.1 ft in Crystalline Rock (Mica Gneiss)	

NCDOT BORE DOUBLE BR0070 GEO_BRDG0061_BH.GPJ NC_DOT.GDT 11/22/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1	TIP BR-0070	COUNTY CASWELL	GEOLOGIST Ferreira, E.
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500			GROUND WTR (ft)
BORING NO. B1-A	STATION 29+88	OFFSET 11 ft LT	ALIGNMENT L
COLLAR ELEV. 399.5 ft	TOTAL DEPTH 54.1 ft	NORTHING 1,002,726	EASTING 1,885,787
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER McCain, P.	START DATE 09/23/21	COMP. DATE 09/23/21	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
400	399.5	0.0												399.5	0.0	GROUND SURFACE
	396.3	3.2	WOH	WOH	2							M		397.5	2.0	ALLUVIAL VERY LOOSE, TAN, FINE, SAND (A-3) WITH TRACE ROOTS
395			4	3	4							M		392.5	7.0	MEDIUM STIFF, RED AND BROWN, SANDY SILT (A-4)
																SOFT, GRAY, SANDY CLAY (A-6)
390	390.5	9.0	0	2	2							Sat.		387.5	12.0	MEDIUM STIFF, GRAY, CLAY (A-7-6)
														384.5	15.0	LOOSE, GRAY, FINE TO COARSE SAND (A-3)
385	385.5	14.0	WOR	2	3							Sat.		382.5	17.0	MEDIUM DENSE, GRAY, COARSE SAND (A-1-B)
														377.5	22.0	RESIDUAL MEDIUM DENSE TO VERY DENSE, GRAY AND BLACK, SILTY FINE TO COARSE SAND (A-2-4)
380	380.5	19.0	3	5	5							Sat.				
375	375.7	23.8	7	16	14							W				
370	370.7	28.8	5	5	9							W				
365	365.7	33.8	20	40	39							W				
360	360.7	38.8	28	56	44/0.3							W		360.2	39.3	WEATHERED ROCK ORANGE, MICA SCHIST, SAMPLED AS SILTY FINE TO COARSE SAND (A-2-4)
355	355.7	43.8	69	31/0.3								W				
350	350.5	49.0	100/0.3									W				
	345.5	54.0	60/0.1											345.5	54.0	CRYSTALLINE ROCK ORANGE MICA SCHIST Boring Terminated with Standard Penetration Test Refusal at Elevation 345.4 ft in Crystalline Rock (Mica Schist)
														345.4	54.1	

