

REFERENCE: R-2707C

PROJECT: 34497

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CLEVELAND  
 PROJECT DESCRIPTION US 74 SHELBY BYPASS FROM  
EAST OF NC 226 TO EAST OF NC 150  
 SITE DESCRIPTION BRIDGE NO. 472 AND BRIDGE NO.  
473 ON -L- (US 74) OVER -YIIEV2- (NC 180)  
AND -YI3- (CSX RR)

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-5	PROFILES
6-11	CROSS SECTION(S)
12-29	BORE LOGS, CORE REPORTS, AND ROCK CORE PHOTOS
30	SOIL TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	30

**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 1919 T07-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

- NOTES:
1. 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.
  2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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<u>J.K. STICKNEY</u>	<u>GEOLOGIC</u>
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INVESTIGATED BY ECS CAROLINAS, LLP  
 DRAWN BY M. BREWER, P.E.  
 CHECKED BY M. WALKO, P.E.  
 SUBMITTED BY ECS CAROLINAS, LLP  
 DATE AUGUST 2016



DocuSigned by:  
D. Matthew Brewer  
 EC2ABBEE99DB48C... 8/29/2016

SIGNATURE DATE

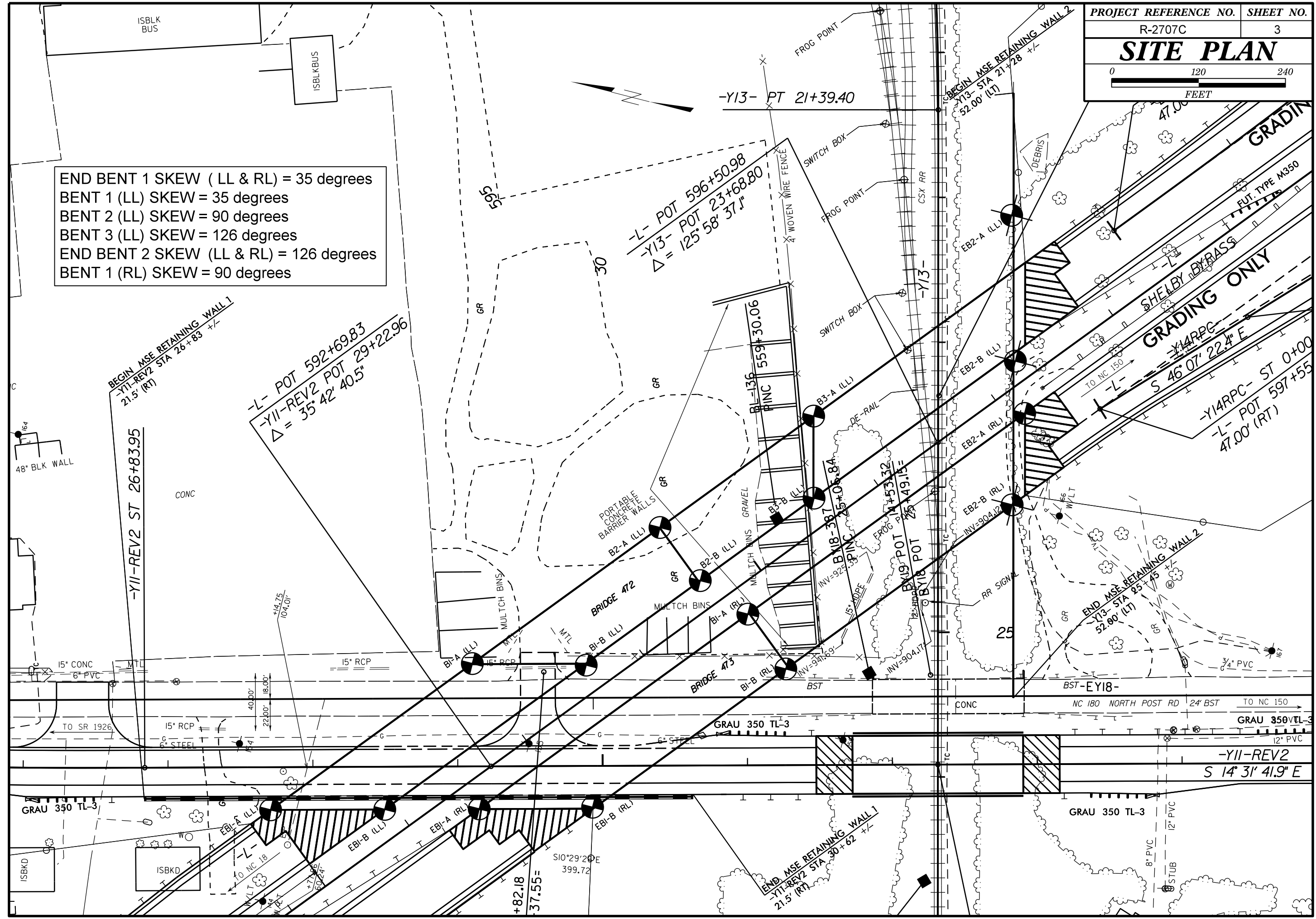
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

## SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

<b>SOIL DESCRIPTION</b> 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 298, 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		<b>GRADATION</b> 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.		<b>ROCK DESCRIPTION</b> 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:		<b>TERMS AND DEFINITIONS</b>																																																																																									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="6">GRANULAR MATERIALS ( ≤ 35% PASSING #200)</th> <th colspan="3">SILT-CLAY MATERIALS ( &gt; 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th colspan="2">A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								GENERAL CLASS.	GRANULAR MATERIALS ( ≤ 35% PASSING #200)						SILT-CLAY MATERIALS ( > 35% PASSING #200)			ORGANIC MATERIALS			A-1	A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7				GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7										SYMBOL																<b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.		<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50		<b>PERCENTAGE OF MATERIAL</b> <table border="1"> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt; 10%</td> <td>&gt; 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>			GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE
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<b>RECOMMENDATION SYMBOLS</b> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL								<b>ABBREVIATIONS</b> AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAG. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED UG - UNIT WEIGHT UG - DRY UNIT WEIGHT <b>SAMPLE ABBREVIATIONS</b> S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO																																																																																							
<b>SOIL MOISTURE - CORRELATION OF TERMS</b> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>								SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<b>EQUIPMENT USED ON SUBJECT PROJECT</b> DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> DIEDRICH D-50 <input checked="" type="checkbox"/> DIEDRICH D-120 ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 6" HOLLOW AUGERS <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG.-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> _____ <input type="checkbox"/> _____ HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____ HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST																																																																								
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<b>PLASTICITY</b> <table border="1"> <tr> <th>NON PLASTIC</th> <th>SLIGHTLY PLASTIC</th> <th>MODERATELY PLASTIC</th> <th>HIGHLY PLASTIC</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th colspan="2">PLASTICITY INDEX (PI)</th> <th colspan="2">DRY STRENGTH</th> </tr> <tr> <td>0-5</td> <td>6-15</td> <td>VERY LOW</td> <td>SLIGHT</td> </tr> <tr> <td>16-25</td> <td>26 OR MORE</td> <td>MEDIUM</td> <td>HIGH</td> </tr> </table>								NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC					PLASTICITY INDEX (PI)		DRY STRENGTH		0-5	6-15	VERY LOW	SLIGHT	16-25	26 OR MORE	MEDIUM	HIGH	<b>FRACTURE SPACING</b> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>		TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	<b>BEDDING</b> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </table>		TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																						
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<b>INURDATION</b> FOR SEDIMENTARY ROCKS, INURDATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INURDATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INURDATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INURDATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.								<b>NOTES:</b> NORTHINGS AND EASTINGS OBTAINED WITH A TRIMBLE GEO 7X WITH SUB-FOOT ACCURACY. THE SOIL BORING LOGS, CORELOGS, AND ROCK CORE PHOTOS FOR BORINGS EB2-A (LL), EB2-B (LL), AND EB2-B (RL) (FORMERLY B-1, B-2, AND B-3) WERE PERFORMED BY NCDOT AND ARE INCLUDED IN THIS REPORT.																																																																																							
<b>COLOR</b> DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.								<b>FRACURE SPACING / BEDDING</b> BENCH MARK: BY18 - 387 N = 579,372,8619, E = 1,255,991,3208 ELEVATION: 944.05 FEET																																																																																							

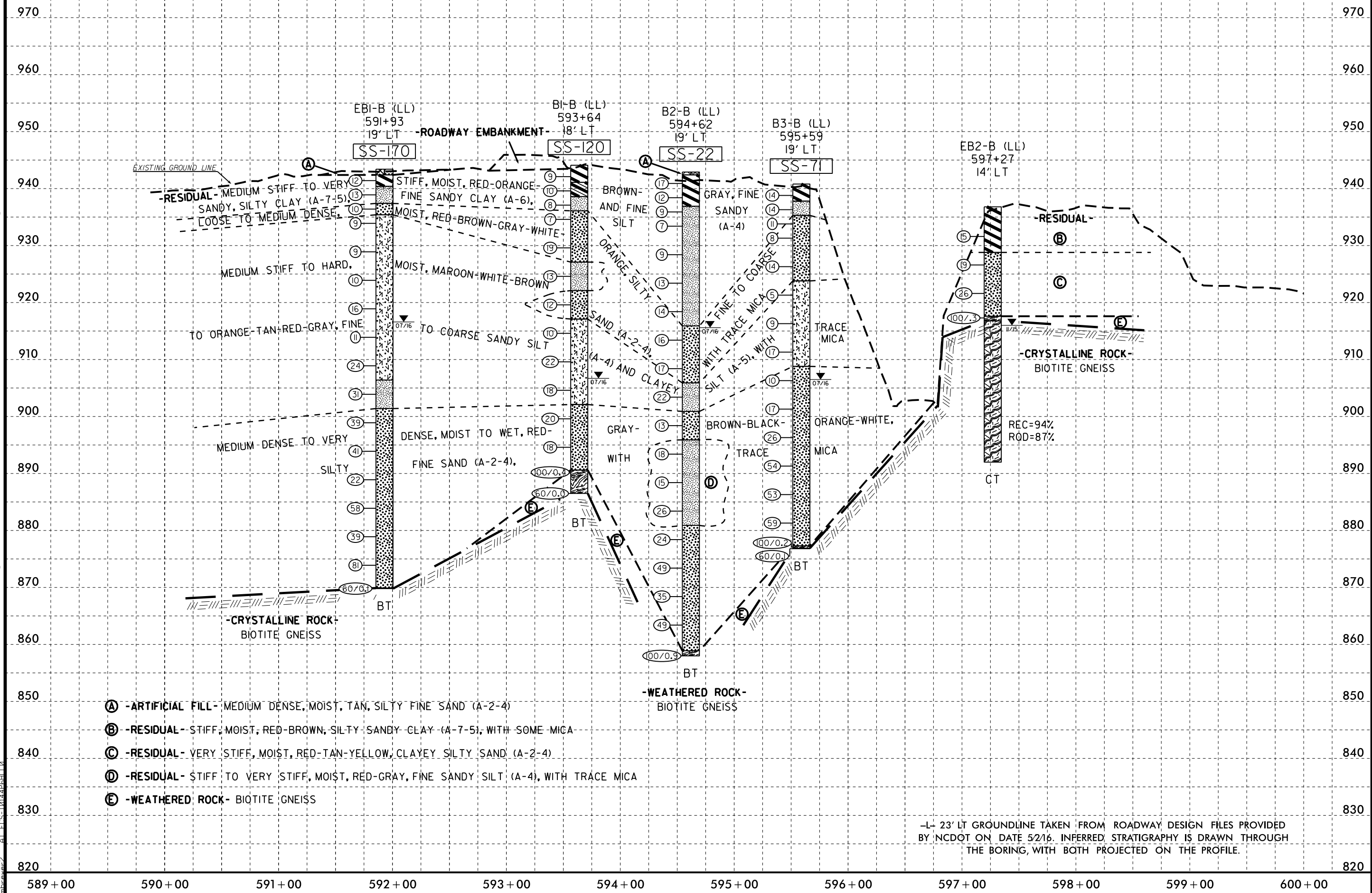
END BENT 1 SKEW (LL & RL) = 35 degrees  
 BENT 1 (LL) SKEW = 35 degrees  
 BENT 2 (LL) SKEW = 90 degrees  
 BENT 3 (LL) SKEW = 126 degrees  
 END BENT 2 SKEW (LL & RL) = 126 degrees  
 BENT 1 (RL) SKEW = 90 degrees



5/14/99  
 K:\AUG-2016\1537-PROJ\PROJECTS\11000-11999\11700\11717 - R-2707C - Site 6 Dual Bridges US74 over NC180\CADD\GEOTECH\Site&Sub\AR2707C\_GEO\_BRD04728BRD0473\_PFI.LL.dgn  
 15:56:07  
 AT: FCS-104428110

**-L- (SHELBY BYPASS)**

PROJECT REFERENCE NO. <b>R-2707C</b>	SHEET NO. <b>4</b>
PROFILE BORINGS PROJECTED 23' LT OF -L- ALONG GRADELINE OF BRIDGE 472 (LL)	
VE=5:1	

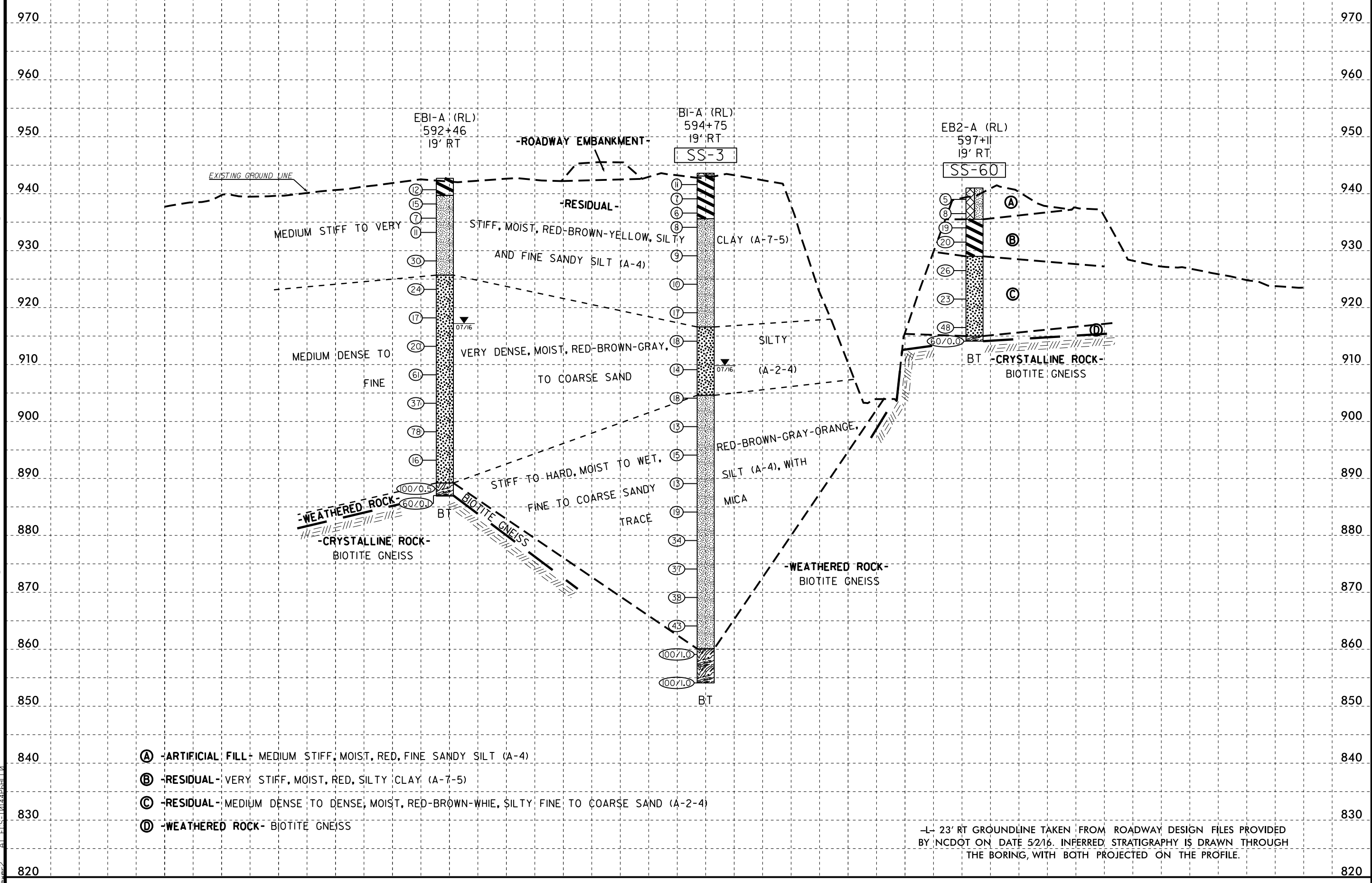


-L- 23' LT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

5/14/99  
 I:\AUG-2016\1537-PROJ\11000-11999\11700\11717 - R-2707C - Site 6 Dual Bridges US74 over NC180\CADD\GEO\TECH\Site\Sub\AR2707C\_GEO\_BRD04728BRD0473\_PFI.L1.dgn  
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 5/14/99

