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

DESCRIPTION

BORE LOG(S) & CORE REPORT(S)

TITLE SHEET LEGEND SITE PLAN

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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 EXCENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:

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

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

PERSONNEL

B. SMITH, PG

B. WORLEY, PG

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INVESTIGATED BY _B. SMITH, PG

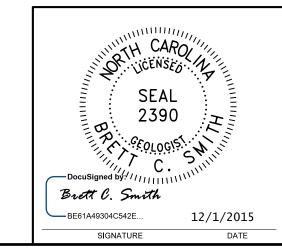
DRAWN BY B. SMITH, PG & B. WORLEY, PG

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

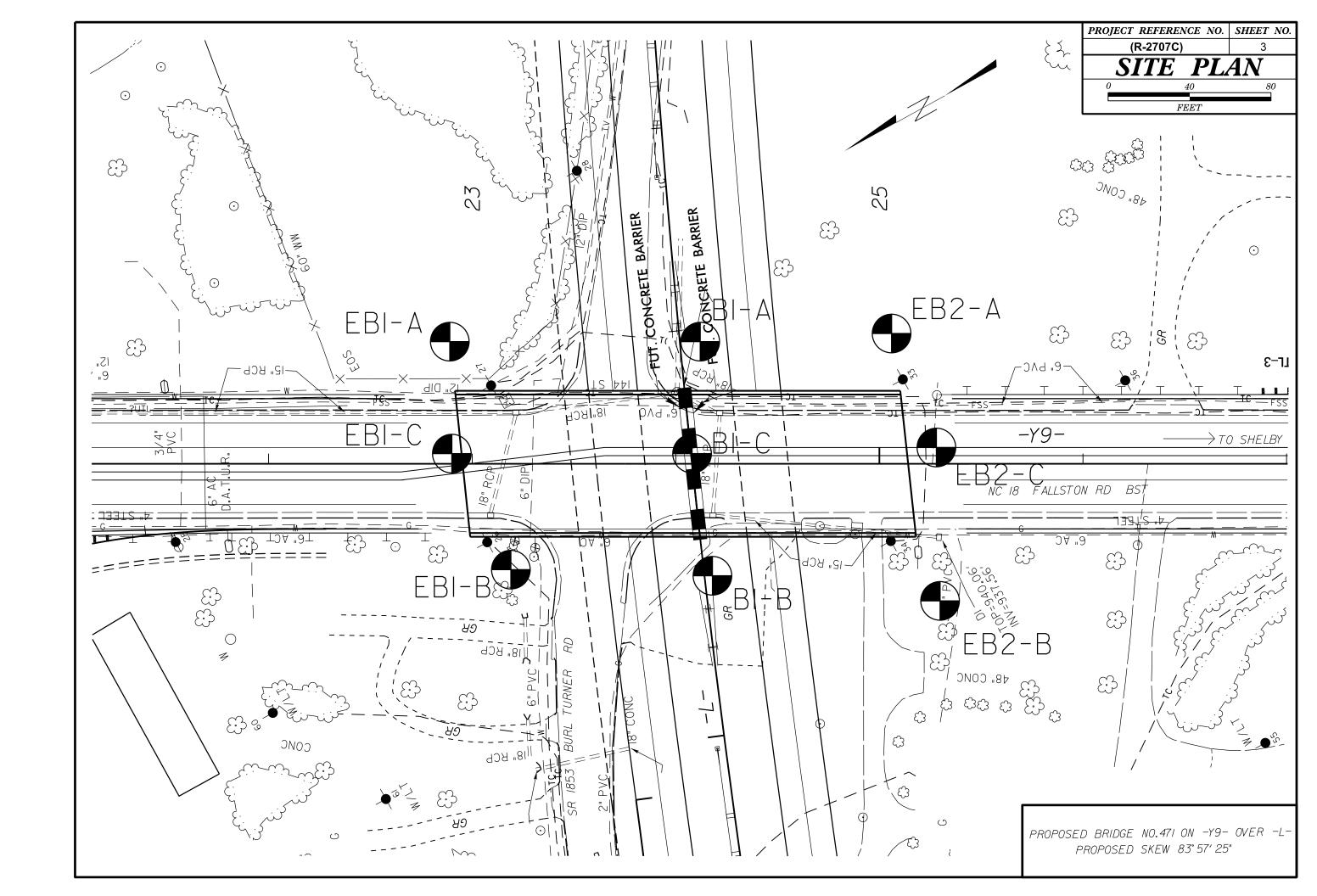
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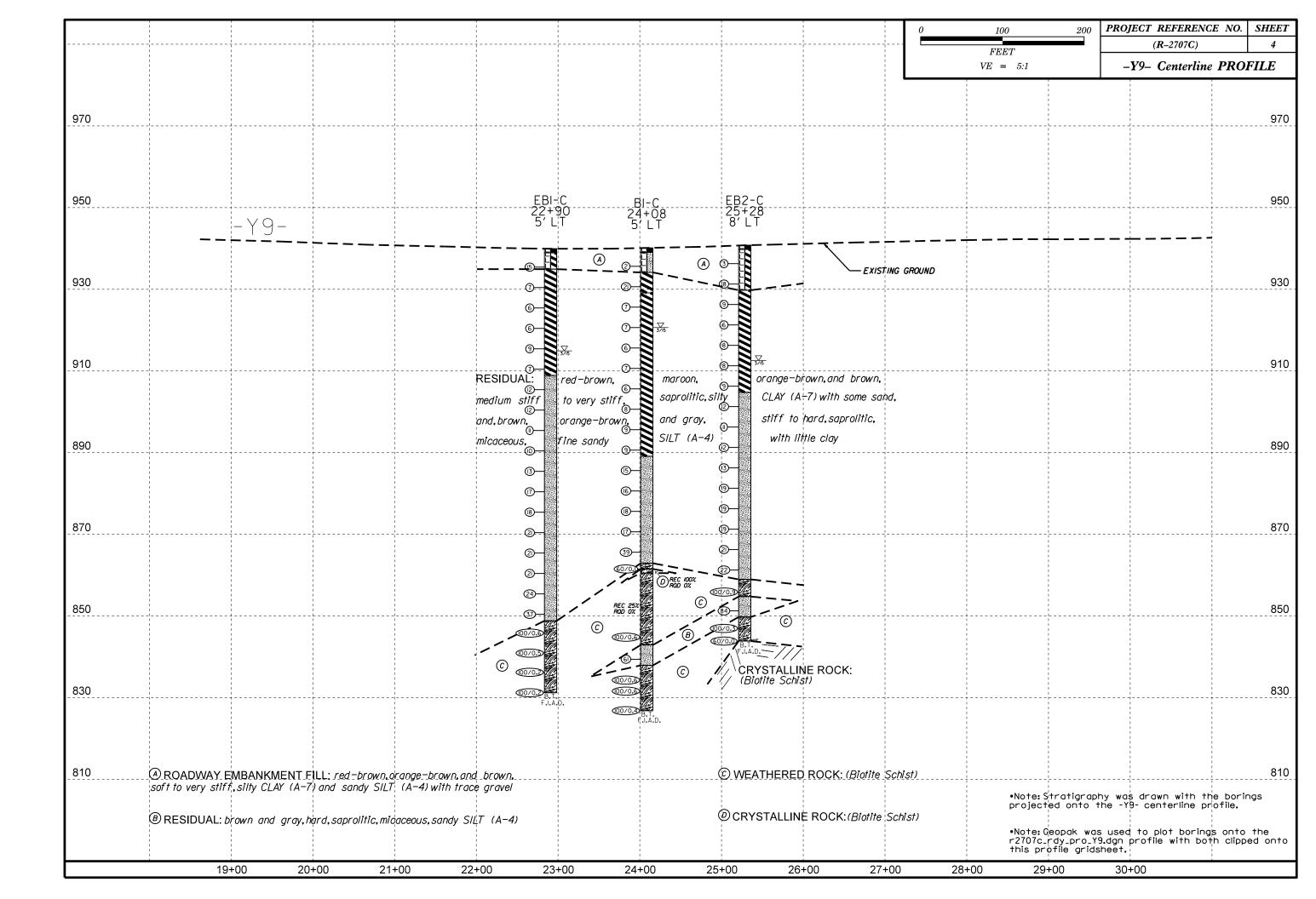
GEOTECHNICAL ENGINEERING UNIT