NCDOT BORE DOUBLE BR0070_GEO_BRDG0061_BH.GPJ NC_DOT.GDT 11/22/21

CORE PHOTOGRAPHS

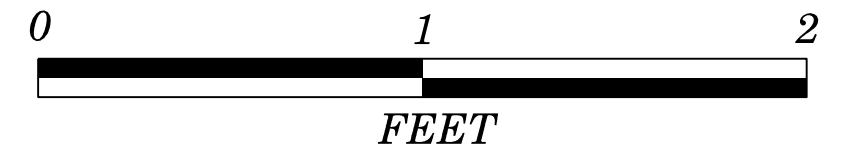
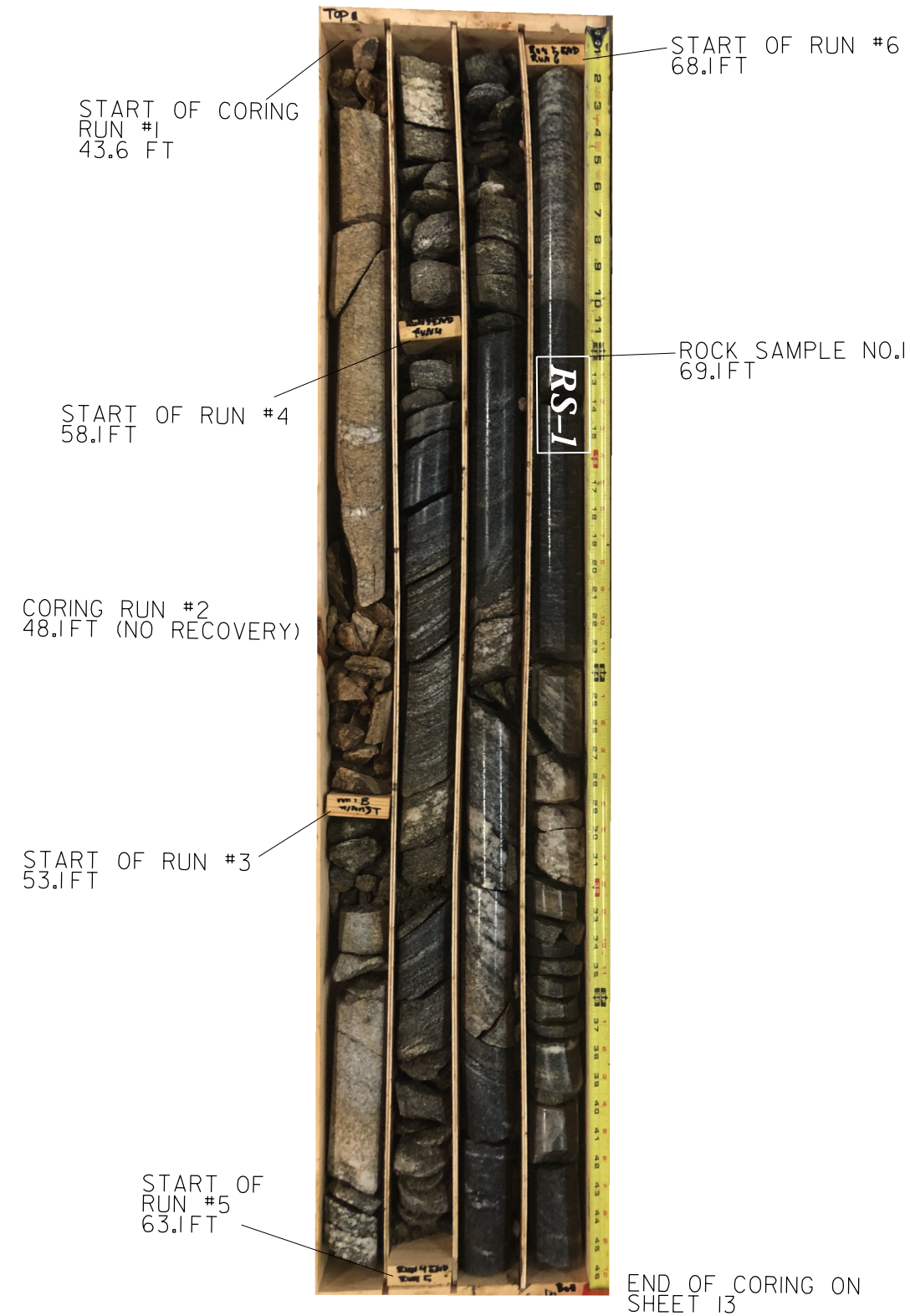
PROJECT REFERENCE NO.

SHEET NO.

