REFERENCE

STATE OF NORTH CAROLINA

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

CONTENTS

SHEET NO.	DESCRIPTION
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

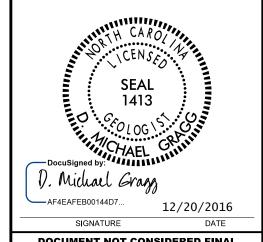
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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 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 MEDICATED DESCRIPTIONS AND ASSECTIONS OF THE INVESTIGATION. THE STANDARD TEST METHOD. 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
INVESTIGAT	ED BY D. Michael Gragg
DRAWN BY	Tamara Stivers
	Kenneth Bussey
	BY HDR ICA
	ovember, 2016
DAIL	*



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

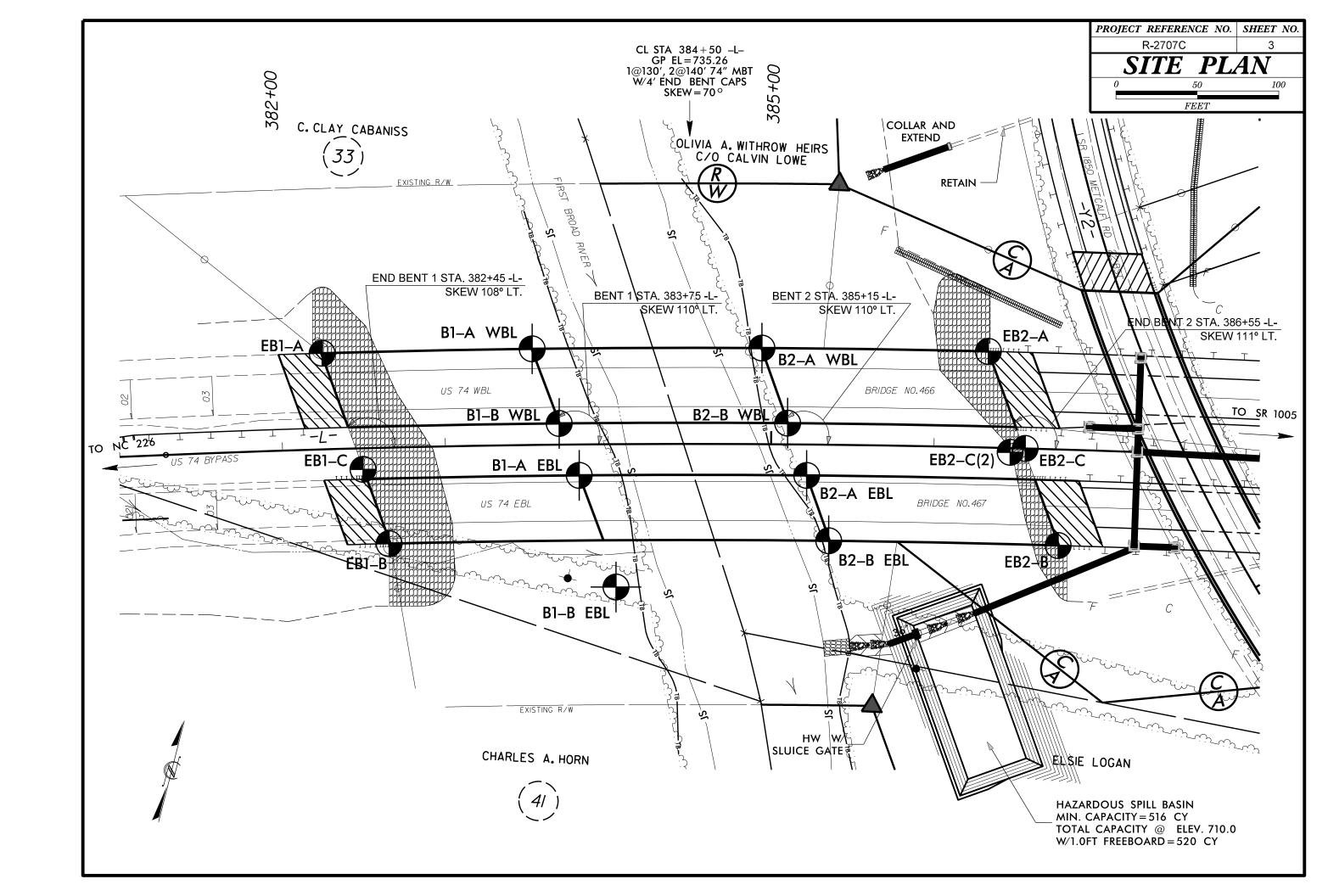
001, 05000101101			T5010 110 0557WT1010
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED 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	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:	NI//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 VILLE NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 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
CLASS. (\$\(\sigma\) ASSING "200) (\$\(\sigma\) 35% 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-2-6 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.