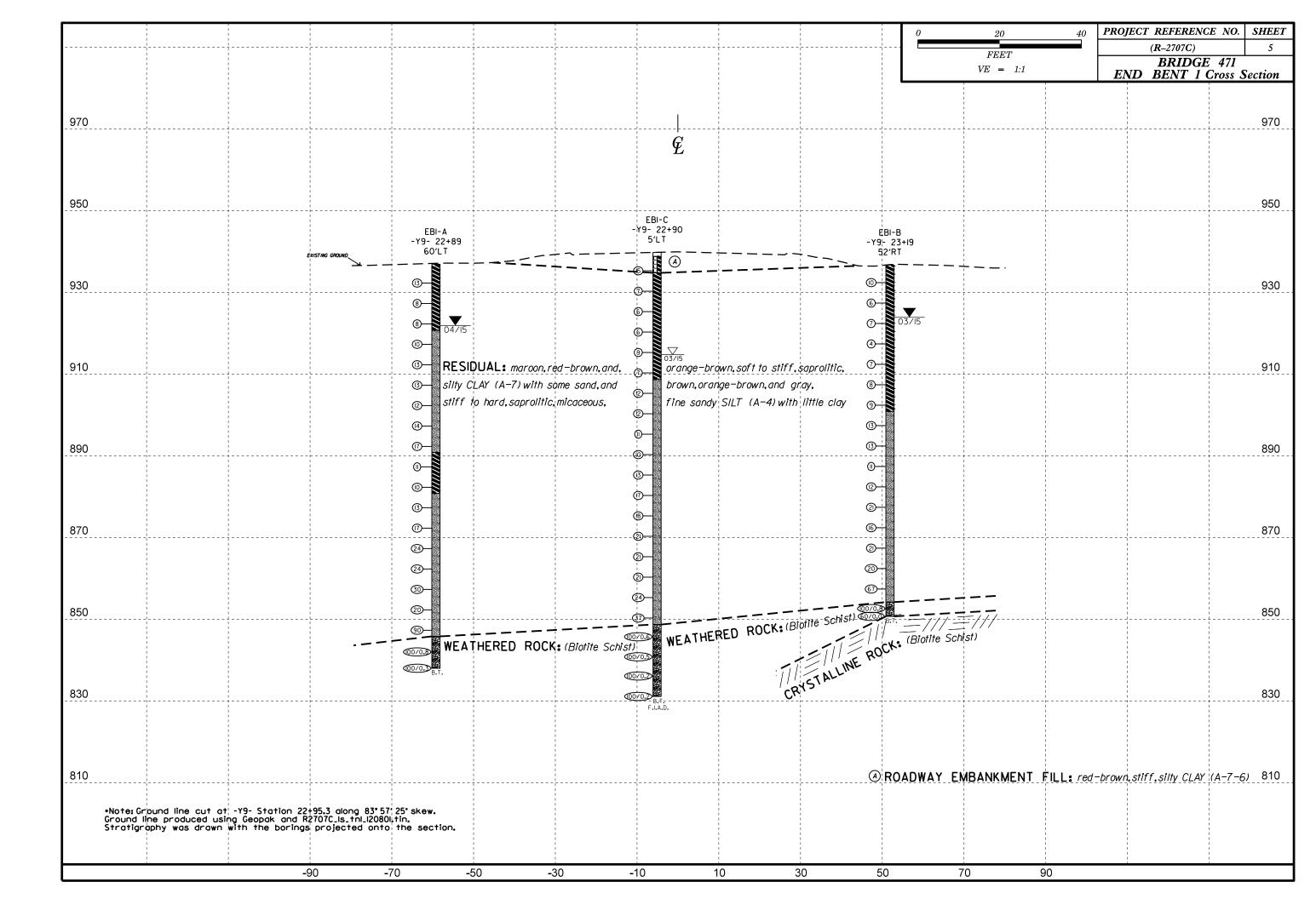
SUBSURFACE INVESTIGATION

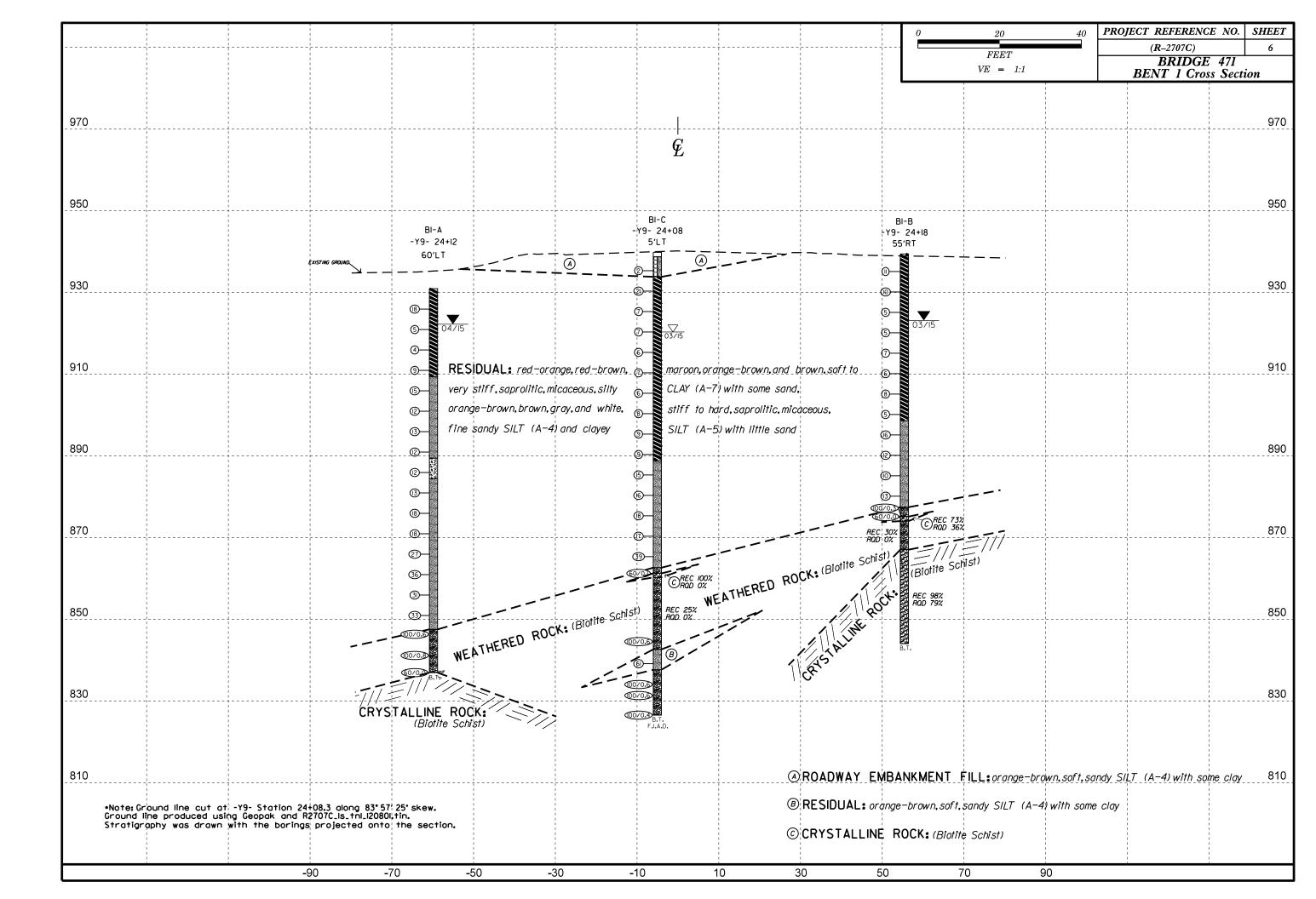
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

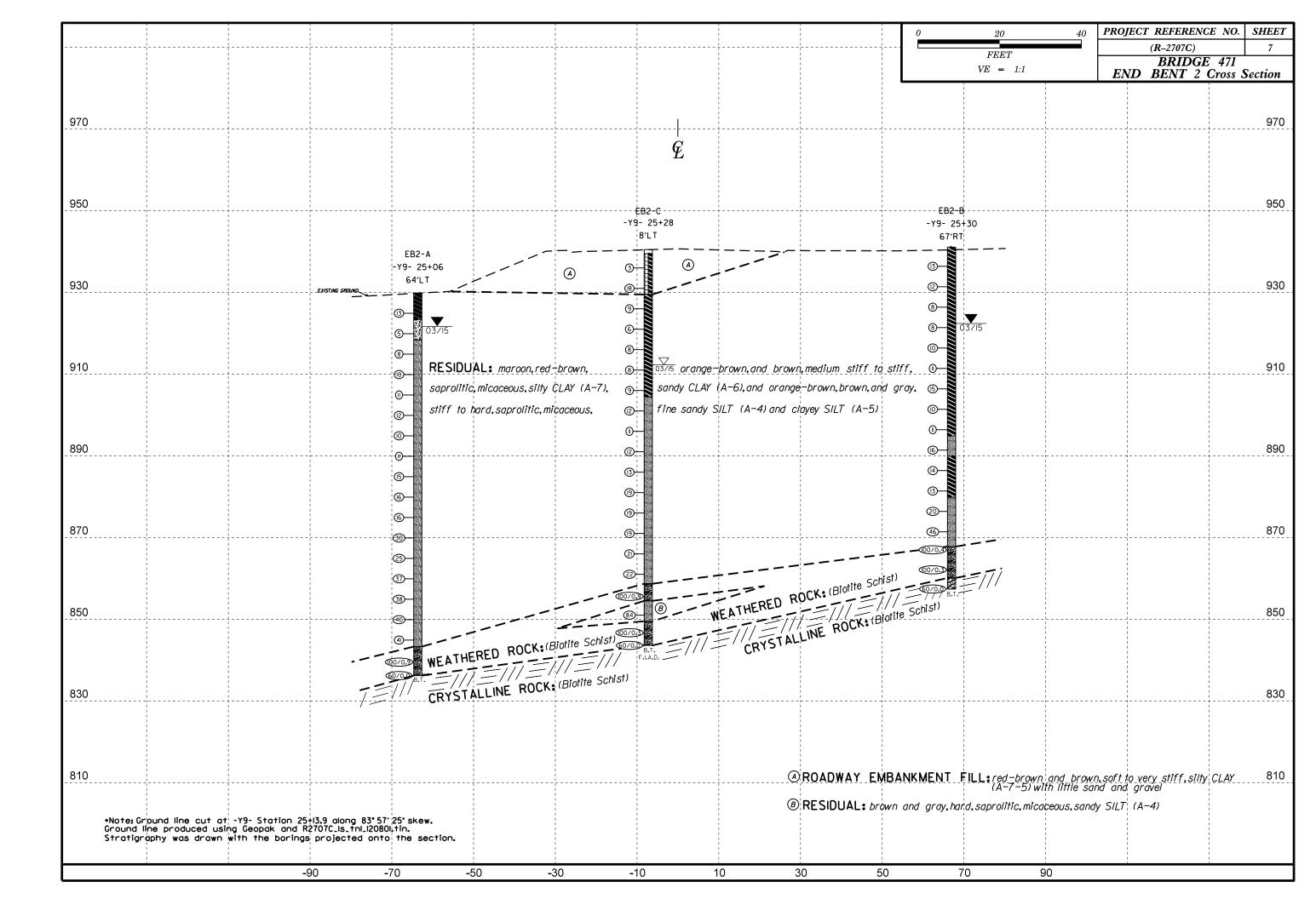
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AGHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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, GRAV, SLTY CLAV, MOIST WITH INTERBEDDED FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS, (≤ 35%, PASSINO *280) (> 35%, PASSINO *280) (> 35%, PASSINO *280)	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERAL OGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELOSPAR, MICA, TALC, KAOLIN, ETC.	WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE CRYSTALLINE OWNED YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SUFFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7 SYMBOL 000000000000000000000000000000000000	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	NON-CRYSTALLINE ROCK (NCR) GNEISS, GABBRO, SCHIST, ETC. 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.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
7. PASSING GRANULAR GRANULAR	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEOS, ETC. WEATHERING	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN 25 MX 51 MN 50 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36	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.	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	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 OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX	GROUND WATER ▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (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.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	STATIC WATER LEVEL AFTER 24 HOURS VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	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 - 38 ; PI OF A-7-6 SUBGROUP IS > LL - 38 CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED	SPRING OR SEEP MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAQLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPRESSIVE PENETRATION RESISTENCE (COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²) GENERALLY VERY LOOSE 4 TO 10	ROADWAY EMBANKMENT (RE) #ITH SOIL DESCRIPTION SOIL SYMBOL ### SOIL SYMB	IF TESTED, WOULD YIELD SPT REFUSAL 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 FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
DRANULAR MEDIUM DENSE 10 TO 30	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARITZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE 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 MINDR	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD TEST BORING WITH CORE PIEZOMETER INSTALLATION SPI N-VALUE	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES (100 BPF</u> 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.	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 ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4 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 OPENING (MM) 4,76 2,00 0.42 0.25 0.075 0.053 BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNCLASSIFIED EXCAVATION - EXCAVATION UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - CCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES 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.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE 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 - COME 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 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	STANDARD PENETRATION TEST TERNETRATION 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 DUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION - SATURATED - USUALLY LIQUID; VERY WET, USUALLY	CSE COARSE ORG ORGANIC O	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAYATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAYATED READILY WITH POINT OF PICK. PIECES 1 INCH	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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
PLASTIC RANGE - WET - (W) (SAT.) FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING 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: CME-45C CLAY BITS X AUTOMATIC MANUAL	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 THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	N 583,014.502 E 1,250,250,9513
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CME-55 6 CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET THINLY LAMINATED < 0.008 FEET	F.I.A.D. = Filled immediately after drilling
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC Ø-5 VERY LOW	CME-550 HARD FACED FINGER BITS X-N Q2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	VANE SHEAR TEST X CASING X W/ ADVANCER PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X DIEDRICH D-50 X TRICONE 3" TUNGCARB. SOUNDING ROD X CORE BIT VANE SHEAR TEST	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHAPP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1











