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REFERENCE: B-4968

PROJECT: 40162

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY LEE
PROJECT DESCRIPTION REPLACE BRIDGE NO.10 OVER
DEEP RIVER ON US 15-501/NC 87

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4968	1	21

CAUTION NOTICE

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

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

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

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

PERSONNEL

SUMMIT DRILLING

A. SUTTLE

INVESTIGATED BY ECS SOUTHEAST, LLP

DRAWN BY Q. ESTEBAN

CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS SOUTHEAST, LLP

DATE JULY 2018

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DocuSigned by:

Michael J. Walko 8/6/2018

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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

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 208, 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

Table with columns for GENERAL CLASS., GRANULAR MATERIALS (<= 35% PASSING #200), SILT-CLAY MATERIALS (> 35% PASSING #200), ORGANIC MATERIALS, and various soil types like A-1-a, A-1-b, etc.

PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

Table mapping soil types to consistency/dense ness levels like VERY LOOSE, MEDIUM DENSE, VERY DENSE, etc.

TEXTURE OR GRAIN SIZE

Table showing U.S. STD. SIEVE SIZE OPENING (MM) and corresponding soil types like BOULDER, COBBLE, GRAVEL, etc.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating soil moisture scale (Atterberg limits) with field moisture description like SATURATED, WET, MOIST, DRY.

PLASTICITY

Table showing PLASTICITY INDEX (PI) and DRY STRENGTH for different soil types.

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-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

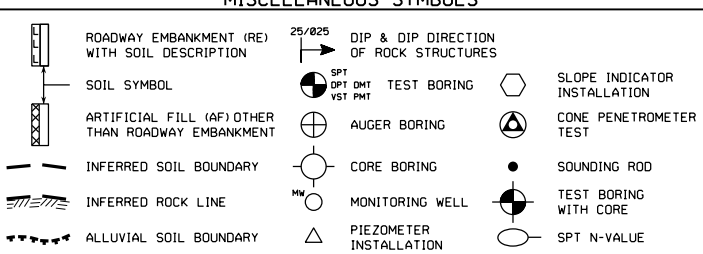
PERCENTAGE OF MATERIAL

Table showing percentages for ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, and OTHER MATERIAL.

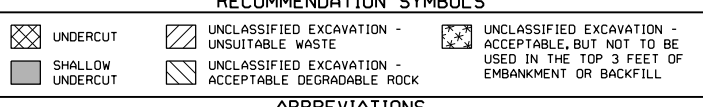
GROUND WATER

Water level symbols and descriptions: WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SPRING OR SEEP.

MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table listing abbreviations for AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, etc.

EQUIPMENT USED ON SUBJECT PROJECT

Form for listing equipment used, including DRILL UNITS (CME-45C, CME-55, etc.), ADVANCING TOOLS (CLAY BITS, AUGERS, etc.), HAMMER TYPE (AUTOMATIC, MANUAL), CORE SIZE, HAND TOOLS (POST HOLE DIGGER, AUGER, etc.), and 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:

Table describing WEATHERED ROCK (WR), CRYSTALLINE ROCK (CR), NON-CRYSTALLINE ROCK (NCR), and COASTAL PLAIN SEDIMENTARY ROCK (CP).

WEATHERING

Descriptions of weathering levels: FRESH, VERY SLIGHT (V SLI), SLIGHT (SLI), MODERATE (MOD), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV.), VERY SEVERE (V SEV.), COMPLETE.

ROCK HARDNESS

Descriptions of rock hardness levels: VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT.

FRACTURE SPACING

Table showing FRACTURE SPACING and BEDDING terms and thicknesses.

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. Descriptions include FRIABLE, MODERATELY INDURATED, INDURATED, and EXTREMELY INDURATED.

TERMS AND DEFINITIONS

DEFINITIONS for ALLUVIUM (ALLUV.), AQUIFER, ARENACEOUS, ARGILLACEOUS, ARTESIAN, CALCAREOUS (CALC.), COLLUVIUM, CORE RECOVERY (REC.), DIKE, DIP, DIP DIRECTION (DIP AZIMUTH), FAULT, FISSILE, FLOAT, FLOOD PLAIN (FP), FORMATION (FM), JOINT, LEDGE, LENS, MOTTLED (MOT.), PERCHED WATER, RESIDUAL (RES.) SOIL, ROCK QUALITY DESIGNATION (ROQ), SAPROLITE (SAP.), SILL, SLICKENSIDE, STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT), STRATA CORE RECOVERY (SREC.), STRATA ROCK QUALITY DESIGNATION (SROD), TOPSOIL (TS).

BENCH MARK: BL 102: N-665,649.2720, E-1,942,206.2580

ELEVATION: 229.03 FEET

NOTES: ROADWAY DESIGN FILES, B4968.IS.TIN, DATED 3/30/2018, AND GPK FILE PROVIDED BY NCDOT

NORTHINGS AND EASTINGS OBTAINED USING A TRIMBLE GEO-7X
TOP OF RAIL AT DOWNSTREAM EB-1 STA. 31+37.85.0' RT: 232.61 FT
TOP OF RAIL AT DOWNSTREAM EB-2 STA. 36+60.84.0' RT: 232.27 FT

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)

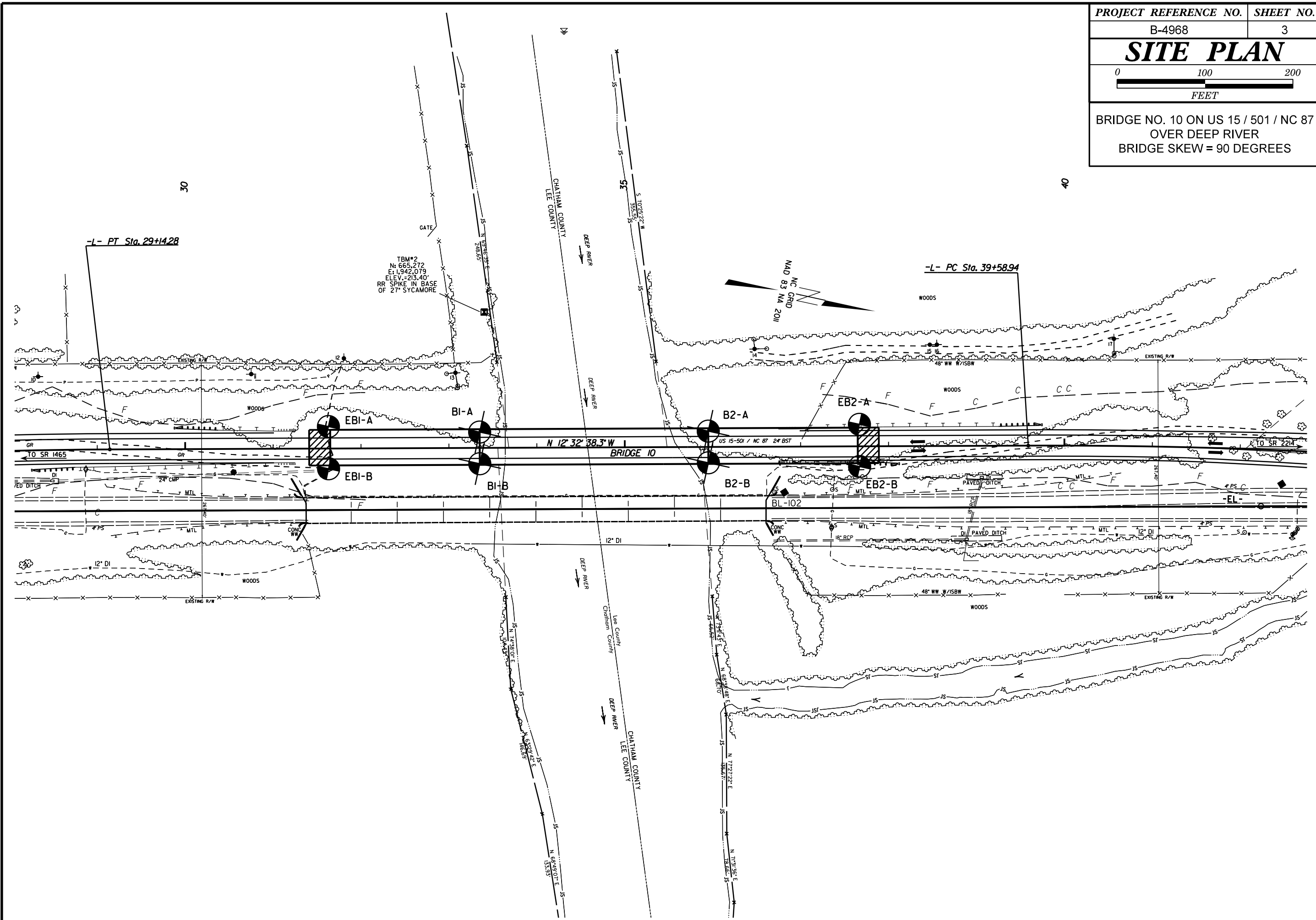
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)					
<p>From the lithology, structure and surface conditions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

