

REFERENCE: BR-0086

PROJECT: 67086

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0086	1	19

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY JOHNSTON  
PROJECT DESCRIPTION REPLACE BRIDGE 500070 ON  
US 301 OVER NEUSE RIVER AT -L- STATION  
17+26

**CONTENTS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
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5 - 6	CROSS SECTION(S)
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**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

MICHAEL D. MASON

NCDOT PERSONNEL

INVESTIGATED BY S.V. HUDSON, PG

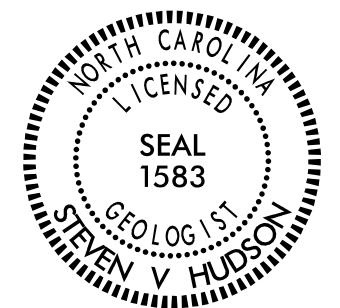
DRAWN BY S.V. HUDSON, PG

CHECKED BY J. LEE STONE, PG

SUBMITTED BY S.V. HUDSON, PG

DATE JULY 2023

**CATLIN**  
Engineers and Scientists



DocuSigned by:

Steven V. Hudson 05/09/2024  
01DB23BB746D469...  
SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

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

SOIL DESCRIPTION										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 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - 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><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - 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. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (ROD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																										
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b>										<b>WEATHERED ROCK (WR)</b>										<b>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>																																																																																																																																										
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<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>										<p>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.</p>																																																																																																																																										
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<b>MISCELLANEOUS SYMBOLS</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>SEVERE (SEV.)</b>										<b>VERY SEVERE (IV SEV.)</b>																																																																																																																																										
<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>										<p>25/025 DIP &amp; DIP DIRECTION OF ROCK STRUCTURES SPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION</p>										<p>SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>										<p>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</p>										<p>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 &lt; 100 BPF</p>																																																																																																																																
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<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>ROCK HARDNESS</b>										<b>VERY HARD</b>																																																																																																																																										
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<p>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.</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>										<p>FRAGILE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>										<p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>																																																																																																																																										
<b>NOTES:</b>										<b>EXTREMELY INDURATED</b>										<b>INDURATED</b>										<b>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</b>																																																																																																																																										
<p>FIAD = FILLED IMMEDIATELY AFTER DRILLING REF = REFUSAL</p>										<p>ELEVATION: FEET</p>										<p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>DATE: 8-15-14</p>																																																																																																																																										

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

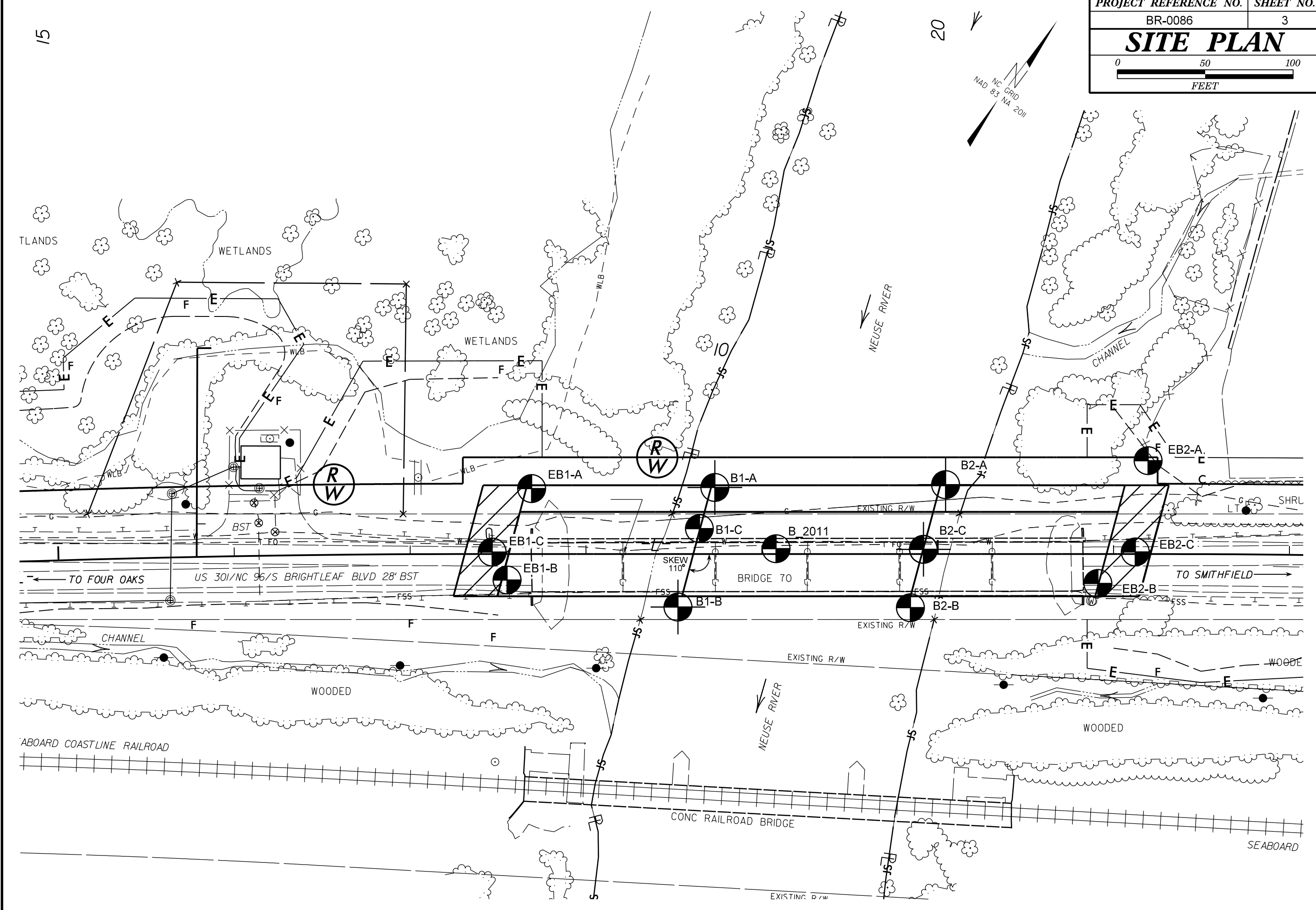
# SUBSURFACE INVESTIGATION

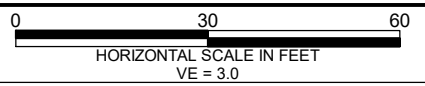
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

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

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

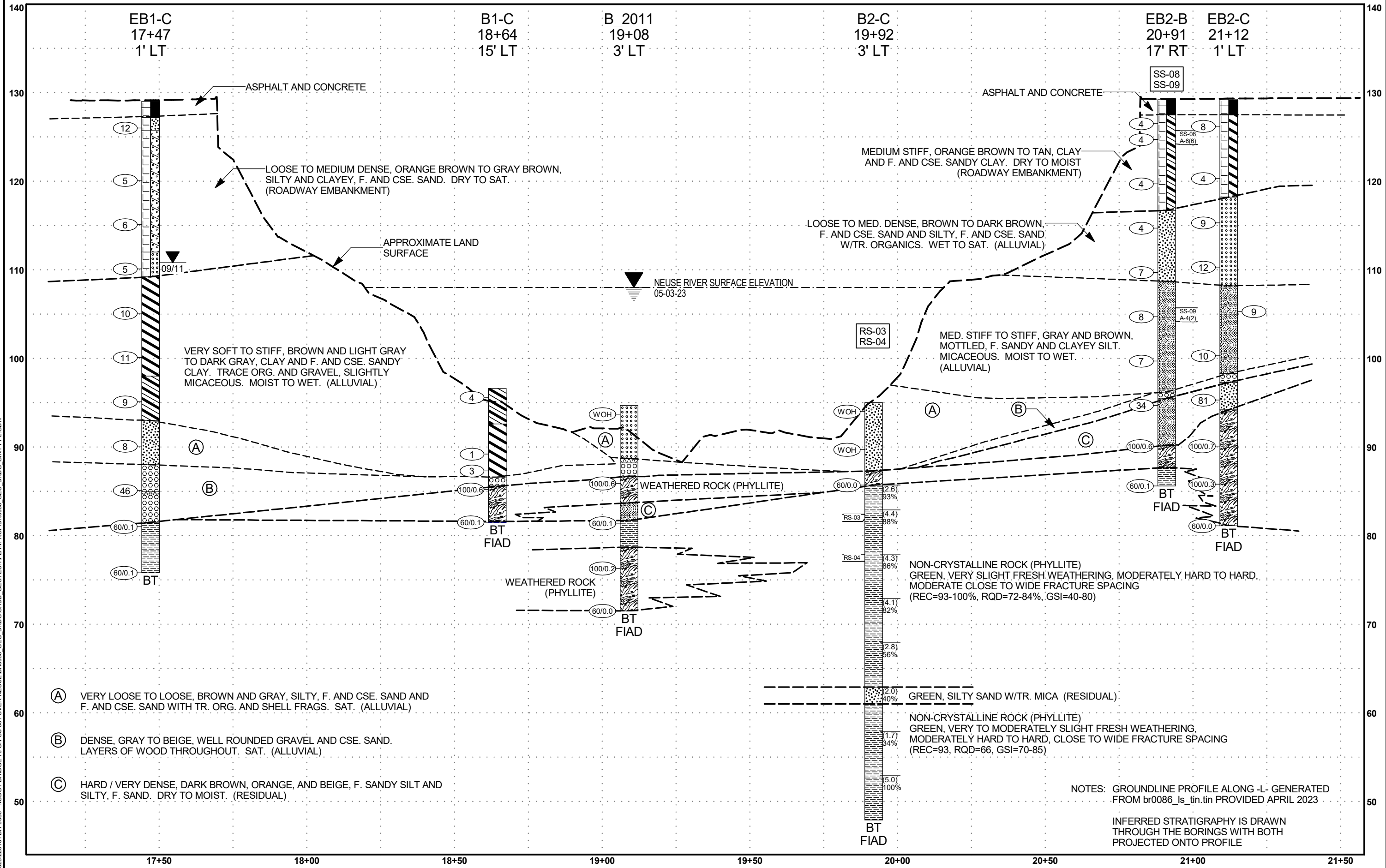
<p><b>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p> <p><b>STRUCTURE</b></p>	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
<p><b>INTACT OR MASSIVE</b> - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p><b>BLOCKY</b> - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p><b>VERY BLOCKY</b> - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p><b>BLOCKY/DISTURBED/SEAMY</b> - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p><b>DISINTEGRATED</b> - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p><b>LAMINATED/SHEARED</b> - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	SURFACE CONDITIONS					
<p>DECREASING INTERLOCKING OF ROCK PIECES</p> <p>↓</p>	<p>DECREASING SURFACE QUALITY</p> <p>→</p>	90	80	70	60	50
<p>↑</p>	<p>COMPOSITION AND STRUCTURE</p>	N/A	N/A	N/A	N/A	N/A
<p><b>A. Thick bedded, very blocky sandstone</b> The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.</p> <p><b>B. Sandstone with thin inter-layers of siltstone</b></p> <p><b>C. Sandstone and siltstone in similar amounts</b></p> <p><b>D. Siltstone or silty shale with sandstone layers</b></p> <p><b>E. Weak siltstone or clayey shale with sandstone layers</b></p> <p><b>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</b></p> <p><b>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</b></p> <p><b>H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</b></p> <p>→ Means deformation after tectonic disturbance</p>	<p>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</p>	70	60	50	40	30
<p>↓</p>	<p>VERY GOOD - Very Rough, fresh unweathered surfaces</p>	N/A	N/A	N/A	N/A	N/A
<p>↑</p>	<p>GOOD - Rough, slightly weathered surfaces</p>	N/A	N/A	N/A	N/A	N/A
<p>↓</p>	<p>FAIR - Smooth, moderately weathered and altered surfaces</p>	N/A	N/A	N/A	N/A	N/A
<p>↑</p>	<p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p>	N/A	N/A	N/A	N/A	N/A
<p>↓</p>	<p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>	N/A	N/A	N/A	N/A	N/A





