2 K REFERENCE

**CONTENTS** 

**DESCRIPTION** 

TITLE SHEET LEGEND (SOIL & ROCK)

SITE PLAN

PROFILE(S)

BORE LOG(S)

SHEET NO.

5-7

449 3 STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>CLEVELAND</u>

SITE DESCRIPTION CULVERT AT -L- STA. 453 + 07 OVER UNNAMED TRIBUTARY TO WILLIAM CREEK ON PROPOSED US 74

STATE PROJECT REPERENCE NO. R-2707C

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSES 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 1999 707-6550. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 STIU 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 NDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS THE 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 DIES NOT WARRANT OR CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR POINON OF THE DEPARTMENT AS TO THE TYPE TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE 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 HAVIOR 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.

	M.L. SMITH	
INVEST	IGATED BY R.W. TODD	
	BYT.T. WALKER	
CHECKE	ED BY J.E. BEVERLY	
SUBMIT	TTED BY K.B. MILLER	
DATE	NOVEMBER 2016	

PERSONNEL

R.W. TODD



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

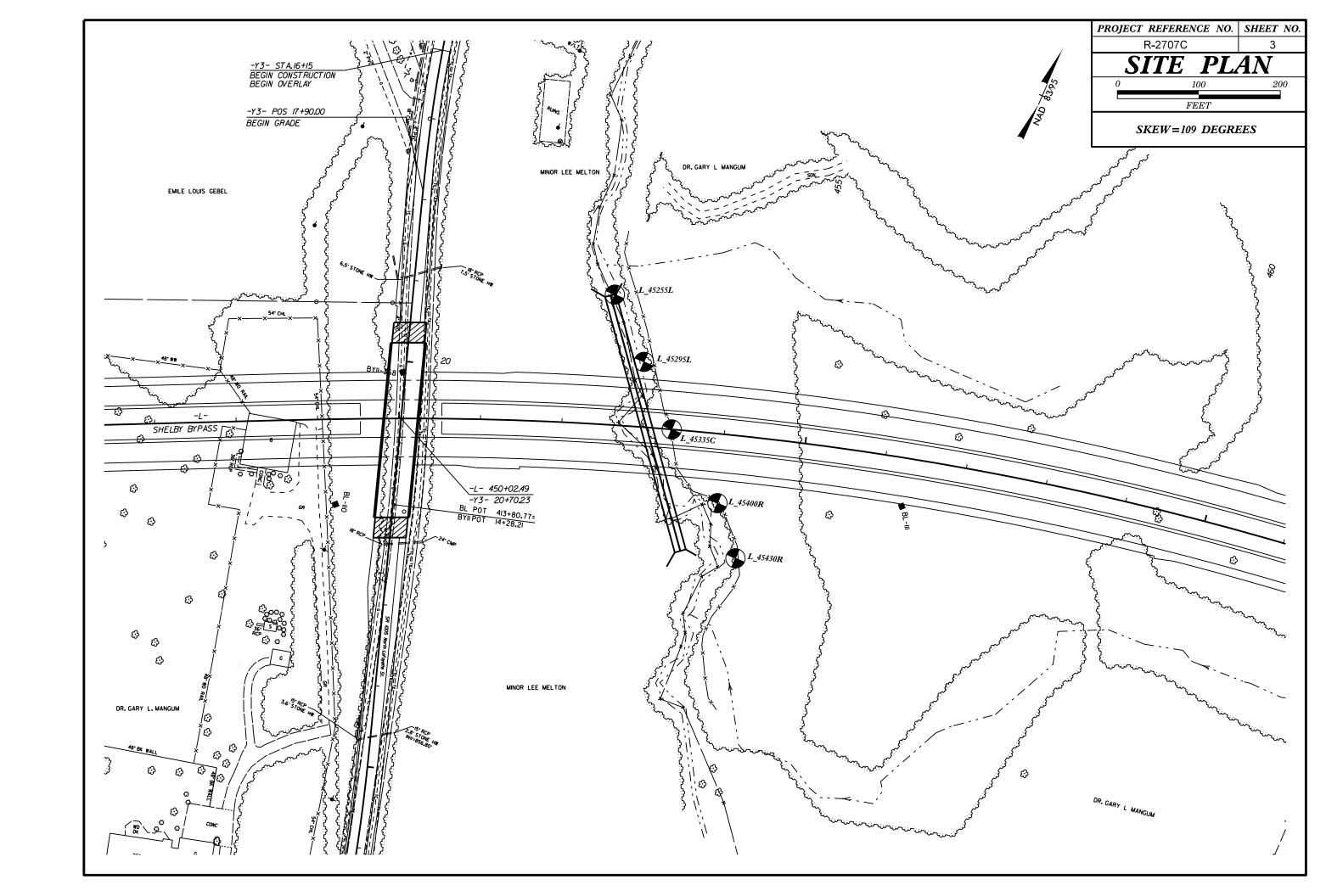
PROJECT REPERENCE NO.	onee! NO.
R-2707C	2

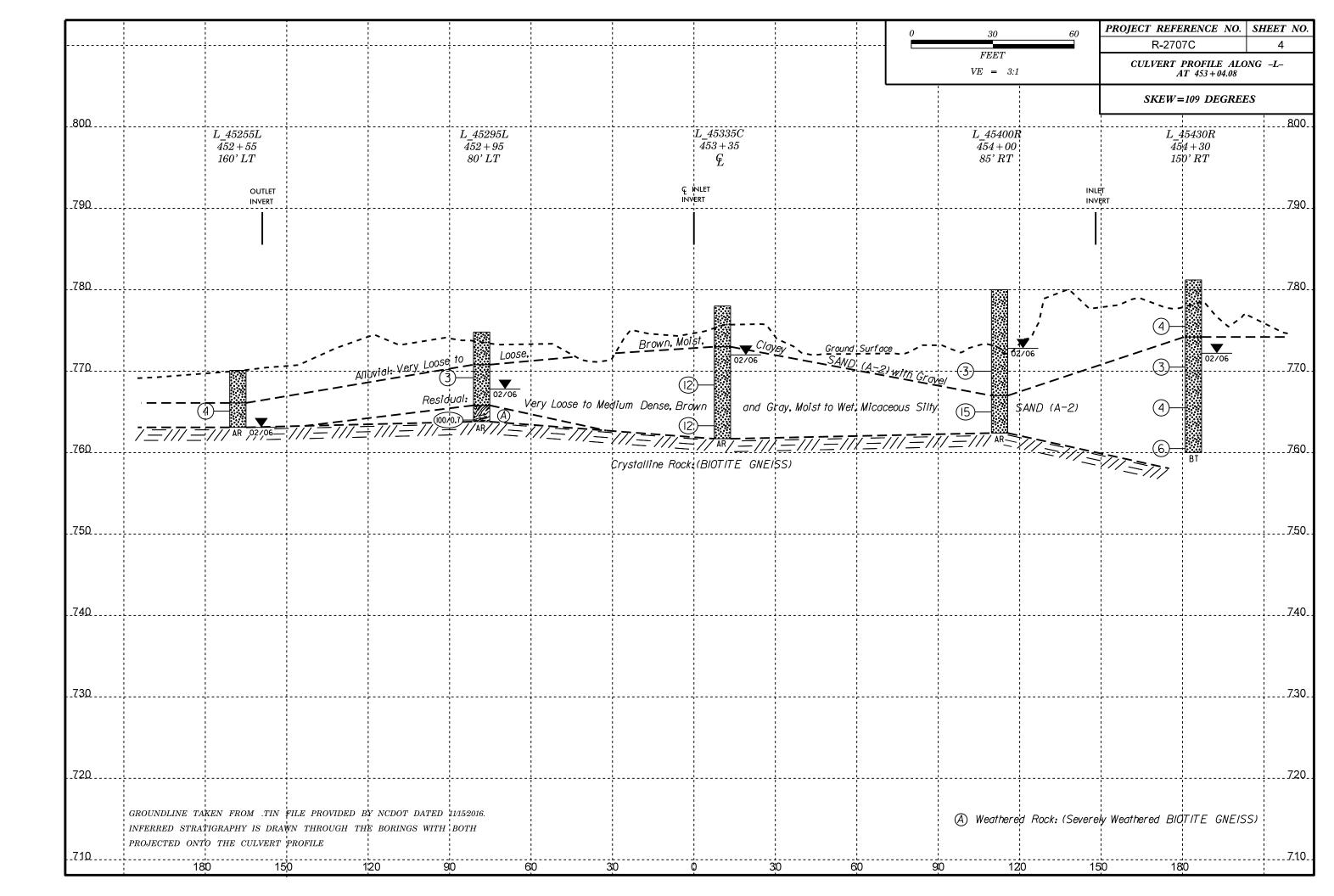
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# 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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF.GRAY.SILTY CLAY.WOIST WITH INTERBEDDED FINE SAND LAYERS.HIGHLY PLASTIC.A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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
CENERAL CRAMINAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	THE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE. GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS, A-1-a A-1-b A-2-4 A-2-5 A-2-5 A-2-7 A-2-7 A-2-7 A-3 A-6, A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK PY REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT-GRANULAR SILT-MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
"40 30 MX 50 MX 51 MN	GRANIII AR STIT - CLAY	- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
"200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL — — 48 MX 41 NN 48 MX 41 NN 48 MX 41 MN 48 MX 41 MN 18 MX 41 MN LITTLE OR LICLIY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP DIRECTION OIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
CODINI DINDEY A A A MAY A MAY 12 MAY 15 MAY 10 MAY	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAYEL, AND SAND GRAYEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN BATING FAIR TO	─────────────────────────────────────	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	E	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<b>5</b>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/825 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(TUNS/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE 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	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  CRANN AP LOOSE 4 TO 10	SOIL SYMBOL  OPT ONT TEST BORING  SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT THOUGH BURING TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  MN MONITORING WELL  TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A ALLINIAL SOLI BOUNDARY A PIEZOMETER CONT. N. MALLIE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	→ → → → → → → ALLUVIAL SOIL BOUNDARY \( \triangle \) INSTALLATION \( \triangle \) SPT N-VALUE	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	UNDERCOT LESS ACCEPTABLE DEGRAPABLE NOCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE. SD.) (F SD.)	ABBREVIATIONS  AB AUGED DEFUGAL  MED MEDIUM  ABOUT MANE CUEED TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 74 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD HOISTONE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS  DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS, - FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC   SEMISOLID: REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FINGERNAIL. FRACTURE SPACING BEDDING	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: N/A
- MOIST - (M) COLID. AT OR NEAR ORTINIM MOISTINE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: N/A FEET
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED Ø.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BORINGS TAKEN FROM GEOTECHNICAL ROADWAY INVENTORY
ATTAIN OPTIMUM MOISTURE	CME-55 CME-55 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	REPORT DATED 11/2008
PLASTICITY		INDURATION	1
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNG,-CARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:	
COLOR	PORTABLE HOIST X TRICONESTEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
The second of th	<u> </u>	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14





	B	ORE LOG							
<b>WBS</b> 34497.1.2	TIP R-2707C COUNTY	Y CLEVELAND	GEOLOGIST Todd, R. W.		<b>WBS</b> 34497.1.2	TIP R-2707C COUN	TY CLEVELAND	GEOLOGIST Todd, R. W.	
SITE DESCRIPTION Culvert at	-L- Station 453+07 over Unnamed Ti	ributary to Williams Creek on P	roposed US 74	GROUND WTR (ft)	SITE DESCRIPTION Culvert a	at -L- Station 453+07 over Unnamed	Tributary to Williams Creek or	Proposed US 74	GROUND WTR (ft)
BORING NO. L_45255L	<b>STATION</b> 452+55	OFFSET 160 ft LT	ALIGNMENT -L-	<b>0 HR</b> . N/A	<b>BORING NO.</b> L_45295L	<b>STATION</b> 452+95	OFFSET 80 ft LT	ALIGNMENT -L-	<b>0 HR</b> . N/A
COLLAR ELEV. 770.1 ft	TOTAL DEPTH 7.0 ft	<b>NORTHING</b> 583,086	<b>EASTING</b> 1,242,878	<b>24 HR.</b> 7.0	COLLAR ELEV. 776.8 ft	TOTAL DEPTH 11.0 ft	<b>NORTHING</b> 583,024	<b>EASTING</b> 1,242,944	<b>24 HR.</b> 7.0
DRILL RIG/HAMMER EFF./DATE HE	O0064 CME-550 84% 03/19/2014	DRILL METHOD H.	S. Augers HAMIN	MER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE	HFO0064 CME-550 84% 03/19/2014	DRILL METHOD	H.S. Augers HAM	IMER TYPE Automatic
DRILLER Smith, M.L.	START DATE 02/09/06	<b>COMP. DATE</b> 02/09/06	SURFACE WATER DEPTH N	I/A	DRILLER Smith, M.L.	<b>START DATE</b> 02/09/06	COMP. DATE 02/09/06	SURFACE WATER DEPTH	√/A
	START DATE 02/09/06  BLOWS PER FOOT	75 100 SAMP. MOI G	SURFACE WATER DEPTH N  SOIL AND ROCK DESELEV. (ft)  770.1 GROUND SURF ALLUVIAL Brown, Loose, Moist, Clay  766.1 RESIDUAL	EACE 0.0 ey SAND (A-2) y SAND (A-2)	DRILLER Smith, M.L.	START DATE   02/09/06     02/	COMP. DATE 02/09/06  T 75 100 NO. MOI 0	SURFACE WATER DEPTH 1	FACE 0.0  See, Moist, Clayey 2) 4.0  Lum Dense, Moist, A-2) 9.0  ROCK 9.0  TITTE GNEISS) 11.0  uger Refusal at ystalline Rock
NCDOT BORE DOUBLE R2707C_GEO_BH.GPJ NC_DOT.GDT 11/29/16									

	BORE LOG								
<b>WBS</b> 34497.1.2 <b>TIP</b> R-2707	7C COUNTY CLEVELAND	GEOLOGIST Todd, R. W.	<b>WBS</b> 34497	7.1.2		TIP R-2707C COUN	ITY CLEVELAND	GEOLOGIST Todd, R. W.	
SITE DESCRIPTION Culvert at -L- Station 453+	-07 over Unnamed Tributary to Williams Creek on P	roposed US 74 GROUND WTR (ft)	SITE DESCR	RIPTION (	Culvert at -L-	Station 453+07 over Unnamed		reek on Proposed US 74	GROUND WTR (ft)
BORING NO. L_45335C STATION 4		ALIGNMENT -L- 0 HR. N/A	BORING NO	. L_45400		<b>STATION</b> 454+00	OFFSET 85 ft RT	ALIGNMENT -L-	<b>0 HR.</b> 10.0
COLLAR ELEV. 778.0 ft TOTAL DEP		<b>EASTING</b> 1,243,008 <b>24 HR.</b> 6.0	COLLAR EL			TOTAL DEPTH 17.6 ft	<b>NORTHING</b> 582,901	l	<b>24 HR.</b> 7.2
DRILL RIG/HAMMER EFF./DATE HF00064 CME-550 8						064 CME-550 84% 03/19/2014			MER TYPE Automatic
DRILLER Smith, M.L. START DAT		SURFACE WATER DEPTH N/A	DRILLER S			<b>START DATE</b> 02/09/06	COMP. DATE 02/09	9/06 SURFACE WATER DEPTH N	N/A
ELEV (ft)	BLOWS PER FOOT SAMP. CONTROL OF SAMP. CO	SOIL AND ROCK DESCRIPTION  ELEV. (ft)  DEPTH (ft)	ELEV ELEV (ft)	DEPTH 0.	BLOW COUNT 5ft 0.5ft 0.5			MOI G SOIL AND ROCK DES	SCRIPTION
775		778.0 GROUND SURFACE 0.0  ALLUVIAL  Brown, Loose, Wet, Silty SAND (A-2) with  Gravel  773.0 5.0	785	  -  -  -  -  -  -		1		780.8 GROUND SURI	
770 769.3 8.7 2 5 7	▼	RESIDUAL Gray, Medium Dense, Moist to Wet, Silty SAND (A-2)	775 771.8	‡	2 1 2	1	· · · · · · · · · · · · · · · · · · ·	Gravel	13.0
2	- ـ	Boring Terminated by Auger Refusal at Elevation 761.7 ft on Crystalline Rock (BIOTITE GNEISS)	765		2 5 10	1		Province of the control of the contr	oist, Micaceous2)  17.6  uger Refusal at vstalline Rock



						ВО	RE L	<u>OG</u>			
<b>VBS</b> 344	497.1.2			TI	<b>IP</b> R-2707C	COUNTY	CLEVELA	ND		GEOLOGIST Todd, R. W.	
SITE DES	CRIPTIO	<b>N</b> Cul	vert at	-L- St	tation 453+07 over Un	named Tribu	utary to W	illiams (	Creek on	Proposed US 74	GROUND WTR (ff)
BORING I	NO. L_4	5430R		S <sup>-</sup>	<b>TATION</b> 454+30	0	FFSET 1	50 ft R1	-	ALIGNMENT -L-	<b>0 HR</b> . N/A
	ELEV. 7			- 1	OTAL DEPTH 21.2 ft	I .	ORTHING			<b>EASTING</b> 1,243,143	<b>24 HR.</b> 9.0
RILL RIG/	HAMMER	EFF./DA	TE H	<del>-</del> 00064	4 CME-550 84% 03/19/201	4		DRILL N	IETHOD	H.S. Augers HAW	MER TYPE Automatic
RILLER	Smith, I	M.L.		S	TART DATE 02/09/0	6 <b>C</b> (	OMP. DAT	<b>E</b> 02/0	9/06	SURFACE WATER DEPTH	N/A
LEV DRIV		0.5ft	0.5ft		4	PER FOOT 0 75	100	SAMP. NO.	MOI G	SOIL AND ROCK DE	SCRIPTION DEPTH (
<b>785</b>	+				 				·	781.2 GROUND SUR	
776	5.5 + 4.7									Brown, Loose, Moist to W (A-2)	
775		1	2	2	4						
771	.5 = 9.7	2	1	2	3					Brown, Very Loose to Micaceous Silty SA	Loose, Wet, ND (A-2)
<u>766</u>	5.5 <del>-</del> 14.7	2	2	2							
										<del>-</del> - - - -	
760	<u> </u>	2	2	4	6					760.0  Boring Terminated at Elev	21
	<del>                                     </del>										

REFERENCE

#### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO.	<b>DESCRIPTION</b>
1	TITLE SHEET
2	LEGEND
2A	SUPPLEMENTAL GSILEGEND
3	SITE PLAN
4-5	PROFILES
6-7	CROSS SECTIONS
8-34	BORE LOGS, CORE REPORTS, & CORE PHOTOGR

LABORATORY SUMMARY FOR ROCK CORE

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_Cleveland PROJECT DESCRIPTION US 74 (Shelby Bypass) from West of NC 226 to West of NC 150

SITE DESCRIPTION Bridge Nos. 0466 & 0467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	36

#### **CAUTION NOTICE**

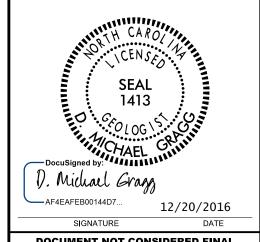
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC 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 CUARANTEE 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 FOR ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

	PERSONNEL
	Stephen Abernathy
	Mike Morgan
INVEST	IGATED BY <b>D. Michael Gragg</b>
DRAWN	BY _Tamara Stivers
	ED BY Kenneth Bussey
SUBMIT	TED BY HDR ICA
DATE .	November, 2016



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

PROJECT REFERENCE NO. SHEET NO.

R-2707C

2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

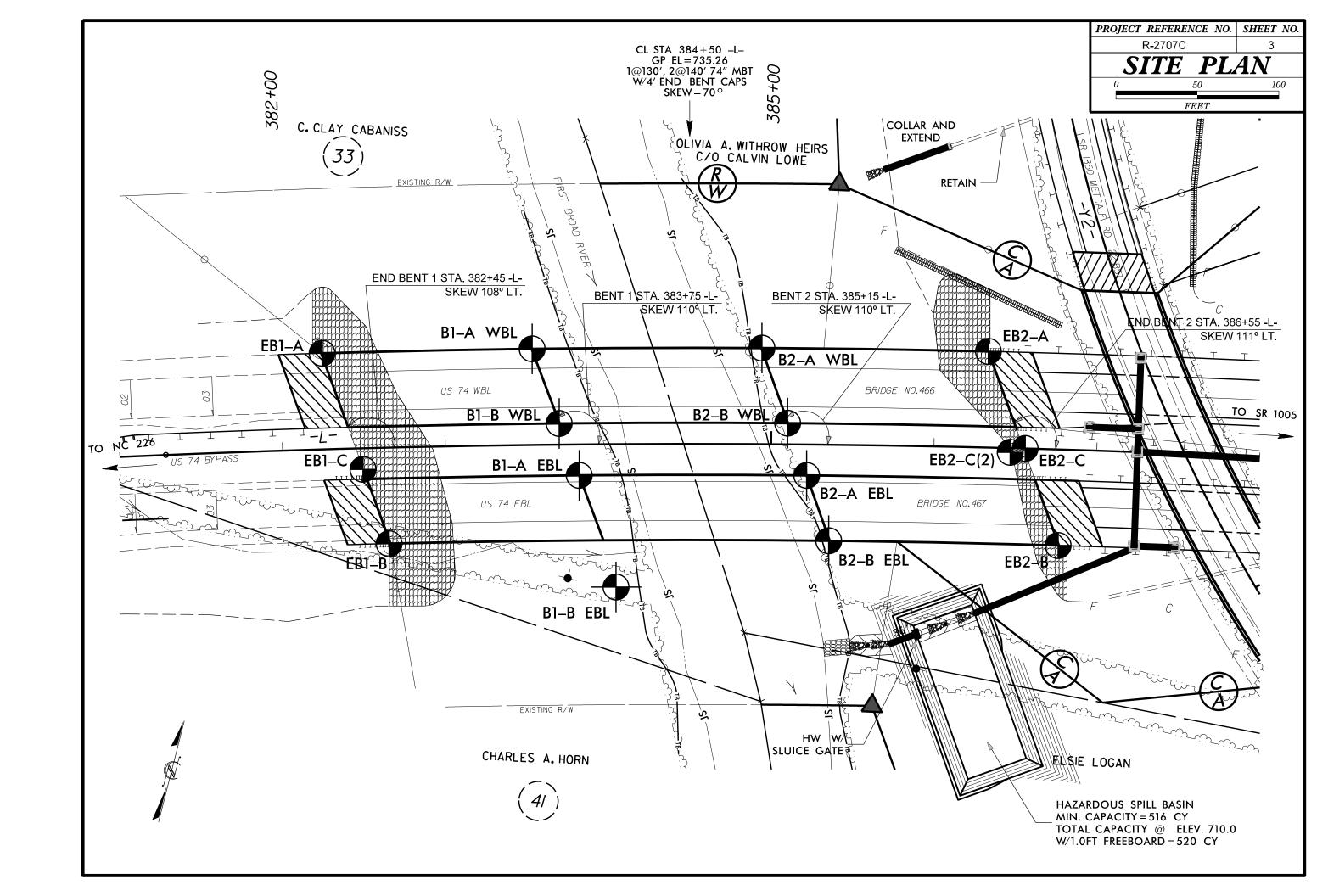
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	<u>ARENACEOUS</u> - 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
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED WILL NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
LLASS. (\$\leq 39.7 PASSING "200) (> 39.4 PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 B-2-6 A-2-7 A-4, A-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7. PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
■10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40    30 MX   50 MX   51 MN   PEAT   *200    15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN   36 MN   36 MN   36 MN   36 MN   36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40  LL - 40 MX 41 MN	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITILL M HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		(MOD.) 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	PARENT MATERIAL.
AS SUBURADE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS  COMPAGENESS OR RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTINESS OF PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4 TO 10 GRANULAR LOOSE 4 TO 10	SOIL SYMBOL  Opt omt test boring  SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 30 10 50 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— INFERRED SOIL BOUNDARY — CORE BORING ● SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	WITH CORE  TTT ALLUVIAL SOIL BOUNDARY  PIEZONETOR  NETOLIATION  SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (ROD) - 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
HARD > 30 > 4	→ SPT N-VALUE	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIF	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW STEET OF SHALLOW SEED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER	UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.005 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE CAUSE FOR THE REPORT OF THE PROPERTY	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)  OBSCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE  LL _ LIQUID LIMIT	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOLID. PEGUIDES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(P) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BYIO 363
"" PL L PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N 581443.2347 E 1236575.2458 BL STATION 10+83.19
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 752.92 FEET
SL SHRINKAGE LIMIT	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	BOING ELEVATIONS OBTAINED BY SURVEY CONDUCTED 10-30-2016
PLASTICITY	CME-55	INDURATION	
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNG-CARRIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST Y CASING Y W/ ADVANCER HAND TOOLS:	GENILE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB. SOUNDING ROD	CRAING ARE DIFFICULT TO SEPARATE WITH STEEL PROPE.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CORE BIT VANE SHEAR TEST	INDURATED DIFFICULT TO BREAK WITH HAMMER.	
■ DESCRIPTIONS MAIL INCLUDE COLOR ON COLOR CUMDINALIUNS (TAN, RED, TELLUM-DRUWN, BLUE-URAT).	VANCE SILENT TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-

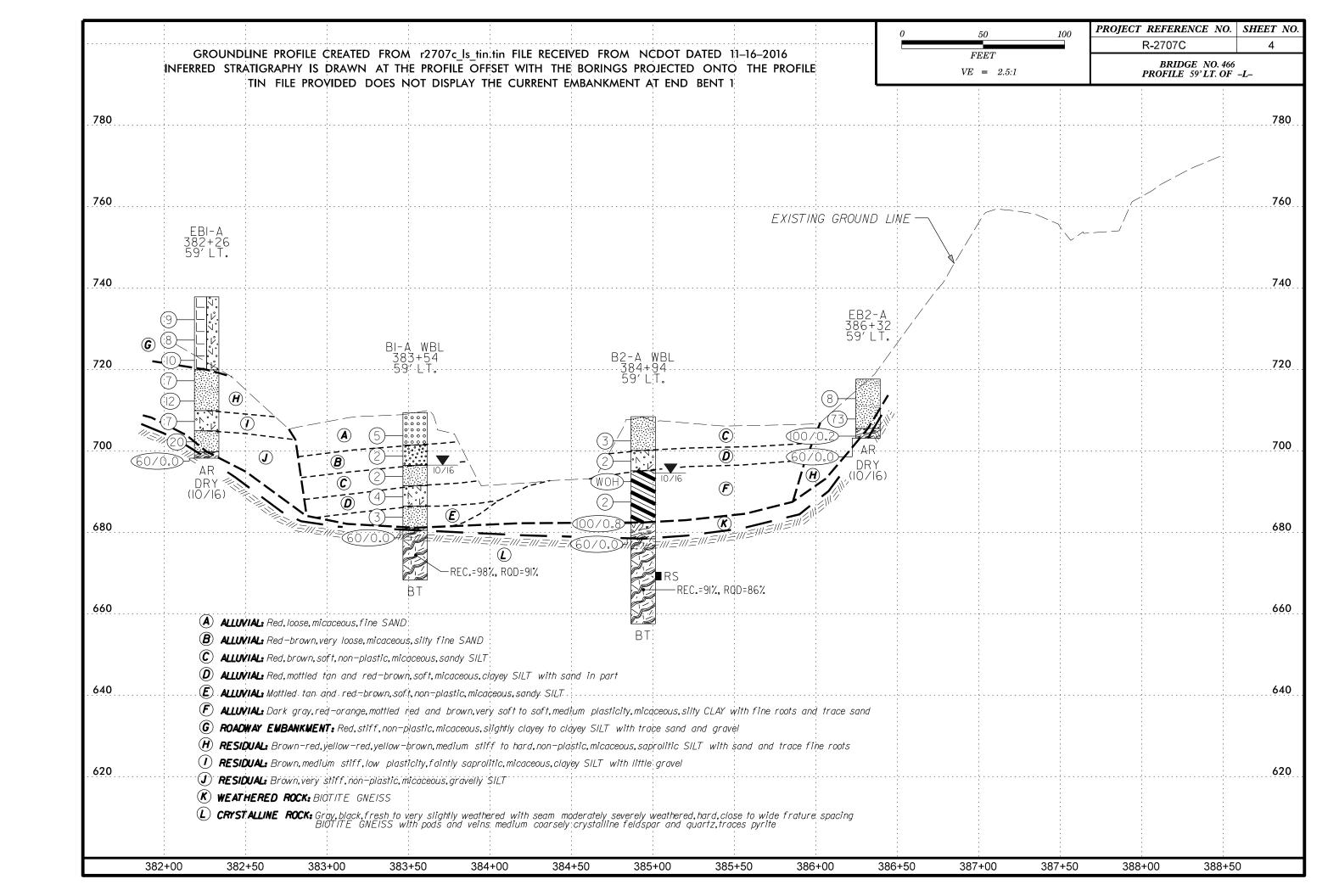
PROJECT REFERENCE NO.	SHEET NO.
R-2707C	2A

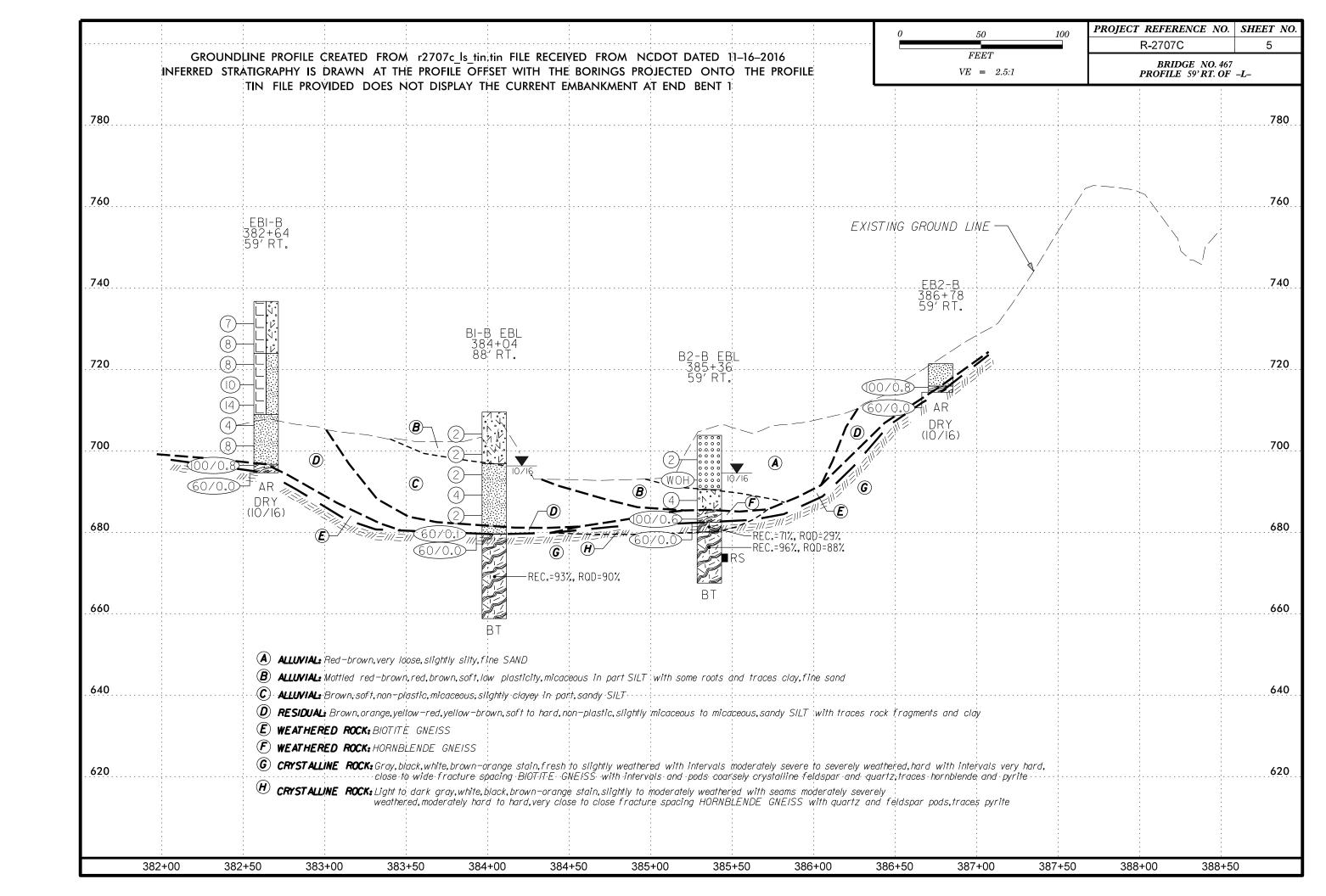
#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

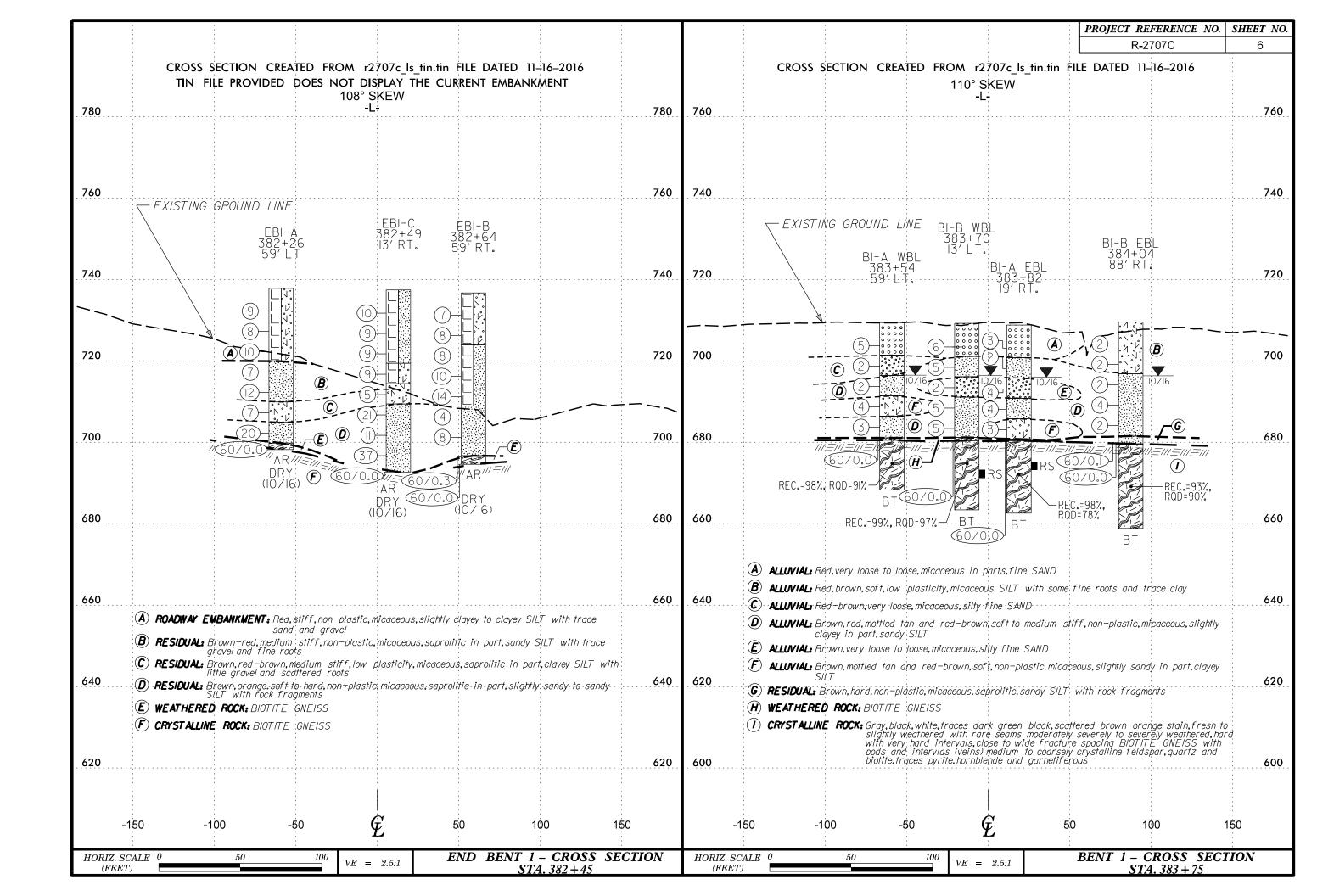
# SUBSURFACE INVESTIGATION

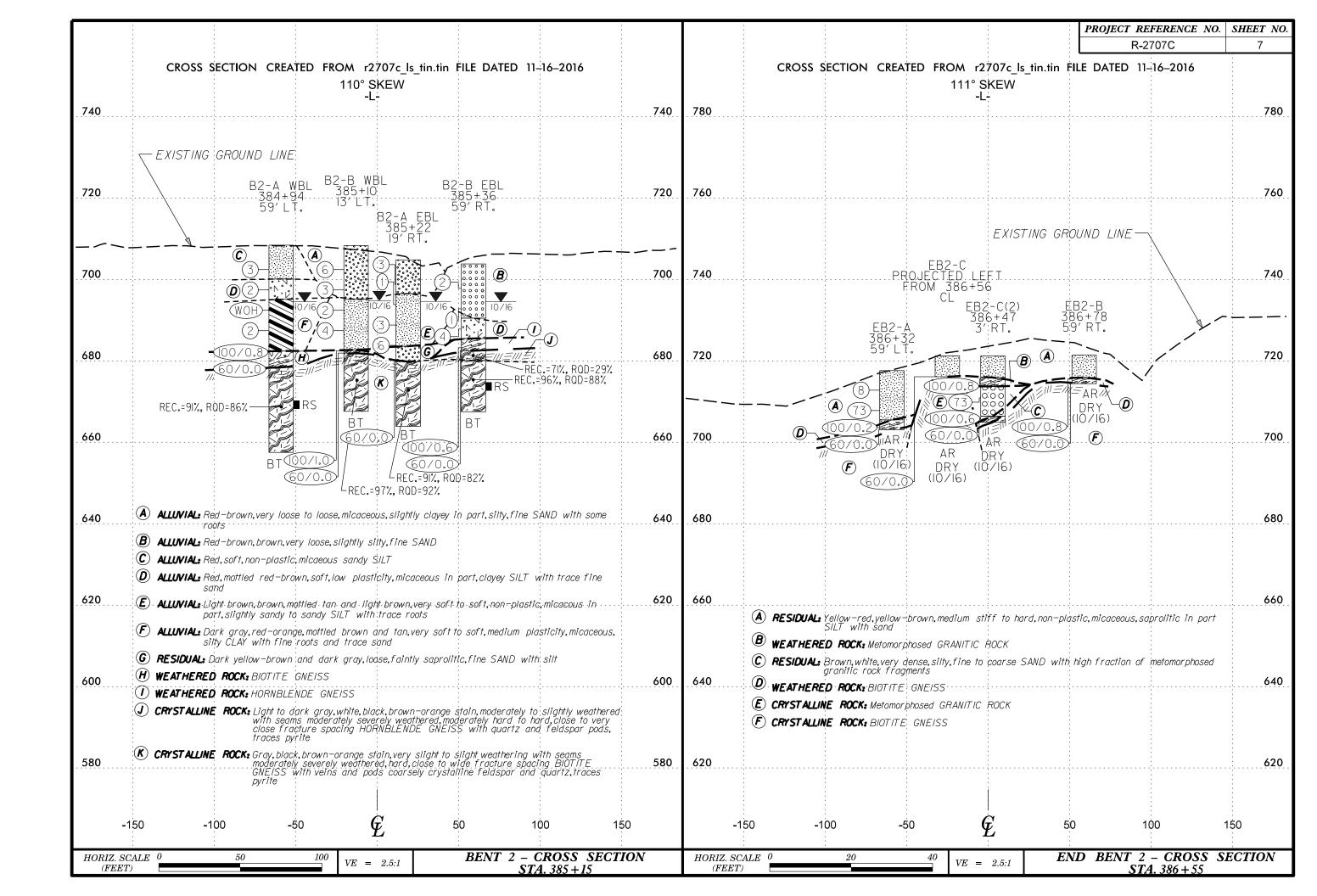
		SUPPLEMI FR	ENTAL LI OM AAS	EGEND, GEO HTO LRFD	DLOGIC BRID	AL STRENGTH INDEX (GSI) TABLES GE DESIGN SPECIFICATIONS				
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Ro	ock Mass (Marinos and Hoek,	2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Def	ormed Heterogeneous Rock	Masses (Marı	nos and Hoek	. <b>,</b> 2000)
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		ν Φ ΤΟ 00 00		S O O	s O O	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos.P and Hoek E., 2000)				
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	SURFACE CONDITIONS	VERY GOOD  Very rough, fresh unweathered surface:  6000  Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	ed surf	VERY POOR Slickensided, highly weathered surfa with soft clay coatings or fillings	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slicken- sided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE		DECREASING S	URFACE QU	ALITY	>	COMPOSITION AND STRUCTURE				
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities  BLOCKY - well interlocked un-	PIECES 	90 80		N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70 A			
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets  VERY BLOCKY - interlocked,	OF ROCK	70 60			<u> </u>	B. Sand- stone with stone and stiltstone layers of siltstone amounts  C. Sand- stone or silty shale with sand- stone layers shale with sandstone layers	50 B	C	D E	
partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	OCKING		50			Dilli layers	40			
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	 ASING INTERL 		40	30		C.D.E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.		30	F 20	
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	 			20		G. Undisturbed silty or clayey shale with or clayey shale forming a chaotic structure with pockets thin sandstone layers		¢ S		10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	Ÿ	N/A N/A			10	Means deformation after tectonic disturbance				DATE: 8-19-