**-L- (SHELBY BYPASS)**

0 25 50 FEET	PROJECT REFERENCE NO. R-2707C	SHEET NO. 5
VE=5:1	PROFILE BORINGS PROJECTED 23' RT OF -L- ALONG GRADELINE OF BRIDGE 473 (RL)	

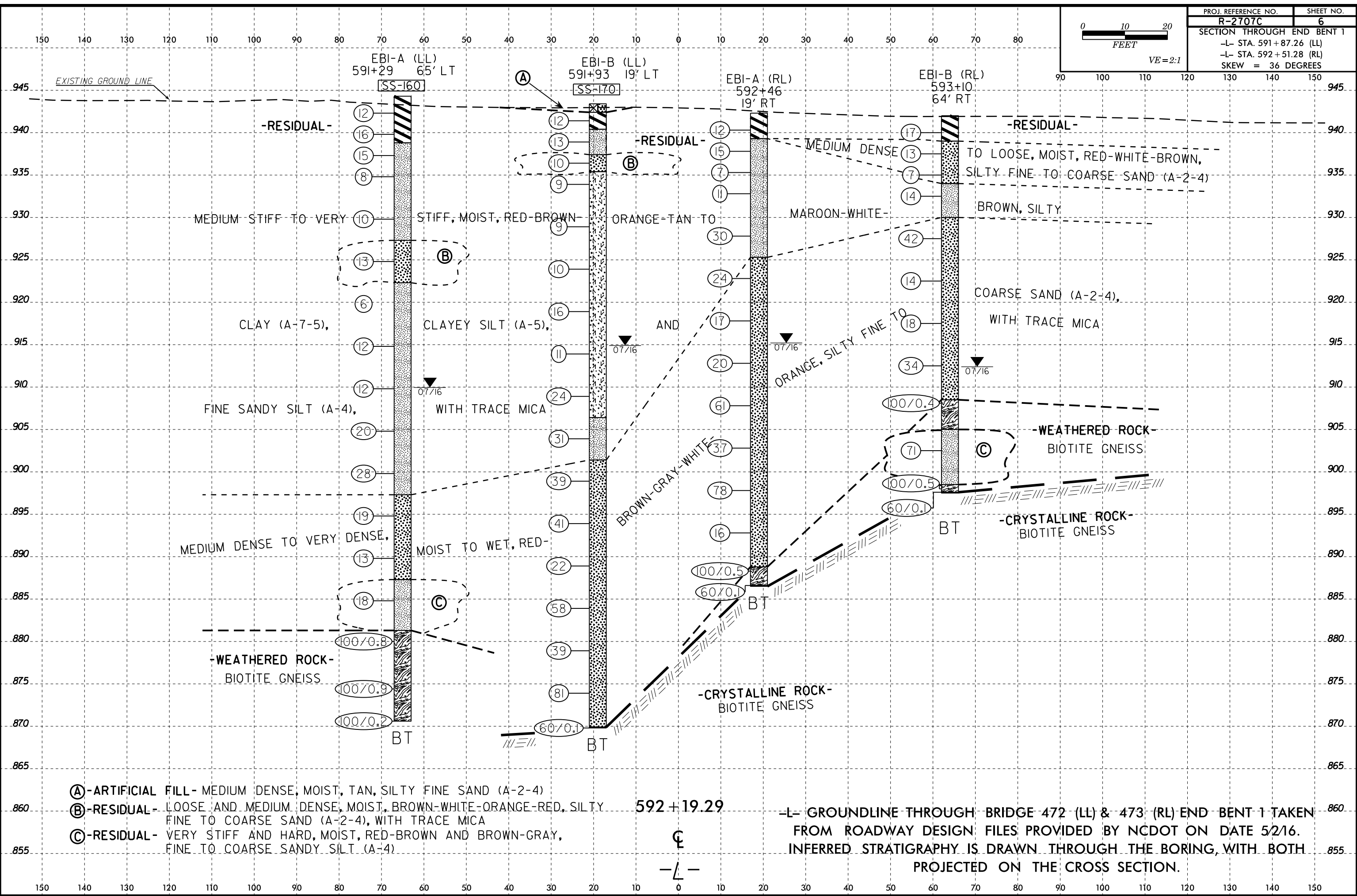
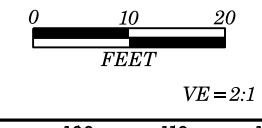


- Ⓐ -ARTIFICIAL FILL- MEDIUM STIFF, MOIST, RED, FINE SANDY SILT (A-4)
- Ⓑ -RESIDUAL- VERY STIFF, MOIST, RED, SILTY CLAY (A-7-5)
- Ⓒ -RESIDUAL- MEDIUM DENSE TO DENSE, MOIST, RED-BROWN-WHIE, SILTY FINE TO COARSE SAND (A-2-4)
- Ⓓ -WEATHERED ROCK- BIOTITE GNEISS

-L- 23' RT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

8/23/99  
12-AUG-2016 15:40  
I:\2016\CH-02-PRG\JCS\1000\1999\11700\11717 - R-2707C - Site 6 Dual Bridges US74 over NC180\CADD\GEO\TECH\Site\Sub\1\2707C.Geo.BRD00472&BRD00473.xrs.dgn  
Author: jcs

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	6
SECTION THROUGH END BENT 1	
-L- STA. 591+87.26 (LL)	
-L- STA. 592+51.28 (RL)	
SKEW = 36 DEGREES	

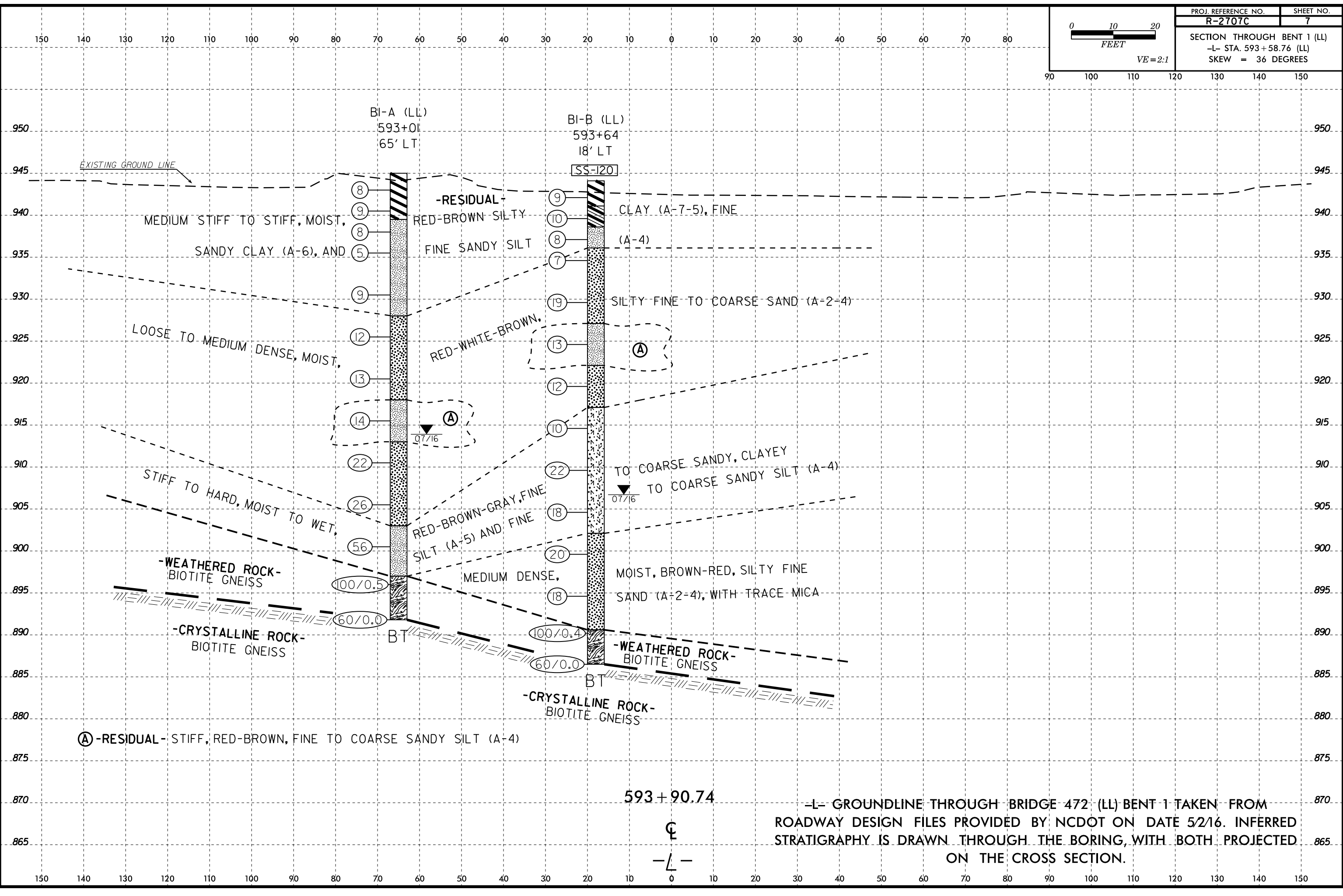


- (A) -ARTIFICIAL FILL - MEDIUM DENSE, MOIST, TAN, SILTY FINE SAND (A-2-4)
  - (B) -RESIDUAL - LOOSE AND MEDIUM DENSE, MOIST, BROWN-WHITE-ORANGE-RED, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA
  - (C) -RESIDUAL - VERY STIFF AND HARD, MOIST, RED-BROWN AND BROWN-GRAY, FINE TO COARSE SANDY SILT (A-4)
- 592 + 19.29
- L- GROUNDLINE THROUGH BRIDGE 472 (LL) & 473 (RL) END BENT 1 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

8/23/99

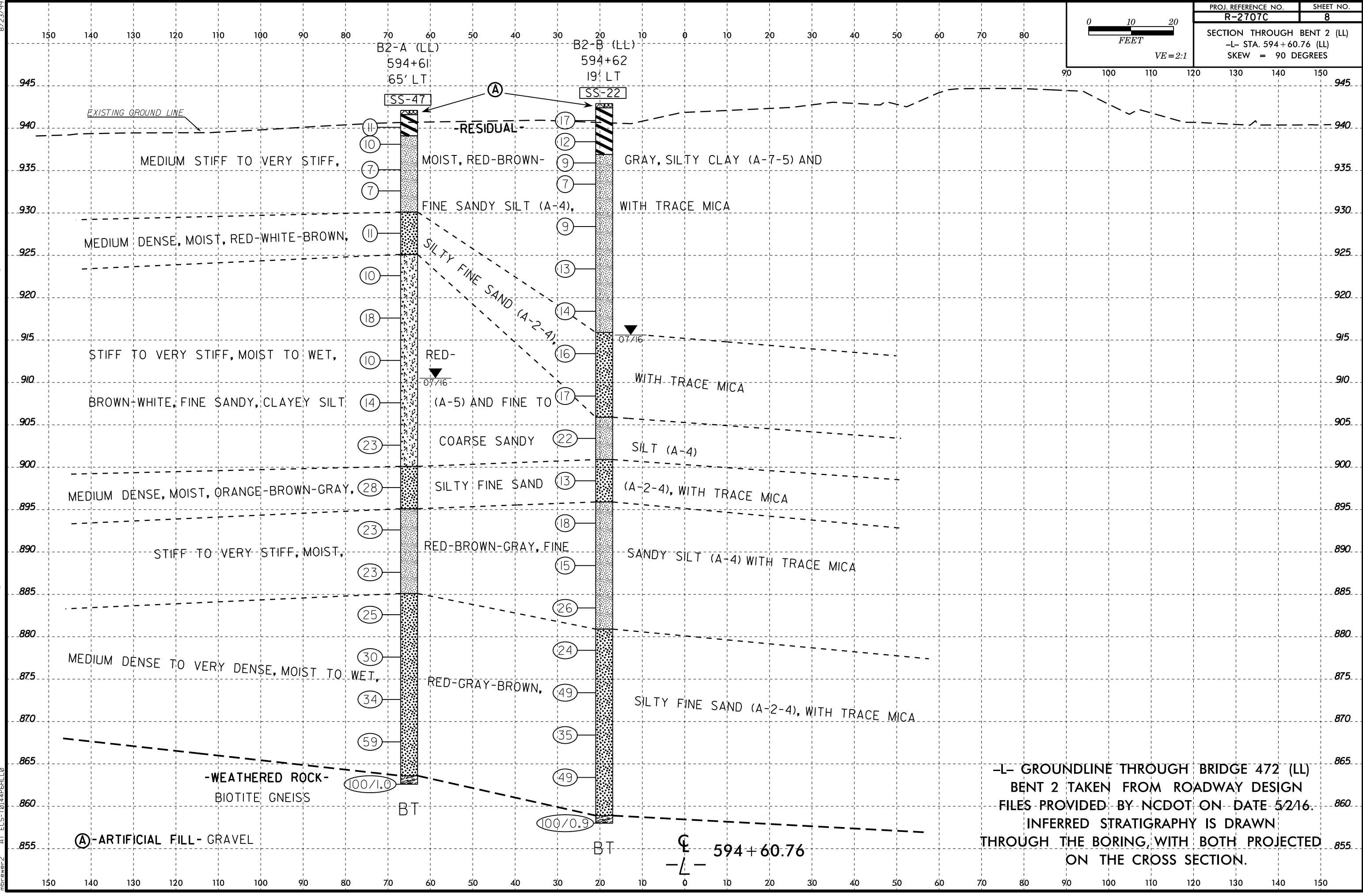
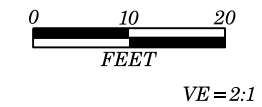
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PROJ. REFERENCE NO. <b>R-2707C</b>	SHEET NO. <b>7</b>
SECTION THROUGH BENT 1 (LL) -L- STA. 593+58.76 (LL) SKEW = 36 DEGREES	