00000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	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 0000 doood 0000 0000 0000 0000 0000 00	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
Z PASSING ■10 50 MX GRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
16 50 MX 50 MX 51 MN S0 MX 50 MX 51 MN S0 MX 50	GRANULAR SILT - CLAY	WEATHERING	<u>DIKE</u> - 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 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PAGGING MAG	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
PASSING *40 40 MX 41 MN	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 11 MN MODERATE ADDRESS.	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	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. ORGANIC ORGANIC ORGANIC ORGANIC ORGANIC ORGANIC ORGANIC	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.	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 EVEN TO COOR FAIR TO DOOD HARWARD FOR		(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 \leq LL - 30 ; PI OF A-7-6 SUBGROUP IS $>$ LL - 30	O UU - STAING ON SEET	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
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED 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 ²)	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	SOIL SYMBOL SPIT 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.
GRANULAR LUUSE 4 10 10 10 N/A	M	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 AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE / 500	THE PROPERTY OF THE PROPERTY O	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.
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 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	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2	PIEZOMETER NETAL ATION SPT N-VALUE	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 SUIL BOUNDARY \(\triangle \) INSTALLATION \(\triangle \) SPT N-VALUE	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	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	UNDERCUT UNCLASSIFIED EXCAVATION - 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	WORD WE THE TOP O SEET 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 COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(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 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 0.05 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