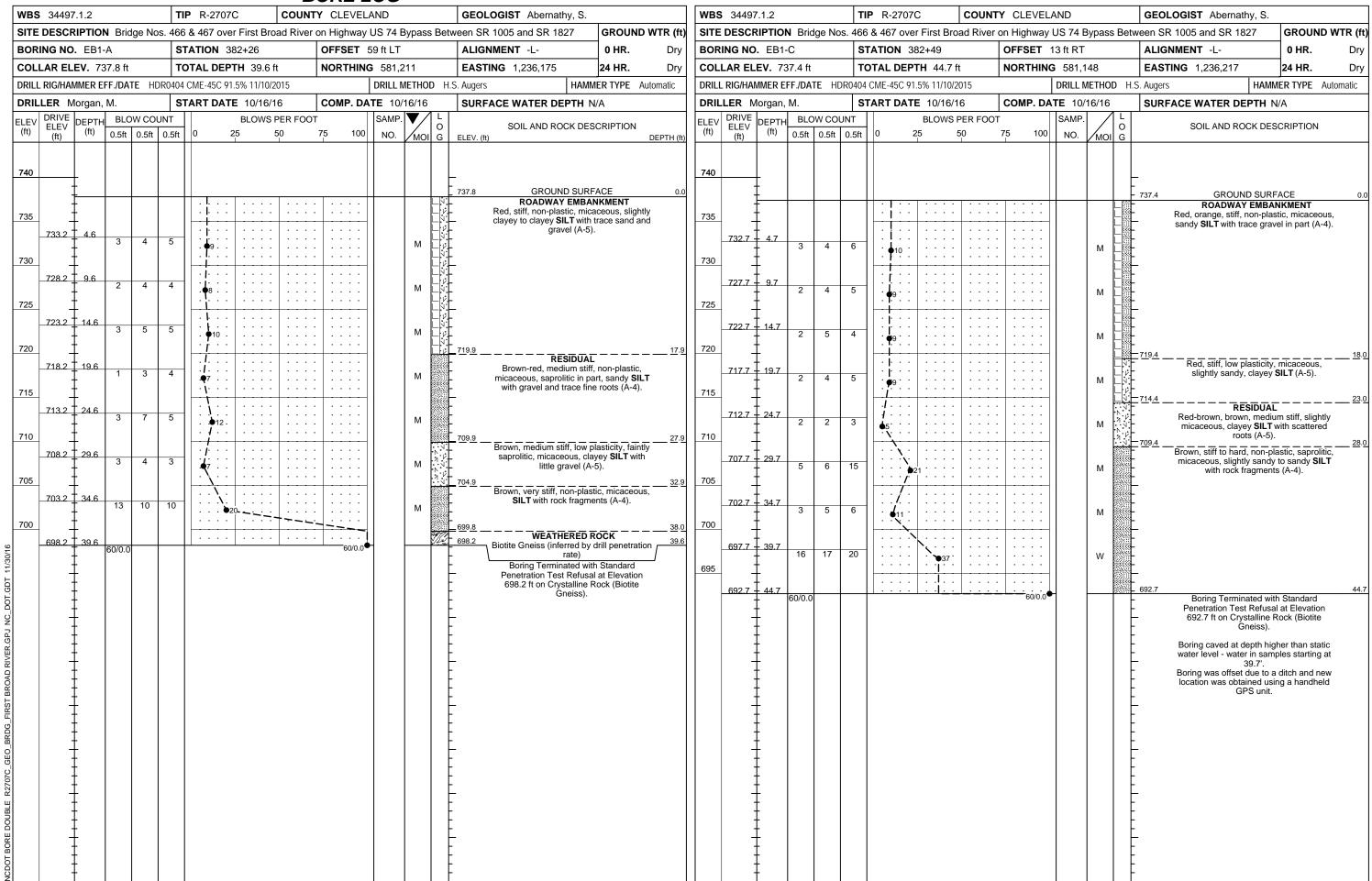












\\\D	0.4407.4.0				<b>D</b> D 0707	, o	_	<b>DUK</b>					OFOLOGIST Abancatha O		WDG	0.440	7.4.0			TID I	D 07070	2011	ITV OLEVE	AND		056	OLOGICT Abarrathy O	
-	34497.1.2				P R-2707			NTY CL					GEOLOGIST Abernathy, S.			3449					R-2707C		ITY CLEVEL				DLOGIST Abernathy, S.	
			idge No				road Riv				ypass		en SR 1005 and SR 1827	GROUND WTR (ft)											sypass B		SR 1005 and SR 1827	GROUND WTR (ft
	ING NO. E				TATION 3					59 ft RT			ALIGNMENT -L-	0 HR. Dry			<b>).</b> B1-A				ION 383+54		OFFSET				GNMENT -L-	<b>0 HR.</b> N/A
COI	LAR ELEV.	736.7 f	t	TO	OTAL DEP	<b>TH</b> 42.1	1 ft	NOR	THING	581,1	80	1	<b>EASTING</b> 1,236,244	<b>24 HR.</b> Dry	COL	LAR EL	L <b>EV.</b> 70	09.4 ft		TOTA	L DEPTH 4	1.1 ft	NORTHIN	<b>G</b> 581,2	46	EAS	STING 1,236,300	<b>24 HR.</b> 12.9
DRIL	RIG/HAMMER	R EFF./DA	ATE HE	DR0404	CME-45C 9	1.5% 11/10	0/2015			DRILL M	ETHOD	H.S. <i>I</i>	Augers HAN	IMER TYPE Automatic	DRILI	_ RIG/HA	MMER E	FF./DATE	HDR04	104 CME	E-45C 91.5% 11	/10/2015		DRILL M	IETHOD	H.S. Auge	ers HAN	IMER TYPE Automatic
DRI	.LER Morga				TART DAT	<b>E</b> 10/16	6/16	COM	P. DA	<b>TE</b> 10/	16/16	;	SURFACE WATER DEPTH	N/A	DRIL	LER N	Morgan,	М.		STAR	RT DATE 10/	25/16	COMP. DA	ATE 10/2	25/16	SUR	RFACE WATER DEPTH	N/A
ELE\ (ft)	DRIVE ELEV (ft) DEP	TH BL	OW COL		0	BLOWS	S PER F	75	100	SAMP. NO.	MOI	L O G E	SOIL AND ROCK DE	SCRIPTION DEPTH (ft)	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	$\overline{}$	V COUNT 0.5ft 0.5	_	BLO 25	WS PER FOO	OT 75 100	SAMP. NO.	MOI G		SOIL AND ROCK DE	SCRIPTION
740	+											-			710		<u> </u>						.		000	-709.4	GROUND SUR ALLUVIA	
	<u> </u>											73	36.7 GROUND SUR				‡								000		Red, loose, micaceous, f	
735											L	_\\.\.\.	ROADWAY EMBA Red, medium stiff, lo		705	704.7	± 4.7								000			
	1								: :		L	- :- -	micaceous, slightly sand (A-5).	dy, clayey <b>SILT</b>			Ī	2	3 2	•	5				M			
	732.2 7 4.5	3	4	3	7						М		(A-3).				Ŧ			<i>i</i>					000	701.4		
730	‡				1	ļ · · · ·					Ļ	-K.F			700	699.7	9.7	2	1 1	<b>⊣</b>   ‡				{		::E	Red-brown, very loose, fine <b>SAND</b> (A-	micaceous, silty -2-4).
	727.2 9.5	,			: : : :						Ļ						Ŧ	-	' '	•2					M		`	
705	' <i>``</i> '	2	3	5	8				: :		M	-  <u> </u>  -  -			605		‡			:						<u>- 696.4</u>	Brown, soft, non-plasti	
725	† †					<b> </b>					L	-  <u> </u>  -	23.9	12.8	695	694.7	14.7	1	1 1	$- \underline{\dagger}$				†	w	t	sandy <b>SILT</b> (	A-4).
	722.2 14.	5			.						Ī	_WE _	Red, medium stiff to sti micaceous, slightly sand	v to sandv SILT			±			\P2.					V V	£		
720		4	4	4	. 8						М	- <b>\ </b> F	with little grave	I (A-4).	690	000 -	Ŧ =			-  ;						691 <u>.4</u>	Mottled tan and red-	<u>18.0</u> brown, soft,
					. j	1					Ĺ				000	689.7	19.7	WOH	2 2		14			1	w A	<u> </u>	micaceous, clayey	<b>SILT</b> (A-5).
	717.2 19.	5 3	4	6							[						‡			-     ř.					.1	686.4		23.0
715	1 ±	3	*	"	- •10 -						M L				685	6847-	24.7									E	Mottled tan and red-	brown, soft,
	+				\						L					004.7	+ 24.7	1	1 2	63	3 · · ·   · ·				w	<b>-</b>	non-plastic, micaceous, s	andy SILT (A-4).
	712.2 ‡ 24.	5 2	5	9							M L						‡			-   :						681.1		28.3
710	‡	-			• 14		<u>:   : :</u>				IVI L					680.5	28.9	60/0.0					60/0.09	<u> </u>		680.5	WEATHERED	
	<u> </u>				: /: : :						L	70	08.9 RESIDUA	<u> </u>			ł	00,0.0									Biotite Gneiss (inferred by rate)	y drill penetration
	707.2 729.	5 1	2	2	$   \mathcal{J} : : :$						М	WF.	Brown orange soft to	medium stiff			Ŧ									<b>\$</b>	CRYSTALLINE	ROCK
705	‡				14	ļ · · · ·							non-plastic, slightly n micaceous, sandy <b>SILT</b>	with trace rock	675		‡							41 1		#	Biotite Gne	ISS
	‡	_			1							ף	fragments and cl	ay (A-4).			‡									<b>}</b>		
	702.2 T 34.	3	4	4							М	æŁ					İ			11						<b>}</b>		
700	<del> </del>				1	+									670	-	Ŧ							-		668.3		
16	697.2 39.	5										¥F					╄			₩.				4	F. 3	668.3	Boring Terminated at Ele	vation 668.3 ft in
/30/	037.2 33.	10	90/0.3		: <del> -</del>	- -:-:-		÷÷+:::	60/0.3			- 69 - 69	96.7 WEATHERED	40.0 ROCK			‡									ļ	Crystalline Rock (Bio	tite Gneiss).
695 E	694.6 + 42.	60/0.	0		<u> </u>	<b> </b>			60/0.0	-	<u> </u>	- 69 -	94.6 Biotite Gne Boring Terminated w			-	‡									-		
5	<u> </u>											Ŀ	Penetration Test Refus	al at Elevation			<u>†</u>									ŀ		
8	Ŧ											F	694.6 ft on Crystalline Gneiss).	Rock (Biotite			Ŧ									F		
S S	‡											F	,			-	‡									F		
.GP.	‡											ţ					‡									ţ		
N= N	±											Ł				_	<u> </u>									E		
D R	Ŧ											F				]	+									<u> </u>		
3RO/	‡											F					Ŧ									F		
STE	‡											Ļ				-	‡									Ļ		
F.												Ł					‡									t		
RDG												-					†									-		
0	‡											F				-	Ŧ									F		
B B	‡											ļ.					‡									-		
707	‡											ţ					‡									ļ.		
RZ												F				-	$\pm$									-		
UBLE												F					+									-		
Õ	‡											F					Ŧ									F		
30RE	‡											F				-	‡									F		
OT E	‡											ţ					‡									<u> </u>		
NC L	+											-					†									<u> </u>		

								<u> </u>	<u>Ur</u>	E LOG						
WBS	34497.1.2			TIP	R-270	)7C	C	OUNT	Y C	VELAND	GE	OLOGI	ST Aber	nathy, S.		
SITE	DESCRIPTION	<b>)N</b> Bri	dge Nos.	466 &	467 o	ver First I	Broad	River	on Hi	iway US 74 Bypass Betv	tween	SR 100	5 and SR	1827	GROUN	ND WTR (ft
BOR	ING NO. B1-	A WBL	-	STA	TION	383+54			OFF	ET 59 ft LT	ALI	IGNMEI	NT -L-		0 HR.	N/A
COL	LAR ELEV. 7	709.4 ft		тот	AL DE	<b>PTH</b> 41	.1 ft		NOF	THING 581,246	EAS	STING	1,236,30	00	24 HR.	12.9
DRILL	RIG/HAMMER	EFF./D <i>F</i>	TE HDR	0404 CN	ЛЕ-45C	91.5% 11/	10/2015			DRILL METHOD H.	I.S. Auge	ers		HAMM	ER TYPE	Automatic
DRIL	LER Morgar	n, M.		STA	RT DA	TE 10/2	25/16		COI	P. DATE 10/25/16	SUI	RFACE	WATER	DEPTH N	/A	
COR	E SIZE NQ2			ТОТ	AL RU	<b>N</b> 12.2 f										
ELEV (ft)	RUN ELEV (ft) DEPT (ft)	H RUN (ft)	DRILL RATE (Min/ft)	REC.	UN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)	DESCR	RIPTION	AND REM	IARKS		DEPTH (ft
680,5	680 5 28 0						(40.0)	(44.4)		20.5			ng @ 28.			
675	680.5 — 28.9 678.3 = 31.1 673.3 = 36.1 668.3 = 41.1	5.0	1:35/0.2 1:44 1:49 1:53 2:09 2:07 1:59 1:45 1:28 1:39 1:29 1:35	(2.2) 100% (5.0) 100% (4.8) 96%	(4.7)		98%	(11.1) 91%		Gray, black, fresh t close fracture spa medium 12 0°-15° joints, son with some ca	to very pacing, I n to coa me with calcite in	slightly v BIOTITE Irse cryst In faint irou Infill, no s GS	GNEISSv alline felds n oxide sta tain, partia SI=75	, hard, close vith small poo spar and qua ain; 1 80° join ally healed to	ds and veir rtz. t at 36.9'-3 healed	ns <sup>*</sup> 37.8', 41.1
													eiss).			

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B1-A WBL STA. 383+54 @ 59' LT. Box 1 of 2: 28.9 – 38.4 FEET



B1-A WBL STA. 383+54 @ 59' LT. Box 2 of 2: 38.4 – 41.1 FEET



										1				.00			
	3449						R-2707					Y CL					GEOLOGIST Abernathy, S.
SITE	DESC	RIPTIO	<b>N</b> Brid	dge No	os. 466	8 4	67 ove	er F	irst Bro	ad R	iver o	on Hig	hway	US 74 E	3ypas	s Betv	veen SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO	). B1-E	3 WBL		S <sup>-</sup>	TATI	ON 3	383+	<b>-</b> 70			OFF	SET	13 ft LT			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	.EV. 70	09.2 ft		TO	OTA	L DEF	РΤН	45.8	ft		NOR	THIN	<b>G</b> 581,2	205		<b>EASTING</b> 1,236,327 <b>24 HR.</b> 12.8
DRILL	RIG/HA	MMER E	FF./DA	TE HI	DR0404	CME	-45C 9	1.5%	11/10/2	2015				DRILL N	ЛЕТНО	D H.	S. Augers HAMMER TYPE Automatic
DRIL	LER N	/lorgan,	M.		S.	TAR	T DAT	ΓE	10/25/	16		COM	P. DA	TE 10/	25/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE	DEPTH	BLC	ow co	UNT			В	LOWS	PER F	-00T			SAMP.	<b>V</b> /		CONTAND DOOR DECODIDATION
(ft)	ELEV (ft)	(ft)	$\overline{}$	0.5ft	0.5ft	0		25		50		<b>7</b> 5	100	NO.	MO	O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
710																	
		<del> </del>				H		Τ.		T ·		<del> </del>				0000	709.2 GROUND SURFACE 0.0 ALLUVIAL
		‡				į		:		:	· · ·	: :				0000	Red, loose, micaceous, fine <b>SAND</b> (A-3).
705	704.4	+ + 4.8				;		_:		<u> </u>		<u>  : :</u>					_
	704.4	± <del>7.0</del>	4	2	4		6	:		:	 				М	0000	
		t				j		:		:	 	: :				0000	701.1 8.1
700	699.4	9.8	ļ	_				+-		+-		+				H	Brown, medium stiff, non-plastic, micaceous, <b>SILT</b> with sand (A-4).
		Ŧ	2	3	2	🛉	5	:		:		: :			M	F	
695		Ŧ				¦		:		:		: :					
	694.4	14.8	2	1	1	Ī.		Τ.							Sat.		SAND (A-2-4).
		‡				<b>  T</b> 2     1.		:		:		: :					691.1 18.1
690	689.4	108				1		_:		<u> </u>		<u>  : :</u>					Brown, medium stiff, non-plastic,
	003.4	13.0	2	2	3		5	:		:	 				w		micaceous, sandy <b>SILT</b> (A-4).
		t						:		:	 	: :				l E	
685	684.4	24.8	1	2	3	H		+:		+-		+:				l E	-
		+	'		3	•	5	.		•					W	-	
680	680.4	28.8				<u>i</u>	<u> </u>	1		↓ <u>:</u> .	 - <u></u> .	<u> </u>				477	681.2 28.0 28.8 WEATHERED ROCK 28.8
	-	Ŧ	60/0.0					Τ.		1.			60/0.0				Biotite Gneiss (inferred by drill penetration rate)
		‡						:		:	· · ·	: :					CRYSTALLINE ROCK
675	-	‡				ا ا		_:		<u> </u>		<u> </u>					Biotite Gneiss
		‡						:		:				RS-A	-		
070	,	‡				:		:		:	 	: :		(10-A)	1		
670	-	‡				<del>  -</del>	<del></del>	+:	<del></del>	+-		+					-
		ŧ						:		:		: :					
665	_	£						-				l					_
		<del> </del>				<u> </u>											663.4 45.8
		Ŧ														l F	Boring Terminated at Elevation 663.4 ft in Crystalline Rock (Biotite Gneiss).
	=	‡															_
		‡															
	,	‡															
	-	†														<u> </u>	-
		ł														1 -	
	,	Ŧ															
	_	Ŧ														l F	-
		Ŧ															
	-	‡															-
		‡															
		‡															
	_	t														F	-
		Ŧ														F	
		Ŧ															
	=	‡															-
		‡															
	.	+														1 -	

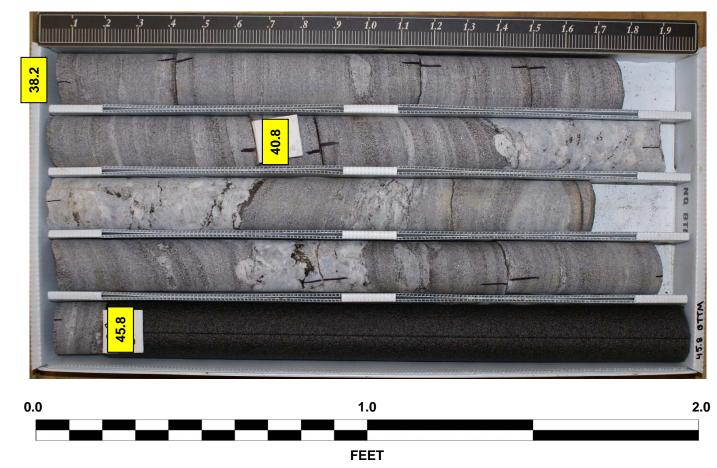
									<u> </u>	<u>U</u>	E LOG
WBS	34497	'.1.2			TIP	R-270	)7C	С	OUNT	Υ	EVELAND GEOLOGIST Abernathy, S.
SITE	DESCR	IPTIO	<b>N</b> Brid	lge Nos.	466 &	467 o	ver First I	Broad	River	on	nway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (
BOR	ING NO	. B1-E	3 WBL		STA	TION	383+70			O	ET 13 ft LT         ALIGNMENT -L-         0 HR.         N//
COLI	AR EL	<b>EV.</b> 70	09.2 ft		тот	AL DE	<b>PTH</b> 45	.8 ft		N	THING 581,205 EASTING 1,236,327 24 HR. 12.6
DRILL	RIG/HAN	/MER E	FF./DA	TE HDRO	0404 CN	1E-45C	91.5% 11/	10/2015	· ·		DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRIL	LER M	lorgan,	M.		<b>.</b>		TE 10/2			C	P. DATE 10/25/16 SURFACE WATER DEPTH N/A
COR	E SIZE	NQ2					<b>N</b> 17.0 f			L	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS (ILEV. (ft) DEPTH
6 <u>&amp;</u> 204	680.4-	- 28 B	0.0	4.50	(0.0)	(4.0)		(40.0)	(40.5)	2500	Begin Coring @ 28.8 ft
675	678.4 - 678.4 - 673.4 -	- 30.8 - 30.8 - - - - - 35.8 - -	5.0	1:56 1:45 1:53 2:00 2:07 2:02 2:08 2:23 2:23 2:20 2:08 2:09 3:07 3:38	(2.0) 100% (5.0) 100% (5.0) 100% (4.9) 98%	(4.9) 98% (4.8) 96%	RS-A	(16.9) 99%	(16.5) 97%		Gray, black, white, traces dark green-black, fresh to slightly weathered, close to wide fracture spacing, hard with very hard intervals, schistose in parts, <b>BIOTITE GNEISS</b> with intervals and pods coarse grained quartz, feldspar, and biotite with traces pyrite at 41.5'-42.6', 42.9'-43.1' and 44.3'-44.7'.  8 0°-5° joints, few with faint iron oxide stain UCS=10,521 PSI, GSI=82
665	-	45.0		2:39 3:01							
•	663.4	45.8		3:20							63.4 45  Boring Terminated at Elevation 663.4 ft in Crystalline Rock (Biotite Gneiss).

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B1-B WBL STA. 383+70 @ 13' LT. Box 1 of 2: 28.8 – 38.2 FEET



#### B1-B WBL STA. 383+70 @ 13' LT Box 2 of 2: 38.2 – 45.8 FEET

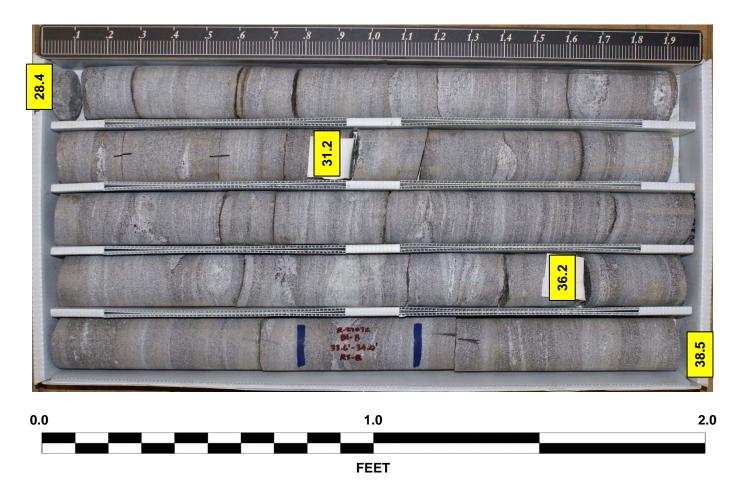


																		1
WBS	34497	7.1.2			T	IP	R-27	7070	2		COU	INT	/ CL	EVEL	AND			GEOLOGIST Abernathy, S.
SITE	DESCF	RIPTIO	<b>N</b> Bric	lge No	s. 466	3 &	467	ove	r Firs	t Bro	ad Riv	ver o	n Hig	hway	US 74 E	Bypas	s Betv	ween SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO	. B1-A	EBL		S	TΑ	TION	1 38	33+8	2			OFFS	SET	19 ft RT			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	<b>EV.</b> 70	08.8 ft		T	οт	AL D	EP	ГН 4	6.2 ft	t		NOR'	THING	<b>3</b> 581,1	78		<b>EASTING</b> 1,236,347 <b>24 HR.</b> 12.8
DRILL	RIG/HAI	MMER E	FF./DA	TE HE	)R0404	1 CN	ME-45	C 91.	5% 1	1/10/2	015				DRILL N	1ETHO	D H.	S. Augers HAMMER TYPE Automatic
DRIL	LER N	lorgan,	M.		S	TΑ	RT D	ATE	<b>=</b> 10	/18/1	6		СОМ	P. DA	TE 10/	18/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE ELEV	DEPTH	BLC	w col	JNT				BLC	DWS F	PER F	тос			SAMP.	lacksquare	LO	SOIL AND ROCK DESCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft		0	2	5	5	50	7	75 	100	NO.	МОІ		ELEV. (ft) DEPTH (ft)
710		L																_
	-	<u> </u>				₩	1		l		1		1				0000	708.8 GROUND SURFACE 0.0
		Ŧ					j		: :					: :			0000	Red, very loose, fine <b>SAND</b> (A-3).
705	704.1	4.7				╟							ļ : :				0000	- -
	704.1	7./	2	1	2	11	•3 ·		: :				: :	: :		М	0000	
700	-	‡				Ш	: : :		: :		::		: :	: :			0000	700.8 8.0
700	699.1	9.7				1	ļ · · ·				<b>.</b> .		<del> </del>					Red, soft, non-plastic, micaceous, sandy SILT (A-4).
		ł	1	1	1		2 .		: :		: :		: :			w		
695	-	+				$\  \ '$	ļ											
	694.1	14.7	2	2	2	$\{ \lceil$	<u>i.</u> .									W		(A-2-4).
		Ī					<b>₩</b> 4 ·		: :				: :			''		000.0
690	689.1	10.7				╟	<u>i</u>				ļ : :		ļ : :					
	009.1	19.7	1	2	2	11	 <b>∮</b> 4 .									w		sandy <b>SILT</b> (A-4).
		<u> </u>					į: :		· ·				: :	: :				. 685.8
685	684.1	24.7				╁	<del>                                      </del>				-		<del>                                     </del>					Brown, soft, non-plastic, micaceous, slightly sandy, clayey <b>SILT</b> (A-5).
	-	Ŧ	1	1	2	•	<b>•</b> 3 ·									W	N.	oliginity duridy, didyby <b>die</b> 1 (100).
680	680.4	28.4					<u></u>	· ·	<u> </u>	· ·		· ·					1 1	680.8
	-	‡	60/0.0										1	60/0.0			Z	Biotite Gneiss (inferred by drill penetration
		‡							· ·									rate) CRYSTALLINE ROCK
675	-	t				$\  \ $						• •	· ·		20.5			Biotite Gneiss
	-	+													RS-B			
	-	F							: :		: :		: :					
670	_	-				╟					ļ : :		ļ : :					<u>-</u>
	-	‡							: :					: :				
005		‡												: :				
665	-	<u> </u>				╟					<del> </del>		<del> </del>					<del>-</del>
	-	<u> </u>				Н												662.6 46.2 Boring Terminated at Elevation 662.6 ft in
	-	F																Crystalline Rock (Biotite Gneiss).
	-	F																<del>-</del> -
		‡																
	_	ţ																<del>-</del>
	-	ł																
	-	F																
	_	-																<u>-</u>
	-	‡																
		‡																
	-	‡																_
	-	1															F	
		Ī																
	-	‡																<del>-</del>
	-	‡																
	-	+																
		F																<del>-</del>
	-	‡																
	-	+	I												1	l	1 -	

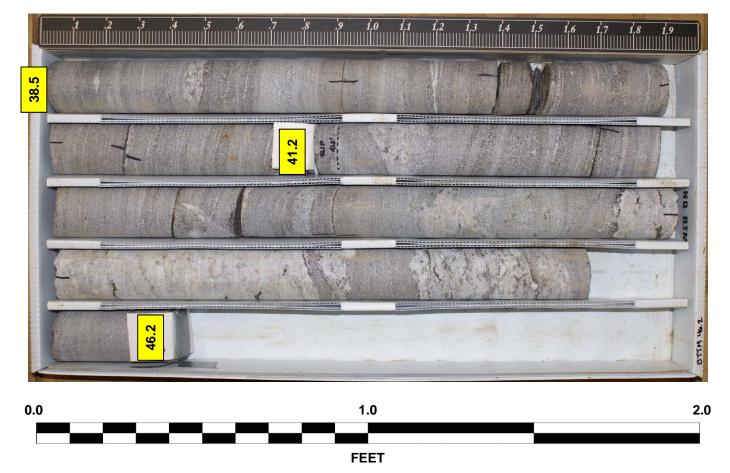
		ORE LOG
<b>WBS</b> 34497.1.2	TIP R-2707C COUNTY	Y CLEVELAND GEOLOGIST Abernathy, S.
SITE DESCRIPTION Bridge Nos. 4	466 & 467 over First Broad River of	on Highway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (ft)
BORING NO. B1-A EBL	<b>STATION</b> 383+82	OFFSET 19 ft RT ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 708.8 ft	TOTAL DEPTH 46.2 ft	<b>NORTHING</b> 581,178 <b>EASTING</b> 1,236,347 <b>24 HR.</b> 12.8
DRILL RIG/HAMMER EFF./DATE HDR04	0404 CME-45C 91.5% 11/10/2015	DRILL METHOD H.S. Augers HAMMER TYPE Automatic
, , , , , , , , , , , , , , , , , , ,		COMP. DATE 10/18/16 SURFACE WATER DEPTH N/A
DUN DOUL	TOTAL RUN 17.8 ft  RUN STRATA	
ELEV (ft) DEPTH RUN RATE (Min/ft)	REC. ROD SAMP. REC. ROD	L         O         DESCRIPTION AND REMARKS           G         ELEV. (ft)         DEPTH (ft)
680.4	(2.8) (1.5) (17.4) (13.9) 98% (78%) (1.5)	Begin Coring @ 28.4 ft  CRYSTALLINE ROCK  Gray, black, traces white and brown-orange stain, fresh to slightly weathered with rare seams moderately severely weathered, hard with intervals, very hard, close to wide fracture spacing, BIOTITE GNEISS with intervals, very hard, close to wide fracture spacing, BIOTITE GNEISS with intervals, very hard, close to wide fracture spacing, BIOTITE GNEISS elidspar at 44.0-45.0 and 45.3-45.7.  28 0°-20° joints, lew with faint iron oxide stain UCS=6,064 PSI, GSI=61  Boring Terminated at Elevation 662.6 ft in Crystalline Rock (Biotite  Gneiss).

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B1-A EBL STA. 383+82 @ 19' RT. Box 1 of 2: 28.4 – 38.5 FEET



#### B1-A EBL STA. 383+82 @ 19' RT. Box 2 of 2: 38.5 – 46.2 FEET

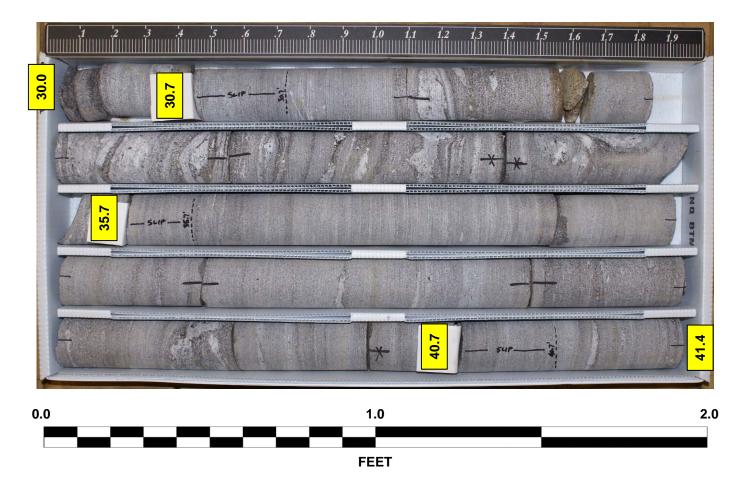


														-00				
WBS	34497	7.1.2			T	ΊP	R-2707	7C		CC	UNT	Y CI	EVEL	AND				GEOLOGIST Abernathy, S.
SITE	DESC	RIPTIO	N Brid	dge N	os. 46	6 8	k 467 ove	er F	First Bro	ad F	River	on Hi	ghway	US 74	Вур	ass	Betw	een SR 1005 and SR 1827 GROUND WTR (ft
BOR	ING NO	). B1-E	B EBL		s	TΑ	ATION 3	384	+04			OFF	SET	88 ft F	T			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	<b>.EV</b> . 7	09.5 ft		Т	ОТ	TAL DEP	TH	<b>1</b> 50.7 1	ft		NOF	RTHIN	<b>G</b> 58′	,117	•		<b>EASTING</b> 1,236,386 <b>24 HR.</b> 13.2
DRILL	. RIG/HAI	MMER E	FF./DA	TE H	DR040	4 CI	ME-45C 9	1.59	% 11/10/2	2015		•		DRIL	MET	THOI	) H.S	. Augers HAMMER TYPE Automatic
DRIL	LER N	/lorgan	, M.		s	STA	RT DAT	ΓE	10/17/	16		CON	IP. DA	TE 1	0/18/	/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE	DEPTH	BLC	ow cc	UNT	П		E	BLOWS	PER	FOOT	-		SAM	P. <b>V</b>	1/	L	COIL AND DOCK DESCRIPTION
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	۱,	0	25		50		75	100	NO	. //	/ MOI	O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft
						П												
710						Ш												709.5 GROUND SURFACE 0.0
		<del>-</del>				$\dagger\dagger$	· · · ·			Τ.		T -			$\top$		7.7.	ALLUVIAL
		‡				Ш				:							\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Red, brown, soft, low plasticity, micaceous, <b>SILT</b> with some fine roots and
705	705.1	4.4	2	1	1	-    -	<u> </u>			<u> </u>		<u> </u>	· · ·		Ι,			trace clay (A-5).
		‡	-	'	'	ľ	<b>●</b> 2 · · · · <b> </b> · · · ·			:		:			'	M		
700	7004	‡ , ,				Ш				:		:						
700	700.1 <u> </u>	9.4	1	1	1	1	2			+:		+:				M		
		‡				Ш	 			:		:			,			696.8 12.7
695	695.1	14.4	WOH			┨╏	<u> </u>			<u> </u>		<u> </u>				<b>V</b>	Ŀ	Brown, soft, non-plastic, micaceous, slightly clayey in part, sandy <b>SILT</b> (A-4).
		‡	I WOH	1	1		2			:		:			\	W	t	
		<u> </u>				Ш	l l			:							Ŀ	
690	690.1	19.4 1	1	2	2	╂	4			+-		+:			\	W	L	
		Ŧ				Ш				.		.					F	
685	685.1	T 24 4				Ш	į			:		:					F	
		<del></del>	1	1	1	7	2			T :		1 :			s	at.	F	
		Ŧ				Ш				:		:					E	681.5 28.0
680	680.1 679.5	† 29.4 1 30.0	29	60/0.1		$\ \cdot\ $	i	↓.		<u>.</u>	· · ·	<u> </u>						RESIDUAL 679.6 Brown, hard, non-plastic, saprolitic, 29.9
		Ţ	60/0.0			Ш				:		.	60/0.0 60/0.1	1				micaceous, sandy SILT with rock fragments (A-4).
675		‡				Ш				:		- 1						CRYSTALLINE ROCK
0/5	-	‡				$\ \cdot\ $				+-		+-						Biotite Gneiss Biotite Gneiss
		‡				Ш				:		:						
670	-	<u> </u>								<u>  :</u>		<u> </u>						
		ŧ				Ш				:								
		ŧ				Ш				:								
665	-	ł				$\ \cdot\ $		+		-		+-						
		+				Ш				.								
660		<del> </del>				Ш				.		•						
		<del>!</del> —	-			+				1.					$\vdash$			658.8 50.7  Boring Terminated at Elevation 658.8 ft in
		Ŧ															F	Crystalline Rock (Biotite Gneiss).
	-	‡															F	Boring was offset due to a large drainage
		‡																ditch and new location was obtained using a handheld GPS unit.
		‡																
	-	‡																
		‡																
	-	‡																
		‡																
		‡															E	
	_	±															l F	
		Ŧ																
		Ŧ																
	-	‡															-	
	:	‡																
		+	1	1	1	1								1			ı F	

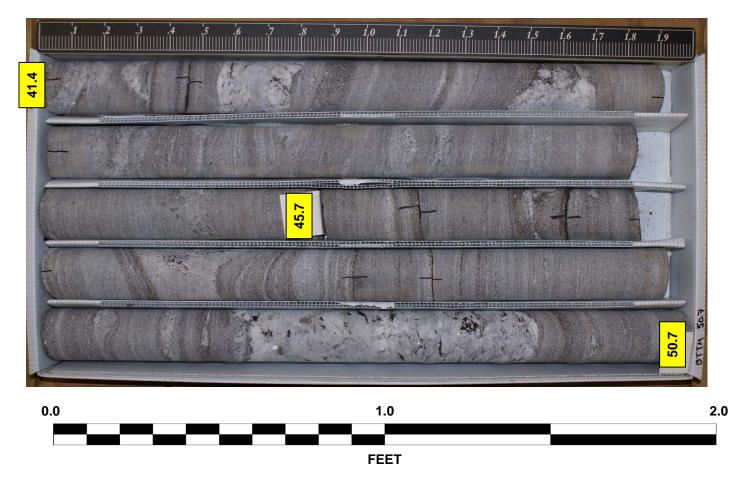
									<u> </u>	<u>U</u>	E LOG
WBS	34497	'.1.2			TIP	R-270	)7C	C	OUNT	Υ	EVELAND GEOLOGIST Abernathy, S.
SITE	DESCF	RIPTIO	<b>N</b> Brid	lge Nos.	466 &	467 o	ver First I	Broad	River	on F	hway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (
BORI	ING NO	. B1-B	EBL		STA	TION	384+04			OF	SET 88 ft RT ALIGNMENT -L- 0 HR. N/A
COLL	AR EL	<b>EV.</b> 70	9.5 ft		TOT	AL DE	<b>PTH</b> 50	.7 ft		NC	THING 581,117
DRILL	RIG/HAI	MER E	FF./DA	re HDRO	)404 CN	1E-45C	91.5% 11/	10/2015			DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRIL	LER M	lorgan,	M.		STA	RT DA	TE 10/1	7/16		CC	P. DATE 10/18/16 SURFACE WATER DEPTH N/A
CORI	E SIZE	NQ2			TOT	AL RU	<b>N</b> 20.7 f			ļ.,	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH
679.5	679.5	30.0	0.7	2:00/0.7	(0.7)	(0.6)		(10.2)	(10.7)		Begin Coring @ 30.0 ft
675	679.5 - 678.8 / - - 673.8 -	[	5.0	2:00/0.7 1:36 0:30 1:54 2:17 2:47 1:55 1:59 2:00	(0.7) 100%/ (3.5) 70% (5.0) 100%	(0.6) (86%) (3.1) 62% (5.0) 100%		93%	(18.7) 90%		Gray, black, white, traces brown-orange stain, fresh to slightly weathered with intervals severly weathered 31.5'-33.2', hard with intervals very hard, close to wide fracture spacing, <b>BIOTITE GNEISS</b> with traces pyrite and intervals and pods coarse crystalline feldspar and quartz with traces hornblende at 41.6'-41.9' and 49.3'-50.2'.  11 0°-10° joints, few with iron oxide stain GSI=73
670	668.8	40.7	5.0	2:06 2:17 2:11	(5.0)	(5.0)					
665	663.8	- - - 45.7	5.0	2:19 2:07 2:21 2:42 2:34 2:37	(5.0)	(5.0) 100%					
660	_	_		2:14 3:28							
-	658.8 _	50.7		2:35							558.8 Boring Terminated at Elevation 658.8 ft in Crystalline Rock (Biotite
											Boring was offset due to a large drainage ditch and new location was obtained using a handheld GPS unit.

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B1-B EBL STA. 384+04 @ 88' RT. Box 1 of 2: 30.0 – 41.4 FEET



B1-B EBL STA. 384+04 @ 88' RT. Box 2 of 2: 41.4 – 50.7 FEET

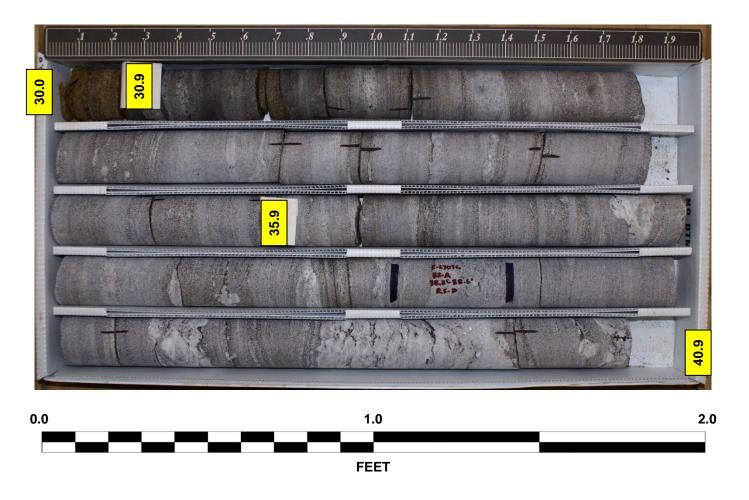


STEE DESCRIPTION   Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827   GROUND WTR (ft)																				1
ORNING NO. B2-A W BL   STATION 384+94   OFFSET 59 ft LT   ALIGNMENT -L.   2 d HR.   N/A																				GEOLOGIST Abernathy, S.
COLLAR ELEV.   708.4   1	SITE	DESCF	RIPTIO	<b>N</b> Brid	dge No	os. 466	8 6	& 467 (	ove	Firs	t Bro	ad R	iver	on Hi	ghway	US 7	'4 B	ypas	s Betv	veen SR 1005 and SR 1827 GROUND WTR (ft)
RILLER Morgan, M. START DATE 10/29/16 COMP. DATE 10/29/16 SURFACE MAIMERTYPE Automatic Plant 10/29/16 SURFACE WATER DEPTH N/A  LEV CRIVE DEPTH SLOW COUNT SLOWS PER FOOT 10/20/16 SURFACE WATER DEPTH N/A  LEV CRIVE DEPTH SLOW COUNT SLOWS PER FOOT 10/20/16 SURFACE WATER DEPTH N/A  LEV CRIVE DEPTH SLOW COUNT SLOWS PER FOOT 10/20/16 SURFACE WATER DEPTH N/A  LEV CRIVE DEPTH SLOW COUNT SLOWS PER FOOT 10/20/16 SURFACE WATER DEPTH N/A  SOIL AND ROCK DESCRIPTION DEPTH (III)  TOBAL GROUND SURFACE 0.0  ALLUVIAL Red, soil, non-plasticity, micaceous, sandy SILT (A-4).  SOIL AND ROCK DESCRIPTION DEPTH (III)  TOBAL GROUND SURFACE 0.0  ALLUVIAL Red, soil, non-plasticity, micaceous, sandy SILT (A-4).  WHAT PROCK BEING WATER DEPTH N/A  SOIL AND ROCK DESCRIPTION DEPTH (III)  TOBAL GROUND SURFACE 0.0  ALLUVIAL Red, soil, non-plasticity, micaceous, sandy SILT (A-4).  WHAT PROCK BEING WATER DEPTH N/A  SOIL AND ROCK DESCRIPTION DEPTH (III)  TOBAL GROUND SURFACE 0.0  ALLUVIAL Red, soil, non-plasticity, micaceous, sandy SILT (A-4).  WHAT PROCK Being Crive Parage, mailist brown and 13-2 in, new year to sail, reducing plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  Red, soil, non-plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  WHAT PROCK Being Crive Parage, mailist brown and 13-2 in, new year to sail, reducing plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  Red, soil, non-plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  WHAT PROCK Being Crive Parage, mailist brown and 13-2 in, new year to sail, reducing plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  Red, soil, non-plasticity, micaceous, sity CLAY with fine roots and trace sand (A-6).  WHAT PROCK BEING CRIVE PARAGE P	BOR	ING NO	. B2- <i>A</i>	A WBL		S	TΑ	ATION	38	34+9	4			OFF	SET	59 ft	LT			ALIGNMENT -L- 0 HR. N/A
START DATE   10/29/16   COMP. DATE   10/29/16   SURFACE WATER DEPTH N/A	COL	LAR EL	<b>EV.</b> 70	08.4 ft		T	01	TAL D	EP1	ГН 5	50.9 f	t		NOF	RTHIN	<b>G</b> 58	31,2	81		<b>EASTING</b> 1,236,436 <b>24 HR.</b> 13.9
Level   Deptite   Deptit	DRILL	. RIG/HAI	MMER E	FF./DA	TE HI	DR0404	4 C	ME-450	91.	5% 1	1/10/2	015				DRII	L M	ETHO	D H.:	S. Augers HAMMER TYPE Automatic
1	DRIL	LER M	lorgan,	, M.		S	TΑ	ART D	ATE	Ξ 10	/29/1	6		CON	/IP. DA	TE	10/2	29/16		SURFACE WATER DEPTH N/A
(ii) (ii) 0.5ft 0.5ft 0.5ft 0.5ft 0.2ft 0.	ELEV	DRIVE	DEPTH	BLC	ow co	UNT				BLC	DWS F	PER F	FOOT			SAI	ИP.	$\overline{f V}/$		SOIL AND POCK DESCRIPTION
708.4 GROUND SURFACE 0.0  ALLIUNAL Red, soft, non-plastic, micaceous, sandy SILT (A-4).  Red, soft, no	(ft)		(ft)	0.5ft	0.5ft	0.5ft	Ш	0	2	5	į	50		75	100	N	Э.	/MOI	G	
708.4 GROUND SURFACE 0.0  ALLIUNAL Red, soft, non-plastic, micaceous, sandy SILT (A-4).  Red, soft, no							П													
708.4 GROUND SURFACE 0.0  ALLIUNAL Red, soft, non-plastic, micaceous, sandy SILT (A-4).  Red, soft, no	710						Ш													
Red, soft, non-plastic, micaceous, sandy  Red, soft, non-plastic, micaceous, sandy  SILT (A-4).  Red, soft, low plasticity, micaceous, sandy  Red, soft, low plasticity, micaceous, sandy  Silt (A-4).  Red, soft, low plasticity, micaceous, sandy  Red, soft, low plasticity, micaceous	7.10	-	‡																	708.4 GROUND SURFACE 0.0
703.4 5.0 1 2 1 1		-					П		:	: :										
1 2 1	705	-	t					<u>i: : :</u>	•			Ŀ		<u> </u>						
13.0		703.4	5.0	1		1	$\  \ $							.					H	
698.4 10.0 2 1 1 1		-	F	'	2	'	Ш	<b>•</b> 3		: :		:		:				М	F	
698.4 10.0 2 1 1	700	_	F				$\ \cdot\ $	ļ. · ·	•			ļ:		<u> </u>						
996 683.4 15.0 WOH WOH WOH WOH 690 688.4 20.0 WOH 1 1 1 1 683.4 25.0 WOH 2 98/0.3 666 678.4 30.0 60/0.0 60/0.0 60/0.0 60/0.0 688.0 60/0		698.4	10.0	2	1	1	$\  \ $	<u>i</u> : : :		: :			 					М		clayey <b>SILT</b> with sand (A-5).
693.4 15.0 WOH WOH WOH WOH 300	005	-	‡					<b>♥</b> <sup>2</sup> · ·	:			:	 	:				IVI		005.4
WOH   Trace sand (A-6).   WO	695	-	<u> </u>	1				<u> </u>	_	-		+-		+-			ļ	<b>V</b>		Dark gray, red-orange, mottled brown and
trace sand (A-6).  RS-D.  trace sand (A-6).  Trace sand (A-6).  RS-D.  trace sand (A-6).  RS-D.  Boring Terminated at Elevation 657.5 ft in		693.4	15.0	WOH	WOH	WOH	1	0				.		.				W		tan, very soft to soft, medium plasticity,
688.4 20.0 WOH 1 1 1	690	-	Ī				Ĭ			: :		:	 	:						trace sand (A-6).
885		688.4	20.0				H	<u> </u>		- : :		ļ :		1:						-
683.4 25.0 WOH 2 98/0.3 60/0.0 60/0.0 60/0.0 60/0.0 RS-D  RS-D  Boring Terminated at Elevation 657.5 ft in		-		WOH	1	1	1	<u>.</u>				:	 					W		
880 678.4 30.0 60/0.0 60/0.0 60/0.0 RS-D 667.5 Boring Terminated at Elevation 657.5 ft in	685	_	Ł				Ц	<u> </u>	•			Ŀ								
678.4 30.0 60/0.0 60/0.0 RS-D  680  678.4 30.0 60/0.0 RS-D  667.5 Boring Terminated at Elevation 657.5 ft in		683.4	25.0	14/011		00/0.0		<u> </u>						-						
678.4 30.0 60/0.0 60/0.0 60/0.0 CRYSTALLINE ROCK Biotite Gneiss  RS-D  RS-D  Boring Terminated at Elevation 657.5 ft in			Ŧ	WOH	2	98/0.3	1	'÷::::		<del>  - :</del>	-:-:-	<del>  -</del> -	<del></del> -	- -:-	100/0.8					
60/0.0	680	-	‡				$\ \cdot\ $					ļ:		<u> </u>						Biotite Gneiss
Biotite Gneiss  RS-D  RS-D  Boring Terminated at Elevation 657.5 ft in		678.4	30.0	60/0.0	1		Ш		:			:	 	:	 -60/0.0					
870 RS-D 865 Boring Terminated at Elevation 657.5 ft in		-	t	00,010			Ш		:	: :		:								
665	675	-	+				$\ \cdot\ $					<u> </u>		-						-
665		-	Ŧ				Ш					.		.						
865 RS-D RS-D 867.5 So.9 Boring Terminated at Elevation 657.5 ft in	670	-	Ī				Ш			: :		:	 	:						
657.5 Boring Terminated at Elevation 657.5 ft in	0.0	-	ļ									T .		T -		RS	-D/			•
657.5 Boring Terminated at Elevation 657.5 ft in		•	‡				Ш					:	 							
657.5 So.9  Boring Terminated at Elevation 657.5 ft in	665	-	t									<u>  • </u>		<u> </u>						_
657.5 So.9  Boring Terminated at Elevation 657.5 ft in		-	t	1								:		.						
657.5 So.9  Boring Terminated at Elevation 657.5 ft in		-	+	1						: :		:		:						
	660	_	F				$\ \cdot\ $		•			ļ:		<u> </u>						
									:			:								
		-	t																L	- Crystalline Nock (Blottle Griefss).
		-	+																<b> </b>	
		-	Ŧ																l F	
		-	‡																	-
		•	‡																	
		_	t																l	_
		-	t	1																
			F	1																
		_	‡	1																
		-	‡	1																
		-	ł	1															F	
		_	F	1															F	
		-	‡	1																
		-	‡	1																