# PROFILE THROUGH BORINGS PROJECTED ALONG -L-

SKEW = 105°



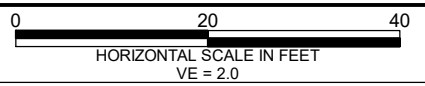
- (A) VERY LOOSE TO LOOSE, BROWN AND GRAY, SILTY, F. AND CSE. SAND AND F. AND CSE. SAND WITH TR. ORG. AND SHELL FRAGS. SAT. (ALLUVIAL)
- (B) DENSE, GRAY TO BEIGE, WELL ROUNDED GRAVEL AND CSE. SAND. LAYERS OF WOOD THROUGHOUT. SAT. (ALLUVIAL)
- (C) HARD / VERY DENSE, DARK BROWN, ORANGE, AND BEIGE, F. SANDY SILT AND SILTY, F. SAND. DRY TO MOIST. (RESIDUAL)

NON-CRYSTALLINE ROCK (PHYLLITE)  
GREEN, VERY SLIGHT FRESH WEATHERING, MODERATELY HARD TO HARD, MODERATE CLOSE TO WIDE FRACTURE SPACING  
(REC=93-100%, RQD=72-84%, GSI=40-80)

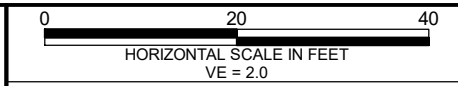
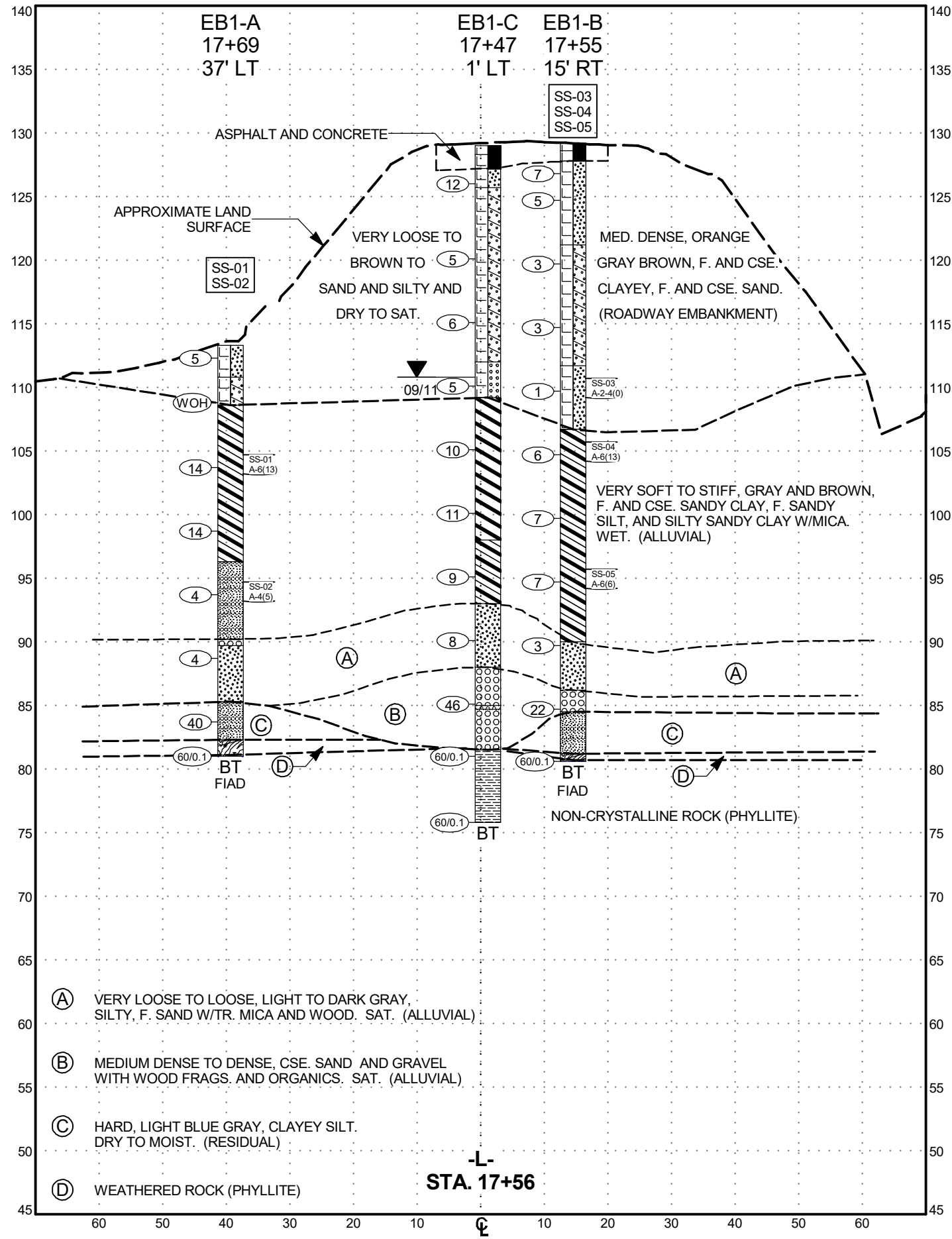
NON-CRYSTALLINE ROCK (PHYLLITE)  
GREEN, VERY TO MODERATELY SLIGHT FRESH WEATHERING, MODERATELY HARD TO HARD, CLOSE TO WIDE FRACTURE SPACING  
(REC=93, RQD=66, GSI=70-85)

NOTES: GROUNDLINE PROFILE ALONG -L- GENERATED FROM br0086\_ls\_tin.tin PROVIDED APRIL 2023  
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE

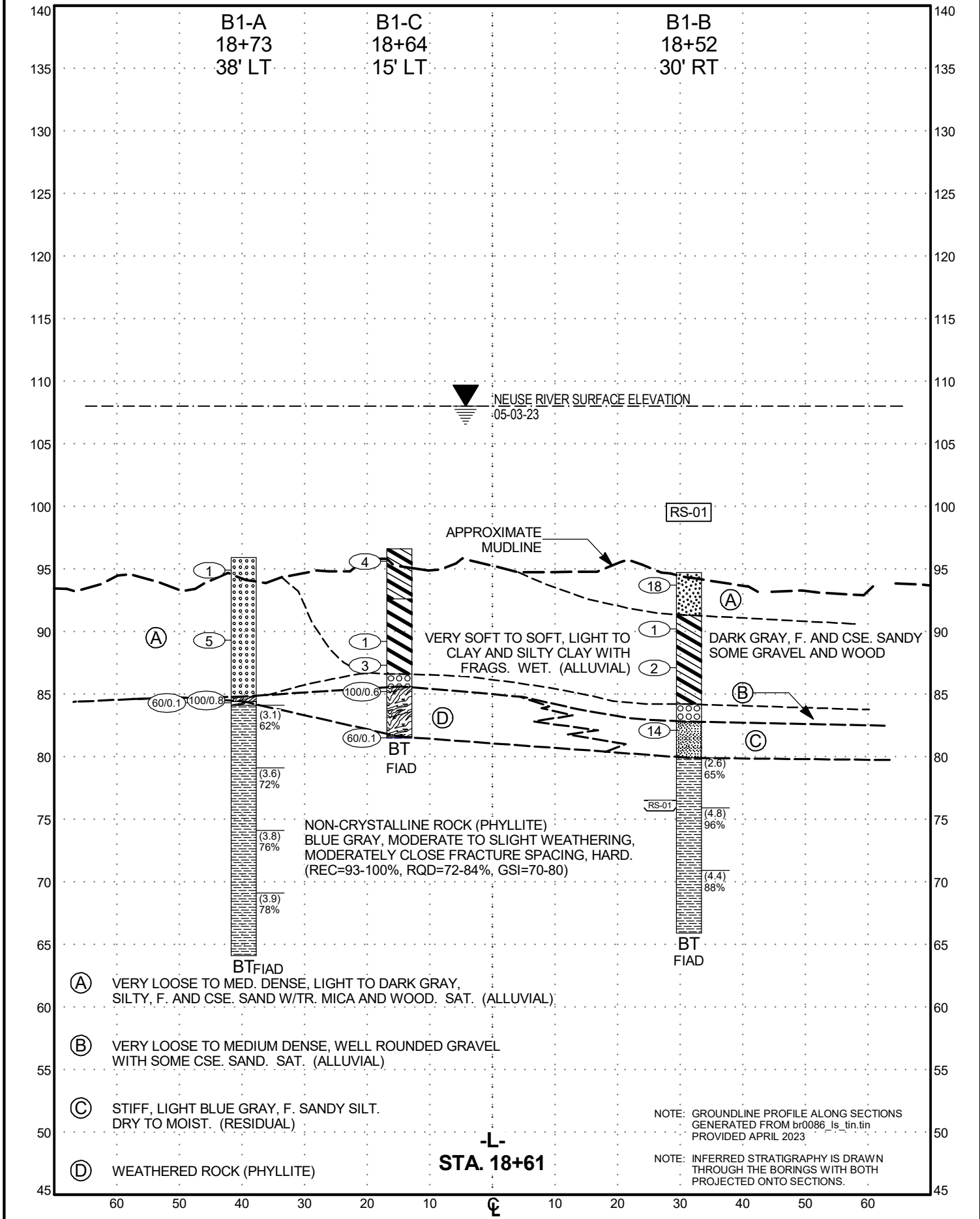
P:\2023\223101 BR-0086 - NCDOT BRIDGE 70 ON US 301 OVER NEUSE\BR0086\_GEO\_BRD\G\CADD\_GEO\BRD\G\INT-P\F\LD\W