SIZE 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	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7- DRY UNIT WEIGHT	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 OFFICE PROPERTY OF THE PROPERTY OF T	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION OF THE BOOK DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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. 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 SD SAND, SANDY SS - SPLIT SPOON	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
LL LIQUID LIMIT	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	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	BENCH MARK: BYIO 363
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N 581443.2347 E 1236575.2458 BL STATION 10+83.19 ELEVATION: 752.92 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: 132:32 TEET
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	G* CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BOING ELEVATIONS OBTAINED BY SURVEY CONDUCTED 10-30-2016
	I CME-55	THINLY LAMINATED < 0.008 FEET INDURATION	
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI) NON PLASTIC 0-5 VERY LOW		DIDDING WITH FINCED EDEES NUMEDOUS CRAINS.	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UNGCARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING X W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	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).	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
		Similar State of Control of the Control	DATE: 0 15 P

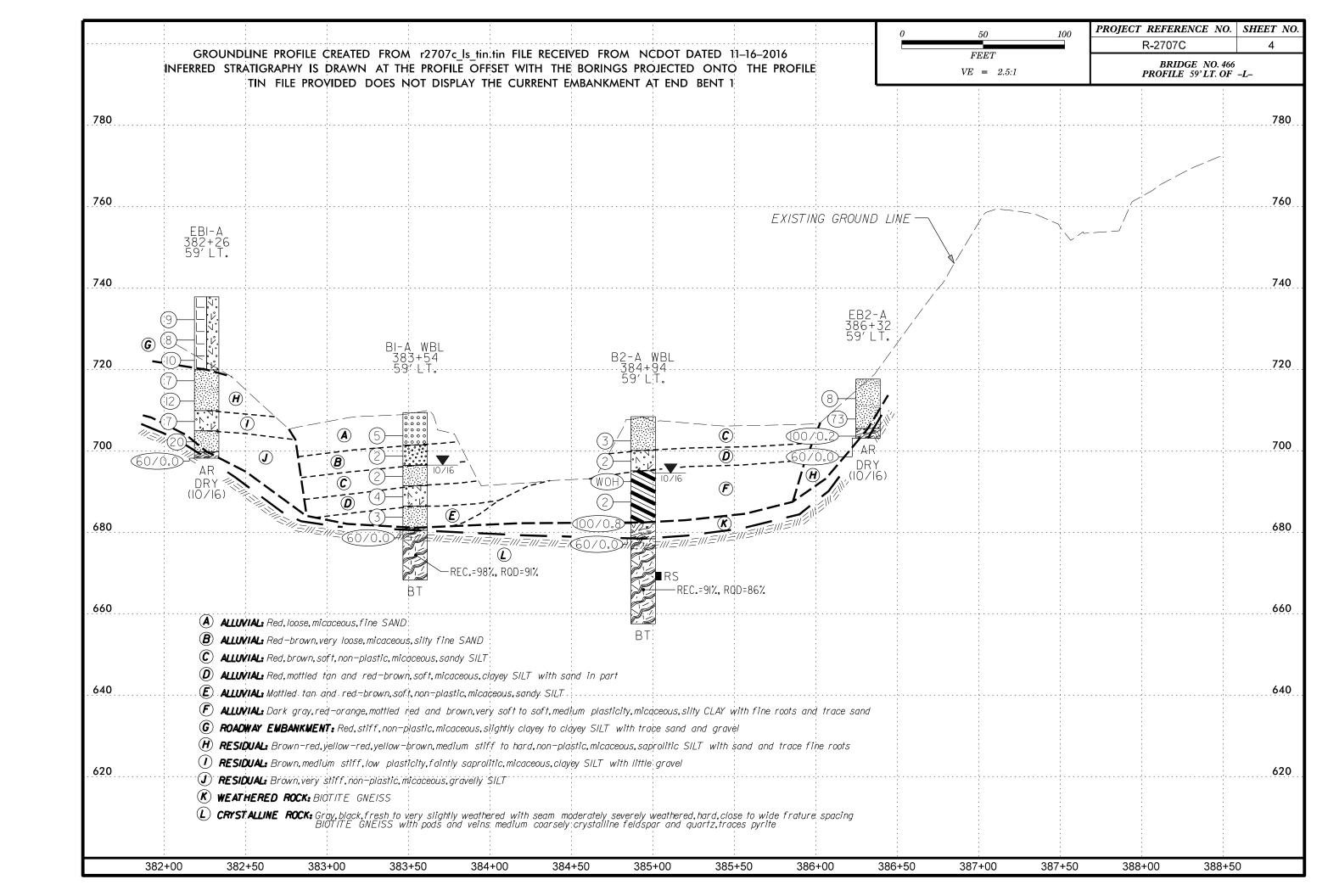
PROJECT REFERENCE NO.	SHEET NO.
R-2707C	2A

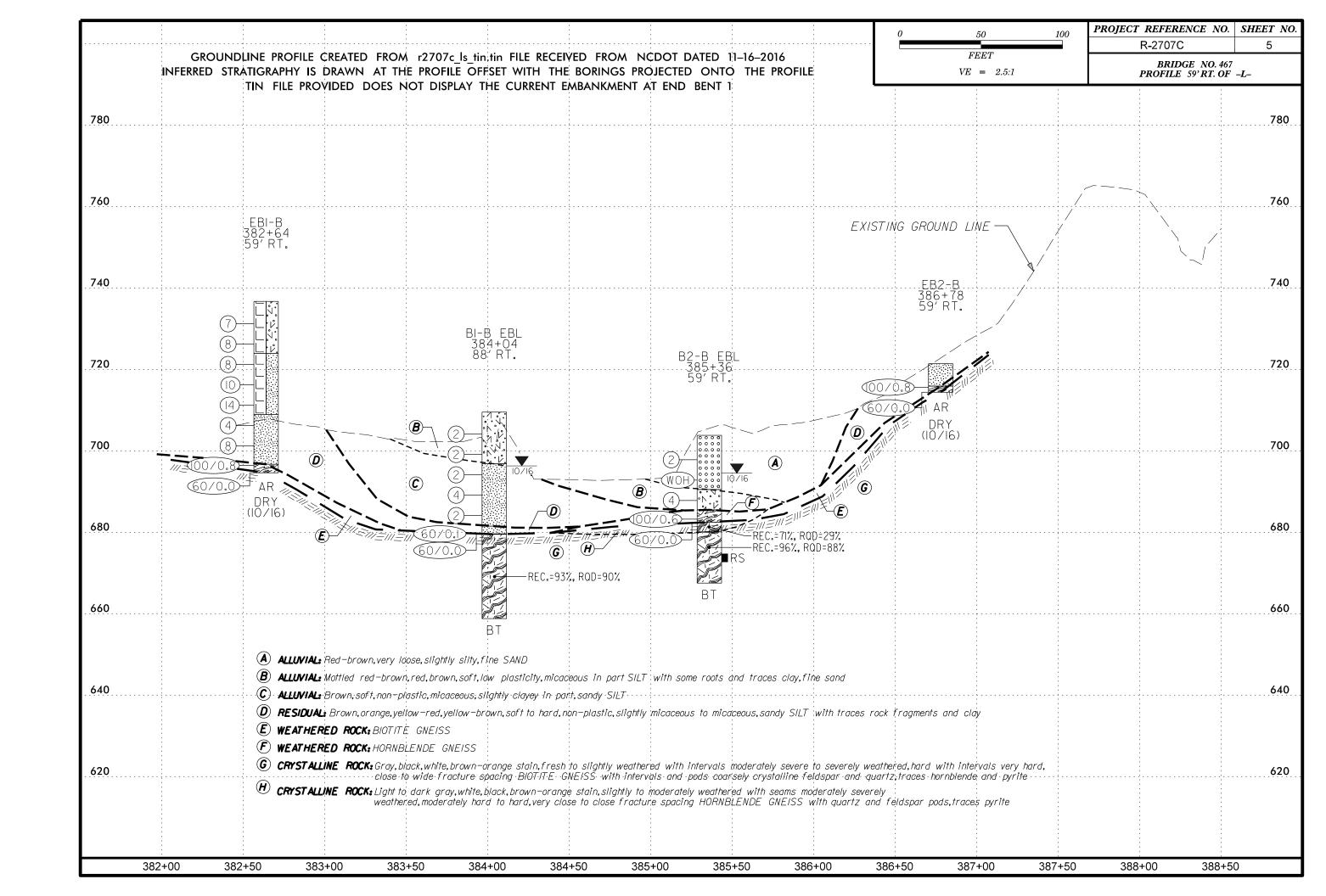
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

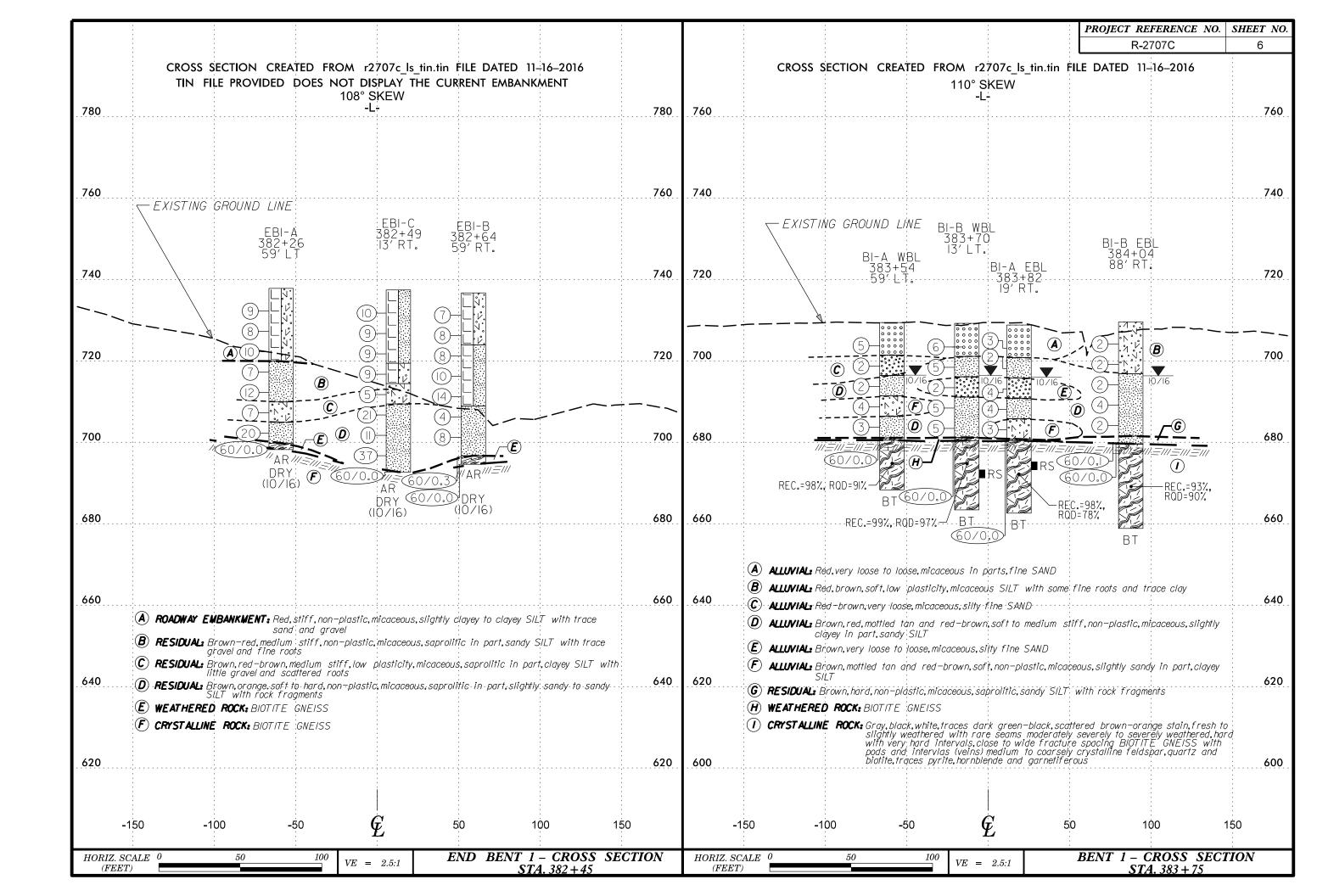
SUBSURFACE INVESTIGATION

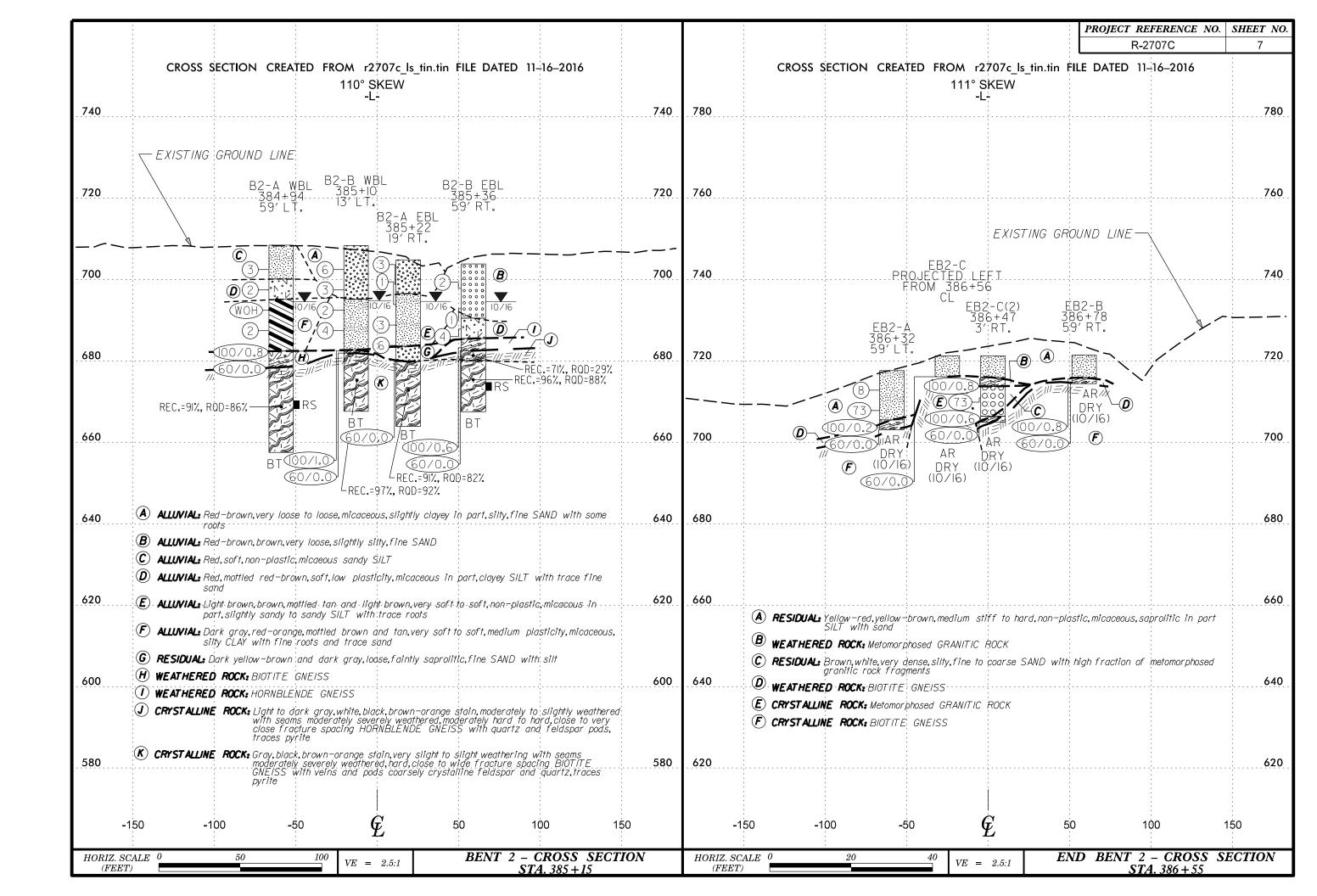
		SUPPLEM. FR	ENTAL LEGEND, C ROM AASHTO LR	GEOLOGIC EFD BRID	CAL STRENGTH INDEX (GSI) TABLES OGE DESIGN SPECIFICATIONS				
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Rock Mass (Ma	rinos and Hoek,	, 2000)		AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically De	formed Hetero	geneous Rock	Masses (Marınos	and Hoek, 2000)
GEOLOGICAL STRENGTH INDEX (GSI)FOR JOINTED ROCKS (Hoek and Marınos,2000)	« Ф О	P	S 9 0 6	s 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	G00D Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfamily compact coatings or fillings or angular fragments	ighly weathered surfa 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.	p	GOOD - Rough, slightly weathered surfaces	ooth, modera	slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces
STRUCTURE	DE	CREASING S	SURFACE QUALITY 💳		COMPOSITION AND STRUCTURE				