8/23/99  
 I:\20201\CH\07-PROJECTS\10000\1999\11700\11717 - R-2707C - Site 6 Dual Bridges US74 over NC180\CADD\GEO\TECH\Site\Sub\R2707C\_Geo.BRD00472\BRD00473.xsiddgn  
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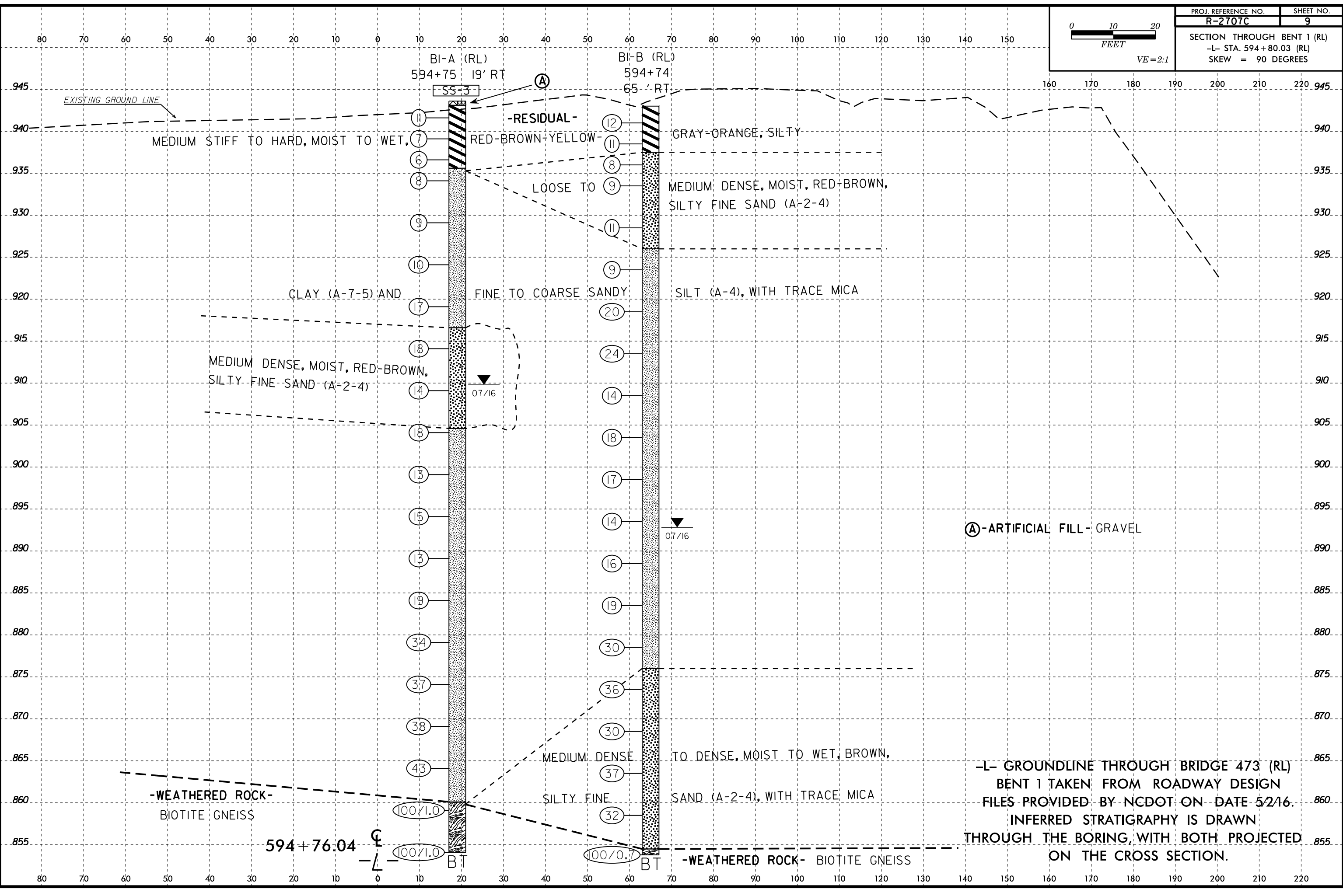
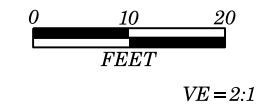
PROJ. REFERENCE NO.	SHEET NO.
R-2707C	8
SECTION THROUGH BENT 2 (LL)	
-L- STA. 594+60.76 (LL)	
SKEW = 90 DEGREES	





8/23/99

I:\2016-2017\proj\proj\1000\1999\11700\11717 - R-2707C - Site 6 Dual Bridges US74 over NC180\CADD\GEO\TECH\Site\Sub\192707C\_Geo\_BRD00472&BRD00473\_x.svdgn



BI-A (RL)  
594+75 19' RT

BI-B (RL)  
594+74 65' RT

EXISTING GROUND LINE

MEDIUM STIFF TO HARD, MOIST TO WET, RED-BROWN-YELLOW -RESIDUAL-

GRAY-ORANGE, SILTY

LOOSE TO MEDIUM DENSE, MOIST, RED-BROWN, SILTY FINE SAND (A-2-4)

CLAY (A-7-5) AND

FINE TO COARSE SANDY

SILT (A-4), WITH TRACE MICA

MEDIUM DENSE, MOIST, RED-BROWN, SILTY FINE SAND (A-2-4)

0.7/16

0.7/16

(A) -ARTIFICIAL FILL - GRAVEL

-WEATHERED ROCK-  
BIOTITE GNEISS

594+76.04

C

MEDIUM DENSE TO DENSE, MOIST TO WET, BROWN, SILTY FINE SAND (A-2-4), WITH TRACE MICA

BT

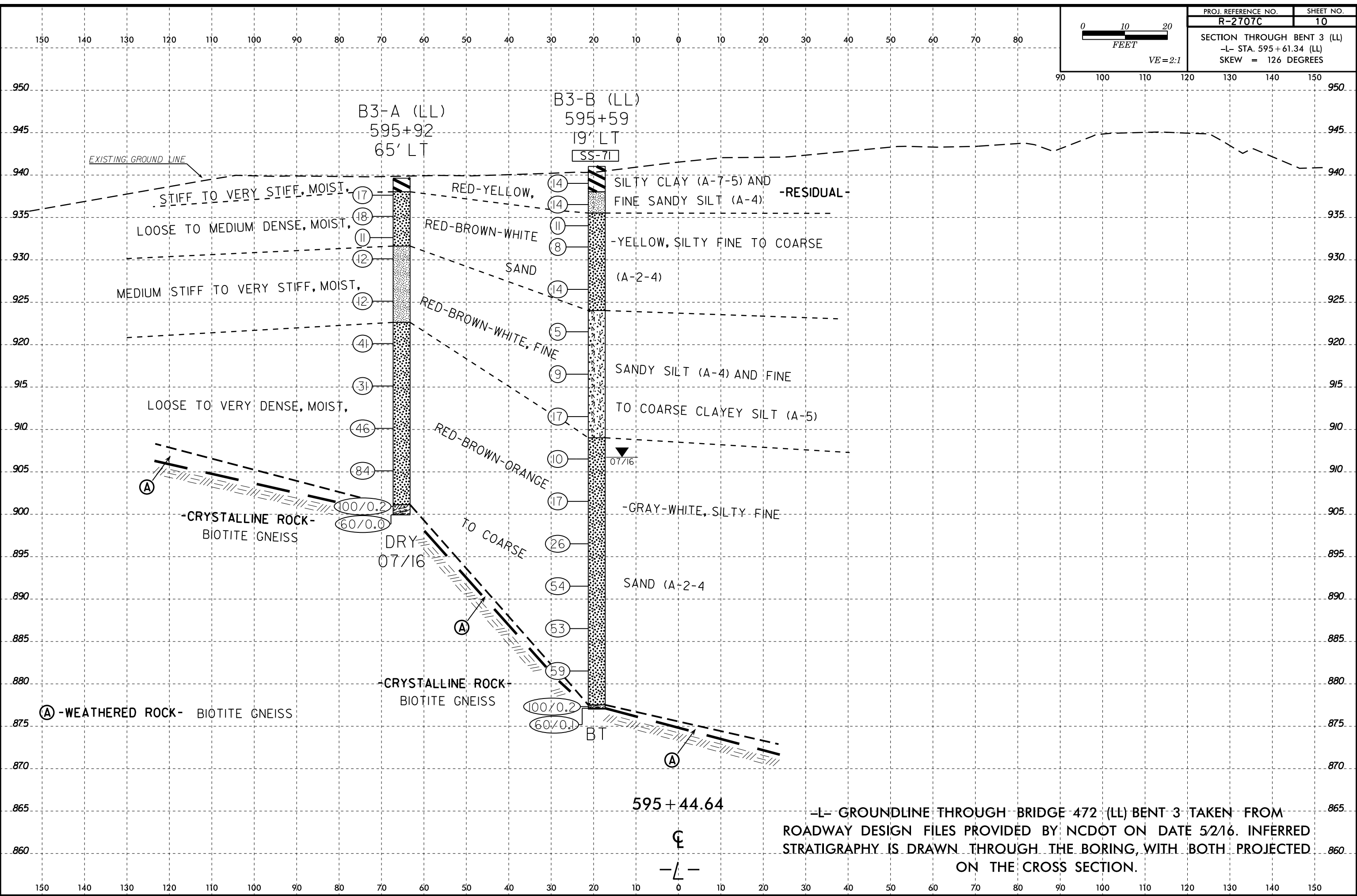
-WEATHERED ROCK- BIOTITE GNEISS

-L- GROUNDLINE THROUGH BRIDGE 473 (RL)  
BENT 1 TAKEN FROM ROADWAY DESIGN  
FILES PROVIDED BY NCDOT ON DATE 5/2/16.  
INFERRED STRATIGRAPHY IS DRAWN  
THROUGH THE BORING WITH BOTH PROJECTED  
ON THE CROSS SECTION.

8/23/99  
12-AUG-2016 15:46  
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PROJ. REFERENCE NO.	SHEET NO.
R-2707C	10
SECTION THROUGH BENT 3 (LL)	
-L- STA. 595+61.34 (LL)	
SKEW = 126 DEGREES	

0 10 20  
FEET  
VE=2:1

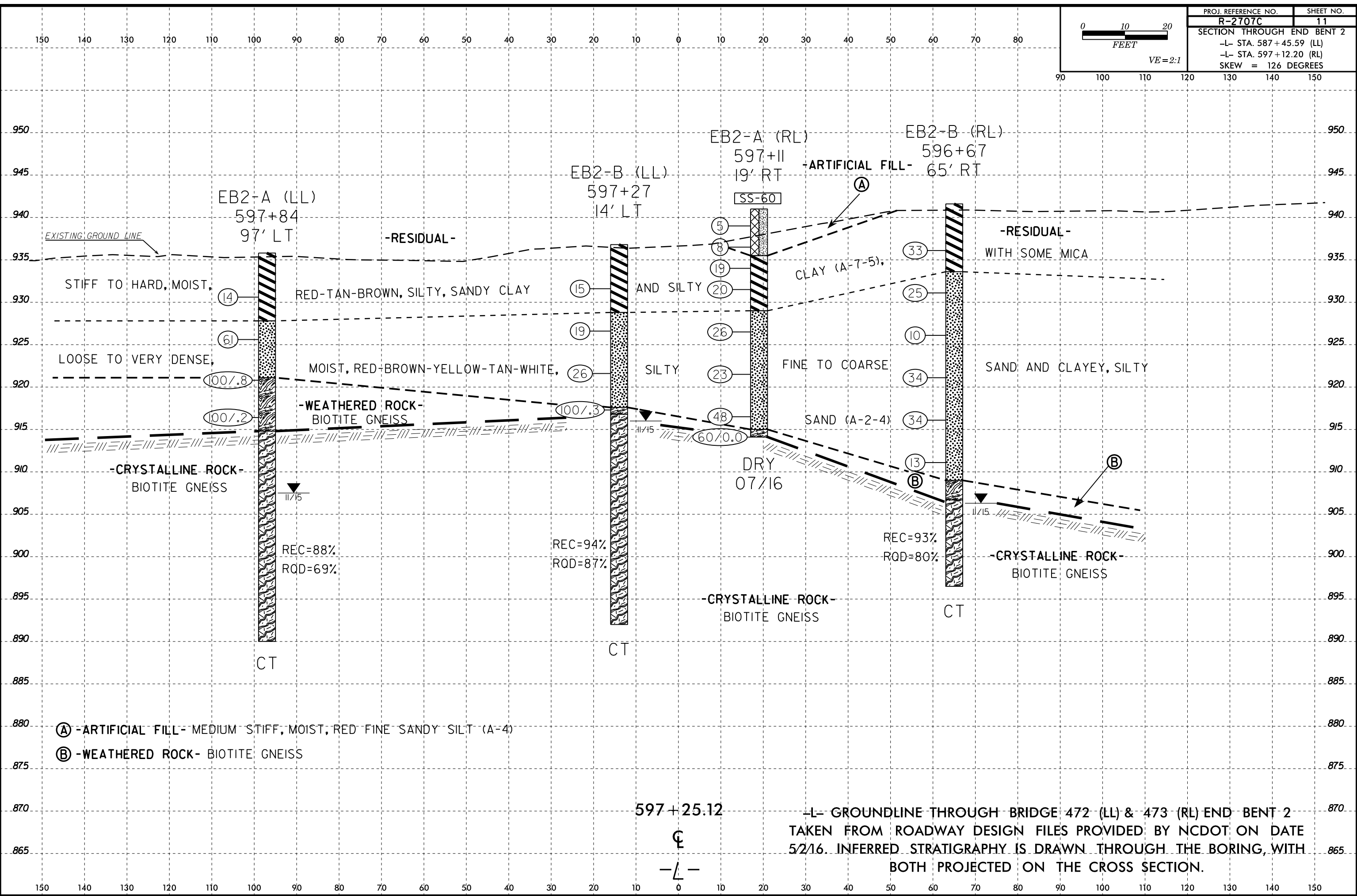


-L- GROUNDLINE THROUGH BRIDGE 472 (LL) BENT 3 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

8/23/99  
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PROJ. REFERENCE NO.	SHEET NO.
R-2707C	11
SECTION THROUGH END BENT 2	
-L- STA. 587+45.59 (LL)	
-L- STA. 597+12.20 (RL)	
SKEW = 126 DEGREES	

0 10 20  
 FEET  
 VE=2:1



- (A) -ARTIFICIAL FILL- MEDIUM STIFF, MOIST, RED FINE SANDY SILT (A-4)
- (B) -WEATHERED ROCK- BIOTITE GNEISS

597+25.12  
 -L- GROUNDLINE THROUGH BRIDGE 472 (LL) & 473 (RL) END BENT 2  
 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE  
 5/2/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH  
 BOTH PROJECTED ON THE CROSS SECTION.

# GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.2	TIP R-2707C	COUNTY CLEVELAND	GEOLOGIST C. Bukovitz
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)			
BORING NO. EB1-A (LL)	STATION 591+29	OFFSET 65 ft LT	ALIGNMENT -L-
COLLAR ELEV. 944.3 ft	TOTAL DEPTH 73.7 ft	NORTHING 579,750	EASTING 1,255,798
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. Messick	START DATE 07/13/16	COMP. DATE 07/13/16	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
945															-944.3	GROUND SURFACE 0.0
940	943.3	1.0	5	5	7	12								M	-940.8	<b>RESIDUAL</b> Stiff to Very Stiff, Red-Brown, Silty CLAY (A-7-5)
940	940.8	3.5	6	7	9	16								M	-938.8	Stiff to Medium Stiff, Red-Brown, Fine Sandy SILT (A-4) 5.5
935	938.3	6.0	3	5	10	15								M		
935	935.8	8.5	3	3	5	8								M		
930	930.8	13.5	4	5	5	10								M		
925	925.8	18.5	5	5	8	13								M	-927.3	Medium Dense, Brown-White, Silty Fine to Coarse SAND (A-2-4), with trace mica 17.0
920	920.8	23.5	3	3	3	6								M	-922.3	Medium Stiff to Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica 22.0
915	915.8	28.5	8	6	6	12								M		
910	910.8	33.5	3	5	7	12								M		
905	905.8	38.5	6	8	12	20								M		
900	900.8	43.5	8	11	17	28								M		
895	895.8	48.5	23	9	10	19								M	-897.3	Medium Dense, Red-Brown, Silty Fine to Coarse SAND (A-2-4) 47.0
890	890.8	53.5	6	4	9	13								M		
885	885.8	58.5	5	6	12	18								M	-887.3	Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4(0)), with little clay. 57.0
880	880.8	63.5	48	52/0.3							SS-160	28%			-881.3	<b>WEATHERED ROCK</b> Gray-White (BIOTITE GNEISS) 63.0
875	875.8	68.5	25	26	74/0.4											
	870.8	73.5													-870.6	Boring Terminated at Elevation 870.6 ft In Weathered Rock (BIOTITE GNEISS) 73.7

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ NC\_DOT\_GDT 8/12/16

1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)								
BORING NO. EB1-B (LL)		STATION 591+93		OFFSET 19 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 943.4 ft		TOTAL DEPTH 73.6 ft		NORTHING 579,674		EASTING 1,255,818									
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Messick		START DATE 07/14/16		COMP. DATE 07/14/16		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					
945															
	942.4	1.0	4	5	7										943.4 GROUND SURFACE 0.0 942.4 ARTIFICIAL FILL 1.0
940	939.9	3.5	6	6	7										940.4 Medium Dense, Tan, Silty Fine SAND (A-2-4) 3.0
	937.4	6.0	4	4	6										937.4 RESIDUAL Stiff, Red-Brown, Fine Sandy, Silty CLAY (A-7-5) 6.0
935	934.9	8.5	2	4	5										935.4 Stiff, Red-Orange, Fine Sandy SILT (A-4), with trace mica 8.0
															Loose, White-Orange-Red, Silty Fine to Coarse SAND (A-2-4), with trace mica
930	929.9	13.5	4	3	6										Stiff to Very Stiff, Maroon-White-Brown to Orange-Red-Tan, Fine to Coarse Sandy, Clayey SILT (A-5(5)), with trace mica
	924.9	18.5	4	4	6										
925	919.9	23.5	3	6	10										
920	914.9	28.5	4	4	7										
915	909.9	33.5	14	12	12										SS-170 37%
910	904.9	38.5	7	13	18										
905	899.9	43.5	39	17	22										
900	894.9	48.5	9	14	27										
895	889.9	53.5	10	7	15										
890	884.9	58.5	12	22	36										
885	879.9	63.5	12	14	25										
880	874.9	68.5	32	41	40										
875	869.9	73.5	60/0.1												
870	869.8														869.9 CRYSTALLINE ROCK (BIOTITE GNEISS) 73.5 869.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 869.8

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ NC\_DOT.GDT 8/12/16

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)								
BORING NO. EB1-B (LL)		STATION 591+93		OFFSET 19 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 943.4 ft		TOTAL DEPTH 73.6 ft		NORTHING 579,674		EASTING 1,255,818									
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Messick		START DATE 07/14/16		COMP. DATE 07/14/16		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					
865															Match Line
															ft In Crystalline Rock (BIOTITE GNEISS)

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-A (LL)		STATION 593+01		OFFSET 65 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 945.0 ft		TOTAL DEPTH 53.2 ft		NORTHING 579,640		EASTING 1,255,930										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/14/16		COMP. DATE 07/14/16		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						
945														945.0	GROUND SURFACE	0.0
	944.0	1.0	4	4	4										<b>RESIDUAL</b> Medium Stiff to Stiff, Red, Silty CLAY (A-7-5)	
	941.5	3.5	4	4	5											
940	939.0	6.0	2	4	4									939.5	Medium Stiff to Stiff, Red-Brown, Fine Sandy SILT (A-4)	5.9
	936.5	8.5	2	3	2											
935	931.5	13.5	4	4	5											
	926.5	18.5	5	6	6									928.0	Medium Dense, Red-Brown, Silty Fine SAND (A-2-4)	17.0
925	921.5	23.5	5	7	6											
	916.5	28.5	5	6	8									918.0	Stiff, Red-Brown, Fine Sandy SILT (A-4)	27.0
915	911.5	33.5	11	9	13									913.0	Medium Dense, Red-Brown, Silty Fine to Coarse SAND (A-2-4)	32.0
	906.5	38.5	8	11	15											
905	901.5	43.5	5	31	25									903.0	Hard, Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel-sized rock fragments	42.0
	896.5	48.5	75	25/0.0										897.0	<b>WEATHERED ROCK</b> Gray (BIOTITE GNEISS)	48.0
895	891.8	53.2	60/0.0											891.8		53.2
Boring Terminated with Standard Penetration Test Refusal at Elevation 891.8 ft On Crystalline Rock (BIOTITE GNEISS)																
1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.																

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-B (LL)		STATION 593+64		OFFSET 18 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 944.1 ft		TOTAL DEPTH 57.6 ft		NORTHING 579,564		EASTING 1,255,948										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/13/16		COMP. DATE 07/13/16		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						
945														944.1	GROUND SURFACE	0.0
	943.1	1.0	3	4	5										<b>RESIDUAL</b> Stiff, Red, Fine Sandy, Silty CLAY (A-7-5)	
	940.6	3.5	5	5	5									941.1	Stiff, Red-Brown, Fine Sandy CLAY (A-6)	3.0
940	938.1	6.0	3	3	5									938.6	Medium Stiff, Red-Brown, Fine Sandy SILT (A-4)	5.5
	935.6	8.5	4	3	4									936.1	Loose to Medium Dense, Red-White-Brown, Silty Fine to Coarse SAND (A-2-4)	8.0
935	930.6	13.5	5	10	9											
	925.6	18.5	3	5	8									927.1	Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4)	17.0
925	920.6	23.5	7	4	8									922.1	Medium Dense, Red-Brown, Silty Fine to Coarse SAND (A-2-4)	22.0
	915.6	28.5	6	5	5									917.1	Stiff to Very Stiff, Red-Brown-Gray, Fine to Coarse Sandy, Clayey SILT (A-5(1))	27.0
915	910.6	33.5	6	9	13											
	905.6	38.5	7	8	10											
905	900.6	43.5	6	8	12									902.1	Medium Dense, Brown-Red, Silty Fine SAND (A-2-4), with trace mica	42.0
	895.6	48.5	10	8	10											
895	890.6	53.5	100/0.4											890.6	<b>WEATHERED ROCK</b> (BIOTITE GNEISS)	53.5
	886.5	57.6	60/0.0											886.5		57.6
Boring Terminated with Standard Penetration Test Refusal at Elevation 886.5 ft On Crystalline Rock (BIOTITE GNEISS)																
1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.																

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ NC\_DOT\_GDT 8/12/16

## GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B2-A (LL)		STATION 594+61		OFFSET 65 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 942.1 ft		TOTAL DEPTH 79.5 ft		NORTHING 579,538		EASTING 1,256,053										
DRILL RIG/HAMMER EFF./DATE GEO102 Diedrich D120 86% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER M. Ireland		START DATE 07/08/16		COMP. DATE 07/08/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
945																
940	941.1	1.0	4	5	6											942.1 GROUND SURFACE 941.6
	939.1	3.0	3	4	6											ARTIFICIAL FILL Gravel (0.5 feet)
935	936.1	6.0	3	3	4											RESIDUAL Stiff, Red, Fine Sandy, Silty CLAY (A-7-5) Stiff to Medium Stiff, Red-Brown, Fine Sandy SILT (A-4), with trace mica
	933.6	8.5	3	3	4											
930	928.6	13.5	9	5	6											930.1 Medium Dense, Red-Brown, Silty Fine SAND (A-2-4), with trace mica
925	923.6	18.5	3	4	6											925.1 Stiff to Very Stiff, Red-Brown, Fine Sandy, Clayey SILT (A-5(5)), with trace mica
920	918.6	23.5	5	8	10											
915	913.6	28.5	4	5	5											
910	908.6	33.5	4	6	8											SS-47 32%
905	903.6	38.5	8	11	12											
900	898.6	43.5	10	12	16											900.1 Medium Dense, Orange-Brown, Silty Fine SAND (A-2-4)
895	893.6	48.5	9	10	13											895.1 Very Stiff, Red-Brown, Fine Sandy SILT (A-4), with trace mica
890	888.6	53.5	7	10	13											
885	883.6	58.5	7	10	15											885.1 Medium Dense to Very Dense, Brown, Silty Fine SAND (A-2-4), with trace mica
880	878.6	63.5	9	13	17											
875	873.6	68.5	11	15	19											
870	868.6	73.5	11	22	37											
865																

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ\_NC\_DOT.GDT 8/12/16

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B2-A (LL)		STATION 594+61		OFFSET 65 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 942.1 ft		TOTAL DEPTH 79.5 ft		NORTHING 579,538		EASTING 1,256,053										
DRILL RIG/HAMMER EFF./DATE GEO102 Diedrich D120 86% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER M. Ireland		START DATE 07/08/16		COMP. DATE 07/08/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
865																
	863.6	78.5	31	69/0.5												Match Line
																863.6 WEATHERED ROCK 862.6 Gray-Brown (BIOTITE GNEISS) Boring Terminated at Elevation 862.6 ft In Weathered Rock (BIOTITE GNEISS)





# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B3-A (LL)		STATION 595+92		OFFSET 65 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 939.4 ft		TOTAL DEPTH 39.7 ft		NORTHING 579,459		EASTING 1,256,154										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/12/16		COMP. DATE 07/12/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
940														939.4	0.0	GROUND SURFACE
	938.4	1.0	5	6	11									937.8	1.8	RESIDUAL Very Stiff, Red, Silty CLAY (A-7-5)
935	935.9	3.5	7	8	10											Medium Dense, Red-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments
	933.4	6.0	4	5	6									931.4	8.0	Stiff, Red-Brown, Fine Sandy SILT (A-4)
930	930.9	8.5	3	4	8											
	925.9	13.5	4	5	7									922.4	17.0	Dense to Very Dense, Red-Brown-Gray-White, Silty Fine to Coarse SAND (A-2-4)
925	920.9	18.5	9	13	28											
	915.9	23.5	11	21	10											
915	910.9	28.5	24	19	27											
	905.9	33.5	14	28	56											
905	900.9	38.5												900.9	38.5	WEATHERED ROCK Brown-Gray (BIOTITE GNEISS)
900	899.7	39.7	100/0.2											899.7	39.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 899.7 ft On Crystalline Rock (BIOTITE GNEISS)
			60/0.0													1) Approximately 0.2 ft. of topsoil was encountered at the ground surface.

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B3-B (LL)		STATION 595+59		OFFSET 19 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 940.8 ft		TOTAL DEPTH 64.0 ft		NORTHING 579,440		EASTING 1,256,099										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/11/16		COMP. DATE 07/11/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
945														940.8	0.0	GROUND SURFACE
														937.8	3.0	RESIDUAL Stiff, Red, Fine Sandy, Silty CLAY (A-7-5)
940	939.8	1.0	4	6	8									935.3	5.5	Stiff, Red-Yellow, Fine Sandy SILT (A-4)
	937.3	3.5	6	6	8											Loose to Medium Dense, Red-Yellow-White, Silty Fine to Coarse SAND (A-2-4)
935	934.8	6.0	4	5	6											
	932.3	8.5	4	4	4											
930	927.3	13.5	5	7	7											
	922.3	18.5	3	2	3									923.8	17.0	Medium Stiff to Very Stiff, Red-White, Fine to Coarse Sandy, Clayey SILT (A-5(5))
925	917.3	23.5	8	4	5											
	912.3	28.5	5	7	10											
920	907.3	33.5	4	4	6											
	902.3	38.5	7	5	12											
915	897.3	43.5	4	18	8											
	892.3	48.5	70	26	28											
910	887.3	53.5	25	31	22											
	882.3	58.5	13	21	38											
895	877.3	63.5														
	876.9	63.9	100/0.2											877.3	63.5	WEATHERED ROCK Brown-White (BIOTITE GNEISS)
905			60/0.1											876.8	64.0	CRYSTALLINE ROCK (BIOTITE GNEISS)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 876.8 ft In Crystalline Rock (BIOTITE GNEISS)
																1) Approximately 0.2 ft. of topsoil was encountered at the ground surface.

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ NC\_DOT.GDT 8/12/16

# GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.2	TIP R-2707C	COUNTY CLEVELAND	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)			GROUND WTR (ft)
BORING NO. EB2-A (LL)	STATION 597+84	OFFSET 97 ft LT	ALIGNMENT -L-
COLLAR ELEV. 935.8 ft	TOTAL DEPTH 45.8 ft	NORTHING 579,355	EASTING 1,256,322
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		DRILL METHOD NW Casing w/ Core	HAMMER TYPE Automatic
DRILLER Smith, C.L.	START DATE 11/12/15	COMP. DATE 11/12/15	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
940																
935															935.8	GROUND SURFACE
930	931.6	4.2	3	6	8										927.8	RESIDUAL RED-TAN-BROWN STIFF MOIST SILTY SANDY CLAY (A-7)
925	926.6	9.2	67	30	31										921.1	RESIDUAL TAN-BROWN-WHITE HARD MOIST CLAYEY SILTY SAND (A-2)
920	921.6	14.2	25	75/3											914.8	WEATHERED ROCK SEVERELY WEATHERED BIOTITE GNEISS
915	916.6	19.2	100/2												890.0	CRYSTALLINE ROCK BROWN-GRAY-WHITE BANDED BIOTITE GNEISS
910																
905																
900																
895																
890																
																Boring Terminated at Elevation 890.0 ft In Crystalline Rock (Biotite Gneiss)

NCDOT BORE DOUBLE R2707C\_BORELOGS\_BY\_NCDOT.GPJ NC\_DOT.GDT 8/12/16

# GEOTECHNICAL BORING REPORT CORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)				
BORING NO. EB2-A (LL)		STATION 597+84		OFFSET 97 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 935.8 ft		TOTAL DEPTH 45.8 ft		NORTHING 579,355		EASTING 1,256,322					
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic					
DRILLER Smith, C.L.		START DATE 11/12/15		COMP. DATE 11/12/15		SURFACE WATER DEPTH N/A					
CORE SIZE NW		TOTAL RUN 23.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
914.8	914.8	21.0	3.8		(2.7) 71%	(0.0) 0%	(21.8) 88%	(17.2) 69%		914.8 BROWN-GRAY-WHITE BANDED, SEVERELY WEATHERED TO FRESH, MODERATELY HARD TO HARD BIOTITE GNEISS WITH VERY CLOSE TO WIDE FRACTURE SPACING R1=12, R2=17, R3=15, R4=20, R5=7, RMR=71 ROCK TYPE E	21.0
	911.0	24.8	5.0	1:18/1.0	(4.4) 88%	(3.1) 62%					
	906.0	29.8	5.0	1:26/1.0	(5.0) 100%	(4.4) 88%					
	901.0	34.8	5.0	1:42/1.0	(4.8) 96%	(4.8) 96%					
	896.0	39.8	5.0	1:48/1.0	(4.9) 98%	(4.9) 98%					
	891.0	44.8									
										890.0	45.8
Boring Terminated at Elevation 890.0 ft In Crystalline Rock (Biotite Gneiss)											

NCDOT CORE DOUBLE R2707C\_BORELOGS\_BY\_NCDOT.GPJ NC\_DOT.GDT 8/12/16

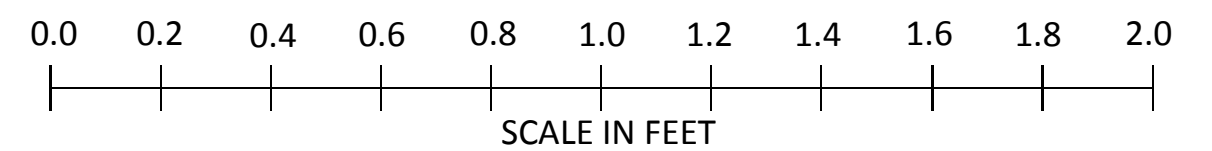
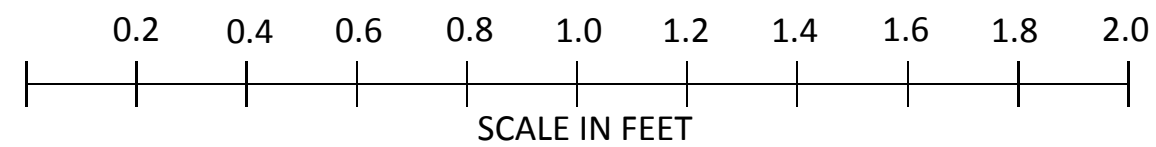