WBS 344 SITE DESC BORING N COLLAR E DRILL RIG/H DRILLER ELEV (ft) DRIV ELE* (ft) 940 935 933.	CRIPTION NO. EB1- ELEV. 93 HAMMER E Bare, J. VE DEPTH	-A 36.9 ft : FF./DA		lo. 471	on -Y				NTY C S 74 She				GEOL	OGIST Smith, B.			WBS 344	497.1.2	-			IP R-27	076	COUNT	Y CLEVEL	AND.		GEOL	.OGIST Smith, I	3.		-
BORING N COLLAR E DRILL RIG/H DRILLER ELEV (ft) 940 935 933	ELEV. 93 HAMMER E Bare, J. VE DEPTH	-A 36.9 ft : FF./DA			TATIC		10) 000	I -L- (U	3 /4 311						GROUND V	VTD (ft)	SITE DES	CDIDTI	ON D	ridao N	lo 471 /	on V0 /	NC 18) ov	or I (IIS 7	4 Shalby By	(DOCC)					GROUND	WITD (ff)
DRILL RIG/H DRILLER ELEV (ft) DRIV ELE (ft) 940 935	HAMMER E Bare, J. VE DEPTH	36.9 ft FF./ DA					+80		OFF		60 ft LT		ALIGN	IMENT -Y9-	0 HR.	N/A	BORING N			iluge iv		TATION		ei -L- (US 7-	OFFSET	-		ALIGI	NMENT -Y9-		0 HR.	N/A
DRILL RIG/H DRILLER ELEV Cft) 940 935 933	Bare, J.	FF./DA			OTAI		H 98.9	ft			582,9	64		ING 1,250,831	24 HR.	15.0	COLLAR E			ft			PTH 98.9) ft	NORTHING		64	_	ING 1,250,831		24 HR.	15.0
DRILLER ELEV (ff) DRIVELE* (ff) STATE (ff) 940 935 933	Bare, J.			SUM009									H.S. Augers		MER TYPE Au		DRILL RIG/I											H.S. Augers			R TYPE A	
940 ELE' (ft) 940 935	V DEFIII						03/31/				TE 03/:			ACE WATER DEPTH N			DRILLER	Bare,	J.				TE 03/3		COMP. DA				ACE WATER DE			
935				OUNT t 0.5ft		25	BLOWS			100	SAMP.			SOIL AND ROCK DES	SCRIPTION	DEPTH (ft)	ELEV CHI (ft)	/E DEF	PTHE	BLOW Co				S PER FOOT		SAMP.			SOIL AND RO			
928. 925 923.	3 - 3.6	2	3	8 4 5								M M	936.9	GROUND SURF RESIDUAL red-brown and orange-brown, and orange-brown, and saprolitic, silty CLAY (A-7-5) brown, orange-brown, and micaceous, fine sandy SIL clay	own, silty CLAY ne sand orange-brown,) with some sand gray, saprolitic,	<u>16</u> . <u>1</u>	855 853 850 848 845 843	3 78	7 6.6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		12		\$30	tch Line	90		Sat.	845.8	— — — WEATF (Bio	HERED RO	Q-4) with littl	e <u>91</u>
910 908. 905 903. 900 898.	23.6 23.28.6 23.28.6 23.33.6 23.33.6 23.33.6	3 3	5	7 7 9		10						M M Sat.						+++++++++++++++++++++++++++++++++++++++											-Greater than 180	proposed lad power lin	ocation due es	to
890 888. 885 883. 880 875 875 870 868.	† †	3 3	5 7 9	6 7 8		117 111 111 110 110 111	24					Sat. Sat. Sat. Sat. Sat.	890.8	brown and gray, saprolitic, CLAY (A-7-5) with so brown, orange-brown, and micaceous, fine sandy SIL' clay	gray, saprolitic,	<u>56</u> .1		+++++++++++++++++++++++++++++++++++++++														

WBS 34497.1.2 TIP R-2707C	COUNTY CLEVELAND	GEOLOGIST Smith, B.	WBS 34497.1.2 TIP	R-2707C COUNTY CLEVE	ELAND.	GEOLOGIST Smith, B.
SITE DESCRIPTION Bridge No. 471 on -Y9- (NC 18) over -L-		GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 471 on			GROUND WTR (ft)
BORING NO. EB1-C STATION 22+90		ALIGNMENT -Y9- 0 HR. 25.0		ATION 22+90 OFFSET	· · · · · · · · · · · · · · · · · · ·	ALIGNMENT -Y9- 0 HR. 25.0
COLLAR ELEV. 939.8 ft TOTAL DEPTH 108.7 ft	NORTHING 582,989	EASTING 1,250,783 24 HR . FIAD	COLLAR ELEV. 939.8 ft TOTA	TAL DEPTH 108.7 ft NORTHIN	NG 582,989	EASTING 1,250,783 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 10/10/	2014 DRILL METHOD H.S. /	Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE SUM0093 DII	JEDRICH D-50 86% 10/10/2014	DRILL METHOD H.S.	Augers HAMMER TYPE Automatic
DRILLER Bare, J. START DATE 03/26/15	COMP. DATE 03/26/15	SURFACE WATER DEPTH N/A	DRILLER Bare, J. STAI	ART DATE 03/26/15 COMP. D	DATE 03/26/15	SURFACE WATER DEPTH N/A
DRIVE CH CH CH CH CH CH CH C	75 100 110 7 0	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV (ft) DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0.5ft	BLOWS PER FOOT 0 25 50 75 10	SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
936 3 3.5 5 6 9	M	39.8 GROUND SURFACE 0.0 38.8 ROADWAY EMBANKMENT 1.0 ASPHALT & CONCRETE red-brown, silty CLAY (A-7-6) 34.8 RESIDUAL maroon and orange-brown, saprolitic, silty CLAY (A-7-5) with some sand Drown, orange-brown, and gray, saprolitic, micaceous, fine sandy SILT (A-4) with little clay	860 856.3 83.5 5 9 15 850 851.3 88.5 7 14 23 846.3 93.5 55 45/0.1 841.3 98.5 60 40/0.0 836.3 103.5 100/0.2	Match Line 24 100/0. 100/0. 100/0.	Sat	brown, orange-brown, and gray, saprolitic, micaceous, fine sandy SILT (A-4) with little clay (continued) 91.1 WEATHERED ROCK (Biotite Schist) Boring Terminated at Elevation 831.1 ft in Weathered Rock (Biotite Schist) -Boring offset from proposed location due to overhead power lines -Asphalt (0.0 - 0.5 feet) -Concrete (0.5 - 1.0 feet) -Greater than 180 tons capacity reached around 85.5 feet -Driller reported harder drilling at 91.1 feet, interpreted as the top of Weathered Rock