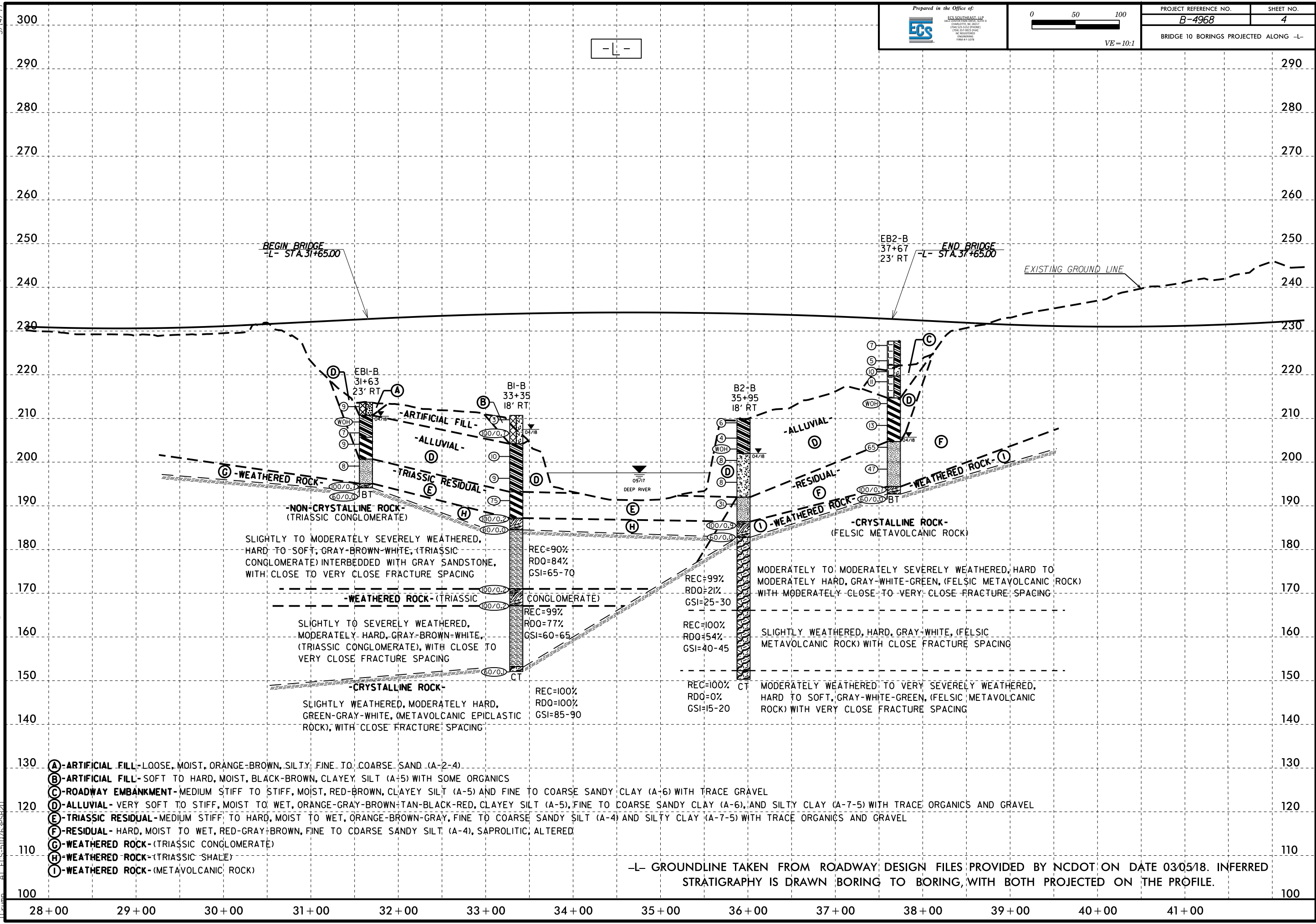
SITE PLAN



BRIDGE NO. 10 ON US 15 / 501 / NC 87
OVER DEEP RIVER
BRIDGE SKEW = 90 DEGREES

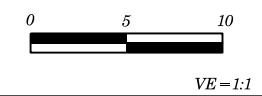


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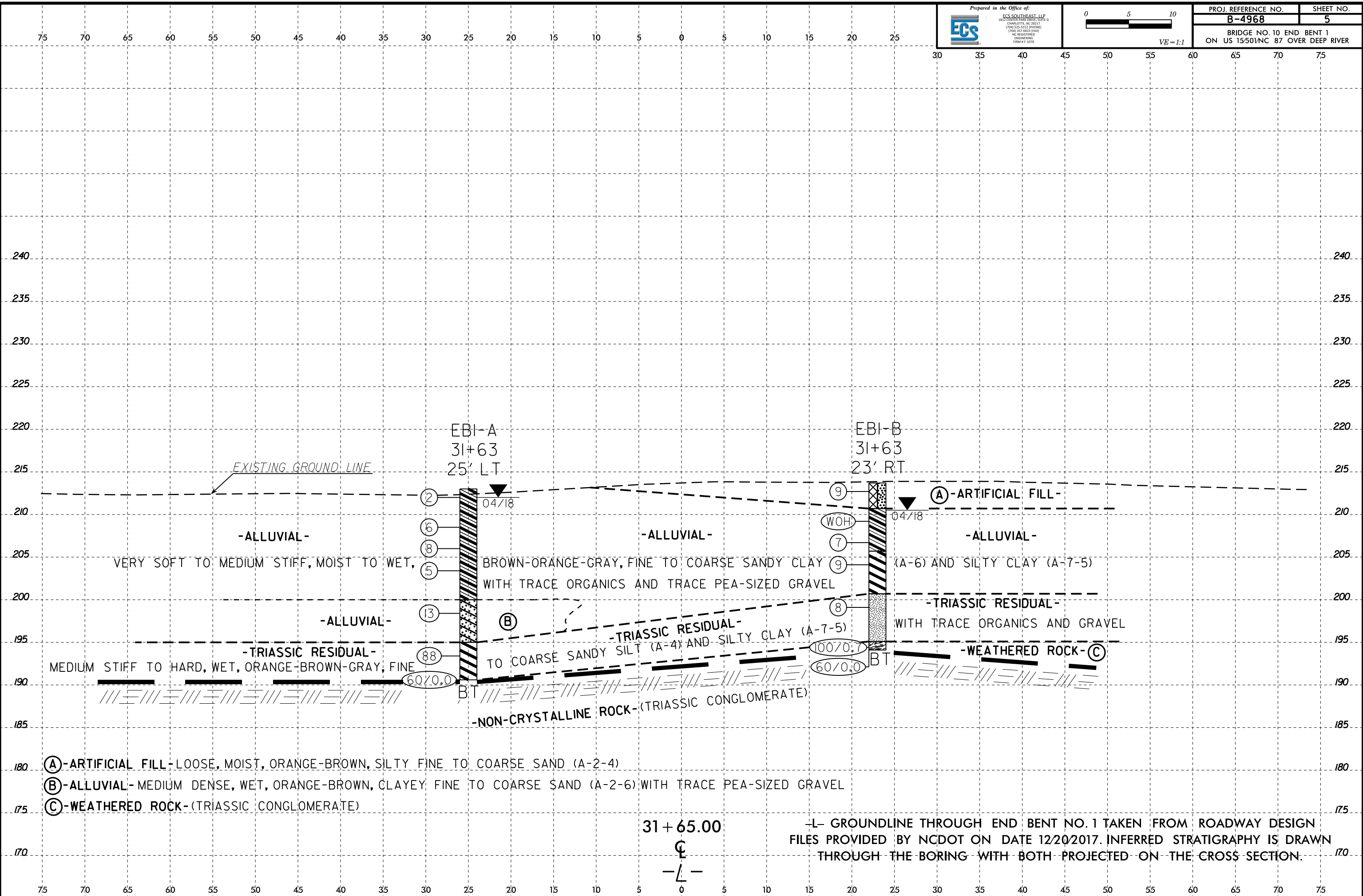


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 03/05/18. INFERRED STRATIGRAPHY IS DRAWN BORING TO BORING, WITH BOTH PROJECTED ON THE PROFILE.

30-JUL-2018 11:21 AM C:\Users\luz1\OneDrive\Documents\2000-12999\12500\12596-A - B-4968-Replace Bridge No.10 over Deep River\Structure\CADD_GEO\TECH\10-4968_BRIDGE10_GEO_XSI_REV2.dgn



PROJ. REFERENCE NO.	SHEET NO.
B-4968	5
BRIDGE NO. 10 END BENT 1 ON US 15/501NC 87 OVER DEEP RIVER	



EXISTING GROUND LINE

EBI-A
31+63
25' LT

EBI-B
31+63
23' RT

-ALLUVIAL-
VERY SOFT TO MEDIUM STIFF, MOIST TO WET,

-ALLUVIAL-
BROWN-ORANGE-GRAY, FINE TO COARSE SANDY CLAY WITH TRACE ORGANICS AND TRACE PEA-SIZED GRAVEL

(A) -ARTIFICIAL FILL-
(A-6) AND SILTY CLAY (A-7-5)

-TRIASSIC RESIDUAL-
MEDIUM STIFF TO HARD, WET, ORANGE-BROWN-GRAY, FINE

(B) -TRIASSIC RESIDUAL-
TO COARSE SANDY SILT (A-4) AND SILTY CLAY (A-7-5)

-TRIASSIC RESIDUAL-
WITH TRACE ORGANICS AND GRAVEL

-NON-CRYSTALLINE ROCK-(TRIASSIC CONGLOMERATE)

(C) -WEATHERED ROCK-

(A) -ARTIFICIAL FILL- LOOSE, MOIST, ORANGE-BROWN, SILTY FINE TO COARSE SAND (A-2-4)

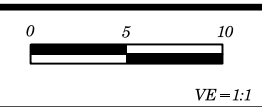
(B) -ALLUVIAL- MEDIUM DENSE, WET, ORANGE-BROWN, CLAYEY FINE TO COARSE SAND (A-2-6) WITH TRACE PEA-SIZED GRAVEL

(C) -WEATHERED ROCK- (TRIASSIC CONGLOMERATE)

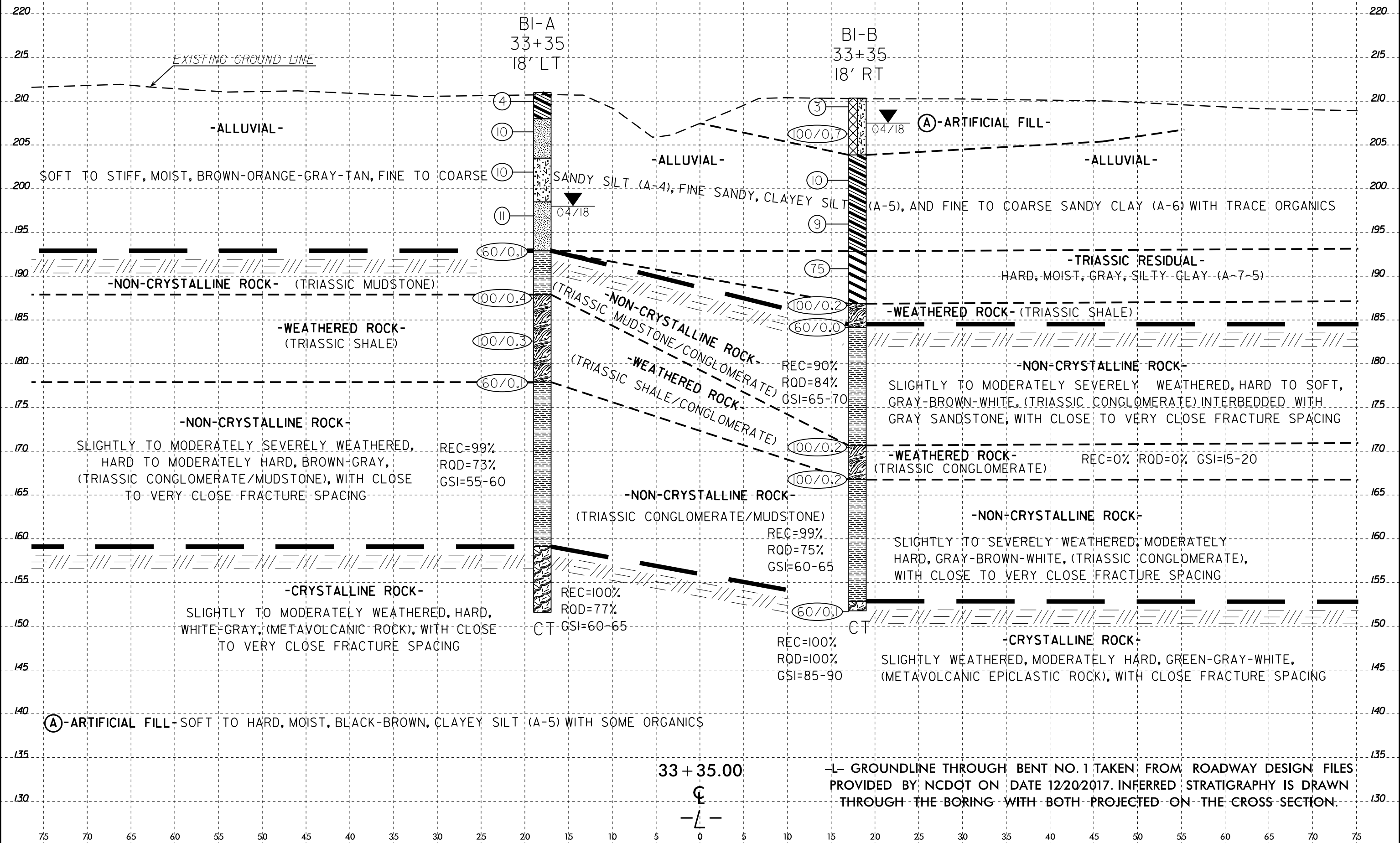
31 + 65.00

-L- GROUNDLINE THROUGH END BENT NO. 1 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 12/20/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ON THE CROSS SECTION.