Bridge No. 472 on -L- (Shelby Bypass) over -Y11REV2- & -Y13-  
WBS - 34497.1.2 TIP No. - R-2707C

ECS Carolinas Project No. 08:11717


Rock Core Photographs: Boring - EB2-A (LL) — Station: 597+84 Offset: 97' LT

\*Core Photos Provided By NCDOT





# GEOTECHNICAL BORING REPORT CORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 472 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)				
BORING NO. EB2-B (LL)		STATION 597+27		OFFSET 14 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 936.8 ft		TOTAL DEPTH 44.8 ft		NORTHING 579,329		EASTING 1,256,226					
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic					
DRILLER Smith, C.L.		START DATE 11/10/15		COMP. DATE 11/10/15		SURFACE WATER DEPTH N/A					
CORE SIZE NW		TOTAL RUN 24.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
916.8	916.8	20.0	4.8	1:48/1.0	(4.6) 96%	(3.2) 67%	(23.4) 94%	(21.6) 87%		Begin Coring @ 20.0 ft <b>CRYSTALLINE ROCK</b> WHITE-BLACK-BROWN BANDED, SLIGHTLY WEATHERED TO FRESH, HARD BIOTITE GNEISS WITH ZONES OF GRANITE, AND VERY CLOSE TO WIDE FRACTURE SPACING R1=15, R2=17, R3=20, R4=20, R5=7, RMR=79 ROCK TYPE E	20.0
915	912.0	24.8	5.0	1:43/1.0	(5.0) 100%	(5.0) 100%					916.8
910	907.0	29.8	5.0	2:00/1.0	(5.0) 100%	(5.0) 100%					
905	902.0	34.8	5.0	1:51/1.0	(4.6) 92%	(4.6) 92%					
900	897.0	39.8	5.0	1:55/1.0	(4.2) 84%	(3.8) 76%					
895	892.0	44.8									
										Boring Terminated at Elevation 892.0 ft In Crystalline Rock (Biotite Gneiss)	

NCDOT CORE DOUBLE R2707C\_BORELOGS\_BY\_NCDOT.GPJ NC\_DOT.GDT 8/12/16

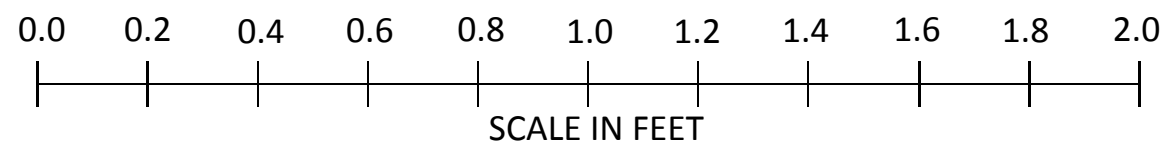
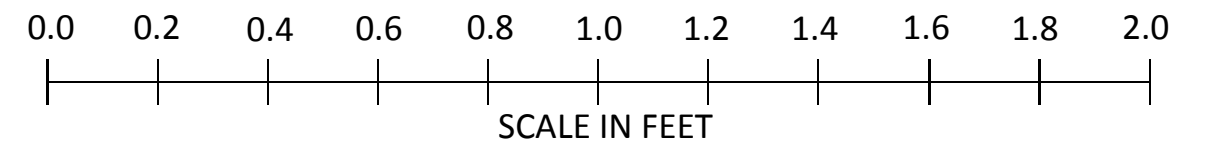
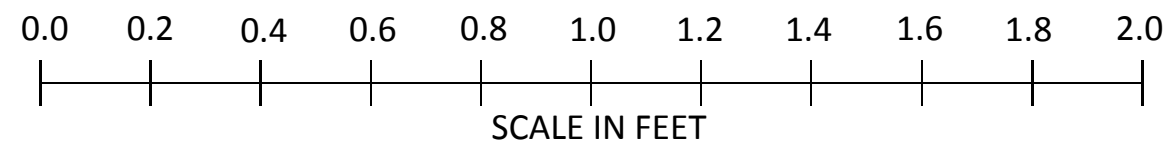


Bridge No. 472 on -L- (Shelby Bypass) over -Y11REV2- & -Y13-  
WBS - 34497.1.2 TIP No. - R-2707C

ECS Carolinas Project No. 08:11717

Rock Core Photographs: Boring - EB2-B (LL) — Station: 597+27 Offset: 14' LT

\*Core Photos Provided By NCDOT



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. EB1-A (RL)		STATION 592+46		OFFSET 19 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 942.7 ft		TOTAL DEPTH 55.8 ft		NORTHING 579,611		EASTING 1,255,834										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/14/16		COMP. DATE 07/14/16		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						
945														942.7	GROUND SURFACE	0.0
940	941.7	1.0	4	5	7	12						M	RESIDUAL Stiff, Red, Silty CLAY (A-7-5)	939.7	3.0	
	939.2	3.5	6	7	8	15						M	Medium Stiff to Very Stiff, Red-Brown, Fine Sandy SILT (A-4)			
	936.7	6.0	4	3	4	7						M				
935	934.2	8.5	9	5	6	11						M				
930	929.2	13.5	4	11	19	30						M				
925	924.2	18.5	10	13	11	24						M	Medium Dense to Very Dense, Red-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with little to some gravel-sized rock fragments	925.7	17.0	
920	919.2	23.5	9	6	11	17						M				
915	914.2	28.5	14	13	7	20						M				
910	909.2	33.5	8	31	30	61						M				
905	904.2	38.5	52	22	15	37						M				
900	899.2	43.5	21	61	17	78						M				
895	894.2	48.5	7	6	10	16						M				
890	889.2	53.5	100/0.5											889.2	53.5	
	887.0	55.7	60/0.1											887.0	55.7	
														886.9	55.8	

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. EB1-B (RL)		STATION 593+10		OFFSET 64 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 942.0 ft		TOTAL DEPTH 44.5 ft		NORTHING 579,674		EASTING 1,255,818										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/14/16		COMP. DATE 07/14/16		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						
945														942.0	GROUND SURFACE	0.0
940	941.0	1.0	4	7	10	17						M	RESIDUAL Very Stiff, Red, Silty CLAY (A-7-5)	939.0	3.0	
	938.5	3.5	7	7	6	13						M	Medium Dense to Loose, Red-White-Brown, Silty Fine to Coarse SAND (A-2-4)			
935	936.0	6.0	5	4	3	7						M				
	933.5	8.5	3	3	11	14						M	Stiff, Red-Brown, Fine Sandy SILT (A-4)	934.0	8.0	
930	928.5	13.5	16	23	19	42						M				
925	923.5	18.5	4	6	8	14						M	Medium Dense to Dense, Red-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace gravel sized rock fragments	930.0	12.0	
920	918.5	23.5	6	7	11	18						M				
915	913.5	28.5	8	18	16	34						M				
910	908.5	33.5	100/0.4									M		908.5	33.5	
905	903.5	38.5	66	14	57	71						M	WEATHERED ROCK Brown-Gray (BIOTITE GNEISS)	905.0	37.0	
900	898.5	43.5											RESIDUAL Hard, Brown-Gray, Fine Sandy SILT (A-4), with trace gravel sized rock fragments	898.5	43.5	
	897.6	44.4	100/0.5											897.6	44.4	
			60/0.1											897.5	44.5	

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ\_NC\_DOT.GDT 8/12/16

1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-A (RL)		STATION 594+75		OFFSET 19 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 943.6 ft		TOTAL DEPTH 89.5 ft		NORTHING 579,464		EASTING 1,256,010										
DRILL RIG/HAMMER EFF./DATE GEO102 Diedrich D120 86% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER M. Ireland		START DATE 07/07/16		COMP. DATE 07/07/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
945																
	942.6	1.0	4	5	6	1										0.0
940	940.1	3.5	3	3	4	7										9.9
	937.6	6.0	3	3	3	6										
935	935.1	8.5	3	5	3	8										
930	930.1	13.5	4	5	4	9										
925	925.1	18.5	3	4	6	10										
920	920.1	23.5	4	9	8	17										
915	915.1	28.5	5	10	8	18										
910	910.1	33.5	4	6	8	14										
905	905.1	38.5	5	8	10	18										
900	900.1	43.5	4	6	7	13										
895	895.1	48.5	5	6	9	15										
890	890.1	53.5	3	5	8	13										
885	885.1	58.5	4	8	11	19										
880	880.1	63.5	9	14	20	34										
875	875.1	68.5	12	15	22	37										
870	870.1	73.5	9	14	24	38										
865	865.1	78.5														

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-A (RL)		STATION 594+75		OFFSET 19 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 943.6 ft		TOTAL DEPTH 89.5 ft		NORTHING 579,464		EASTING 1,256,010										
DRILL RIG/HAMMER EFF./DATE GEO102 Diedrich D120 86% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER M. Ireland		START DATE 07/07/16		COMP. DATE 07/07/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
865																
			11	17	26	43										
860	860.1	83.5	24	41	59/0.5											83.5
855	855.1	88.5	41	59/0.5												89.5

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ NC\_DOT\_GDT 8/12/16

# GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-B (RL)		STATION 594+74		OFFSET 65 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 943.0 ft		TOTAL DEPTH 89.2 ft		NORTHING 579,429		EASTING 1,255,980										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/12/16		COMP. DATE 07/12/16		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						
945																
942.0	942.0	1.0	4	5	7											
940	939.5	3.5	4	5	6											
	937.0	6.0	5	4	4											
935	934.5	8.5	3	4	5											
	929.5	13.5	4	5	6											
930	924.5	18.5	4	4	5											
925	919.5	23.5	4	6	14											
920	914.5	28.5	4	11	13											
915	909.5	33.5	9	6	8											
910	904.5	38.5	7	7	11											
905	899.5	43.5	3	7	10											
900	894.5	48.5	4	6	8											
895	889.5	53.5	4	6	10											
890	884.5	58.5	5	9	10											
885	879.5	63.5	9	15	15											
880	874.5	68.5	9	13	23											
875	869.5	73.5	11	12	18											
870																
865																

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)							GROUND WTR (ft)									
BORING NO. B1-B (RL)		STATION 594+74		OFFSET 65 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 943.0 ft		TOTAL DEPTH 89.2 ft		NORTHING 579,429		EASTING 1,255,980										
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Messick		START DATE 07/12/16		COMP. DATE 07/12/16		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						
865	864.5	78.5	9	9	28											
	859.5	83.5	10	11	21											
860	854.5	88.5	43	57	0.2											
855																

NCDOT BORE DOUBLE R-2707C\_GEO\_DUALBRIDGES\_BORELOGS.GPJ\_NC\_DOT.GDT 8/12/16

Match Line

Dense to Medium Dense, Brown, Silty Fine SAND (A-2-4), with trace mica (continued)

**WEATHERED ROCK**  
Brown-Gray (BIOTITE GNEISS)  
Boring Terminated at Elevation 853.8 ft In Weathered Rock (BIOTITE GNEISS)

1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.



# GEOTECHNICAL BORING REPORT CORE LOG

WBS 34497.1.2	TIP R-2707C	COUNTY CLEVELAND	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge No. 473 on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR)			GROUND WTR (ft)
BORING NO. EB2-B (RL)	STATION 596+67	OFFSET 65 ft RT	ALIGNMENT -L-
COLLAR ELEV. 941.6 ft	TOTAL DEPTH 45.1 ft	NORTHING 579,305	EASTING 1,256,129
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Smith, C.L.	START DATE 11/04/15	COMP. DATE 11/04/15	SURFACE WATER DEPTH N/A

CORE SIZE NW				TOTAL RUN 10.2 ft				STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %			
906.7												
905	906.7 906.5	34.9 35.1	0.2 5.0		(0.2) 100%	(0.0) 0%		(9.5) 93%	(8.2) 80%		906.7	34.9
	901.5	40.1	5.0		(4.9) 98%	(3.8) 76%						
900					(4.4) 88%	(4.4) 88%						
	896.5	45.1									896.5	45.1
Boring Terminated at Elevation 896.5 ft In Crystalline Rock (Biotite Gneiss)												

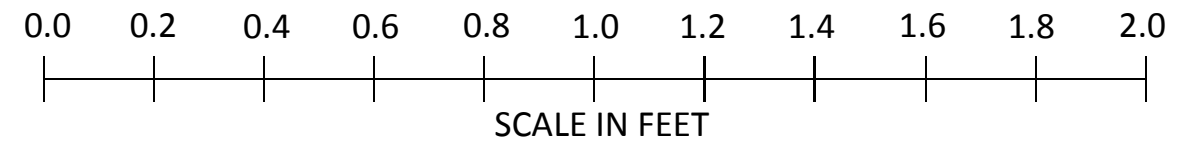
NCDOT CORE DOUBLE R2707C\_BORELOGS\_BY\_NCDOT.GPJ NC\_DOT.GDT 8/12/16



**Bridge No. 473 on -L- (Shelby Bypass) over -Y11REV2- & -Y13-  
WBS - 34497.1.2 TIP No. - R-2707C  
ECS Carolinas Project No. 08:11717**

**Rock Core Photographs: Boring - EB2-B (RL) — Station: 596+67 Offset: 65' RT**

**\*Core Photos Provided By NCDOT**



## SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
EB1-A (LL)	SS-160	65' LT	591+29	58.5 - 60.0'	A-4 (0)	34	6	26.2	37.7	26.5	9.7	99.0	83.0	45.0	27.9	-
EB1-B (LL)	SS-170	19' LT	591+93	28.5 - 30.0'	A-5(5)	48	8	16.3	33.4	41.1	9.2	99.0	91.0	59.0	36.7	-
B1-B (LL)	SS-120	18' LT	593+64	38.5 - 40.0'	A-5(1)	42	2	8.8	49.5	32.3	9.4	100.0	98.0	53.0	34.8	-
B2-A (LL)	SS-47	65' LT	594+61	28.5 - 30.0'	A-5(5)	43	8	13.1	32.3	42.0	12.5	99.0	91.0	64.0	32.2	-
B2-B (LL)	SS-22	19' LT	594+62	3.5 - 5.0'	A-7-5(24)	63	21	2.8	18.2	32.8	46.3	100.0	99.0	86.0	28.0	-
B3-B (LL)	SS-71	19' LT	595+59	23.5 - 25.0'	A-5(5)	47	8	14.6	32.4	38.5	14.5	100.0	92.0	62.0	32.3	-
B1-A (RL)	SS-3	19' RT	594+75	6.0 - 7.5'	A-7-5(12)	45	15	7.4	32.5	30.2	38.9	99.0	96.0	75.0	23.3	-
EB2-A (RL)	SS-60	19' RT	597+11	6.0 - 7.5'	A-7-5(5)	68	29	10.5	18.2	13.1	58.3	99.0	93.0	75.0	25.7	-

LAB TECHNICIAN: AMANDA R. ROTH

NCDOT CERTIFICATION NO. 112-09-1003

SIGNATURE: 

REFERENCE: R-2707C

PROJECT: 34497

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	13

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CLEVELAND  
PROJECT DESCRIPTION US 74 SHELBY BYPASS FROM  
EAST OF NC 226 TO EAST OF NC 150

SITE DESCRIPTION BRIDGE NO. 474 AND BRIDGE NO.  
475 ON -L- (US 74) OVER -Y14- (NC 150)

**CONTENTS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-5	PROFILES
6-7	CROSS SECTIONS
8-11	BORE LOGS
12	LABORATORY TEST RESULTS
13	SITE PHOTOS

**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.

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  2. 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

HPC

C. BUKOVITZ

M. BREWER

INVESTIGATED BY ECS CAROLINAS, LLP

DRAWN BY M. BREWER, P.E.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS CAROLINAS, LLP

DATE SEPTEMBER 2016



DocuSigned by:  
D. Matthew Brewer

EC2ABBE99DB48C...