	34497				TIP R-2707C COUNTY CLEVELAN e No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypa								GEOLOGIST Smith, B.	1		WBS 34497.1.2		TIP R-2707C	COUNTY CLEV				GEOLOGIST Smith, B.	
				ge No				`		<u> </u>			1	GROUND	` '	SITE DESCRIPTION	 ,							GROUND WTR (1
BOR	ING NO.	EB1-E	3			TATION 2			OFFSET				ALIGNMENT -Y9-	0 HR.	N/A	BORING NO. EB1-		STATION 23+19		r 52 ft F			ALIGNMENT -Y9-	0 HR. N/
	LAR ELE					OTAL DEPT		!	NORTHIN				EASTING 1,250,719	24 HR.	12.8	COLLAR ELEV. 936		TOTAL DEPTH 86		ING 58			EASTING 1,250,719	24 HR. 12.
			F./DAT	E SL		DIEDRICH D								MER TYPE AL	ıtomatic	DRILL RIG/HAMMER EF								AMMER TYPE Automatic
-	LER B					TART DATE			COMP. DA			<i>1</i>	SURFACE WATER DEPTH	I/A		DRILLER Bare, J.		START DATE 03/1		DATE (15	SURFACE WATER DEPTH	N/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH_ (ft)	0.5ft			0 2	BLOWS PE		75 100	SAMP.	17	0	SOIL AND ROCK DES		DEPTH (ft)	ELEV DRIVE ELEV (ft) DEPTH (ft)	0.5ft 0.5ft 0.5	→ I	/S PER FOOT 50 75	00 NO	_ /	101 G		DESCRIPTION
940	-	-														858.4 78.3	12 25 42		atch Line	1 1	w		brown, orange-brown, a micaceous, fine sandy \$	SILT (A-4) with little
935	933.4	3.3				.							936.7 GROUND SURF RESIDUAL red-brown, silty CLAY (A-7- sand		0.0 e	855 853.4 T 83.3				·		7.	clay (contil	8
930	-		2	4	6	. 1 10 .					M		930.9 red-brown and orange-br	own, saprolitic,	5.8	850.7 + 86.0	00/0.8			0.8♥			(Biotite Sc	chist) 8
925	928.4	8.3	2	2	4	6					М		micaceous, silty CLĂY (A- sand	7-5) with some									- (Biotite Solution Sol	with Standard Il at Elevation 850.7
020	923.4	13.3	2	3	4	. 7					M		•										-Boring offset from propo	osed location due to
920	918.4	18.3	2	2	2						w												- Greater than 180 tons around 7	'8 ft.
915	913.4	23.3									"												Driller indicates harder interpreted as t Auger refusal	op of WR.
910	-		2	3	4						M												_	
905	908.4	28.3	3	3	5	. • · · · · · · · · · · · · · · · · · ·					М												-	
903	903.4	33.3	3	3	6	. l . l . q 9					M												-	
900	898.4 -	38.3	4	5	8	j		: : : :			M		. brown, orange-brown, and micaceous, fine sandy SIL' clay	gray, saprolitic, T (A-4) with little	35.8								-	
895	893.4 -	43.3				\psi 13.					IVI												-	
890		-	3	5	8						w	E											<u>-</u>	
DO 1.001	888.4	48.3	3	4	7	11 .					М	ŀ											-	
885 25 25	883.4 -	53.3	3	3	9					-	М												-	
880 880	878.4	58.3	5	9	12	\																	<u> </u>	
875 875	-			9	12		21				M												-	
9 2 870	873.4	63.3	4	5	11	• 16					w	F											[- -	
865 865	868.4	68.3	5	8	13	· · · · · · · · · · · · · · · · · · ·	21				w	F											-	
865	863.4	<u> </u>																					F	

Mile	WRS	34497.1.2				TIP R-2707C COUNTY CLEVELAND 1 on -Y9- (NC 18) over -I - (US 74 Shelhy Rynass)						GEOL	L OGIST Smith, B.			WBS 3449	712			TIE	P R-2707C	COUNTY	CLEVEL	AND		GEOL	OGIST Smith, E	<u> </u>	
MARCHAN SALA	—			ridae N				J				OLO:	Color Cimui, B.	GROUND V	NTR (ft)	-		J Brida	ie No. 4			_				0202	Olivi, E		UND WTR (ff)
Column C	-			ilugo i		•		2 (00 /		*		ALIGI	NMENT -Y9-	_		-			10.110.		. , ,	<u> </u>		<u> </u>		ALIGN	IMENT -Y9-		
Married Profession Part	-			ft				ft			 56																		
Description Company									1										E SUM								.,200,2		
Section Sect									COMP. DA				<u> </u>										COMP. DA				ACE WATER DE		
## Of Control 10 10 10 10 10 10 10 1				LOW C							V / L	- '						BLOV	V COUN		1				o.	- '			ON.
200.	(ft)			ft 0.51	ft 0.5ft	0	25	50	75 100	NO.					DEPTH (ft)		(ft)	0.5ft	0.5ft C	0.5ft	0 25	50 7	75 100	NO.			SOIL AND RO	CK DESCRIPTION	JIN
200.																													
Part	935											_				855	┷	l			Mat	tch Line		↓					
10		‡										ļ.					‡				1 1 1						micaceous, fine sa	ndy SILT (A-4) w	prolitic, ith little
## A Section of the Company of the C	930	‡					_	1				930.9			0.0		† ^{79.0}	7	12	21		1			Sat.	#	ciay (continuea)	
### A PART	300	‡						1		1		*	red-orange, silty CLAY (A-		Э	000	‡												
Section Sect		926.9 + 4	.0 4	8	10			1	.			\$	sand			846.9	84.0	65 3	35/0 1		. 🖵 🗀		1			847.5 -			83.4
## APPLIED TO THE PROPERTY OF	925	+				- · · · • · · • · · · · · · · · · · · ·	8	ļ · · · ·			IVI	924.4			6.5	845	Ŧ		, , , , ,			·	· · · · · · i				(Biot	ite Schist)	
90		921 9	_			: /: :			.		\mathbf{v}	\$	orange-brown, saprolitic, s with some sa	silty CLAY (A-7-5) and)	841 0	T 89 0							!		F			
910 11 5 12 1 2 1 2 1 2 1 2 2	920	921.9	2	2	3	∮ 5· · ·					М	\$					1 03.0	62 3	38/0.3					•		F			
## 15 Company 1		Ŧ										\					Ŧ							}					
10		916.9 14	1.0	1	3				.		м	\				836.9	94.0	60/0.0						-		836.9	CRYSTA	LLINE ROCK	94.0
10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	915	+				1	+	 				\					+									_			ard
190		911.9 19	9.0			.1			.			\					‡									E	Penetration Test R	efusal at Elevation	n 836.9
956 3 24.0 4 6 0 0	910	<u> </u>	3	3	6	• •9• •					М	909.4			21.5		<u> </u>									<u>-</u>	-	•	
Contact Plan 10 Plan P		‡				::/:::							orange-brown, tan-brown	wn, and white,	<u> </u>		‡									-	embankment, ove	rhead power line	
Sol 3 22.0 3 5 7 40.2	005	906.9 + 24	1.0	6	9	\					М	<u></u>			,		‡									<u> </u>	ū		nacity.
March Section Sectio	905	‡				 		<u> </u>		-		-					‡									-	reached with	SPT at 74.0 fee	pacity et
1		901.9 + 29	0.0	<u> </u>		:::į:::											‡									ţ			
195	900	‡	3	l °	'	· •12·				_	М	L .					‡									Ė	as the top o	weathered Roc	ĸ
860		‡				: : : :						J.					‡									Ė			
880 9 44 0 3 5 7 12	895	890.9 + 32	3	5	8	· · • 13·					М	F					‡									F			
88.9		Ŧ										F					Ŧ									F			
Second		891.9 7 39	0.0	4	8						M	F					Ŧ									F			
Septimized to the series of th	890	Ŧ				• • • • • • • • • • • • • • • • • • •	+	ļ · · · ·			IVI	889.4			41.5		Ŧ									F			
885	0	886 9 I 44	ו ח								*N	<u></u>	saprolitic, micaceous, claye	ey SILT (A-5) with	h		Ŧ									E			
881.9 49.0 2 5 8	885	Ī	3	5	7	• •12 •					W N		little fine sa	and	46 F		Ī									E			
880	5.	1															<u> </u>									L			
876.9 54.0 4 7 11	3	881.9 49	0.0	5	8						w	E		LT (A-4) WITH IIIUE	!		<u> </u>									E			
871.9 59.0 4 7 11	880	+				1 1 1 1		<u> </u>		-		F					‡									-			
871.9 59.0 4 7 11	5	876.9 + 54	1.0	<u> </u>	<u> </u>	: : 1/:						*					‡									-			
866.9 64.0 6 13 14	875	‡	4	'	11	· · · • 1:	8				W	L .					‡									L			
866.9 64.0 6 13 14	3047	‡										#					‡									‡			
866.9 64.0 6 13 14 Q27 Sat. Sat. Sat. Sat.	2 2 870	871.9 <u>+ 59</u> +	9.0	7	11		8				Sat.	#					‡									ţ			
865	370	‡										F					‡									F			
865	ر ا	866.9 + 64	1.0	13	14		/ · · · ·				C.	J.					Ŧ									F			
5 860 + 7 17 19 -	865	‡	"	'3	'-		Q 27 · · ·	ļ · · · ·			Sat.	F					‡									F			
5 860 + 7 17 19 -	OBLE	861 9 + 20	,				//					F					Ŧ									F			
	860	+ 00	7	17	19		. 36 .				Sat.	F					Ŧ									F			
5 856 9 740	Z C	Ŧ					<u> </u>					E					Ŧ									E			
S		856.9 74	1.0	14	17		1				Sat	Œ					Ŧ									E			

ROKE	LOG REPORT					
WBS 34497.1.2	TIP R-2707C COUNTY CLEVELAND	GEOLOGIST Smith, B.	WBS 34497.1.2	TIP R-2707C COUNTY	Y CLEVELAND	GEOLOGIST Smith, B.
SITE DESCRIPTION Bridge No	o. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)	GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 4	471 on -Y9- (NC 18) over -L- (US 74	4 Shelby Bypass)	GROUND WTR (ft)
BORING NO. B1-C	STATION 24+08 OFFSET 5 ft LT	ALIGNMENT -Y9- 0 HR. 19.5	BORING NO. B1-C	STATION 24+08	OFFSET 5 ft LT	ALIGNMENT -Y9- 0 HR. 19.5
COLLAR ELEV. 939.8 ft	TOTAL DEPTH 113.3 ft NORTHING 582,886	EASTING 1,250,726 24 HR. FIAD	COLLAR ELEV. 939.8 ft	TOTAL DEPTH 113.3 ft	NORTHING 582,886	EASTING 1,250,726 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE S	UM0093 DIEDRICH D-50 86% 10/10/2014 DRILL METHOD	NW Casing W/SPT & Core HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE SUMO	/10093 DIEDRICH D-50 86% 10/10/2014	DRILL METHOD N	W Casing W/SPT & Core HAMMER TYPE Automatic
DRILLER Bare, J.	START DATE 03/24/15 COMP. DATE 03/25/15	SURFACE WATER DEPTH N/A	DRILLER Bare, J.	<u> </u>	COMP. DATE 03/25/15	SURFACE WATER DEPTH N/A
ELEV CHIP CHIP CHIP CHIP CHIP CHIP CHIP CHIP		C SOIL AND ROCK DESCRIPTION DEPTH (ft)	ELEV (ft) DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0.	I	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION
940		939.8 GROUND SURFACE 0.0938.7 ROADWAY EMBANKMENT 1.1		Match Line		CRYSTALLINE ROCK
935 936.3 7 3.5 2 1	1	ASPHALT & CONCRETE orange-brown, sandy SILT (A-4) with some clay 933.8 6.0	855			(Biotite Schist) WEATHERED ROCK (Biotite Schist) (continued)
930 931.3 8.5 5 8	13 21 M	red-brown and yellow-brown, silty CLAY (A-7-6) with little fine sand 928.8 maroon, red-brown, orange-brown, and	850			- - - - -
925 926.3 13.5 2 4	3 47 M	brown, saprolitic, micaceous, silty CLAY (A-7-5) with some sand	845 845.1 94.7 70 30/0.1		. 100/0.6	L 842.6 97.2
920 921.3 + 18.5 2 3	4 7		840 840.1 99.7 17 26 3	35	Sat.	- RESIDUAL - brown and gray, saprolitic, micaceous, sandy - SILT (A-4) with little clay - 837.6
915 916.3 † 23.5 2 2 2 911.3 † 28.5	4 6 W		835 835.1 104.7 46 52 48 831.9 107.9	8/0.1	100/0.6	(Biotite Schist)
910 2 3	1		830 64 36/0.1		100/0.6	
905	1				100/0.4	Boring Terminated at Elevation 826.5 ft in Weathered Rock (Biotite Schist)
900	5 1					-Concrete (0.5 - 1.1 feet) -Harder drilling at 77.2 feet was interpreted as the top of Weathered Rock -Resumed SPT drilling with NW Casing
891.3 7 48.5	5					Advancer at 90.6 feet due to less than 25% core recovery -Switched to mud rotary drilling at 104.7 feet
886.3 53.5 3 6	9 • 15 · · · · · · · · · · · · · · · · · ·	888.8				— when we ran out of casing - - - -
881.3 58.5 3 6	10 10 Sat.					- - -
876.3 T 63.5 5 6	12 • 18 · · · · · · · · · · · · · · · · · ·					
871.3 68.5 4 6	11 11 Sat.					- - - -
866.3 73.5 8 16		962.6				- - - - -
861.3 78.5	60/0.1	862.6 77.2 861.2 WEATHERED ROCK 78.6 860.2 (Biotite Schist) 79.6	11 + 1 1			