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90 80 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 60	A		
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	OF ROCK P	70 60			8. Sand- stone with stone and siltstone or silty shale thin inter- siltstone with sand- siltstone or clayey		50		
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	CKING		50		8. Sand- stone with stone and thin inter- layers of siltstone amounts Stone layers layers layers siltstone siltstone siltstone layers layers	;	40	C D	/E /
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	ASING INTERL		30		C.O.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	DECREK		20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers #L. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed unto small rock pieces.		/	\$	H 10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A		10	sandstone are transformed into small rock pieces. Means deformation after tectonic disturbance				DATE: 8

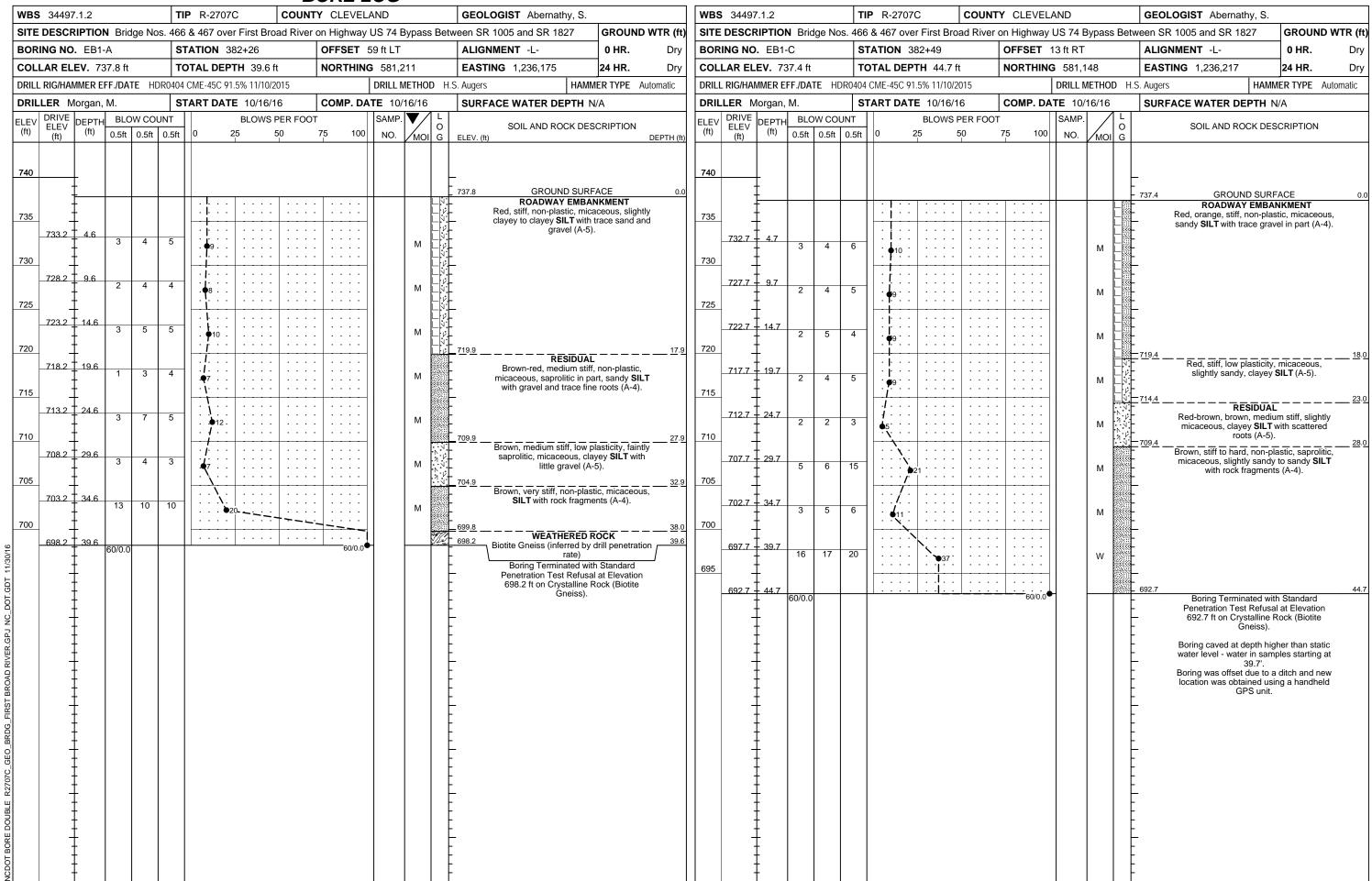












WDG	0.4407.4.0			T	D D 0707	, o	_	DUK!					OFOL COLOT. Also associtive O		IMP 6	2 044	27.4.0			TID	D 07070	2011	ITY OLEVE	AND		054	OL COLOT. Alsomorphics O	
-	34497.1.2				P R-2707			NTY CLE					GEOLOGIST Abernathy, S.		l	S 3449					R-2707C		NTY CLEVEL				OLOGIST Abernathy, S	
