

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

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

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)

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 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

- NOTES:
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

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

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10/3/2016

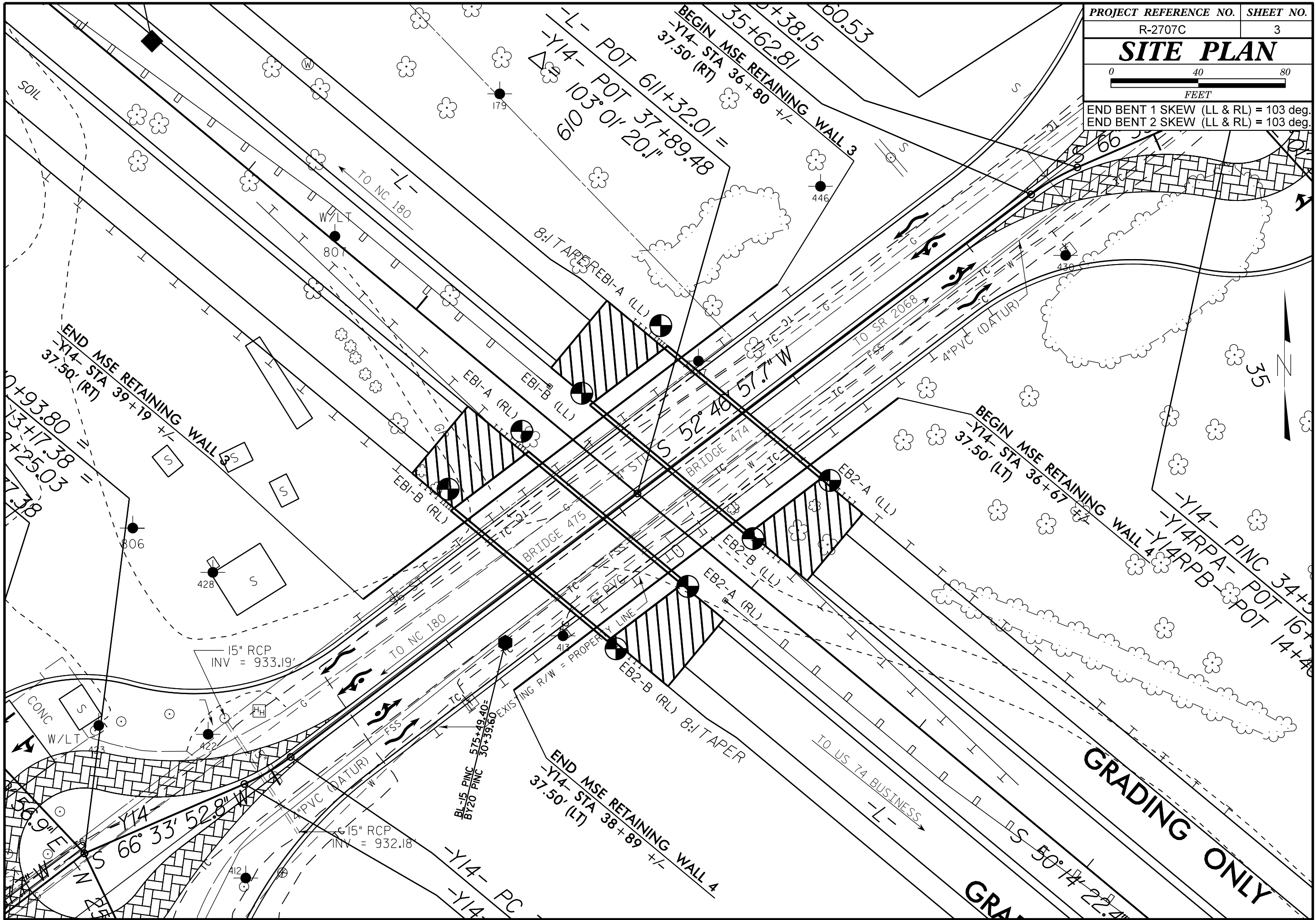
SIGNATURE

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																																																																																																																																																																																								