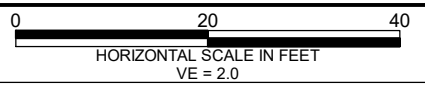


**CROSS SECTION  
END BENT 1  
SKEW = 105°**

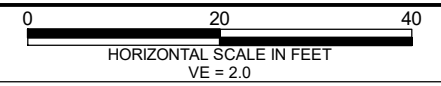
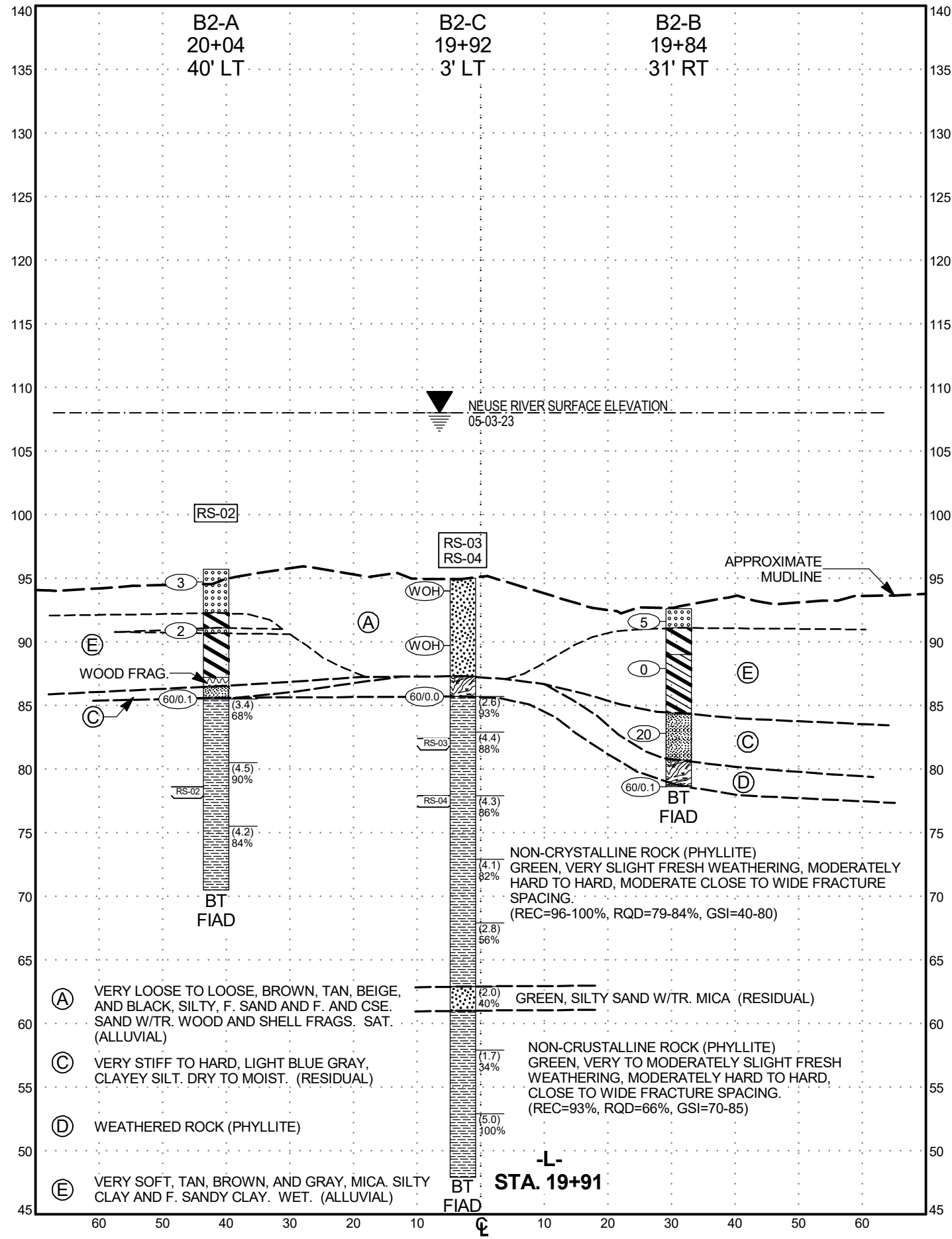


**CROSS SECTION  
BENT 1  
SKEW = 105°**

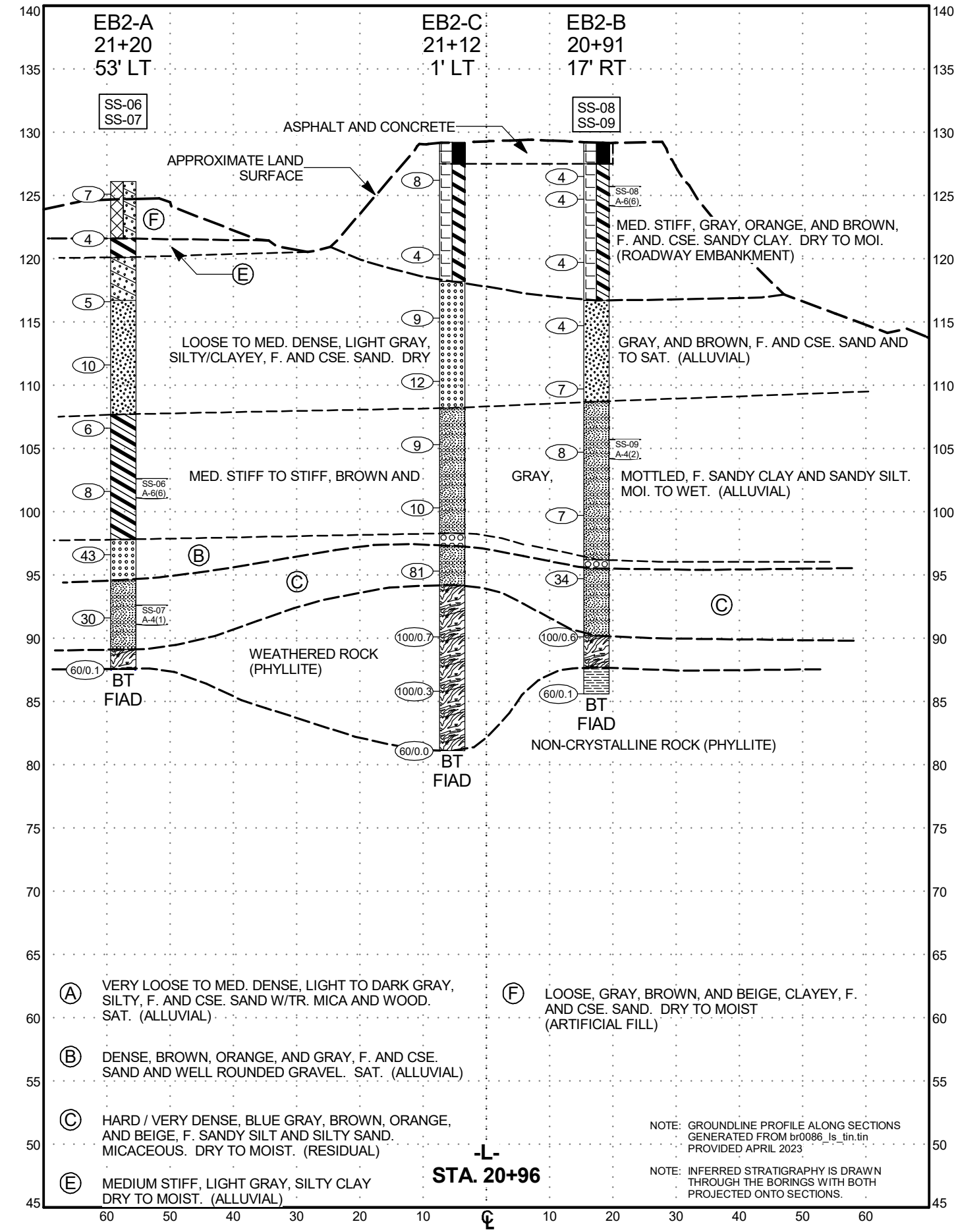




**CROSS SECTION  
BENT 2  
SKEW = 105°**



**CROSS SECTION  
END BENT 2  
SKEW = 105°**



# GEOTECHNICAL BORING REPORT BORE LOG



WBS: 67086.1.1	TIP: BR-0086	COUNTY: JOHNSTON	GEOLOGIST: C. Stratton
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			GROUND WTR (ft)
BORING NO.: EB1-A	STATION: 17+69	OFFSET: 37 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 113.3 ft	TOTAL DEPTH: 32.3 ft	NORTHING: 630,755	EASTING: 2,187,565
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94.5% 02/23/2023		DRILL METHOD: MUD ROTARY	HAMMER TYPE: AUTOMATIC
DRILLER: Austin Fowler	START DATE: 04/21/23	COMP. DATE: 04/21/23	SURFACE WATER DEPTH: N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
130																
125																
120																
115																
113.3	113.3	0.0														113.3
110	109.8	3.5	WOH	WOH	WOH											110.8
																108.6
105	104.7	8.6														105.7
100	99.7	13.6														100.7
95	94.7	18.6														96.3
90	89.7	23.6														89.7
85	84.7	28.6														85.3
																82.3
																81.1
																81.0

WBS: 67086.1.1	TIP: BR-0086	COUNTY: JOHNSTON	GEOLOGIST: C. Stratton
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			GROUND WTR (ft)
BORING NO.: EB1-B	STATION: 17+55	OFFSET: 15 ft RT	ALIGNMENT: -L-
COLLAR ELEV.: 129.2 ft	TOTAL DEPTH: 48.6 ft	NORTHING: 630,705	EASTING: 2,187,585
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94.5% 02/23/2023		DRILL METHOD: MUD ROTARY	HAMMER TYPE: AUTOMATIC
DRILLER: Austin Fowler	START DATE: 04/20/23	COMP. DATE: 04/20/23	SURFACE WATER DEPTH: N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
130																
125																
120																
115																
129.2	129.2	0.0														129.2
																127.8
																127.8
125	125.7	3.5														125.7
120	120.7	8.5														121.2
115	115.7	13.5														115.7
110	110.7	18.5														111.7
105	105.7	23.5														106.7
100	100.7	28.5														100.7
95	95.7	33.5														96.3
90	90.7	38.5														89.7
85	85.7	43.5														85.3
																82.3
																81.1
																81.0