10/3/2016

SIGNATURE

DATE

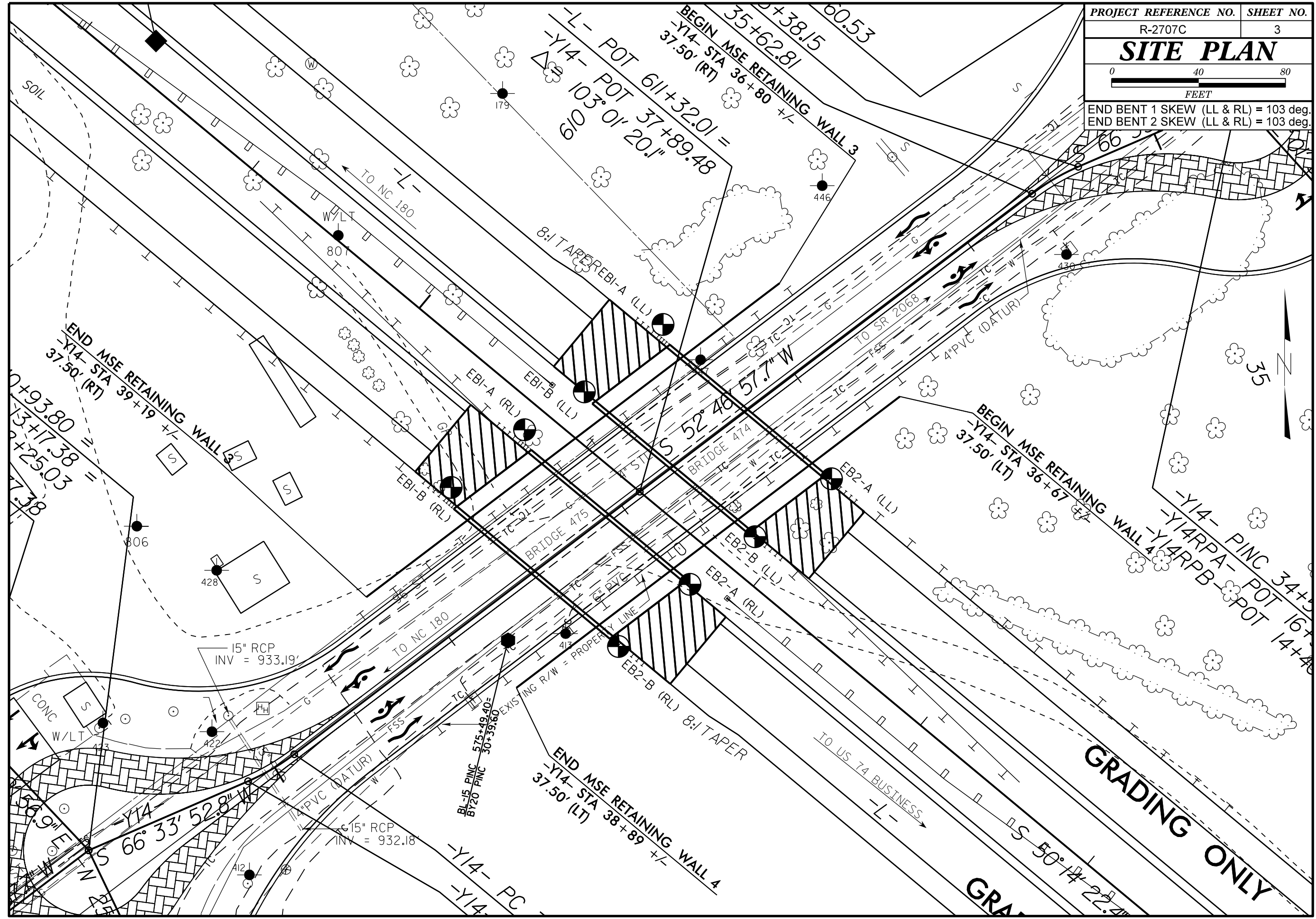
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
**SUBSURFACE INVESTIGATION**  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with 4 main columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. It includes various technical specifications, charts, and symbols used in geotechnical engineering.



END BENT 1 SKEW (LL & RL) = 103 deg.  
 END BENT 2 SKEW (LL & RL) = 103 deg.

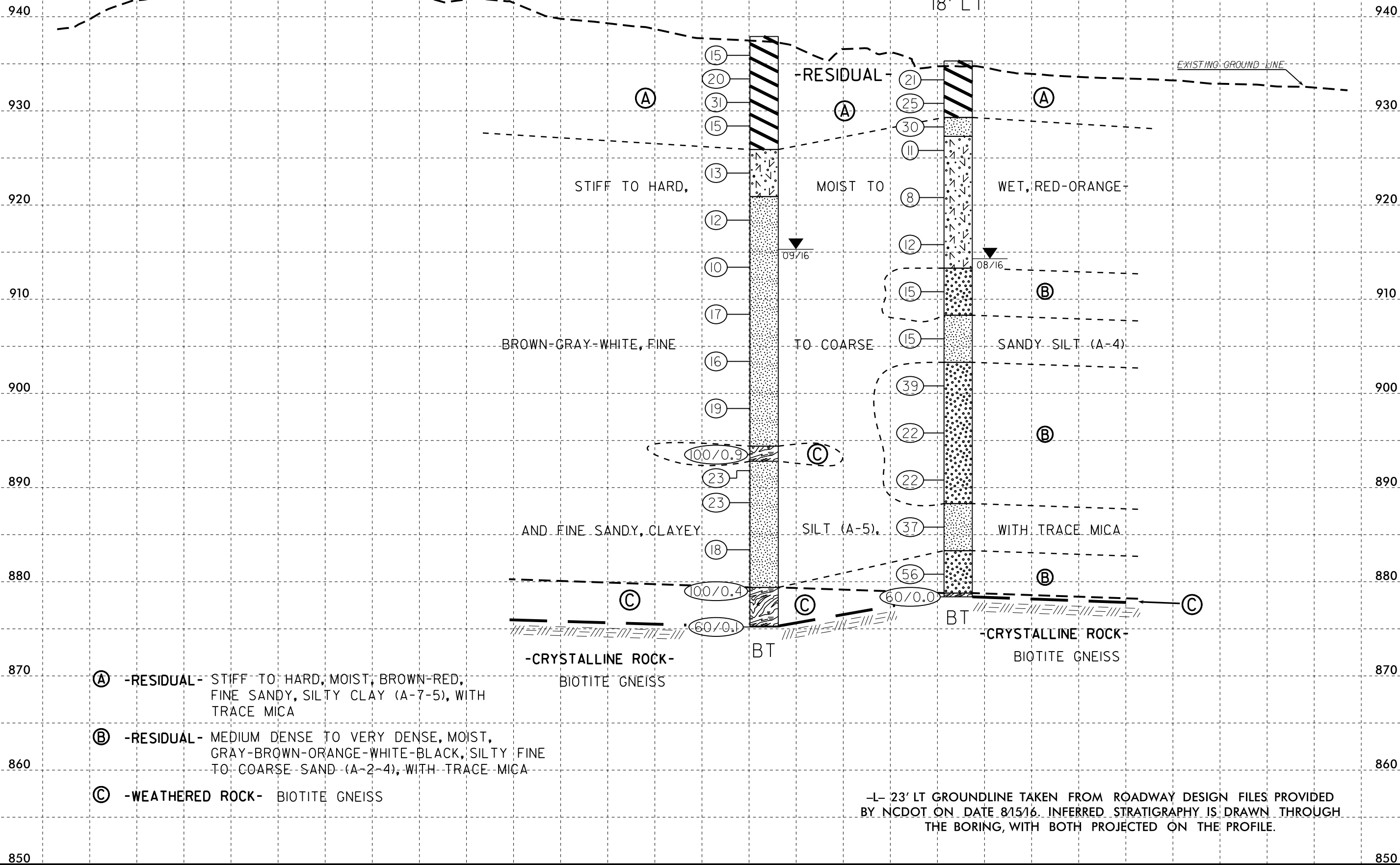


5/14/99

-L- (SHELBY BYPASS)

EB1-B(LL)  
610+83  
19' LT

EB2-B(LL)  
611+86  
18' LT

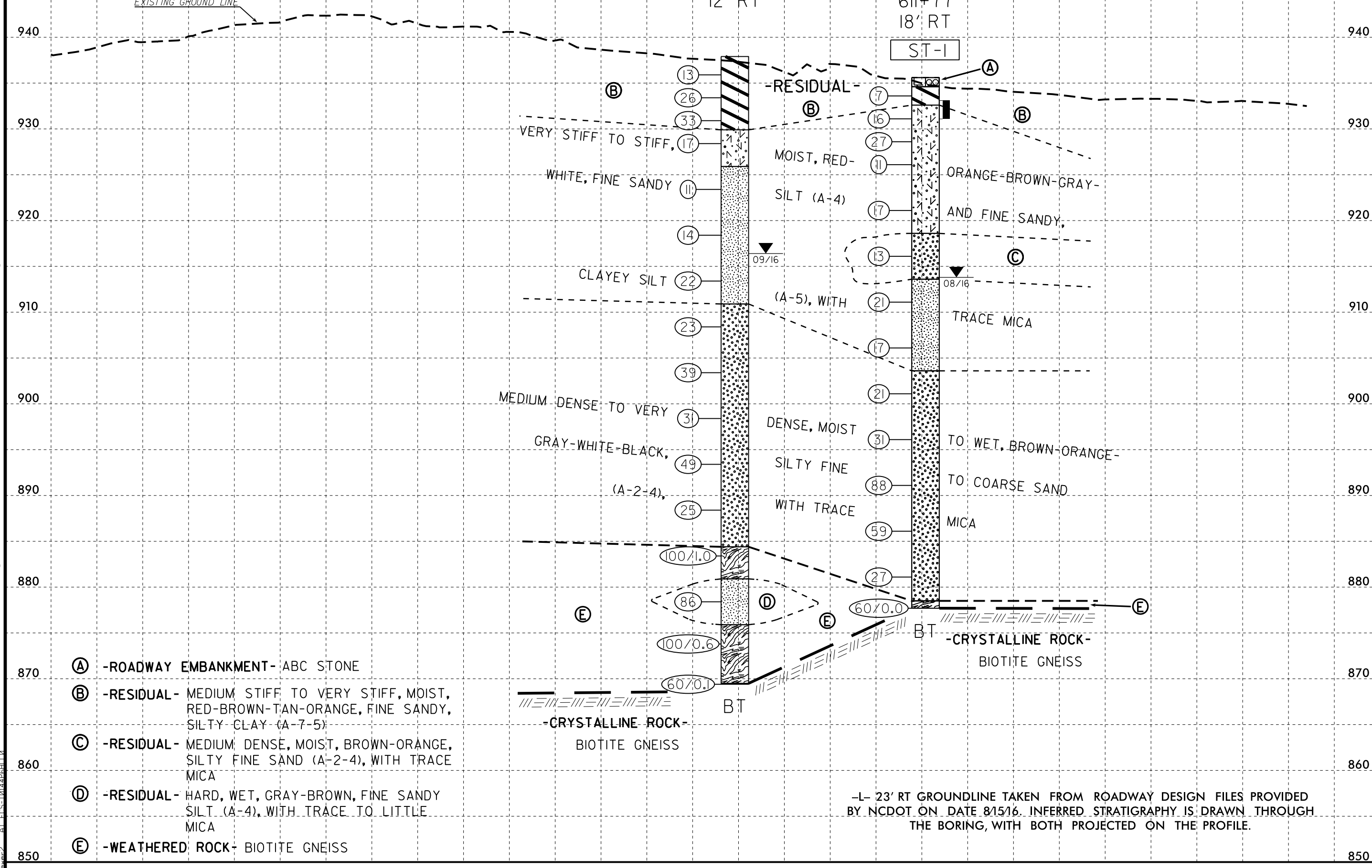


-L- 23' LT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 8/5/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

17-SEP-2016 16:37  
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# -L- (SHELBY BYPASS)



- (A)** -ROADWAY EMBANKMENT- ABC STONE
- (B)** -RESIDUAL- MEDIUM STIFF TO VERY STIFF, MOIST, RED-BROWN-TAN-ORANGE, FINE SANDY, SILTY CLAY (A-7-5)
- (C)** -RESIDUAL- MEDIUM DENSE, MOIST, BROWN-ORANGE, SILTY FINE SAND (A-2-4), WITH TRACE MICA
- (D)** -RESIDUAL- HARD, WET, GRAY-BROWN, FINE SANDY SILT (A-4), WITH TRACE TO LITTLE MICA
- (E)** -WEATHERED ROCK- BIOTITE GNEISS

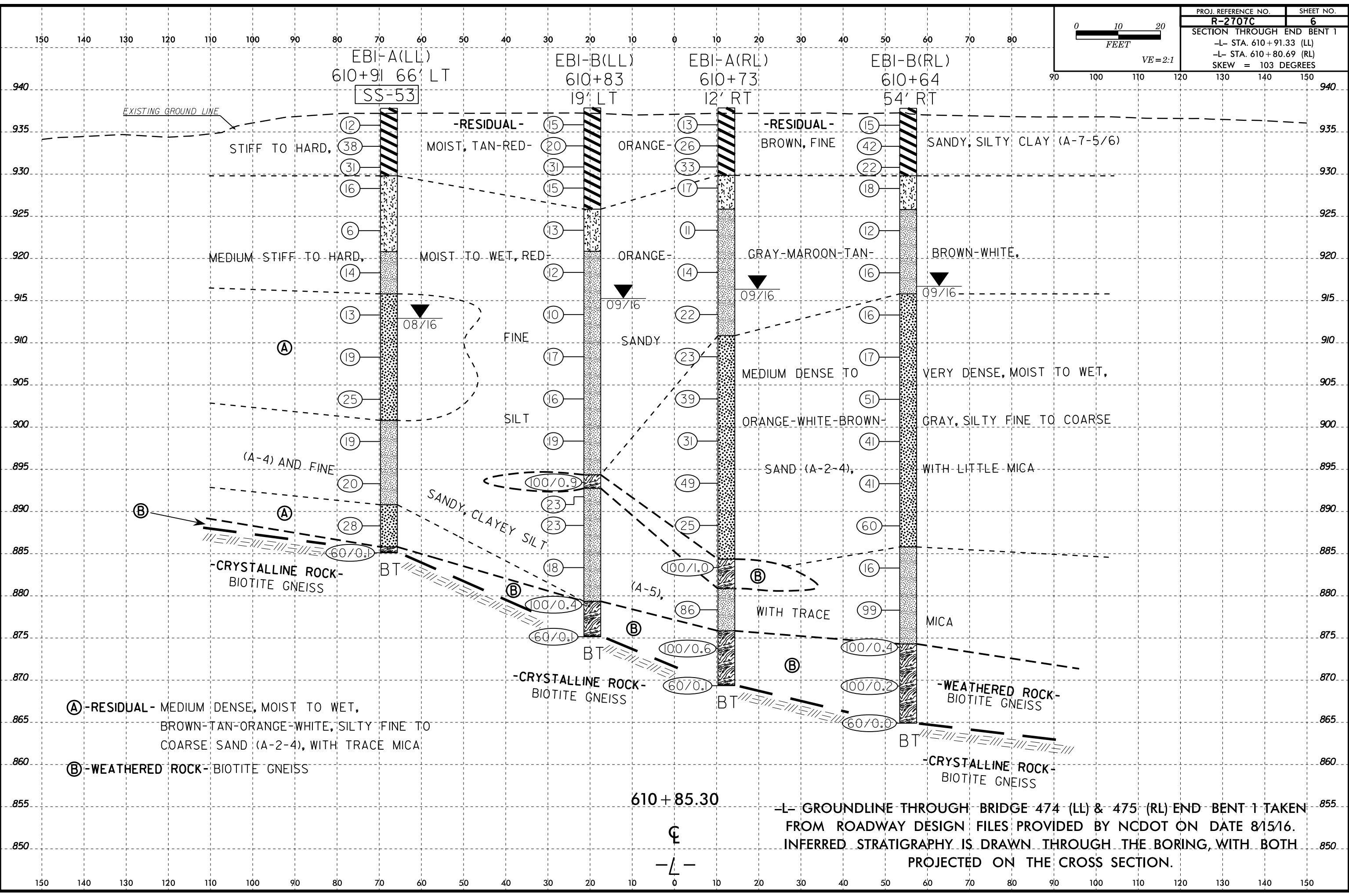
-L- 23' RT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 8/15/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