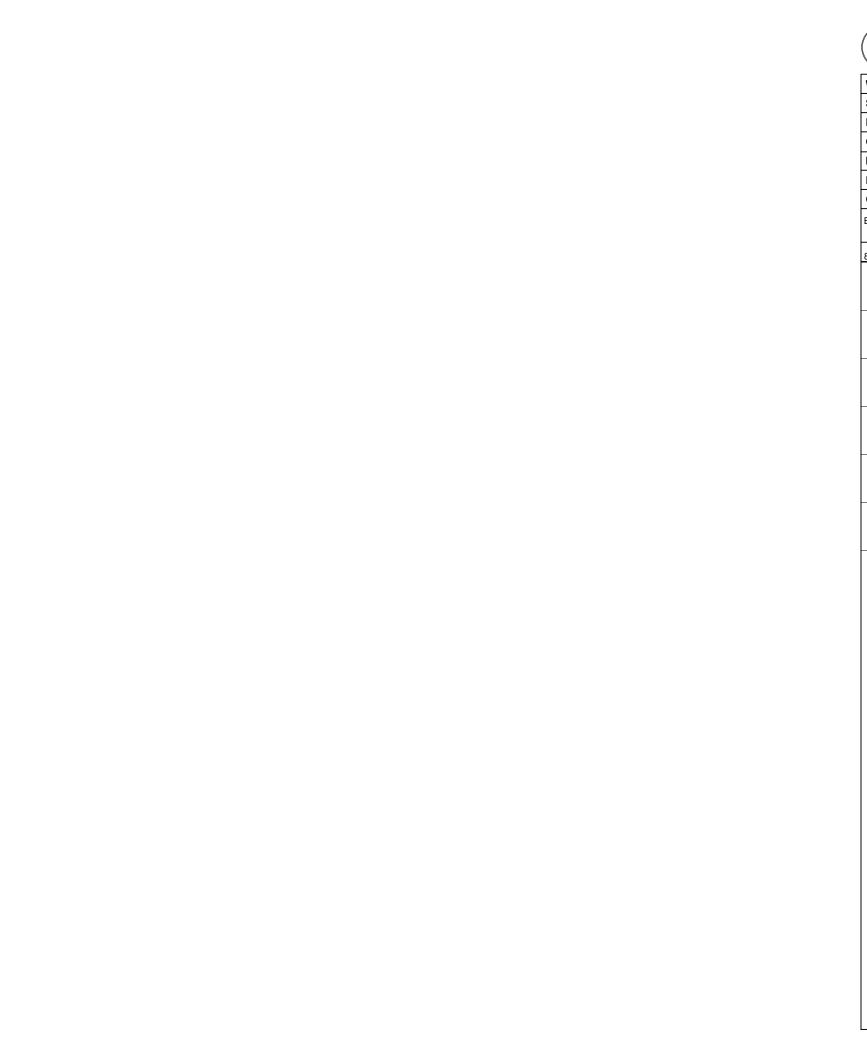




SHEET 13

						D ^-	70	Π_	O1 ::: :-			NND		0501 00:05 5 5			
	34497		D!	lao Na 1		R-270					LEVELA			GEOLOGIST Smith, B	•	CDCU	D WED 45
				lge No. 47	1			er -L-	(US 7	1		•		ALICAIMENT VO		-	D WTR (ft)
	ING NO.						24+08	205		+	FSET 5			ALIGNMENT -Y9-		0 HR.	19.5
	LAR ELI			TE CUMO	<u> </u>		PTH 113		2014	NO	RIHING	582,886	ND NIW	EASTING 1,250,726	LIAMA	24 HR.	FIAD
			FF./DA	TE SUM0					2014		MD DAT			Casing W/SPT & Core			Automatic
	LER B						TE 03/2			- 00	IVIP. DA	FE 03/25/15		SURFACE WATER DEP	'IH N	/A	
	RUN			DRILL		JN JN	N 12.0 f		ATA	L							
(ft)	ELEV (ft)	DEPTH (ft)	(ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	Ö G	ELEV. (f	t)	D	ESCRIPTION AND REMARK	S		DEPTH (ft)
861.24	861.2	78.6	2.0	1:56/1.0	(1.2)	(0.0)		(1.0)	(0.0)		861.2			Begin Coring @ 78.6 ft CRYSTALLINE ROCK			_ 78.6
860	859.2		5.0	1:15/1.0 1:11/1.0 1:26/1.0	60% (1.4) 28%	(0.0) (0.0) 0%		(1.0) (100%/ (2.8) 16%			860.2 / - -	gray and bro		lerate severe weathering, mode fracture spacing, BIOTITE S WEATHERED ROCK		medium ha	
855	854.2	85.6	5.0	1:37/1.0 1:22/1.0 1:40/1.0 1:37/1.0		(0.0)					- 	brown, seve	rely wea	thered, 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%					- - -						
				1.20/1.0							- - -						
845	=	 		N=100/0.6							 - <u>842.6</u>			<u></u>			97.2
840	-			N=61							- - -	brown and	gray, sa	RESIDUAL prolitic, micaceous, sandy SIL	T (A-4) v	with little cla	
835	-	<u> </u>									<u>- 837.6</u> _ - -			WEATHERED ROCK (Biotite Schist)	- — — -		102.2
000	-	 -		N=100/0.6							- - -						
830	-			N=100/0.6							- - -						
	-	-		N=100/0.4							- - 826.5 -	Boring Termin	nated at	Elevation 826.5 ft in Weather	ed Rock	(Biotite Sc	113.3 hist)
	-	F									-			-Asphalt (0.0 - 0.5 feet)			
	-	Ī									=			-Concrete (0.5 - 1.1 feet)			
	-	F										-Harder drillir	ng at 77.	2 feet was interpreted as the	top of W	eathered R	ock
	-										- - -	-Resumed S	PT drillir	ng with NW Casing Advancer than 25% core recovery	at 90.6 fe	eet due to l	ess
	-	 -									- - -	-Switched to	o mud ro	otary drilling at 104.7 feet when	n we ran	out of casi	ng
	-	<u> </u>									- - -						
											- - -						
	=	 -									- - -						
	-	<u> </u>									- - -						
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-	3449					P R-2707		1	Y CLEVE				GEOLOGIST Smith, B.		WBS 34				TIP R-27070		NTY CLEVEL				GEOLOGIST	Smith, B.		
—				dge No				-L- (US 7	74 Shelby B	• • •			T	GROUND WTR (ft)						18) over -L- (US							GROUND W	
) . B1-E			-	ATION 2			OFFSET				ALIGNMENT -Y9-	0 HR . N/A	BORING				STATION 24		OFFSET				ALIGNMENT		0 HR.	N/A
		L EV . 9					TH 95.4 f		NORTHIN				EASTING 1,250,668	24 HR. 16.3	COLLAR				OTAL DEPT		NORTHING				EASTING 1,2		24 HR.	16.
			EFF./DA	ATE SI			D-50 86% 10/		_					MER TYPE Automatic						50 86% 10/10/2014					Core Boring		MMER TYPE Auto	omatic
		Bare, J.				ART DAT	E 03/16/1		COMP. D			4	SURFACE WATER DEPTH N	N/A	DRILLER				TART DATE		COMP. DA			15	SURFACE WA	TER DEPTH	N/A	
ELEV (ft)	CLCV	DEPTH (ft)	·——	OW CO		0		PER FOOT 50	Г 7 <u>5</u> 100	SAMP NO.	17	´ 0	SOIL AND ROCK DES		ELEV DR EL		PTH ft) 0	BLOW COUNT .5ft 0.5ft 0.5ft		BLOWS PER FC 50	OT 75 100	SAMP NO.	1/			AND ROCK D	ESCRIPTION	
. ,	(ft)	+ ` ′	0.510	0.510	0.51				10 .00	P INO.	V M	OI G	ELEV. (ft)	DEPTH (fi	(it) (f	(t) \ \	, 0.	.511 0.511 0.511			., .,	INO.	/ M	101 G	i			
940															860					Match Line								
940		‡—				1 . 1	· · · · ·				+		- 939.4 GROUND SURF - RESIDUAL		800	-+-		-+	+			<u> </u>				CRYSTALLINI		
	936.1	† 3.3				1 . 1							red-brown, silty CLAY (A-7- sand			‡									· · · · · · · · · · · · · · · · · · ·	Biotite Schist) (ontinuea)	
935	930.1	+ 3.3	4	4	7	11-				_	М		- -		855	‡									*			
		‡				:::::			.				- 933.6 red-brown, orange-brown	n, and brown,		‡						!	Los		*			
930	931.1	8.3	3	4	6	: : :					_M		- saprolitic, silty CLAY (A-7-5)) with some sand	850	Ŧ							Los of retu		*			
		Ŧ				. /					'"		- - -			Ŧ]	wate	ter 🎏	F			
	926.1	13.3				;/: : :							- -			Ŧ							1100	Si	F			
925		Ŧ	2	2	3	5			+		М		_		845	Ŧ												95
		Ŧ											- -			ł									Boring T	erminated at Elestalline Rock (B	evation 844.0 ft in otite Schist)	
920	921.1	18.3	1	2	3	5					l w		- - -			\pm									L	•	sed location due to	
		<u> </u>				Ĭ°							- -			1									_	inderground util	ty conflict	
	916.1	23.3				1							• •			‡									Harder o	rilling at 62.0 fe	et was interpreted	
915	-	†	2	3	4	7				-	W		_ -			+										Auger refusal a		
		‡							.				- -			‡									_	ragor roradara	01.01000	
910	911.1	28.3	2	2	4	6					l w		- -												_			
		‡				1::::							- -			‡									-			
005	906.1	33.3	2	3	5	.					l		- -			‡									-			
905		‡	-	3	"						W		- -			‡									-			
	004.4	‡				;::::							- -			‡									‡			
900	901.1	38.3	2	2	3	4 5					Sat	t. 🔀	- -			‡									_			
		‡				:/: : :							- 898.6 light brown, orange-brow	<u>40.8</u> wn, and gray,		‡									-			
895	896.1	43.3	4	5	11	: :/: :					0.01		saprolitic, micaceous, fine s with little clar	saliuy OiLi (A- -1)		‡									-			
000		‡	'			1 6					Sat	ι.	- -			‡									-			
	891.1	‡ 48.3				: : <i>[</i> : :							- -			ŧ									F			
890		+	3	5	7	12 —				_	Sat	t.	- -			Ŧ									F			
		Ŧ				: ;; :							-			Ŧ									F			
885	886.1	53.3	3	4	6	10					Sat	t.	• •			Ŧ									-			
		Ŧ				- 10-							_ - -			Ŧ									E			
	881.1	58.3	<u> </u>										- -			Ŧ									E			
880	-	±	4	6	7	13-	 				Sat	t.	_			\pm									-			
		<u> </u>				: : i <u>-</u> :	 -		<u>- -: -: -:</u>	1		\$ 677 2	- 877.4 WEATHERED R	62.0		1									Ł			
875	876.1 875.1	63.3	100/0.3	3					100/0.3	2			875.1 (Biotite Schis	st) 64.3		<u> </u>									Ł			
		‡	60/0.0)					1	'T			CRYSTALLINE F (Biotite Schis	st)		‡									-			
070		‡							.				- WEATHERED R - (Biotite Schis			‡									ţ			
870	1	‡								1			<u>-</u> -			‡									F			
		‡											867.0	72.4		‡									ţ			
865		‡					1			41			CRYSTALLINE F (Biotite Schis	KUCK st)		‡									L			
		‡											- -			‡									ļ.			
000		‡											- -			‡									ļ			
apu	1	1	1	1	, ,	1	1	1	1	1.1	1					1	- 1	1 1	1			1	1	- 1	i			