BR-0070

10

BORING BI-B
BI-B: STA. 30+04 -L-, 20 FT RT
CORE DEPTH: 43.6 FT TO 73.1 FT



GEOTECHNICAL BORING REPORT BORE LOG

WBS 67070.1.1				TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.									
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)										
BORING NO. B2-A			STATION 31+03		OFFSET 16 ft LT		ALIGNMENT L		0 HR.	N/A							
COLLAR ELEV. 396.1 ft			TOTAL DEPTH 38.1 ft		NORTHING 1,002,835		EASTING 1,885,750		24 HR.	8.0							
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021					DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER McCain, P.			START DATE 09/29/21		COMP. DATE 09/29/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	DEPTH (ft)	
400																	
395	396.1	0.0	1	1	2									396.1	0.0	GROUND SURFACE	
														388.6	6.5	ALLUVIAL	
														393.1	3.0	VERY LOOSE, GRAY, SILTY SAND (A-2-4)	
	391.9	4.3	3	3	3									390.9	5.3	VERY LOOSE, GRAVEL AND COARSE SAND (A-1-B)	
390																LOOSE, GRAY, SILTY SAND (A-2-4)	
																LOOSE, BROWN, FINE SAND (A-3)	
	387.8	8.3	2	3	2												
385														385.1	11.0		
	382.8	13.3	WOH		2									382.5	13.6		
380														382.2	13.9		WOOD
														379.1	17.0		
	377.8	18.3	9	15	14									377.5	18.6		
375														374.1	22.0		
	373.0	23.1	100/0.9														
370																	
	368.1	28.0	60/0.1											369.1	27.0		
365																	
	363.1	33.0	60/0.2											364.1	32.0		
360																	
	358.1	38.0	60/0.1											359.1	37.0		
														358.1	38.1		
<p style="text-align: center;">CRYSTALLINE ROCK GRAY, MICA GNEISS, SAMPLED AS SILTY SAND (A-2-4)</p> <p style="text-align: center;">Boring Terminated with Standard Penetration Test Refusal at Elevation 358.1 ft in Crystalline Rock (Mica Gneiss)</p>																	

NCDOT BORE DOUBLE BR0070_GEO_BRDG0061_BH.GPJ NC_DOT.GDT 11/22/21

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.									
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)								
BORING NO. B2-B		STATION 31+29		OFFSET 15 ft RT		ALIGNMENT L									
COLLAR ELEV. 397.1 ft		TOTAL DEPTH 43.6 ft		NORTHING 1,002,868		EASTING 1,885,772									
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER McCain, P.		START DATE 09/28/21		COMP. DATE 09/28/21		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					
400															
	397.1	0.0	1	1	2									397.1	0.0
395														395.1	2.0
	393.2	3.9	5	5	4									391.1	6.0
390														386.1	11.0
	388.6	8.5	2	0	2										
385														380.1	17.0
	383.6	13.5	2	2	2										
380														375.1	22.0
	378.6	18.5	5	9	10										
375														369.0	28.1
	374.1	23.0													
370															
	369.0	28.1													
365															
360															
355															

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.					
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)				
BORING NO. B2-B		STATION 31+29		OFFSET 15 ft RT		ALIGNMENT L					
COLLAR ELEV. 397.1 ft		TOTAL DEPTH 43.6 ft		NORTHING 1,002,870		EASTING 1,885,777					
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER McCain, P.		START DATE 09/28/21		COMP. DATE 09/28/21		SURFACE WATER DEPTH N/A					
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
368.91											
	368.9	28.2	2.4	2:36/1.0	(2.0)	(1.4)		(14.4)	(10.7)		Begin Coring @ 28.2 ft
	366.5	30.6	5.0	3:27/1.0	83%	59%		94%	69%		CRystalline Rock HARD TO VERY HARD, TAN AND LIGHT GRAY, MICA GNEISS WITH SLIGHT WEATHERING AND VERY CLOSE TO MODERATELY CLOSE FRACTURES. [GSI=70]
365				1:44/0.4	(4.4)	(3.9)					
				3:34/1.0		(3.9)					
	361.5	35.6	5.0	3:01/1.0	88%	78%					
				3:46/1.0		(3.7)					
360				6:14/1.0	(5.0)	(3.7)					
				7:42/1.0	100%	73%					
				2:47/1.0		(3.0)					
	356.5	40.6	3.0	1:58/1.0		(1.7)					
				3:04/1.0		56%					
355				2:52/1.0	(3.0)	(1.7)					
				2:25/1.0	100%	56%					
	353.5	43.6	3.0	2:10/1.0							Boring Terminated at Elevation 353.5 ft in Crystalline Rock (Mica Gneiss)