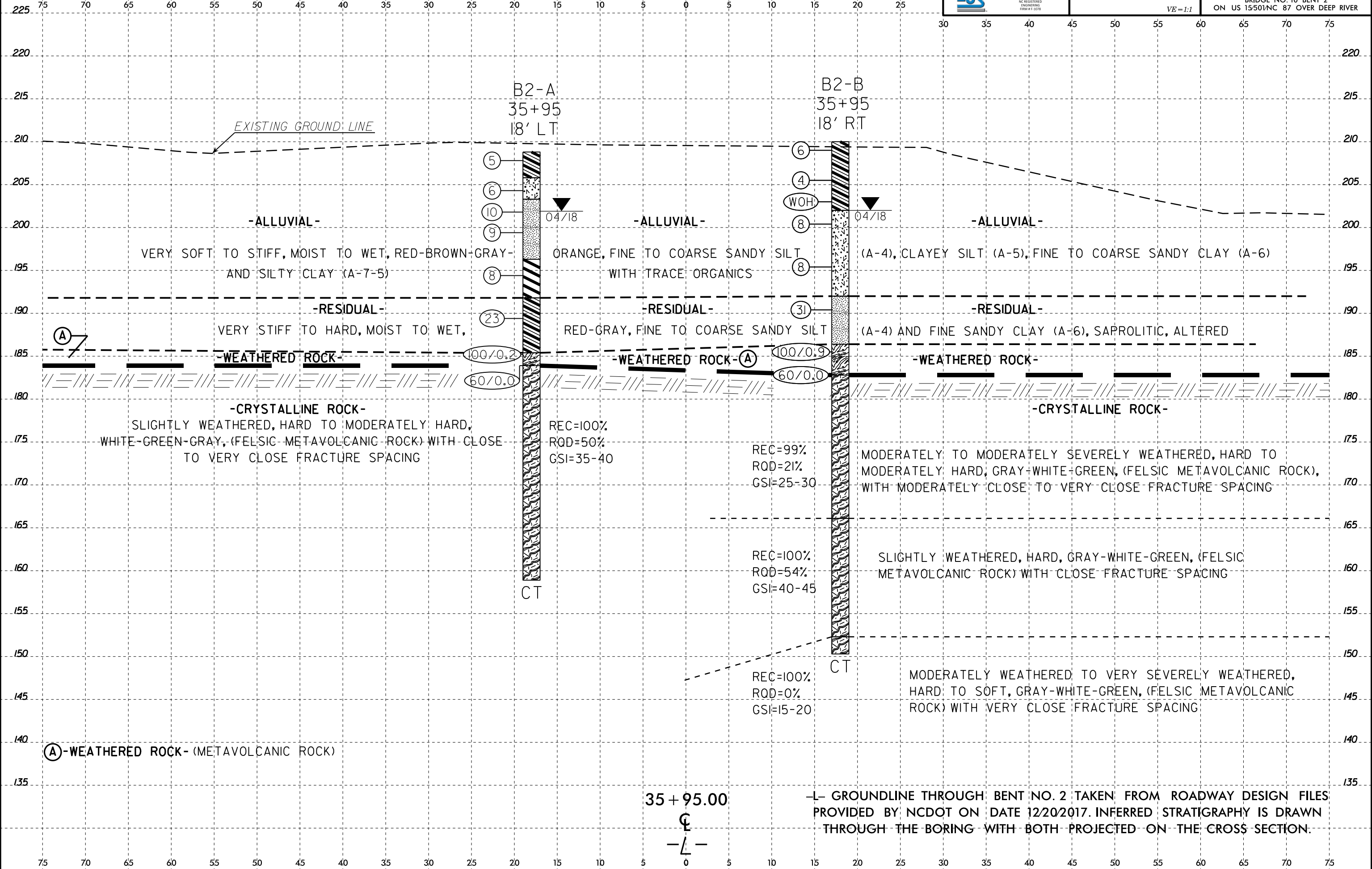
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 User: ECG



PROJ. REFERENCE NO.	SHEET NO.
B-4968	6
BRIDGE NO. 10 BENT 1 ON US 15/501/NC 87 OVER DEEP RIVER	



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12500-GEO10-XSL-REV2.dwg
12500-GEO10-XSL-REV2.dwg



35 + 95.00
CL
-L-

-L- GROUNDLINE THROUGH BENT NO. 2 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 12/20/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ON THE CROSS SECTION.

(A) - WEATHERED ROCK - (METAVOLCANIC ROCK)

-ALLUVIAL-
VERY SOFT TO STIFF, MOIST TO WET, RED-BROWN-GRAY-AND SILTY CLAY (A-7-5)

-RESIDUAL-
VERY STIFF TO HARD, MOIST TO WET,

-WEATHERED ROCK-

-CRYSTALLINE ROCK-
SLIGHTLY WEATHERED, HARD TO MODERATELY HARD, WHITE-GREEN-GRAY, (FELSIC-METAVOLCANIC ROCK) WITH CLOSE TO VERY CLOSE FRACTURE SPACING

-ALLUVIAL-
ORANGE, FINE TO COARSE SANDY SILT WITH TRACE ORGANICS

-RESIDUAL-
RED-GRAY, FINE TO COARSE SANDY SILT

-WEATHERED ROCK-

REC=100%
RQD=50%
GSI=35-40

-ALLUVIAL-
(A-4), CLAYEY SILT (A-5), FINE TO COARSE SANDY CLAY (A-6)

-RESIDUAL-
(A-4) AND FINE SANDY CLAY (A-6), SAPROLITIC, ALTERED

-WEATHERED ROCK-

REC=99%
RQD=21%
GSI=25-30
MODERATELY TO MODERATELY SEVERELY WEATHERED, HARD TO MODERATELY HARD, GRAY-WHITE-GREEN, (FELSIC METAVOLCANIC ROCK), WITH MODERATELY CLOSE TO VERY CLOSE FRACTURE SPACING

REC=100%
RQD=54%
GSI=40-45
SLIGHTLY WEATHERED, HARD, GRAY-WHITE-GREEN, (FELSIC METAVOLCANIC ROCK) WITH CLOSE FRACTURE SPACING

REC=100%
RQD=0%
GSI=15-20

MODERATELY WEATHERED TO VERY SEVERELY WEATHERED, HARD TO SOFT, GRAY-WHITE-GREEN, (FELSIC METAVOLCANIC ROCK) WITH VERY CLOSE FRACTURE SPACING

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 31+63		OFFSET 25 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 213.0 ft		TOTAL DEPTH 22.4 ft		NORTHING 665,126		EASTING 1,942,244										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER L. Gonzales		START DATE 04/16/18		COMP. DATE 04/16/18		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						
215	213.0	0.0	1	1	1									213.0	GROUND SURFACE	0.0
210	209.5	3.5	2	2	4									210.7	ALLUVIAL Very Soft to Medium Stiff, Brown-Orange, Fine to Coarse Sandy CLAY (A-6) with trace organics and trace pea-sized gravel	
	207.0	6.0	2	4	4									205.7	ALLUVIAL Very Soft to Medium Stiff, Orange-Gray-Brown, Fine to Coarse Sandy CLAY (A-6)	
205	204.4	8.6	2	2	3									200.7	ALLUVIAL Stiff, Orange-Gray, Silty CLAY (A-7-5)	
	199.4	13.6	1	2	11									200.0	TRIASSIC RESIDUAL Medium Dense, Orange-Brown, Clayey Fine to Coarse SAND (A-2-6) with trace pea-sized gravel	13.0
195	194.4	18.6	5	13	75									195.0	TRIASSIC RESIDUAL Hard, Orange-Gray, Silty CLAY (A-7-5)	18.0
	190.6	22.4												190.6	TRIASSIC RESIDUAL Boring Terminated with Standard Penetration Test Refusal at Elevation 190.6 ft On Non-Crystalline Rock (TRIASSIC CONGLOMERATE)	22.4

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 31+63		OFFSET 23 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 213.7 ft		TOTAL DEPTH 19.6 ft		NORTHING 665,137		EASTING 1,942,291										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER L. Gonzales		START DATE 04/18/18		COMP. DATE 04/18/18		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						
215	213.7	0.0	3	5	4									213.7	GROUND SURFACE	0.0
210	210.2	3.5	WOH	WOH	WOH									210.7	ARTIFICIAL FILL Loose, Orange-Brown, Silty Fine to Coarse SAND (A-2-4)	3.0
	207.7	6.0	2	3	4									205.7	ALLUVIAL Very Soft to Medium Stiff, Orange-Gray-Brown, Fine to Coarse Sandy CLAY (A-6)	
205	205.1	8.6	3	4	5									200.7	ALLUVIAL Stiff, Orange-Gray, Silty CLAY (A-7-5)	8.0
	200.1	13.6	2	4	4									200.0	TRIASSIC RESIDUAL Medium Stiff, Orange-Brown, Fine to Coarse Sandy SILT (A-4) with trace gravel and organics	13.0
195	195.1	18.6	16	84	0.2									195.1	WEATHERED ROCK Orange-Brown-Gray (TRIASSIC CONGLOMERATE)	18.6
	194.1	19.6												194.1	WEATHERED ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 194.1 ft On Non-Crystalline Rock (TRIASSIC CONGLOMERATE)	19.6

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

GEOTECHNICAL BORING REPORT

BORE & CORE LOG

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. B1-A		STATION 33+35		OFFSET 18 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 211.0 ft		TOTAL DEPTH 59.4 ft		NORTHING 665,296		EASTING 1,942,213										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic												
DRILLER L. Gonzales		START DATE 04/17/18		COMP. DATE 04/17/18		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						
215																
210	211.0	0.0	1	2	2									211.0	GROUND SURFACE	0.0
205	207.5	3.5	3	4	6								M	208.0	ALLUVIAL Soft, Brown, Fine to Coarse Sandy CLAY (A-6) with trace organics	3.0
200	202.9	8.1	4	4	6								M	203.5	Stiff, Orange-Brown, Fine to Coarse Sandy SILT (A-4)	7.5
195	202.9	8.1	4	4	6								M	203.5	Stiff, Orange-Brown, Fine Sandy, Clayey SILT (A-5)	7.5
190	197.9	13.1	3	5	6								M	198.5	Stiff, Gray-Orange-Brown, Fine to Coarse Sandy SILT (A-4) with trace organics	12.5
185	192.9	18.1	60/0.1											192.9	NON-CRYSTALLINE ROCK (TRIASSIC MUDSTONE)	18.1
180	187.9	23.1	100/0.4											187.9	WEATHERED ROCK Gray (TRIASSIC SHALE), very fissile	23.1
175	182.9	28.1	100/0.3											177.9	NON-CRYSTALLINE ROCK Brown-Gray (TRIASSIC CONGLOMERATE/MUDSTONE)	33.1
170	177.9	33.1	60/0.1											177.9		
165														159.1	CRYSTALLINE ROCK White-Gray, (METAVOLCANIC ROCK)	51.9
160														151.6	Boring Terminated at Elevation 151.6 ft In Crystalline Rock (METAVOLCANIC ROCK)	59.4

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle						
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)					
BORING NO. B1-A		STATION 33+35		OFFSET 18 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 211.0 ft		TOTAL DEPTH 59.4 ft		NORTHING 665,296		EASTING 1,942,213						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER L. Gonzales		START DATE 04/17/18		COMP. DATE 04/17/18		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
177.89	177.9	33.1	1.3	0:48/0.3	(1.2)	(0.8)		(18.6)	(13.8)		Begin Coring @ 33.1 ft	
175	176.6	34.4	5.0	N=60/0.1 0:48/0.3 2:56/1.0	92%	62%		99%	73%		NON-CRYSTALLINE ROCK Slightly to Moderately Severely Weathered, Hard to Moderately Hard, Brown-Gray, (TRIASSIC CONGLOMERATE/MUDSTONE), with Close to Very Close Fracture Spacing	33.1
170	171.6	39.4	5.0	2:54/1.0 3:48/1.0 3:27/1.0 3:34/1.0 3:06/1.0	100%	64%	RS-1				RS-1: 36.6' - 37.1' Unit Weight: 174.2 pcf Unconfined Compressive Strength: 2,590 psi (373 ksf) GSI: 55 - 60	
165	166.6	44.4	5.0	4:05/1.0 2:54/1.0 2:58/1.0 3:07/1.0 2:46/1.0	98%	70%					Slickensides at 38.8' and 39.0'	
160	161.6	49.4	5.0	2:21/1.0 2:26/1.0 2:02/1.0 3:26/1.0 3:27/1.0	100%	76%						
155	156.6	54.4	5.0	2:54/1.0 3:33/1.0 3:01/1.0 3:19/1.0 5:18/1.0	(4.8)	(4.2)		(7.5)	(5.8)		CRYSTALLINE ROCK Slightly to Moderately Weathered, Hard, White-Gray, (METAVOLCANIC ROCK), with Close to Very Close Fracture Spacing	51.9
	151.6	59.4		1:54/1.0 2:45/1.0 2:31/1.0 2:39/1.0 4:14/1.0	(5.0)	(3.3)		100%	77%		Boring Terminated at Elevation 151.6 ft In Crystalline Rock (METAVOLCANIC ROCK)	59.4