									C	UI	RE LUG				
WBS	34497	7.1.2			TIP	R-270	)7C	С	OUNT	Υ	CLEVELAND	GEOLOGIST Abe	rnathy, S.		
SITE	DESC	RIPTIO	N Bric	dge Nos.	466 &	467 o	ver First I	Broad	River	on H	lighway US 74 Bypass Betw	een SR 1005 and SR	R 1827	GROUNE	WTR (ft)
BOR	ING NO	B2-A	WBL		STA	TION	384+94			OF	FSET 59 ft LT	ALIGNMENT -L-		0 HR.	N/A
COL	LAR EL	EV. 70	08.4 ft		тот	AL DE	<b>PTH</b> 50	.9 ft		NO	<b>PRTHING</b> 581,281	<b>EASTING</b> 1,236,4	36	24 HR.	13.9
DRILI	RIG/HAI	MMER E	FF./DA	TE HDRO	404 CN	1E-45C	91.5% 11/1	10/2015	,		DRILL METHOD H.S	. Augers	HAMM	ER TYPE	Automatic
DRIL	LER N	lorgan,	M.		STA	RT DA	TE 10/2	9/16		СО	MP. DATE 10/29/16	SURFACE WATER	DEPTH N	/A	
COR	E SIZE	NQ2			тот	AL RU	<b>N</b> 20.9 f								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RATA RQD (ft) %	LOG	D ELEV. (ft)	ESCRIPTION AND REM	MARKS		DEPTH (ft)
678.4	670 A	30.0		0.50/0.0	(0.0)	(0.0)		(10.1)	(4= 0)			Begin Coring @ 30.			
675 670	678.4 677.5 - 672.5	35.9	5.0	0:53/0.9 0:56 1:05 1:31 1:50 2:05 1:55 2:08	(4.1) 82% (5.0)	(0.0) (4.0) 80% (4.6) 92%		(19.1) 91%	(17.9) 86%		weathered at 30.0'-3  GNEISS with coal  18 0°-10° ioints. s	CRYSTALLINE RC states weathering with states to wide sely crystalline quartz apyrite. some with heavy iron ox 1 45° joint healed UCS=14.262 PSI, GS	eam moderate fracture spa and feldspar v ide stain; 1 2 ; 2 90º joints l	cing, <b>BIOTI</b> eins, traces 5º ioint with	
	667.5	40.9	5.0	2:02 1:57 2:24 1:50 1:45	(5.0)	(4.5) 90%	RS-D				<del>-</del> - -	003=14,202 F31, 93	si=09		
665	662.5	45.9	5.0	1:48 1:40 1:36 1:38	(4.8)	(4.8)					 - - -				
660	657.5	50.9		1:47 1:38 1:46 2:00	96%	96%					- - - 657.5 - Boring Terminate	d at Elevation 657.5 ft ir	Crystalline F	Rock (Biotite	50.9

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B2-A WBL STA. 384+94 @ 59' LT. Box 1 of 2: 30.0 – 40.9 FEET



B2-A WBL STA. 384+94 @ 59' LT. Box 2 of 2: 40.9 – 50.9 FEET

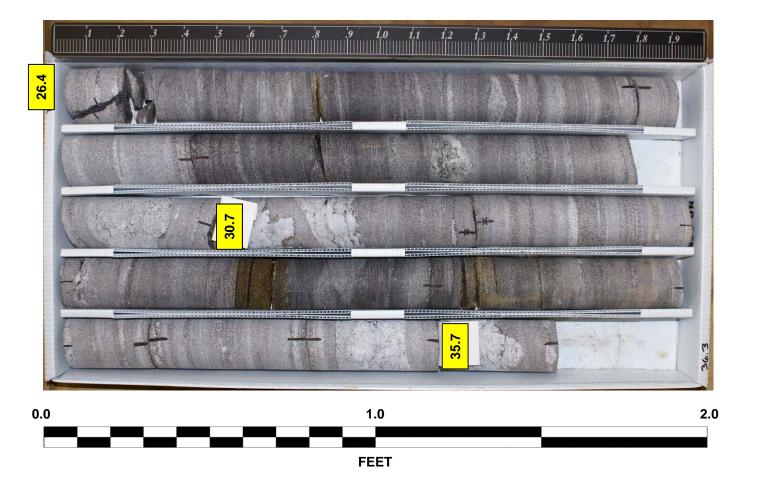


														.UG					
	34497					<b>P</b> R-							EVEL					GEOLOGIST Abernathy, S.	
SITE	DESCF	RIPTIO	<b>N</b> Bri	dge No	os. 466	8 46	7 ove	r Firs	t Broa	ad Riv	er o	n Hig	hway	US 74	Вура	ss I	Betw	een SR 1005 and SR 1827	GROUND WTR (ft)
BOR	ING NO	. B2-E	3 WBL	-	S	TATIC	<b>N</b> 38	85+1	0			OFFS	SET	13 ft L	Γ			ALIGNMENT -L-	<b>0 HR.</b> N/A
COLI	LAR EL	EV. 70	08.3 ft		T	OTAL	DEP	TH 4	10.7 ft			NOR	THING	<b>3</b> 581	,240			<b>EASTING</b> 1,236,463	<b>24 HR.</b> 13.5
DRILL	RIG/HAI	MMER E	FF./DA	TE H	DR0404	CME-4	45C 91	.5% 1	1/10/20	015				DRILL	METH	IOD	H.S	. Augers HAMME	R TYPE Automatic
DRIL	LER M	lorgan,	М.		S	TART	DAT	<b>E</b> 10	/29/1	6	Т	СОМ	P. DA	TE 10	0/29/1	6		SURFACE WATER DEPTH N/	A
ELEV	DRIVE	DEPTH	1	ow co	UNT			BLC	DWS F	ER FC	OOT			SAME	p. 🔻		L	I	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	О	2	25	5	0	7	<b>7</b> 5	100	NO.	М		0   G	SOIL AND ROCK DESC ELEV. (ft)	RIPTION DEPTH (ft)
710																			
		‡															F	708.3 GROUND SURFA	CE 0.0
						1										,,		ALLUVIAL Red-brown, brown, very lo	ose to loose.
705	-	‡				<u>                                   </u>	· · ·	<u> </u>				ļ : :						micaceous, slightly claye SAND (A-2-4).	y, silty fine
	703.4	4.9	2	3	3							: :			М			3AND(A-2-4).	
		ţ	-			👫							: :		"				
00	-	<u> </u>				<del>  'i</del>		<del> </del>				<del> </del>							
	698.4	9.9	2	2	1	<b> </b>									М	,			
95	-	F				<del> </del>		: :		: :		: :	: :			7	::F	695.1	13.2
	693.4	14.9						٠.							_		¥-	Light brown, mottled tan an soft, non-plastic, micaceous	d light brown,
		‡	2	1	1	<b> </b>   • 2						: :			l w		**	(A-4).	s, sarray <b>SIL</b> 1
90	_	‡						<u> </u>			- :	<u> </u>							
	688.4	19.9	2	2	2							: :	: :		w	, 100			
		ŧ	-	-	-			: :					: :		**		æ		
85		<del> </del>				<u>                                   </u>		<del> </del>				<del> </del>				8000			
	683.4 681.9	_	5	95/0.5	5			<u> </u>	:-	<u></u>	<del>-</del> -	<u> </u>	<u>.</u> .	,		\$7	-	682.7 681.9 <b>WEATHERED RO</b>	25.0 OCK26.4
80			60/0.0	D				: :				: :	60/0.0	'				Biotite Gneiss	
	-	Ŧ						٠.									2	CRYSTALLINE R Biotite Gneiss	оск
		‡										: :							
75	_	‡				اـــٰــٰ		<u> </u>			• •								
		‡				:::		: :											
		ŧ				: :		: :					: :						
70	-	ŧ				l <del></del>		<del> </del>				<del> </del>							
		<u> </u>												4		i i		667.6	40.7
		Ŧ															F	Boring Terminated at Elevat Crystalline Rock (Biotite	Gneiss).
	-	‡															F		
		‡															ļ		
	-	ţ															Ė		
		t															E		
		ł															ŀ		
	_	F															F		
		‡															F		
		‡															ţ		
	-	ţ															F		
	-	ł															E		
	-	Ŧ															F		
	-	Ŧ															F		
		‡															þ		
	_	ţ															Ł		
	-	ł															F		
		Ŧ															F		
	-	‡															L		
		‡															F		
		ł	[														+		
	-	+															F		

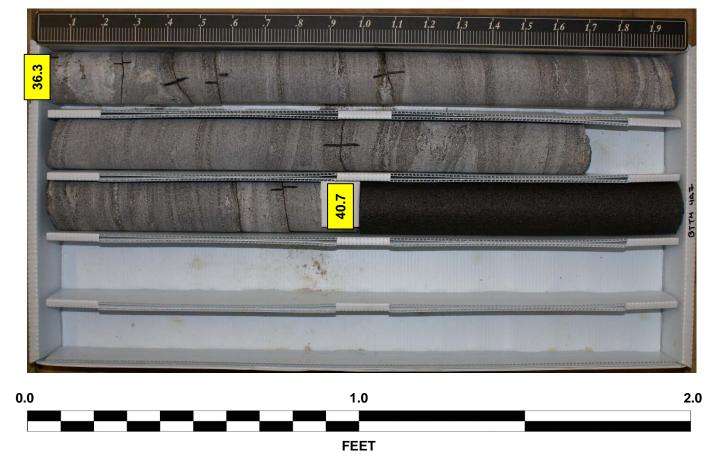
									<u> </u>	U	RE LOG		
WBS	34497	7.1.2			TIP	R-270	)7C	C	OUNT	Υ	LEVELAND	GEOLOGIST Abernathy, S.	
SITE	DESCF	RIPTIO	<b>N</b> Brid	dge Nos.	466 &	467 o	ver First I	Broad	River	on I	ighway US 74 Bypass Betw	een SR 1005 and SR 1827	GROUND WTR (ft
BOR	ING NO	B2-B	WBL		STA	TION	385+10			OF	FSET 13 ft LT	ALIGNMENT -L-	<b>0 HR.</b> N/A
COL	LAR EL	<b>EV.</b> 70	08.3 ft		тот	AL DE	<b>PTH</b> 40	.7 ft		NC	<b>RTHING</b> 581,240	<b>EASTING</b> 1,236,463	<b>24 HR.</b> 13.5
DRILL	RIG/HAI	MMER E	FF./DA	TE HDRO	404 CN	1E-45C	91.5% 11/1	0/2015			DRILL METHOD H.S	. Augers HAMM	IER TYPE Automatic
DRIL	LER N	lorgan,	M.		STA	RT DA	TE 10/2	9/16		CC	<b>MP. DATE</b> 10/29/16	SURFACE WATER DEPTH N	/A
COR	E SIZE	NQ2			тот	AL RU	<b>N</b> 14.3 f	t					
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC.	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	DI ELEV. (ft)	ESCRIPTION AND REMARKS	DEPTH (ft
681.9												Begin Coring @ 26.4 ft	
680	681.9 - 677.6 - - - - 672.6 -	<del> </del>	5.0	1:37/0.3 1:30 1:28 1:31 1:48 1:47 1:31 1:20 1:04 1:53	(4.2) 98% (4.6) 92% (5.0)	(3.9) 91% (4.3) 86%		(13.8) 97%	(13.2) 92%		<ul> <li>weathering with sea</li> <li>close to wide fractu</li> <li>coar</li> </ul>	CRYSTALLINE ROCK active drown-orange stain, very sligt m moderately severely weathered 32 re spacing, BIOTITE GNEISS with p sely crystalline feldspar and quartz. 15° joints, some with iron oxide stain GSI=76	2.7'-32.9', hard, ods and veins
670	-	40.7	0.0	1:35 1:42 1:42	100%	100%					- - -		
	667.6 -	40.7		1:51							- 667.6 - Boring Terminated	d at Elevation 667.6 ft in Crystalline F Gneiss).	Rock (Biotite

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B2-B WBL STA. 385+10 @ 13' LT. Box 1 of 2: 26.4 – 36.3 FEET



B2-B WBL STA. 385+10 @ 13' LT. Box 2 of 2: 36.3 – 40.7 FEET



## Sufficiency   Fig.   Sufficiency   Suffi	BORE LOG	
BORING NO. B2-A EBL	TIP R-2707C COUNTY CLEVELAND GEOLOGIST Abernathy, S.	
COLLAR ELEV. 704.8 ft   TOTAL DEPTH 40.9 ft   NORTHING 581,212   EASTING 1,236,482   24 HR.	e Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827 GROUND WT	TR (
DRILL RIGHAMMER EFF/DATE HDR0404 CME-45C 91.5% 11/10/2015 DRILL METHOD H.S. Augers HAMMER TYPE Autor DRILLER Morgan, M. START DATE 10/28/16 COMP. DATE 10/28/16 SURFACE WATER DEPTH N/A  ELEV (II) DEPTH (II) DEPTH (II) DEPTH (II) DEPTH (II) DEPTH (III) DEPTH	STATION 385+22         OFFSET 19 ft RT         ALIGNMENT -L-         0 HR.	N/A
DRILLER   Morgan, M.   START DATE   10/28/16   COMP. DATE   10/28/16   SURFACE WATER DEPTH N/A	TOTAL DEPTH 40.9 ft NORTHING 581,212 EASTING 1,236,482 24 HR.	10.
DRILLER   Morgan, M.   START DATE   10/28/16   COMP. DATE   10/28/16   SURFACE WATER DEPTH N/A	HDR0404 CME-45C 91.5% 11/10/2015	matic
SOIL AND ROCK DESCRIPTION		
Column   C		
705	SOIL AND ROCK DESCRIPTION	
ALLUVIAL Red-brown, very loose, sitly fine SAND with some roots (A-2-4).  M  695 694.8 10.0 WOH WOH 1 696 689.8 15.0 1 1 2 686 684.8 20.0 2 1 5 687 688 689.8 25.0 60/0.0  689.8 25.0 60	MAN / WOI G ELEV. (II)	PIN
ALLUVIAL Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sithy fine SAND with some roots (A-2-4).  Red-brown, very losse, sith some roots (A-4).		
Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  Red-brown, key loose, sitly fine SAND with some roots (A-2-4).  What is a second some second s		(
700 699.8 5.0 2 1 2 1 3 3	Red-brown, very loose, silty fine SAND	
695 694.8 10.0 WOH WOH 1 696.5 Brown, light brown, very soft to soft, non-plastic, slightly sandy to sandy SILT with trace roots (A-4).  690 689.8 15.0 1 1 2		
695 694.8 10.0 WOH WOH 1 1 1 2 683.6 Brown, light brown, very soft to soft, non-plastic, slightly sandy to sandy SILT with trace roots (A-4).  690 689.8 15.0 1 1 2 63 WW W 683.6 RESIDUAL Dark yellow-brown, dark gray, loose, faintly saprolitic, fine SAND with silt (A-2-4).  687 679.8 CRYSTALLINE ROCK Biotite Gneiss  688 689.8 25.0 60/0.0 GRYSTALLINE ROCK Biotite Gneiss	1 2 •3 · · · · · · · · · · · · · · · · · ·	
680 689.8 15.0 WOH WOH 1		
690 689.8 15.0 1 1 2 685 684.8 20.0 2 1 5 660 675 6675 6665 6666 6666 6666 6666		
685 684.8 20.0 2 1 5 6600.0 W 683.6 RESIDUAL Dark yellow-brown, dark gray, loose, faintly saprolitic, fine SAND with silt (A-2-4). CRYSTALLINE ROCK Biotite Gneiss	/OH 1 1 1	
685 684.8 20.0 2 1 5 660.0 660.0 660.0 663.9 ft in		
685 684.8 20.0 2 1 5	1 2 1 A	
685 684.8 20.0 2 1 5	<mark>                              </mark>	
680 679.8 25.0 60/0.0 2 1 5		
680 679.8 25.0 60/0.0 60/0.0 60/0.0 CRYSTALLINE ROCK Biotite Gneiss  670 663.9 Boring Terminated at Elevation 663.9 ft in	VV (V,3X);; GOO:0	21
680 679.8 25.0 60/0.0 679.8 25.0 60/0.0 679.8 faintly saprolitic, fine SAND with silt (A-2-4). CRYSTALLINE ROCK Biotite Gneiss	Dark yellow-brown, dark gray, loose,	
675  CRYSTALLINE ROCK Biotite Gneiss  670  665  Boring Terminated at Elevation 663.9 ft in	faintly saprolitic, fine <b>SAND</b> with silt	25
675 665 Boring Terminated at Elevation 663.9 ft in	CRYSTALLINE ROCK	
665  Boring Terminated at Elevation 663.9 ft in		
665 663.9 Boring Terminated at Elevation 663.9 ft in		
665 663.9 Boring Terminated at Elevation 663.9 ft in		
665  663.9  Boring Terminated at Elevation 663.9 ft in		
663.9  Boring Terminated at Elevation 663.9 ft in		
663.9 Boring Terminated at Elevation 663.9 ft in		
Boring Terminated at Elevation 663.9 ft in		40
Crystalline Rock (Biotite Gneiss).	Boring Terminated at Elevation 663.9 ft in	40
	Crystalline Rock (Biotite Gneiss).	

	<u> </u>	ORE LOG		
<b>WBS</b> 34497.1.2	TIP R-2707C COUNT	Y CLEVELAND	<b>GEOLOGIST</b> Abernathy, S.	
SITE DESCRIPTION Bridge Nos. 4	466 & 467 over First Broad River of	on Highway US 74 Bypass Betwe	een SR 1005 and SR 1827	GROUND WTR (ft)
BORING NO. B2-A EBL	<b>STATION</b> 385+22	OFFSET 19 ft RT	ALIGNMENT -L-	<b>0 HR</b> . N/A
COLLAR ELEV. 704.8 ft	TOTAL DEPTH 40.9 ft	NORTHING 581,212		
DRILL RIG/HAMMER EFF./DATE HDR0	1	DRILL METHOD H.S.		ER TYPE Automatic
DRILLER Morgan, M.	<b>START DATE</b> 10/28/16	<b>COMP. DATE</b> 10/28/16	SURFACE WATER DEPTH N	/A
CORE SIZE NQ2	TOTAL RUN 15.9 ft  RUN SAMP STRATA	L		
ELEV (ft) DEPTH RUN RATE (Min/ft)	REC. RQD (ft) (ft) (ft) NO. (ft) (ft) % %		SCRIPTION AND REMARKS	DEPTH (ft)
679.8 25.0 0.9 1:23/0.9	(0.9) (0.6) (14.5) (13.0)	679.8	Begin Coring @ 25.0 ft CRYSTALLINE ROCK	25.0
675 673.9 30.9 1.26 1.17 0.42 1.51 5.0 2.07 2.03 2.05 670 668.9 35.9 1.55	(3.8) (3.2) (3.2) (4.9) (4.3) 98% 86%	Gray, black, brown moderately severely hard, close to mod with veins and	-orange stain, very slight weathering weathered 26.6'-27.3', 28.9'-29.8' at erately close fracture spacing, <b>BIOT</b> pods coarsely crystalline feldspar an e with iron oxide stain, some with mu GSI=65	g with seams nd 34.2'-34.3', ITE GNEISS d quartz.
5.0 1:58 1:48 1:58 2:10	(4.9) 98% 98%			
663.9 40.9 1:58		663.9 Boring Terminated	I at Elevation 663.9 ft in Crystalline R	40.9 Rock (Biotite

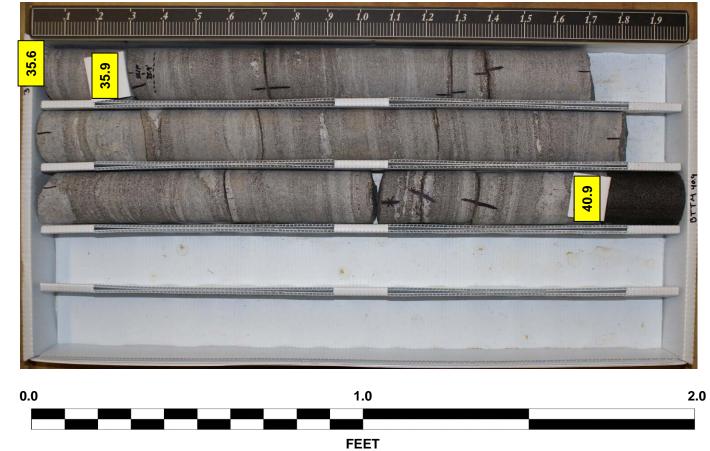
### CORE PHOTOGRAPHIC RECORD

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B2-A EBL STA. 385+22 @ 19' RT. Box 1 of 2: 25.0 – 35.6 FEET



B2-A EBL STA. 385+22 @ 19' RT. Box 2 of 2: 35.6 – 40.9 FEET



#### GEOTECHNICAL BORING REPORT BORE LOG

																	<u> </u>	
WBS	34497	7.1.2			TI	P R	-2707	7C		COL	JNT	Y CL	EVEL	AND			GEOLOGIST Abernathy, S.	
SITE	DESCF	RIPTIO	N Bric	lge No	s. 466	& 40	67 ov	er Fi	rst Bro	ad Ri	ver o	on Hig	hway	US 74 E	Bypass	Betw	een SR 1005 and SR 1827	ROUND WTR (ft)
BOR	ING NO	. B2-B	BEBL		S	ΓΑΤΙ	ON 3	385+	36			OFFS	SET 5	9 ft RT			ALIGNMENT -L-	HR. N/A
COL	LAR EL	<b>EV.</b> 70	)3.8 ft		Т	DTAI	DEF	РΤΗ	36.3 f	t		NOR	THING	581,1	76		<b>EASTING</b> 1,236,505 <b>2</b> 4	<b>4 HR.</b> 9.3
DRILL	RIG/HAI	MMER E	FF./DA	TE H	DR0404	CME	-45C 9	1.5%	11/10/2	2015				DRILL M	1ETHO	D H.S	. Augers HAMMER	TYPE Automatic
DRIL	LER M	lorgan,	M.		S	ΓAR	ΓDA	ΓE 1	0/28/1	16		СОМ	P. DA	TE 10/2	28/16		SURFACE WATER DEPTH N/A	
ELEV	DRIVE	DEPTH		W CO	UNT			Bl	LOWS	PER F	OOT	•		SAMP.	<b>V</b> /	1 L		IDTION
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25		50		75	100	NO.	МОІ	O G	SOIL AND ROCK DESCR ELEV. (ft)	IPTION DEPTH (ft)
705																		
700	-	<u> </u>				<u> </u>											703.8 GROUND SURFAC	E 0.0
	-	‡				:      :		:		: :						0000	ALLUVIAL Red-brown, brown, very loos	se, slightly
700	-	‡				:		<u> </u>		<u> </u>	• •	: :					silty, fine <b>SAND</b> (A-3	i).
	698.8 -	5.0	1	1	1	j.		:							М			
	-	ł				<b>  T</b> 2		:		: :			: :			0000		
695	693.8 -	100				<u> </u>		+:		+:		+ : :				0000		
	- 055.0	10.0	1	1	WOH	1		.		: :					w			
690	-	F				[ ]		:		: :		: :	: :			~ · · · ·	690.5	13.3
	688.8 -	15.0	2	1	3	1.		١.		ļ							Mottled red-brown, tan, soft, lo SILT with clay and trace fine s	w plasticity, sand (A-5).
		‡	^	'	3	•4	÷÷:	- -:-	· · ·	:_:			: :		W			
685	-	‡				Ŀ		<u> </u>	• • •	ļ:::		<u> </u>	-:			777	685.5 WEATHERED ROO	K 18.3
	683.8 - 682.5 <sup>-</sup>		76	24/0.1		:		:		: :			 00/0.6			黨	Hornblende Gneiss	
	- 002.0	21.0	60/0.0					:		: :			50/0.0				Hornblende Gneiss	3
680	-	Ł				<u> </u>		+:		+:		+ : :					680.1 Biotite Gneiss	23.7
	-	-				.		.										
675	-	F				:		:		: :		: :						
	-	Ŧ						Ţ:						RS-C				
	-	ļ						:		: :								
670	_	‡				Ľ		ֈ։		ļ::		ļ · ·						
	-	‡						:		: :			: :				667.5	36.3
	-															E	Boring Terminated at Elevation Crystalline Rock (Biotite G	n 667.5 ft in
	-	Ł														l E	Crystalline Nock (Blottle C	oneiss).
	-	+																
	-	F														l F		
	-	F														l F		
	-	ļ																
	_	‡																
	-	‡																
	-	ł														lE		
	_	-														l F		
	-	Ŧ														l F		
	-	‡																
	-	‡																
	-	‡																
	-	Ł														l E		
	-	t														-		
	-	F														F		
	_	‡																
	-	‡																
	-	†														<u> </u>		
	_	t														E		
	-	+														l F		
	-	Į														ΙĖ		

SHEET 30

#### GEOTECHNICAL BORING REPORT CORE LOG

									<u> </u>	$\cup$	E LOG
WBS	34497	7.1.2			TIP	R-270	)7C	С	OUNT	Υ	EVELAND GEOLOGIST Abernathy, S.
				lge Nos.	466 &	467 o	ver First I	Broad	River	on	ghway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (f
BOR	ING NO	. B2-E	BEBL		STA	TION	385+36			0	SET 59 ft RT ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	<b>EV.</b> 70	03.8 ft		тот	AL DE	<b>PTH</b> 36	.3 ft		N	THING 581,176
DRILL	RIG/HAI	MMER E	FF./DA	TE HDRO	0404 CN	ЛЕ-45C	91.5% 11/	10/2015			DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRIL	LER N	lorgan,	M.		STA	RT DA	TE 10/2	8/16		C	IP. DATE 10/28/16 SURFACE WATER DEPTH N/A
COR	E SIZE	NQ2					<b>IN</b> 15.0 f		A T A		
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	UN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS  ELEV. (ft) DEPTH (ft)
682.5	682.5 -	21.3	5.0	1:17	(4.2)	(3.0)		(1.7)	(0.7)		Begin Coring @ 21.3 ft 682.5 Light to dark gray, white, black, brown-orange stain, moderately to 21.
680	- - -	26.3		1:20 1:44 1:45 1:51	(4.3) 86%	60%		(1.7) 71% (12.1) 96%	(0.7) 29% (11.1) 88%		slightly weathered with seams moderately severely weathered, moderately hard to hard, close to very close fracture spacing, HORNBLENDE GNEISSwith quartz and feldspar pods, traces pyrite. 12 0°-5° joints with iron oxide stain
675	- - -		5.0	1:58 1:46 2:02 1:59	(5.0) 100%	(4.9) 98%	RS-C				GSI=29  Gray, black, brown-orange stain, very slight weathering with seams moderately severely weathered, hard, close to wide fracture spacing BIOTITE GNEISS
670	672.5 - - -	31.3	5.0	1:41 1:52 1:59 1:57	(4.5) 90%	(3.9) 78%					17 0°-15° joints, some with iron oxide stain and/or clay <1mm; 1 60° joint with slightly rough walls UCS=11,848 PSI, GSI=71
	667.5 -	36.3		1:46 1:29							667.5  Boring Terminated at Elevation 667.5 ft in Crystalline Rock (Biotite
											Gneiss).

SHEET 31

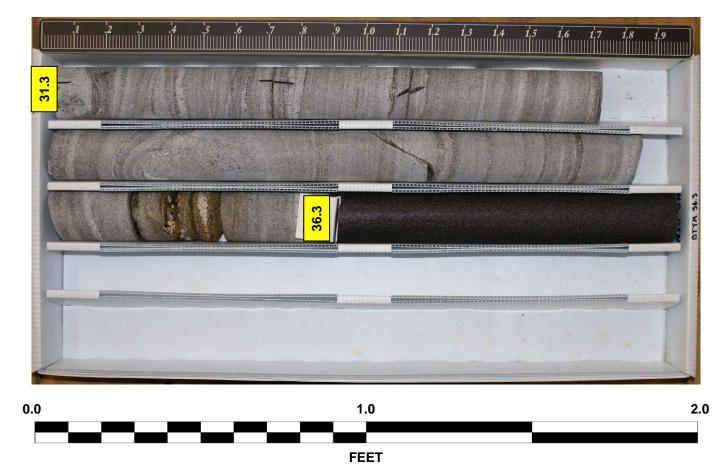
### CORE PHOTOGRAPHIC RECORD

Bridge Nos. 466 & 467 over First Broad River on Highway US 74 Bypass Between SR 1005 and SR 1827

B2-B EBL STA. 385+36 @ 59' RT. Box 1 of 2: 21.3 – 31.3 FEET



#### B2-B EBL STA. 385+36 @ 59' RT. Box 2 of 2: 31.3 – 36.3 FEET



#### GEOTECHNICAL BORING REPORT BORE LOG

		BORE LOG							
<b>WBS</b> 34497.1.2	TIP R-2707C COUN	ITY CLEVELAND	<b>GEOLOGIST</b> Abernathy, S.	_	<b>WBS</b> 34497.1.2	TIP R-2707C CC	DUNTY CLEVELAND	GEOLOGIST Abernathy, S.	
SITE DESCRIPTION Bridge Nos	s. 466 & 467 over First Broad Rive	r on Highway US 74 Bypass Betw	veen SR 1005 and SR 1827	GROUND WTR (ft)	SITE DESCRIPTION Bridge N	los. 466 & 467 over First Broad F	River on Highway US 74 Bypass Bet	ween SR 1005 and SR 1827	GROUND WTR (ft)
BORING NO. EB2-A	<b>STATION</b> 386+32	OFFSET 59 ft LT	ALIGNMENT -L-	<b>0 HR.</b> Dry	BORING NO. EB2-C	<b>STATION</b> 386+56	OFFSET CL	ALIGNMENT -L-	<b>0 HR.</b> Dry
COLLAR ELEV. 717.6 ft	TOTAL DEPTH 14.5 ft	<b>NORTHING</b> 581,313	<b>EASTING</b> 1,236,572	<b>24 HR.</b> Dry	COLLAR ELEV. 721.2 ft	TOTAL DEPTH 5.1 ft	<b>NORTHING</b> 581,261	<b>EASTING</b> 1,236,608	<b>24 HR.</b> N/A
DRILL RIG/HAMMER EFF./DATE HD	R0404 CME-45C 91.5% 11/10/2015	DRILL METHOD H.S	S. Augers HAMN	MER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE H	HDR0404 CME-45C 91.5% 11/10/2015	DRILL METHOD H	.S. Augers HAMN	IER TYPE Automatic
DRILLER Morgan, M.	<b>START DATE</b> 10/27/16	COMP. DATE 10/27/16	SURFACE WATER DEPTH N	I/A	DRILLER Morgan, M.	<b>START DATE</b> 10/27/16	COMP. DATE 10/27/16	SURFACE WATER DEPTH N	/A
ELEV (ft) DRIVE ELEV (ft) DEPTH BLOW COU		75 100   112   /   0	SOIL AND ROCK DES	SCRIPTION  DEPTH (ft)	ELEV CHAPTER SECOND CONTROL OF THE SECOND CO		FOOT   SAMP.   L O O NO.   MOI G	SOIL AND ROCK DES	CRIPTION
715 713.8 = 3.8 2 4	4		717.6 GROUND SURF RESIDUAL Yellow-red, yellow-brown, hard, non-plastic, micace SILT with sand in pa	medium stiff to ous, saprolitic	720 716.6 = 4.6 4 60/0.0			721.2 GROUND SURF RESIDUAL Inferred as yellow-red, y medium stiff to hard, n micaceous, SILT with s	ellow-brown, on-plastic, sand (A-4).
710 708.8 = 8.8 3 15 705 703.8 = 13.8	58		705.5 WEATHERED F	_		5	60/0.0	Boring Terminated with Penetration Test Refusa 716.1 ft on Crystalline F Gneiss). SPT refusal suspected to oboulder. Boring was offset	at Elevation lock (Biotite ccur on colluvial lo' and redrilled
NCDOT BORE DOUBLE R2707C_GEO_BRDG_FIRST BROAD RIVER.GPJ NC_DOT.GDT 11/30/16  13.88 1		100/0.2	Boring Terminated wit Penetration Test Refusa 703.1 ft on Crystalline F Gneiss).	h Standard Il at Elevation				boulder. Boring was offset as EB2-C(2)  as EB2-C(2)  as EB2-C(2)	10' and redrilled .

#### GEOTECHNICAL BORING REPORT BORE LOG

	BORE LOG	<u> </u>		. —							
WBS 34497.1.2 TIP R-27070		GEOLOGIST Abernathy, S.	1	<b>↓ ├</b> ──	<b>S</b> 34497.1				ITY CLEVELAND	GEOLOGIST Abernathy, S.	T
SITE DESCRIPTION Bridge Nos. 466 & 467 over			GROUND WTR (ft)	I						Setween SR 1005 and SR 1827	GROUND WTR
BORING NO. EB2-C(2) STATION 38		ALIGNMENT -L-	<b>0 HR.</b> Dry	l	RING NO.			<b>STATION</b> 386+78	OFFSET 59 ft RT	ALIGNMENT -L-	<b>0 HR</b> . D
COLLAR ELEV. 721.2 ft TOTAL DEPT		EASTING 1,236,600	24 HR. Dry	<b></b>		721.4 ft		TOTAL DEPTH 7.0 ft	NORTHING 581,208	<b>EASTING</b> 1,236,642	24 HR. D
DRILL RIG/HAMMER EFF./DATE HDR0404 CME-45C 91.			MER TYPE Automatic	<b>↓ ├</b> ──				14 CME-45C 91.5% 11/10/2015	DRILL METHOD		MER TYPE Automatic
DRILLER Morgan, M. START DATE	E 10/27/16	SURFACE WATER DEPTH N	I/A	1 -	DRIVE L		W COUNT	START DATE 10/27/16  BLOWS PER FOO	COMP. DATE 10/27/16 DT SAMP.	SURFACE WATER DEPTH N	I/A
I FI EV I FI E	25 50 75 100 NO. MOI		CCRIPTION  DEPTH (ft)	ELEV (ft)	(ft)		0.5ft 0.5ft		75 100 NO. MOI G		SCRIPTION
		721.2 GROUND SURF			<u> </u>					- 721.4 GROUND SURF	
716.9 4.3 33 32 68/0.3		Inferred as yellow-red, y medium stiff to hard, n micaceous, SILT with s	ellow-brown, non-plastic, sand (A-4).	720	716.9	4.5	35 65/0.3	3		Inferred as yellow-red, yr medium stiff to hard, n micaceous, SILT with s	ellow-brown, non-plastic, sand (A-4).
715	100/0.8 100/0.6 100/0.6 60/0.0	713.7 Metamorphosed Grain RESIDUAL Brown, white, very dense, silty SAND with high finetamorphosed granitic metamorphosed granitic metamorphosed. (A-1).	ritic Rock 7.5  fine to coarse, fraction of ock fragments  14.8  ROCK 16.3  h Standard I at Elevation Rock (Biotite		714.4	1 1			60/0.0	715.9  Positive Gneiss  Boring Terminated with Penetration Test Refusal 714.4 ft on Crystalline R Gneiss).  Gneiss).	s / / / / / / / / / / / / / / / / / / /



	Pi	roject reference no	Э.	SHEET NO	O.
		R-2707C		35	
_		R/W SHEET N	10.		
7	RC	DADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
		INCOMPLE DO NOT USE FOR			
		PRELIMINA DO NOT USE FOR			

		L	ABORAT	ORY SU	JMN	MARY SH	EET FOI	R ROC	CK CORE	SAMI	PLES	
SAMPLE NO.	BORING NO.	DEPTH (FT)	ROCK TYPE	GEOLOGIC MAP UNIT	RUN RQD	LENGTH (FT)	DIAMETER (FT)	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (PSI)	SPLITTING TENSILE STRENGTH (PSI)	REMARKS
RS-A	B1-B WBL	36.0-36.4	Biotite Gneiss	CZbg	98%	0.336	0.166	169.2	10,521	-	-	fresh
RS-B	B1-A EBL	33.6-34.0	Biotite Gneiss	CZbg	62%	0.337	0.166	171.5	6,064	-	-	fresh
RS-C	B2-B EBL	29.1-29.5	Biotite Gneiss	CZbg	98%	0.338	0.166	170.9	11,848	-	-	fresh
RS-D	B2-A WBL	38.2-38.6	Biotite Gneiss	CZbg	92%	0.338	0.166	175.5	14,262	-	-	v. sli. wthd.

ssss/STIMEssss heresterned to the second to STATE OF NORTH CAROLINA

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

#### **CONTENTS**

X

REFERENCE

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-19	BORE LOGS & CORE LOGS W/CORE PHOTOGRAPHS
20	LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY Cleveland				
PROJECT DESCRIPTION	US 74 B	ypass from	East of NC	<u>226</u>
to East of NC 150				
SITE DESCRIPTION Propon -Y2- over -L-	sed Brid	ge Structure	: 3	

STATE PROJECT REFERENCE NO. R-2707C 20

#### **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 1999 707-6805. 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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS MAY WARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS WAS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

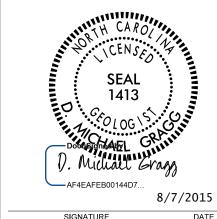
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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 SATISTY 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 FOR BE ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

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

Robbie DeLost Mike Morgan Harold Morris INVESTIGATED BY D. Michael Gragg DRAWN BY \_\_Tamara Stivers CHECKED BY Kenneth Bussey SUBMITTED BY HDR ICA 

**PERSONNEL** 



8/10/2015

SIGNATURE

038206

Lenneth K. Bussey, Jr.

3449

PROJECT REFERENCE NO. SHEET NO.