SHEET 15

	/ W		אי		OF	K//V(j KE	PU	K I													
WBS	34497.1.2				TIP	R-270	07C	С	OUNT	Υ (CLEVELA	ND	GEOLOGIS	ST Smith, B	١.							
SITE	DESCRIPTION	N Bri	dge	No. 4	171 on	-Y9- (I	NC 18) ov	er -L-	(US 7	4 Sł	nelby Byp	ass)				GROUN	D WTR (ft)					
BORI	NG NO. B1	В			STA	TION	24+18			OF	FSET 5	5 ft RT	ALIGNMEN	NT -Y9-		0 HR.	N/A					
COLL	AR ELEV.	939.4 f	t		тот	AL DE	PTH 95.	.4 ft		NC	RTHING	582,906	EASTING	1,250,668		24 HR.	16.3					
DRILL	RIG/HAMMER	EFF./D	ATE	SUM	0093 D	EDRICH	1 D-50 86%	10/10/2	2014			DRILL METHOD Cor	e Boring		HAMM	ER TYPE	Automatic					
DRIL	LER Bare, c				STA	RT DA	TE 03/1	6/15		CC	MP. DAT	E 03/18/15	SURFACE	WATER DEF	TH N/	A						
CORI	SIZE NQ2						N 31.1 f	t														
ELEV (ft)	RUN ELEV (ft) DEPT (ft)	H RUN (ft)	' F	ORILL RATE Min/ft)	REC. (ft) %	UN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	LOG		D	ESCRIPTION	AND REMARK	S							
8 875 51														ng @ 64.3 ft								
	875.1 64.3 874.0 65.4	1.1	N= 3:	=60/0.0 :00/1.1	기 (0.8) -∕\ 73%	(0.4)	Į.	(0.8) \ 73% /	(0.4) \ 36% /		875.1 874.0	gray and orange-brov		LLINE ROCK severe weather	ing, hard	to modera	64.3 tely \65.4/					
	Ŧ		1	40/1.0 38/1.0	(1.6) 32%	(0.0)		(2.1)	(0.0)			hard, cl		pacing, BIOTIT	E ŠCHIST	•						
870	869.0 + 70.4		1:	29/1.0 20/1.0 31/1.0	32 /0	0 /0		3070	070		-	orange-brown, dark o	gray, and black	k, severely wear			d to					
	Ŧ	5.0	1::	29/1.0	(4.3)	(1.6) 32%					867.0	sort, very clos	e to close frac	ture spacing, B	OHES	СПІЗТ	72.4					
865	Ŧ		1:	30/1.0 33/1.0		52/0		(22.6) 98%	(18.1) 79%		LLINE ROCK green, fresh to	ery sliah	lv weather									
	864.0 75.4	5.0	1:	33/1.0 30/1.0		(3.3)		3070	.570	se to close fract CHIST.	ure spaci	ng, BIOTIT	Ë,									
	‡	3.0	1:	:38/1.0 :27/1.0	100%	66%					F		30	л пот.								
860	859.0 + 80.4		1:	54/1.0 57/1.0																		
	000.0	5.0	1:	59/1.0	(4.8)	(4.7)	1				-											
855	‡		1:	42/1.0		94%					1											
000	854.0 + 85.4		2:	48/1.0		(4.0)					-											
	‡	5.0	2:	27/1.0	100%	(4.0) 80%					‡											
850			2:	28/1.0 04/1.0							Ł											
	849.0 7 90.4	5.0	2:	: <u>20/1.0</u> :43/1.0	(4.8)	(4.5)	-				-											
	‡		2:	:39/1.0 :02/1.0		90%					_											
845	844.0 + 95.4			:09/1.0 :19/1.0							844.0						95.4					
	‡										-	Boring Terminated at	Elevation 844	1.0 ft in Crystalli	ne Rock (Biotite Sch	nist)					
	<u> </u>										Ł	-Boring offset from p	proposed local	tion due to und	erground	utility confl	ict					
	ŧ										E	-Harder drilling at 62.	0 feet was inte	erpreted as the	top of We	athered R	ock					
	<u>†</u>										E		-Auger refu	sal at 64.3 feet								
	+										F											
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WBS 34	497.1.2			TIF	R-2707C	COUN	ITY CLE	VELAN	ID		GEOLOGIST Smith, B	i.		WBS	34497	.1.2		т	TIP R-2707C COUNT	FY CLEVE	LAND		GEOLOGIST Smith, B.	
		N Brid	lge No			B) over -L- (US					· · · · · · · · · · · · · · · · · · ·		JND WTR (ft)	l			Bridge N		I on -Y9- (NC 18) over -L- (US					GROUND WTR
BORING I					ATION 25+0	<u> </u>		ET 64			ALIGNMENT -Y9-	0 HF	• • •	l	ING NO.				STATION 25+06	OFFSET			ALIGNMENT -Y9-	0 HR . N
COLLAR	ELEV. 9	929.7 ft		то	TAL DEPTH	93.5 ft	NORT	HING	582,772		EASTING 1,250,730	24 HF	. 8.0	COL	LAR ELE	V . 92	9.7 ft	Т	TOTAL DEPTH 93.5 ft	NORTHIN	IG 582,7	72	EASTING 1,250,730	24 HR . 8
DRILL RIG/	HAMMER	EFF./DA	TE SU	JM0093	DIEDRICH D-50	86% 10/10/2014		DI	RILL METH	OD H.	S. Augers	HAMMER TYP	E Automatic	DRIL	L RIG/HAN	MER EF	FF./DATE	SUM009	93 DIEDRICH D-50 86% 10/10/2014	1	DRILL N	METHOD H.	S. Augers	HAMMER TYPE Automati
DRILLER	Bare, J			ST	ART DATE	03/30/15	СОМР	. DATE	03/30/1	5	SURFACE WATER DEP	PTH N/A		DRIL	LER B	are, J.		s	START DATE 03/30/15	COMP. D	ATE 03/	30/15	SURFACE WATER DEP	TH N/A
ELEV DRI	VE DEPT	H BLO	ow cou	JNT	Е	BLOWS PER FO	OT	s	SAMP.		SOIL AND BO	CK DESCRIPTION	iNI	ELEV	DRIVE ELEV	DEPTH	BLOW CO	TNUC	BLOWS PER FOO	T	SAMP.	L	SOIL AND BOO	CK DESCRIPTION
(ft) (ft		0.5ft	0.5ft	0.5ft	0 25	50	75 	100	NO. M	OI G	ELEV. (ft)	ON DESCRIPTION	DEPTH (ft)		(ft)	(ft)	0.5ft 0.5f	t 0.5ft	t 0 25 50	75 100	0 NO.	MOI G	SOIL AND NOC	DESCRIPTION
930												D SURFACE	0.0	850					Match Line		↓ ↓			
	‡				.		I				RES orange-brown and t	SIDUAL tan-brown, sandy	CLAY		-	-						Sat.	micaceous, fine san	nd brown, saprolitic, dy SILT (A-4) with little
925	.9 + 3.8				: : : : :		I	1 1			((A-6)		845	845.9	- - 83.8	10 10		_ :::: ::: ::: :::		1 1		_ clay <i>(c</i> -	ontinued)
925	‡	4	6		13				M		- 923.4		6.3		-	-	10 19	22	→ → → → → → → → → →		\dashv	Sat.	- - 843.3	8
	. ‡				: /. : : :			1 1			orange-brown and	tan-brown, claye little fine sand	SILT		-	-					-		WEATHE	RED ROCK e Schist)
920	.9 8.8	2	2	3	•/·······				М	12.5	_	intio inio odna		840	840.9	- 88.8 -	32 40	60/0.4	4		41		- (Diotit	e odnist)
	‡				1 : : : :					.1.1. 	918.4 orange-brown a	ind brown saprol	<u>11.3</u>		-	-				. 100/0.9	T		- -	
915	.9 ‡ 13.8				:1: : : :						micaceous, fine sar	ndy SILT (A-4) w clay	th little		836.2		60/0.0			60/0.0		972	836.2 CDVSTAL	LINE ROCK
915	‡	2	3	5	8				M		-	olay			_	-	00/0.0						(Biotit	e Schist)
	. ‡				: : : :										-	-							Penetration Test Re	ited with Standard rusal at Elevation 836.2
910	.9 18.8	2	4	6	10				М		-				_	-							_	Rock (Biotite Schist)
	‡				- -										-	-							_	o overhead power lines
905	.9 23.8				: : : :										_	-							- Greater than 180 - reached are	tons bearing capacity ound 71.3 feet
905	‡	2	4		11-				M		-				_	-							 - Harder drilling at 86	i.4 feet was interpreted
	. ‡				.										-	-							as the top of	Weathered Rock
900	.9 28.8	3	5	7	12-				l w		_				_	-						‡	-Auger refu	sal at 93.5 feet
	‡				:;:: :										-	-							<u>-</u> -	
895	.9 ‡ 33.8	3	4	6	:::::::			1 1	l						-	-							• •	
093	‡	3	4	0	♦ 10				l w		-				-	-							_ -	
000	<u></u>				: :: :										-	-						‡	. -	
890	.9 1 38.8	3	4	7	11				l w		_				-	-						‡	- -	
	‡				: :/: : :										-	-						‡	- -	
885	.9 ‡ 43.8	3	6	0	: : <i>ij</i> : :			: :							-	-						‡	- -	
000	‡	"	"	9	15				W		_				_	-						‡	- -	
000	, ‡ ,,,				: : : :										_	-						‡	- -	
880	.9 + 48.8	3	6	10	16				w		-					-						‡	- -	
	‡				: : ‡ : :			: :		#						-							-	
875	.9 + 53.8	4	6	10	: :			: :								-							- -	
	‡	-		'	16				Sat	·	-				-	-							- -	
070	4 500				: : : : : : :			: :		F					-	-							- -	
870	.9 + 58.8	8	11	19	· · · · · <u>}</u>	30			Sat	:	-				-	-							<u>-</u>	
	‡				::::: /:					#					-	-							- -	
865	.9 ‡ 63.8	6	10	15	: : : : :			: :	0-4	F					-	-							- -	
	‡	"	'0	'`	25				Sat	·	-					-							- -	
060	4 600				: : : : }	$\langle \vdots \vdots \mid \vdots \mid \vdots $: :		#						-							- -	
860	.9 + 68.8	6	15	22	-	37			Sat	:	-				-	-							- -	
	‡				: : : : :					 						-							- -	
855	.9 ‡ 73.8	10	15	23	: : : : :			: :								-						‡	- -	
300	‡	'0	13	20		38-			Sat	·	-					-						‡	- -	
- 1	+	1	i	i I				1 1	- 1	topped of L														