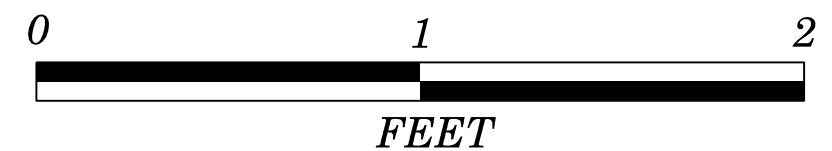
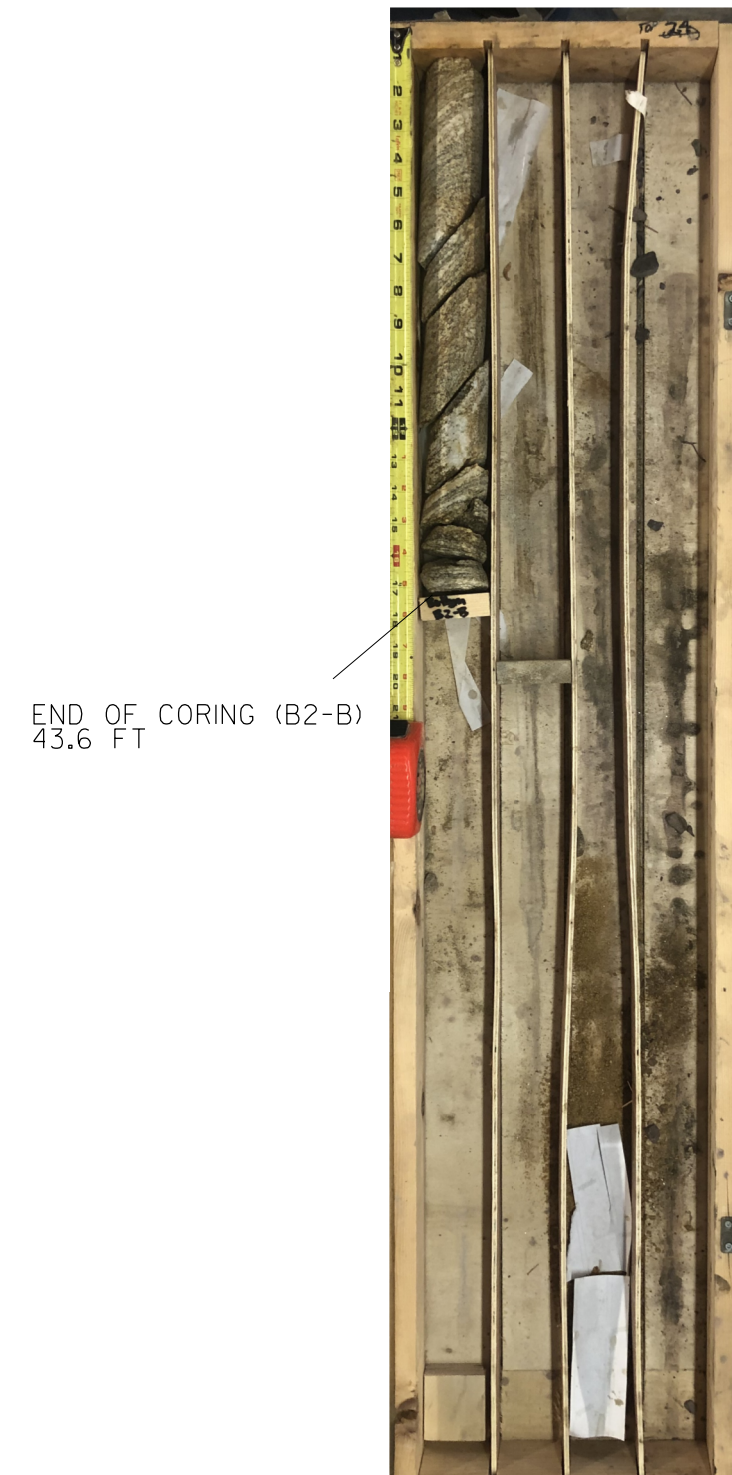