NCDOT BORE DOUBLE - BR0086\_GEO\_BRDG\_CATLIN.GPJ.NCDDOT\_CATLIN.GDT\_05/23/23

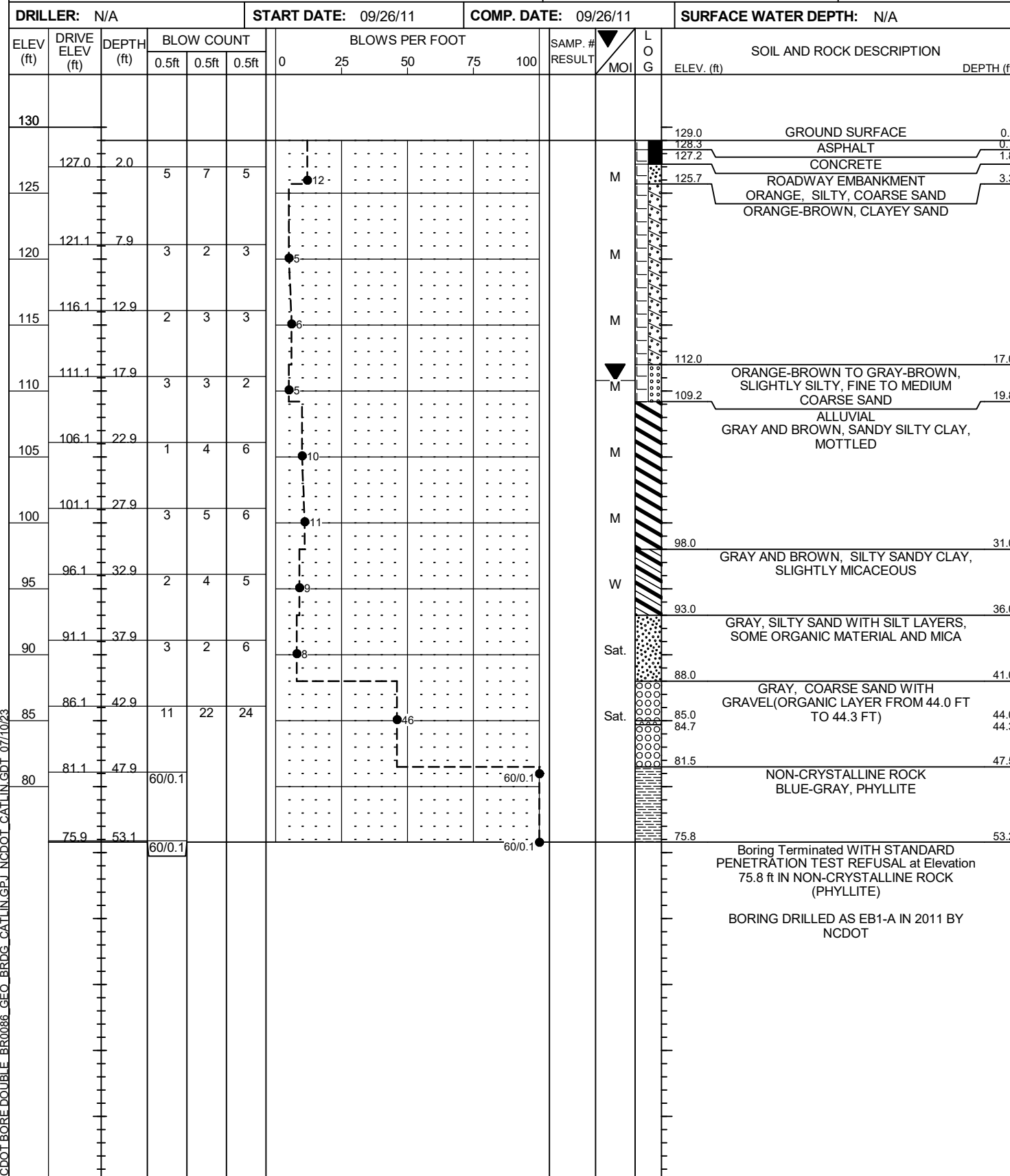
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 81.0 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 80.6 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

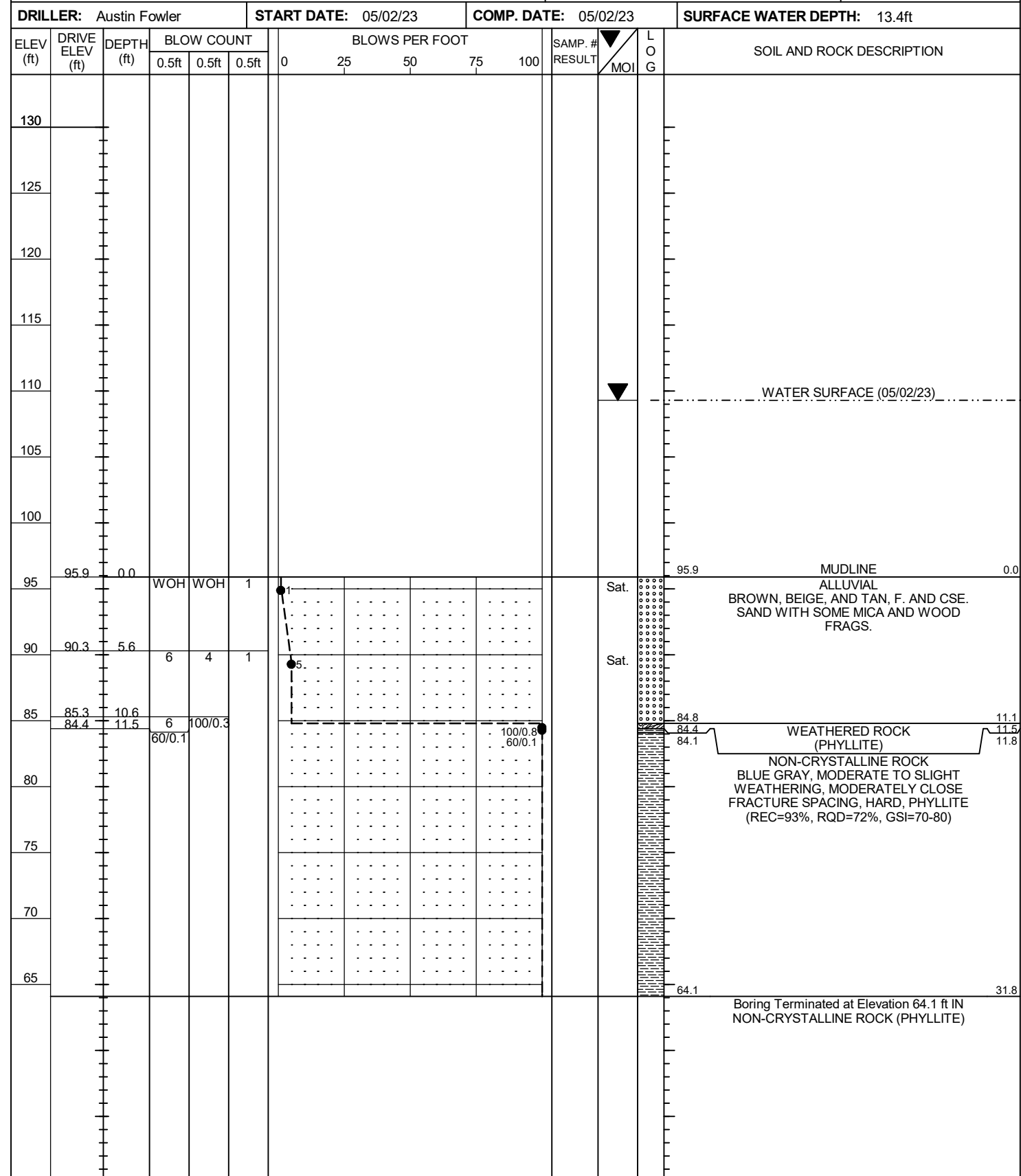


# GEOTECHNICAL BORING REPORT BORE LOG

**WBS:** 67086.1.1 **TIP:** BR-0086 **COUNTY:** JOHNSTON **GEOLOGIST:** Bruinsma, C. M.  
**SITE DESCRIPTION:** REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26  
**BORING NO.:** EB1-C **STATION:** 17+47 **OFFSET:** 1 ft LT **ALIGNMENT:** -L- **GROUND WTR (ft)**  
**COLLAR ELEV.:** 129.0 ft **TOTAL DEPTH:** 53.2 ft **NORTHING:** 630,713 **EASTING:** 2,187,569 **0 HR.** N/A  
**24 HR.** 18.2  
**DRILL RIG/HAMMER EFF./DATE:** RFO0067 CME-550X 77% 03/15/2010 **DRILL METHOD:** Mud Rotary **HAMMER TYPE:** AUTOMATIC  
**DRILLER:** N/A **START DATE:** 09/26/11 **COMP. DATE:** 09/26/11 **SURFACE WATER DEPTH:** N/A



**WBS:** 67086.1.1 **TIP:** BR-0086 **COUNTY:** JOHNSTON **GEOLOGIST:** C. Stratton  
**SITE DESCRIPTION:** REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26  
**BORING NO.:** B1-A **STATION:** 18+73 **OFFSET:** 38 ft LT **ALIGNMENT:** -L- **GROUND WTR (ft)**  
**COLLAR ELEV.:** 95.9 ft **TOTAL DEPTH:** 31.8 ft **NORTHING:** 630,818 **EASTING:** 2,187,648 **0 HR.** FIAD  
**24 HR.** FIAD  
**DRILL RIG/HAMMER EFF./DATE:** CAT1314 CME-45B 86.7% 04/05/2023 **DRILL METHOD:** NW Casing W/SPT & Core **HAMMER TYPE:** AUTOMATIC  
**DRILLER:** Austin Fowler **START DATE:** 05/02/23 **COMP. DATE:** 05/02/23 **SURFACE WATER DEPTH:** 13.4ft



NCDOT BORE DOUBLE - BR0086\_GEO\_BRDG\_CATLIN.GPJ - NCDOT - CATLIN.GDT - 07/10/23

# GEOTECHNICAL BORING REPORT CORE LOG

**B1-A**  
DEPTH: 11.8 to 31.8 ft



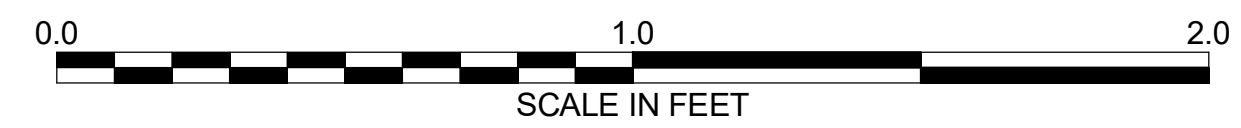
PROJECT REFERENCE

BR-0086

SHEET

9

WBS: 67086.1.1		TIP: BR-0086		COUNTY: JOHNSTON		GEOLOGIST: C. Stratton					
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26							GROUND WTR (ft)				
BORING NO.: B1-A		STATION: 18+73		OFFSET: 38 ft LT		ALIGNMENT: -L-					
COLLAR ELEV.: 95.9 ft		TOTAL DEPTH: 31.8 ft		NORTHING: 630,818		EASTING: 2,187,648					
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 86.7% 04/05/2023				DRILL METHOD: NW Casing W/SPT & Core		HAMMER TYPE: AUTOMATIC					
DRILLER: Austin Fowler		START DATE: 05/02/23		COMP. DATE: 05/02/23		SURFACE WATER DEPTH: 13.4ft					
CORE SIZE: NQ		TOTAL RUN: 20.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)			
84.1	84.1	11.8	5.0	2:34/1.0 3:51/1.0 3:26/1.0 3:02/1.0 2:33/1.0	(4.0) 80%	(3.1) 62%	(18.5) 93%	(14.4) 72%	LOG	Begin Coring @ 11.8 ft NON-CRYSTALLINE ROCK BLUE GRAY, MODERATE TO SLIGHT WEATHERING, MODERATELY CLOSE FRACTURE SPACING, HARD, PHYLLITE (GSI=75-80)	11.8
80	79.1	16.8	5.0	2:15/1.0 2:45/1.0 3:04/1.0 2:36/1.0 1:59/1.0	(5.0) 100%	(3.6) 72%					
75	74.1	21.8	5.0	3:02/1.0 2:57/1.0 2:13/1.0 2:43/1.0 2:07/1.0	(4.5) 90%	(3.8) 76%					
70	69.1	26.8	5.0	2:12/1.0 2:14/1.0 1:52/1.0 1:47/1.0 1:58/1.0	(5.0) 100%	(3.9) 78%					
65	64.1	31.8								Boring Terminated at Elevation 64.1 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	31.8