R-2707C

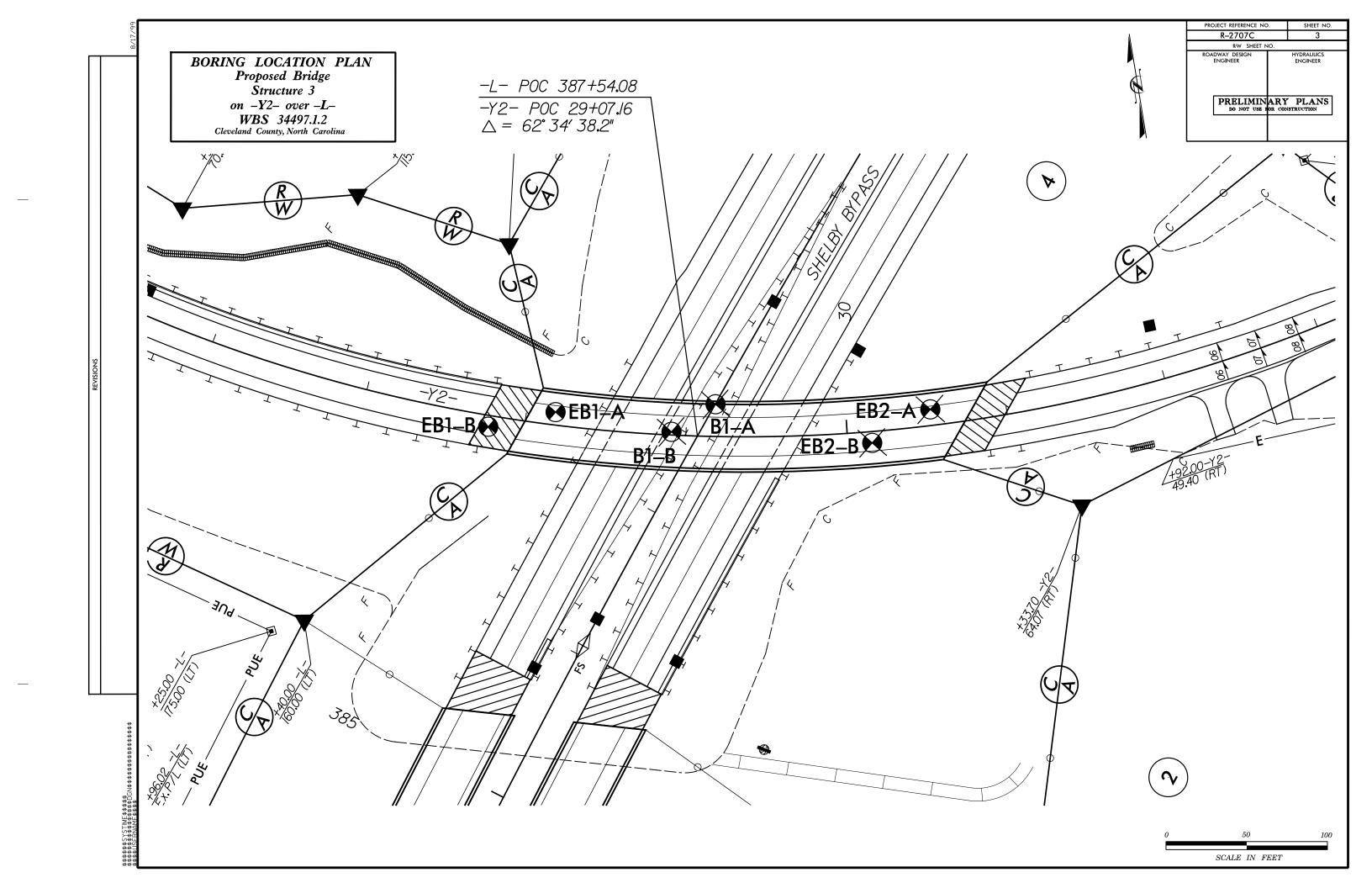
2

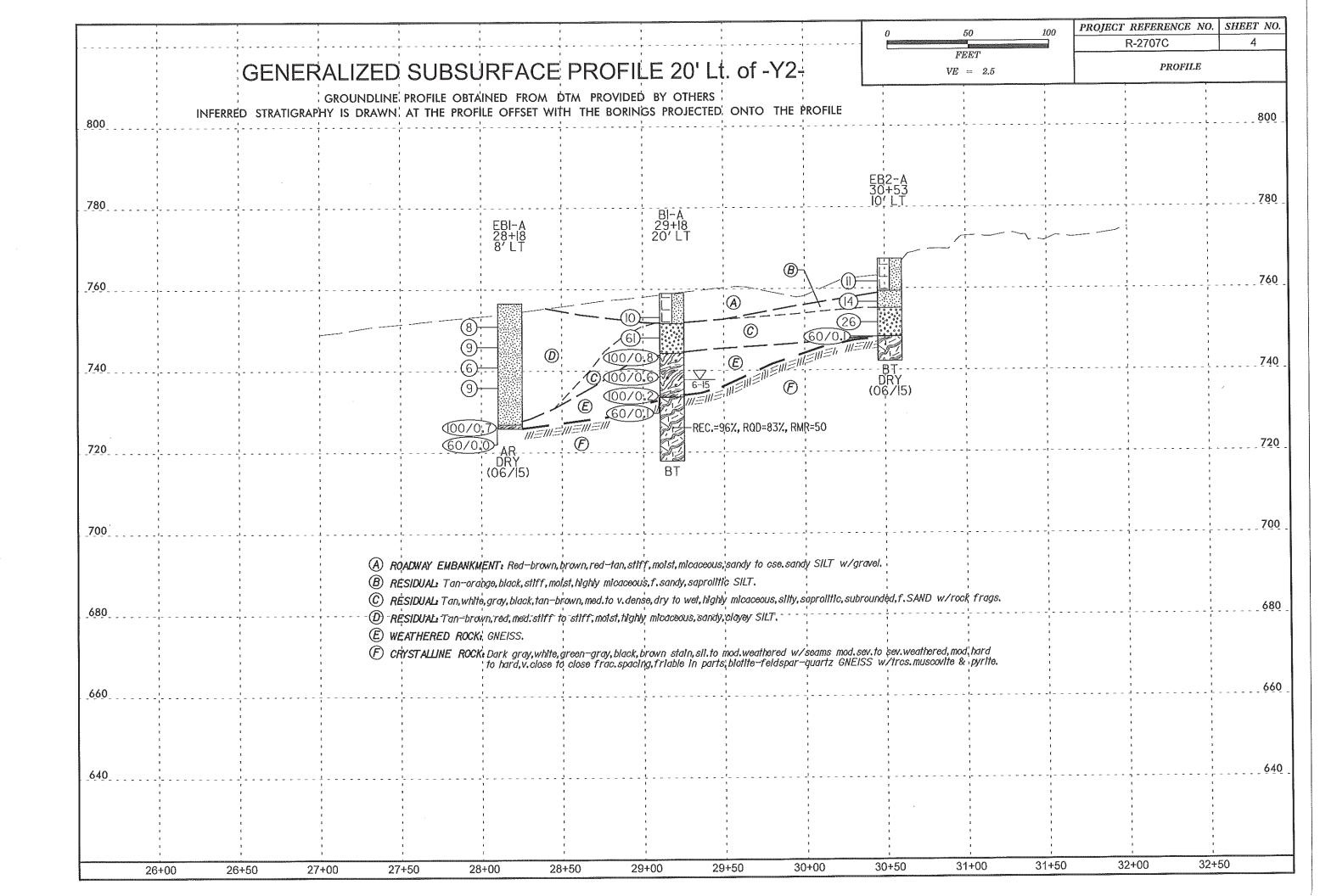
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

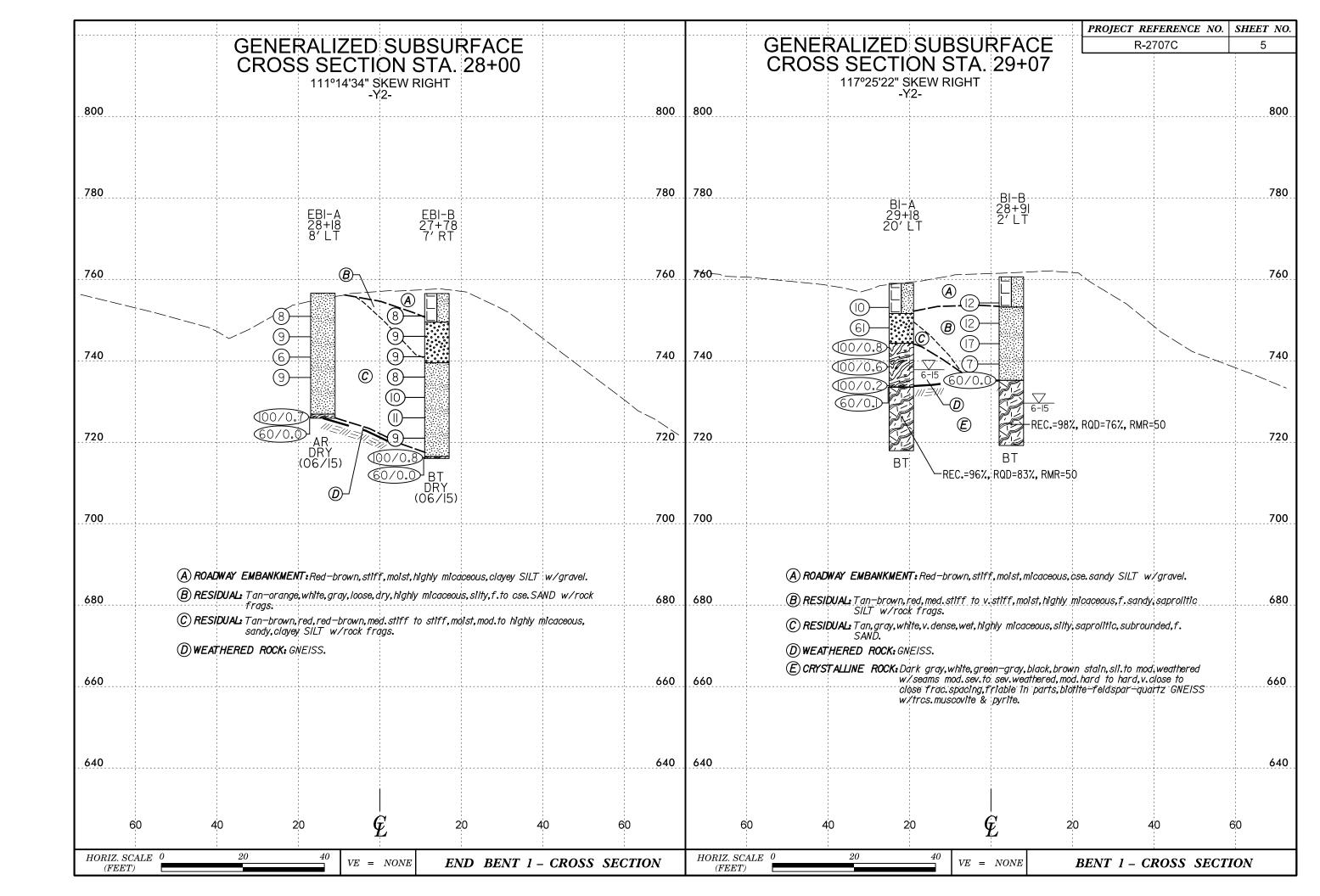
## SUBSURFACE INVESTIGATION

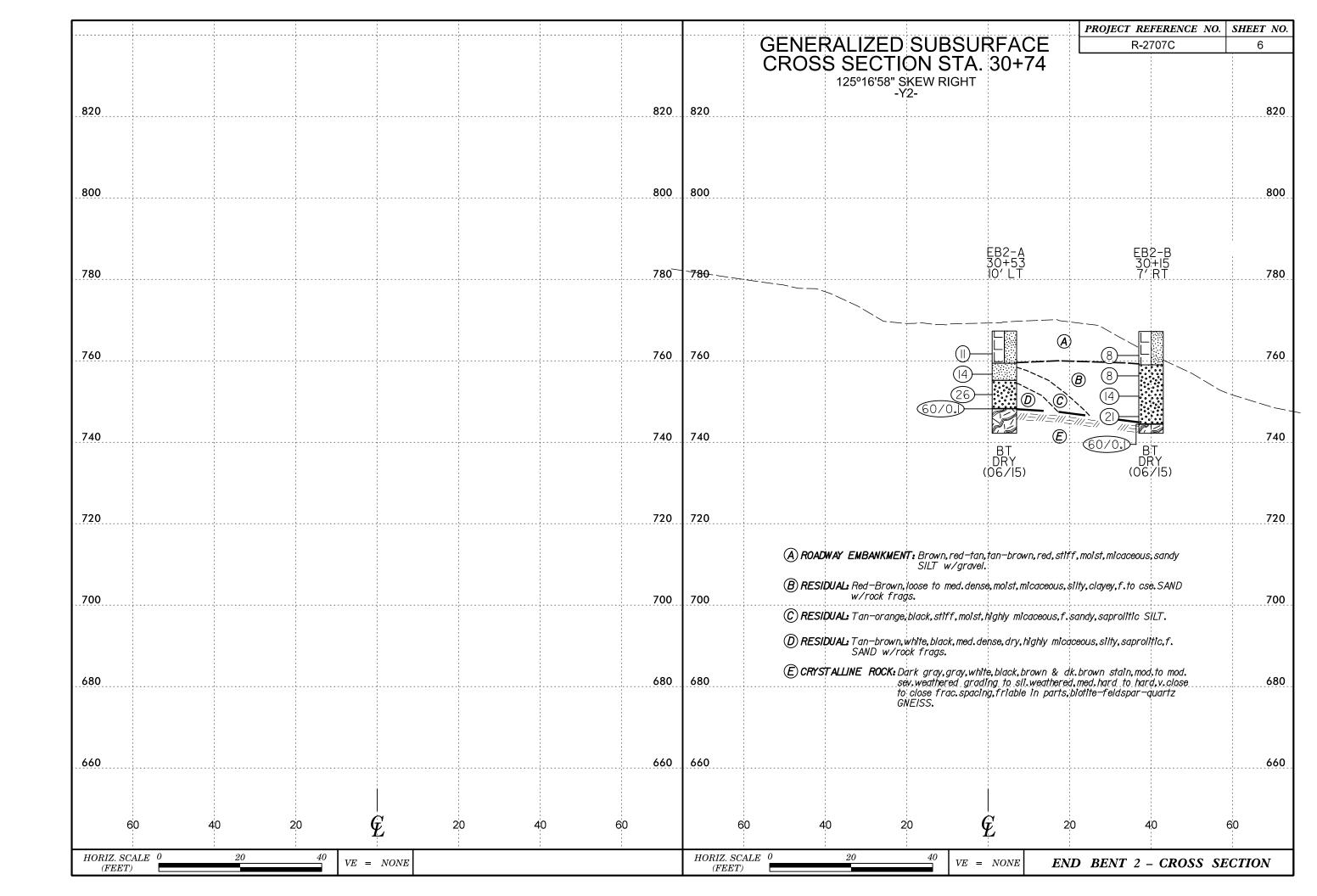
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

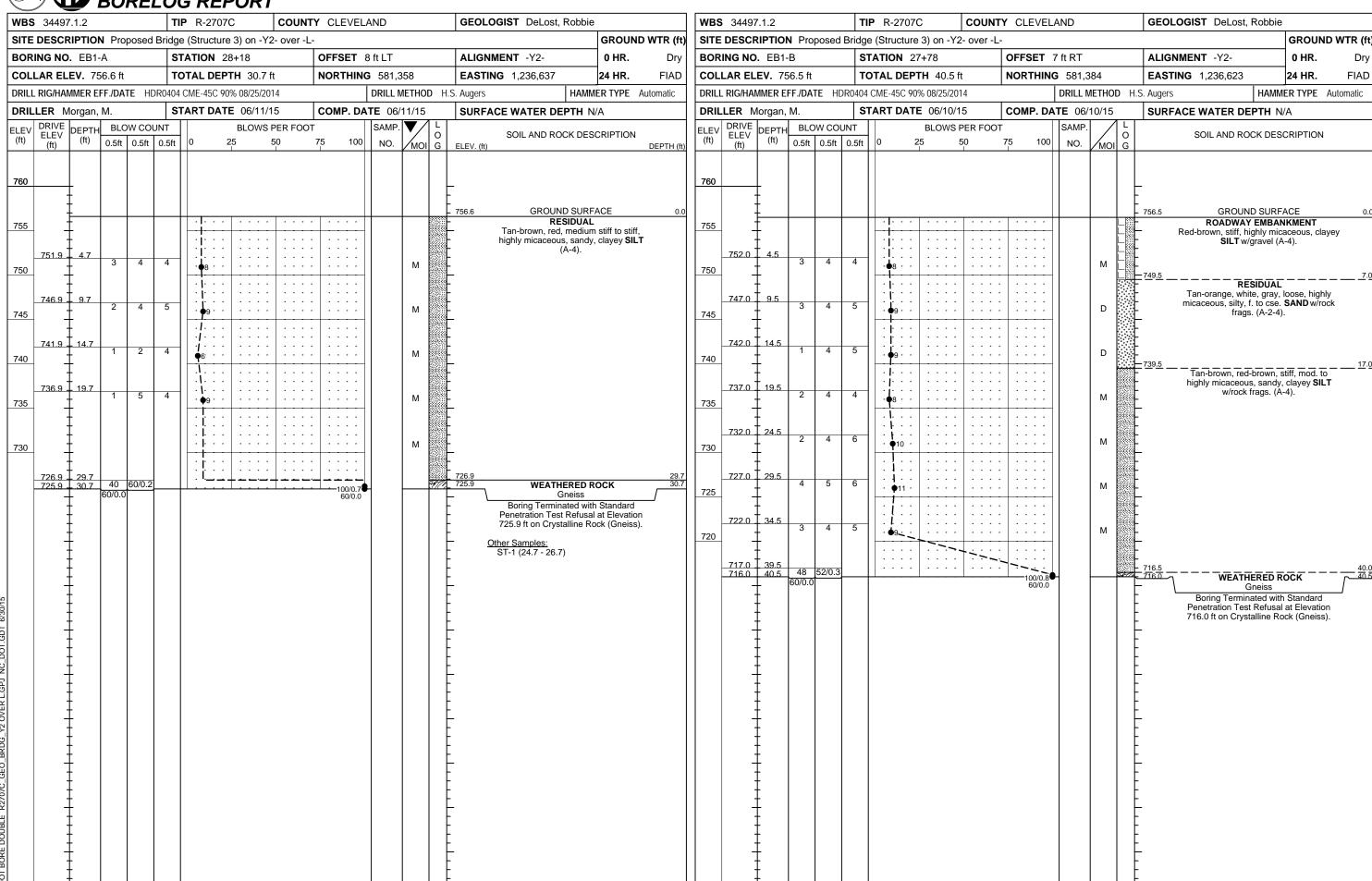
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	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.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	SI//AI//A	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED VISCOUNTY NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. ( \$ 39% PASSING "200) ( > 39% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
''. PASSING	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
#40 30 MX 50 MX 51 MN SOILS SOILS PEAT		- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
אורו פני אור	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS TRACE OF ORGANIC MATTER 2 - 3% 3 - 5%, TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL -  -  40 MX  41 MN  40 MX  41 MN  40 MX  41 MN  40 MX  41 MN   LITTE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
PI 6 MX NP IW MX IW MX II MN II MN IW MX II MN I	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX U U U 4 MX 8 MX 12 MX 16 MX NU MX AMUUN 15 UF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STUNE PRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	PARENT MATERIAL.
AS SUBURADE POUR	── SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
DANCE OF STANDARD DANCE OF UNCONFINED		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	<u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/FT-)	T SPI	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE	SOIL SYMBOL  OPT OMT TEST BORING  INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A  MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY  ALL ROCK EXCEPT DIJARTZ DISCOLORED OR STAINED, ROCK FARRIC ELEMENTS ARE DISCERNIRLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT	INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MANITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BFF</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL   STIFF   8 TO 15   1 TO 2	• PIE 70ME TER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - 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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER OF SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	XX  UNDERCUT	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 3 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL HI HIGHLY V - VERY	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MED MEDIUM VST - VANE SHEAR TEST	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MICA MICACEOUS WEA WEATHERED  CPT - CONE PENETRATION TEST MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIEF FOR FIELD MOISTURE DESCRIPTION	CSE COARSE NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD MOISTONE BESCRIPTION	DMT - DILATOMETER TEST ORG ORGANIC SAMPLE ABBREVIATIONS  DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SAP SAPROLITIC SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SD SAND, SANDY ST - SHELBY TUBE FIAD - FIL IN AFTER DRILLING SL SILT, SILTY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOLID. PEGUIDES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SCHISCILIS REGULTES DATING TO ATTAIN OPTIMUM MOISTURE  PLASTIC LIMIT	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL CBR - CALIFORNIA BEARING FRAGS, - FRAGMENTS W - MOISTURE CONTENT RATIO	FRACTURE SPACING BEDDING	BENCH MARK: NA
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: NA FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: NA FEET
SL SHRINKAGE LIMIT	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	BORING ELEVATIONS OBTAINED USING
	CORE SIZE:    8*HOLLOW AUGERS	INDURATION	R2707C Is tnl_120801.tin DATED 2-27-2015
PLASTICITY 1957 PL SON STOCKET		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	TING -CARRIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST Y CASING Y WY ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TOYOUTS ATTIME CARD		
	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
PRODUCTIONS SUCH AS LIGHT, DHAM, STREMKED, ETC. ARE USED TO DESCRIBE AFTEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-











WBS	34497	7.1.2			TI	IP R-2707C	COUNT	Y CLEVEL	AND			GEOLOGIST DeLost, Robbi	e	
SITE	DESCR	RIPTIO	N Pro	posed	Bridg	e (Structure 3) on -	/2- over -L						GROUN	ND WTR (f
BOR	NG NO	B1-A	Α		S	<b>TATION</b> 29+18		OFFSET	20 ft LT			ALIGNMENT -Y2-	0 HR.	21.2
COLI	AR EL	EV. 7	59.0 ft		T	OTAL DEPTH 41.1	ft	NORTHING	<b>3</b> 581,2	287		<b>EASTING</b> 1,236,726	24 HR.	FIAD
DRILL	RIG/HAN	MMER E	FF./DA	TE HI	<b></b> DR0404	4 CME-45C 90% 08/25/2	014		DRILL N	ИЕТНО	D N\	W Casing W/SPT & Core HAM	MER TYPE	Automatic
DRIL	LER M	lorgan.	М.		S	TART DATE 06/09	/15	COMP. DA				SURFACE WATER DEPTH		
LEV	DRIVE	DEPTH	1	ow co		11	PER FOO		SAMP.		1 [			
(ft)	ELEV (ft)	(ft)	0.5ft		0.5ft	0 25	50	75 100	NO.	MOI	O     G	SOIL AND ROCK DE ELEV. (ft)	SCRIPTION	l DEPTH (
	( )					<u> </u>	l			1				<u> </u>
760														
700	_	-				<u> </u>	<del> </del>				1 888	759.0 GROUND SUR		0
	-	‡										Red-brown, stiff, highly n	nicaceous, d	cse.
755		<b>†</b>										sandy <b>SĬLŤ</b> (Æ	N-4).	
	754.1	4.9	3	4	6	10	.			М				
	-	+										751.6 RESIDUA		
750	749.1	9.9										Tan, gray, white, v. do micaceous, silty, saprolitic	<b>L</b> ense, highly	,
	-	- 0.0	13	27	34		•61			w		micaceous, silty, saprolition SAND (A-2-	:, f. sub-rour 4).	nded
745	-	‡					·   · • • · ·					· ·	,	
745	744.1	14.9		F0/0.0			<u> </u>	+			200	744.3 WEATHERED	BOCK	14
	-	ł	50	50/0.3				100/0.8	•			Gneiss	ROCK	
740	-	F					.					•		
	739.1	19.9	52	48/0.1	-			400/0.0				<del>-</del> ·		
	-	‡	"-	10,011				. 100/0.6		$\vdash$		•		
735	<del>-</del>	<u> </u>										<del>-</del>		
	734.1 733.6	24.9 25.4	100/0.2				.	100/0.2	3			· 733.6 - 733.5_/\	ROCK	25 \(\sum_25\)
	-	-	60/0.1					60/0.1				Gneiss		
730	_	F										CRYSTALLINE Gneiss	ROCK	
	-	ļ										•		
725	-	‡										•		
123	_	‡										<del>_</del>		
	-	t							RS-6	1				
720	-	+												
	-	F							RS-7	}		_ . 717.9		41
İ		-							1.10			Boring Terminated at Elev	ation 717.9	
	_	‡										. Crystalline Rock (	Gneiss).	
	-	t									1 1			
	-	ł												
	_	F										- <del>-</del>		
	-	‡										•		
	-	‡												
	-	t									1 -	<u>-</u>		
	-	<u> </u>										•		
	-	Ī									1	•		
	_	‡										<del>-</del> ·		
	-	‡									1			
	-	Ł										_		
	-	+									F			
	-	ļ										•		
	-	‡										<del>-</del>		
	-	ł												
	-	F										•		
	_	‡										<del>-</del>		
	-	ţ									1 - E			
	_	1	1	I	I	I			1	1	1 Г			

WDS	34497	'.1.2			TIP	R-270	)7C	C	OUN	TY (	CLEVELAND	GEOLOGIST DeLost	Robbie		
SITE	DESCR	IPTION	<b>l</b> Prop	oosed Br	idge (	Structu	ure 3) on	-Y2- (	over -l	-			GRO	JND WTR (f	
BORI	NG NO	. B1-A			STA	TION	29+18			+	FSET 20 ft LT	ALIGNMENT -Y2-	0 HR		
				<b>EASTING</b> 1,236,726	24 HR										
				re HDR0						_		/ Casing W/SPT & Core	HAMMER TYP	E Automatic	
	LER M		М.				ATE 06/0			CC	<b>DMP. DATE</b> 06/10/15	SURFACE WATER D	URFACE WATER DEPTH N/A		
CORE	E SIZE			DDILL			JN 15.61		ΡΔΤΔ	<del> </del>	Т				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC.	RUN RQD (ft) %	SAMP. NO.	REC.	RATA RQD (ft) %	Ö	D	KS	DEDTI. (		
733.5	(II)			(IVIIII/IL)	<u> </u>	- %			%	+ -	ELEV. (ft)		DEPTH (f		
	733.5 - 732.9 /	- 25.5 _26.1_/	0.6 5.0	0:35/0.6	(0.6)	(0.4)		(14.9	(12.9	)	733.5 Dark gray, green-gra	Begin Coring @ 25.5 f CRYSTALLINE ROCK by, white, slightly to moderate		25.	
730	-	-	5.0	1:28 0:50 1:26	(4.3)			0070	0070		moderately severe	ly to severely weathered (2) close to close frac. spacing,	.6'-28.0'), hard to	mod.	
-	727.9	31.1	5.0	1:50 1:44 1:37		(5.0)					bjotite-feldsr	par-quartz Gneiss w/trcs. m 0° some w/iron stain; 2 35°	scovite & pyrite.		
725	-	-	3.0	1:50 1:57	100%	100%					R1=4, I	R2=17, R3=10, R4=12, R5= Rock Type E	7, RMR=50		
	722.9	36.1		2:05 1:36			DC C								
	-	-	5.0	1:07 1:25	(5.0) 100%	(4.8) 6 96%	RS-6	1							
720	_	-		1:53 1:50							-				
-	717.9	<u>41.1</u>		1:52		+	RS-7	1			717.9 Boring Terminated	at Elevation 717.9 ft in Cry	stalline Rock (Gne	41. eiss).	
	-	-									<del>-</del>				
	-	-									-				
	-	-									-				
	-	-									-				
	-	-									E				
	_	-									E				
	-	-									F				
	-	‡				F									
	7	Ī				1 1					<b>F</b>				

NCDOT CORE DOUBLE R2707C\_GEO\_BRDG\_Y2 OVER L.GPJ NC\_DOT.GDT 7/6/15

SHEET 9

# CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 3 ON -Y2- OVER -L-

WBS 34497.1.2 TIP R-2707C



B1-A, 29+18, 20' LT. Box 1 of 2



B1-A, 29+18, 20' LT. Box 2 of 2



<b>VBS</b> 3	34497.1.2			TI	<b>P</b> R-27	07C	COUNT	Y CLEVEL	AND			GEOLOGIST DeLost, Robbie	
ITE DE	SCRIPTIO	N Pro	posed	Bridge	e (Structi	ure 3) on -Y2	2- over -L-	<u> </u>					GROUND WTR (
ORING	<b>3 NO</b> . B1-	В		S	TATION	28+91		OFFSET	2 ft LT			ALIGNMENT -Y2-	<b>0 HR.</b> 31.
OLLA	R ELEV. 7	760.6 ft		TO	TAL DE	<b>EPTH</b> 41.41	ft	NORTHIN	<b>G</b> 581,2	97		<b>EASTING</b> 1,236,695	<b>24 HR.</b> FIA
RILL RIC	G/HAMMER	EFF./DA	TE H	DR0404	CME-45C	90% 08/25/20	14		DRILL N	1ETHO	D NV	V Casing W/SPT & Core HAMN	IER TYPE Automatic
RILLE	R Morgar	n, M.		S	TART DA	ATE 06/10/1	15	COMP. D	ATE 06/	10/15		SURFACE WATER DEPTH N	I/A
Th' El	RIVE LEV (ft) (ft)	0.5ft	0.5ft		0		PER FOOT 50	75 100	SAMP. NO.	MOI	C G	SOIL AND ROCK DES	CRIPTION DEPTH
60	<del> </del>				<del>  .</del>   .		<del> </del>	1::::			-	760.6 GROUND SURF ROADWAY EMBAI No sample recovery, in	NKMENT
55 75	55.2 5.4	4	6	6		2				М		cuttings, red, stiff, mica w/gravel (A-4 - 753.2	ceous SILT
50 75	50.2 <u>1</u> 0.4	4	5	7	12	2				М		RESIDUAL Tan-brown, red, med. stiff t micaceous, f. sandy, sa w/rock frags. (A	to v. stiff, highly prolitic <b>SILT</b>
45 74	45.2 15.4	4	7	10	/	17				М		-	
40 74	40.2 20.4 + 20.4	3	3	4	•7-	· · · · · · · · · · · · · · · · · · ·				М		-	
35 _ 73	35.2 <u>25.4</u> -	60/0.0	<u>,</u>					60/0.0	RS-8			735.2 CRYSTALLINE I	ROCK
30	‡								RS-9			-	
725	‡											-	
20			_					<u> </u>			M	719.2 Boring Terminated at Eleva	ation 710 2 ft in
												Crystalline Rock (G	cheiss).

WBS	34497	7.1.2			TIP	R-270	)7C	C	OUNT	Υ (	LEVELAND	GEOLOGIST DeLost	, Robbie		
SITE	DESC	RIPTION	N Pro	posed Bri	idge (S	Structu	re 3) on	-Y2- o	ver -L					GROUN	D WTR (f
BOR	ING NO	. B1-B			STA	TION	28+91			OF	SET 2ft LT	ALIGNMENT -Y2-		0 HR.	31.0
COLI	LAR EL	<b>EV</b> . 76	0.6 ft		тот	AL DE	<b>PTH</b> 41	.4 ft		NO	RTHING 581,297	<b>EASTING</b> 1,236,695		24 HR.	FIAD
DRILL	RIG/HAI	MMER EI	F./DA	re HDR0	404 CN	1E-45C	90% 08/25	/2014			DRILL METHOD N	W Casing W/SPT & Core	HAMM	IER TYPE	Automatic
DRIL	LER N	lorgan,	M.		STAI	RT DA	<b>TE</b> 06/1	0/15		СО	<b>MP. DATE</b> 06/10/15	SURFACE WATER D	EPTH N	/A	
COR	E SIZE	NQ2			тот	AL RU	<b>N</b> 16.0 f								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (ft)	DESCRIPTION AND REMAR	KS		DEPTH (
7 <del>35</del> 52												Begin Coring @ 25.4 ft			
730	729.2	31.4	5.0 5.0	N=60/0.0 1:28 1:19 1:20 1:16 1:23 1:20 1:17 1:33 1:16 1:19 1:58	(4.9) 98% (4.9) 98%	(0.4) 40%/ (3.8) 76% (3.0) 60%	RS-8 /	(15.7) 98%	(12.2) 76%		w/seams, mode 34.0'-34.7'), mode friable in parts, bio	CRYSTALLINE ROCK black, brown stain, slightly to rately severely to severely we rately hard to hard, very clos tite-feldspar-quartz Gneiss w, 37 0°-10° few w/pyrite trcs.; R2=17, R3=10, R4=12, R5= Rock Type E	moderate eathered ( e to close trcs. mus 2 20°	31.3'-31.6' of frac. spacir covite & pyr	& ng,
720	719.2	41.4		1:40 1:50 1:39 1:49	100%	100%					<sup>-</sup> 719.2				41
•		- '''		1.49								ed at Elevation 719.2 ft in Cry	stalline R	ock (Gneiss	

## CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 3 ON -Y2- OVER -L-

WBS 34497.1.2 TIP R-2707C



B1-B, 28+91, 2' LT. Box 1 of 2



B1-B, 28+91, 2' LT. Box 2 of 2



	97.1.2			TI	<b>P</b> R-2707C	COUNT	Y CLEVEL	.AND			GEOLOGIST DeLost, Rot	obie	
TE DES	CRIPTIO	<b>N</b> Pro	posed	Bridge	e (Structure 3) on -Y2	- over -L						GROUI	ND WTR (f
ORING N	O. EB2	?-A		S	<b>FATION</b> 30+53		OFFSET	10 ft LT			ALIGNMENT -Y2-	0 HR.	Dr
OLLAR E	LEV. 7	67.3 ft		TO	OTAL DEPTH 25.1 ft	t	NORTHIN	<b>G</b> 581,1	85		<b>EASTING</b> 1,236,812	24 HR.	FIAD
RILL RIG/H	AMMER E	FF./DA	TE HI	OR0404	CME-45C 90% 08/25/201	4		DRILL N	ЛЕТНО	<b>D</b> SI	PT Core Boring H/	AMMER TYPE	Automatic
RILLER	Morgan	, M.		S	TART DATE 06/11/1	5	COMP. DA	TE 06/	11/15		SURFACE WATER DEPTI	H N/A	
EV DRIV	E DEPTI	BLC	w co	UNT	BLOWS F	PER FOOT	Γ	SAMP.	<b>V</b> /	1 L	COIL AND DOOK	DECODIDATION	
t) ELE\	/ (ft)	0.5ft	0.5ft	0.5ft	0 25 5	50	75 100	NO.	МОІ	O G	SOIL AND ROCK I	DESCRIPTION	DEPTH (
70	$\pm$										_		
	<u> </u>									1 888	767.3 GROUND SI		C
35	Ŧ										ROADWAY EM Brown, red-tan, stiff, ı	micaceous, sai	ndy
700	Ţ.,										SILT w/grav	el (A-4).	
762.	7 <u>+ 4.6</u> +	3	5	6	11 . 11	: : : :			М		• •		
0	‡									L	- 7 <u>5</u> 9.4		
757.	7 + 9.6										RESIDI Tan-orange, black, stiff		
	1	3	6	8	14 : : :				М		f. sandy, saprolit	ic <b>SILT</b> (A-4).	
55	+				<del>  ``</del>						Tan-brown, white, bl	ack, med. dens	<u>12</u> se,
752.	7 + 14.6	15	10	13					_		highly micaceous, silty w/rock frags	, saprolitic, f. s	and
50	‡	15	13	13	26				D		- -	. (/ //	
	+ 3 + 19.0										<del>-</del> - 748.3		1:
740.	19.0	60/0.1					60/0.1	<b>^</b>			CRYSTALLI		<u> </u>
15	+										Gneis CRYSTALLI		
	Ŧ										Gneis		
	‡—							Ц		75	742.2 Boring Terminated at E	Elevation 742.2	25 Oft in
	+++++++++++++++++++++++++++++++++++++++												

	34497	7.1.2			TIP	R-270	7C	C	OUNT	Υ (	CLEVEL	AND	GEOLOGIST DeLos	, Robbie	)	
SITE	DESCR	RIPTION	N Pro	posed Br	idge (S	Structu	re 3) on	-Y2- o	ver -L	-			•		GROU	ND WTR (f
BOF	RING NO	. EB2-	Α		STA	TION	30+53			OF	FSET	10 ft LT	ALIGNMENT -Y2-		0 HR.	Dry
	LAR EL						<b>PTH</b> 25	.1 ft		-		<b>3</b> 581,185	<b>EASTING</b> 1,236,812		24 HR.	FIA
				ΓE HDR0	<u> </u>							DRILL METHOD SP	<u> </u>			Automatic
	LLER M						<b>TE</b> 06/1			CC	MP DA	TE 06/11/15	SURFACE WATER D			7.0.0
			IVI.					1/13			IVIF. DA	112 00/11/13	SURFACE WATER D	EFINI	1/A	
COF	RE SIZE			DBILL			<b>N</b> 6.0 ft	STR	ΑΤΑ	ļ.,						
(ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (		ESCRIPTION AND REMAI	RKS		DEPTH
48.2													Begin Coring @ 19.1 f	t		
745.2	748.2 <sup>-</sup> 746.2	19.1 21.1 25.1	2.0	0:55 0:56 1:09 1:07 1:22 1:21	(1.4) 70% (4.0) 100%	(0.0) (0.0) (2.8) 70%		(5.4)	(2.8) 47%		748.2 - 742.2 - 742.2 	weathered grading to close to close fractions	CRYSTALLINE ROCL ack, brown stain, moderate to slightly weathered, mode c. spacing, friable in parts, Gneiss. 30+ 0°-10° some w/iron si at Elevation 742.2 ft in Cry	( y to mode rately har piotite-felo ain	d to hard, dspar-quar	very z

# CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 3 ON -Y2- OVER -LWBS 34497.1.2 TIP R-2707C



EB2-A, 30+53, 10' LT. Box 1 of 1

	34497					IP R-2707C		Y CLEVEL	AND			GEOLOGIST DeLost, F	Robbie	1	
SITE	DESCR	IPTIO	<b>N</b> Pro	posed	Bridg	e (Structure 3) on -Y2	- over -L	-						GROUN	ND WTR (f
BORI	NG NO	EB2	-B		S	<b>TATION</b> 30+15		OFFSET	7 ft RT			ALIGNMENT -Y2-		0 HR.	Dry
COLL	AR EL	EV. 76	67.2 ft		T	OTAL DEPTH 25.0 ft	t	NORTHING	<b>3</b> 581,1	98		<b>EASTING</b> 1,236,772		24 HR.	FIAD
ORILL	RIG/HAN	MER E	FF./DA	TE H	DR0404	CME-45C 90% 08/25/201	4		DRILL N	ИЕТНО	<b>D</b> SF	PT Core Boring	HAMM	ER TYPE	Automatic
DRIL	LER M	organ,	M.		S	TART DATE 06/11/1	5	COMP. DA	<b>TE</b> 06/	11/15		SURFACE WATER DEF	TH N	/A	
LEV	DRIVE ELEV	DEPTH	BLC	w co	UNT	BLOWS F	PER FOOT	Г	SAMP.	lacksquare	L	SOIL AND ROC	K DES	CRIPTION	J
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25 5	50	75 100	NO.	мо		ELEV. (ft)			DEPTH (
770		_										_			
	-	-										- 767.2 GROUND	SURF	ACF	0
705	-	-										ROADWAY Tan-brown, red, sti	EMBAN	IKMENT	
765	-	_										sandy <b>S</b>	il, nigni i <b>lLT</b> (A-4	y micaced 4).	ous,
	762.3	4.9	2	3	5					l		• •			
760	-	_	-			.•8				M		<del>-</del>			
		_				: : : :   : : : :							ĪDŪAL		8
ŀ	757.3	9.9	2	4	4	.				М		Red-brown, loos micaceous, silty, cl	se to me avev. f.	ed. dense, to cse. <b>S</b> A	AND
'55	_	_				-						_ w/rock fra	gs. (A-2	2-5).	
	752.3	14.9				] : ½:: ::::	: : : :					•			
50	-	-	3	7	7	14	: : : :			М		•			
	-	-				\						<del>-</del> •			
-	747.3	19.9	4	10	11	1				М		• •			
<b>7</b> 45	744.5	- - 22.7								'''		- 			22
	-	-	60/0.1									- 744.4 / CRYSTAL - 742.2 Gr	.LINE R neiss	OCK	22 25
Ī	-	-										CRYSTAL		OCK	
	-	_ -										Boring Terminated a	at Eleva		ft in
	-	_										Crystalline F	Rock (G	neiss).	
	-	_									1 -	• <del>-</del>			
	-	-										-			
	-	-									F	•			
	_	-										- <del>-</del>			
	-	-										<del>.</del> •			
	-	-										• •			
	-	-										<del>-</del> -			
	-	_									1 -	•			
	-	_									-	-			
	-	-										-			
	-	-										•			
	-	-										<del>.</del> <del>-</del>			
	-	-										<u>.</u>			
	-	-									1 -	•			
	-	-									-	_			
	-	-										-			
	-	-										•			
	-	-										<del>-</del> -			
	-	-										•			
	_	_										_			
	-	_										-			
	-											•			
	-	-										• <del>-</del>			
	-	-										- -			
		L	I	I	1				1	I	1 L	_			

<b>NBS</b> 34497.1.2		<b>TIP</b> R-27	'07C	C	OUNT	<b>Y</b> C	VELAND		GEOLOGIST DeLost,	Robbie	·		
SITE DESCRIPTION	Proposed Br	idge (Struct	ure 3) on	-Y2- o	ver -L						GROUN	GROUND WTR (ft	
BORING NO. EB2-E	3	STATION	30+15			OF	ET 7ftRT		ALIGNMENT -Y2-		0 HR.	Dry	
COLLAR ELEV. 767	7.2 ft	TOTAL D	<b>EPTH</b> 25.	.0 ft		NO	<b>HING</b> 581,19	8	<b>EASTING</b> 1,236,772		24 HR.	FIAD	
ORILL RIG/HAMMER EF	F./DATE HDRO	)404 CME-450	90% 08/25	/2014			DRILL ME	THOD SP	PT Core Boring HAMMER TYPE Autom			Automatic	
DRILLER Morgan, N	M.	START D	<b>ATE</b> 06/1	1/15		co	P. DATE 06/1	1/15	SURFACE WATER DE	PTH N	/A		
CORE SIZE NQ2		TOTAL R	<b>UN</b> 2.2 ft										
ELEV RUN DEPTH (ft)	RUN (ft) DRILL RATE (Min/ft)	RUN REC. RQD (ft) (ft) % %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	O DESCRIPTION AND REMARKS						
44.4									Begin Coring @ 22.8 ft				
744.4 = 22.8 742.2 = 25.0	2.2 0:48/1.2 0:54	(1.7) (0.0) 77% 0%		(1.7)	(0.0)		mediur	n to modera	CRYSTALLINE ROCK dark brown stain, moderatel tely hard, very close frac. sp biotite-feldspar-quartz Gneis 13 0°-15°; 1 60° at Elevation 742.2 ft in Crys	acing, fri	able in par	ts,	

# CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 3 ON -Y2- OVER -LWBS 34497.1.2 TIP R-2707C



EB2-B, 30+15, 7' RT. Box 1 of 1



PROJECT REFERENCE NO. SHEET NO.

R—2707C 20

RW SHEET NO.

ROADWAY DESIGN HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR RAW ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

		L	ABORATO	ORY SU	JMN	MARY SH	EET FOI	R $ROC$	CK CORE	SAMI	PLES	
SAMPLE NO.	BORING NO.	DEPTH (FT)	ROCK TYPE	GEOLOGIC MAP UNIT	RUN RQD	LENGTH (FT)	DIAMETER (FT)	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (PSI)	SPLITTING TENSILE STRENGTH (PSI)	REMARKS
RS-6	B1-A	35.6-36.0	Gneiss	CZbg	100%	0.332	0.165	171.3	6,379	-	-	slimod. wthd.
RS-7	B1-A	40.0-40.4	Gneiss	CZbg	96%	0.330	0.165	171.2	7,243	-	-	slimod. wthd.
RS-8	B1-B	27.3-27.6	Gneiss	CZbg	76%	0.330	0.165	167.5	9,450	-	-	slimod. wthd.
RS-9	B1-B	32.2-32.6	Gneiss	CZbg	60%	0.328	0.165	170.7	6,251	-	-	slimod. wthd.

2

\$\$\$\$YSTIME\$\$\$\$\$ \$\$\$\$\$\$\$\$\$\$\$\$\$DGN\$\$\$\$\$\$\$\$\$\$\$ STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO.	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-14	BORE LOGS & CORE LOGS W/CORE PHOTOGRAPHS
15	LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY Cleveland				
PROJECT DESCRIPTION	US	74 Bypass from	East of NC	226
to East of NC 150				
SITE DESCRIPTION Prop	posed	Bridge Structure	e <b>4</b>	
on -Y3- over -L-				

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	15

#### **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 1999 707-6805. 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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS MAY WARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS ACCORDING TO CLIMATIC CANDITIONS WAS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

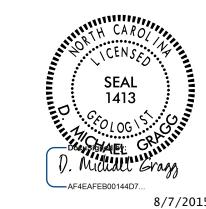
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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 SATISTY 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 FOR BE ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

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

Robbie DeLost Mike Morgan Harold Morris INVESTIGATED BY D. Michael Gragg DRAWN BY \_\_Tamara Stivers CHECKED BY Kenneth Bussey SUBMITTED BY HDR ICA 

**PERSONNEL** 



8/7/2015

SIGNATURE DATE 038206

8/10/2015

SIGNATURE

3449

REFERENCE

PROJECT REFERENCE NO. SHEET NO.