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:  WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - 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. 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CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</i></p> <p>VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i></p> <p>COMPLETE: ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>																													
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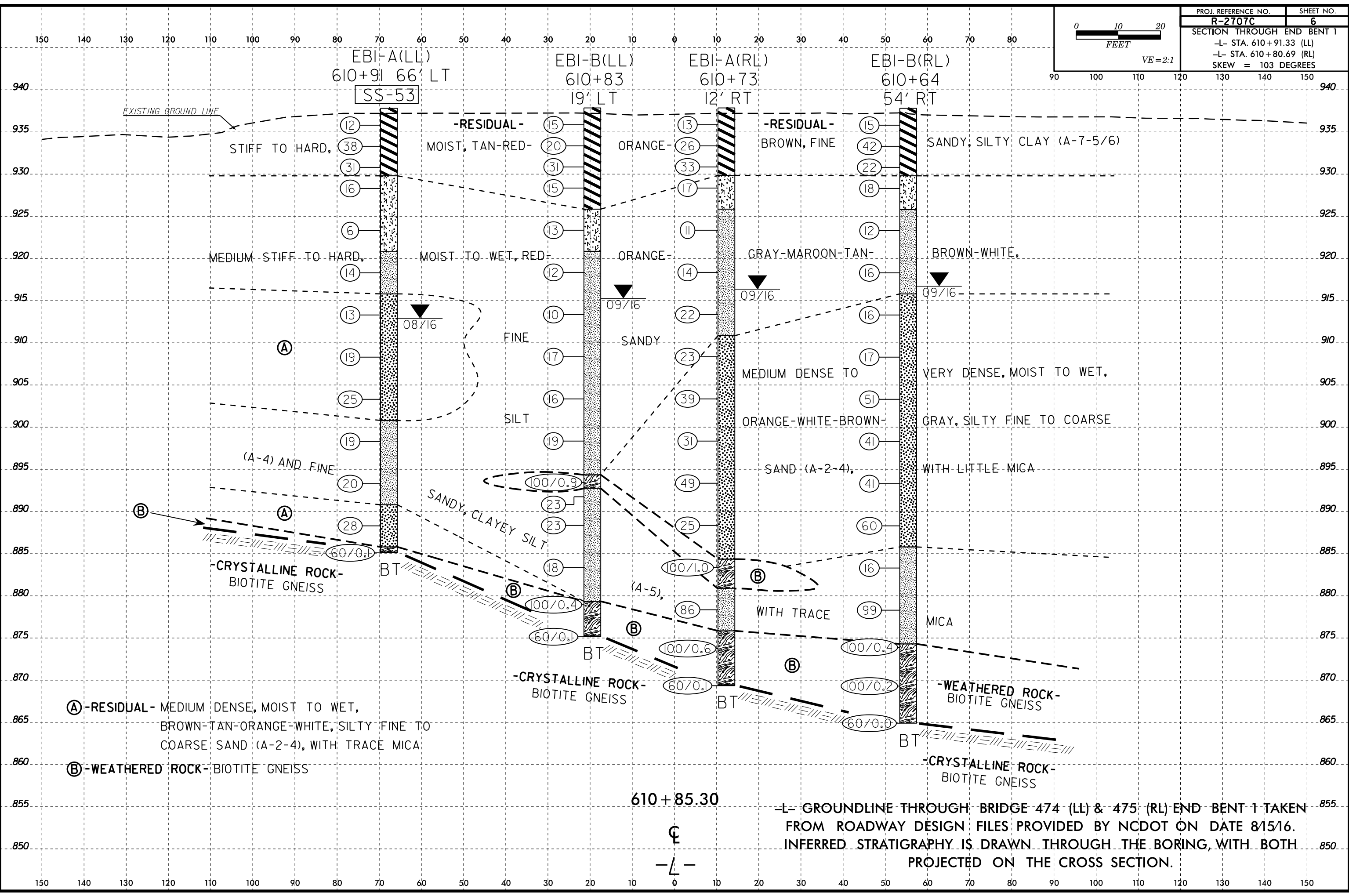




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PROJ. REFERENCE NO.	SHEET NO.
R-2707C	6
SECTION THROUGH END BENT 1	
-L- STA. 610+91.33 (LL)	
-L- STA. 610+80.69 (RL)	
SKEW = 103 DEGREES	