NCDOT CORE W-PHOTO BR0086\_GEO\_BRDG\_CATLIN.GPJ CATLIN.GDT\_05/16/23

# GEOTECHNICAL BORING REPORT BORE LOG

<b>WBS:</b> 67086.1.1	<b>TIP:</b> BR-0086	<b>COUNTY:</b> JOHNSTON	<b>GEOLOGIST:</b> C. Stratton
<b>SITE DESCRIPTION:</b> REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			<b>GROUND WTR (ft)</b>
<b>BORING NO.:</b> B1-B	<b>STATION:</b> 18+52	<b>OFFSET:</b> 30 ft RT	<b>ALIGNMENT:</b> -L-
<b>COLLAR ELEV.:</b> 94.7 ft	<b>TOTAL DEPTH:</b> 28.8 ft	<b>NORTHING:</b> 630,751	<b>EASTING:</b> 2,187,672
<b>DRILL RIG/HAMMER EFF./DATE:</b> CAT1314 CME-45B 86.7% 04/05/2023		<b>DRILL METHOD:</b> NW Casing W/SPT & Core	<b>HAMMER TYPE:</b> AUTOMATIC
<b>DRILLER:</b> Austin Fowler	<b>START DATE:</b> 05/04/23	<b>COMP. DATE:</b> 05/05/23	<b>SURFACE WATER DEPTH:</b> 11.0ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
130															
125															
120															
115															
110															
105															
100															
95	94.7	0.0		5	6	12									
90	91.2	3.5		1	1	0									
85	88.1	6.6	WOH	1	1										
80	83.1	11.6		6	4	10									
75	79.9	14.8	60/0.1												
70															

<b>WBS:</b> 67086.1.1	<b>TIP:</b> BR-0086	<b>COUNTY:</b> JOHNSTON	<b>GEOLOGIST:</b> C. Stratton
<b>SITE DESCRIPTION:</b> REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			<b>GROUND WTR (ft)</b>
<b>BORING NO.:</b> B1-C	<b>STATION:</b> 18+64	<b>OFFSET:</b> 15 ft LT	<b>ALIGNMENT:</b> -L-
<b>COLLAR ELEV.:</b> 96.6 ft	<b>TOTAL DEPTH:</b> 15.1 ft	<b>NORTHING:</b> 630,794	<b>EASTING:</b> 2,187,655
<b>DRILL RIG/HAMMER EFF./DATE:</b> CAT1314 CME-45B 86.7% 04/05/2023		<b>DRILL METHOD:</b> NW Casing W/SPT & Core	<b>HAMMER TYPE:</b> AUTOMATIC
<b>DRILLER:</b> Austin Fowler	<b>START DATE:</b> 05/03/23	<b>COMP. DATE:</b> 05/03/23	<b>SURFACE WATER DEPTH:</b> 11.4ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
130															
125															
120															
115															
110															
105															
100															
95	96.6	0.0		7	3	1									
90	90.2	6.4	WOH	1	0										
85	88.3	8.3		2	1	2									
80	85.8	10.8		56	44	0.1									
75	81.6	15.0	60/0.1												
70															

NCDOT BORE DOUBLE - BR0086\_GEO\_BRDG\_CATLIN.GPJ\_NCDOT\_CATLIN.GDT\_05/23/23

RS-01

NON-CRYSTALLINE ROCK  
GRAY BLUE AND BEIGE, VERY SLIGHT WEATHERING, MODERATE CLOSE TO WIDE FRACTURE SPACING, HARD, PHYLLITE WITH QUARTZ VEINS.  
(REC=100%, RQD=84%, GSI=75-80)

Boring Terminated at Elevation 65.9 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

WATER SURFACE (05/03/23)

MUDLINE 0.0

ALLUVIAL LIGHT TO DARK GRAY, F. AND CSE. SANDY CLAY W/TR. GRAVEL 4.0

LIGHT TO DARK GRAY, SILTY CLAY W/TR. CSE. SAND AT BASE OF STRATUM 10.0

GRAY BEIGE, WELL ROUNDED GRAVEL 11.0

WEATHERED ROCK (PHYLLITE) 15.0

NON-CRYSTALLINE ROCK (PHYLLITE) 15.1

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 81.5 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)

# GEOTECHNICAL BORING REPORT CORE LOG

**B1-B**  
DEPTH: 14.8 to 28.8 ft



PROJECT REFERENCE

BR-0086

SHEET

11

<b>WBS:</b> 67086.1.1		<b>TIP:</b> BR-0086		<b>COUNTY:</b> JOHNSTON		<b>GEOLOGIST:</b> C. Stratton	
<b>SITE DESCRIPTION:</b> REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26							<b>GROUND WTR (ft)</b>
<b>BORING NO.:</b> B1-B		<b>STATION:</b> 18+52		<b>OFFSET:</b> 30 ft RT		<b>ALIGNMENT:</b> -L-	
<b>COLLAR ELEV.:</b> 94.7 ft		<b>TOTAL DEPTH:</b> 28.8 ft		<b>NORTHING:</b> 630,751		<b>EASTING:</b> 2,187,672	
<b>DRILL RIG/HAMMER EFF./DATE:</b> CAT1314 CME-45B 86.7% 04/05/2023				<b>DRILL METHOD:</b> NW Casing W/SPT & Core		<b>HAMMER TYPE:</b> AUTOMATIC	
<b>DRILLER:</b> Austin Fowler		<b>START DATE:</b> 05/04/23		<b>COMP. DATE:</b> 05/05/23		<b>SURFACE WATER DEPTH:</b> 11.0ft	
<b>CORE SIZE:</b> NQ		<b>TOTAL RUN:</b> 14.0 ft					

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
79.9	79.9	14.8	4.0	3:24 2:56 2:31 3:05	(4.0) 100%	(2.6) 65%		(14.0) 100%	(11.8) 84%		Begin Coring @ 14.8 ft NON-CRYSTALLINE ROCK GRAY BLUE AND BEIGE, VERY SLIGHT WEATHERING, MODERATE CLOSE TO WIDE FRACTURE SPACING, HARD, PHYLLITE WITH QUARTZ VEINS. (GSI=75-85)	14.8
75	75.9	18.8	5.0	2:56 3:07 3:29 2:47 2:05	(5.0) 100%	(4.8) 96%	RS-01					
70	70.9	23.8	5.0	2:52 2:49 2:33 3:06 2:22	(5.0) 100%	(4.4) 88%						
	65.9	28.8									Boring Terminated at Elevation 65.9 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	28.8

## ROCK TEST RESULTS

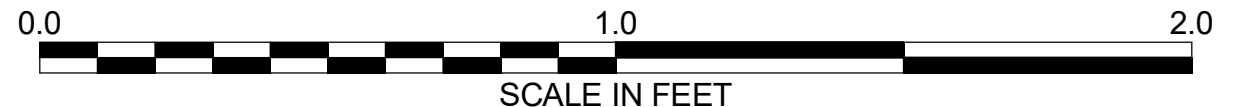
SAMPLE NUMBER	DEPTH INTERVAL	ROCK TYPE	UNIT WT. (lb/ft <sup>3</sup> )	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-01	18.2' - 18.8'	PHYLLITE	161.5	3,280