R-2707C

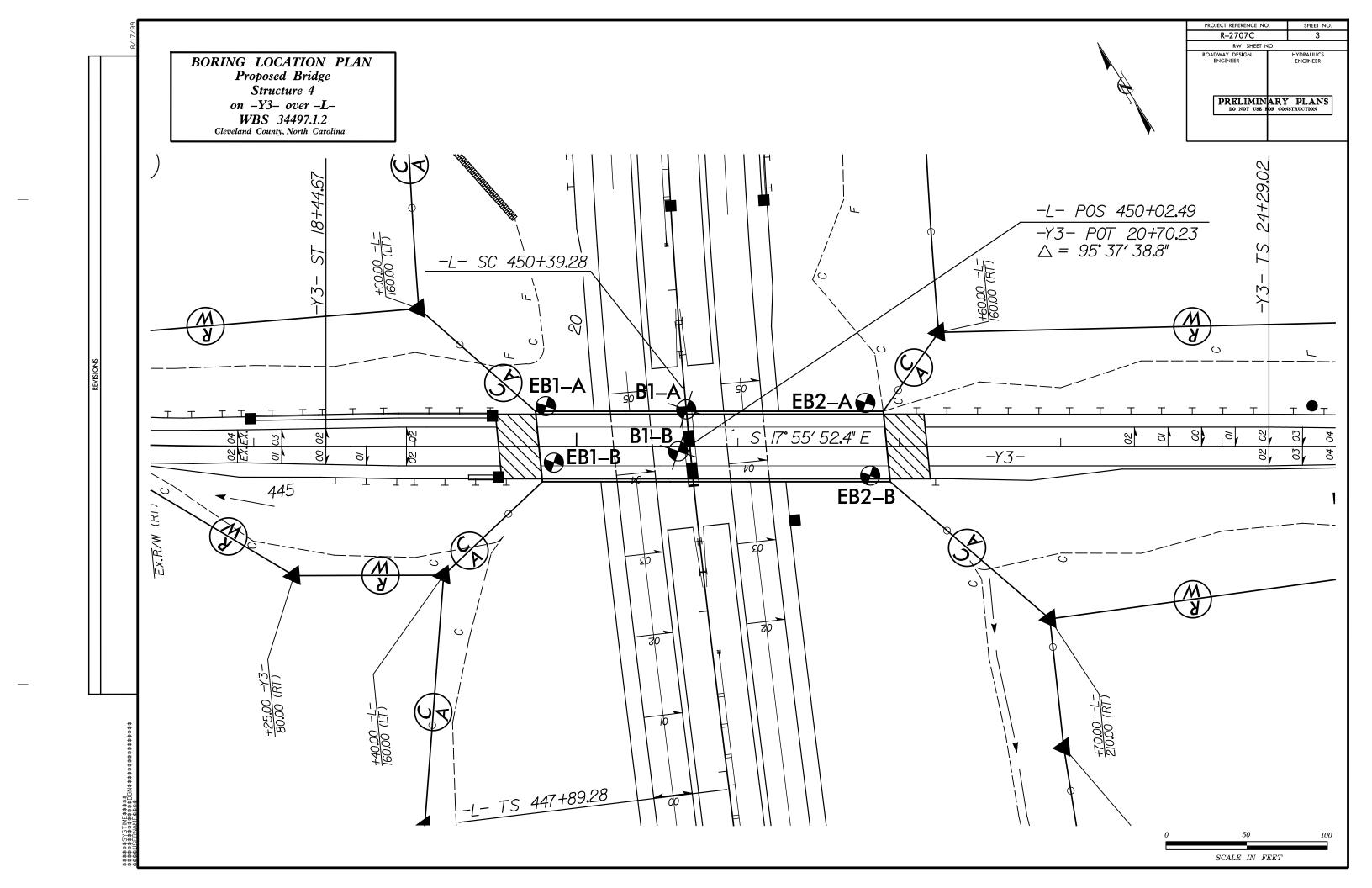
2

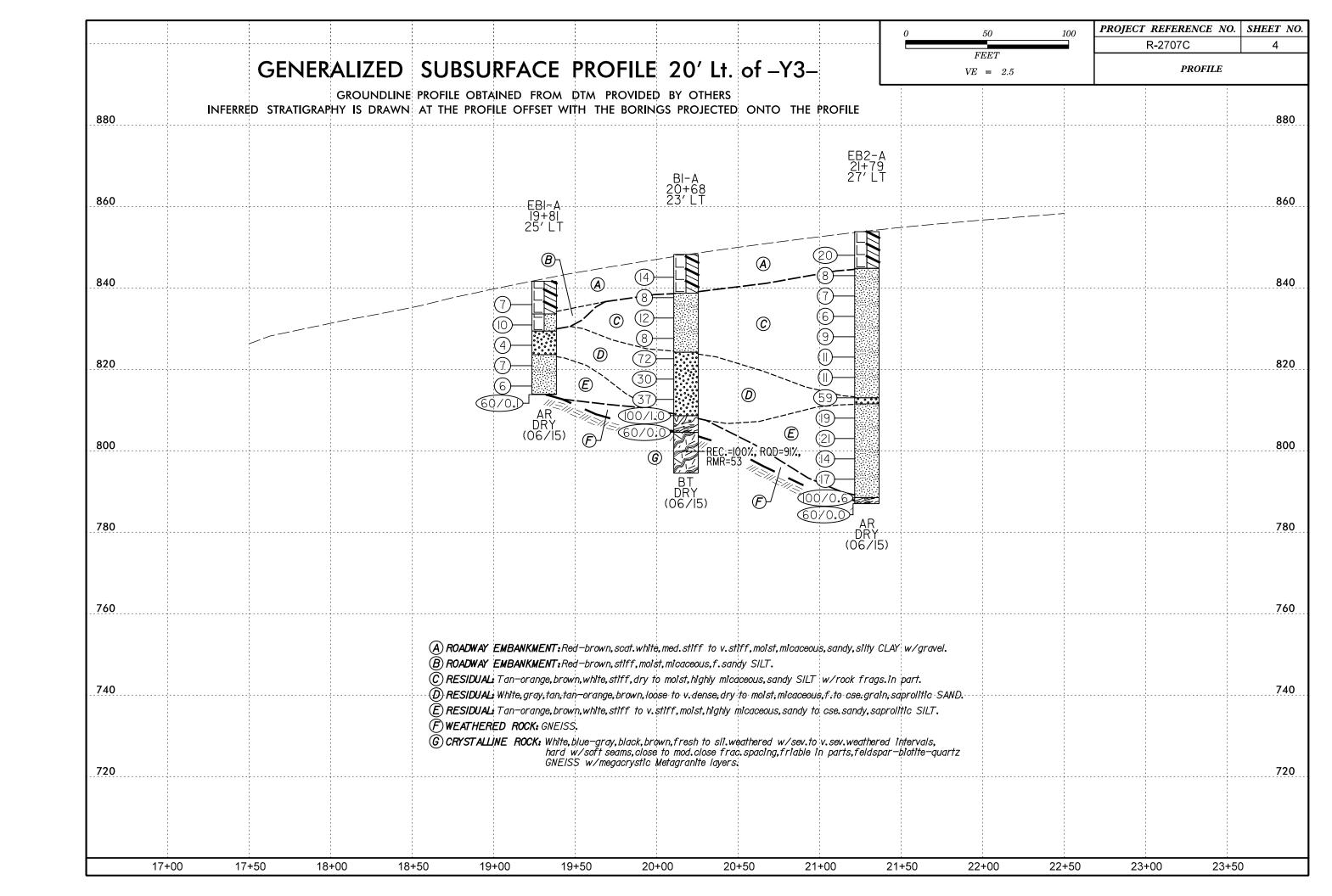
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

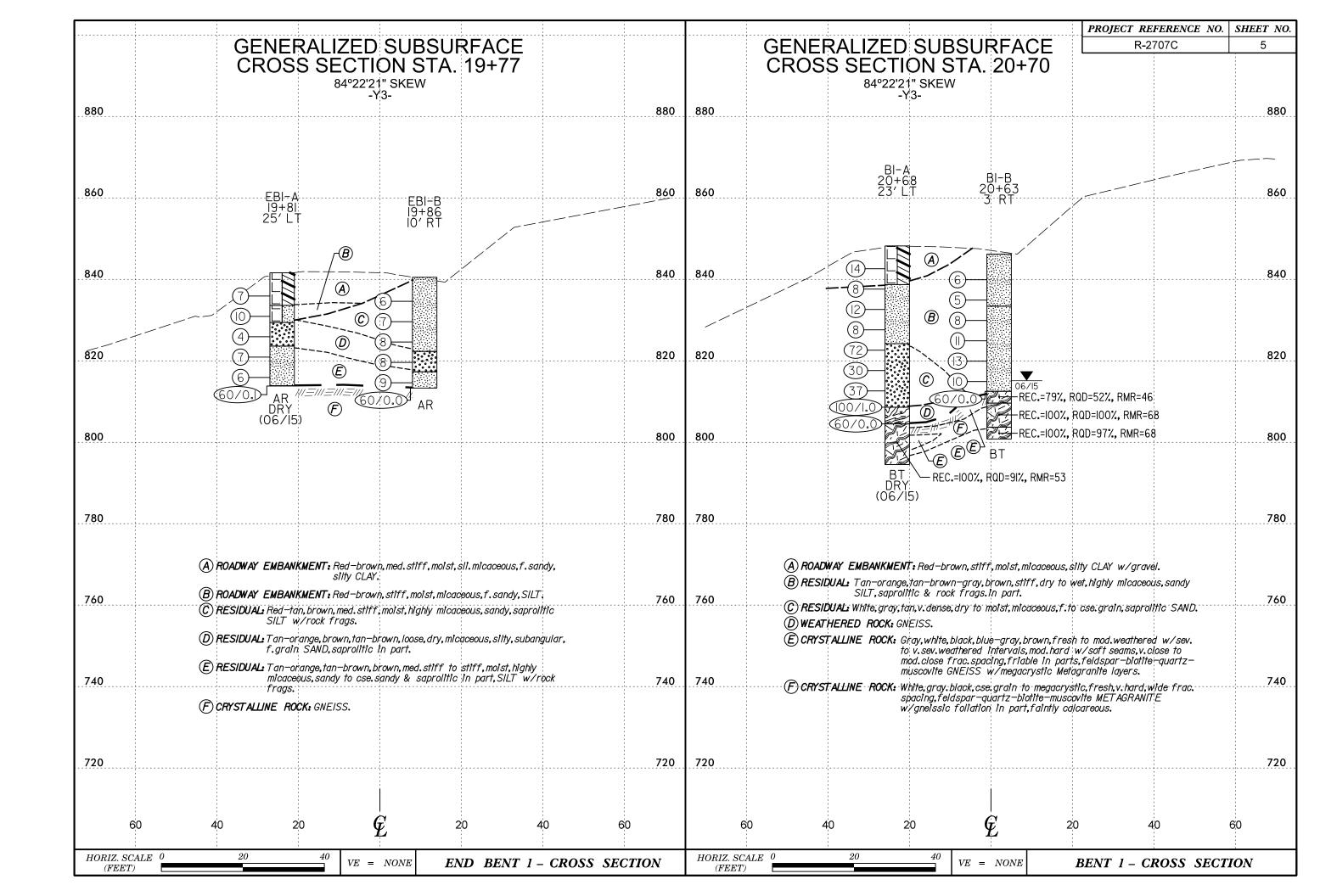
## SUBSURFACE INVESTIGATION

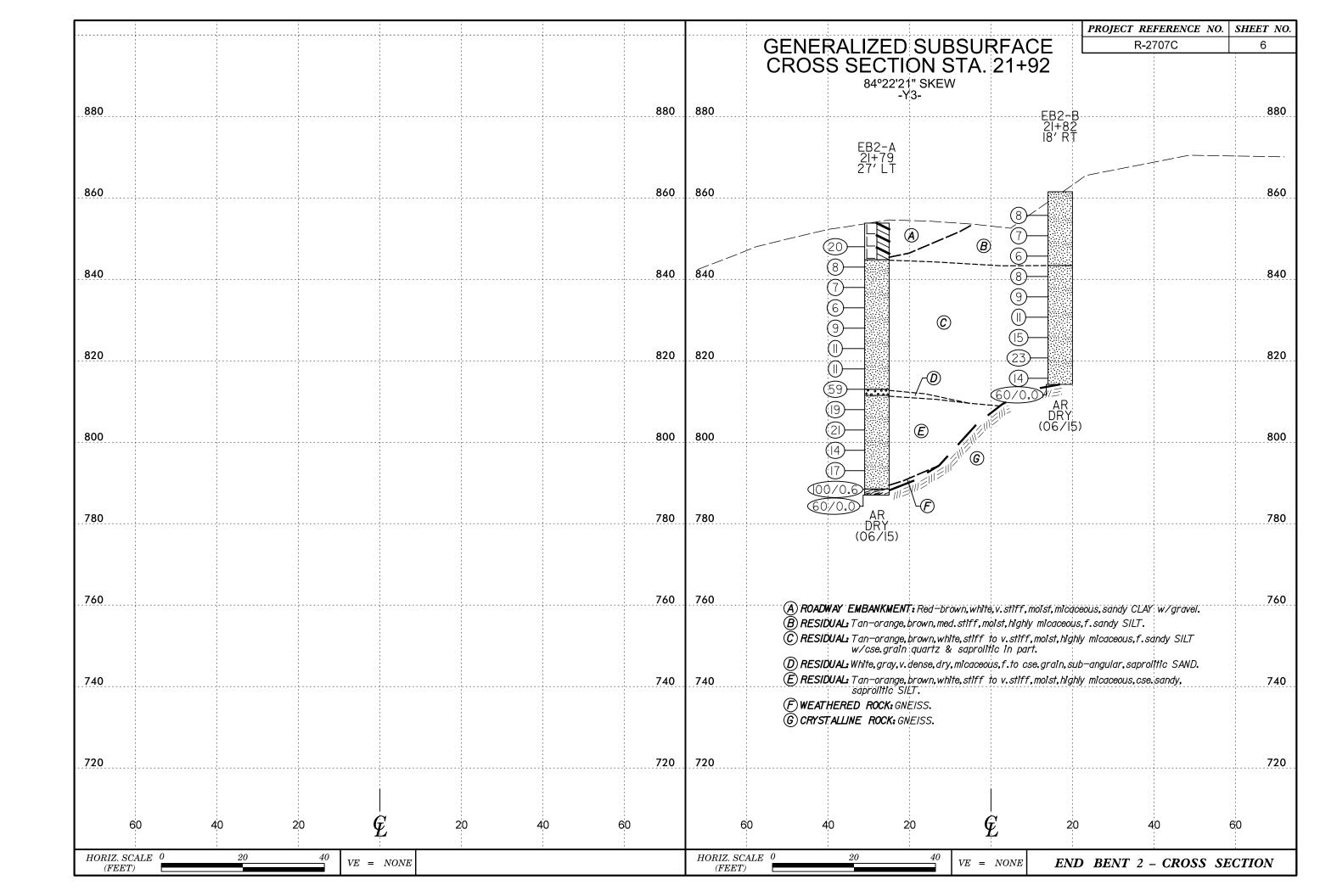
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

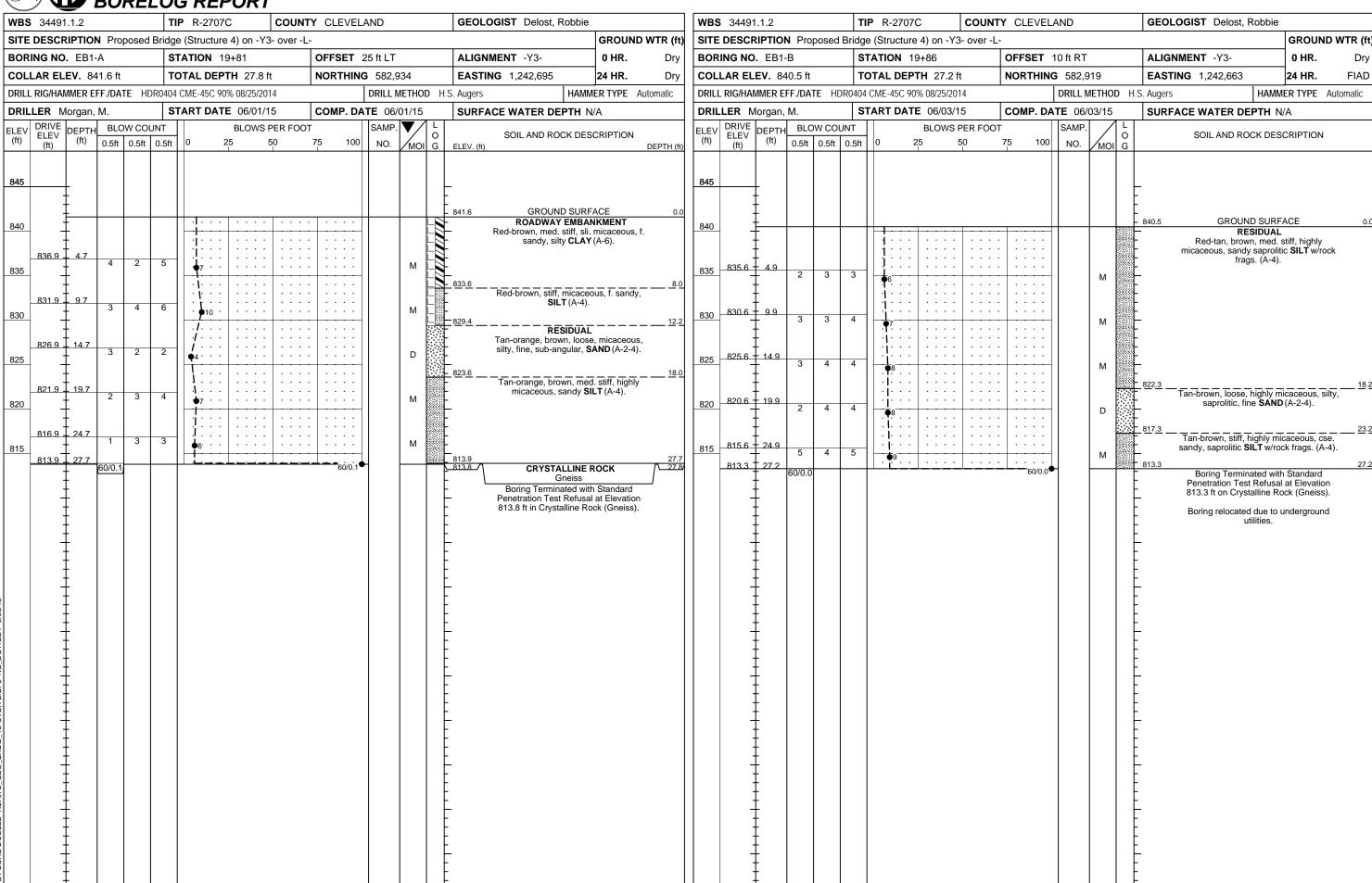
001, 05000101101			TED. 10. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	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.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.  ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED VISCOUSTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
LLASS. (\$\(\sigma\) 39% PASSING "200) (\$\(\sigma\) 37% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOOLD FIELD SPI REFUSAL IF TESTED. ROCK TIPE INCLUDES GRAINTE,	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-6 A-2-7 A-1, A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7 PASCING.	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
"10 50 MX GRANULAR SILI" MUCK,	PERCENTAGE OF MATERIAL	CCP) SHELL BEDS.ETC.  WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40    30 MX   50 MX   51 MN   PEAT   *200    15 MX   25 MX   35 MX   35 MX   35 MX   35 MX   36 MN   36 MN   36 MN   36 MN   36 MN   50 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR LITTLE OR HIGHLY PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX   A   A   A   A MX   R MX   12 MX   I6 MX   NO MX   AMOUNTS OF   UKUANJU	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN BATING FAIR TO	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	~	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.)  AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  LOOSE 4 TO 10	SOIL SYMBOL  OPT DMT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	M → 15.1111	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE)	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  AUGER BORING  CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY CORE BORING • SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	■ INFERRED ROCK LINE MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0   MATERIAL   STIFF   8 TO 15   1 TO 2	INFERRED ROCK LINE O MONITORING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - 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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	→→→→→ ALLUVIAL SOIL BOUNDARY △ PIEZUMETER	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	HOSE IN THE TOP OFFEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.005	AR - AUGER REFUSAL HI HIGHLY V - VERY	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MED MEDIUM VST - VANE SHEAR TEST CL CLAY MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MICA MICACEOUS WEA WEATHERED  CPT - CONE PENETRATION TEST MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE NP - NON PLASTIC 7/d - DRY UNIT WEIGHT DMT - DILATOMETER TEST ORG ORGANIC SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
<u> </u>	DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SAP SAPROLITIC         SS - SPLIT SPOON           F - FINE         SD SAND, SANDY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	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.
LL LIOUID LIMIT	FIAD - FLL IN AFTER DRILLING SL SILT, SILTY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FOSS FOSSILIFEROUS SLI SLIGHTLY RT - RECOMPACTED TRIAXIAL FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	<u> </u>
(PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS W - MOISTURE CONTENT RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: NA
- MOICT - (M) COLID. AT OR NEAR ORTIMUM MOICTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: NA FEET
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
DECULDES ADDITIONAL WATER TO	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BORING ELEVATIONS OBTAINED USING
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	8* HOLLOW AUGERS    H	INDURATION	R2707C_ls_+nl_l2080l.+in DATED 2-27-2015
PLASTICITY INDEX (PI) DRY STRENGTH	☐ CME-550 ☐ HARD FACED FINGER BITS ☐ X -N 02	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING X W/ ADVANCER POST HOLE DIGGER	CONTROL CAN DE CEDADATED FROM CAMPLE MITH CTEEL PROPE	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1







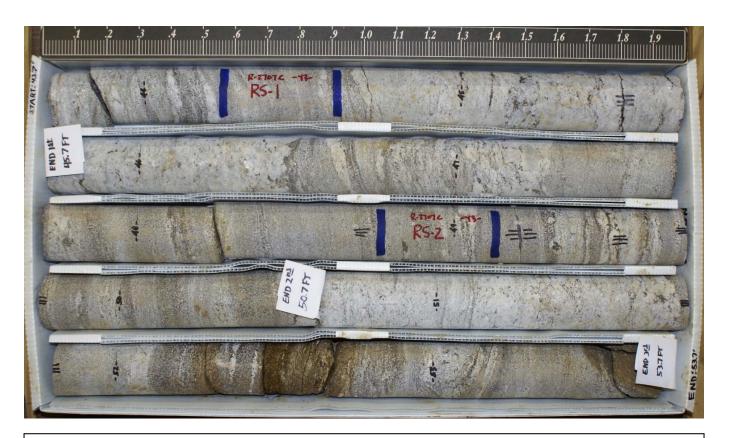




<b>WBS</b> 3449	91.1.2			Т	IP R-2707C	COUNT	Y CLEVEL	AND			GEOLOGIST Delost, Robb	ie	
SITE DESC	RIPTIO	N Pro	posed	d Bridg	e (Structure 4) on -Y3	3- over -L-	·					GROU	ND WTR (f
BORING N	<b>O.</b> B1-	4		S	<b>TATION</b> 20+68		OFFSET	23 ft LT			ALIGNMENT -Y3-	0 HR.	Dry
COLLAR E	LEV. 8	48.2 ft		T	OTAL DEPTH 53.7 f	t	NORTHIN	<b>G</b> 582,8	351		<b>EASTING</b> 1,242,719	24 HR.	Dry
DRILL RIG/H	AMMER E	FF./DA	TE H	DR0404	1 CME-45C 90% 08/25/20	14		DRILL N	ИЕТНО	D SI	PT Core Boring HAI	MER TYPE	Automatic
DRILLER	Morgan	, M.		s	TART DATE 06/09/1	5	COMP. DA				SURFACE WATER DEPTH	N/A	
DRIVE	DEDTI	1	ow co	UNT	BLOWS	PER FOOT		SAMP.		1 [	1		
(ft) ELEV	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МОІ	O G	SOIL AND ROCK D	ESCRIPTION	N DEPTH (
											, ,		
850													
	Ŧ										- 848.2 GROUND SU	RFACE	0
	Ŧ					T					ROADWAY EME Red-brown, stiff, micac		AY
845	‡										w/gravel (A		
_843.6	+ 4.6	6	6	8					М		•		
040	‡				:://:: ::::						•		
838.6	+ 9.6				<del>  . <i> </i>  </del>						 - 838.7		9
000.0	1	4	3	5	1   : <b>∮</b> 8 : :   : : : :				М		- RESIDU. - Tan-orange, brown		
835	<u>†</u>				•   • • • • •						- micaceous, sandy	SILT (4-4).	
833.6	14.6	5	5	7	{  : <u> </u>						<u>.</u>		
	<del>-</del>			'	<b>•</b> 12.				D		•		
830	Ŧ				-	+	1				<u>-</u>		
828.6	+ 19.6 +	4	4	4					D		•		
825	Ŧ				:::::::						• •		
	24.6		<u> </u>		]		1				824.2 White, gray, tan, v. der	se micaceo	<u>2</u>
	‡	38	10	62		:: <u>]</u> >	72		D		fine to cse. grain, saprol	tic <b>SAND</b> (A-	2-4).
820	‡					// /					• <del>-</del>		
818.6	29.6	8	12	18					М		• •		
0.4.5	‡				· · · ·   <del>\</del> \ <del>\</del> \ <del>\</del> \ <del>\</del> \ · · · · ·   \ <del>\</del> \ <del>\</del> \ · · · · ·   \ <del>\</del> \ <del>\</del> \ · · · · · ·   \ <del>\</del> \ <del>\</del> \ · · · · · · ·   \ <del>\</del> \ <del>\</del> \ · · · · · · ·   \ <del>\</del> \ <del>\</del> \ · · · · · · · · · · · · · · · · · ·				""		• •		
815	+ + 34.6				<del>    . \  </del>	<del> </del>	1				<del>-</del> •		
010.0	1	11	26	11	37				М		•		
810	<u>†</u>										<u>.                                    </u>		
808.6	39.6	100/1.0	1		: : : :   : : <b>i</b>	<u> </u>	100/1.0	•		1000	- 808.6 - WEATHERED	POCK	39
	Ŧ	100/1.	Ĭ								- WEATHERED	ROCK	
805 804.5	43.7	100/0				ļ · · · ·	00/0.0	<b>.</b>			- 		43
	‡	60/0.0	]				60/0.0	RS-1	1		- CRYSTALLIN Gneiss	E ROCK	
800	‡										• •		
000	‡							RS-2			<del>-</del> •		
	‡								Ί		•		
795	‡										- <del>-</del> 794.5		53
	<u>†</u>										Boring Terminated at Ele Crystalline Rock	evation 794.5	ft in
	<u> </u>										- Crystalline Rock	(Grieiss).	
	<b>†</b>										<del>-</del>		
	Ŧ										•		
	Ŧ										•		
	‡										<del>-</del> •		
	‡										• •		
	‡										- <del>-</del>		
	‡												
	<u>†</u>									[	•		
	Ŧ										_		
	Ŧ										•		
	‡										•		

WBS	34491	.1.2			TIP	R-270	)7C	С	OUNT	TY CLEVELAND		GEOLOGIST Delost, I	Robbie			
SITE DESCRIPTION Proposed Bi						Structu	ıre 4) on	-Y3- o	ver -L					GROUND WTR (		
BORING NO. B1-A						STATION 20+68					FSET 23 ft LT	ALIGNMENT -Y3-		<b>0 HR.</b> D		
COLLAR ELEV. 848.2 ft						TOTAL DEPTH 53.7 ft					RTHING 582,851	<b>EASTING</b> 1,242,719		24 HR.	D	
					1 0404 CME-45C 90% 08/25/2014					DRILL METHOD SPT Core Boring HAMMER TYP						
DRIL	LER M	lorgan,	M.		<b>START DATE</b> 06/09/15					COMP. DATE 06/09/15 SURFACE WATER DEPTH N/A						
	E SIZE				TOTAL RUN 10.0 ft											
LEV	RUN	DEPTH	RUN	DRILL	RUN   SAMP.   REC.   RQD   (ft)   (					L						
(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	G	ELEV. (ft)	ESCRIPTION AND REMAR	KS		DEPTH	
04.5	~~-											Begin Coring @ 43.7 ft				
800	804.5 - 802.5 - - -		5.0	N=60/0.0 2:03 3:07 2:36 2:01 1:54 1:36	(2.0) 100% (5.0) 100%	(1.8) 90% (4.9) 98%	RS-1 /	(10.0) 100%	(9.1) 91%		sev. weathered inter- close fracs., fri	White, blue-gray, black, brown, fresh to slight, weathered, w/sev. to v. sev. weathered intervals (52.4'-53.7'), hard, w/soft seams, mod. close to close fracs., friable, in parts, feldspar biotite, quartz, Gneiss w/megacrystic, metagranite layers (44.7'-46.5' & 50.7'-51.9'). 9@0°-20°; 2@40°				
	797.5 -	50.7	3.0	1:48 1:52	(3.0)	(2.4)					R1=7, R	22=17, R3=10, R4=12, R5=7 Rock Type E	7, RMR=53	3		
795	794.5 <b>–</b>	53.7	0.0	2:02 1:32		80%					- 794.5	Rock Type E			5	

# CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 4 ON -Y3- OVER -LWBS 34491.1.2 TIP R-2707C



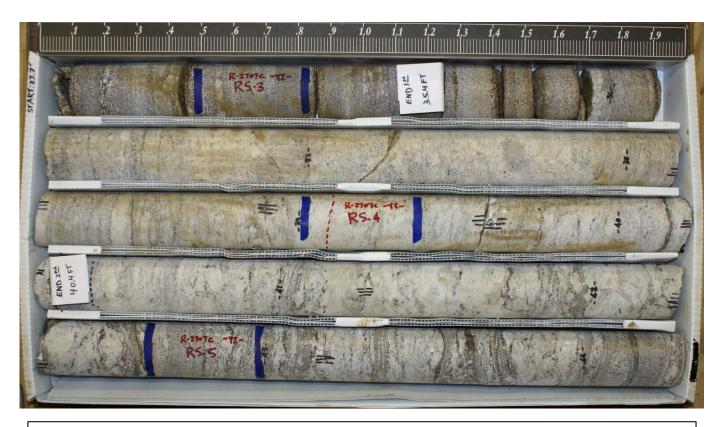
B1-A, 20+68, 23' LT. Box 1 of 1

WBS	34491	1.1.2			Т	IP R	R-2707	C	COUN	TY C	LEVEL	AND			GEOLOGIST Delost, Robi	oie	
SITE D	DESCR	RIPTIO	N Pro	posed	d Bridg	e (St	ructure	e 4) on -Y3	3- over -l						•	GROU	ND WTR (f
		). B1-E					<b>ON</b> 2			_	SET	3 ft RT			ALIGNMENT -Y3-	0 HR.	
OLL	AR EL	EV. 84	46.2 ft	<u> </u>	-+			<b>TH</b> 45.41	ft	NOF	RTHIN	<b>G</b> 582,8	348		<b>EASTING</b> 1,242,693	24 HR.	31.1
RILL F	RIG/HAN	MMER E	FF./DA	TE H	DR0404	1 CME	-45C 90	0% 08/25/20	14	1		DRILL N	ЛЕТНО	D N	W Casing W/SPT & Core HA	MMER TYPE	Automatic
RILL	ER M	lorgan,	. M.		s	TAR	T DAT	E 06/08/1	15	CO	MP. DA	TE 06/			SURFACE WATER DEPTH		
ı =\/ [	DRIVE	DEPTH		ow co					PER FOO			SAMP.	<b>V</b> /	1 - 1	1		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	:	25	50	75	100	NO.	МО	0 I G	SOIL AND ROCK [ ELEV. (ft)	ESCRIPTIO	N DEPTH (
350															_		
	-	<u> </u>													- -		
	-	<u> </u>				Ц.		<del></del>	<del></del>					300000	846.2 GROUND SU		0
345	-	<u> </u>				H			<del> </del>	.   .					RESIDU Red-brown, mediu	m stiff, highly	
	-	ŧ													micaceous, f. sandy, S	LT w/gravel (	(A-4).
340	840.9	5.3	1	3	3	╢							M		- -		
	-	ŧ				j									<u>.</u>		
	- 835.9 -	10.3				] ¦									• -		
335	-	t	2	2	3		5	+	<del> </del>				W		 - 833.4		12
	-	ł				i									Tan-brown-gray, stiff,	nighly micace	ous,
30	830.9 _	15.3	4	3	5	{ <u>L'</u>				-   -			M		cse. sandy, saprolitic (A-4)	OIL I W/IOCK II	ags.
	-	ł				Ⅱ .`	ļ			:   :			'''		<u>.</u>		
	825.9 <b>-</b>	20.3					1::								- - -		
25	-	ł	4	5	6	<u>                                     </u>	11-	+	<del> </del>				М		<u>-</u>		
	-	ł					1::								- - -		
20	820.9	25.3	4	4	9	{  :	11.	: : : :		.   .			M		_		
	-	Ŧ					.7.						IVI		_ •		
	815.9 <b>-</b>	30.3					1			:   :			_		•		
315	013.9 =	- 30.3	5	4	6	1 <u> </u> -	10		ļ · · ·				—M-	-	- <del>-</del>		
	812.5 -	33.7	00/0.6			:	i <u>.</u> :		<u> </u>	<u>:   :</u>	 	•			- 812.5		33
310	-	Ŧ	60/0.0	1		:					60/0.0	RS-3			- CRYSTALLIN Gneis		00
	-	Ŧ				-									809.6 - Metagra	nite	36
	-	‡				:						RS-4			- -		
305	-	‡				ŀ			ļ · · · ·	<u> </u>					- - -		40
	-	‡										RS-5			- 803.7 - Gneis	6	42
	-	‡			1	Ш:	· · ·			<u>:   :</u>					800.8	ovetien 200	45 0 ft in
	-	‡													<ul><li>Boring Terminated at E</li><li>Crystalline Roc</li></ul>		8 π in
	-	‡													- Boring relocated due		
	-	‡													utilities and steep	embankment.	
	-	‡													<del>.</del> •		
	-	‡													<u>.</u> -		
	-	ţ													<del>-</del> -		
	-	‡													<u>.</u>		
	_	ţ													- -		
	_	‡													- -		
	-	ł													-		
	-	Ŧ													-  -		
	-	Ŧ													- -		
	-	Ŧ													- -		
	-	‡													<del>-</del> •		
	-	‡			1										-		
	_	+	1	1	1								1	1	-		

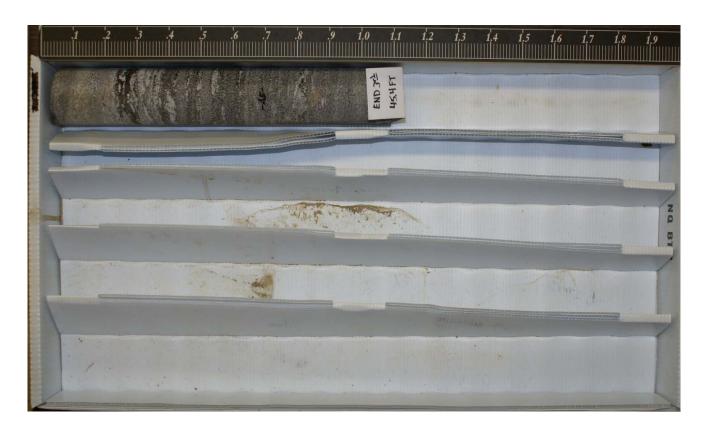
<b>VBS</b> 34491.1.2			TIP	R-270	7C	С	TNUO	Υ (	EVELAND		GEOLOGIST Delost, R	obbie		
SITE DESCRIPTION	<b>N</b> Prop	osed Bri	dge (S	Structu	ire 4) on	-Y3- o	ver -L	-					GROUND	WTR (f
BORING NO. B1-	3		STA	ΓΙΟΝ	20+63			OF	SET 3 ft RT		ALIGNMENT -Y3-		0 HR.	21.2
COLLAR ELEV. 8	46.2 ft		TOT	AL DE	<b>PTH</b> 45	.4 ft		NO	<b>THING</b> 582,848		<b>EASTING</b> 1,242,693		24 HR.	31.
RILL RIG/HAMMER	FF./DAT	E HDR0	404 CN	IE-45C	90% 08/25	/2014		•	DRILL METHOD	NW	Casing W/SPT & Core	HAMM	ER TYPE AL	utomatic
DRILLER Morgan	, M.		STAI	RT DA	TE 06/0	8/15		СО	IP. DATE 06/08/15		SURFACE WATER DEF	PTH N	/A	
CORE SIZE NQ2			TOTA	AL RU	<b>N</b> 11.7 f	t								
LEV RUN ELEV (ft) DEPT	H RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (ft)	DE	SCRIPTION AND REMARK	S		DEPTH
12.5			,,,	,,,		,,	,,,		. ,		Begin Coring @ 33.7 ft			
812.5 - 33.7 810.8 - 35.4 805.8 - 40.4 800.8 - 45.4	5.0	N=60/0.0 3:35 1:30/0.7/ 2:07 2:34 2:32 2:13 1:58 2:11 2:47 1:22 1:55 1:59	(1.2) 71% (4.9) 98% (5.0) 100%	(1.1) 65% (4.4) 88% (5.0) 100%	RS-4 RS-5	(2.3) 79% (5.9) 100% (2.9) 100%	(2.8)		hard to hard, v feld:  R1:  White, gray, bl	ack, sli v. clos Ispar-t =4, R2 lack, c spar-q	CRYSTALLINE ROCK i. to mod. weathered w/seam se to close frac. spacing, friab biotite-mascovite gneiss w/tro 10@0°-10° 2=13, R3=10, R4=12, R5=7, Rock Type E cse grain to megacrystic, fres quartz-biotite-mascovite, meta liation in part, faintly calcarect 1@40°	ole at disc. garne RMR=4 sh, v, ha agranite	scontinuities, ts. 46 rd, wide frac.	4.
800.8						100%	9/%		Gray, bl.  R1:  R1:  Boring Termin	=4, R2 lack, w feldsp =4, R2 nated a		RMR=6 frac. spareous RMR=6	pacing, 68 ock (Gneiss).	4.

## CORE PHOTOGRAPHIC RECORD PROPOSED BRIDGE STRUCTURE 4 ON -Y3- OVER -L-

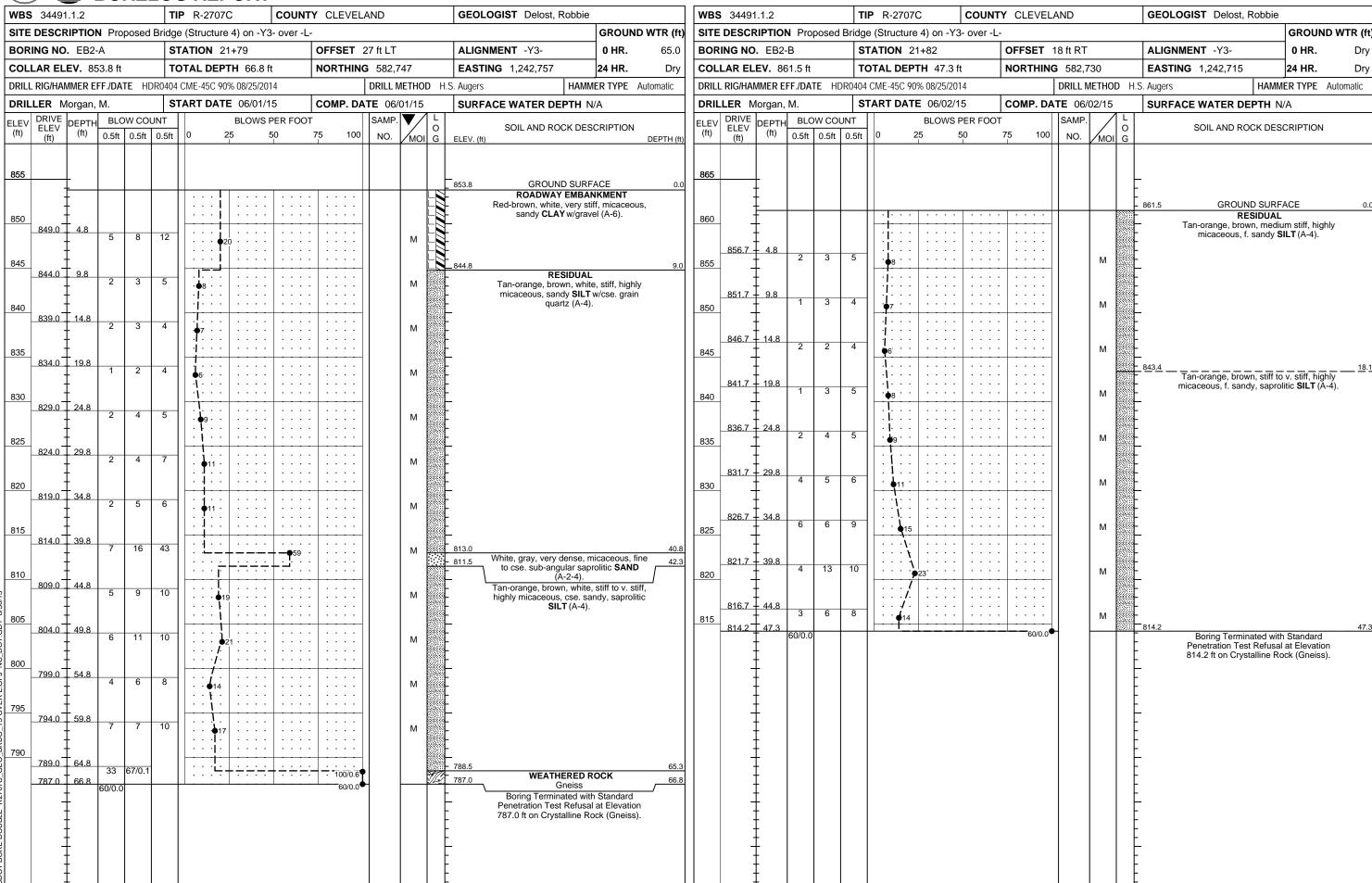
WBS 34491.1.2 TIP R-2707C



B1-B, 20+63, 3' RT. Box 1 of 2



B1-B, 20+63, 3' RT. Box 2 of 2





PROJECT REFERENCE NO.

R—2707C

RW SHEET NO.

ROADWAY DESIGN
ENGINEER

HYDRAULICS
ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR I/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

		L	ABORAT	ORY SU	JMN	MARY SH	EET FOR	R $ROC$	CK CORE	SAMI	PLES	
SAMPLE NO.	BORING NO.	DEPTH (FT)	ROCK TYPE	GEOLOGIC MAP UNIT	RUN RQD	LENGTH (FT)	DIAMETER (FT)	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (PSI)	SPLITTING TENSILE STRENGTH (PSI)	REMARKS
RS-1	B1-A	44.2-44.6	Gneiss	CZbg	90%	0.333	0.165	170.8	7,287	-	-	fresh-sli. wthd.
RS-2	B1-A	48.8-49.2	Gneiss	CZbg	98%	0.329	0.166	170.4	8,062	-	-	fresh-sli. wthd.
RS-3	B1-B	34.4-34.8	Gneiss	CZbg	65%	0.329	0.166	169.9	5,730	-	-	slimod. wthd.
RS-4	B1-B	39.0-39.4	Metagranite	Ocg	82%	0.337	0.166	157.9	5,322	-	-	fresh
RS-5	B1-B	42.6-43.0	Gneiss	CZbg	100%	0.333	0.165	168.7	6,187	_	-	fresh

KEVISIO

\$\$\$SYSTIME\$\$\$\$\$ \$\$\$\$\$\$\$\$\$\$\$\$\$\$\\\\\$\$\$\$\$\$\$\$\$\$\$\$\$ 70 N 2  $\mathcal{H}$ EZ FERE **CONTENTS** 

**DESCRIPTION** 

BORE LOG(S) & CORE REPORT(S)

TITLE SHEET LEGEND SITE PLAN

PROFILE(S) CROSS SECTION(S)

CORE PHOTOGRAPHS

SITE PHOTOGRAPHS

SHEET NO.

8-II

12

#### STATE OF NORTH CAROLINA

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

#### **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>CLEVELAND</u>

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

SITE DESCRIPTION BRIDGE NO. 470 ON -Y4- REV (MCBAYER-SPRINGS RD) OVER -L- (US 74 BYPASS)

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

#### **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 1991 707-6805. 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 STIU 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN TEXT OF THE 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** 

B. WORLEY, PG

B. SMITH, PG

J. BARE

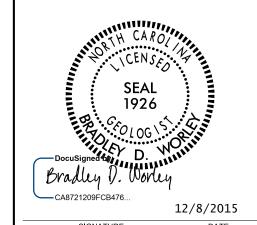
T. BRIGMAN

INVESTIGATED BY B. WORLEY

DRAWN BY B. WORLEY and B. SMITH

SUBMITTED BY Engineering Serives, PLLC

DATE \_\_MAY, 2015



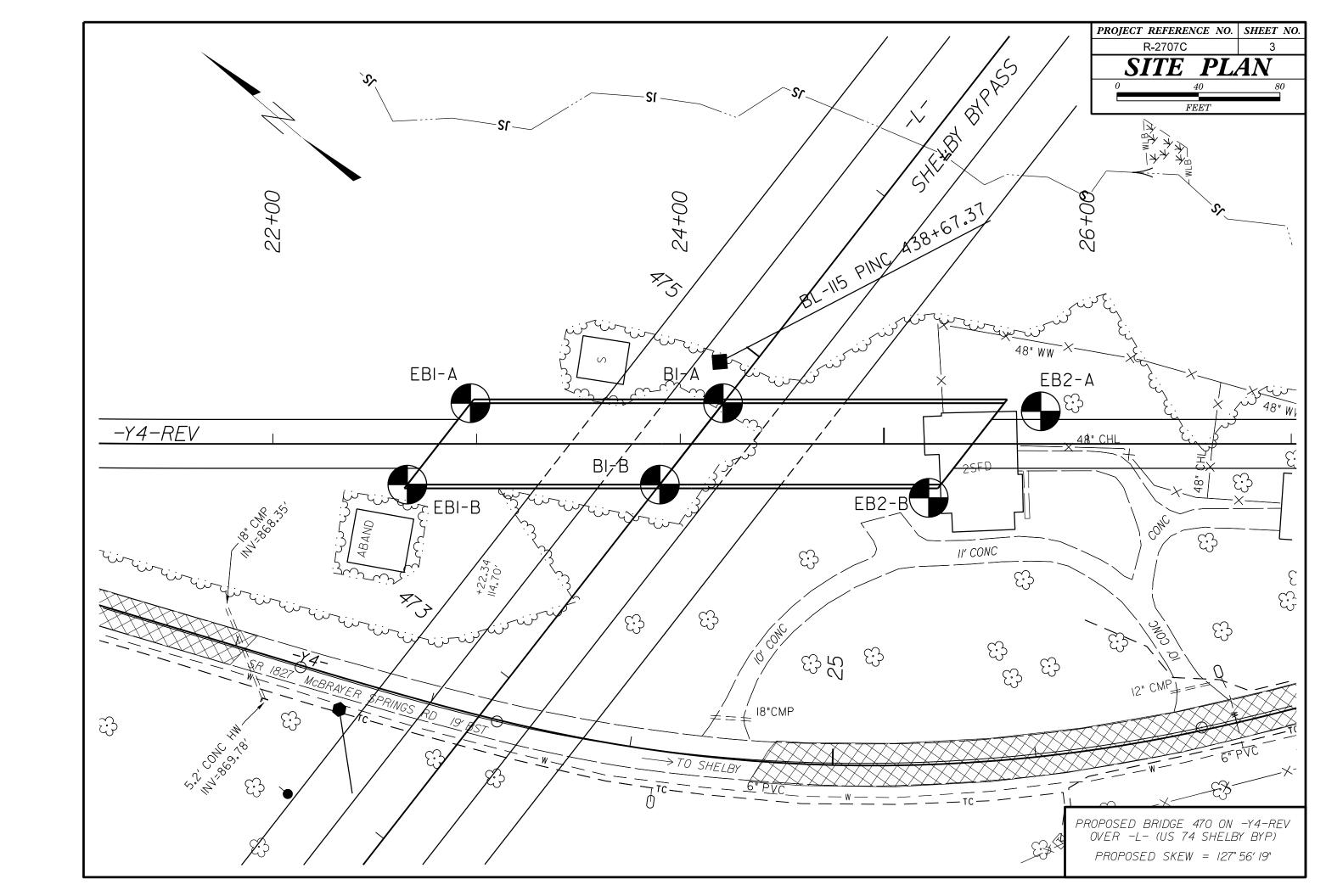
PROJECT REFERENCE NO. SHEET NO. 2

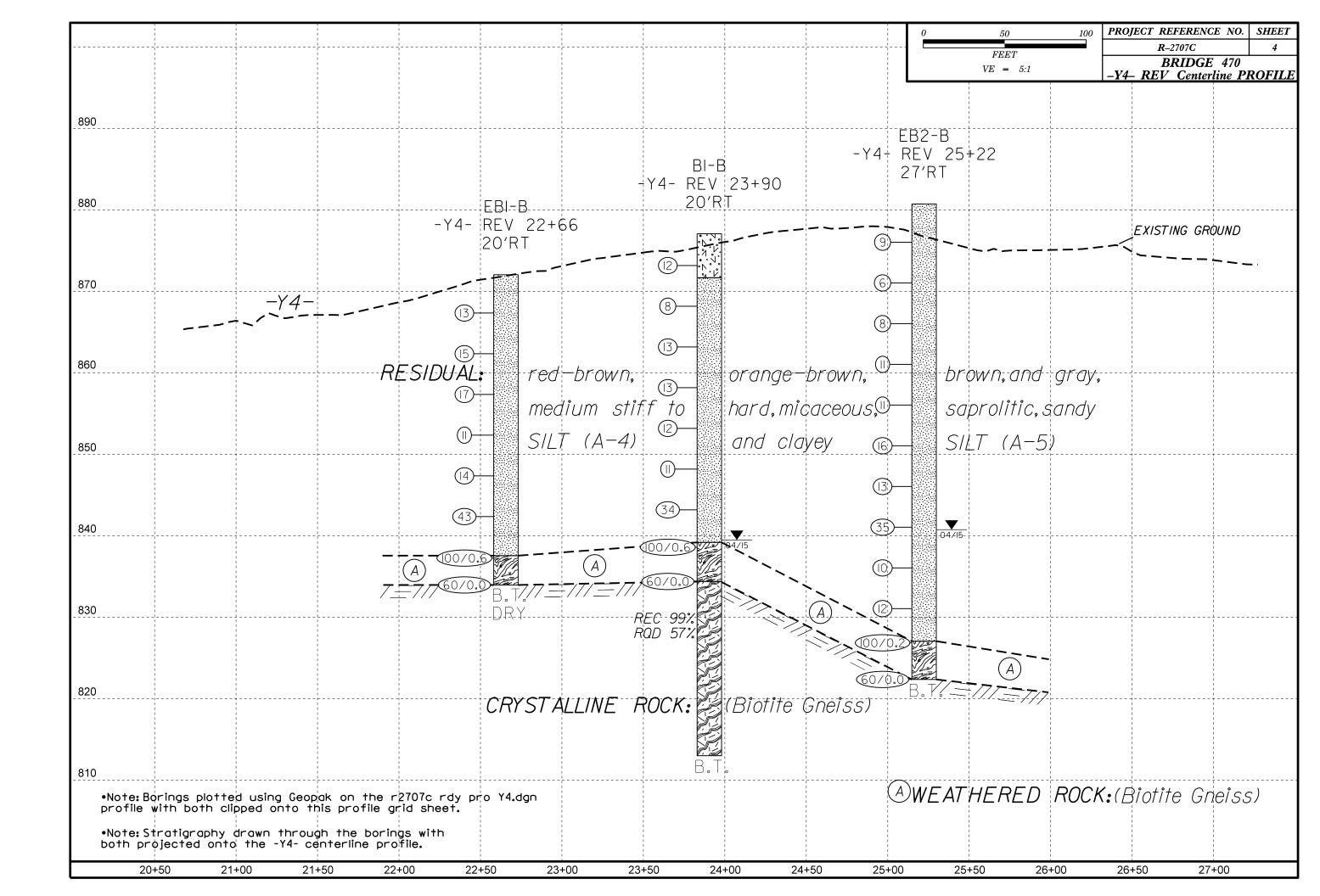
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