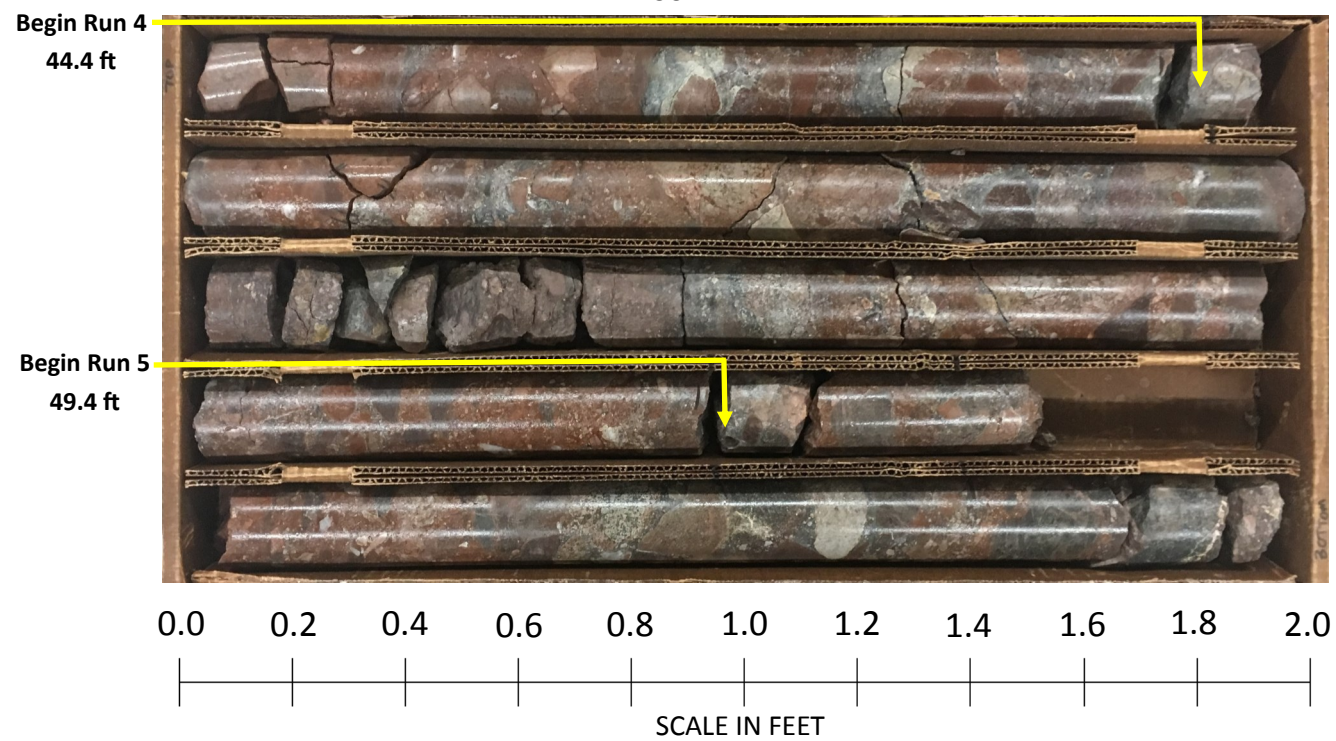
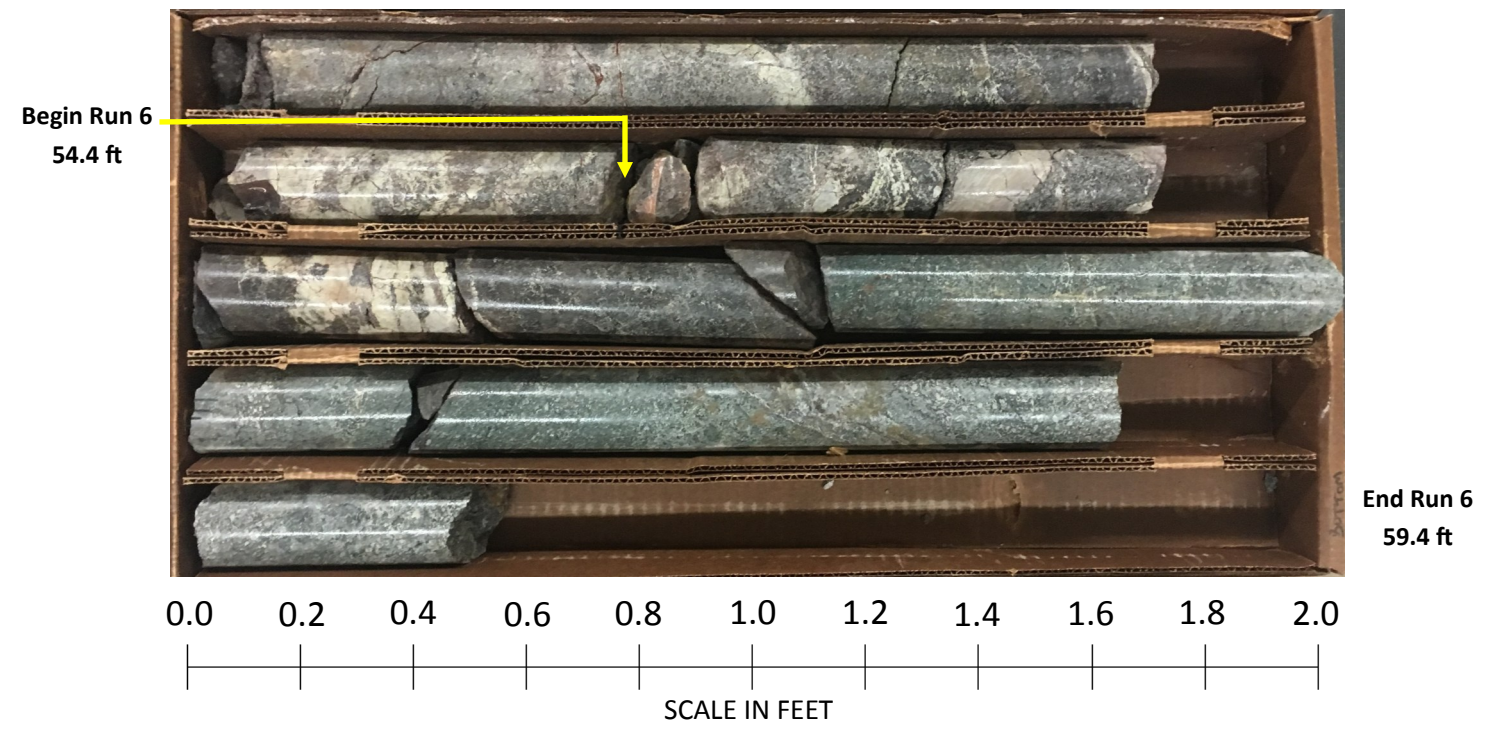
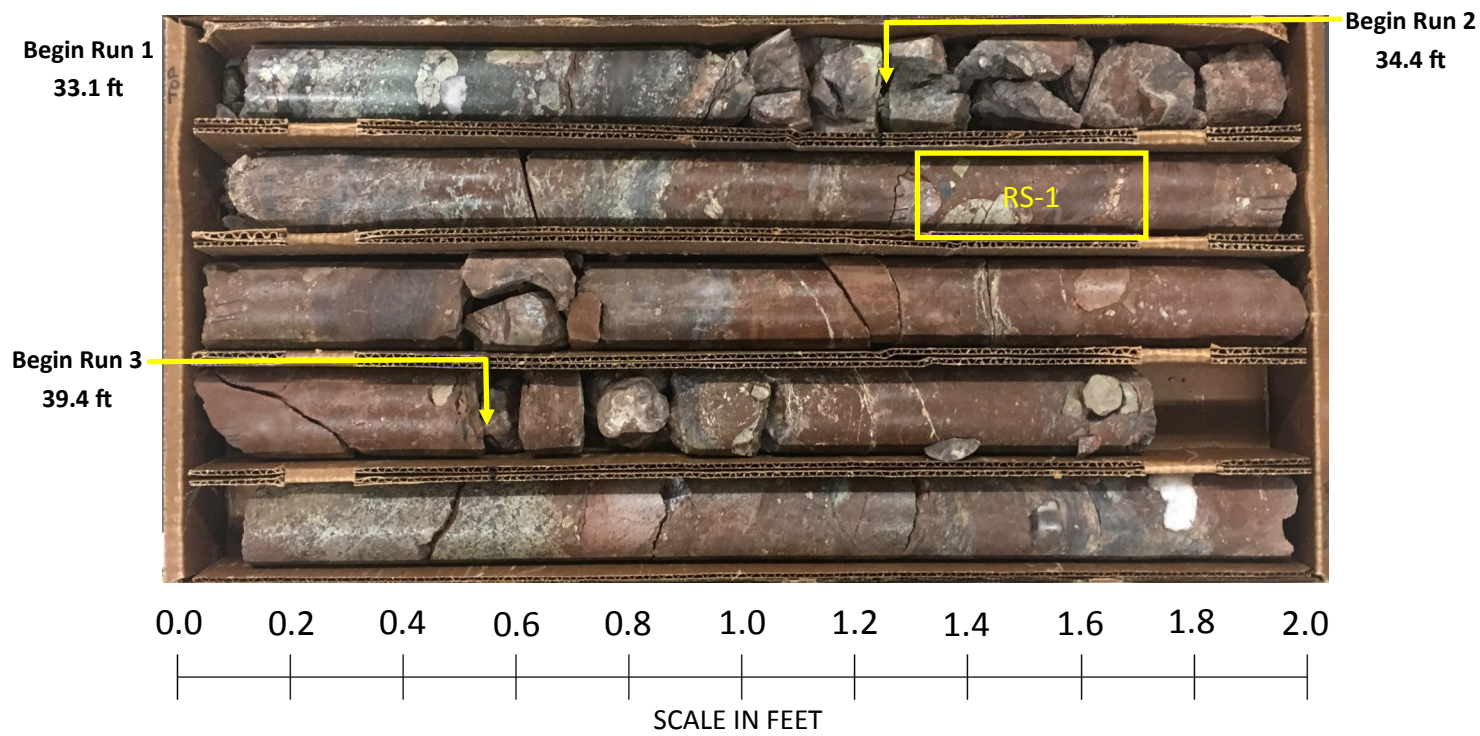
Replace Bridge No. 10 over Deep River on US 15-501/NC 87

ECS Southeast Project No. 08:12596-A

WBS: 40162.1.1 Tip No.: B-4968

Rock Core Photographs: Boring - B1-A

Station: 33+35 Offset: 18' LT



GEOTECHNICAL BORING REPORT

BORE & CORE LOG

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. B1-B		STATION 33+35		OFFSET 18 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 210.7 ft		TOTAL DEPTH 58.7 ft		NORTHING 665,304		EASTING 1,942,248										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic												
DRILLER L. Gonzales		START DATE 04/16/18		COMP. DATE 04/17/18		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						
215																
210	210.7	0.0	2	2	1									210.7	GROUND SURFACE	0.0
	207.3	3.4	26	74/0.2											ARTIFICIAL FILL	
															Soft to Hard, Black-Brown, Clayey SILT (A-5) with some organics	
205															* High N-values likely the result of riprap encountered within the Artificial Fill	
	202.3	8.4	5	5	5										ALLUVIAL	
															Stiff, Brown-Tan-Black-Orange, Fine to Coarse Sandy CLAY (A-6)	
200	197.3	13.4	4	4	5											
	192.2	18.5	68	26	49										TRIASSIC RESIDUAL	
															Hard, Gray, Silty CLAY (A-7-5)	
190	187.2	23.5	100/0.2													
	184.5	26.2	60/0.0												WEATHERED ROCK	
															Gray-Brown-Maroon (TRIASSIC SHALE)	
185															NON-CRYSTALLINE ROCK	
															Gray (TRIASSIC CONGLOMERATE)	
180																
175																
	171.0	39.7	100/0.2												WEATHERED ROCK	
															Gray-Brown (TRIASSIC CONGLOMERATE)	
170	167.3	43.4	100/0.2												NON-CRYSTALLINE ROCK	
															Gray-Brown (TRIASSIC CONGLOMERATE)	
165																
160																
155	152.1	58.6	60/0.1												CRYSTALLINE ROCK	
															Green-Gray-White (METAVOLCANIC EPICLASTIC ROCK)	
															Boring Terminated at Elevation 152.0 ft In Crystalline Rock (METAVOLCANIC EPICLASTIC ROCK)	