14.8



BOX 1 of 2

BOX 2 of 2

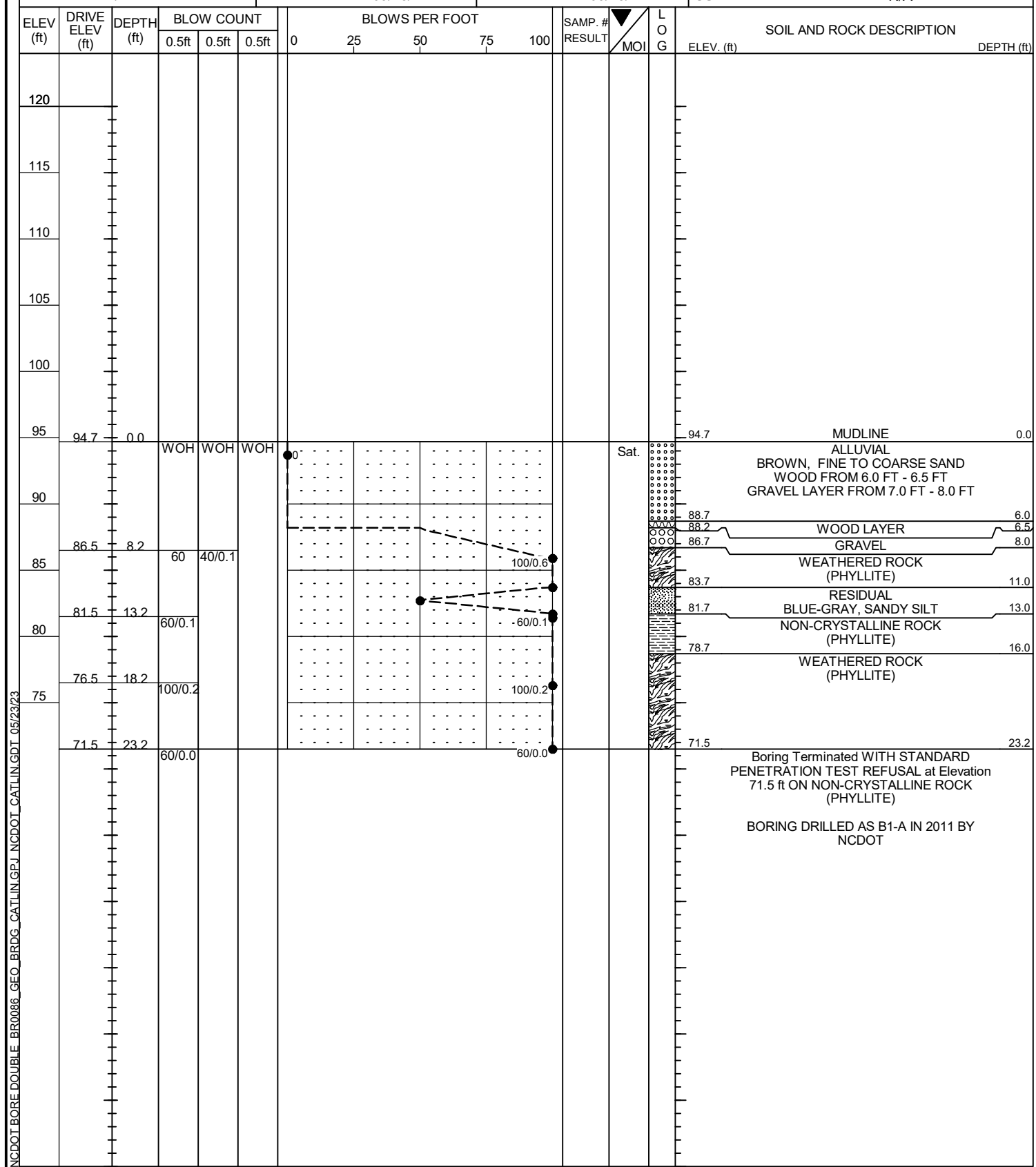


NCDOT CORE W-PHOTO BR0086\_GEO\_BRDG\_CATLIN.GPJ CATLIN.GDT\_05/16/23

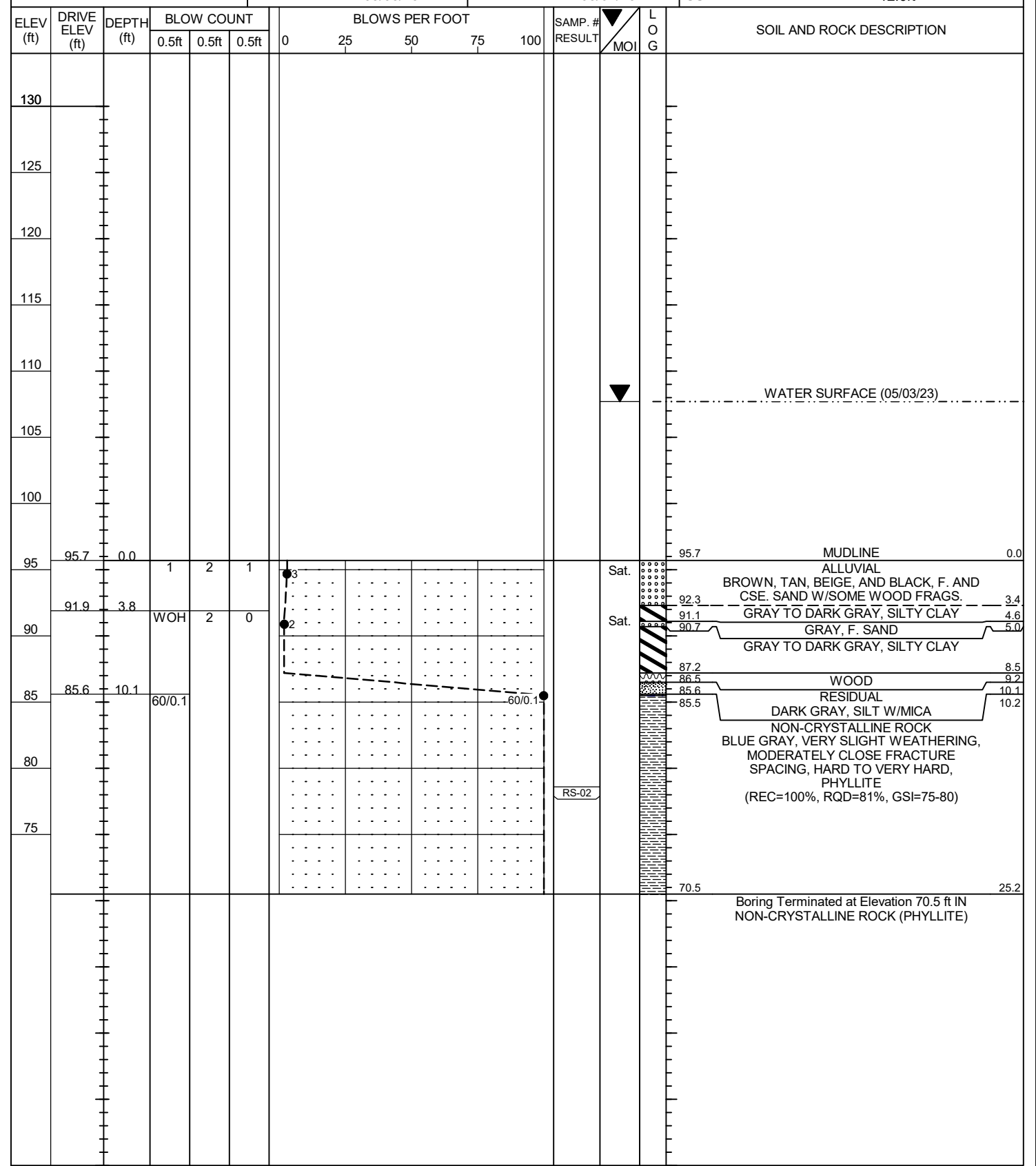
# GEOTECHNICAL BORING REPORT BORE LOG



WBS: 67086.1.1	TIP: BR-0086	COUNTY: JOHNSTON	GEOLOGIST: Bruinsma, C. M.
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			GROUND WTR (ft)
BORING NO.: B_2011	STATION: 19+08	OFFSET: 3 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 94.7 ft	TOTAL DEPTH: 23.2 ft	NORTHING: 630,811	EASTING: 2,187,698
DRILL RIG/HAMMER EFF./DATE: RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD: Mud Rotary	HAMMER TYPE: AUTOMATIC
DRILLER: N/A	START DATE: 09/28/11	COMP. DATE: 09/28/11	SURFACE WATER DEPTH: N/A



WBS: 67086.1.1	TIP: BR-0086	COUNTY: JOHNSTON	GEOLOGIST: C. Stratton
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			GROUND WTR (ft)
BORING NO.: B2-A	STATION: 20+04	OFFSET: 40 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 95.7 ft	TOTAL DEPTH: 25.2 ft	NORTHING: 630,898	EASTING: 2,187,752
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 86.7% 04/05/2023		DRILL METHOD: NW Casing W/SPT & Core	HAMMER TYPE: AUTOMATIC
DRILLER: Austin Fowler	START DATE: 05/03/23	COMP. DATE: 05/04/23	SURFACE WATER DEPTH: 12.0ft



NCDOT BORE DOUBLE BR0086\_GEO\_BRDG\_CATLIN.GPJ NCDOT\_CATLIN.GDT 05/23/23

# GEOTECHNICAL BORING REPORT CORE LOG

**B2-A**  
DEPTH: 10.2 to 25.2 ft



PROJECT REFERENCE

BR-0086

SHEET

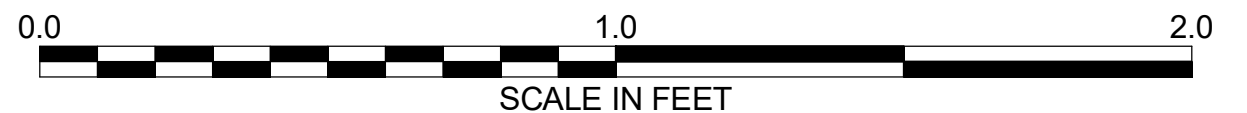
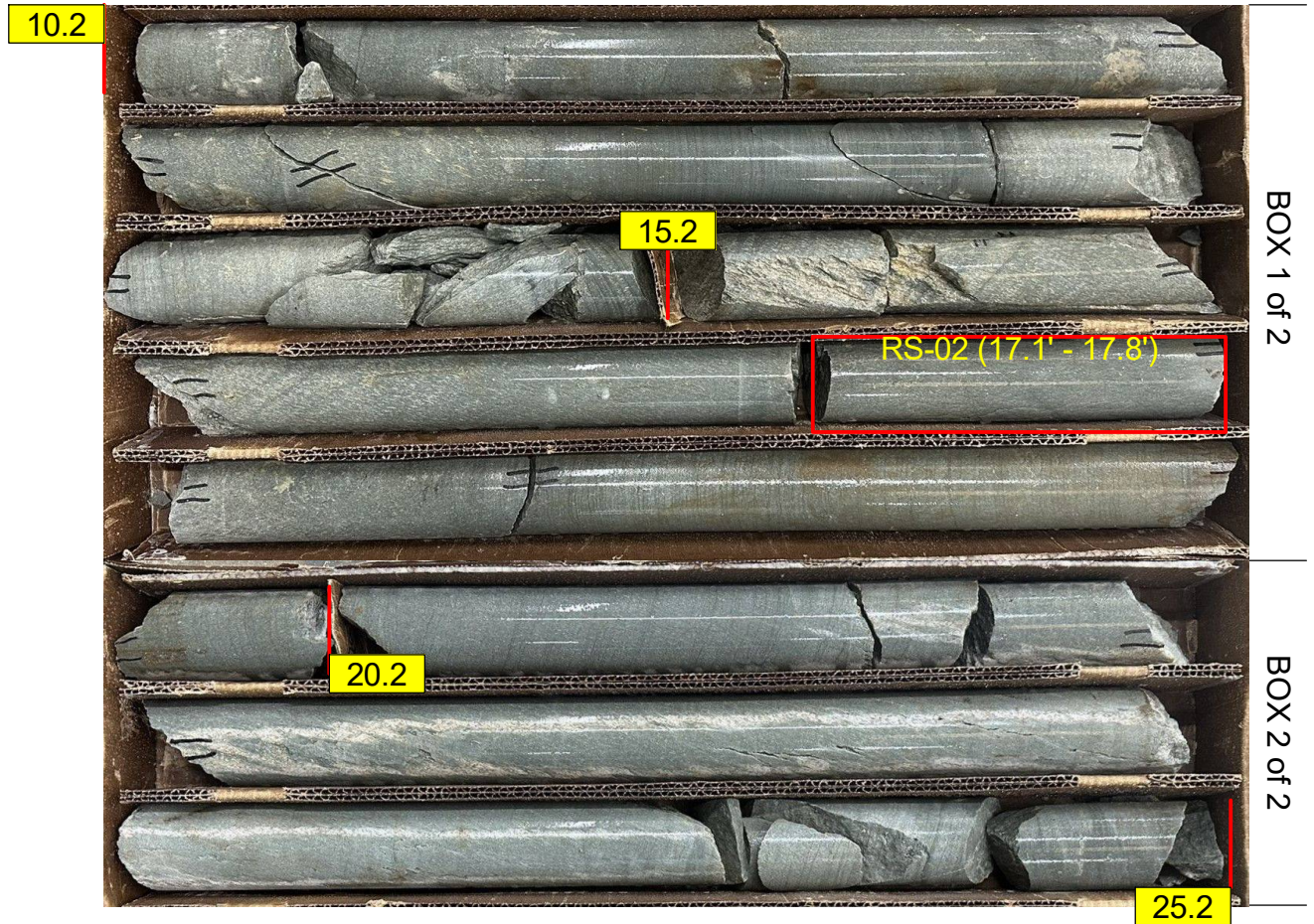
13