-			ridge No				road Riv				pass I		en SR 1005 and SR 1827	GROUND WTR (ft)	l										Bypass B		SR 1005 and SR 1827	GROUND WTR (ft)
-	ING NO. E				TATION 3			OFFS					ALIGNMENT -L-	0 HR. Dry			O. B1-A				TION 383+5		OFFSET				GNMENT -L-	0 HR. N/A
COL	LAR ELEV.	736.7	ft	T0	OTAL DEP	TH 42.1	1 ft	NORT	HING	581,10	8	E	EASTING 1,236,244	24 HR. Dry	COL	LAR E	LEV. 7	09.4 ft		TOTA	AL DEPTH 4	11.1 ft	NORTHIN	IG 581,2	246	EAS	STING 1,236,300	24 HR. 12.9
DRILI	RIG/HAMMER	R EFF./D	ATE H	DR0404	CME-45C 9	1.5% 11/10	0/2015			DRILL ME	THOD	H.S. A	Augers HAN	MMER TYPE Automatic	DRIL	L RIG/H	AMMER E	FF./DATI	E HDR04	404 CMI	E-45C 91.5% 1	1/10/2015		DRILL N	METHOD	H.S. Auge	ers HAN	MMER TYPE Automatic
DRIL	LER Morga				TART DAT	E 10/16	6/16	COM	. DAT	TE 10/1	6/16	s	SURFACE WATER DEPTH	N/A	DRIL	LLER	Morgan,				RT DATE 10	/25/16	COMP. DA	ATE 10/	25/16	SUF	RFACE WATER DEPTH	N/A
ELEV (ft)	DRIVE ELEV (ft) DEP		LOW CO		0	BLOWS	S PER FO	75 /	100	SAMP. NO.	MOI	L O G EL	SOIL AND ROCK DE	ESCRIPTION DEPTH (ft)	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	$\overline{}$	V COUNT 0.5ft 0.5	_	BL0 25 	DWS PER FO	OT 75 100	SAMP.	MOI G		SOIL AND ROCK DI	ESCRIPTION
740												-			710		<u> </u>								000	-709.4	GROUND SUI	