-		197.1.2				P R-2707			CLEVELA				GEOLOGIST Smith, B.	_		34497.1.			TIP R-270		OUNTY CLEVEL				GEOLOGIST Smith, B.		
SITE	DESC	CRIPTIC	ON Br	idge No	. 471 (on -Y9- (NO	2 18) over -L-							GROUND WTR (ft)	SITE	DESCRIPT	TION	Bridge No. 4	71 on -Y9- (N	C 18) over -L-	(US 74 Shelby By	/pass)				GROUND WT	ſR (ft
BOR	ING N	IO. EB	32-C		S	TATION 2	5+28	OF	FFSET 8	ft LT			ALIGNMENT -Y9-	0 HR. 28.2	BORII	NG NO. E	B2-C		STATION	25+28	OFFSET	8 ft LT			ALIGNMENT -Y9-	0 HR.	28.2
COL	LAR E	ELEV.	940.51	t	TC	OTAL DEP	FH 96.9 ft	NC	ORTHING	582,78	80		EASTING 1,250,670	24 HR. FIAD	COLL	AR ELEV.	940.	5 ft	TOTAL DEF	PTH 96.9 ft	NORTHING	3 582,	780		EASTING 1,250,670	24 HR.	FIAD
DRIL	L RIG/H	HAMMER	R EFF./D	ATE S	UM0093	DIEDRICH [)-50 86% 10/10/2	014		DRILL M	IETHO	D H.	S. Augers HAMN	MER TYPE Automatic	DRILL	RIG/HAMMI	ER EFF.	/DATE SUMO	0093 DIEDRICH	D-50 86% 10/10/2	2014	DRILL	METH	OD H	I.S. Augers	HAMMER TYPE Autom	matic
DRIL		Bare,				TART DAT	E 03/23/15		OMP. DAT		23/15	<u> </u>	SURFACE WATER DEPTH N	I/A		LER Bare				E 03/23/15	COMP. DA		_	5	SURFACE WATER DEPTI	H N/A	
ELEV (ft)	DRIV ELE	۱۳/۳۱ ۷	…⊢	OW CO	_	0	BLOWS PER	FOOT 75		SAMP. NO.	MOI	O I G	SOIL AND ROCK DES	SCRIPTION DEPTH (ft	ELEV (ft)		" ⋯—	.5ft 0.5ft 0.		BLOWS PEF	75 100	SAMP.	1 /	O O OI G	SOIL AND ROCK	DESCRIPTION	
945															865					Match L	ine						
0.0		Ī											-			862.0 7	8.5								brown, orange-brown, micaceous, fine sandy clay <i>(cor</i>	/ SILT (A-4) with little	
940		<u> </u>	+										940.5 GROUND SURF -939.5 ROADWAY EMBAN		860	<u> </u>		4 8 1	14	22			W		- -	,	
	007	, , <u>-</u>	.			· · · · ·			: : : :				ASPHALT & CONC brown, red-brown, and yello	CRETE						<u> </u>	·			773	858.7 WEATHER		81
935	937.	0 3.5	2	2	1	3 · · ·					М		CLAY (A-7-6) with little sa	and and gravel	855	857.0 T 8	3.5	49 40 60/	/0.4							Schist)	
300		‡				`` \							- ·		000	‡					100/0.9				854.5		86
	932.	0	5 5	7	11						М					852.0 # 8	8.5	24 34 5	50	.			l w		brown and gray, saprol SILT	itic, micaceous, sandy (A-4)	
930		‡				- · · · • · · · · · · · · · · · · · · ·					IVI		-929.5	11.0	850	Ŧ							"	100000000000000000000000000000000000000	- 		91
	927.	0 I 13.5	5										RESIDUAL maroon, red-brown, and c	orange-brown,		847.0 9	3.5			.					WEATHER (Biotite		
925		<u> </u>	2	4	5	- ∳9					М		saprolitic, silty CLAY (A-7-5)	with some sand	845	<u> </u>	100	0/0.3			100/0.3	11					
		. ‡					1									843.6 + 9		/0.0			60/0.0	4		1/2	- 843.6 - CRYSTALL	INE ROCK	96
020	922.	0 18.5	5 2	2	4	•1 · · ·					М					‡									- (Biotite Boring Terminate	Schist)	
920		‡				 	.						-			‡									Penetration Test Refuse ft on Crystalline Ro	sal at Elevation 843.6	
	917.	0 ‡ 23.5	5 2	3	5											‡									-Boring offset due to d	,	
915		‡	-	"]	· ♦ 8 · ·					W		=			‡									-Boring onset due to 0	•	
	912.	0 ± 28.5	5													‡									-Concrete (0.	•	
910	312.	+ 20.	2	3	5	-∳8					w					Ŧ									[,	
		Ŧ				-	1						- ·			Ŧ									-180 tons bearing cap 81.0	feet	
	907.	0] 33.5	5 2	5	4						w					Ŧ									-Harder drilling at 81.8 - as the top of W		
905	-	\pm				 1	 .						<u>904.5</u> <u>brown, orange-brown, and </u>	gray saprolitic 36.0		+									- Auger refusa		
	902.	0 + 38.5	5		<u> </u>	: ; : :							micaceous, fine sandy SILT	Γ (A-4) with little		‡									- Auger relusa	at 30.9 leet	
900		‡	3	5	'	· •12 ·					W		-			‡									<u>-</u>		
	007	, ‡ ,,,,	_			:: :::										‡									- -		
895	897.	0 43.5	3	5	6	 . • 11 -					w					‡									- -		
3		‡				- 1	· · · · · ·						-			‡									- -		
	892.	0 + 48.5	5 2	5	7		.				w	F				Ŧ									- -		
890	-	Ŧ				12.					**		-			Ŧ									-		
5	887.	0 I 53.5	5				1					E				Ŧ									[
885		\pm	4	5	8	· ·•13·					W	E	_			Ī											
		ŧ				<u>}</u> .						Ŀ				<u> </u>									_ _		
	882.	0 58.5	5 5	7	12		9				w					‡									_		
880		‡					1						<u>-</u>			‡									-		
I	877.	0 ‡ 63.5	5 5	8	11											‡									- -		
875		‡	"	*	11	· · · • 1	9	.			W		-			‡									-		
4	270	0 68.5	_			:::: ;										‡									-		
870	0/2.	+ 00.8	4	8	11		9				М	ļ, ļ				‡									-		
1	1	Ŧ					1					F	_			Ŧ									- -		
5	867.	0 73.5	5 5	9	12	::::1					l w	F				‡									-		
865	1	Ť	1 -	1	1 -		∠ı .	.		1 1	ı vv	10:00 H			1	+	- 1	1 1	1			1	1	1 1	r		

N/A

18.7

GROUND WTR (ft)

0 HR.

24 HR.

SOIL AND ROCK DESCRIPTION

Boring Terminated with Standard Penetration Test Refusal at Elevation 857.4 ft in Crystalline Rock (Biotite Schist)

-Boring offset from proposed location due to overhead powerlines. -Greater than 180 tons bearing capacity reached with SPT at 68.7 feet.