WBS: 67086.1.1		TIP: BR-0086		COUNTY: JOHNSTON		GEOLOGIST: C. Stratton	
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26							GROUND WTR (ft)
BORING NO.: B2-A		STATION: 20+04		OFFSET: 40 ft LT		ALIGNMENT: -L-	
COLLAR ELEV.: 95.7 ft		TOTAL DEPTH: 25.2 ft		NORTHING: 630,898		EASTING: 2,187,752	
DRILL RIG/HAMMER EFF./DATE: CAT1314 CME-45B 86.7% 04/05/2023				DRILL METHOD: NW Casing W/SPT & Core		HAMMER TYPE: AUTOMATIC	
DRILLER: Austin Fowler		START DATE: 05/03/23		COMP. DATE: 05/04/23		SURFACE WATER DEPTH: 12.0ft	
CORE SIZE: NQ		TOTAL RUN: 15.0 ft					

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
85.5	85.5	10.2	5.0	3:08 3:26 2:52 2:36	(5.0) 100%	(3.4) 68%		(15.0) 100%	(12.1) 81%		Begin Coring @ 10.2 ft NON-CRYSTALLINE ROCK BLUE GRAY, VERY SLIGHT WEATHERING, MODERATELY CLOSE FRACTURE SPACING, HARD TO VERY HARD, PHYLLITE (GSI=75-80)	10.2
80	80.5	15.2	5.0	3:15 3:26 2:53 2:31 2:57	(5.0) 100%	(4.5) 90%	RS-02					
75	75.5	20.2	5.0	2:36 3:04 3:17 2:51 2:23	(5.0) 100%	(4.2) 84%						
	70.5	25.2									Boring Terminated at Elevation 70.5 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	25.2

## ROCK TEST RESULTS

SAMPLE NUMBER	DEPTH INTERVAL	ROCK TYPE	UNIT WT. (lb/ft <sup>3</sup> )	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-02	17.1' - 17.8'	PHYLLITE	163.8	7,420



NCDOT CORE W-PHOTO BR0086\_GEO\_BRDG\_CATLIN.GPJ CATLIN.GDT\_05/16/23



# GEOTECHNICAL BORING REPORT CORE LOG

**B2-C**  
DEPTH: 9.3 to 47.1 ft



PROJECT REFERENCE	SHEET
BR-0086	15

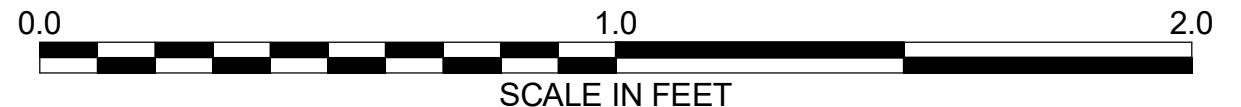
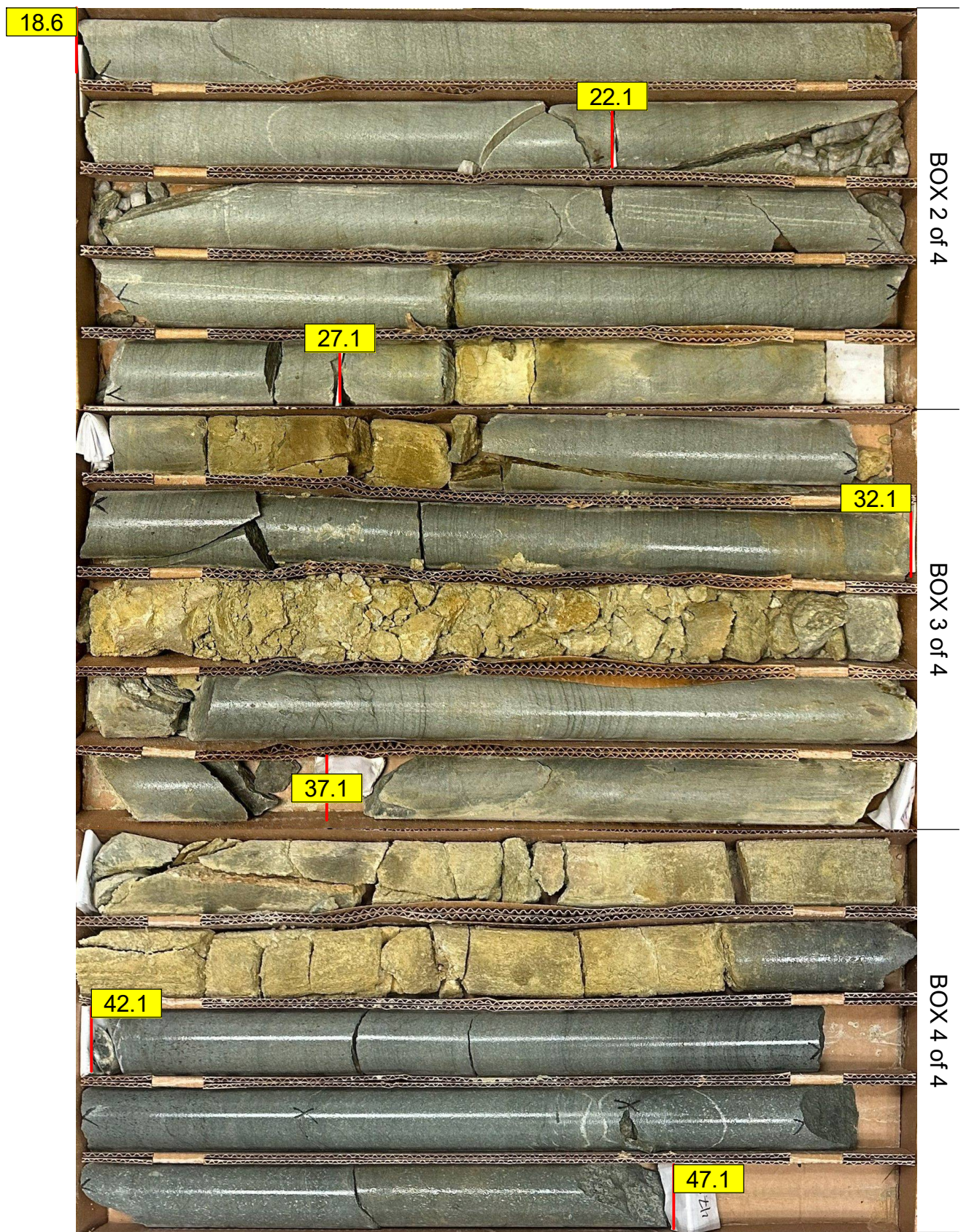
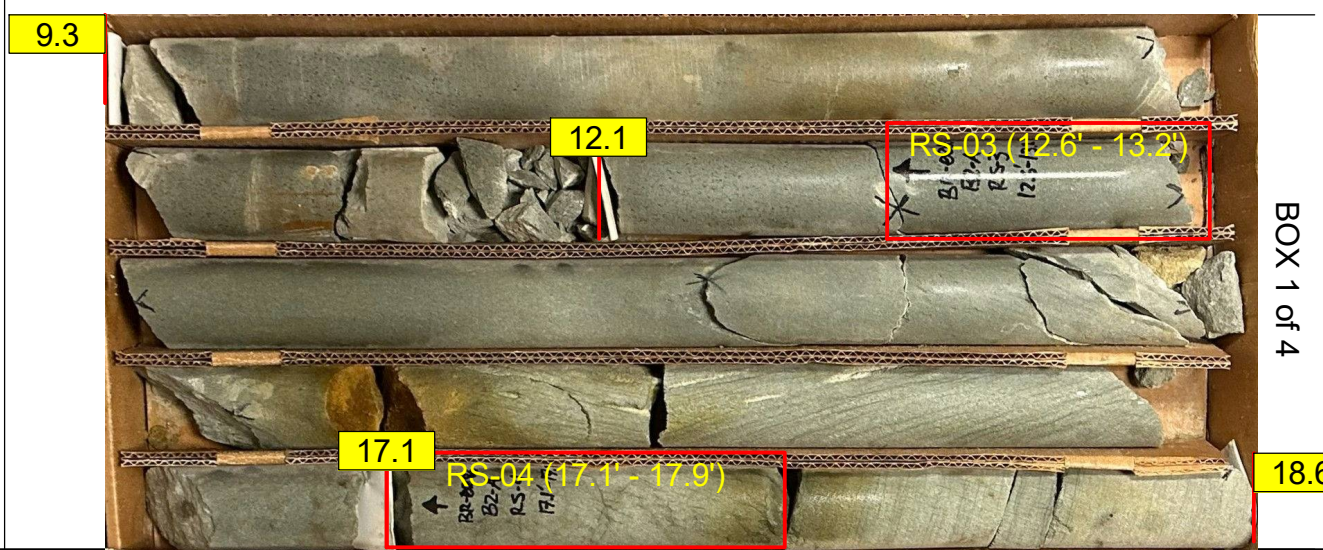
WBS: 67086.1.1	TIP: BR-0086	COUNTY: JOHNSTON	GEOLOGIST: N. Moore
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			GROUND WTR (ft)
BORING NO.: B2-C	STATION: 19+92	OFFSET: 3 ft LT	ALIGNMENT: -L-
COLLAR ELEV.: 95.0 ft	TOTAL DEPTH: 47.1 ft	NORTHING: 630,861	EASTING: 2,187,764
DRILL RIG/HAMMER EFF./DATE: N/A		DRILL METHOD: NW Casing W/SPT & Core	HAMMER TYPE: AUTOMATIC
DRILLER: N/A	START DATE: 10/14/20	COMP. DATE: 10/14/20	SURFACE WATER DEPTH: N/A
CORE SIZE: NW		TOTAL RUN: 37.8 ft	

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
85.7	85.7	9.3	2.8	N=60/0.0	(2.6)	(2.6)		(21.8)	(18.0)		Begin Coring @ 9.3 ft NON-CRYSTALLINE ROCK	9.3
	82.9	12.1	5.0		(4.9)	(4.4)	RS-03	96%	79%		GREEN, VERY SLIGHT FRESH WEATHERING, MODERATELY HARD TO HARD, MODERATE CLOSE TO WIDE FRACTURE SPACING, PHYLLITE (GSI=40-80)	
80	77.9	17.1	5.0		(4.7)	(4.3)	RS-04	94%	86%			
75	72.9	22.1	5.0		(4.8)	(4.1)		96%	82%			
70	67.9	27.1	5.0		(5.0)	(2.8)		100%	56%			
65	62.9	32.1	5.0		(4.1)	(2.0)		82%	40%		RESIDUAL GREEN, SILTY SAND W/TRACE MICA	32.1
60	57.9	37.1	5.0		(12.2)	(8.7)		93%	66%		NON-CRYSTALLINE ROCK GREEN, VERY TO MODERATELY SLIGHT FRESH WEATHERING, MODERATELY HARD TO HARD, CLOSE TO WIDE FRACTURE SPACING, PHYLLITE (GSI=70-85)	34.0
55	52.9	42.1	5.0		(5.0)	(1.7)		100%	34%			
50	47.9	47.1	5.0		(5.0)	(5.0)		100%	100%		Boring Terminated at Elevation 47.9 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	47.1