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle						
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)					
BORING NO. B1-B		STATION 33+35		OFFSET 18 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 210.7 ft		TOTAL DEPTH 58.7 ft		NORTHING 665,304		EASTING 1,942,248						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER L. Gonzales		START DATE 04/16/18		COMP. DATE 04/17/18		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	DEPTH (ft)
					REC. (ft)	RQD (%)		REC. (ft)	RQD (%)			
184.5												
	184.5	26.2	3.5	N=60/0.0 1:59/0.5 2:57/1.0 2:25/1.0 1:52/1.0	(3.4) 97%	(3.1) 89%		(12.2) 90%	(11.3) 84%		Begin Coring @ 26.2 ft	
	181.0	29.7	5.0	1:57/1.0 2:20/1.0 2:30/1.0 2:10/1.0 2:06/1.0	(5.0) 100%	(4.8) 96%					NON-CRYSTALLINE ROCK	26.2
											Slightly to Moderately Severely Weathered, Hard to Soft, Gray-Brown-White, (TRIASSIC CONGLOMERATE) interbedded with Gray Sandstone, with Close to Very Close Fracture Spacing	
	176.0	34.7	5.0	2:03/1.0 2:20/1.0 2:28/1.0 2:55/1.0 3:32/1.0	(4.8) 96%	(3.4) 68%	RS-2				RS-2: 34.7' - 35.1'	
											Unit Weight: 165.3 pcf	
											Unconfined Compressive Strength: 5,510 psi (793 ksf)	
											GSI: 65 - 70	
175												
	171.0	39.7	3.9	N=100/0.2	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		WEATHERED ROCK	39.7
											Gray-Brown (TRIASSIC CONGLOMERATE)	
170	167.1	43.6	5.0	N=100/0.2 1:52/1.0 2:23/1.0 2:15/1.0 2:14/1.0 2:27/1.0	(5.0) 100%	(4.0) 80%		(13.3) 99%	(10.0) 75%		NON-CRYSTALLINE ROCK	43.6
											Severely to Slightly Weathered, Moderately Hard, Gray-Brown-White, (TRIASSIC CONGLOMERATE), with Close to Very Close Fracture Spacing	
											GSI: 60 - 65	
165												
	162.1	48.6	5.0	2:43/1.0 2:54/1.0 2:48/1.0 2:49/1.0 2:40/1.0	(5.0) 100%	(3.8) 76%						
160	157.1	53.6	5.0	3:12/1.0 4:08/1.0 5:01/1.0 2:19/1.0 1:40/1.0	(4.9) 98%	(3.8) 76%						
155												
	152.1	58.6		N=60/0.1				(1.6) 100%	(1.6) 100%		CRYSTALLINE ROCK	57.0
											Slightly Weathered, Moderately Hard, Green-Gray-White, (METAVOLCANIC EPICLASTIC ROCK), with Close Fracture Spacing	58.6
											Boring Terminated at Elevation 152.0 ft In Crystalline Rock (METAVOLCANIC EPICLASTIC ROCK)	58.7

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18



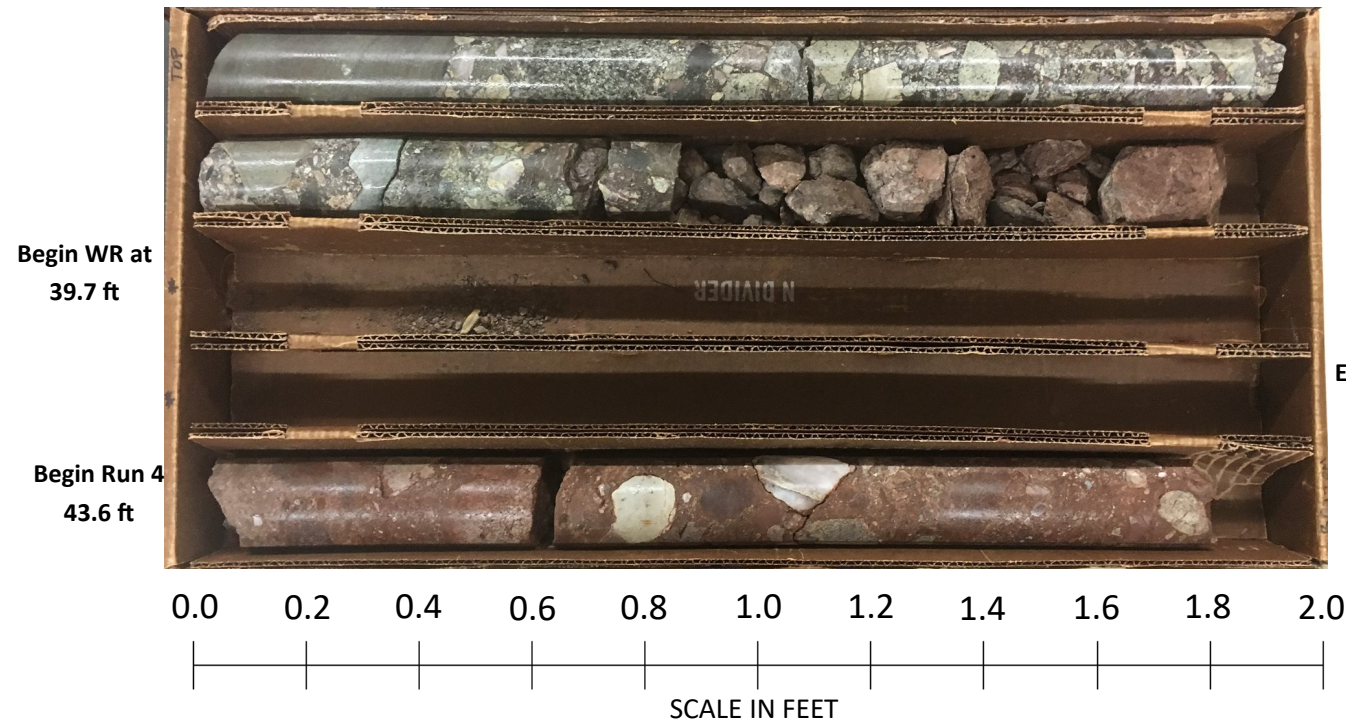
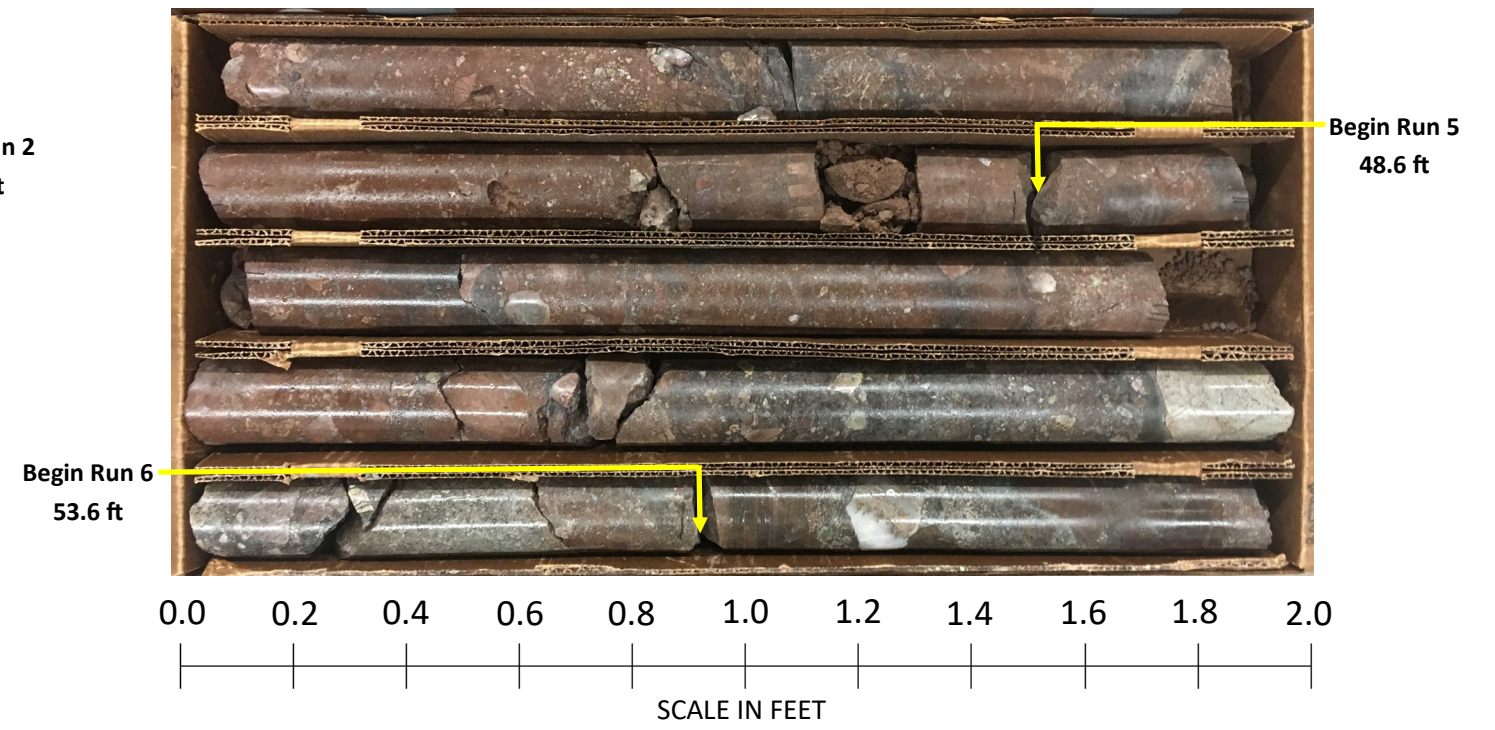
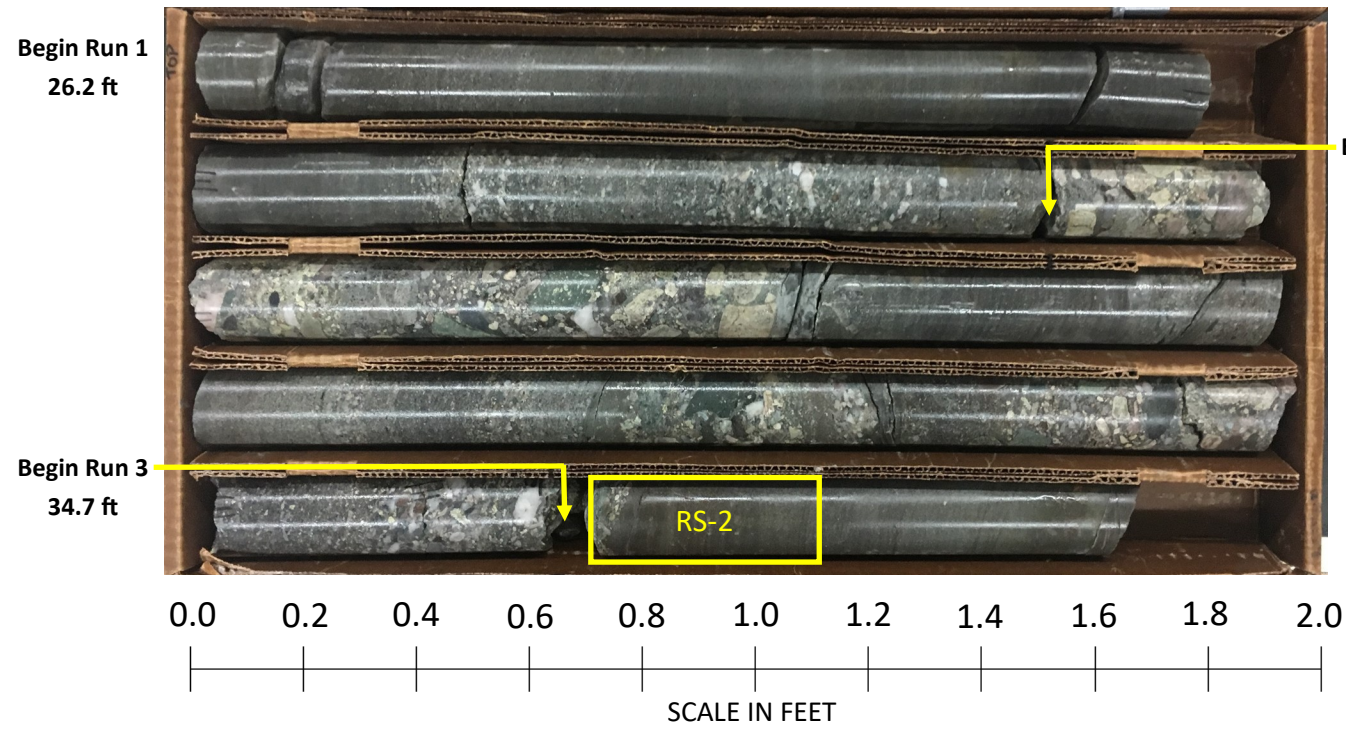
Replace Bridge No. 10 over Deep River on US 15-501/NC 87