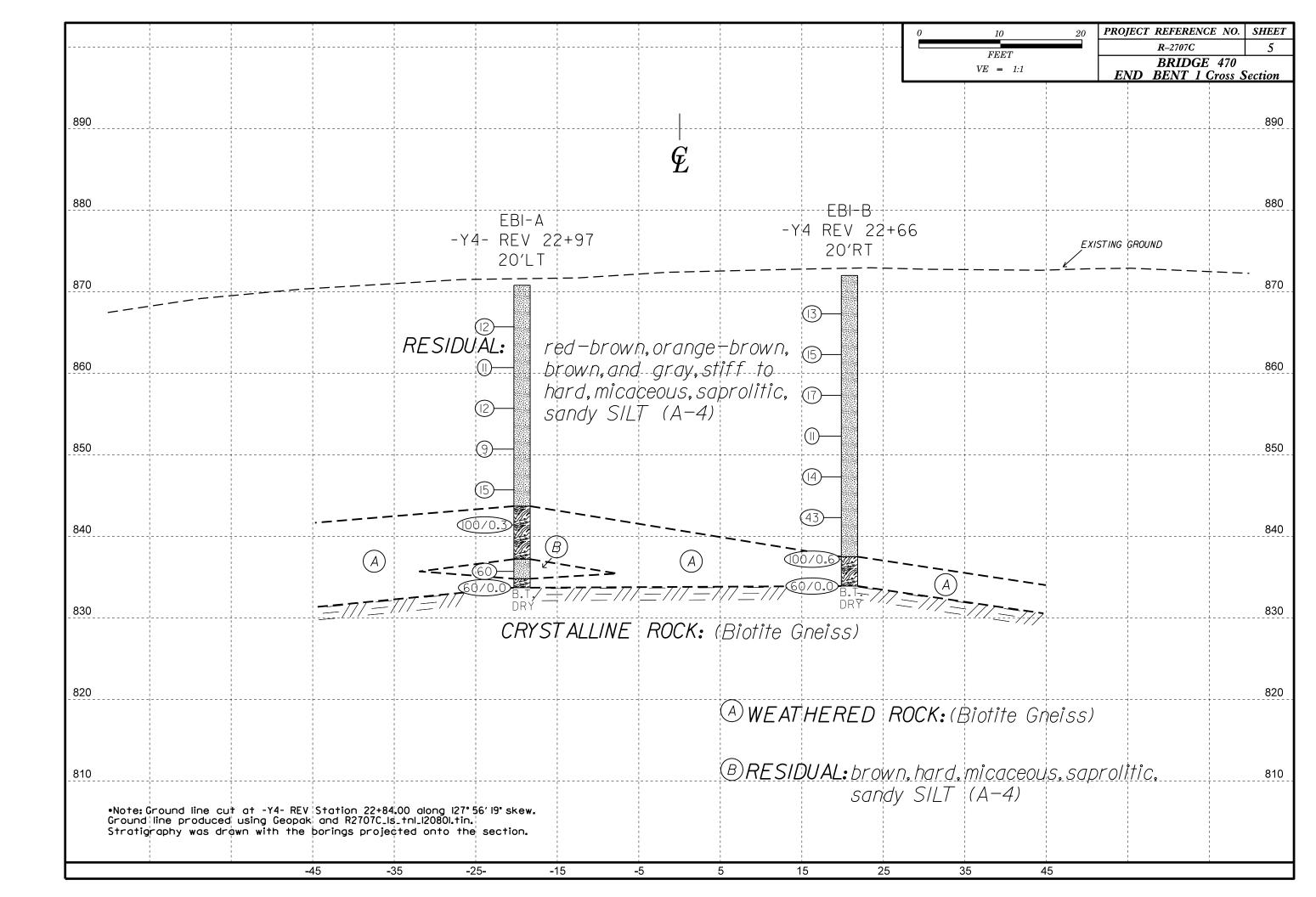
#### SUBSURFACE INVESTIGATION

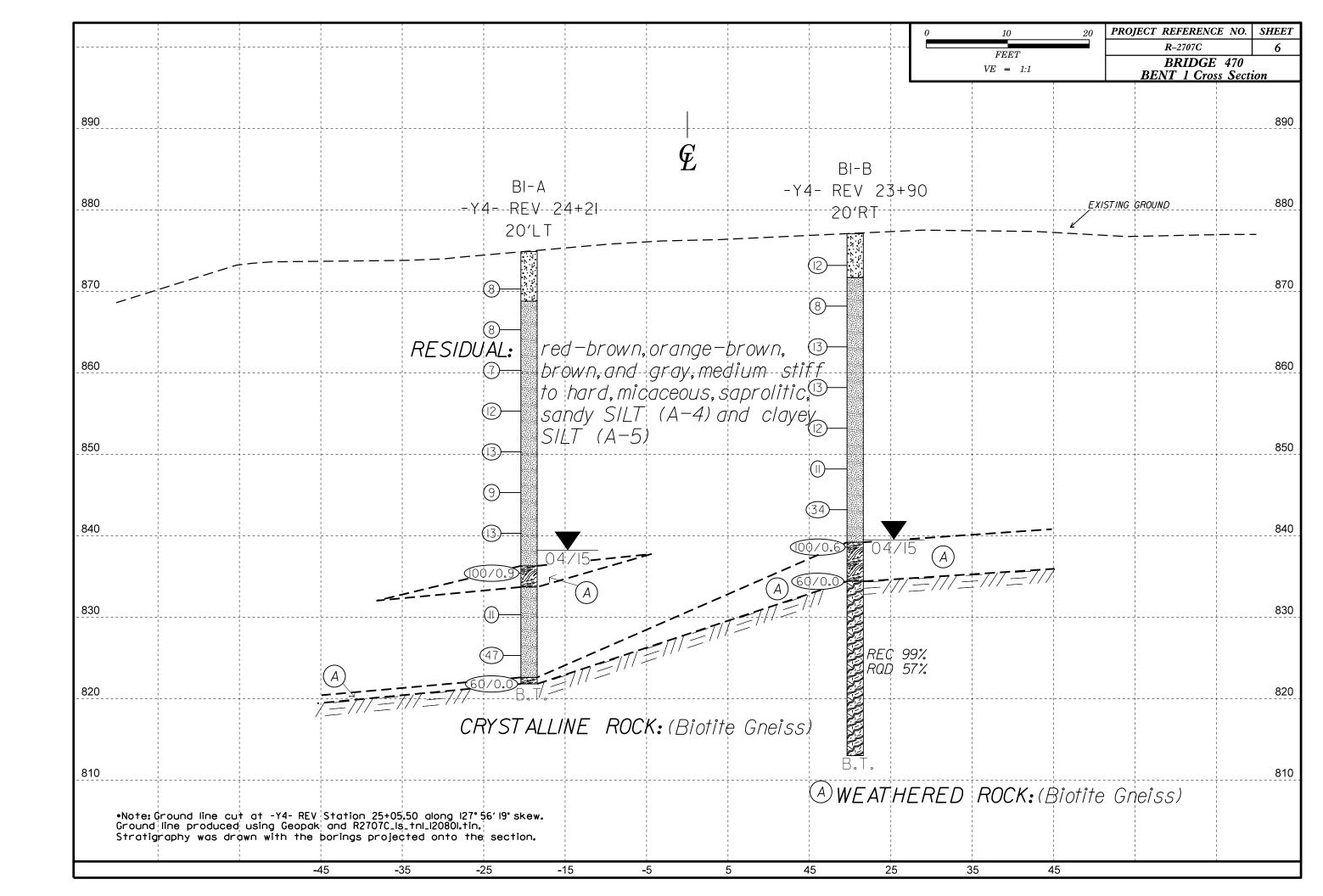
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

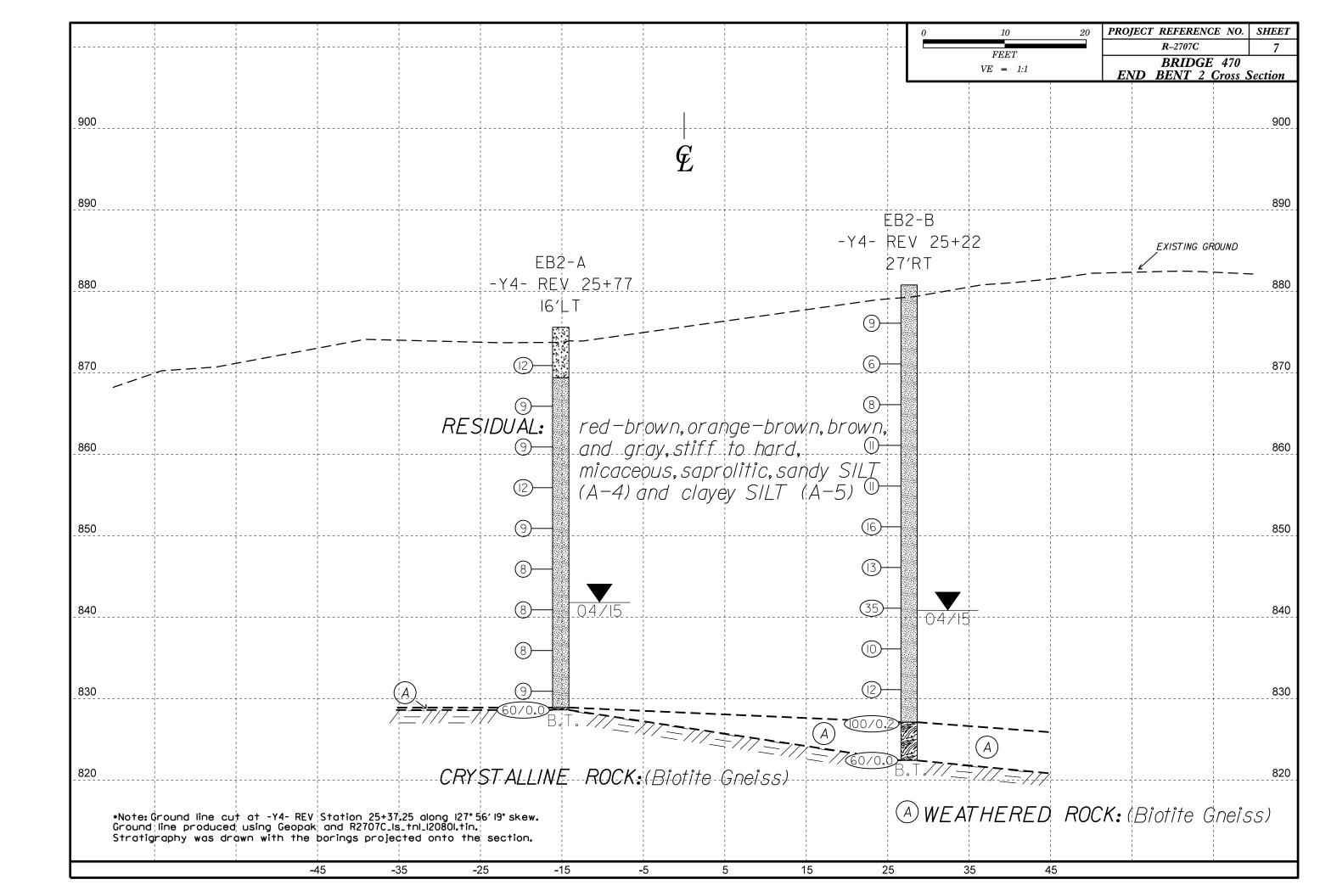
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASSHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	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 Ø.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNEISS, GABBRU, SUHISI, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 0000G0000G	MODERATELY COMPRESSIBLE	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	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
*40 30 MX 50 MX 51 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
-260 13 MA 23 MA 13 MA 33 MA 35 MA 36 MM 36 MM 36 MM 36 MM 36 MM 36 MM	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE OPERATE	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 4 MX 8 MX 12 MX 16 MX NU MX AMUUNIS UF ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STUNE FRAGS.  OF MAJOR GRAYEL, AND SAND GRAYEL AND SAND SOLIC SOLIC SOLIC	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING  ▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	STATIC WATER LEVEL AFTER 24 HOURS  \[ \sum_{PW} \]  PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBCROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBCROUP IS > LL - 30	0 11	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS  COMPACTATIONS OF RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE)	ROADWAY EMBANKMENT (RE)  ROADWAY EMBANKMENT (RE)  25/825  DIP & DIP DIRECTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	<u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LODGE / A	SPT SLOPE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A	SUIL SYMBOL STALLATION INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER OUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE         > 50           VERY SOFT         < 2	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	DIE TOMETED	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - 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
HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY SPT N-VALUE	ALSO AN EXAMPLE.  ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270  OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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
BOULDER CORRE CRAVEL COARSE FINE SUIT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER	ABBRE VIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
S1ZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE SOURCE TO SEE THE DESCRIPTION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  OESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNALL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS, - FRAGMENTS	FRACTURE SPACING BEDDING	
(P) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BL-II5 N 583,217,3760
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	E 1,245,136,1329 ELEVATION: 872.98 FEET
SL SHRINKAGE LIMIT	DRILL UNITS:   ADVANCING TOOLS:   HAMMER TYPE:   CME-45C   CLAY BITS   X AUTOMATIC   MANUAL	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	
PLASTICITY	CME-55	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC         0-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDIDIDATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH  COLOR	PORTABLE HOIST   TRICONE STEEL TEETH   HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
	X Diedrich D-50 TRICONE TRICONE SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14











### NCDOT GEOTECHNICAL ENGINEERING UNIT

VBS	34497	7.1.2			TI	I <b>P</b> R-2	707C	;	COUNT	ΤY	CLEVEL	AND			GEOLOGIS	ST Smith, B			
ITE I	DESCR	IPTION	<b>I</b> Brid	lge No	. 470	on -Y4-	REV	(SR 182	7) over -	-L-	(US 74 Sh	elby By <sub>l</sub>	oass)		•			GROUN	ID WTR (1
ORII	NG NO.	EB1	-A		S.	TATION	<b>N</b> 22	+97		(	DFFSET 2	20 ft LT			ALIGNMEN	IT -Y4- RE\	/	0 HR.	Di
OLL	AR ELI	<b>EV</b> . 87	70.8 ft		T	OTAL D	DEPTI	H 37.1 f	t	N	ORTHING	583,2	97		EASTING	1,245,041		24 HR.	Di
RILL	RIG/HAI	MMER E	FF./DA	TE SI	UM0093	B DIEDRI	CH D-	50 86% 10/	10/2014			DRILL N	ЛЕТНО	D H.	.S. Augers		HAMM	ER TYPE	Automatic
RILL	<b>.ER</b> B	are, J.			S.	TART [	DATE	04/07/1	5	C	OMP. DA	<b>TE</b> 04/	07/15		SURFACE	WATER DEP	TH N/	Α	
.EV	DRIVE ELEV	DEPTH	BLC	W CO	UNT			BLOWS	PER FOO	T		SAMP.	<b>V</b> /	LO		SOIL AND RO	OK DESC	PIDTION	
ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5 5	50	75	5 100	NO.	МОІ	G	ELEV. (ft)	OOIL AND NO	JK DLOC	ordi Hore	DEPTH
75		1													_				
		‡													- -				
70	-	<u> </u>				Ш.,									870.8	GROUNI		ACE	
0	-	‡														Brown, red-brow			
	866.7 -	4.1				: :				:					- mi -	icacous, saproli	tic, sand	y SILT (A-	4)
5	_	‡	4	5	7	1	12 .						М		- -				
		‡				::;	: :			:					<b>-</b>				
0	861.7 -	9.1	3	5	6	::				:			М		- -				
	-	‡													- -				
	856.7 -	14.1				: :¦				:					<b>-</b> -				
5	-	‡	4	7	5	• • •	12			•			М		- -				
		‡				: j				:					- -				
0	851.7 -	19.1	3	4	5					:			D		- -				
	-	‡													<u> </u>				
	846.7 -	24.1				]   : : ;	<u>,</u> : :			:					- -				
5	_	‡	3	5	10	• •	15			•			D		<u>-</u>				
	-	‡					<u>-:-</u>	<del></del>		+	-:-:-:-:-:				- 843.7 -	WEATHE	RED RO	OCK	
.0	841.7 -	29.1	100/0.3			::	: :				100/0.3				- -	(biotit	e gneiss	)	
.0	-	‡													-				
	836.7 -	34.1				] ::			· · · ·	-:-					837.2	DEG	SIDUAL		
35	_	‡	20	23	37				. •60	· 			М			wn, micaceous	, saprolit	ic sandy S	LT /
H	833.7 -	37.1	60/0.0								60/0.0	+		77/2	833.7	WEATHE			—/_
		‡													_	(biotit	e gneiss LINE R		
	-	‡													<del>-</del> -	(biotit Boring Termina	e gneiss		
		‡													Pene	tration Test Re on Crystalline I	fusal at E	Elevation 8	
	_	‡													_	-		-	
		‡													Softe	der drilling at 2° r drilling at 33.6	' interpre	eted as res	idual
	-	‡													_ Har -	der drilling at 30	o.u inter	preted as v	VK
	-	‡													<u>-</u>				
		‡													- -				
	_	‡													- -				
		‡													-				
	:	‡													-				
	-	‡													<del>-</del> -				
	-	‡													- -				
	-	‡													- 				
		‡													-				
	-	‡													- -				
	-	t													_ -				
	-	t													-				
	-	Ţ										1			-				

NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	34497	'.1.2			TI	<b>P</b> R-2707C	COUNT	Y CLEVEL	AND			GEOLOGIST Worley, B	3.		
SITE	DESCR	IPTION	<b>I</b> Brid	dge No	o. 470 d	on -Y4- REV (SR 182	27) over -	L- (US 74 Sh	elby By	pass)				GROUN	ID WTR (ft)
BOR	ING NO.	EB1	-B		S	<b>TATION</b> 22+66		OFFSET 2	20 ft RT			ALIGNMENT -Y4- REV		0 HR.	Dry
COLI	LAR ELE	<b>EV</b> . 87	72.0 ft		T	OTAL DEPTH 38.11	ft	NORTHING	583,2	295		<b>EASTING</b> 1,244,990		24 HR.	Dry
DRILL	RIG/HAI	MMER E	FF./DA	TE S	UM0093	3 DIEDRICH D-50 86% 10	/10/2014		DRILL N	METHO	D H.	S. Augers	HAMM	ER TYPE	Automatic
DRIL	<b>LER</b> B	are, J.			S <sup>-</sup>	TART DATE 04/02/	15	COMP. DA	TE 04/	02/15		SURFACE WATER DEP	TH N/	'A	
ELEV	DRIVE ELEV	DEPTH	BLO	ow co	UNT	BLOWS	PER FOOT	г	SAMP.	<b>V</b> /	LO	SOIL AND ROC	Y DESC	PDIDTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МО		ELEV. (ft)	N DESC	JKIF HON	DEPTH (f
875												_			
												and the	OUDE		
	-				1		T						IDUAL		0.
870	_	<u> </u>				<del>   </del>	<del> </del>	<del></del>			E	_ Red-brown to ta micaceous, saprolitic	n-brown , f. sand	and gray, ly SILT (A-	4) w/
	868.3	3.7	4	6	7	13.		.		М	E	some CR			,
865											-				
	863.3	8.7		<u> </u>			: : :				F	-			
		F	3	7	8	15	: : :	.		D	F				
860	_	ļ									F	-			
	858.3	13.7	5	6	11					D					
855	-	ļ				· · · •   · · · · · · · · · · · · ·									
000	853.3	18.7										-			
	- 0000.0	10.7	3	5	6	1 . •11				D					
850	_	<u> </u>										_			
	848.3	23.7	2	5	9	: : [: :   : : : :		.							
	-	ł	2	°	9	14.		.		D	H				
845	_	-					1				F	-			
	843.3	28.7	14	28	15		3	.		D	F				
840	-	Ī						.			F				
	838.3	33.7									F	-			
	-	ļ.	13	66	34/0.1	: : : :   : : : : <del>':</del>	- -:-:-:-	100/0.6	•		7/2	837.5 WEATHE			34.
835	833.9	38.1					1					(biotite 	e gneiss	)	38.
	833.9 -	38.1	60/0.0					60/0.0	4		-	CRYSTAL			30.
	:	<u> </u>										Boring Termina	e gneiss ted with		
	-	<u> </u>										<ul> <li>Penetration Test Ref ft on Crystalline R</li> </ul>			
	-	<u> </u>										Harder drilling at 2		-	
	_	<u> </u>										-	-7.0 1110	orproted **	
		<u> </u>													
	-	ŀ									E				
	-	-									<u> </u>	-			
		Ī									F				
	-	F									l F				
	-	ļ									F	-			
	-	ļ													
	_	‡										-			
	:	‡			1										
	-	‡													
	-	t										-			
	-	ł			1						F				
	-	Ł									F	_			
	-	F			1						F	=			
	:	Ţ		1	1										
	-	t		1	1						1				

## NCDOT GEOTECHNICAL ENGINEERING UNIT

VBS	34497	7.1.2			TI	<b>P</b> R-2707C	COUNT	Y CLEVELA	AND			GEOLOGIST Smith, B.	
ITE	DESCR	IPTION	l Bric	lge No	. 470 (	on -Y4- REV (SR 18	27) over -l	L- (US 74 Sh	elby By	pass)		•	GROUND WTR (f
ORI	ING NO.	. B1-A			S	<b>TATION</b> 24+21		OFFSET 2	20 ft LT			ALIGNMENT -Y4- REV	<b>0 HR.</b> 40.
OLL	AR ELI	<b>EV.</b> 87	'4.9 ft		т	OTAL DEPTH 53.1	ft	NORTHING	583,2	203		<b>EASTING</b> 1,245,121	<b>24 HR.</b> 36.
RILL	. RIG/HAI	MMER E	FF./DA	TE SI	JM0093	DIEDRICH D-50 86% 10	/10/2014		DRILL N	ИЕТНО	<b>D</b> H.:	S. Augers HAI	MMER TYPE Automatic
RIL	<b>LER</b> B	are, J.			S	TART DATE 04/07/	15	COMP. DAT	<b>ΓE</b> 04/	08/15		SURFACE WATER DEPTH	N/A
EV	DRIVE	DEPTH	BLC	W CO	UNT	BLOWS	PER FOOT		SAMP.	<b>V</b> /	L		
ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	MOI	O G	SOIL AND ROCK DI	ESCRIPTION DEPTH
75												_874.9 GROUND SUI	RFACE
		£										RESIDUA Red-brown, micaceous,	
	871.3	3.6						.				,,	
0	_	Ŧ	3	3	5	8	+			М	ľ:¦F	- 868.8	
		Ŧ									F	Brown and orange-brown micaceous, sandy	own, saprolitic,
5	866.3	8.6	2	3	5					М	F	micaceous, sandy	SILI (A-4)
	-	Ŧ									F	-	
	861.3	13.6									F		
0	_	-	3	3	4	7				М		_	
		‡				:\; :: ::::		.					
5	856.3	18.6	5	5	7	: \i : : : : : :		:   : : : :		М			
3	-	‡								IVI		-	
	- 851.3 <sup>-</sup>	22.6						.					
0	001.0	23.6	4	6	7	13				D		_	
	-	ŧ				::/:: ::::		.			l t		
	846.3	28.6			_	:[:: ::::		.			l E		
5_	-	<del> </del>	4	4	5	9	+			М	li e	-	
		Ŧ				: {:: ::::		.			F		
0	841.3	33.6	5	7	6	13				М	F		
	-	Ŧ				· ·   · · · · ·					F	-	
	836.3	38.6									F	836.3	3
5_	-	‡	36	64/0.4				100/0.9		M		WEATHERED (biotite gne	ice)
		‡				:;-:-	+	:+÷÷::-:-				RESIDUA	AL 4
0	831.3	43.6	3	4	7			.		Sat.		Brown to orange-brown a micaceous, sandy	
	-	‡				11.				Jai.		-	
	826.3 <sup>-</sup>	48.6				:::: `\\.::							
5	020.5	40.0	15	28	19		□ ■47			Sat.		_	
		‡						.				822.6	5
	821.8 -	53.1	60/0.0				T	60/0.0	1		<i>F///</i> _	821.8 WEATHERED (biotite gne	ROCK5
	-	<u> </u>									╽	CRYSTALLINE	ROCK
		ŧ									<u> </u>	(biotite gne Boring Terminated v	vith Standard
	_	t									E	Penetration Test Refusal ft on Crystalline Rock	at Elevation 821.8
	-	ł									F	Softer drilling at 41.2' inte	rpreted as residual
	-	ł									F	Harder drilling at 52.3' in Auger refusal	terpreted as WR
	-	ł									F	-	
	-	Ŧ									F		
	:	Ŧ											
	-	Ŧ										-	
	-	‡											
	-	‡										-	
	:	‡											
	-	†									<u> </u>		



WBS	3449	97.1.2			TI	<b>P</b> R-2707C	COUNT	Y CLEVEL	AND			GEOLOGIST Smith, B.		
SITE	DESC	RIPTION	l Brid	dge No	o. 470 d	on -Y4- REV (SR 182	7) over -l	L- (US 74 Sh	elby By	pass)			GRO	OUND WTR (ft
BOR	ING N	<b>)</b> . B1-B	1		S	<b>TATION</b> 23+90		OFFSET 2	20 ft RT			ALIGNMENT -Y4- REV	0 HI	R. N/A
COL	LAR E	L <b>EV</b> . 87	77.1 ft		TO	OTAL DEPTH 64.1 f	t	NORTHING	583,2	200		<b>EASTING</b> 1,245,071	24 HI	<b>R.</b> 37.6
DRILI	L RIG/H	AMMER E	FF./DA	ATE S	UM0093	DIEDRICH D-50 86% 10/	10/2014		DRILL N	METHO	<b>D</b> SI	PT Core Boring	HAMMER TY	PE Automatic
DRIL	LER	Bare, J.			S	TART DATE 04/08/1	5	COMP. DA	TE 04/	08/15		SURFACE WATER DEP	TH N/A	
ELEV	DRIVE	DEPTH	BLO	ow co	UNT	BLOWS	PER FOOT		SAMP.	<b>V</b> /	LO	SOIL AND ROO	OK DESCRIPTI	ON
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МОІ		ELEV. (ft)	OR DESCRIP II	DEPTH (
880		1										_		
		<u> </u>										- ODOLINE	0.1054.05	
		<del>                                     </del>		-		<del>                                     </del>	<u> </u>				v.	RES	SURFACE SIDUAL	0.
875	874.2	1 2.9				<del>   </del>	<u> </u>	<del></del>			1.1.1	_ Red-brown, c	layey SILT (A-5	5)
		Ŧ	2	5	7	. •12				М		- - 871.7		5.
870		Ŧ										- Brown to orange-bro	wn and gray, sandy SILT (A-4	aprolitic,
	869.2	7.9	2	3	5	1				М		- Illicaceous, s	alluy SILT (A-4	·)
		Ŧ										•		
865	864.2	± <sub>12.9</sub>				- 1						-		
		+	4	6	7	13.				М		• •		
860		Ŧ				: : : :   : : : :						• •		
-	859.2	17.9	4	6	7	1				M		<del>-</del> -		
		‡				• 13				IVI		•		
855	854.2	+ 22.9										<del>-</del>		
	034.2	‡ <sup>22.9</sup>	5	5	7	12.				М		• •		
050		‡				::i::: :::::		:   : : : :				• •		
850	849.2	27.9	4	5	6							<del>-</del> -		
		‡	-	"				.		М		- -		
845		‡										- -		
	844.2	32.9	7	14	20	34		.		М				
		<u> </u>				:::: ::::`:`	* ; ; ;	.				• •		
840	839.2	37.9	47	50/0.4		<del>   </del>						839.2		37.
		1	47	53/0.1	'			. 100/0.6	'				RED ROCK e gneiss)	
835		<u> </u>						.				- <del></del> 834.4		40
	834.4	42.7	60/0.0	0					'			CRYSTAL	LINE ROCK	42.
		Ŧ						.				(biotite	e gneiss)	
830		Ŧ										<del>-</del>		
		Ŧ										•		
825		Ŧ										•		
		Ŧ										<del>-</del> ·		
		‡										- -		
820	-	‡						4				- <del>-</del>		
		‡						:   : : : :				- -		
815		‡						:   : : : :				• •		
010	1	‡					: : :					<del>-</del> 813.0		64.
		+					1		1		NF-/	Boring Terminated Crystalline Roo	at Elevation 81	
		<del>+</del> + + +										Crystaline Rot	ck (blottle griets	55)
		‡										_ - -		

#### NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	34497			RE B		R-270				Υ	CLEVELAND GEOLOGIST Smith, B.
			l Brid	lae No. 4				_			JS 74 Shelby Bypass) GROUND WTR (fi
	ING NO.			<u> </u>			23+90			_	FSET 20 ft RT ALIGNMENT -Y4- REV 0 HR. N//
	LAR ELI				_		PTH 64.	1 ft		_	ORTHING 583,200 EASTING 1,245,071 24 HR. 37.0
				TE SUMO					2014	1	DRILL METHOD SPT Core Boring HAMMER TYPE Automatic
	LER B						<b>TE</b> 04/0			СО	DMP. DATE 04/08/15 SURFACE WATER DEPTH N/A
	E SIZE						N 22.4 f				
ELEV	RUN	DEPTH	RUN	DRILL		JN RQD	SAMP.		ATA RQD	Ŀ	
(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft)	NO.	(ft) %	(ft) %	Ö G	DESCRIPTION AND REMARKS  ELEV. (ft)  DEPTH (
834.4											Begin Coring @ 42.7 ft
	834.4 833.0 832.0	+ 42.7 - 44.1 - 45.1	2.4 5.0	N=60/0.0	(1.8) 75%	(0.7)		(21.2) 99%	(12.3) 57%		834.4 CRYSTALLINE ROCK 42 Light to dark gray and black with orange-brown satining, v. slightly to slightly
830		10	3.0		(5.0)	(0.7)					weathered, mostly hard, moderately close to close-fractured, biotite gneiss with zones (43.9'- 47.9', 54.1'-55.1', and 58.0'-59.1') of moderate to
-	828.0	49.1									moderately severe-weathered, soft to medium hard, v. close-fractured weathered rock (biotite gneiss)
		10.1	5.0		(4.7) 94%	(4.7) 94%					- Hours of took (state grides)
825		‡			94 /0	94 /0					<u></u>
	823.0	54.1	5.0		(4.8)	(1.9)					‡
820	:	†	5.0		96%	38%					<del>-</del>
020	818.0	59.1									<u> </u>
	010.0	00.1	5.0		(4.9) 98%	(4.3) 86%					<del>-</del>
815		‡			90 /0	00 /6					<del>_</del>
	813.0	64.1								S	813.0 64  Boring Terminated at Elevation 813.0 ft in Crystalline Rock (biotite gneiss)
	:	‡									borning Terminated at Elevation 813.0 it in Crystalline Rock (blottle griefss)
	-	‡									-
	:	‡									
	:	‡									
	:	‡									
	:	<u> </u>									
	-	ł									-
		ł									-
	_	ł									_
		ł									_
	] :	-									_
	-	-									_
		Ŧ									-
	:	Ŧ									-
	-	Ŧ									F
		‡									-
	-	‡									- -
	:	‡									-
	:	‡									
	-	‡									_
	:	ł									<u> </u>
		ł									_
	-	ł									Ł
	:	<u> </u>									Ŀ
	-	Ŧ									F
	:	ļ									F
	:	‡									-
	-	‡									<u> </u>
	:	‡									‡
	:	t									L

## NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 3	34497.1	1.2			TI	IP R-2707C	;	COUNT	Y CLEVEL	AND			GEOLOGIST Smith, B.	
SITE DE	ESCRIF	PTION	Brid	lge No	. 470	on -Y4- REV	' (SR 182	7) over -L	(US 74 Sh	elby By	pass)			GROUND WTR (
	G NO.			_		TATION 25		-	OFFSET				ALIGNMENT -Y4- REV	0 HR. 37
COLLA	R ELE\	<b>v</b> . 87	'5 6 ft			OTAL DEPTI			NORTHING	583.0	81		<b>EASTING</b> 1,245,219	<b>24 HR</b> . 33
				TF SI		B DIEDRICH D-			1			п н		MMER TYPE Automatic
			11./07	12 00		TART DATE			COMP. DA			11.	SURFACE WATER DEPTH	
	R Bar		DI C	ow co		IARI DATE		PER FOOT		SAMP.	7//15	1 1	SURFACE WATER DEPTH	IN/A
/ft\ E	ELEV	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0 25		60 10	75 100	NO.	//	0	SOIL AND ROCK DE	
	(ft)		0.510	0.510	0.51	H - 1		ſ		110.	/MOI	G	ELEV. (ft)	DEPTH
380	-+												_	
	Ŧ												<del>-</del>	
375	Į												- 875.6 GROUND SUF	
,,,	‡												<ul><li>RESIDUA</li><li>Red-orange, micaceous, s</li></ul>	
8	371.9	3.7				]   : : : :						N.	- w/ some sa	and
370			3	6	6	• •12 •					М	   	- <del>-</del> 869.4	
	ŧ					::::							Brown to orange-brown ar	nd gray, saprolitic,
8	366.9 <del>T</del>	8.7	2	3	6								micaceous, sandy	SIL1 (A-4)
365	Ŧ		_			9	· · · · ·				M		- -	
	‡					: :::							- -	
	361.9	13.7	2	4	5	-   ·   · · ·					М		- -	
360	+					1 1			<del>   </del>				_ -	
8	356.9	18.7				•   • •							_	
355	Ŧ	10.7	5	4	8	• •12 •		: : : :			D		- -	
	Ŧ												<del>-</del> -	
8	351.9	23.7	4		_	::::							- -	
50	‡		4	4	5	. •9			<u> </u>		M		- <del>-</del>	
	<u> </u>					: i: : :							- -	
	346.9	28.7	2	4	4	{  · <u> </u> . · ·					М		-	
345	Ŧ								+		IVI		- -	
	,,,, ‡	00.7											- -	
340	341.9	33.7	3	3	5						W		- -	
940	‡					-			1				<del>-</del> -	
8	336.9	38.7				]							- -	
335	Ţ		3	3	5	. •8					W		- -	
	Ŧ					-							<u>-</u> -	
	331.9	43.7	2	3	6	: ;::					147		- -	
330	‡		_			9			+		W		- - - 828 9	
8	328.6 +	47.0	60/0.0						60/0.0	4			828.9 828.6	ROCK /\_
	‡												_ \ (biotite gne - CRYSTALLINE	
	‡												<ul><li>(biotite gne</li><li>Boring Terminated w</li></ul>	
	‡												Penetration Test Refusal	at Elevation 828.6
	土												ft on Crystalline Rock (	,
	Ŧ											F	Driller indicates harder dri ft. Auger refusal	
	Ŧ													
	‡												- <del>-</del>	
	‡												- -	
	‡												- -	
	+												_ -	
	Ŧ												- -	
	‡												<del>-</del> -	
	‡												<del>-</del> -	
	1												- -	
	Ţ					1							- -	





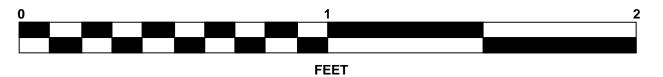
WBS	34497						R-2707C		COUNT	Y CLI	=VFI A	AND			GEOLOGIST Smith, B.	
			<b>J</b> Brid	lae No			-Y4- REV (S	R 182					nass)		GROUND WTR	(ft)
	ING NO			.90 . 10			TION 25+2		., 0.0. 2			7 ft RT	-			7.0
	LAR ELI				-		AL DEPTH		t			583,0	95			0.0
				TF SI			EDRICH D-50			· · · · ·				<b>D</b> H.S	S. Augers HAMMER TYPE Automati	
	LER B			12 00			RT DATE			COM	דאת פ	TE 04/0		J 11.0	SURFACE WATER DEPTH N/A	
	DRIVE		BLC	W COI		H			PER FOOT		P. DAI	SAMP.		1 🗆 🗆	SURFACE WATER DEPTH N/A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft		0.5ft	0			50	75	100	NO.	MOI	O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTI	⊔ /#\
	(11)						I		1	-			V WICE		DEI 11	11 (11)
885																
000	-	‡												-	-	
		‡													880.8 GROUND SURFACE	0.0
880	_	‡				+									RESIDUAL	0.0
	877.1	3.7									: :				Brown to orange-brown and gray, saprolitic, micaceous, sandy SILT (A-4)	
075	8//.1	3.7	4	5	4		9				: :		М			
875	-	-					<del>:/: : :   :</del>		<u> </u>	+ : :				<b>   -</b>	-	
	872.1	8.7	<u> </u>				1::: :	: : :			: :			E		
870		t	4	3	3		6						M	E	_	
		ł					1							E		
	867.1	13.7	2	3	5					1			М	E		
865	-	ł					T°		<u> </u>	+				<b>-</b>	-	
	862.1	T 18.7					: [ : : ] :			: :				F		
860		-	3	6	5		• •11 •			: :			М	F		
	-	Ŧ												F	-	
	857.1	23.7	3	5	6						: :		М	F		
855	-	‡	-				• •11 • •			- : :			IVI		-	
	852.1	28.7					: ' :   :				: :			<b> </b>		
850	002.1	20.7	3	7	9		16	: : :			: :		М			
000	-	‡								1				-	-	
	847.1	33.7	6	7	6		:::::::::::::::::::::::::::::::::::::::				: :					
845	-	ţ	"	'			•13.						M		-	
		‡									: :			E		
	842.1	38.7	8	15	20		: : : :   `:	35 .			: :		M			
840	-	t							<del> </del>	+ : :					-	
	837.1	43.7					:: // :				::			Æ		
835		-	5	4	6		· •10 · ·						М	-	_	
		Ī												E		
	832.1	48.7	4	5	7								l w	E		
830	-	F				-	1 12			+				IIII -	-	
	827.1	T 53.7								1::				F	827.1	53.7
825		-	100/0.2						T <del></del> .	7.7	00/0.2				WEATHERED ROCK (biotite gneiss)	
	-	Ŧ														
	822.4	58.4	60/0.0							1	60/0.0	1		-	822.4 CRYSTALLINE ROCK	58.4
	-	‡												F	(biotite gneiss) Boring Terminated with Standard	
		ļ													Penetration Test Refusal at Elevation 822.4 ft on Crystalline Rock (biotite gneiss)	
	:	‡														
	-	‡												-	Auger refusal at 58.4'	
		‡														
	_	‡												<u> </u>	-	
		‡														
		‡														
				l										$\sqcup$		

#### **CORE PHOTOGRAPHS**

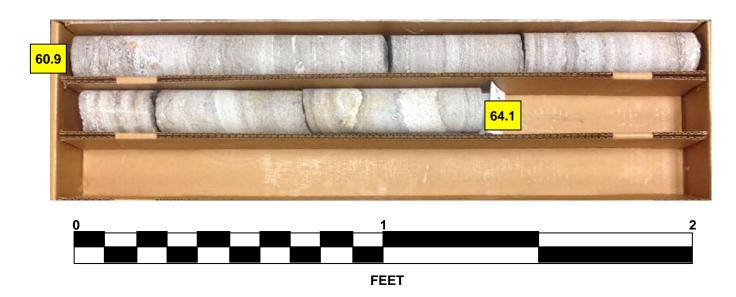
**B1-B**BOX 1&2 of 3: 42.7 - 60.9 FEET







**B1-B**BOX 3 of 3: 60.9 - 64.1 FEET



#### **SITE PHOTOGRAPHS**

Bridge No. 470 on -Y4- REV (SR 1827) over -L- (US 74 Shelby Bypass)





Standing at EB1-A looking upstation (southeast) towards EB2-A

Standing at EB2-B looking downstation (northwest) towards EB1-B

70 N 2  $\mathcal{H}$ RENFERE **CONTENTS** 

**DESCRIPTION** 

BORE LOG(S) & CORE REPORT(S)

TITLE SHEET LEGEND SITE PLAN

PROFILE(S)

CROSS SECTION(S)

CORE PHOTOGRAPH(S)

SITE PHOTOGRAPH(S)

SHEET NO.