-CRYSTALLINE ROCK-  
BIOTITE GNEISS

BT -CRYSTALLINE ROCK-  
BIOTITE GNEISS

607+00 608+00 609+00 610+00 611+00 612+00 613+00

8/23/99  
 28-SEP-2016 14:36  
 I:\2016\CH\02-PROJ\1000\1999\11800\11816 - R-2707C 1/2  
 Dual Br-ridges 474 & 475\CADD\_GEO\TECH\Site&Sub\ R2707C\_Geo\_BRD0474&475\_XS1.LL.dgn



- (A) -RESIDUAL- MEDIUM DENSE, MOIST TO WET, BROWN-TAN-ORANGE-WHITE, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA
- (B) -WEATHERED ROCK-BIOTITE GNEISS

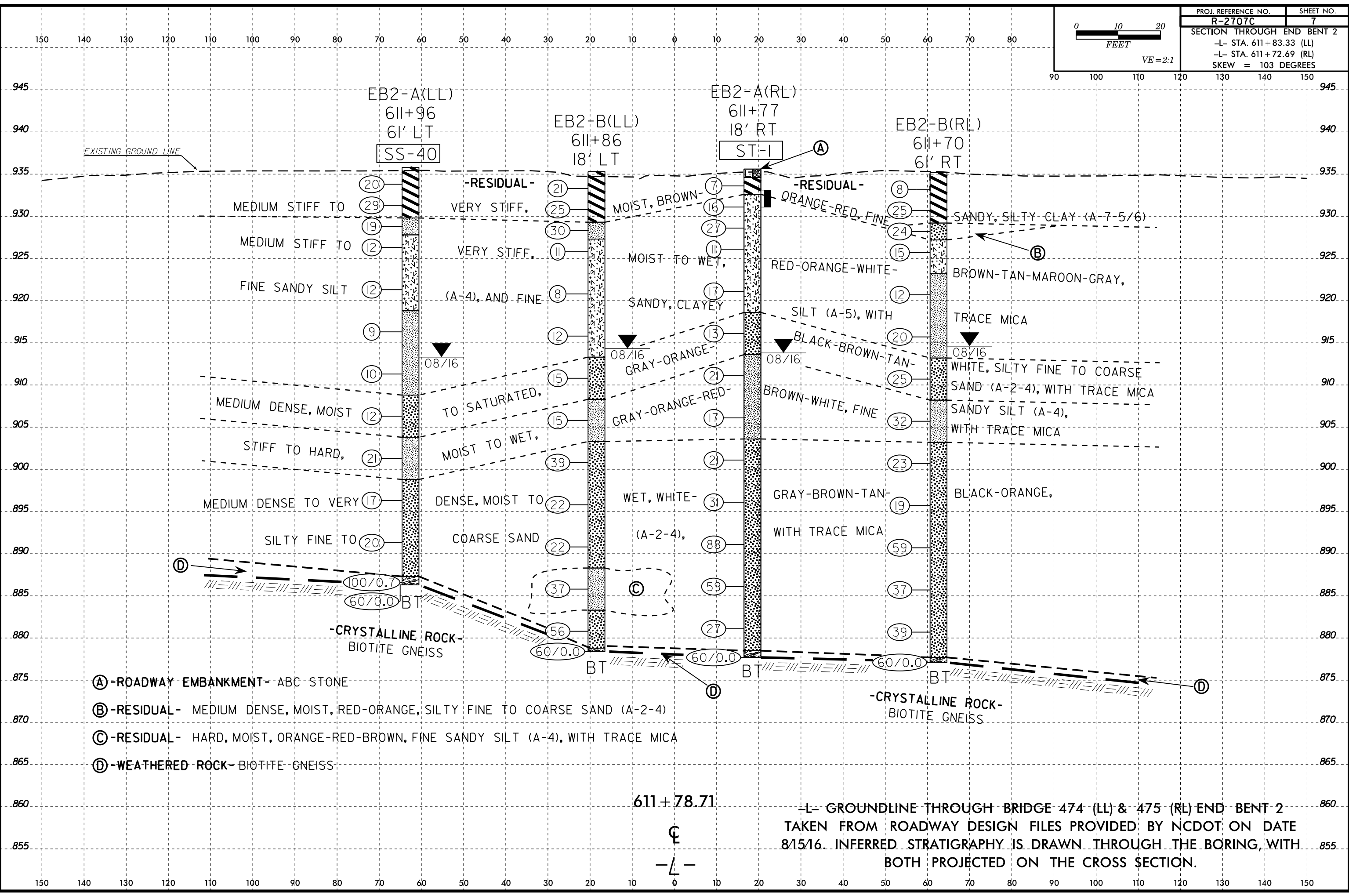
-L- GROUNDLINE THROUGH BRIDGE 474 (LL) & 475 (RL) END BENT 1 TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 8/15/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

610 + 85.30  
 ☽  
 -L-

8/23/99  
 28-SEP-2016 14:37  
 I:\ZODIAC\CH\02-PROJ\EGS\1014\1816\11816 - R-2707C - Geo-BRDG474 & 475-XS1.LLDgn  
 Dual Br-ridges 474 & 475\CADD\_GEO\TECH\Site&Sub\ R2707C\_Geo-BRDG474&475-XS1.LLDgn

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	7
SECTION THROUGH END BENT 2	
-L- STA. 611+83.33 (LL)	
-L- STA. 611+72.69 (RL)	
SKEW = 103 DEGREES	

0 10 20  
 FEET  
 VE=2:1



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer								
SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)							
BORING NO. EB1-A(LL)		STATION 610+91		OFFSET 66 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 937.8 ft		TOTAL DEPTH 52.7 ft		NORTHING 578,496		EASTING 1,257,307								
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER J. Cain		START DATE 08/30/16		COMP. DATE 08/30/16		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
940														937.8 GROUND SURFACE 0.0
935	936.8	1.0	5	6	6								M	RESIDUAL Stiff to Hard, Tan-Red-Orange, Fine Sandy, Silty CLAY (A-7-6(10)).
	934.3	3.5	7	14	24								SS-53 17%	
	931.8	6.0	7	13	18								M	
930	929.3	8.5	5	8	8								M	8.0 Very Stiff to Medium Stiff, Red-Orange-Gray-Maroon, Fine Sandy, Clayey SILT (A-5), with trace mica.
925	924.3	13.5	3	3	3								M	
920	919.3	18.5	3	7	7								M	17.0 Stiff, Tan-Orange, Fine Sandy SILT (A-4), with trace mica.
915	914.3	23.5	4	6	7								M	22.0 Medium Dense, Brown-Tan-Orange-White, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments and mica.
910	909.3	28.5	4	9	10								M	
905	904.3	33.5	7	10	15								M	
900	899.3	38.5	7	7	12								W	37.0 Very Stiff, Orange-Tan, Fine Sandy SILT (A-4), with trace mica.
895	894.3	43.5	4	9	11								W	
890	889.3	48.5	8	10	18								W	47.0 Medium Dense, White-Brown-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica.
	885.2	52.6	60/0.1										W	52.0 52.6 52.7 WEATHERED ROCK (BIOTITE GNEISS) CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 885.1 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz								
SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)							
BORING NO. EB1-B(LL)		STATION 610+83		OFFSET 19 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 937.9 ft		TOTAL DEPTH 62.7 ft		NORTHING 578,465		EASTING 1,257,271								
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER J. Cain		START DATE 08/31/16		COMP. DATE 08/31/16		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
940														937.9 GROUND SURFACE 0.0
935	936.9	1.0	4	6	9								M	RESIDUAL Stiff, Very Stiff, and Hard, Red-Brown, Silty CLAY (A-7-5).
	934.4	3.5	7	9	11								M	
	931.9	6.0	9	13	18								M	
930	929.4	8.5	6	7	8								M	8.0 Stiff, Red-Orange, Fine Sandy, Clayey SILT (A-5 (5)).
925	924.4	13.5	4	5	8								M	
920	919.4	18.5	6	6	6								M	17.0 Stiff to Very Stiff, Red-Orange-Brown-Gray-White, Fine to Coarse Sandy SILT (A-4).
915	914.4	23.5	4	6	4								M	
910	909.4	28.5	8	10	7								W	
905	904.4	33.5	4	7	9								W	
900	899.4	38.5	7	8	11								W	
895	894.4	43.5	38	62/0.4									W	43.5 WEATHERED ROCK Brown-White (BIOTITE GNEISS). 45.1
	892.8	45.1	18	15	8								W	RESIDUAL Very Stiff, Brown-White-Gray, Fine Sandy SILT (A-4), with little gravel sized rock fragments.
890	889.4	48.5	12	11	12								W	
885	884.4	53.5	4	6	12								W	
880	879.4	58.5	100/0.4										W	58.5 WEATHERED ROCK Brown-Orange (BIOTITE GNEISS).
	875.3	62.6	60/0.1										W	62.6 CRYSTALLINE ROCK (BIOTITE GNEISS). Boring Terminated with Standard Penetration Test Refusal at Elevation 875.2 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)

NCDOT BORE DOUBLE R2707C\_GEO\_BRDG474&475\_BORINGLOGS.GPJ\_NC\_DOT.GDT 9/27/16

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer										
SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)									
BORING NO. EB2-A(LL)		STATION 611+96		OFFSET 61 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 935.8 ft		TOTAL DEPTH 49.5 ft		NORTHING 578,425		EASTING 1,257,384										
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER J. Cain		START DATE 08/30/16		COMP. DATE 08/30/16		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						
940																
935	934.8	1.0	5	8	12									935.8	GROUND SURFACE	0.0
	932.3	3.5	10	12	17											
930	929.8	6.0	6	9	10									929.8	RESIDUAL Very Stiff, Brown-Orange, Fine Sandy, Silty CLAY (A-7-6 (10)).	6.0
	927.3	8.5	5	6	6									927.8	Very Stiff, Red-Brown-Orange, Fine Sandy SILT (A-4).	8.0
925															Stiff, Orange-Brown-Tan, Fine Sandy, Clayey SILT (A-5), with trace mica.	
	922.3	13.5	3	5	7											
920																
	917.3	18.5	5	4	5									918.8	Stiff, Orange-White-Gray-Red, Fine to Coarse Sandy SILT (A-4), with trace mica.	17.0
915																
	912.3	23.5	5	5	5											
910																
	907.3	28.5	4	6	6									908.8	Medium Dense, Tan-White-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica.	27.0
905																
	902.3	33.5	5	9	12									903.8	Very Stiff, Gray-Orange-Red, Fine Sandy SILT (A-4), with trace mica.	32.0
900																
	897.3	38.5	5	5	12									898.8	Medium Dense, White-Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments and trace mica.	37.0
895																
	892.3	43.5	7	10	10											
890																
	887.3	48.5	10	90/0.2										887.3		48.5
	886.3	49.5	60/0.0											886.3	WEATHERED ROCK (BIOTITE GNEISS). Boring Terminated with Standard Penetration Test Refusal at Elevation 886.3 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)	49.5

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer										
SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)									
BORING NO. EB2-B(LL)		STATION 611+86		OFFSET 18 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 935.3 ft		TOTAL DEPTH 56.9 ft		NORTHING 578,398		EASTING 1,257,349										
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER J. Cain		START DATE 08/30/16		COMP. DATE 08/30/16		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						
940																
935	934.3	1.0	8	10	11									935.3	GROUND SURFACE	0.0
	931.8	3.5	10	11	14											
930	929.3	6.0	7	15	15									929.3	RESIDUAL Very Stiff, Brown-Red, Fine Sandy, Silty CLAY (A-7-5), with trace mica.	6.0
	926.8	8.5	4	4	7									927.3	Very Stiff, Orange-Brown, Fine Sandy SILT (A-4), with trace mica.	8.0
925															Medium Stiff to Stiff, Brown-Red-Orange-White, Fine Sandy, Clayey SILT (A-5).	
	921.8	13.5	2	3	5											
920																
	916.8	18.5	5	6	6											
915																
	911.8	23.5	5	4	11									913.3	Medium Dense, Gray-Brown-Orange, Silty Fine to Coarse SAND (A-2-4), with little clay and trace mica.	22.0
910																
	906.8	28.5	8	7	8									908.3	Stiff, Brown-Orange, Fine to Coarse Sandy SILT (A-4), with trace mica.	27.0
905																
	901.8	33.5	8	19	20									903.3	Dense to Medium Dense, Gray-White-Black-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel sized rock fragments.	32.0
900																
	896.8	38.5	12	7	15											
895																
	891.8	43.5	6	10	12											
890																
	886.8	48.5	10	14	23									888.3	Hard, Orange-Red-Brown, Fine Sandy SILT (A-4), with trace mica.	47.0
885																
	881.8	53.5	12	31	25									883.3	Very Dense, White-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel sized rock fragments.	52.0
880																
	878.4	56.9	60/0.0											878.8		56.5
														878.4	WEATHERED ROCK (BIOTITE GNEISS). Boring Terminated with Standard Penetration Test Refusal at Elevation 878.4 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)	56.9

NCDOT BORE DOUBLE R2707C\_GEO\_BRDG474&475\_BORINGLOGS.GPJ\_NC\_DOT.GDT 9/27/16

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)									
BORING NO. EB1-A(RL)		STATION 610+73		OFFSET 12 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 937.9 ft		TOTAL DEPTH 68.5 ft		NORTHING 578,447		EASTING 1,257,243										
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 08/31/16		COMP. DATE 08/31/16		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						
940														937.9	0.0	GROUND SURFACE
	936.9	1.0	6	7	6											RESIDUAL
935	934.4	3.5	7	11	15											Stiff, Red-Brown-Tan, Fine Sandy, Silty CLAY (A-7-5).
	931.9	6.0	10	15	18											
930	929.4	8.5	6	8	9											Very Stiff, Red-Orange-Brown, Fine Sandy, Clayey SILT (A-5), with trace mica.
	924.4	13.5	5	4	7											Stiff to Very Stiff, Red-Orange-Brown-Gray, Fine Sandy SILT (A-4), with trace clay.
925	919.4	18.5	5	6	8											
920	914.4	23.5	6	8	14											
915	909.4	28.5	7	11	12											Medium Dense and Dense, Orange-White-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments.
910	904.4	33.5	13	16	23											
905	899.4	38.5	11	11	20											
900	894.4	43.5	11	20	29											
895	889.4	48.5	30	15	10											
890	884.4	53.5	7	10	90/0.5											
885	879.4	58.5	27	39	47											
880	874.4	63.5	69	31/0.1												
875	869.5	68.4														
870																

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST C. Bukovitz										
SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)									
BORING NO. EB1-B(RL)		STATION 610+64		OFFSET 54 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 937.8 ft		TOTAL DEPTH 72.9 ft		NORTHING 578,421		EASTING 1,257,209										
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 08/31/16		COMP. DATE 08/31/16		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						
940														937.8	0.0	GROUND SURFACE
	936.8	1.0	6	7	8											RESIDUAL
935	934.3	3.5	14	20	22											Stiff, Red-Brown-Tan, Fine Sandy, Silty CLAY (A-7-5).
	931.8	6.0	8	11	11											
930	929.3	8.5	7	8	10											Very Stiff, Red-Orange, Fine Sandy, Clayey SILT (A-5), with trace mica.
	924.3	13.5	5	6	6											Stiff to Very Stiff, Red-Gray-Orange-Brown, Fine Sandy SILT (A-4), with trace mica.
925	919.3	18.5	5	7	9											
920	914.3	23.5	7	9	7											
915	909.3	28.5	6	8	9											Medium Dense to Very Dense, Orange-White-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with little mica.
910	904.3	33.5	13	18	33											
905	899.3	38.5	4	13	28											
900	894.3	43.5	11	16	25											
895	889.3	48.5	11	22	38											
890	884.3	53.5	8	7	9											
885	879.3	58.5	8	41	58											
880	874.3	63.5														
875	869.5	68.3														
870																
865																