## ROCK TEST RESULTS

SAMPLE NUMBER	DEPTH INTERVAL	ROCK TYPE	UNIT WT. (lb/ft <sup>3</sup> )	UNIAXIAL COMPRESSIVE STRENGTH (psi)
RS-03	12.6' - 13.2'	PHYLLITE	162.8	5,460
RS-04	17.1' - 17.9'	PHYLLITE	154.8	2,370

NGDOT CORE W-PHOTO BR0086 GEO\_BRDG\_CATLIN.GPJ\_CATLIN.GDT\_06/02/23





# GEOTECHNICAL BORING REPORT BORE LOG

<b>WBS:</b> 67086.1.1	<b>TIP:</b> BR-0086	<b>COUNTY:</b> JOHNSTON	<b>GEOLOGIST:</b> C. Stratton
<b>SITE DESCRIPTION:</b> REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			<b>GROUND WTR (ft)</b>
<b>BORING NO.:</b> EB2-A	<b>STATION:</b> 21+20	<b>OFFSET:</b> 53 ft LT	<b>ALIGNMENT:</b> -L-
<b>COLLAR ELEV.:</b> 126.1 ft	<b>TOTAL DEPTH:</b> 38.6 ft	<b>NORTHING:</b> 630,978	<b>EASTING:</b> 2,187,836
<b>DRILL RIG/HAMMER EFF./DATE:</b> CAT1303 CME-550 94.5% 02/23/2023		<b>DRILL METHOD:</b> MUD ROTARY	<b>HAMMER TYPE:</b> AUTOMATIC
<b>DRILLER:</b> Austin Fowler	<b>START DATE:</b> 04/21/23	<b>COMP. DATE:</b> 04/21/23	<b>SURFACE WATER DEPTH:</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
130														
125	126.1	0.0	5	4	3							D	LAND SURFACE	0.0
													ARTIFICIAL FILL GRAY, BROWN, AND BEIGE, CLAYEY, F. AND CSE. SAND	
120	122.6	3.5	2	2	2							M	ALLUVIAL LIGHT GRAY, SILTY CLAY LIGHT GRAY, CLAYEY, F. AND CSE. SAND	4.5
														6.0
115	117.6	8.5	2	2	3							M	LIGHT TO DARK GRAY, SILTY, F. AND CSE. SAND	9.4
110	112.6	13.5	4	4	6							M		
105	107.6	18.5	2	3	3							M	MOTTLED BROWN GRAY, F. SANDY AND SILTY CLAY, MICACEOUS	18.4
100	102.6	23.5	3	3	5							M		
95	97.6	28.5	12	14	29							Sat.	BROWN, ORANGE, AND GRAY, F. AND CSE. SAND W/SOME CLAY AND GRAVEL	28.3
90	92.6	33.5	11	13	17							M	RESIDUAL BLUE GRAY, F. SANDY SILT, MICACEOUS	31.5
	87.6	38.5											WEATHERED ROCK (PHYLLITE)	37.0
													NON-CRYSTALLINE ROCK (PHYLLITE)	38.5
													Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 87.5 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	38.6

<b>WBS:</b> 67086.1.1	<b>TIP:</b> BR-0086	<b>COUNTY:</b> JOHNSTON	<b>GEOLOGIST:</b> C. Stratton
<b>SITE DESCRIPTION:</b> REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26			<b>GROUND WTR (ft)</b>
<b>BORING NO.:</b> EB2-B	<b>STATION:</b> 20+91	<b>OFFSET:</b> 17 ft RT	<b>ALIGNMENT:</b> -L-
<b>COLLAR ELEV.:</b> 129.2 ft	<b>TOTAL DEPTH:</b> 43.6 ft	<b>NORTHING:</b> 630,905	<b>EASTING:</b> 2,187,855
<b>DRILL RIG/HAMMER EFF./DATE:</b> CAT1303 CME-550 94.5% 02/23/2023		<b>DRILL METHOD:</b> MUD ROTARY	<b>HAMMER TYPE:</b> AUTOMATIC
<b>DRILLER:</b> Austin Fowler	<b>START DATE:</b> 04/20/23	<b>COMP. DATE:</b> 04/20/23	<b>SURFACE WATER DEPTH:</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
130														
125	127.5	1.7	1	2	2							Sat.	ROAD SURFACE	0.0
													ASPHALT	0.7
	127.5	3.5	WOH	2	2							Sat.	CONCRETE	1.7
													ROADWAY EMBANKMENT ORANGE, RED, TAN, AND GRAY, F. AND CSE. SANDY CLAY	
120	120.7	8.5	1	2	2							Sat.		
115	115.7	13.5	2	2	2							M	ALLUVIAL DARK BROWN TO BROWN, SILTY, F. AND CSE. SAND W/SOME MICA	12.5
110	110.7	18.5	4	3	4							M		
105	105.7	23.5	2	3	5							M	GRAY BROWN MOTTLED, F. SANDY AND CLAYEY SILT	20.5
100	100.7	28.5	3	3	4							M		
95	95.7	33.5	8	11	23							M	WELL ROUNDED GRAVEL	33.0
													RESIDUAL DARK BROWN, ORANGE, AND BEIGE, F. SANDY SILT	33.7
90	90.7	38.5	18	82/0.1								M	WEATHERED ROCK (PHYLLITE)	39.0
													NON-CRYSTALLINE ROCK (PHYLLITE)	41.5
													Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 85.6 ft IN NON-CRYSTALLINE ROCK (PHYLLITE)	43.6

NCDOT BORE DOUBLE BR0086\_GEO\_BRDG\_CATLIN.GPJ NCDOT\_CATLIN.GDT 07/10/23

# GEOTECHNICAL BORING REPORT BORE LOG

223101



PROJECT REFERENCE

BR-0086

SHEET

17

WBS: 67086.1.1		TIP: BR-0086		COUNTY: JOHNSTON		GEOLOGIST: Bruinsma, C. M.											
SITE DESCRIPTION: REPLACE BRIDGE 500070 ON US 301 OVER NEUSE RIVER AT -L- STA. 17+26							GROUND WTR (ft)										
BORING NO.: EB2-C		STATION: 21+12		OFFSET: 1 ft LT		ALIGNMENT: -L-											
COLLAR ELEV.: 129.2 ft		TOTAL DEPTH: 48.1 ft		NORTHING: 630,932		EASTING: 2,187,861											
DRILL RIG/HAMMER EFF./DATE: RFO0067 CME-550X 77% 03/15/2010				DRILL METHOD: Mud Rotary		HAMMER TYPE: AUTOMATIC											
DRILLER: N/A		START DATE: 09/27/11		COMP. DATE: 09/27/11		SURFACE WATER DEPTH: N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. # RESULT	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
130														129.2	0.0	GROUND SURFACE	
														128.5	0.7	ASPHALT	
														127.5	1.7	CONCRETE	
125	127.2	2.0	3	3	5								M			ROADWAY EMBANKMENT GRAY AND ORANGE-BROWN, SANDY CLAY	
120	121.3	7.9	2	2	2								M				
115	116.3	12.9	5	5	4								M			ALLUVIAL BROWN, FINE TO MEDIUM COARSE, SAND WITH TRACE ORGANIC MATERIAL	
110	111.3	17.9	5	5	7								M				
105	106.3	22.9	2	4	5								M			GRAY AND BROWN, SANDY CLAYEY SILT, MOTTLED TO MICACEOUS	
100	101.3	27.9	4	4	6								M				
95	96.3	32.9	11	30	51								M			GRAY, GRAVEL RESIDUAL BROWN, SILTY SAND (PHYLLITE)	
90	91.1	38.1	14	55	45/0.2											WEATHERED ROCK (PHYLLITE)	
85	86.1	43.1	100/0.3														
	81.1	48.1	60/0.0														
																	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 81.1 ft ON NON-CRYSTALLINE ROCK  BORING DRILLED AS EB2-A IN 2011 BY NCDOT

NCDOT BORE DOUBLE BR0086\_GEO\_BRDG\_CATLIN.GPJ NCDOT\_CATLIN.GDT\_06/13/23

# LABORATORY SUMMARY SHEET

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

### TEST RESULTS

Proj. Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09						
Lab Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09						
Retained #4 Sieve %	0	0	0.6	0	0	1.3	0	4.4	0						
Passing #10 Sieve %	100	99.9	98.3	100	100	98.0	100	89.2	100						
Passing #40 Sieve %	98	100	83	99	100	97	99	69	98						
Passing #200 Sieve %	88	74	29	87	66	57	61	44	64						
<b>MINUS NUMBER 10 FRACTION</b>															
<b>SOIL MORTAR - 100%</b>															
Coarse Sand Ret.-#60 %	2.7	1.3	32.6	1.7	1.2	8.0	7.4	34.3	7.4						
Fine Sand Ret.-#270 %	15.5	38.4	42.7	17.1	44.0	40.6	38.3	20.5	37.4						
Silt 0.05 - 0.005mm %	42.1	32.8	13.9	39.2	29.4	24.5	49.2	20.8	29.8						
Clay <0.005mm %	39.7	27.5	10.9	42.0	25.4	26.8	5.1	24.4	25.4						
Liquid Limit (LL)	37	28	NP	37	31	35	31	37	22						
Plasticity Index (PI)	14	9	NP	14	12	15	3	20	7						
AASHTO Classification /Group Index	<b>A-6(13)</b>	<b>A-4(5)</b>	<b>A-2-4(0)</b>	<b>A-6(13)</b>	<b>A-6(6)</b>	<b>A-6(6)</b>	<b>A-4(1)</b>	<b>A-6(6)</b>	<b>A-4(2)</b>						
Organic Content %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Station	17+69	17+69	17+55	17+55	17+55	21+20	21+20	20+91	20+91						
Offset	37ft LT	37ft LT	15ft RT	15ft RT	15ft RT	53ft LT	53ft LT	17ft RT	17ft RT						
Alignment	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-	-L-						
Boring Identification	<b>EB1-A</b>	<b>EB1-A</b>	<b>EB1-B</b>	<b>EB1-B</b>	<b>EB1-B</b>	<b>EB2-A</b>	<b>EB2-A</b>	<b>EB2-B</b>	<b>EB2-B</b>						
Depth (FT)	8.6	18.6	18.5	23.5	33.5	23.5	33.5	3.5	23.5						
to	10.1	20.1	20.0	25.0	35.0	25.0	35.0	5.0	25.0						
Field Moist. Content %															
Tested By	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON						
Submitted By	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON	SVHUDSON						
Date Submitted	05/02/23	05/02/23	05/02/23	05/02/23	05/02/23	05/02/23	05/02/23	05/02/23	05/02/23						

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

*Michael D. Mason*  
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Laboratory Manager

Report Date: 5/25/2023  
Laboratory Report Page 1 of 1

# SITE PHOTOGRAPHS



FACING UPSTATION ALONG -L- EB1-B IN FOREGROUND



FACING DOWNSTATION ALONG -L- EB2-B IN FOREGROUND



DOWNSTREAM OF BRIDGE 70 NEAR EB2 RIGHT OF -L- FACING SOUTHWEST