ECS Southeast Project No. 08: 12596-A

WBS: 40162.1.1 Tip No.: B-4968

Rock Core Photographs: Boring - B1-B

Station: 33+35 Offset: 18' RT



GEOTECHNICAL BORING REPORT

BORE & CORE LOG

WBS 40162.1.1	TIP B-4968	COUNTY LEE	GEOLOGIST A. Suttle
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87			GROUND WTR (ft)
BORING NO. B2-A	STATION 35+95	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 208.8 ft	TOTAL DEPTH 49.9 ft	NORTHING 665,550	EASTING 1,942,157
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER L. Gonzales	START DATE 04/19/18	COMP. DATE 04/19/18	SURFACE WATER DEPTH N/A

WBS 40162.1.1	TIP B-4968	COUNTY LEE	GEOLOGIST A. Suttle
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87			GROUND WTR (ft)
BORING NO. B2-A	STATION 35+95	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 208.8 ft	TOTAL DEPTH 49.9 ft	NORTHING 665,550	EASTING 1,942,157
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER L. Gonzales	START DATE 04/19/18	COMP. DATE 04/19/18	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION									
			0.5ft	0.5ft	0.5ft			0	25	50	75	100	ELEV. (ft)	DEPTH (ft)			
210	208.8	0.0	1	2	3			208.8	GROUND SURFACE	0.0							
205	205.3	3.5	3	3	3		M	205.8	ALLUVIAL Medium Stiff, Brown, Fine to Coarse Sandy CLAY (A-6) with trace organics	3.0							
200	202.8	6.0	2	5	5		M	203.3	Medium Stiff, Brown, Clayey SILT (A-5) with trace organics	5.5							
195	200.4	8.4	4	4	5		M	196.3	Stiff, Orange-Brown-Gray, Fine to Coarse Sandy SILT (A-4) with trace organics	12.5							
190	195.4	13.4	3	3	5		M	191.8	Medium Stiff, Orange-Gray, Silty CLAY (A-7-5)	17.0							
185	190.4	18.4	5	10	13		M	185.4	RESIDUAL Very Stiff, Red-Gray, Fine Sandy CLAY (A-6), saprolitic	23.4							
180	185.4	23.4						183.9	WEATHERED ROCK Red-Gray (METAVOLCANIC ROCK), altered	24.9							
175	183.9	24.9							CRYSTALLINE ROCK White-Green-Gray (FELSIC METAVOLCANIC ROCK)								
170																	
165																	
160																	

ELEV (ft)	CORE SIZE	RUN DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 25.0 ft		SAMP. NO.	LOG	DESCRIPTION AND REMARKS
					REC. (%)	RQD (%)			
183.94	NQ2	24.9	5.0	N=60/0.0 2:11/1.0 2:38/1.0 1:35/1.0 2:12/1.0 1:49/1.0	(5.0)	(1.6)			Begin Coring @ 24.9 ft
180		29.9	5.0	2:18/1.0 2:19/1.0 1:52/1.0 3:12/1.0 3:51/1.0	100%	(2.2)	RS-3		CRYSTALLINE ROCK Slightly Weathered, Hard to Moderately Hard, White-Green-Gray, (FELSIC METAVOLCANIC ROCK) with Close to Very Close Fracture Spacing
175		34.9	5.0	2:12/1.0 3:31/1.0 3:22/1.0 2:46/1.0 3:07/1.0	(5.0)	(2.0)	RS-3A		RS-3: 31.5' - 31.9' Unit Weight: 183.7 Unconfined Compressive Strength: 5,680 psi (818 ksf) GSI: 35 - 40
170		39.9	5.0	2:12/1.0 2:20/1.0 2:15/1.0 3:15/1.0 2:34/1.0	100%	(2.8)			RS-3A: 34.0' - 34.4' Unit Weight: 180.3 pcf Unconfined Compressive Strength: 6,960 psi (1,002 ksf) GSI: 35 - 40
165		44.9	5.0	2:01/1.0 1:40/1.0 2:07/1.0 2:10/1.0 1:51/1.0	(5.0)	(3.8)			
160		49.9							Boring Terminated at Elevation 158.9 ft In Crystalline Rock (FELSIC METAVOLCANIC ROCK)



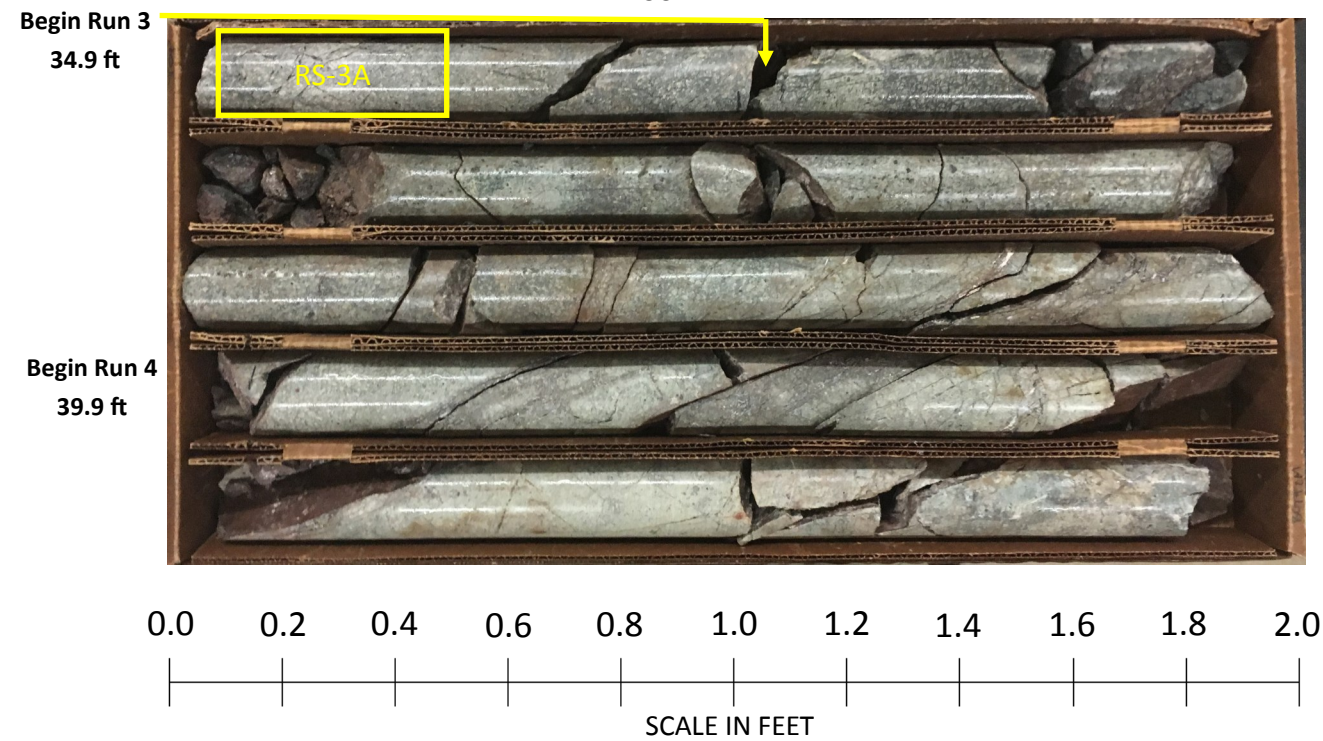
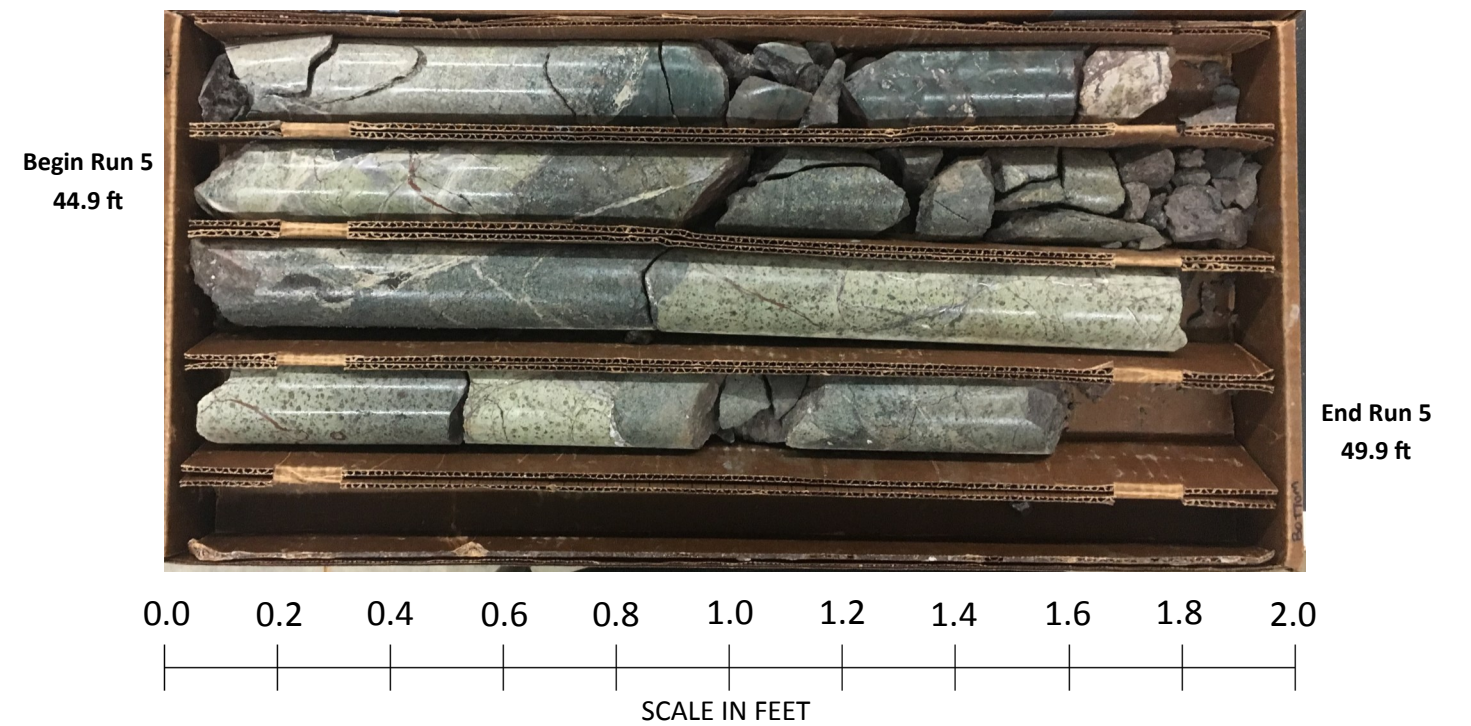
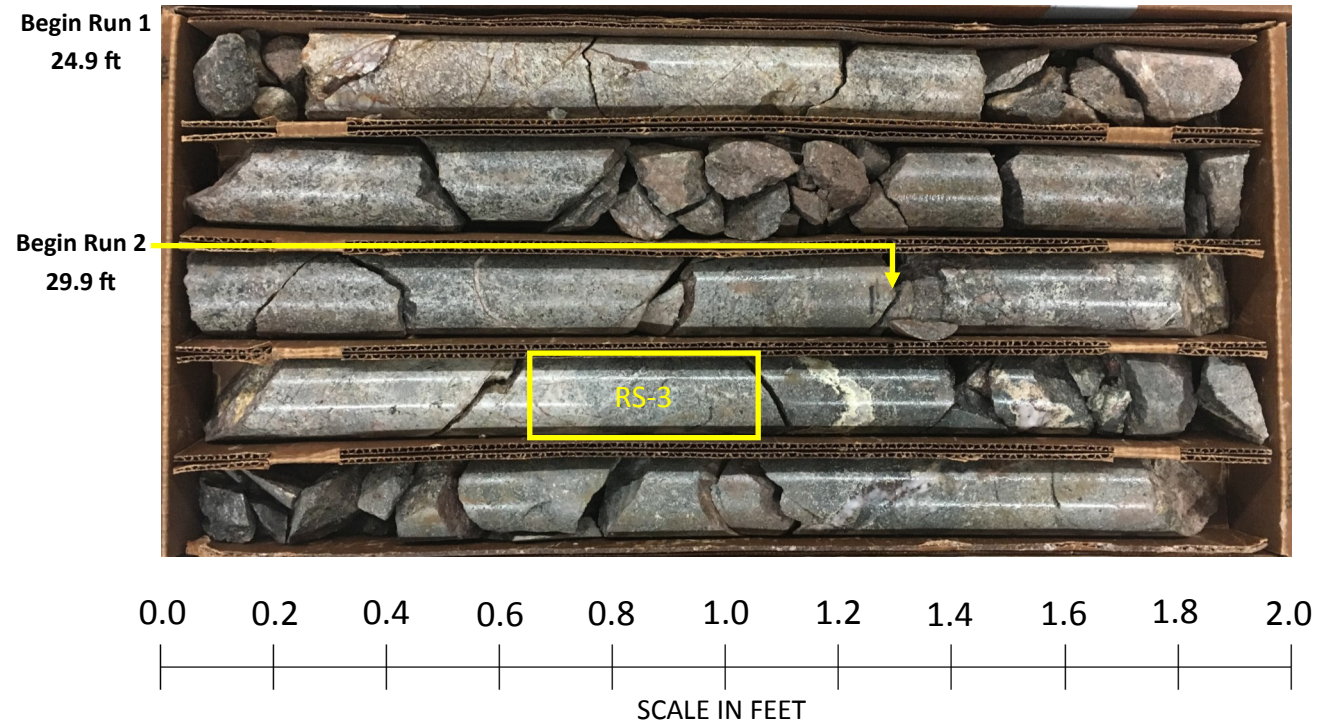
Replace Bridge No. 10 over Deep River on US 15-501/NC 87