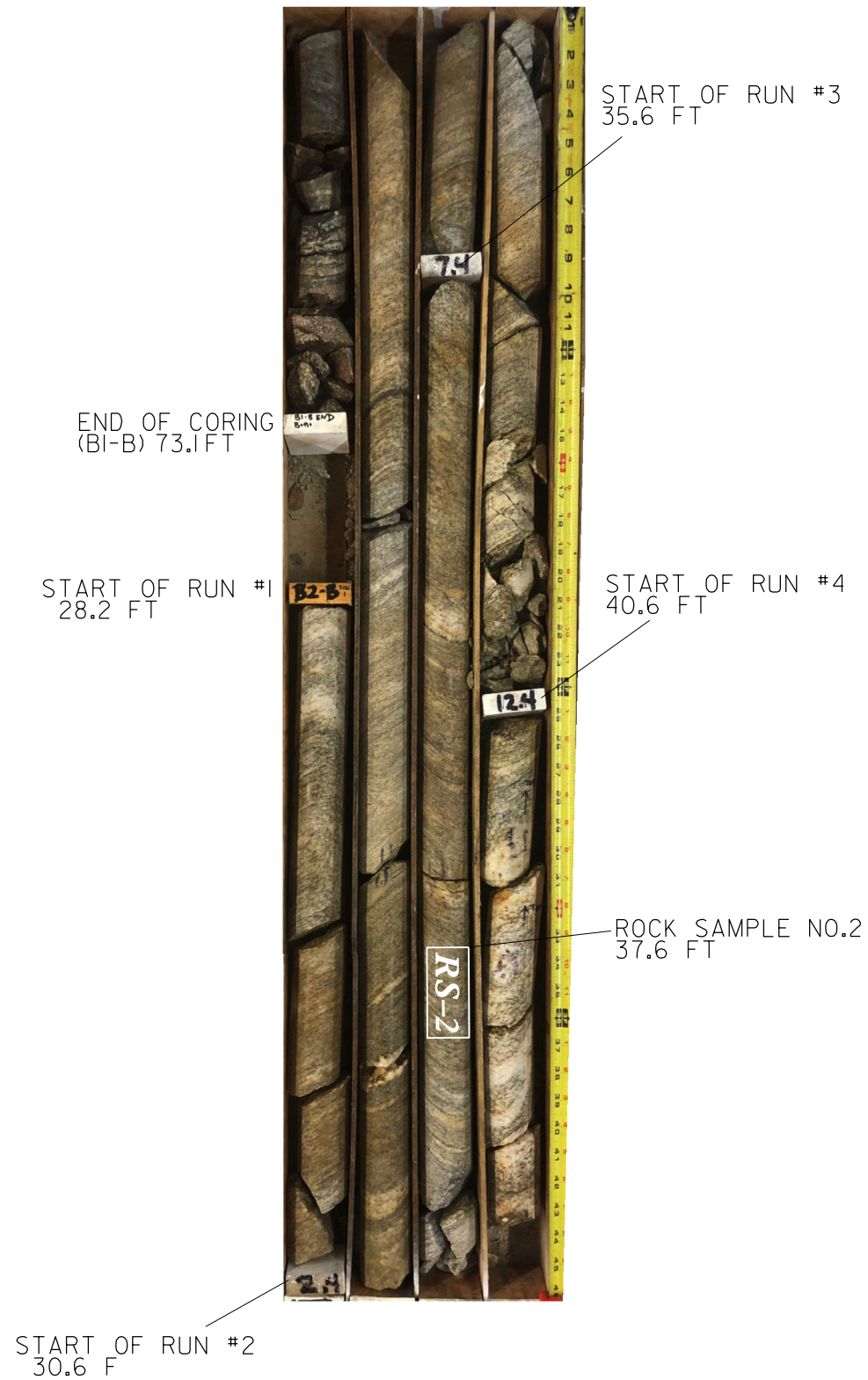
NCDOT BORE DOUBLE BR0070_GEO_BRD0061_BH.GPJ NC_DOT.GDT 10/28/21