0 10 20  
FEET  
VE=2:1

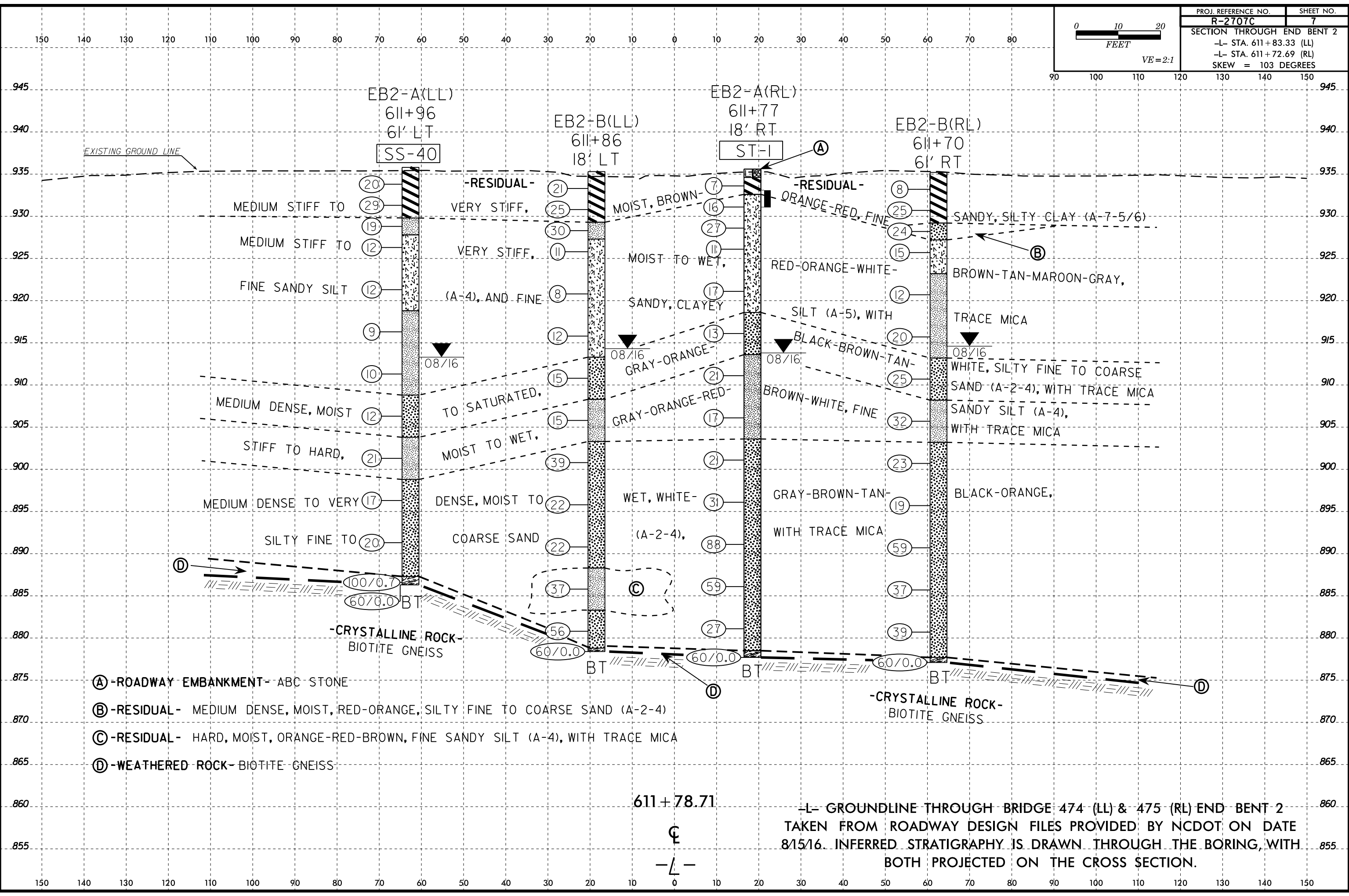




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 I:\ZODIAC\CH\02-PROJ\EGS\1014\1816\11816 - R-2707C - Geo.BRDG474&475.XSL.L.dgn  
 Dual Bridges 474 & 475\CADD\_GEO\TECH\Site&Sub\ R2707C\_Geo.BRDG474&475.XSL.L.dgn

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	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	Stiff, Tan-Orange, Fine Sandy SILT (A-4), with trace mica.
915	914.3	23.5	4	6	7								M	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	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	Medium Dense, White-Brown-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica.
	885.2	52.6	60/0.1										W	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	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	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	WEATHERED ROCK (BIOTITE GNEISS) Brown-White (BIOTITE GNEISS).
	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	WEATHERED ROCK (BIOTITE GNEISS) Brown-Orange (BIOTITE GNEISS).
	875.3	62.6	60/0.1										W	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	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		49.5
															<b>WEATHERED ROCK (BIOTITE GNEISS).</b>	
															Boring Terminated with Standard Penetration Test Refusal at Elevation 886.3 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)	

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	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		56.9
															<b>WEATHERED ROCK (BIOTITE GNEISS).</b>	
															Boring Terminated with Standard Penetration Test Refusal at Elevation 878.4 ft ON 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 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	GROUND SURFACE	0.0		
	936.9	1.0	6	7	6											<b>RESIDUAL</b>			
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.	8.0		
	924.4	13.5	5	4	7											Stiff to Very Stiff, Red-Orange-Brown-Gray, Fine Sandy SILT (A-4), with trace clay.	12.0		
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.	27.0		
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	GROUND SURFACE	0.0		
	936.8	1.0	6	7	8											<b>RESIDUAL</b>			
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.	8.0		
	924.3	13.5	5	6	6											Stiff to Very Stiff, Red-Gray-Orange-Brown, Fine Sandy SILT (A-4), with trace mica.	12.0		
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.	22.0		
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

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

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-