ECS Southeast Project No. 08:12896-A

WBS: 40162.1.1 Tip No.: B-4968

Rock Core Photographs: Boring - B2-A

Station: 35+95 Offset: 18' LT



GEOTECHNICAL BORING REPORT

BORE & CORE LOG

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle								
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)							
BORING NO. B2-B		STATION 35+95		OFFSET 18 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 210.0 ft		TOTAL DEPTH 59.7 ft		NORTHING 665,557		EASTING 1,942,192								
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic								
DRILLER L. Gonzales		START DATE 04/20/18		COMP. DATE 04/20/18		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				
210	210.0	0.0	2	3	3							M	210.0 GROUND SURFACE 0.0	
	206.5	3.5	2	2	2							M	ALLUVIAL Medium Stiff to Very Soft, Red-Brown-Gray, Fine to Coarse Sandy CLAY (A-6)	
205	204.0	6.0	WOH	WOH	WOH							W		
	201.4	8.6										W	202.0 Medium Stiff, Gray-Brown, Clayey SILT (A-5) with trace organics 8.0	
200	196.4	13.6	3	4	4							W		
195	191.4	18.6	13	14	17							W	192.0 RESIDUAL Hard, Red-Gray, Fine to Coarse Sandy SILT (A-4), saprolitic, altered 18.0	
190	186.4	23.6	26	74/0.4								W	186.4 WEATHERED ROCK Red-Gray (METAVOLCANIC ROCK), altered 23.6	
185	182.8	27.2	60/0.0									W	182.8 CRYSTALLINE ROCK Gray-White-Green (FELSIC METAVOLCANIC ROCK) 27.2	
180												W		
175												W		
170												W		
165												W	166.1 Gray-White-Green (FELSIC METAVOLCANIC ROCK) 43.9	
160												W		
155												W	152.3 Gray-White-Green (FELSIC METAVOLCANIC ROCK) 57.7	
												W	150.3 Gray-White-Green (FELSIC METAVOLCANIC ROCK) 59.7	
												W	Boring Terminated at Elevation 150.3 ft In Crystalline Rock (FELSIC METAVOLCANIC ROCK)	

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/30/18

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle						
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)					
BORING NO. B2-B		STATION 35+95		OFFSET 18 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 210.0 ft		TOTAL DEPTH 59.7 ft		NORTHING 665,557		EASTING 1,942,192						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic						
DRILLER L. Gonzales		START DATE 04/20/18		COMP. DATE 04/20/18		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 32.5 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (%)		REC. (ft)	RQD (%)			
182.76	182.8	27.2	3.2	N=60/0.0 0:13/0.2 1:41/1.0 2:15/1.0 2:30/1.0 2:30/1.0 2:28/1.0 2:01/1.0 2:42/1.0	(3.1) 97%	(1.0) 31%		(16.6) 99%	(3.5) 21%		Begin Coring @ 27.2 ft	
180	179.6	30.4	5.0	2:30/1.0 2:30/1.0 2:28/1.0 2:01/1.0 2:42/1.0	(5.0) 100%	(1.2) 24%					182.8 Moderately to Moderately Severely Weathered, Hard to Moderately Hard, Gray-White-Green, (FELSIC METAVOLCANIC ROCK) with Moderately Close to Very Close Fracture Spacing 27.2	
175	174.6	35.4	5.0	2:14/1.0 2:09/1.0 1:53/1.0 2:11/1.0 2:11/1.0	(5.0) 100%	(1.3) 26%	RS-4				RS-4: 34.5' - 34.9' Unit Weight: 177.4 pcf Unconfined Compressive Strength: 6,490 psi (935 ksf) GSI: 25 - 30	
170	169.6	40.4	5.0	1:51/1.0 2:27/1.0 2:20/1.0 1:59/1.0 2:31/1.0	(5.0) 100%	(0.7) 14%					Brecciated at 40.0 to 40.4 feet Slickensides at 38.0 feet	
165	164.6	45.4	5.0	1:47/1.0 1:57/1.0 2:09/1.0 1:53/1.0 1:59/1.0	(5.0) 100%	(3.7) 74%		(13.8) 100%	(7.5) 54%		166.1 Slightly Weathered, Hard, Gray-White-Green, (FELSIC METAVOLCANIC ROCK) with Close Fracture Spacing 43.9	
160	159.6	50.4	5.0	1:59/1.0 2:33/1.0 1:52/1.0 2:13/1.0 2:10/1.0	(5.0) 100%	(2.5) 50%					GSI: 40 - 45	
155	154.6	55.4	4.3	1:32/1.0 1:47/1.0 2:08/1.0 1:51/1.0 1:13/0.3	(4.3) 100%	(0.6) 14%					152.3 Moderately Weathered to Very Severely Weathered, Hard to Soft, Gray-White-Green (FELSIC METAVOLCANIC ROCK) with Very Close Fracture Spacing 57.7	
	150.3	59.7						(2.0) 100%	(0.0) 0%		150.3 Boring Terminated at Elevation 150.3 ft In Crystalline Rock (FELSIC METAVOLCANIC ROCK) 59.7	