5-7

8-18

19-20

49 4 3 E PR

#### STATE OF NORTH CAROLINA

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

#### **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>CLEVELAND</u>

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

SITE DESCRIPTION BRIDGE NO. 471 ON -Y9- (NC 18) OVER -L- (US 74 BYPASS)

STATE PROJECT REFERENCE NO. R-2707C 21

#### **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 1991 707-6805. 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 STIU 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN TEXT OF THE 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** 

B. SMITH, PG

B. WORLEY, PG

J. BARE

T. BRIGMAN

INVESTIGATED BY \_B. SMITH, PG

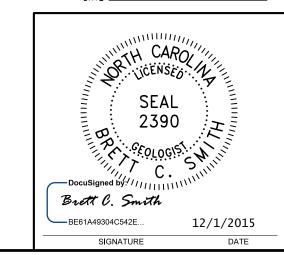
DRAWN BY B. SMITH, PG & B. WORLEY, PG

CHECKED BY \_\_B. WORLEY, PG

Summit Design and

SUBMITTED BY <u>Engineering</u>, PLLC

DATE \_\_MAY, 2015



PROJECT REFERENCE NO.	SHEET NO.
R-2707C	2

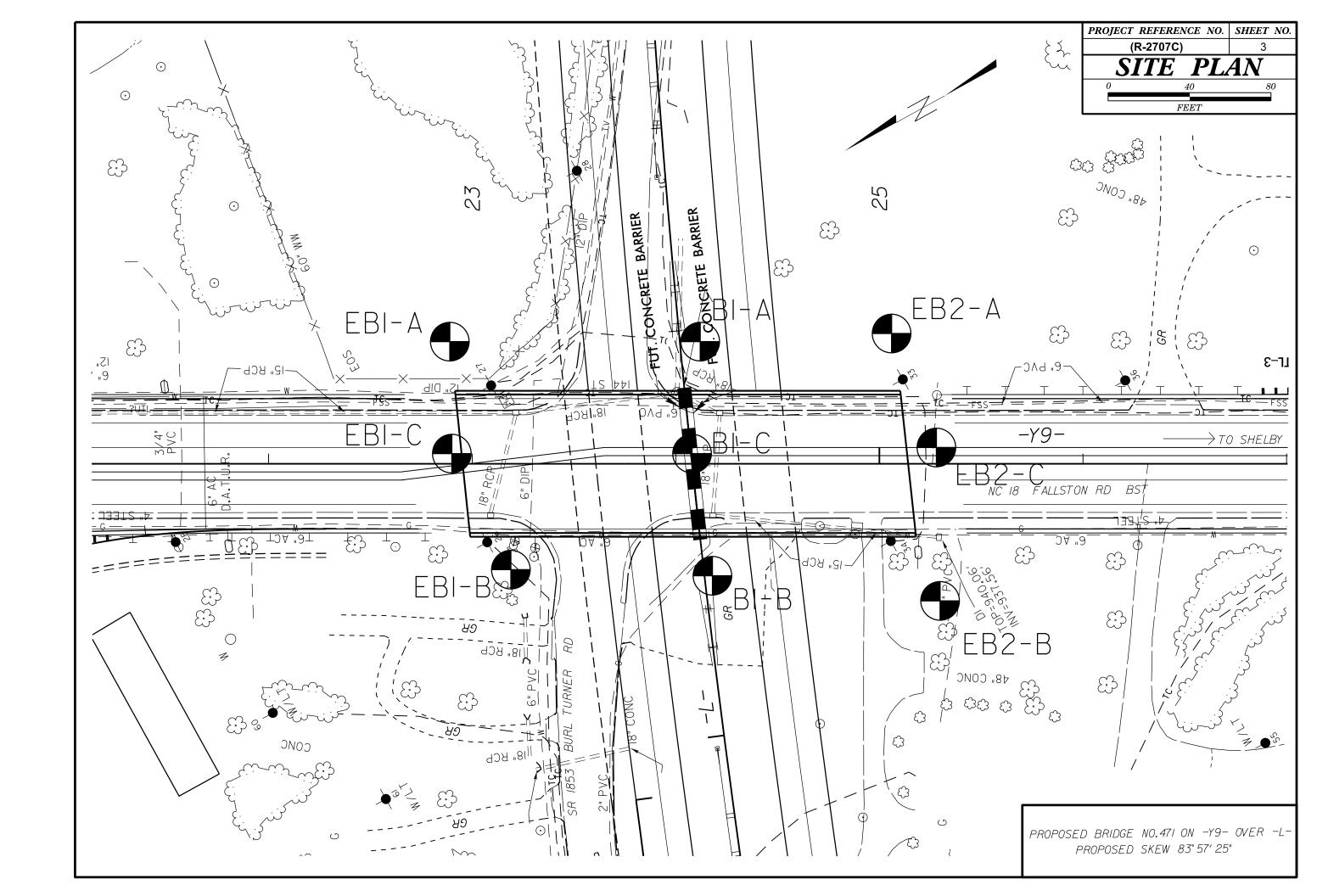
#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

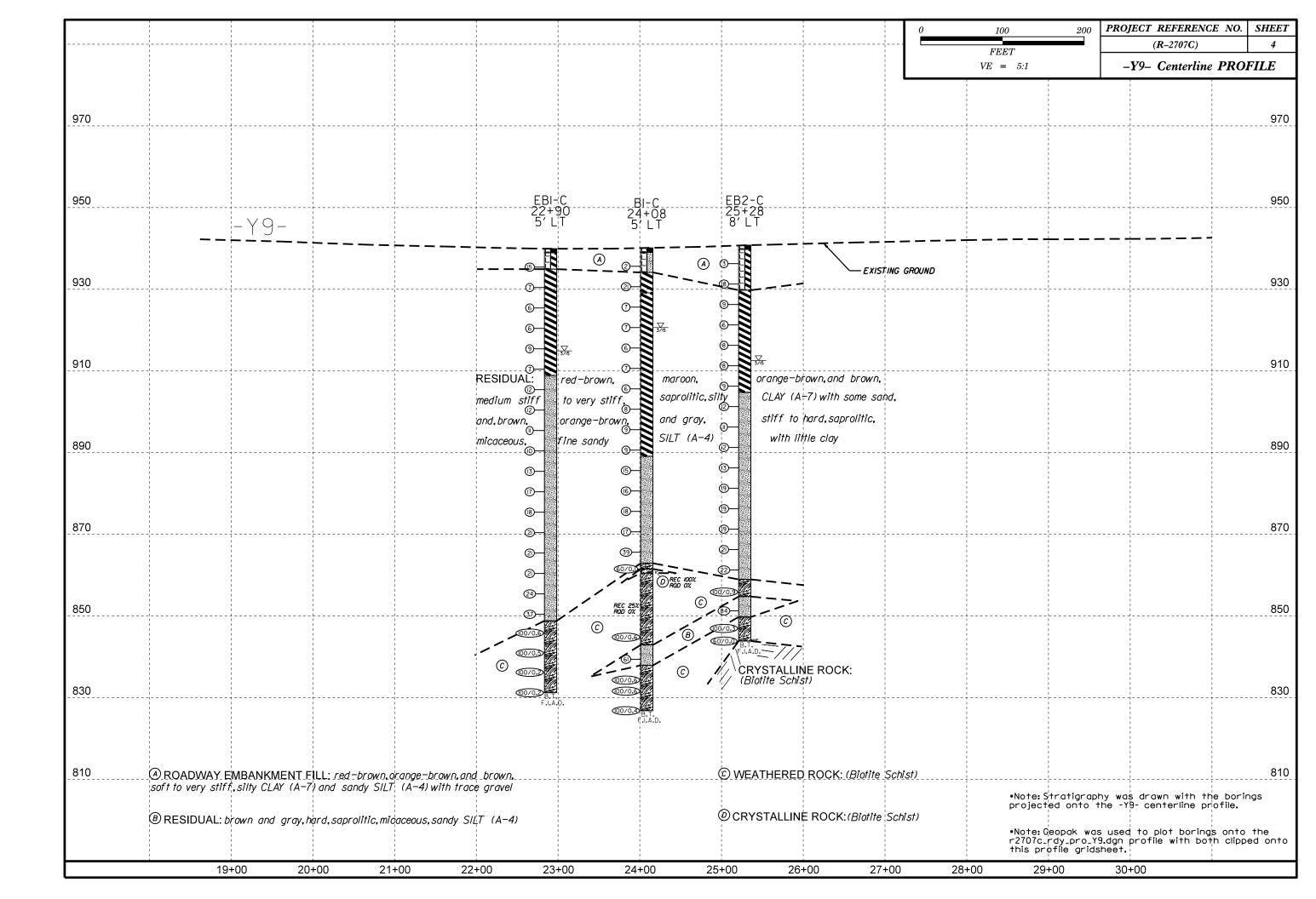
#### GEOTECHNICAL ENGINEERING UNIT

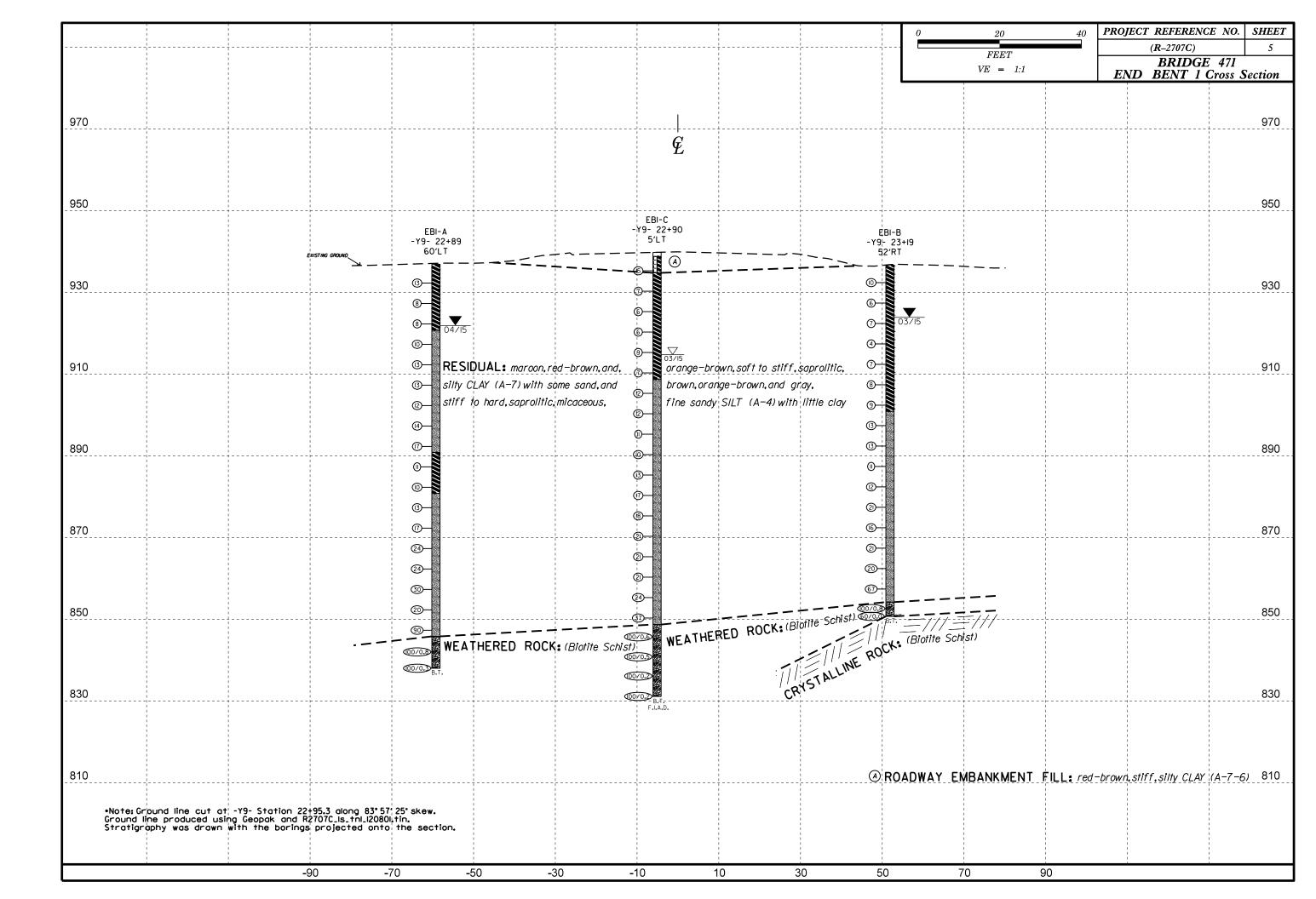
#### SUBSURFACE INVESTIGATION

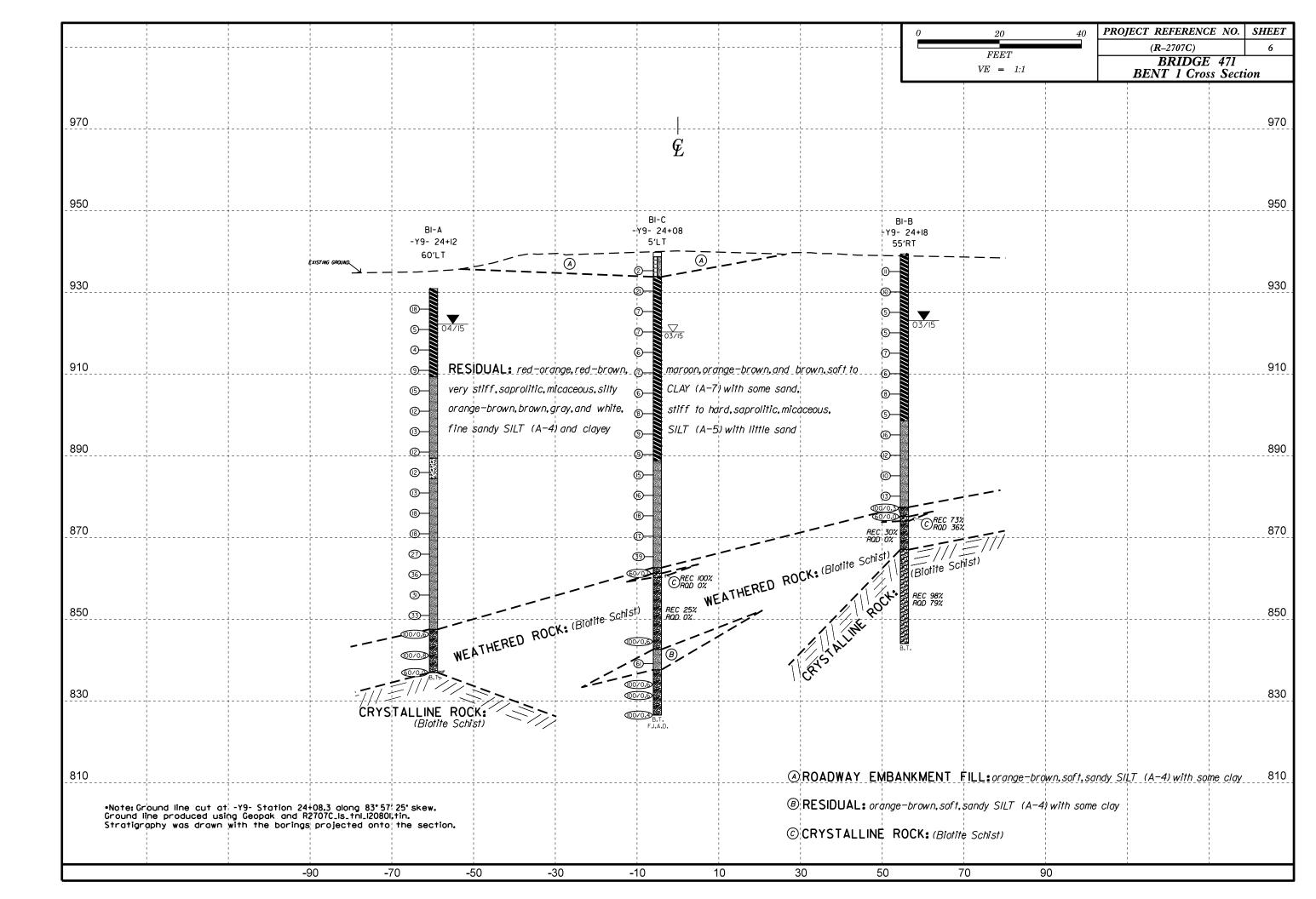
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

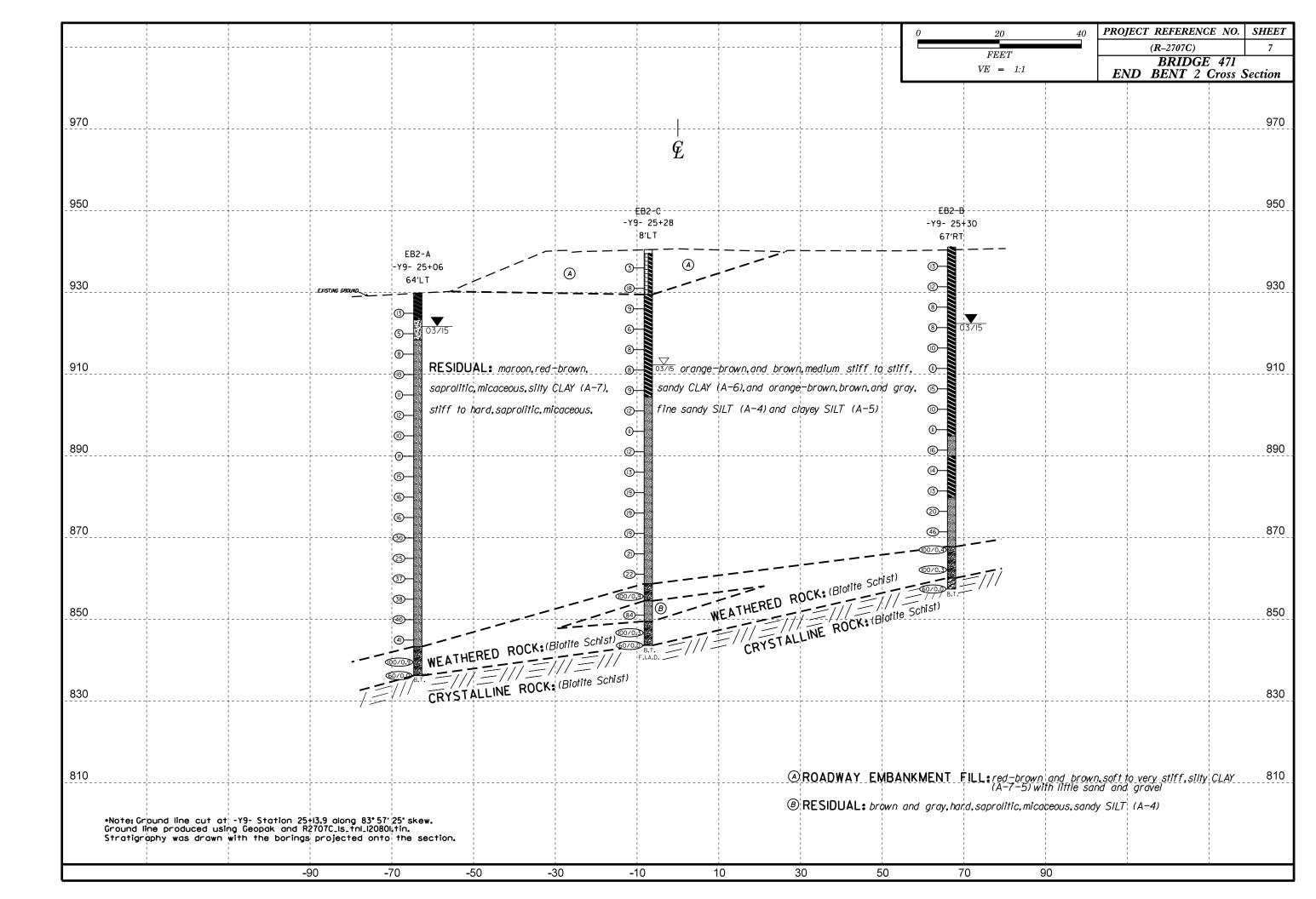
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST MASHITO T 206, SATM D1580, SOIL CLASSIFICATION IS BASED ON THE AGSHITO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AGSHITO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	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 Ø.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:	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
VERY STIFF, GRAY, SILTY CLAY, WOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.  MINERALOGICAL COMPOSITION	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	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
GENERAL   GRANULAR MATERIALS   SILT-CLAY MATERIALS   ORGANIC MATERIALS   CLASS. (≤ 35% PASSING *2000)   (> 35% PASSING *2000)   CASSING *2000   CASSING *20	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	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.	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
ULOSS A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7 SYMBOL 000000000000000000000000000000000000	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31	NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
7. PASSING *18 GRANULAR SILT MUCK.	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	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.
*48 38 MX 58 MX 51 MN 5 MX 51 MN 55 MX 55 MX 55 MX 55 MX 55 MX 55 MX 55 MX 56	ORGANIC MATERIAL GRANULAS SILT - CLAY ORGANIC MATERIAL SOLLS OTHER MATERIAL	WEATHERING  FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	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
MATERIAL PASSING *40  LL	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%, LITLE ORGANIC MATTER 3 - 5%, 5 - 12%, LITTLE 10 - 20%, MODERATELY ORGANIC 5 - 10%, 12 - 20%, SOME 20 - 35%,	HAMMER IF CRYSTALLINE.  VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP - THE HIGGE HI WHICH I STRITTON OR HINT PLANNER FERTURE IS INCLINED FROM THE HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN 11 MN 10 MX 11 MN 11 MN MODERATE HIGHLY GROUP INDEX 8 8 8 8 4 MY 8 MY 12 MY 16 MY MO MY AMOUNTS OF GROWIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE  GROUND WATER	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,  FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS. OF MAJOR GRAVEL AND GRAVEL AND GRAVEL AND GRAVEL AND SAND GRAVEL AND SAND SOILS ORDER TO SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC SOILS ORGANIC ORGANIC SOILS ORGANIC SOILS ORGANIC ORGA	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▼ STATIC WATER LEVEL AFTER 24 HOURS	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN. RATING SAND SHOP COOD FAIR TO POOR POOR UNSUITABLE  GEN. RATING POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN  (MOD.) 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	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.  FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS   LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS	SPRING OR SEEP  MISCELLANEOUS SYMBOLS	WITH FRESH ROCK.  MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/825 DIP & DIP DIRECTION	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAMATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )  GENERALLY VERY LOOSE	with soil description of rock structures  of rock structures  of rock structures  Stope indicator installation	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
UHANULAN	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT   AUGER BORING   CON PENETROMETER TEST	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50  VERY SOFT < 2 < 0.25  GENERALLY SOFT 2 TO 4 0.25 TO 0.5		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTICES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	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.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	INFERRED ROCK LINE  MONITORING WELL  TEST BORING WITH CORE  PIEZOMETER INSTALLATION SPT N-VALUE	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.	ROCK QUALITY DESIGNATION (ROD) - 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
HARD > 30 > 4	INSTALLATION SPINITHLE	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS    XX   UNDERCUT   UNCLASSIFIED EXCAVATION -   TATAL UNCLASSIFIED EXCAVATION -   TATA	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 U.S. STD. SIEVE SIZE 4, 10 40 60 200 270 U.S. STD. SIEVE SIZE 5 10 200 270 U.S. STD. STD. SIEVE SIZE 5 10 200 270 U.S. STD. STD. SIEVE SIZE 5 10 200 270 U.S. STD. STD. STD. STD. STD. STD. STD. S	Macceptable, But not to be used in the top 3 feet of shallow   UNCLASSIFIED EXCAVATION - UNCL	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED  TO DETACH HAND SPECIMEN.	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,
BOULDER COBBLE GRAVEL SAND SAND (CD.) (CD.)	UNDERCUT ACCEPTABLE DEGRADABLE ROCK  ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY UNIT WEIGHT	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	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.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIP'S TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	DPT - DYNAMIC PENETRATION TEST	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
LL LIOUID LIMIT PLASTIC  RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(P) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BL-128 -BL- 490+33.28
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINKLY BEDDED 0.16 - 1.5 FEET	N 583,014.5021 E 1,250,250.9513 ELEVATION: 937.38 FEET NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CME-45C CLAY BITS X AUTOMATIC MANUAL  CME-55 CONTINUOUS FLIGHT AUGER  CORE SIZE:	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET  VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 F. 0.008 FEET  THINLY LAMINATED 4.0.008 FEET	F.I.A.D. = Filled immediately after drilling
PLASTICITY	X 6*HOLLOW AUGERS	INDURATION	]
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	TUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	X CASING X W/ ADVANCER  POST HOLE DIGGER  POST HOLE DIGGER  POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X TRICONE 3" TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1
			•











	<u>"</u> V	V	BO	RE	LOC	3 REF	PORT	_																								
WBS	3449	7.1.2		TIP R-2707C COUNTY CLEVELAND						ELAND		GEOL	OGIST Smith, B.			WBS 3	34497.1	1.2			TII	<b>P</b> R-2707	C C	<b>DUNTY</b> C	LEVELA	AND		GEOL	OGIST Smith,	В.		
SITE	DESCF	RIPTIO	<b>N</b> Bri	idge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby I STATION 22+89 OFFSET					74 Shelby I	Bypass)				GROUND V	VTR (ft)	SITE DE	ESCRIP	MOIT	Bridg	ge No.	. 471 c	on -Y9- (NO	C 18) over -L-	(US 74 She	elby Byp	pass)					GROUND V	VTR (ft)
BOR	ING NO	. EB1	1-A		S	TATION 2	2+89		OFFSET	60 ft LT		ALIGN	NMENT -Y9-	0 HR.	N/A	BORING	G NO.	EB1-A	4		ST	TATION 2	2+89	OFF	SET 6	60 ft LT		ALIGN	MENT -Y9-		0 HR.	N/A
COL	LAR EL	<b>EV</b> . 9	36.9 ft	t	TO	OTAL DEP	<b>TH</b> 98.9	ft	NORTHI	<b>NG</b> 582,9	64	EASTI	<b>ING</b> 1,250,831	24 HR.	15.0	COLLA	R ELEV	<b>/.</b> 936	6.9 ft		TC	OTAL DEP	<b>TH</b> 98.9 ft	NO	RTHING	582,96	34	EAST	<b>ING</b> 1,250,831	:	24 HR.	15.0
DRIL	RIG/HA	MMER E	EFF./D/	ATE S	UM0093	DIEDRICH D	)-50 86% 10	0/10/2014		DRILL N	METHOD I	H.S. Augers	НАМІ	MER TYPE Au	tomatic	DRILL RI	IG/HAMI	IER EF	F./DAT	E SU	JM0093	DIEDRICH E	)-50 86% 10/10/2	014		DRILL MI	ETHOD	H.S. Augers		HAMME	R TYPE Aut	tomatic
	LER E					TART DATI				DATE 03/3		SURF	ACE WATER DEPTH	V/A		DRILLE		e, J.				TART DATI	E 03/31/15		MP. DA	<b>TE</b> 03/3	1/15	SURF	ACE WATER DE	PTH N/A		
ELEV (ft)	CLCV	DEPTH (ft)	H BL	OW CC				PER FOO <sup>-</sup> 50		SAMP.	/  0		SOIL AND ROCK DES			ELEV E	=LEV	EPTH (ft)		W COU			BLOWS PEF 25 50	FOOT 75	100	SAMP.	/ 6	·	SOIL AND RO	OCK DESCI	RIPTION	
(11)	(ft)	(11)	0.5π	υ.5π	0.5ft			50	75 10	00 NO.	MOI G	ELEV. (ft)	)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5π	0.5π		25 50	75	100	NO.	MOI G	<del>i</del>				
940	_	‡										-				860	358.3	70.6	+		+	<del></del>	Match L			++			brown, orange-bro	own, and gr	ay, saprolitic,	
		‡										936.9	GROUND SURF		0.0		-	70.0	7	12	18		<b>A</b> 00				Sat.	<b>t</b>	micaceous, fine sa clay	andy SILT ( <i>i</i> (continued)	4-4) with little	
935	_	‡										<b>‡</b>	RESIDUAL red-brown and orange-brown	own, silty CLAY		855	‡						<i>i</i>					Ł				
	933.3	3.6	3	5	8					:	м	‡	(A-7-6) with little fire	ine sand		_8	353.3	83.6	6	8	12		, ,				Sat.	#				
930		‡				· · · <b>7</b> ····				1 1		930.8	maroon, red-brown, and	orango brown	6.1	850	‡						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				our.	‡				
	928.3	8.6			<u> </u>	. į				-		F	saprolitic, silty CLAY (A-7-5	b) with some sand	d		348.3	88.6						````				F				
		Ī	2	4	4	.•8				.	М	<b>-</b>					Ī		18	25	65		.	.	. <b>4</b> 90		Sat.	845.8				91.1
925	-	Ŧ					+ : : : : :			$\dashv$		<del>[</del>				845	Ξ						<del>    -</del>		- '\'			<u> </u>		HERED RO	:к	
	923.3	13.6	2	3	5	. <b>I</b> . <b>●</b> 8				.		}					343.3	93.6	30	42	58/0.3		.	.	100/0.8	,			(=			
920	_	‡				· j. · ·				_		920.8	brown, orange-brown, and	I gray, saprolitic,	<u>16.1</u>	840	‡								100/0.6			<b>4</b>				
	918.3	18.6	2	4	6					:	м	-	micaceous, fine sandy SIL clay	T (A-4) with little		8	338.3	98.6	00/0.3						100/0.3		<u> </u>	838.0	Daring Tarminate	d at Flaveti	- 020 0 ft in	98.9
915		‡				. ♥10 .				1 1	IVI	<b>L</b>					‡								100/0.0			ţ	Boring Terminate Weathered F	Rock (Biotite	Schist)	
913	913.3	+ + 23.6					<u> </u>	1		-		<u>-</u>					‡											F	-Boring offset from			,
		‡	3	6	7	•13.				1 1	М	F					‡											-		ad power lin		
910	-	‡					· · · ·					L					Ŧ											F	-Greater than 180	78.6 feet	u wilii SPT al	
	908.3	28.6	3	6	7	13				11	М	F					Ŧ											F				
905	_	Ī								1 1		E					Ī											E				
	903.3	33.6	3	5	7					:		L					1											Ł				
000		‡			'	12 .					Sat.	<u></u>					‡											ţ				
900	808.3	38.6				· · · ·	<u> </u>			-		<b> </b> -					‡											<b> </b>				
	030.3	+ 30.0	4	5	9	•14				:	Sat.	<b>L</b>					‡											ţ				
895	-	‡				· · \ ·						<u>F</u>					‡											F				
15	893.3	† 43.6 †	5	6	11		,			:	Sat.	ļ.					ŧ											F				
890		Ŧ				::;;;"						890.8	brown and gray saprolitic	micaceous silty	46.1		‡											F				
GDI	888.3	48.6	1	F		/				.]		}_	brown and gray, saprolitic, CLAY (A-7-5) with se	ome sand			Ŧ											E				
100		‡	"	5	6	11 .				:	Sat.	}					Ī											ţ				
2 885 2	882.2	53.6				<del>  .  </del>	<del> </del>					}					‡											<u> </u>				
TT.GPJ	003.3	+ 33.6	3	3	7	10 .				.	Sat.	<u>+</u>					‡											‡				
880 880	-	‡				· i · ·						<u> </u>	brown, orange-brown, and				‡											_				
BRDG0477	878.3	58.6	3	5	8					:	Sat.	<b> </b>	micaceous, fine sandy SIL clay	T (A-4) with little			‡											ţ				
QH 875		‡				♥13. <b> </b>				:	Odi.	-					‡											ļ.				
OHO OHO	873.3	63.6				1 .						F					‡											F				
R2707C 870		Ŧ	3	7	10	17	'				Sat.	E					‡											E				
	-	Ī				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	+ : : : :					F					Ŧ											-				
DOUBLE	868.3	68.6	5	9	15		24				Sat.	E					Ŧ											E				
일 변 865	_	‡						<u> </u>				Ł					Ī											Ł				
T BOF	863.3	73.6	5	10	14						<sub>Cat</sub>	<u>t</u>					‡											ţ				
2000		‡					Q24			.	Sat.	<b> </b>					‡											‡				

	34497.1.	4497.1.2         TIP         R-2707C         COUNTY         CLEVELAND           SCRIPTION         Bridge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)				GEOLOGIST Smith, B.	1		<b>WBS</b> 344			<b>TIP</b> R-27070		ITY CLEVEL				GEOLOGIST Smith, B.								
-		ESCRIPTION Bridge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Byp G NO. EB1-B STATION 23+19 OFFSET 5.								<u> </u>	GROUND				<u> </u>	· ` ` `	18) over -L- (US		· · · · ·				GROUND W			
												ALIGNMENT -Y9-	0 HR.	N/A	BORING N			STATION 23	+19	OFFSET 5				ALIGNMENT -Y9-	0 HR.	N/A
	LAR ELEV.				TAL DEPT			ORTHING				<b>EASTING</b> 1,250,719	24 HR.	12.8	COLLAR E			TOTAL DEPT		NORTHING				<b>EASTING</b> 1,250,719	24 HR.	12.8
			DATE S			-50 86% 10/10/20			DRILL M				MER TYPE A	utomatic			FF./DATE SUM		50 86% 10/10/2014	1					MMER TYPE Auto	matic
	LER Bare				ART DATE	03/16/15		OMP. DAT				SURFACE WATER DEPTH N	I/A		DRILLER		<u> </u>	START DATE		COMP. DA		/16/15	; <del>/    </del>	SURFACE WATER DEPTH	N/A	
ELEV (ft)			t 0.5ft		0 2	BLOWS PER	FOOT 75	100	SAMP. NO.	'/	O G	SOIL AND ROCK DES	SCRIPTION	DEPTH (ft)	ELEV ELET (ft)	DEPTH (ft)	0.5ft 0.5ft 0.	<del></del>	BLOWS PER FOO	75 100	SAMP.	MO	O OI G	SOIL AND ROCK D	ESCRIPTION	
940															860	1			Match Line							
	‡										-	936.7 GROUND SURF. RESIDUAL		0.0		4 <del>+ 78.3</del> +	12 25 4	12 		67		w		brown, orange-brown, a micaceous, fine sandy s clay (conti	SILT (A-4) with little	
935	ļ <u>Ī</u> ,											red-brown, silty CLAY (A-7-		ne	855	. <del>-</del>				<b></b>				854.2		82
	933.4 ‡ 3	3.3	4	6	. •10 .	1	I			М		Sanu			853.	4 † 83.3	100/0.8			. 100/0.8	<b> </b>			WEATHEREI (Biotite Sc		
930	‡				:/: · ·							930.9 red-brown and orange-bro	own, saprolitic,		850.	7 + 86.0	60/0.0			60/0.0	┥		<i>7/12</i>	_ 850.7 CRYSTALLIN	E ROCK	86.
	928.4 + 8	3.3	2	4	1					м		micaceous, silty CLAY (A-7 sand	·7-5) with some	9		‡								- (Biotite So Boring Terminated		
925	‡				1					'''						‡								Penetration Test Refusa ft on Crystalline Rock	l at Elevation 850.7	
020	923.4 1	3.3			1	1										†								 -Boring offset from propo		
	Ŧ	2	3	4	7		I			М						Ī								overhead pov	ver lines	
920					1											$\pm$								-Greater than 180 tons around 7	capacity reached 8 ft.	
	918.4 † 1	8.3	2	2	4	1	I .			w						<u> </u>								_ -Driller indicates harder	drilling at 82.5 ft.,	
915	‡				1											<u> </u>								_ interpreted as t	op of WR.	
	913.4 2	3.3	3	4	1		.			м						‡								- Auger refusal -	at 86.0 ft.	
910	‡				:\[ '. : :					'''						‡								<u>-</u> -		
310	908.4 + 2	8.3														‡								<del>_</del> -		
	‡	3	3	5	. •8	.	.			М						‡								-		
905	1				1 . 1											+								<del>-</del>		
	903.4 † 3	3.3	3	6	. <b> </b>	1				М						Ŧ										
900	1											900.9 brown, orange-brown, and g	gray, saprolition	<u>35.8</u>		<u> </u>								<u>-</u>		
	898.4 3	8.3	5	8	: ½::					м	-	micaceous, fine sandy SILT clay	T (A-4) with littl	le		‡								<u>-</u> -		
905	‡				♥13.		.			IVI						‡								-		
895	893.4 T 4	3.3					.				-					†								<u>-</u> -		
<u>2</u>	1	3	5	8	•13.					w	<b>*</b>					‡								-		
890											F					†								<del>-</del> <del>-</del>		
5	888.4 ‡ 4	8.3	4	7	111		.			м	E					Ī										
885	1					1					Ł					1								_		
5	883.4 5	3.3	3	9		1				м	<u> </u>					‡								<u>-</u> -		
880	‡						.			IVI	<b>*</b>					‡								-		
-1	+ 878.4 + 5	8.3			\.						J.					‡								<u>-</u> -		
3	+	5	9	12	: : : •	. 21   .				М						‡								- -		
875	‡				· · · · /						<u> </u>					‡								- -		
	873.4 † 6	3.3	5	11	j .	1	I .			w	F					‡								- -		
870	‡										F					Ŧ										
1	868.4 1 6	8.3	8	1							F					Ŧ								-		
865	1	5	8	13		21				W	E					Ī										
865	]	,									E					+								<u>-</u> -		
اد 5	863.4 † 7	3.3	8	12		1	I			w	E					<u> </u>								_ - -		
3 860						>   .	.				<b> </b>					+						1		_		

WRS	34497.1					R-2707			Y CLEVE	ΙΔΝΠ		GE	OLOGIST Smith, B.			<b>WBS</b> 3449	17 1 2			TIE	<b>P</b> R-2707C	COUNTY	' CLEVEL	AND		GEOL	OGIST Smith,	 R	
			Brida	e No					4 Shelby E			02	Officer, D.	GROUND W	TR (ft)	-		I Brida	ie No. 4		on -Y9- (NC 18) ove					OLO.	- Onnui,		OUND WTR (ft
-	ING NO.		Driag	. 110.	_	ATION 2		1 2 (00 /	OFFSET	• •		AL	IGNMENT -Y9-	0 HR.	12.5	BORING NO			140.		FATION 24+12	<u> </u>	OFFSET		Γ	ALIG	NMENT -Y9-	0 H	
	LAR ELEV		9 ft		_	TAL DEP1		ft	NORTHIN		856		STING 1,250,772	24 HR.	8.7	COLLAR EL				-	OTAL DEPTH 94.0		NORTHING				ING 1.250.772	24 H	
	RIG/HAMN			: SUI					NORTH			H.S. Aug		MER TYPE Autor					F SUM		DIEDRICH D-50 86% 1		1101111111			H.S. Augers			PE Automatic
	LER Bare		.,			ART DATE			COMP. D			<del></del>	RFACE WATER DEPTH			DRILLER		,_,			TART DATE 03/31/		COMP. DA				ACE WATER DE		7.000000
ELEV	DDI) /E		BLOW	/ COU				PER FOO	<u> </u>	SAMP.		П,					DEPTH	BLOV	V COUN			S PER FOOT		SAMF	p. /	<u>-                                     </u>			<b></b>
(ft)	(ft)		0.5ft (	).5ft	0.5ft	0 2	25	50	75 10	0 NO.	MOI	O   G   ELEV	SOIL AND ROCK DES		EPTH (ft)	(ft) ELEV	(ft)	0.5ft	0.5ft C	0.5ft	0 25	50 7	75 100	NO.	MOI	O   G	SOIL AND R	OCK DESCRIPTI	ON
935												L				855	<b>⊥</b>				Mat	tch Line			_				- <del></del>
	‡											-					‡									#	brown, orange-br micaceous, fine s	andy SILT (A-4) v	iprolitic, vith little
930	<u> </u>											930.9			0.0	851.9 850	79.0	7	12	21	. <b> </b>				Sat.	#	clay	(continued)	
930	‡									1 1		<b>)</b>	<b>RESIDUAI</b> red-orange, silty CLAY (A-7			000	‡							1		#F			
	926.9	4.0	4	8	10				.	1 1	l [	3	sand			846.9	84.0	65 3	35/0 1				· -:-:-:-j			- 847.5 //-		HERED ROCK	83.
925	1		Ť		.	7	3			$\dashv I$	М	924.4	<u> </u>		6.5	845	‡		50/0.1				- 100/0.6	[			(Bio	tite Schist)	
	921.9	9.0				17::			·			3	orange-brown, saprolitic, s with some sa	ilty CLAY (A-7-5) and		8/1 0	89.0							!					
920	321.9	3.0	2	2	3	<b>∮</b> 5· · ·					М	1				840	1 03.0	62 3	38/0.3				100/0.8	•					
	I				3						<b>\</b>					Ŧ													
	916.9	14.0	2	1	3						l M	}				836.9	94.0	60/0.0					60/0.0	$\dashv$	8	836.9	CRYST	ALLINE ROCK	94.
915	+					1	<del> </del>			+		3					†									F		itite Schist) nated with Standa	ard
	911.9	19.0				.1		.	.			3					‡									ŀ	Penetration Test F	Refusal at Elevation Refusal At Elevation Refusal At Elevation	on 836.9
910			3	3	6	. 69					М	909.4			21.5		‡									Ł	-	due to steep road	
						: \\ : :		.					orange-brown, tan-brow saprolitic, micaceous, fine	vn, and white,			‡									ţ	embankment, ov		
005	906.9	24.0	4	6	9	\		:   : : :			м		with little cla				‡									ţ	•		angoitu
905	‡											J-					‡									-	-Greater than 18 reached wi	th SPT at 74.0 fee	et
	901.9	29.0	3	_		: : <i>i</i> : :		.				#					‡									ţ	-Harder drilling at	83.4 feet was intended Room	
900	‡		3	"	´	· •12·				41	M	i L					‡									Ė	as the top t	ii weathered Roc	N.
	896.9	24.0				: : : :						, F					‡									F			
895	090.9 + .	34.0	3	5	8	13-			.		М						Ŧ									F			
	Ŧ											F					Ŧ									F			
	891.9 I	39.0	3	4	8						м	Æ					Ŧ									E			
890	1					<u> </u>				+1	"	889.4			41.5		$\pm$									E			
2	886.9	44.0						.	.		   		orange-brown, tan-brow saprolitic, micaceous, claye	ey SILT (A-5) with			<u> </u>									Ł			
885			3	5	7	• •12 •					W N	 	little fine sar	na	46.5		<u> </u>									Ŀ			
5													brown, orange-brown, and micaceous, fine sandy SIL		40.0		‡									ţ			
3 2 880	881.9 +	49.0	2	5	8	· ·   · ·		:   : : :			w 🖁		clay	.i (/ t +/ with little			‡									ţ			
2 000	‡					11:1				1		J-					‡									-			
5	876.9	54.0	4	7		: : ; ; :						#					‡									ļ			
875	‡		7	<b>'</b>	``	· · · • 18	3	<u> </u>		41	W	L.					‡									Ė			
400	871.9 ± 5	FO 0				: : : :			.			¥.					‡									F			
870	0/1.9 = 3	39.0	4	7	11		3				Sat.	<b>#</b>					Ŧ									F			
						/						Æ					Ŧ									E			
ر ا	866.9	64.0	6	13	14						Sat.	Æ					Ī									E			
865	<del> </del>					<u> </u>	72/	+		+	Joan S	Æ					$\pm$									E			
JOBE C	861.9 I	69.0					1.1.		.			ף					‡									Ŀ			
860	T		7	17	19	L	36				Sat.	<b>E</b>					<u> </u>									Ł			
							: <i>j</i> : :	.				#					‡									ţ			
3	856.9	74.0	7	14	17		12:	.	:   : : : :		Sat.	#t					İ									Ł			

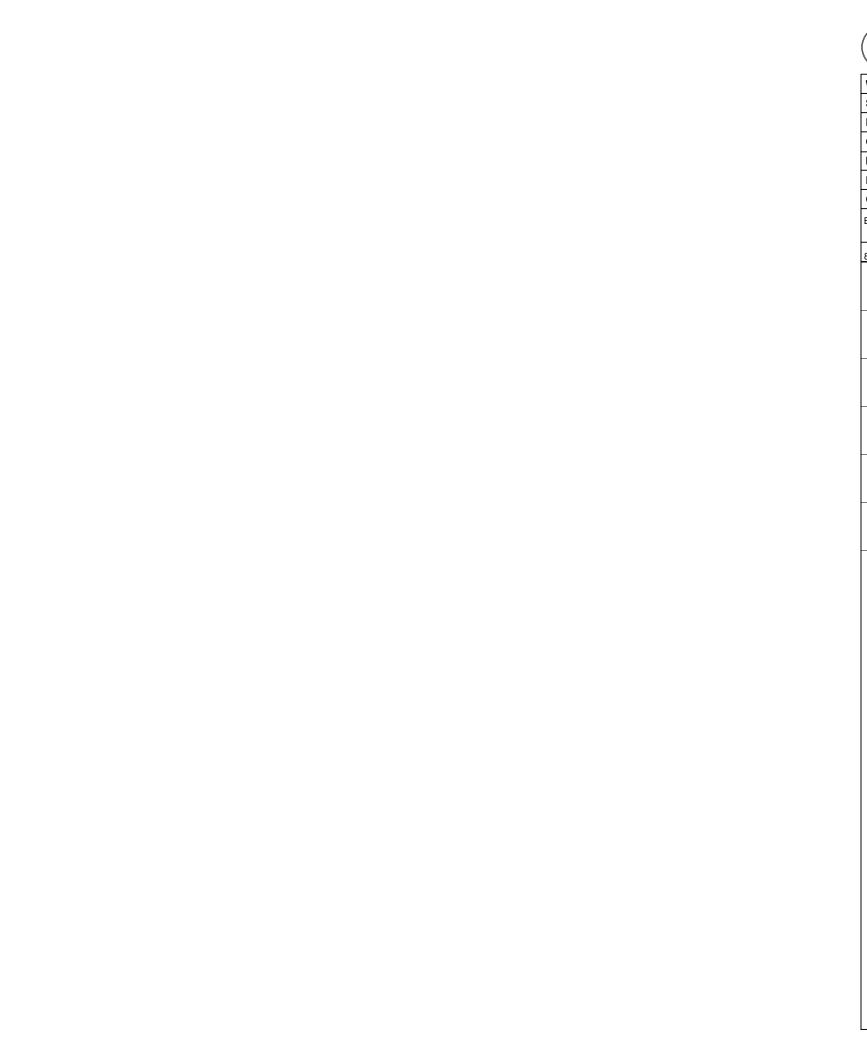
<u>V</u>	J E	3 <i>OF</i>	RELC	)G	REP	ORT																										
<b>WBS</b> 34497.	/BS 34497.1.2 TIP R-2707C ITE DESCRIPTION Bridge No. 471 on -Y9- (NC 18) over								LAND		GEOL	OGIST Smith, I	B.			WBS	<b>S</b> 344	197.1.2			TII	<b>P</b> R-2707	С	COUNT	Y CLEVEL	AND			GEOLOGIS	r Smith, B	3.	
									· · · · ·					GROUN	D WTR (ft)	I				dge No				er -L- (US 7	74 Shelby By						GROU	IND WTR (ft)
BORING NO.	RING NO. B1-C STATION 24+08							OFFSET	5 ft LT		ALIGN	MENT -Y9-		0 HR.	19.5	BOF	RING N	<b>IO</b> . B1-0	C		ST	TATION 2	4+08		OFFSET	5 ft LT			ALIGNMEN	Г -Y9-	0 HR	19.5
COLLAR ELEV	LAR ELEV. 939.8 ft TOTAL DEPTH 113.3							NORTHIN				<b>ING</b> 1,250,726		24 HR.	FIAD	COL	LAR E	ELEV. 9	39.8 ft		TC	OTAL DEPT	TH 113	.3 ft	NORTHING	· · · · ·			EASTING		24 HR	
DRILL RIG/HAM	L RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 10/							1			NW Casing \	W/SPT & Core	HAMN	MER TYPE	Automatic	DRIL	L RIG/F	HAMMER	EFF./DA	TE S		DIEDRICH D			1				N Casing W/SPT	& Core	HAMMER TYP	Automatic
	LLER Bare, J. START DATE 03/24/15							COMP. D			SURF	ACE WATER DE	PTH N	N/A				Bare, J.				TART DATE			COMP. DA			; <del>7</del>	SURFACE V	VATER DEP	PTH N/A	
ELEV DRIVE ELEV (ft)	EPTH (ft)	BLOV	V COUNT		) 2		PER FOOT 50	- 75 100	SAMP.	/   0	<b>I</b>	SOIL AND RO	OCK DES	SCRIPTION				VE DEPTH	1 BLC	OW CO	0.5ft		BLOW:	S PER FOO <sup>-</sup> 50	T 75 100	SAMP.	1 /		5	SOIL AND RO	CK DESCRIPTIO	N
(ft) (ft)	(,	0.511	0.511 0.3	oit   0		i ,		75 100	NO.	MOI G	ELEV. (ft)	)			DEPTH (f	) (11)	(ft)	(1.1)	0.511	0.511	0.511			30	75 100	NO.	/ MC	I G				
												0001											Ma	tch Line								
940										L	939.8 938.7	ROADWA		NKMENT	0. 1.		+	+		+						<u> </u>	-	70	<del>-</del>		LLINE ROCK	
936.3	3.5										` <b>_</b>	orange-brown, sar	T & CONO ndy SILT (		ome			‡							I					WEATH	ite Schist) ERED ROCK	
935		2	1 1	1	2				_	м	933.8		clay		6.1	855		‡											<del>-</del>	(Blotite Sch	nist) (continued)	
‡					./						933.6	red-brown and y	ESIDUAL		· — — — ·	1		‡								!			•			
930 931.3	8.5	5	8 1	3		1	: : : :			м	\$	(A-7-6) wi			VI.	850		Ŧ					: : :						•			
					/-						928.8	maroon, red-bro		nge-brown an	<u>11</u> .			Ŧ							I				<del>-</del>			
926.3	13.5		4 3		. /						}	brown, saprolitic	, micaceo with some	ous, silty CLA	Ϋ́			Ī							I				•			
925		2	4 3	<b>,</b>   -	7				+	М	}	(,,,,,,),	551116			845	845.	1 T 94.7	70	30/0.1	1				. 100/0.6	<b> </b>			<del>_</del>			
921.3	10 5				.						<b>3</b>							‡											842.6	RE	SIDUAL	97.2
920	10.5	2	3 4	4	7						<u>\$</u>					840	840.	1 + 99.7	17	26	35			·   · · · ·	<u></u>	1			brown	and gray, sap SILT (A-4	orolitic, micaceous ) with little clay	, sandy
‡					ļ:::						\$							‡	''	20							Sat.		<u>837.6</u>		-	102.2
916.3 +	23.5	2	2 4	4	<u> </u>						\$					835	935	† 1 <u>104.7</u>							: ]						ERED ROCK ite Schist)	
†					<b>₹</b> °			1		"	*					000	655.	+ 104.7	46	52	48/0.1				1 100/0.6	•			<del>-</del> :			
911.3	28.5				į:::						*						831.9	9 ‡ 107.9	64	36/0.1	1					H			•			
910		2	3   4	⁴	7					Sat.	*					830	-	‡		00,0.1						Ĭ			<del>-</del>			
‡					1						\$						826	9 112.9														440.0
906.3	33.5	1	2 4	4	] ●6					Sat.	<b>\</b>						020.	1 112.0	100/0.4	1					100/0.4	•			Borir	ig Terminated	at Elevation 826.	113.3 5 ft in
$\square$ $\exists$					1						<b>.</b>							Ŧ										l E	<del>-</del>		ock (Biotite Schist	)
901.3	38.5	1	3 5								}							1										1 -	•		(0.0 - 0.5 feet)	
900		'		'   -	_ <b>.</b> 8				+	w E	}							+										1 -	-		(0.5 - 1.1 feet)	1
896.3	13.5				·   · · ·						<b>}</b>							‡											наго		7.2 feet was inter Weathered Rock	
895	43.3	2	3 6	6	9					w	<b>±</b>							‡										1			rilling with NW Ca	
:											\$							‡											. Auvai		eet due to less tha recovery	11 25%
891.3 +	48.5	2	4 5	5	·   · · ·					w E	*							‡											Switc	hed to mud ro	otary drilling at 104	.7 feet
					- T				11		888.8	brown, orange-bro	Own and	l grav saproli	<u>51.</u>	4		Ŧ											<del>-</del> ·	wiien we fa	an out of casing	
886.3	53.5				/						E	micaceous, fine sa	andy SILT	.T (A-4) with I	ittle			Ī											•			
885		3	6   9	<sup>9</sup>   -	15_		<del>                                     </del>		+	Sat.	E		ыау					Ŧ										F	-			
											£							1										E				
881.3	58.5	3	6 1	0	 <b>1</b> 6		ļ · · · · ·			Sat.	Ł							‡										E	<del>-</del>			
					· · · i ·						\$ <del> </del>							‡										-				
876.3	63.5	5	6 1	2						Sat.	#							‡														
+		_	_   '	-   -	<b> </b> 18				1	Odl.	-							‡										-	<del>-</del>			
871.3	68 5				: : :   :						**							‡											•			
870		4	6 1	1	17				41	Sat.	ļ.							‡											<del>-</del>			
					::::`}	\	: : : :				j.							‡														
866.3 +	73.5	8	16 2							Sat.	F							‡											•			
<u> </u>				1 1		· ·			1		963.6				77 .	,		Ŧ											-			
861.3	78.5					: : - :	1				862.6 861.2 860.2		HERED R		77.: 78.	3		Ŧ										F	•			
860	(	60/0.1						60/0.1	T		860.2	(Bio	otite Schis	SI)															•			