-Harder drilling reported at 73.3 feet was interpreted as the top of Weathered Rock.

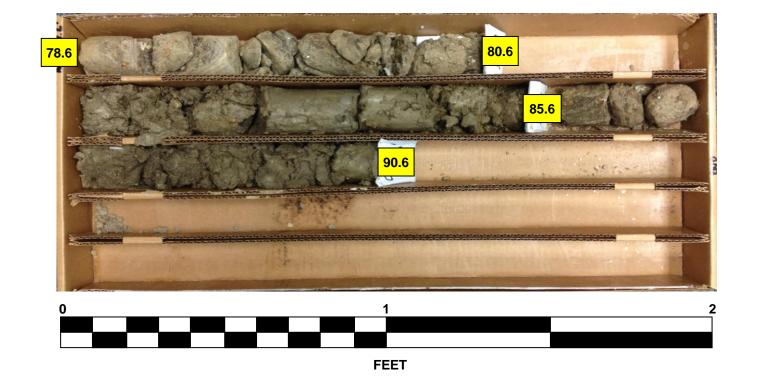
-Very hard drilling and significant rig chatter reported around around 81.0 feet, this was interpreted as the top of Crystalline Rock. -Augers were reported to be very close to refusal 81.0 - 83.7 feet, but were able to slowly advance through the Crystalline Rock.

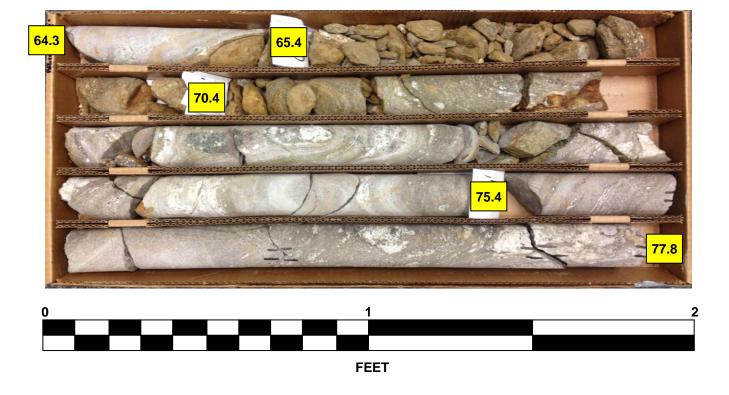
HAMMER TYPE Automatic

WBS 34497.1.2 TIP R-2707C COUNTY CLEVELAND								GEOLOGIST Smith, B.				WBS 34497.1.2					TIP R-2707C COUNTY CLEVEL					GFO	GEOLOGIST Smith, B.							
SITE DESCRIPTION Bridge No. 471 on -Y9- (NC 18) over -L- (US 74 Shelby Bypass)							GROUND WTR (ft)									n -Y9- (NC 18) over -L- (US 74 Shelby Bypass					020	ennun,	GR							
BORING NO. EB2-B STATION 25+30 OFFSET 67 ft RT						ALIGNMENT -Y9- 0 HR. N/A									TION 25+30 OFFSET					ALIG	SNMENT -Y9-	0 H								
					_	TOTAL DEPTH 83.7 ft			_	NORTHING 582,814			EASTING 1,250,604 24 HR.		18.7	COLLAR ELEV. 941.1 ft				TOTAL DEPTH 83.7 ft			NORTHING 582,814				TING 1,250,604			
								H.S. Augers	.,_00,00.	HAMMER TYPE Automatic		DRILL RIG/HAMMER EFF./DATE SUM							DRILL METHOD H					HAMMER TY						
DRILLER Bare, J. START DATE 03/12/15 COMP. DATE 03/12/15								ACE WATER DE	ATER DEPTH N/A			DRILLER Bare, J.			START DATE 03/12/15			COMP. DATE 03/12/15				FACE WATER DE								
ELEV	DRIVE _	DEPTH	BLOV	N COU				BLOWS					V/L					ELEV DRIVI	E DEDTI		W COUNT		BLOWS P			SAMP.		L		
(ft)	ELEV (ft)		0.5ft	0.5ft	0.5ft	0	25		50	75	100	NO.	MOI G	ELEV. (ft)		OCK DESCRIPTION	DEPTH (ft)	(ft) ELEV	(ft)	0.5ft	0.5ft 0.5	5ft 0	25 5	0 7	75 100	NO.	МОІ	O G	SOIL AND R	OCK DESCRIPT
945		.												L				865	⊥	J L			Match	n Line		$\lfloor - \rfloor$		L		
	1													E				000	1 70 7								2 K		WEATI (Biotite So	HERED ROCK chist) (continued
	1					ļ			,					941.1		ID SURFACE	0.0		78.7	100/0.3					100/0.3					
940	+	.				1			+					<u>+</u>	red-brown, silty CL	SIDUAL AY (A-7-6) with little fir	е	860	+						 			860.1 - 857.4		ALLINE ROCK
	937.4	3.7	2	5	8	[.							S	‡		sand		857.4	83.7	60/0.0					60/0.0			857.4		otite Schist) inated with Stand
935		.				•	13.						M	934.9			6.2		‡	00/0.0								Ł	Penetration Test F	Refusal at Elevat e Rock (Biotite S
	932.4	8.7				: : :								<u>}</u>	saprolitic, micaceou	ge-brown, and brown, s, silty CLAY (A-7-5) w	ith		‡									ţ	-Boring offset from	
930	302.7	0.7	3	5	7	j	12.							‡	SO	me sand			‡									ţ		ead powerlines.
930	‡	.				<u> </u>								‡					‡									F	-Greater than 18	80 tons bearing o
	927.4	13.7	2	3	5	: <u> </u> : :								‡					‡									ļ.		th SPT at 68.7 fe
925	‡	.				. €8							"	‡					‡									Ļ	 -Harder drilling re interpreted as the 	
	922.4	18.7				: : :								‡					‡									ļ.	-Very hard drilling	
920	+		2	3	5	. ♠8	: :						M	‡					‡									ļ.	reported around a interpreted as the	
	‡	.				- 1-			1					‡					‡									F	-Augers were rep	
	917.4	23.7	3	4	6		^ I			.			l M	‡					‡									F	refusal 81.0 - 83 slowly advance thr	
915	‡	.					• •							‡					‡									F		
	912.4	28.7				: :	: :							‡					Ŧ									F		
910	Ŧ		3	4	7	1 1	4						М	‡					Ŧ									F		
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2	007.4	42.7				. .]					‡									Ł		
1/14/1	897.4	43.7	3	4	7	. •1	1 .						w C	}					‡									<u> </u>		
4 895 895	†	.				<i>i</i>			+					<u>894.9</u>	tan-brown and whit	e, saprolitic, micaceou	s, 46.2		+									<u> </u>		
00 0.T.0	892.4	48.7	3	7	9	::'							w	t	fine sandy SIL	Γ (A-4) with little clay			‡									ţ		
일 890	‡	.		•		9	9 16						^{**}	889.9	. – – – – – –		51.2		‡									L		
GPJ	887.4	53.7				: :	į :							‡	micaceous, silty C	ange-brown, saprolitic, CLAY (A-7-5) with some	;		‡									ţ		
N 885		50.7	3	6	8	•	14						w	‡		sand			‡									ļ.		
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, DQ0	882.4	58.7	3	5	8									‡					‡									ļ.		
880	‡	.				•	13.						"	879.9		wn, and white, saproliti	61.2		‡									Ė.		
GE.	877.4 +	63.7					7.			.				‡	micaceous, fine sa	ndy SILT (A-4) with tra	c, ce		‡									ļ.		
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T BO	867.4	73.7						::::	ļ		· · · ·		327	867.8	\A/C A T ! !	EDED BOOK	73.3		‡									F		
		Н	00/0.4						• • •	· · ·	100/0.4		1 17//2	'-	WEATH (Biot	ERED ROCK		1 1	+	1 1		- 1				1 1		-		

CORE PHOTOGRAPHS

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

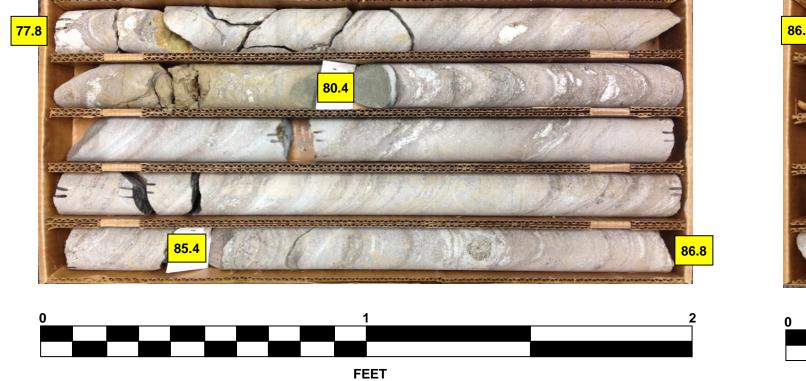


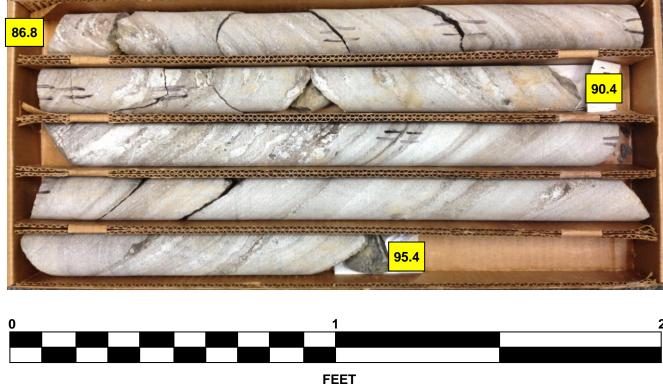


CORE PHOTOGRAPHS

B1-BBOX 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