NCDOT BORE DOUBLE R2707C\_GEO\_BRDG474&475\_BORINGLOGS.GPJ\_NC\_DOT\_GDT 9/27/16



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)								
BORING NO. EB2-A(RL)		STATION 611+77		OFFSET 18 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 935.6 ft		TOTAL DEPTH 57.9 ft		NORTHING 578,376		EASTING 1,257,319									
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 08/29/16		COMP. DATE 08/29/16		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
940															
935	934.6	1.0	4	3	4									935.6	0.0
														934.6	1.0
	932.1	3.5	5	7	9									932.6	3.0
930	929.6	6.0	11	12	15										
	927.1	8.5	6	6	5										
925	922.1	13.5	4	9	8										
920	917.1	18.5	4	5	8									918.6	17.0
915	912.1	23.5	6	11	10									913.6	22.0
910	907.1	28.5	6	8	9										
905	902.1	33.5	6	11	10									903.6	32.0
900	897.1	38.5	7	14	17										
895	892.1	43.5	10	29	59										
890	887.1	48.5	7	20	39										
885	882.1	53.5	12	13	14										
880	877.7	57.9	60/0.0											878.5	57.1
														877.7	57.9
<b>WEATHERED ROCK (BIOTITE GNEISS).</b> Boring Terminated with Standard Penetration Test Refusal at Elevation 877.7 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)															
Other Samples: ST-1 (2.5 - 4.5)															

WBS 34497.1.2		TIP R-2707C		COUNTY CLEVELAND		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150)							GROUND WTR (ft)								
BORING NO. EB2-B(RL)		STATION 611+70		OFFSET 61 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 935.2 ft		TOTAL DEPTH 58.1 ft		NORTHING 578,348		EASTING 1,257,286									
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 08/29/16		COMP. DATE 08/29/16		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
940															
935	934.2	1.0	2	3	5									935.2	0.0
	931.7	3.5	8	10	15										
930	929.2	6.0	8	11	13										
	926.7	8.5	6	6	9										
925	921.7	13.5	4	6	6										
920	916.7	18.5	4	5	15										
915	911.7	23.5	12	14	11										
910	906.7	28.5	11	15	17										
905	901.7	33.5	11	12	11										
900	896.7	38.5	8	11	8										
895	891.7	43.5	8	14	45										
890	886.7	48.5	19	20	17										
885	881.7	53.5	13	15	24										
880	877.1	58.1	60/0.0											877.7	57.5
														877.1	58.1
<b>WEATHERED ROCK (BIOTITE GNEISS).</b> Boring Terminated with Standard Penetration Test Refusal at Elevation 877.1 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)															

NCDOT BORE DOUBLE R2707C\_GEO\_BRDG474&475\_BORINGLOGS.GPJ\_NC\_DOT.GDT 9/27/16

## SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
EB1-A (LL)	SS-53	66' LT	610+91	3.5 - 5.0'	A-7-6 (10)	46	20	19.5	25.7	10.9	44.0	99.0	89.0	58.0	17.2	-
EB2-A (LL)	SS-40	61' LT	611+96	1.0 - 2.5'	A-7-6 (26)	56	32	11.1	12.2	15.0	61.7	99.0	92.0	78.0	25.9	-
EB2-A (RL)	ST-1	18' RT	611+77	3.0 - 3.5'	A-5 (5)	44	8	18.9	24.3	14.6	42.1	100.0	90.0	60.0	22.6	-

LAB TECHNICIAN: AMANDA R. ROTH

NCDOT CERTIFICATION NO. 112-09-1003

SIGNATURE:  \_\_\_\_\_

**SITE PHOTOS**



PHOTO NO. 1: -L- LOOKING UPSTATION (SOUTH) AT END BENT NO. 1



PHOTO NO. 2: -L- LOOKING DOWNSTATION (NORTH) AT END BENT NO. 2



PHOTO NO. 3: -Y14- LOOKING DOWNSTATION (EAST) AT -L-

REFERENCE: R-2707C

PROJECT: 34497

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CLEVELAND  
PROJECT DESCRIPTION US 74 Shelby Bypass from East of  
NC 226 to East of NC 150  
SITE DESCRIPTION Bridge No. 476 on -YIIREV2- (NC 180)  
over -YI3- (CSXRR)

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	BORE LOGS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	4

**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 1919 TOT-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

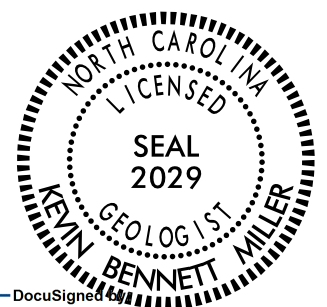
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

- NOTES:
1. 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.
  2. 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

J. K. STICKNEY  
C. L. SMITH  
M. R. MOORE

INVESTIGATED BY J. E. BEVERLY  
DRAWN BY K. B. MILLER  
CHECKED BY J. E. BEVERLY <sup>DS</sup> JEB  
SUBMITTED BY K. B. MILLER  
DATE SEPTEMBER 2016



DocuSigned by  
[Signature]  
957A789AED704CB...

9/23/2016

SIGNATURE DATE

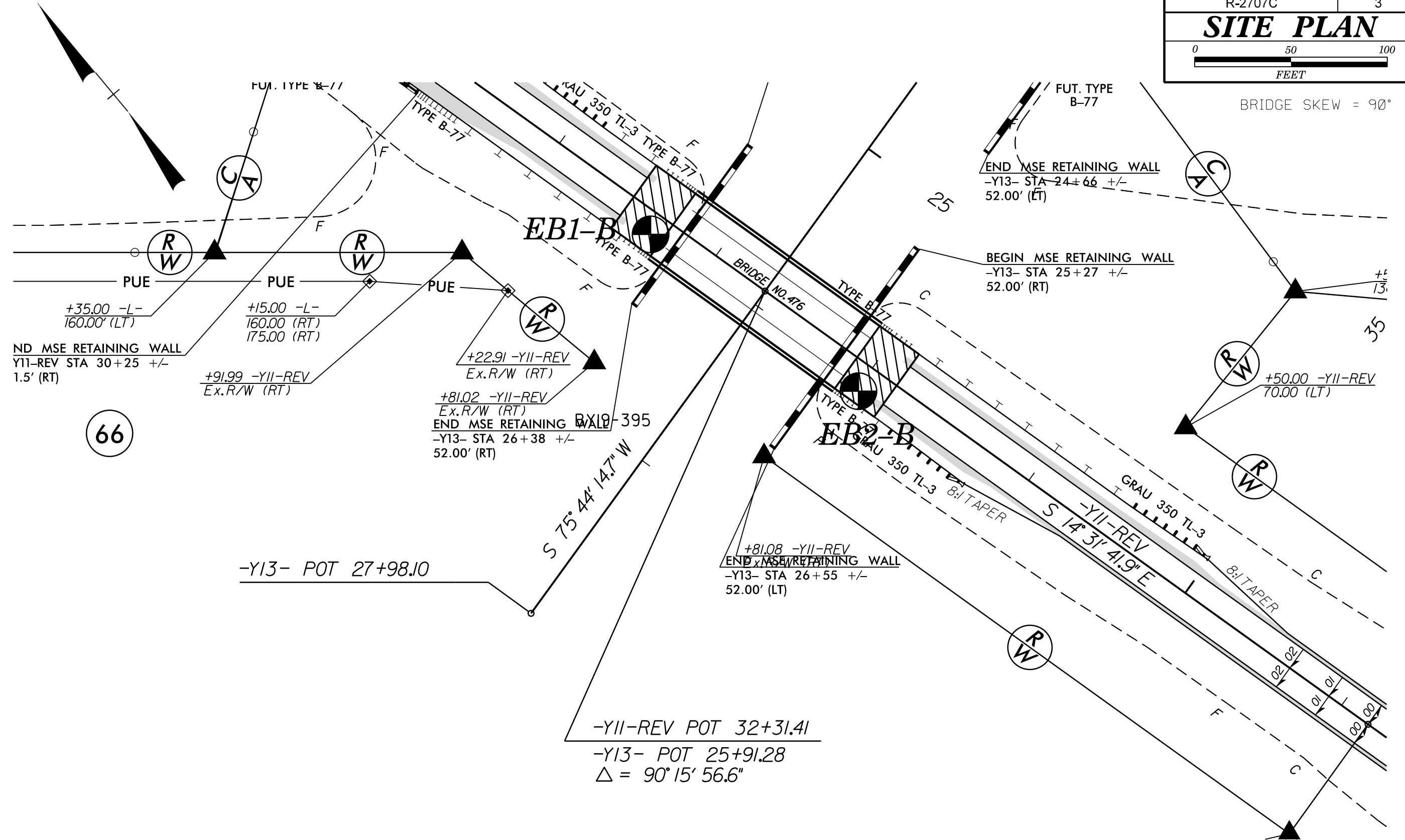
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

**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 209, 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 DISLOGGED 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 (RQD)</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>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
<p style="text-align: center;"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-7-5</td> <td>A-7-6</td> <td>A-3</td> <td>A-6, A-7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td> <td>-</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSUITABLE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p style="text-align: center;"><b>CONSISTENCY OR DENSENESS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>&lt; 4 4 TO 10 10 TO 30 30 TO 50 &gt; 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>&lt; 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 &gt; 30</td> <td>&lt; 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 &gt; 4</td> </tr> </tbody> </table> </td> <td colspan="10"> <p style="text-align: center;"><b>MISCELLANEOUS SYMBOLS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> <td></td> <td>MONITORING WELL</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p style="text-align: center;"><b>RECOMMENDATION SYMBOLS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p style="text-align: center;"><b>ABBREVIATIONS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>W - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>W<sub>d</sub> - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td><b>SAMPLE ABBREVIATIONS</b></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td>S - BULK</td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td>SS - SPLIT SPOON</td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td>ST - SHELBY TUBE</td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td>RS - ROCK</td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td>RT - RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td>CBR - CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p style="text-align: center;"><b>TEXTURE OR GRAIN SIZE</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. 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<p style="text-align: center;"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table>										FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	<p style="text-align: center;"><b>BENCH MARK: BY-18-387</b></p> <p style="text-align: right;">ELEVATION: 944.05 FEET</p> <p>NOTES:</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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BRIDGE SKEW = 90°



ND MSE RETAINING WALL  
Y11-REV STA 30+25 +/-  
1.5' (RT)

66

+91.99 -Y11-REV  
Ex.R/W (RT)

+22.91 -Y11-REV  
Ex.R/W (RT)  
+81.02 -Y11-REV  
Ex.R/W (RT)  
END MSE RETAINING WALL  
-Y13- STA 26+38 +/-  
52.00' (RT)

-Y13- POT 27+98.10

S 75° 44' 14.7" W

+81.08 -Y11-REV  
END MSE RETAINING WALL  
-Y13- STA 26+55 +/-  
52.00' (LT)

-Y11-REV POT 32+31.41  
-Y13- POT 25+91.28  
Δ = 90° 15' 56.6"

END MSE RETAINING WALL  
-Y13- STA 24+66 +/-  
52.00' (LT)

BEGIN MSE RETAINING WALL  
-Y13- STA 25+27 +/-  
52.00' (RT)

+50.00 -Y11-REV  
70.00 (LT)

R/W

R/W

R/W

R/W

35

+13

25

EB1-B

EB2-B

BRIDGE NO. 476

GRAU 350 TL-3 8:1 TAPER

GRAU 350 TL-3 8:1 TAPER

-Y11-REV S 14° 31' 41.9" E

02' 02" 01' 01" 00' 00"

F

C

F

C

F

C

# GEOTECHNICAL BORING REPORT

## BORE LOG

<b>WBS</b> 34497.1.2	<b>TIP</b> R-2707C	<b>COUNTY</b> CLEVELAND	<b>GEOLOGIST</b> Stickney, J. K.
<b>SITE DESCRIPTION</b> BRIDGE NO. 476 ON -Y11-REV2 (NC 180) OVER CSX (-Y13-)			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> EB1-B	<b>STATION</b> 31+66	<b>OFFSET</b> 11 ft RT	<b>ALIGNMENT</b> -Y11-REV2
<b>COLLAR ELEV.</b> 943.1 ft	<b>TOTAL DEPTH</b> 60.9 ft	<b>NORTHING</b> 579,372	<b>EASTING</b> 1,255,915
<b>DRILL RIG/HAMMER EFF./DATE</b> HFO0072 CME-550 88% 03/19/2014		<b>DRILL METHOD</b> NW Casing w/ Advancer	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Smith, C.L.	<b>START DATE</b> 11/16/15	<b>COMP. DATE</b> 11/16/15	<b>SURFACE WATER DEPTH</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
945														943.1 GROUND SURFACE 0.0
940	937.8	5.3	4	5	9									RESIDUAL RED BROWN STIFF MOIST SILTY CLAY (A-7)
935	932.8	10.3	4	4	6									935.1 RESIDUAL 8.0
930	927.8	15.3	3	4	8									LAYERS OF RED BROWN AND TAN YELLOW LOOSE TO MEDIUM DENSE MOIST CLAYEY SILTY FINE SAND (A-2)
925	922.8	20.3	2	3	6									
920	917.8	25.3	3	5	5									
915	912.8	30.3	2	3	5									
910	907.8	35.3	3	4	6									
905	902.8	40.3	2	4	5									
900	897.8	45.3	2	3	5									
895	892.8	50.3	3	4	5									
890	887.8	55.3	3	6	14									
885	882.8	60.3	64	36	1									100/6 WEATHERED ROCK 60.3

<b>WBS</b> 34497.1.2	<b>TIP</b> R-2707C	<b>COUNTY</b> CLEVELAND	<b>GEOLOGIST</b> Stickney, J. K.
<b>SITE DESCRIPTION</b> BRIDGE NO. 476 ON -Y11-REV2 (NC 180) OVER CSX (-Y13-)			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> EB2-B	<b>STATION</b> 33+01	<b>OFFSET</b> 14 ft RT	<b>ALIGNMENT</b> -Y11-REV2
<b>COLLAR ELEV.</b> 943.3 ft	<b>TOTAL DEPTH</b> 45.2 ft	<b>NORTHING</b> 579,240	<b>EASTING</b> 1,255,946
<b>DRILL RIG/HAMMER EFF./DATE</b> HFO0072 CME-550 88% 03/19/2014		<b>DRILL METHOD</b> NW Casing w/ Advancer	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Smith, C.L.	<b>START DATE</b> 11/12/15	<b>COMP. DATE</b> 11/12/15	<b>SURFACE WATER DEPTH</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
945														943.3 GROUND SURFACE 0.0
940	938.0	5.3	4	7	10									RESIDUAL RED PURPLE BROWN VERY STIFF MICACEOUS MOIST SANDY SILTY CLAY (A-7)
935	933.0	10.3	5	6	8									935.3 RESIDUAL 8.0
930	928.0	15.3	6	7	8									LAYERS OF TAN YELLOW WHITE AND RED PURPLE BROWN MEDIUM DENSE MOIST CLAYEY SILTY SAND (A-2)
925	923.0	20.3	2	4	10									
920	918.0	25.3	4	8	8									
915	913.0	30.3	6	8	9									
910	908.0	35.3	3	6	9									
905	903.0	40.3	5	8	10									
900	898.9	44.4	14	86	3									100/8 WEATHERED ROCK 44.1
														898.1 SEVERLY WEATHERED CRYSTALLINE ROCK 45.2

NCDOT BORE DOUBLE R2707C\_BORELOGS(UAY EDIT).GPJ NC\_DOT.GDT 9/23/16