						D ^-	-70	T -	<u> </u>			. N.D.		0501 00:05 5			
	34497		D!	lao N 1		R-270					LEVELA			GEOLOGIST Smith, B	Ξ	CDCU	D WED 45
_				dge No. 47	1			er -L-	(US 7	1		•		ALICABATAIT NO		-	D WTR (ft)
	ING NO.						24+08	205		+	FSET 5			ALIGNMENT -Y9-		0 HR.	19.5
	LAR ELI				<u> </u>		PTH 113		2014	NO	RIHING	582,886	ND NIM	<b>EASTING</b> 1,250,726	LUARARA	24 HR.	FIAD
			FF./DA	TE SUM0					2014		MD DAT			Casing W/SPT & Core			Automatic
	LER B						TE 03/2			00	MP. DA	<b>FE</b> 03/25/15		SURFACE WATER DEP	'IH N	/A	
	RE SIZE RUN			DRILL		JN	<b>1</b> 12.0 ft		ATA								
(ft)	ELEV (ft)	DEPTH (ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	ELEV. (fi	t)	D	ESCRIPTION AND REMARK	S		DEPTH (ft)
861.24	861.2	78.6	0.0	4.50/4.0	(4.0)	(0.0)		(4.0)	(0.0)	020 - V				Begin Coring @ 78.6 ft			70.0
860	859.2		5.0	1:56/1.0 1:15/1.0 1:11/1.0 1:26/1.0	(1.2) 60% (1.4) 28%	(0.0) 0% (0.0) 0%		(1.0) \100%/ (2.8) 16%	(0.0) 0% (0.0) 0%		861.2 860.2	gray and bro		CRYSTALLINE ROCK derate severe weathering, mode fracture spacing, BIOTITE S WEATHERED ROCK		medium ha	78.6 ard, \
855	854.2	85.6		1:37/1.0 1:22/1.0 1:40/1.0				1070	070		- - -	brown, seve	rely wea	athered, medium hard to soft, BIOTITE SCHIST	close fra	cture spaci	ng,
850	849.2	90.6	5.0	1:37/1.0 1:33/1.0 1:09/1.0 1:24/1.0 1:28/1.0	(1.2) 24%	(0.0) 0%					- - -						
	-	50.0		1.20/1.0							- - -						
845	<del>-</del>			N=100/0.6													<u>97.2</u>
840	-	<u> </u>		N=61							- - -	brown and	gray, sa	RESIDUAL prolitic, micaceous, sandy SIL	.T (A-4) \	with little cla	ау
	-	_								477	<u>837.6</u>			WEATHERED ROCK			102.2
835	-	<u> </u>		N=100/0.6							-  -			(Biotite Schist)			
830	-	†    -		N=100/0.6							- - -						
											 _ _ 826.5						113.3
	-	-		N=100/0.4							- 	Boring Termin	nated at	Elevation 826.5 ft in Weather	ed Rock	(Biotite Sc	nist)
	-	‡									<del>-</del> -			-Asphalt (0.0 - 0.5 feet)			
	-	ļ									-			-Concrete (0.5 - 1.1 feet)			
	-	ļ.									-	-Harder drillir	ng at 77.	2 feet was interpreted as the	top of W	eathered R	ock
	-	<u> </u>									- - -	-Resumed S	PT drillir	ng with NW Casing Advancer than 25% core recovery	at 90.6 fe	eet due to l	ess
	-	<u> </u>									<del>-</del> -	-Switched to	o mud ro	otary drilling at 104.7 feet when	n we ran	out of casi	ng
	-										- - -						
	-	<del> </del>									- - -						
											<del>-</del> -						
	-										- - -						
	-	<del> </del>  -									<del>-</del> - -						
	-	<u> </u>									<del>-</del> - -						
	-										- -						
	:	<del> </del>  -									- - -						
											<del></del> - -						

SITE DESCRIPTION   Bridge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)   GROUND WTR (ft)	WBS 344		<b>5</b> 0,	<b>\_</b>		R-2707		1	Y CLEVEI	I AND		GEO	DLOGIST Smith, B.			<b>WBS</b> 3449	9712			TIE	<b>P</b> R-2707C	COLINT	/ CLEVEL	ΔΝΠ		GEOL O	GIST Smith, B.		
EXEMPLE No.   1			<b>J</b> Bride	ne No				J				JOEC	SECOIOT Official, B.	GROUNI	D WTR (ft)	+		N Brid	ae No. 4							GLOLO	Officer, D.		WTR (ff)
Column   C				JC 140.		-	-	L (00 /				Δι ι	GNMENT -Y9-		` '	l ———			gc 110.			<u> </u>		· · · ·		ALIGNM	MENT -Y9-		
MAILER STATE   2.7000   1200					_			it .				_								_									
SMALE   SMAL				F SUI					INORTHIN							1			TE SUM				11011111111				1,200,000		
Part			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						COMP DA				<u> </u>		7 tatornatio	<del>                                     </del>			12 0010				COMP DA			<del></del>	CE WATER DEP		tatornatio
The content of the			BLO\	w cou								-   '				l			W COUN						/ L				
Section   Sect			·——			0 2					'/   C			ESCRIPTION	DEPTH (ft		(ft)	0.5ft					75 100				SOIL AND RO	CK DESCRIPTION	
Second Second								•	'				. ,										•						
Second   Second	940												CDOLIND CLI	DEAGE	0.6	860					   Mat	ch Line							
## Section 2.3		Ŧ-										939.4	RESIDU <i>A</i>	AL	0.0		Ŧ			T	I I	T				<u>-</u>	CRYSTAI (Biotite Sch	LINE ROCK st) (continued)	
193	936.1	1 T 3.3				: 1 : :			.			}		-7-6) with little f	fine		Ŧ					: : : :				F	(2.00 00	01) (00111111111111111111111111111111111	
## Action of any angle show of all times and the control of the c	935	Ŧ	4	4	7	11				+	М	F 033 6			5.9	855	Ŧ					+	+	-		F			
Section   Sec		Ŧ							.			955.0	red-brown, orange-bro	own, and brown	l,	1	Ŧ								Loss	E			
100   100	930	1 8.3	3	4	6	10			1	]	I M	}	saprolitic, silly CLAT (A-7-	-5) Will Some S	sariu	850	$\pm$						1		of <table-cell></table-cell>	E			
201 1 13 2 2 3 3 5 9 9 9 9 11 25 3 2 2 3 4 9 9 9 9 11 25 3 2 3 5 7 9 9 9 9 9 11 25 3 3 5 7 9 9 9 9 9 11 25 3 5 7 9 9 9 9 9 9 9 11 25 3 5 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		Ŧ				1. 1			I			<b>\</b>					Ŧ						1		water	E			
### 1	926.1	1 13.3				1:::			.			}					Ī				I I					ŧ			
20	925	+	2	2	3	5	<del> </del>	<u> </u>			M	}				845	+					<u> </u>		1					95.
### Above of the control of the cont		ł				i · · ·			.			}					<u> </u>									_	Boring Terminated Crystalline Ro	at Elevation 844.0 ft i ck (Biotite Schist)	n
11 100 100 100 100 100 100 100 100 100	920	1 18.3	1	2	3	5				-	w	}_					<u> </u>										Boring offset from p	roposed location due	to
-031.1 - 20.3	916.4	1 23.3				1		1				3					+									-	-Harder drilling at 62	2.0 feet was interprete	ed
905 901 1 23.5 2 2 3 5 901 1 23.5 2 2 3 5 901 1 23.5 2 2 3 5 901 1 23.5 2 2 3 5 901 1 23.5 2 2 3 5 901 1 23.5 2 2 3 5 901 1 23.5 3 4 5 11 96 96 96 96 96 96 96 96 96 96 96 96 96	915	Ŧ	2	3	4	7	1	1			l w	<b>Y</b>					Ŧ									F	•		
900		Ŧ					: : : :		.			1					Ŧ									F	-Auger retu	sai at 64.3 feet	
905 905.1 93.3 2 3 5 7 9 12 900 861 43.3 4 5 15 9 12 9 12 9 12 9 12 9 12 9 12 9 12	910	1 7 28.3	2	2	4	1					l w E	<b>\</b>					Ŧ									E			
905 906.1 43.3 2 2 3 5 1		Ŧ				10					"	7					Ŧ									F			
Sol 1 38.3 2 2 3 3 4 5 11 40.3 3 5 7 7 12 Sel 2 5 5 5 5 7 12 5 5 5 5 5 7 12 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	906.	1 T 33.3				1			.			<b>\</b>					Ŧ									E			
Substitute   Sub	905	Ŧ	2	3	5		1			+	l w	<b>Y</b>					Ŧ									E			
500		Ī				1			.			}					Ī									E			
895 896.1 43.3 4 5 11	900	1 1 38.3	2	2	3	↓ <b>♦</b> 5		<u> </u>		]	Sat.	}_					<u></u>									Ł			
890		1				· · · · ·						<u>- 898.6</u>	light brown orange-br	rown and gray	40.8		İ									E			
880 881 48.3 3 5 7		1 43.3				/						ŧ	saprolitic, micaceous, fine	e sandy SILT (A	, A-4)		<u> </u>									_			
880 881.1 53.3 3 4 6 7	895	†	4	٥	11	16-				1	Sat.	<b>-</b>	with little c	siay			‡									-			
880 881.1 53.3 3 4 6 7	2	. ‡				: :   : :						<b>*</b>					‡									ţ			
880 881.1 58.3 4 6 7 13.3 1000.3 875.1 64.3 1000.3	890	1 48.3	3	5	7	· · /· ·				_	Sat.	Ł					‡									L			
886	5	‡				: :j : :			1			#					‡									-			
880 881 1 58.3 4 6 7  876 1 63.3 10003 5 10003 600.00 875.1 64.3 10003 600.00 876.1	886.	1 ‡ 53.3	3	1	6	:::::						#					‡									-			
875 875 1 64.3 100/0.3 60/0.0 874 0 62.0 875.1 (Biotite Schist) 64.3 (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist)	2 000	‡		Ť	١ ،	10				1	Sat.	<b>"</b> -					‡									-			
875 875 1 64.3 100/0.3 60/0.0 874 0 62.0 875.1 (Biotite Schist) 64.3 (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist) 887.0 CRYSTALLINE ROCK (Biotite Schist)	004	, ‡				: 1 : :						#					‡									ļ.			
875   875   63.3   100/0.3   100/0.3   100/0.3   875.1   63.3   100/0.3   875.1   (Biotite Schist)   64.3   (Biotite Schist)   64.3   (Biotite Schist)   64.3   (Biotite Schist)   64.3   (Biotite Schist)   65.4   (Biotite Schist)   66.0   (Biotite Schis	880	+ 30.3	4	6	7	13-					Sat.	<b>#</b>					‡									Ļ			
875 875.1 64.3 100/0.3 60/0.0 100/0.0 100/0	1	‡				· ·   · ·				]		- 877.4			62.0		‡									ļ.			
870   60/0.0   874.0   CRYSTALLINE ROCK   65.4   (Biotite Schist)	876.	1 63.3	100/0 3						100/0.3			875.1			64.3		‡									ļ.			
WEATHERED ROCK (Biotite Schist)  865  CRYSTALLINE ROCK (Biotite Schist)	5 5 575.	+	60/0.0						60/0.0								Ŧ									F			
865	o'  	Ŧ					: : : :					茅	WEATHERED	ROCK			Ŧ									F			
865	870	‡				<u> </u>				<b>∤</b>	1	<b>}</b>	(Biotite Sch	riiSt)			‡									F			
865 CRYSTALLINE ROCK (Biotite Schist)		Ŧ					: : : :					867.0			72 4		Ŧ									F			
	865	Ŧ										<b>F 11.1</b>	CRYSTALLINE (Rightite Set	E ROCK		1	Ŧ									F			
		Ŧ						1		]		<b>F</b>	(Diotito oui				Ŧ									F			
	5	Ŧ				: : : :			1			<b>F</b>					Ŧ									F			





			KE	OCK		j KE	PU	K I								
WBS	34497.1.2			TIP	R-270	)7C	C	DUNT	Υ (	CLEVELA	ND	GEOLOGIST	Smith, B.			
SITE	DESCRIPTIO	<b>N</b> Bri	dge No. 4	171 on	1) -9Y-	NC 18) ov	er -L-	(US 7	4 Sh	nelby Byp	ass)				GROUN	D WTR (ft)
BORI	<b>NG NO</b> . B1-	В		STA	TION	24+18			OF	<b>FSET</b> 5	5 ft RT	ALIGNMENT	-Y9-		0 HR.	N/A
COLL	AR ELEV. 9	39.4 ft		тот	AL DE	<b>PTH</b> 95.	4 ft		NC	RTHING	582,906	EASTING 1,	250,668		24 HR.	16.3
DRILL	RIG/HAMMER	EFF./DA	ATE SUM	10093 DII	EDRICH	I D-50 86%	10/10/2	2014			DRILL METHOD Cor	e Boring		HAMME	R TYPE	Automatic
DRIL	LER Bare, J			STA	RT DA	<b>TE</b> 03/1	6/15		CC	MP. DAT	E 03/18/15	SURFACE WA	ATER DEP	TH N/	4	
CORI	SIZE NQ2					<b>N</b> 31.1 f	t									
ELEV (ft)	RUN ELEV (ft) DEPT (ft)	H RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	UN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	LOG		D	ESCRIPTION AN	D REMARKS	8		
8 <b>875</b> 51												Begin Coring				
	875.1 64.3 874.0 65.4	1.1 5.0	N=60/0.0 3:00/1.1	0.8) -∕∖ 73%	(0.4) 1 36%	Į.	(0.8) \ 73% /	(0.4) \ 36% /		875.1 874.0	gray and orange-brov	CRYSTALLII wn, moderate sev		ng, hard t	to modera	64.3 tely \65.4/
	Ŧ	"	1:40/1.0	(1.6) 32%	(0.0)		(2.1)	(0.0)		F	hard, cl	ose fracture space		SCHIST		
870	869.0 + 70.4		1:29/1.0 1:20/1.0 1:31/1.0	0270	0,0		3070	070		F	orange-brown, dark o		everely weatl			d to
	Ŧ	5.0	1:29/1.0 1:19/1.0	(4.3)	(1.6) 32%					867.0	SOIL, VELY CIOS	e to close fracture	spacing, bi	OIIIL 3	JI II JI	72.4
865	‡		1:30/1.0		52,0		(22.6) 98%	(18.1) 79%	Z	F	light to dark gray, wh	CRYSTALLII		erv sliahtl	v weather	
	864.0 75.4	5.0	1:33/1.0		(3.3)		30/0	, 5 /0		F	very hard to hard, n	noderately close to SCHIS	o close fractu	re spacir	ng, BIOTIT	Ē,
	‡	3.0	1:38/1.0	100%	66%					F		SUNIS	٠١.			
860	859.0 + 80.4		1:54/1.0 1:57/1.0							<u> </u>						
	0000.0	5.0	1:59/1.0	(4.8)	(4.7)					ļ.						
855	‡		1:42/1.0		94%					‡						
000	854.0 + 85.4		1:48/1.0		(4.0)					F						
	‡	5.0	2:27/1.0	100%	(4.0) 80%					t						
850			2:28/1.0 2:04/1.0							Ł						
	849.0 90.4	5.0	2:20/1.0 2:43/1.0	(4.8)	(4.5)					t						
	‡		2:39/1.0 2:02/1.0		90%					t						
845	844.0 + 95.4		2:09/1.0 2:19/1.0							844.0						95.4
	‡									L	Boring Terminated at	Elevation 844.0 f	t in Crystallir	ne Rock (I	Biotite Sch	nist)
	1									_	-Boring offset from p	proposed location	due to unde	erground (	utility confl	ict
	İ									E	-Harder drilling at 62.	0 feet was interpr	eted as the t	op of We	athered R	ock
	1									E		-Auger refusal	at 64.3 feet			
	+															
	1									L						
	Ŧ									_						
	1									L						
	Ŧ									F						
	Ŧ									F						
	Ŧ									F						
	Ŧ									F						
	Ŧ									F						
	‡									F						
	‡									<u>L</u>						
	‡									Ė						
	‡									<u> </u>						
	‡									F						
	‡									<b> </b>						
	‡									_						
	‡									-						
	‡									_						
	+									L						
	1									_						
	<u> </u>									-						

N/A

8.0

**GROUND WTR (ft)** 

HAMMER TYPE Automatic

<b>WBS</b> 34497.1.2			т	<b>IP</b> R-270	7C	COUNT	ry CLEVE	LAND			GEOLOGIST Smith, B.		WBS	34497.1.2			TII	<b>P</b> R-2707C <b>COUNT</b>	Y CLEVEL	AND			GEOLOGIST Smith, B.	
SITE DESCRIPTION	<b>ON</b> Br	idge N	o. 471	on -Y9- (N	IC 18) ove	r -L- (US	74 Shelby B	ypass)				GROUND WTR (ft)	SITE D	ESCRIPTIO	<b>N</b> Bridg	ge No.	. 471 c	on -Y9- (NC 18) over -L- (US 7	4 Shelby By	rpass)				GROUND WTF
BORING NO. E	32-A		s	TATION	25+06		OFFSET	64 ft LT	-		ALIGNMENT -Y9-	<b>0 HR.</b> N/A	BORIN	<b>G NO</b> . EB2	?-A		ST	<b>TATION</b> 25+06	OFFSET	64 ft LT			ALIGNMENT -Y9-	0 HR.
COLLAR ELEV.	929.7 1	t	Т	OTAL DE	<b>PTH</b> 93.5	ft	NORTHIN	<b>G</b> 582,	772		<b>EASTING</b> 1,250,730	<b>24 HR.</b> 8.0	COLLA	R ELEV. 9	29.7 ft		TC	OTAL DEPTH 93.5 ft	NORTHING	<b>3</b> 582,7	772		<b>EASTING</b> 1,250,730	24 HR.
DRILL RIG/HAMMEI	R EFF./D	ATE S	UM009	3 DIEDRICH	D-50 86% 1	0/10/2014		DRILL	METHOD	) H.S	S. Augers H	AMMER TYPE Automatic	DRILL R	RIG/HAMMER I	EFF./DAT	re su	JM0093	DIEDRICH D-50 86% 10/10/2014		DRILL I	METHO	<b>D</b> H.S	S. Augers H.	AMMER TYPE Automa
DRILLER Bare,	J.		s	TART DA	TE 03/30	′15	COMP. D	<b>ATE</b> 03	/30/15		SURFACE WATER DEPTH	I N/A		ER Bare, J.			ST	TART DATE 03/30/15	COMP. DA	TE 03/	30/15		SURFACE WATER DEPTH	N/A
ELEV DRIVE DEP	…—	ow co				PER FOO			· <b>▼</b> /	L	SOIL AND ROCK	DESCRIPTION	ELEV	DRIVE DEPTH	H BLO	w cou		BLOWS PER FOOT		SAMP.		LO	SOIL AND ROCK	DESCRIPTION
(ft) (ft) (ft	0.5f	t 0.5ft	0.5ft	0	25	50	75 100	NO.			ELEV. (ft)	DEPTH (ft)	(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0 25 50	75 100	NO.	МОІ	Ğ		
930											.929.7 GROUND S		850					Match Line			Sat.	58808		
				::: :							RESID orange-brown and tan-	brown, sandy CLAY		‡							Joan.	<b>*</b>	orange-brown and be micaceous, fine sandy	SILT (A-4) with little
925.9 3.8	3 4	-	7	: :¦:					l l		(A-6	3)	845	845.9 ‡ 83.8	10	19	22					<b> </b>	clay (cont	inuea)
+	4	6	'	<b>9</b> 13				1	M		923.4	6.3	043	‡	10	19	22	• • • • • • • • • • • • • • • • • • •	1		Sat.		- 843.3	
				:/::							orange-brown and tan- (A-5) with little	-brown, clayey SILT		‡									WEATHERE (Biotite S	
920 920.9 8.8	2	2	3	- <b>/</b> · · ·				41	M			5 5 Ga. 14	840	840.9 7 88.8	32	40	60/0.4						- (Diotite C	ornot)
‡				1 : :	:   : : :					1.ú <u> -</u>	918.4 orange-brown and l	orown saprolitic 11.3		‡					. 100/0.9					
915.9 13.	8		<u> </u>	]   :\: :	:   : : :	.					micaceous, fine sandy	SILT (A-4) with little		836.2 + 93.5	60/0.0				60/0.0	H		977	836.2 CRYSTALLII	NE BOCK
915	2	3	5	8				1	M		·			‡	00/0.0								(Biotite S	schist)
‡				:i::						#t				‡									Boring Terminated Penetration Test Refus	al at Elevation 836.2
910.9 18.	8 2	4	6	10-					М	ף	•			<u> </u>								ΙĿ	ft on Crystalline Roc	k (Biotite Schist)
±				.     .		.				<b>#</b>				1								l E	-Boring offset due to ov	verhead power lines
905.9 1 23	8			]   :   :	:   : : :	.				₩Ł				İ								ΙĿ	-Greater than 180 ton reached arour	s bearing capacity
905	2	4	7	11-				+	М		•			$\pm$								l E	-	
<del> </del>										Æ				Ŧ								l E	-Harder drilling at 86.4 as the top of We	athered Rock
900.9 28.	8 3	5	7		.				l <sub>w</sub>	F				Ŧ								l F	-Auger refusal	at 93.5 feet
T T				12				1	"	F	•			Ŧ								l F	•	
895.9 1 33.	ρ			: ;;:			I			F				Ŧ								l F		
895	3	4	6	10-		·			w					‡								ΙF	-	
‡														Ŧ								F		
890.9 38.	8 3	4	7	<b>-</b>   ∶∔∶					l <sub>w</sub>					Ŧ										
T 7		'	'	11-				11	vv	₩F	•			Ŧ								l F	-	
995 0				::/:						#				‡								F		
885.9 43.	3	6	9	· · ·     <sub>1</sub>	5	·			w		-			‡									-	
<u>.</u>     ‡				: :						#				‡										
880.9 48.	8	6	10		:   : : :									‡										
<u> </u>	"	"	10	· · · •	16			1	W		-			‡									-	
875.9 53.				: : ;										‡										
875.9 53.	8 4	6	10	· · · <u>i</u>				41	Sat.					‡										
<u> </u>				: : : `										‡										
870.9 58.	8		1	]   : : : :	: \: : : :	.								‡										
1 870	8	11	19		30			1	Sat.		-			‡									-	
					:   <i>j</i> : : : :	.				#				‡								<u> </u>		
865.9 63.	8 6	10	15	<u> </u>					Sat.	Ŀ				1								L	_	
<u> </u>					. \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	.				æŁ				İ								ΙĿ		
860.9 68.	8			]   : : :	. \ \.\.					<b>Æ</b>				İ								l Ł		
860	6	15	22		→37	+		+1	Sat.	E	•			$\pm$							1	[-	-	
<u> </u>										»F				Ī							1	F		
855.9 73.	8 10	15	23						Sat.	#F				Ŧ							1	F		
<b>T</b>									Jai.	»F	<del>.</del>			Ŧ							1	l F	-	
[   0500 + 70	.				.   !					#F				Ŧ							1	F		
01 = - 000.9 + 78.		1	i	1.1				1.1	1 6	-Loocoo			1 1		1 1		, ,			1	1	. ⊢		

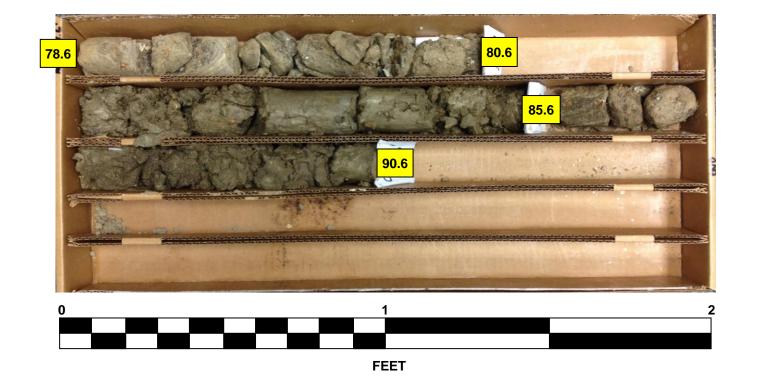
WRS	34497.				TIP R-2707C COUNTY CLEVELAND							GFOI (	DGIST Smith, B.			WBS	34497	12			TIP	P R-2707C	COLINI	Y CLEVEL	AND		GFOI	.OGIST Smith, B				
			Bride	ae Na	lo. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)							0202	onnan, B.	GROUND \	NTR (ft)	l			Brida	ie No			over -L- (US				0201			ND WTR (ft)		
	ING NO.			90 110		STATION   25+28   OFFSET   8 ft LT								AI IGN	MENT -Y9-	0 HR.	28.2	BORII				10 110.		ATION 25+28		OFFSET			ALIG	NMENT -Y9-	0 HR.	
	LAR ELE					TOTAL DEPTH         96.9 ft         NORTHING         582,780						780		_	<b>NG</b> 1,250,670	24 HR.	FIAD	l <del></del>		<b>EV</b> . 94			_	TAL DEPTH		NORTHING		80		ING 1,250,670	24 HR.	
				TE SI		0093 DIEDRICH D-50 86% 10/10/2014 DRILL METHO						IOD +			MMER TYPE Au		l ———				E SUI		DIEDRICH D-50 8		1			H.S. Augers		HAMMER TYPE		
	<b>LER</b> Ba				<b>START DATE</b> 03/23/15 <b>COMP. DATE</b> 03/23/								<del></del>	ACE WATER DEPTH			DRILL						ART DATE 0		COMP. DA				ACE WATER DEF			
ELEV	DRIVE	DEPTH	BLO	w co	/ COUNT BLOWS PER FOOT						SAME		<u> </u>	Τ'				l	DRIVE	DEPTH	BLOV	v cou			OWS PER FOO		SAMP.		-   '			
(ft)	ELEV (ft)		0.5ft	0.5ft 0.5ft 0.5ft 0				Ę	50	75 10	00 NO.	М	OI G	1	SOIL AND ROCK DE		DEPTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	MOI C	- 1	SOIL AND RO	CK DESCRIPTION	N
945														L				865		L					Match Line		<u>                                     </u>		_L			
	$\pm$													E					-										Ł	brown, orange-brownicaceous, fine sar	n, and gray, saprody dy SILT (A-4) with	olitic, h little
	1													940.5	GROUND SUF	RFACE	0.0		862.0	78.5	4	8	14					w	ŧ	clay (d	ontinued)	
940	† ‡					1								939.5	ROADWAY EMBA ASPHALT & CO	ANKMENT	1.0	860	-	-				<u>\</u>			1		 858.7			81.
	937.0	3.5				<u>                                   </u>								<b>}</b> '	brown, red-brown, and y	ellow-brown, silty			857.0	83.5	49	40	00/0.4	::::							RED ROCK e Schist)	
935	1 1	.	2	2	1	3 · ·						M	'  F	<u></u>	CLAY (A-7-6) with little	sand and gravei		855	-	_	49	40	60/0.4			100/0.9	<u> </u>		854.5	`	,	86.
	1 ‡					: \;								<b>}</b>												:   : : ;/:			∭F	RES brown and gray, sap	SIDUAL colitic micaceous	
000	932.0	8.5	5	7	11		18			.   .		М		<u>}</u>					852.0	88.5	24	34	50					w	ŧ	SIL	T (A-4)	carray
930	† ‡	۱					_			:   : : : :				929.5 -	RESIDUA		11.0	850	-							:   : : \	1	7	849 <u>.5</u>	WEATH	RED ROCK	91.
	927.0	13.5	2	4	5	: /:								-	maroon, red-brown, and saprolitic, silty CLAY (A-7-	d orange-brown,	d		847.0	93.5	100/0.3					:   : : : \					e Schist)	
925	‡	.	2	-		• • 9 •		· · · ·				M		}_	(	,		845	_	[	100/0.3					. 100/0.3	]		843.6			
	922.0	10.5				: : :					.			}					843.6	96.9	60/0.0					60/0.0	┥	2	843.6		LINE ROCK	96.
920	922.0	18.5	2	2	4	•1 · ·				.		М		}															ţ		e Schist) ated with Standard	d
320	1 ‡													}					-										F	Penetration Test Re	fusal at Elevation Rock (Biotite Schis	843.6
	917.0	23.5	2	3	5	: : :				.	1 1	١.,		}						<u> </u>									ļ	-Boring offset due t		
915	‡	.		J		-∳8 -	-					W		<u>}</u>					_	_									ļ.	· ·	0.0 - 0.4 feet)	iiics
	912.0 T	28.5								.	1 1		7	<b>;</b>					-	-									F	, ,	(0.4 - 0.8 feet)	
910	712.0	20.5	2	3	5						11	w		<b>;</b>						-									F		,	round
	1 ‡	·												<b>;</b>					-	F									F	-180 tons bearing c 81	0 feet	rouria
	907.0	33.5	2	5	4	1.1.				.		w	,	\$						-									F	-Harder drilling at 8		oreted
905	+ ‡	.				- 9.	-	 				"		904.5		· <del></del>	36.0		-	F									F	•	Weathered Rock	
	902.0	38.5				: 1 :				.				F	brown, orange-brown, an micaceous, fine sandy SI	id gray, saprolitic, LT (A-4) with little	:		-	Ī									F	-Auger retu	sal at 96.9 feet	
900	$\pm$		3	5	7	. 1	2.					w	'	E	ciay				_	E									E			
	I					· ::								E					-	[									E			
<u> </u>	897.0	43.5	3	5	6		.					l <sub>w</sub>	,	L															E			
895	+ +	.				I			<del> </del>	<del></del>				L					_	_									F			
5	892.0	48.5				: :				·   · · · · ·	.			_						<u> </u>									t			
890	1 1	.	2	5	'	• • 1	2 -					W	' 🎆	L					_	_									Ł			
5	l ‡					.								_					-										ţ			
005	887.0	53.5	4	5	8	· · j ·	13-			.   .		l w	,	_															ţ			
885	† ‡	۱								:   : : : :				F					-										<b> </b>			
9	882.0	58.5	5	7	12		\.   :				.			-						‡									‡			
880	‡	.	5	,	12		<b>●</b> 19	· · · ·				W	'	<u>-</u>					-	_									<u> </u>			
9	1 277 0 +	00.5					ļ.   ;			.				-					-	-									ţ			
875	877.0	03.5	5	8	11		I.   ●19			:   : : : :		w	/ 🎇	<b>‡</b>						‡									ļ.			
1 3/3	1 ‡	·					+ -							F					-										F			
8	872.0	68.5	4	8	11					:   : : : :			. 🎆	F						‡									F			
870	‡	.	.		''		19	· · · ·	ļ · · · ·		41	M	'	<u> </u>					-	‡									F			
3	867.0	73.5					1 :			:   : : : :				-					-	‡									F			
3 005	007.0	13.5	5	9	12	:::	1		: : :	:   : : : :		l w	,	it.					-	İ									Ė			

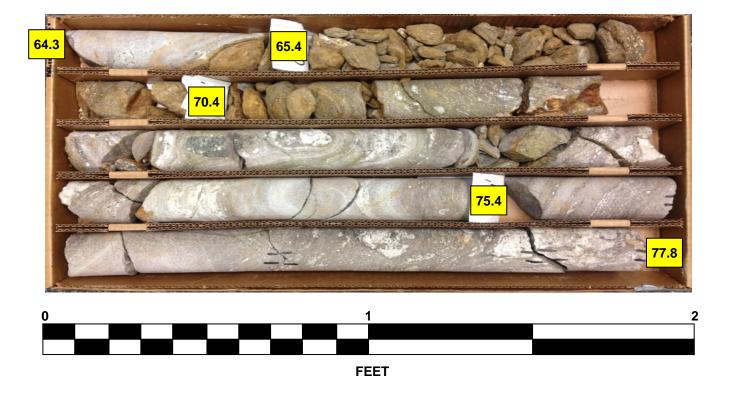
WBS 34497.1.2         TIP R-2707C         COUNT           SITE DESCRIPTION Bridge No. 471 on -Y9- (NC 18) over -L- (US 7           BORING NO. EB2-B         STATION 25+30           COLLAR ELEV. 941.1 ft         TOTAL DEPTH 83.7 ft							OUNTY	TY CLEVELAND					GEOLOGIST Smith, B.					<b>WBS</b> 34497.1.2						<b>TIP</b> R-2707C			
							(US 74	74 Shelby Bypass)				GROUND WTR (ft)			SITE DESCRIPTION Bridge No. 4						71 on -Y9- (NC 18) over -L- (US						
								OFFSET 67 ft RT				ALIGNMENT -Y9- 0 HR. N/A			BORING NO. EB2-B						STATION 25+30						
								<b>NORTHING</b> 582,814				<b>EASTING</b> 1,250,604 <b>24 HR</b> . 18.7			COL	COLLAR ELEV. 941.1 ft						TOTAL DEPTH 83.7 ft					
DRILI	RIG/HAI	MMER E	FF./DA	TE S	UM009	3 DIEDRIC	CH D-50 869	6 10/10/2	2014		DRILL	METH	OD H	S. Augers		HAM	MER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE S	UM0093	DIEDRI	CH D-50	86% 1	0/10/2014
DRILLER Bare, J. START DATE 03/12/15								COMP. DATE 03/12/15				SURFACE WATER DEPTH N/A					DRILLER Bare, J.					<b>START DATE</b> 03/12/15					
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLO	WS PER	FOOT		SAMP.	lacksquare		•	SOIL AND	ROCK DES	SCRIPTION	ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT			BLOWS	S PER FOO
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50		75 100	NO.	MC	OI G	ELEV. (ft		- TOOK BE	DEPTH (f	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25		50
945		-												_				865	ļ <del>-</del>	<b>↓</b>		<b>↓</b>		ļ		Ma	tch Line
	-	ļ												•					862.4	† † 78.7					: :		1
940	-	<b>!</b>				<del>   ,</del>	<del> <sub> </sub></del>	<del></del>		<del> </del>				941.1	GR	OUND SURI RESIDUAL		860		‡	100/0.3	3					
0.0	-	ļ.												-	red-brown, silt	y CLAY (A-7 sand	'-6) with little fine		-	‡							
	937.4	3.7	2	5	8	┤│∷ <mark>¦</mark>	13.	.				M		•		Sana			857.4	† 83.7 †	60/0.0			• •	• •		
935	_	‡				· · ·								934.9	rod brown			<u> </u>	-	‡							
	932.4	8.7				]  : : <u> </u>		.						-			CLAY (A-7-5) with			Ŧ							
930	-	ļ	3	5	7	::•	12.					D				Some Sand	1			Ŧ							
	-	F				-								-					_	Ŧ							
	927.4	13.7	2	3	5	-   . j. ●8		.				М		•						Ŧ							
925	_	F												-					-	Ŧ							
	922.4	18.7				]  : :								-						Ŧ							
920	_	Ŧ	2	3	5	•8						M		-						Ŧ							
	-	F				1								-					_	Ŧ							
	917.4	23.7	3	4	6	-		.				М		•						Ŧ							
915	_	F							· · ·					-					-	Ŧ							
	912.4	28.7						.						•						Ŧ							
910	_	-	3	4	7	1 1	ii .					M								Ŧ							
	-	Ī				1								-						Ŧ							
	907.4	33.7	4	6	9		15	.				w								<u> </u>							
905	_	<u> </u>				<del>  /</del>	<del></del>							_					-	‡							
	902.4	38.7	3	4	6			- 1				١.,								‡							
900	_	_		7	"	. •1	0					M							_	‡							
	897.4 <sup>-</sup>	12.7						- 1						•						‡							
205	- 097.4	43.7	3	4	7	<sup>†</sup>   : ∳₁	ii :   : :					W								‡							
895	_	<u> </u>				<u>                                     </u>				<del> </del>				<u>894.9</u>	tan-brown and	white, sapro	olitic, micaceous,	4	-	‡							
	892.4	48.7	3	7	9	-    : : <b>'</b>						w			fine sandy	SILT (A-4) v	with little clay			‡							
890	_	‡					<b>₽</b> 16					**		889.9			<u> 51</u> .:	<u> </u>	_	‡							
	- 887.4	53.7					į: ::								red-brown ar micaceous, s	ilty CLAY (A	own, saprolitic, -7-5) with some			‡							
005	-	- 50.7	3	6	8	<b>   : :  </b>	14					W				sand				‡							
885	_	<u> </u>								<del> </del>				<del>-</del>					-	‡							
	882.4	58.7	3	5	8	-   : : <u> </u>						М		•						‡							
880	_	‡				1	013.					IVI		879.9			61.:	4	_	‡							
	877.4 <sup>-</sup>	63.7					7.							<u>-</u>	brown, orange micaceous, fin	e sandy SILT	white, saprolitic, T (A-4) with trace			‡							
QTF	-	55.7	9	9	11	: :	20					М				clay				‡							
875	_	‡								1				<del>-</del> -					-	‡							
	872.4	68.7	10	19	27		. <b>.</b> .	: []:				Sat.								‡							
870	<u>-</u>	‡			-		• •   • •	. 🕶 -				Jal							-	‡							
	867.4 <sup>-</sup>	73.7						: ;;;	 	· · · ·				867.8			73.3			‡							
		+ ' ' '	100/0.4	1						100/0.4	<b>)</b>					ATHERED F (Biotite Schi				†	1						

	34497.1.2				P R-27070			Y CLEVEL				GEOLOGI	ST Smith,	В.	1	
SITE	DESCRIPTION	<b>I</b> Brido	ge No.	471 o	on -Y9- (NC	18) over	-L- (US 7	4 Shelby By	pass)					GROUN	ID WTR (fi	
BOR	ING NO. EB2-	-B		ST	ATION 25	+30		OFFSET (	67 ft RT			ALIGNME	<b>NT</b> -Y9-	0 HR.	N/A	
COL	LAR ELEV. 94	11.1 ft		тс	TAL DEPT	<b>H</b> 83.7 f	t	NORTHING	582,8	14		EASTING	1,250,604		24 HR.	18.7
DRILL	L RIG/HAMMER E	FF./DAT	E SU	M0093	DIEDRICH D-	50 86% 10/	10/2014		DRILL N	ЛЕТНО	D H.	S. Augers		HAMN	IER TYPE	Automatic
DRIL	LER Bare, J.			ST	ART DATE	03/12/1	5	COMP. DA	<b>TE</b> 03/	12/15		SURFACE	WATER DE	PTH N	/A	
ELEV (ft)	DRIVE ELEV (ft) DEPTH (ft)	BLO 0.5ft	W COU	JNT 0.5ft	0 2		PER FOOT 50	75 100	SAMP. NO.	MOI	0 I G		SOIL AND R	OCK DES	CRIPTION	
865_	862.4 78.7	100/0.3				Matc	h Line	100/0.3				<del></del>		HERED Rochist) (con		
860	857.4 83.7	60/0.0					::::		-			<del>-</del> .	Boring Term etration Test I ft in Crystalling	Refusal at e Rock (Bi	t)  n Standard Elevation 8 otite Schist I location d	)
	<u> </u>											- - H	Greater than 18 reached wi	ons be Sh SPT at the sported at	aring capac 68.7 feet. 73.3 feet v	vas
												-Vei	erpreted as the ry hard drilling orted around a erpreted as the	and signifaround 81.	icant rig ch 0 feet, this	atter was
	† † † † †											re	ugers were rep fusal 81.0 - 83 ly advance thr	.7 feet, bu	it were able	to
	† † † †															
	<u> </u>											- - - -				
	+ + + + + + + + + + + + + + + + + + + +											<del>-</del>				
												· · · <del>-</del>				
	#											-				
												-				
												<b>-</b>				

#### **CORE PHOTOGRAPHS**

**B1-C**BOX 1 of 1: 78.6 - 90.6 FEET
BOX 1 of 3: 64.3 - 77.8 FEET

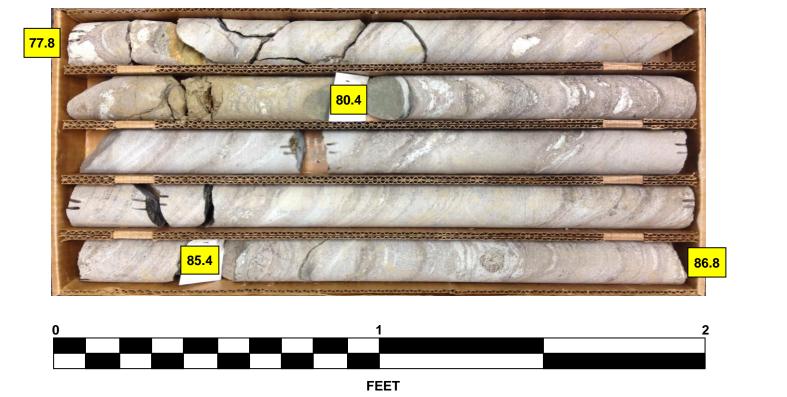




#### **CORE PHOTOGRAPHS**

**B1-B**BOX 2 of 3: 77.8 - 86.8 FEET

BOX 3 of 3: 86.8 - 95.4 FEET





#### **SITE PHOTOGRAPHS**

Bridge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)



Standing at the centerline of -Y9- at End Bent 2 looking North



Standing at the centerline of -Y9- at End Bent 1 looking South