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/30/18



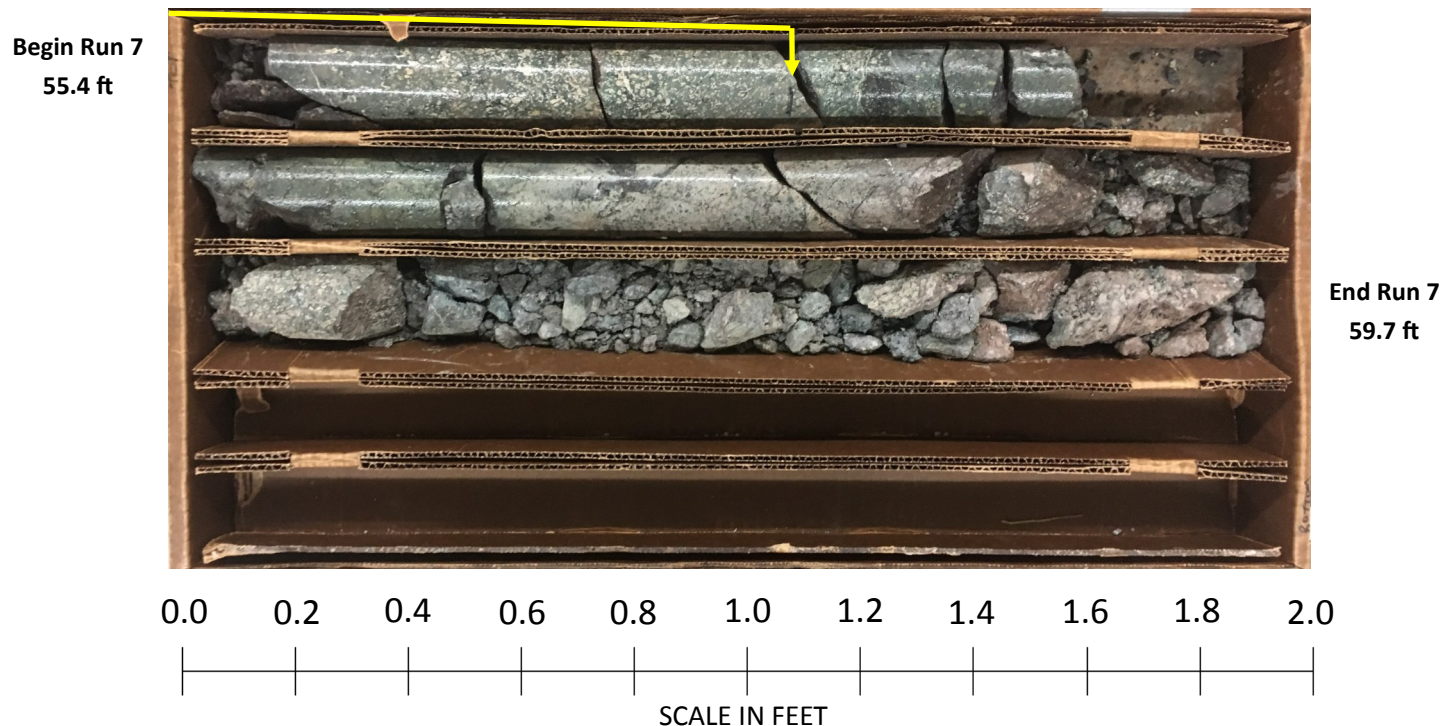
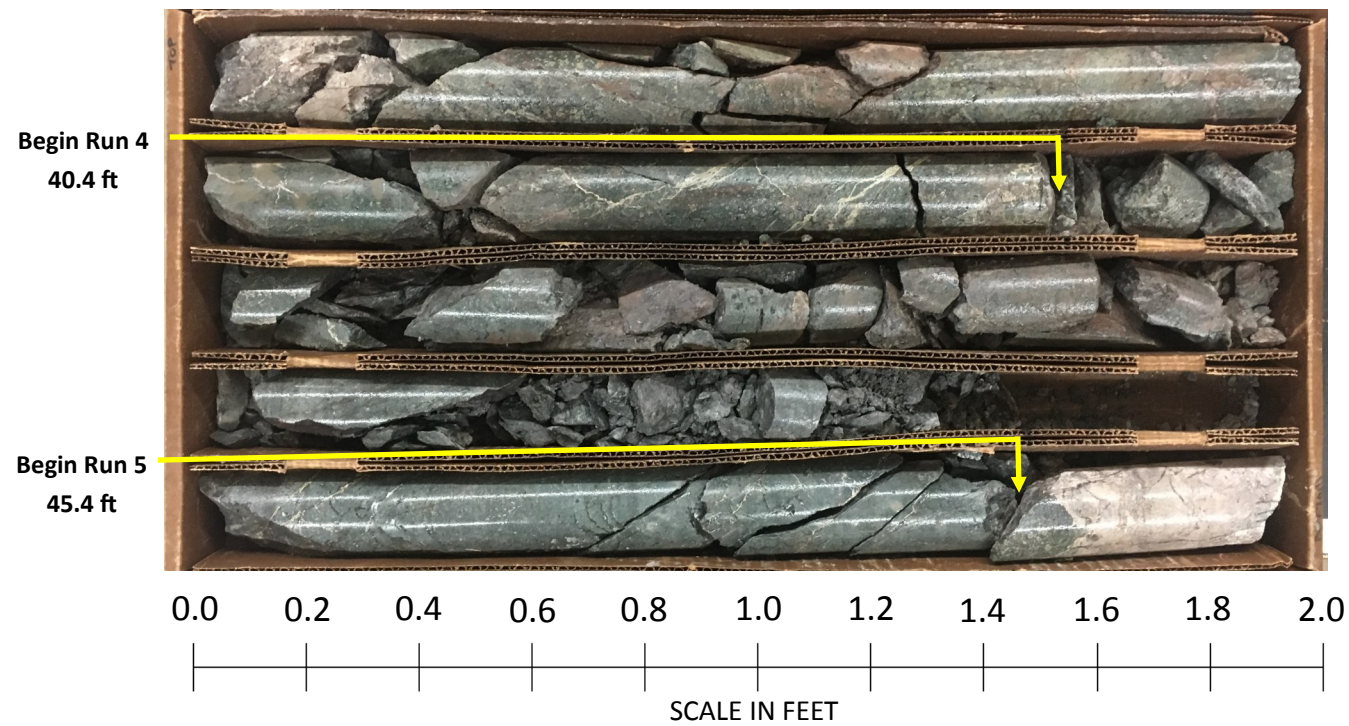
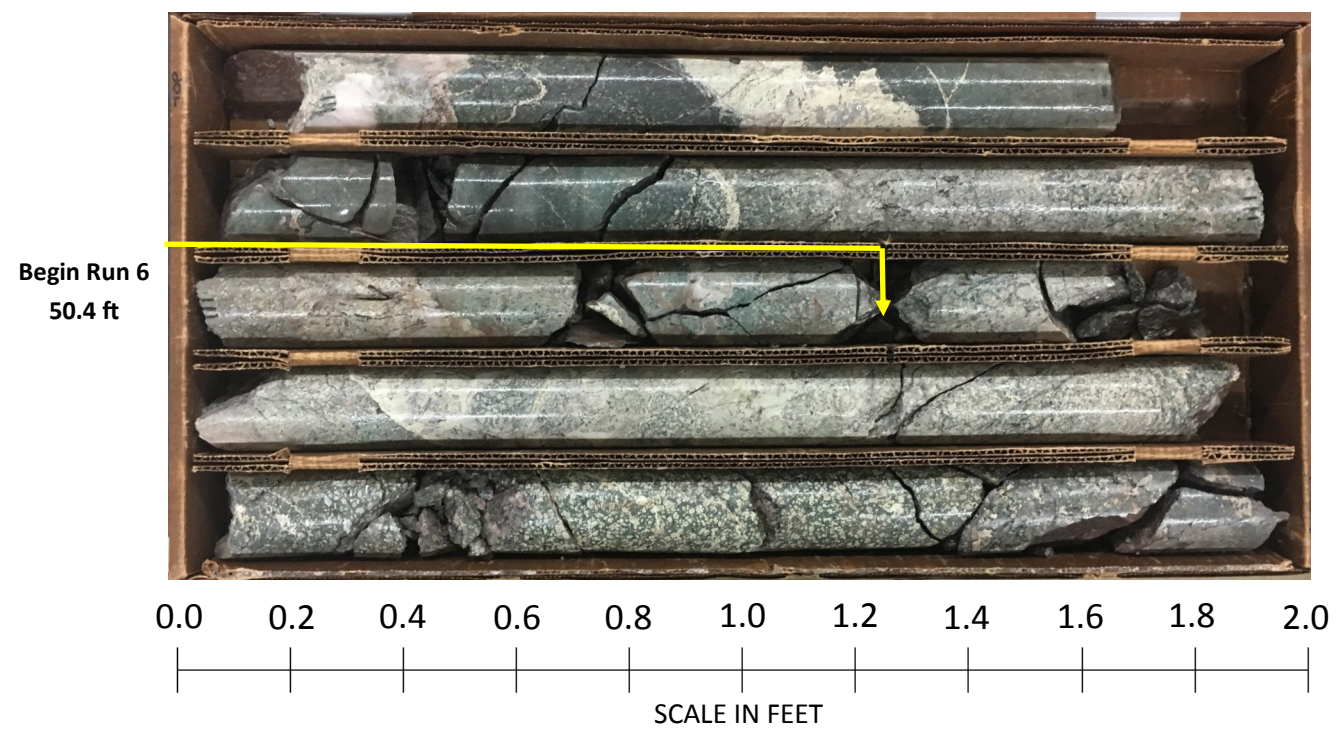
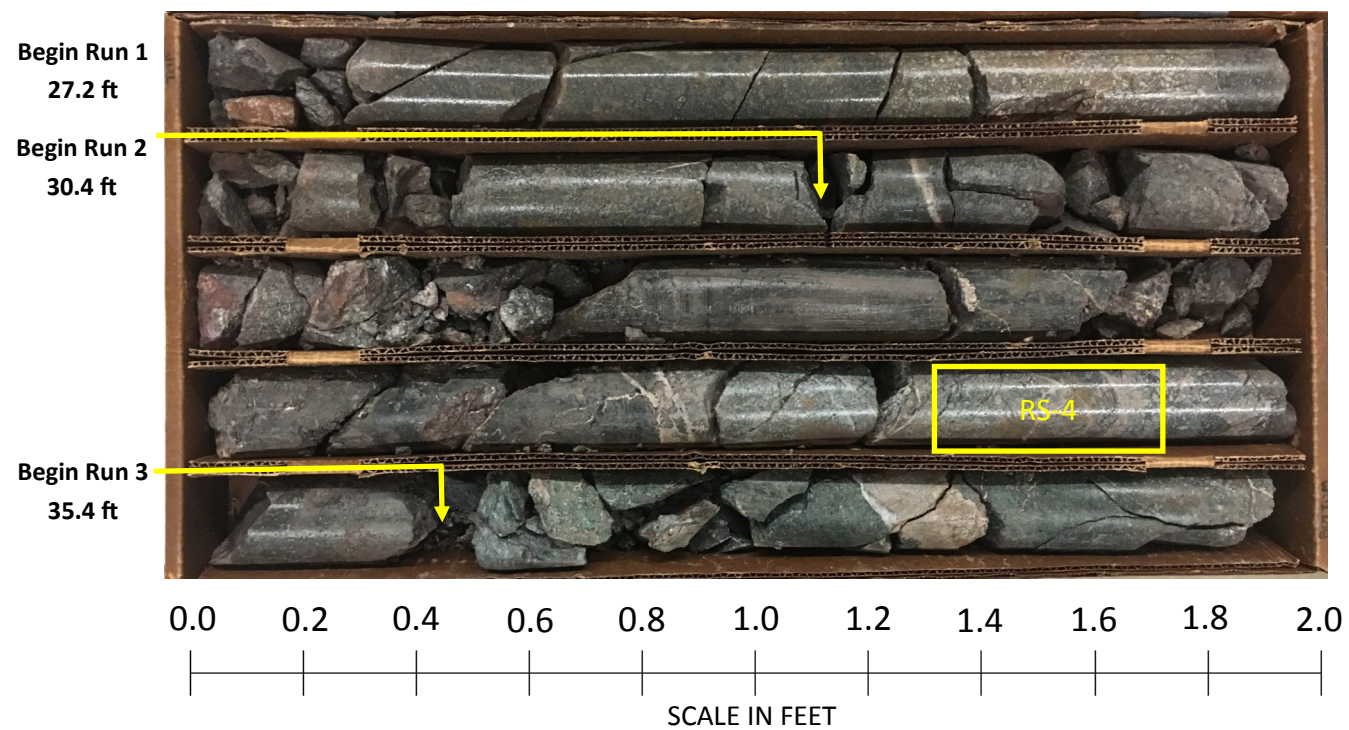
Replace Bridge No. 10 over Deep River on US 15-501/NC 87

ECS Southeast Project No. 08: 12596-A

WBS: 40162.1.1 Tip No.: B-4968

Rock Core Photographs: Boring - B2-B

Station: 35+95 Offset: 18' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 37+67		OFFSET 25 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 215.9 ft		TOTAL DEPTH 14.7 ft		NORTHING 665,716		EASTING 1,942,112										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER L. Gonzales		START DATE 04/19/18		COMP. DATE 04/19/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
220																
215	215.9	0.0	1	2	3										215.9	GROUND SURFACE
	212.4	3.5	3	6	7										212.9	ALLUVIAL Medium Stiff, Brown, Silty CLAY (A-7-5) with trace organics
210	209.9	6.0	7	21	34										210.4	RESIDUAL Stiff, Red-Brown, Silty CLAY (A-7-5), saprolitic
	207.3	8.6	42	58/0.4											207.3	Hard, Gray-Brown, Fine to Coarse Sandy SILT (A-4), saprolitic
205	202.3	13.6	100/0.2												201.3	WEATHERED ROCK Orange-Gray-Brown (METAVOLCANIC ROCK)
	201.3	14.6	60/0.1												201.2	CRYSTALLINE ROCK (METAVOLCANIC ROCK) Boring Terminated with Standard Penetration Test Refusal at Elevation 201.2 ft In Crystalline Rock (METAVOLCANIC ROCK)

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WBS 40162.1.1		TIP B-4968		COUNTY LEE		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 10 over Deep River on US 15-501/NC 87							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 37+67		OFFSET 23 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 227.7 ft		TOTAL DEPTH 35.0 ft		NORTHING 665,726		EASTING 1,942,159										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER L. Gonzales		START DATE 04/19/18		COMP. DATE 04/19/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
230																
	227.7	0.0	2	3	4										227.7	GROUND SURFACE
225	224.2	3.5	2	2	3										222.2	ROADWAY EMBANKMENT Medium Stiff, Brown, Fine to Coarse Sandy CLAY (A-6) with trace gravel
	221.7	6.0	3	5	5										219.7	Stiff, Red-Brown, Clayey SILT (A-5) with trace gravel
220	219.4	8.3	3	5	6										219.7	Stiff, Red-Brown, Fine to Coarse Sandy CLAY (A-6)
215	214.4	13.3	WOH	WOH	WOH										214.7	ALLUVIAL Very Soft to Stiff, Gray-Brown-Orange, Silty CLAY (A-7-5) with trace organics
210	209.4	18.3	3	6	7										204.7	RESIDUAL Hard, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4), saprolitic
205	204.4	23.3	10	25	40										204.7	
200	199.4	28.3	27	27	20										194.4	WEATHERED ROCK Red-Brown-Gray (METAVOLCANIC ROCK)
195	194.4	33.3	12	88/0.2											192.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 192.7 ft On Crystalline Rock (METAVOLCANIC ROCK)
	192.7	35.0	60/0.0												192.7	

NCDOT BORE DOUBLE B-4968_GEO_BORELOGS.GPJ NC_DOT.GDT 7/23/18

B-4968 ROCK TEST RESULTS										
SAMPLE NO.	BORING	STATION	OFFSET	DEPTH INTERVAL	LENGTH (IN.)	DIAMETER (IN.)	RUN RQD	ROCK TYPE	UNIT WEIGHT LB/FT ³	UNCONFINED COMPRESSIVE STRENGTH (PSI/KSF)
RS-1	B1-A	33+35	18' LT	36.6' - 37.0'	4.236	1.980	64%	Triassic Conglomerate/Mudstone	174.2	2,590 psi / 373 ksf
RS-2	B1-B	33+35	18' RT	34.7' - 35.1'	4.470	1.982	68%	Triassic Sandstone	165.3	5,510 psi / 793 ksf
RS-3	B2-A	35+95	18' LT	31.5' - 31.9'	4.181	1.985	44%	Felsic Metavolcanic	183.7	5,680 psi / 818 ksf
RS-3A	B2-A	35+95	18' LT	33.2'-33.6'	4.467	1.986	44%	Felsic Metavolcanic	180.3	6,960 psi / 1,002 ksf
RS-4	B2-B	35+95	18' RT	34.5' - 34.9'	4.475	1.986	24%	Felsic Metavolcanic	177.4	6,490 psi / 935 ksf

RS = NQ2 Rock Core Barrel Sample (ASTM D-2113)

SITE PHOTOS



END BENT 1 LOOKING UP STATION (NORTH)



BENT 1 LOOKING WEST



BENT 1 LOOKING UP STATION (NORTH)



BENT 2 LOOKING DOWN STATION (SOUTH)