BORING BI-B, FIRST CORE IN BOX

CORE PHOTOGRAPHS

BORING B2-B
STA. 31+29 -L-, 15 FT RT
CORE DEPTH: 28.2 FT TO 43.6 FT

BORING B2-B CONT., LAST CORE SHOWN IN BOX



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.										
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 31+89		OFFSET 6 ft LT		ALIGNMENT L										
COLLAR ELEV. 398.2 ft		TOTAL DEPTH 28.5 ft		NORTHING 1,002,921		EASTING 1,885,738										
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER McCain, P.		START DATE 09/29/21		COMP. DATE 09/29/21		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						
400	398.2	0.0												398.2	GROUND SURFACE	0.0
			WOH	2	2								D		ALLUVIAL VERY LOOSE TO LOOSE, BROWN AND TAN, FINE SAND (A-3)	
395	394.2	4.0												392.2	VERY SOFT, GRAY AND BROWN, CLAY (A-7-6)	6.0
				3	5	4							Sat.			
390	388.7	9.5		2	1	1								386.2	VERY LOOSE, GRAY, SILTY COARSE SAND (A-2-4)	12.0
														382.7	WOOD	15.5
385	383.7	14.5	WOH	2	2									381.2	LOOSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	17.0
380	379.7	18.5	WOH	3	5									374.7	CRYSTALLINE ROCK MICA GNEISS, NO RECOVERY	23.5
375	374.7	23.5												369.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 369.7 ft in Crystalline Rock (Mica Gneiss)	28.5
370	369.7	28.5														

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.										
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 32+09		OFFSET 20 ft RT		ALIGNMENT L										
COLLAR ELEV. 397.7 ft		TOTAL DEPTH 28.7 ft		NORTHING 1,002,945		EASTING 1,885,755										
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER McCain, P.		START DATE 09/30/21		COMP. DATE 09/30/21		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						
400	397.7	0.0												397.7	GROUND SURFACE	0.0
				2	3	6									ALLUVIAL LOOSE, BROWN, SILTY FINE SAND (A-2-4)	
395	393.8	3.9		3	4	5								389.2	VERY SOFT, GRAY AND BROWN, CLAY (A-7-6)	6.0
390	389.2	8.5		3	2	3								386.2	VERY LOOSE, GRAY, SILTY COARSE SAND (A-2-4)	12.0
														382.7	WOOD	15.5
385	384.2	13.5	WOH	WOH	WOH									381.2	LOOSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	17.0
380	379.2	18.5		2	3	5								374.7	CRYSTALLINE ROCK MICA GNEISS, NO RECOVERY	23.5
375	374.0	23.7												369.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 369.7 ft in Crystalline Rock (Mica Gneiss)	28.5
370	369.6	28.1														

NCDOT BORE DOUBLE BR0070_GEO_BRD0061_BH.GPJ NC_DOT.GDT 11/22/21

LAB TEST RESULTS



**UNCONFINED COMPRESSIVE STRENGTH
OF INTACT ROCK CORE SPECIMEN**
ASTM D7012

WBS No.: 67070.1.1

Test Date: 10/14/2021

TIP No.: BR-0070

Tested By: J. Evans

County: Caswell

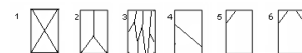
Description: Bridge No. 0061 over Hogan's Creek on NC 86 between SR 1300 and SR 1500

Test No.	1	2		
Boring ID	B1-B	B2-B		
Station	30+04	31+28		
Sample ID	RS-1	RS-2		
Sample Depth, ft	69.1	37.6		
Core Length #1, in.	3.980	3.980		
Core Length #2, in.	3.980	3.980		
Core Length #3, in.	3.970	3.990		
Avg. Core Length, in.	3.977	3.983		
Core Dia. #1, in.	1.975	1.975		
Core Dia. #2, in.	1.975	1.975		
Avg. Core Dia., in.	1.975	1.975		
Length/Dia. Ratio	2.02	2.02		
X-Sectional Area, in ²	3.06	3.06		
Weight, lb	1.20	1.15		
Unit Weight, pcf	170.2	162.8		
Break Type	2	2		
Load at Failure, lb	18,735	25,528		
Correction Factor	1.00	1.00		
Comp. Strength, psi	6,120	8,340		
Comp. Strength, ksf	880	1,200		

Rock Descriptions:

Test 1: Black and white, mica gneiss

Test 2: Tan and light gray, mica gneiss

Break Types:

SITE PHOTOGRAPH

BRIDGE NO. 61 OVER HOGANS CREEK ON HWY NC 86