	<u> </u>					_						73	GROUND SUF				‡								00000		Red, loose, micaceous,	
735	<u> </u>				-						L		ROADWAY EMB Red, medium stiff, lo		705	704.7	4.7]	000			
	İ				<u>-j</u>						L	-\! <u>-</u>	micaceous, slightly san (A-5).	idy, clayey SILT			Ī	2	3 2	-	5				M			
	732.2 7 4.5	5 3	4	3	7		.				М	Ti:F	(A-3).				Ŧ			- i					00000	701.4		
730	‡				 	ļ						<u> </u>			700	699.7	9.7	2	1 1	$\dashv \#$				\parallel		:: <u>-</u>	Red-brown, very loose, fine SAND (A	micaceous, silty2-4).
	727.2 9.5	_			: : : :				: :		Ļ	<u> </u>					‡		' '		2				M		,	
705	''''' 	2	3	5	8				: :		М	<u> </u>			605		‡			- :						696.4	Brown, soft, non-plast	ic. micaceous 13.0
725						 			-		L	72	23.9	12.8	695	694.7	14.7	1	1 1	$- \underline{\dagger} $	 			\parallel	w 🕷	E	sandy SILT	A-4).
	722.2 T 14.	.5					$\cdot \mid \cdot \cdot$		$\cdot \cdot $			- F	Red, medium stiff to st micaceous, slightly sand	tiff, non-plastic,			†		'	•	ź				**	-		
720	ļ <u> </u>	4	4	4	. 8				: :		М	- F	with little grave	el (A-4).	690	00-	Ŧ			- i						691.4 N.F	Mottled tan and red	-brown, soft,
120	‡				. j						Ĺ					- 689.7	19.7	WOH	2 2		1 4 · · · · · ·			11	w [a	·	micaceous, clayey	SILT (A-5).
	717.2 19.	.5	4	6	.												‡			- i	· · · · · ·				۱ ۱	686.4		23.0
715	1	"	4	"	- •10 -						M L	<u> </u>			685	684 7	24.7]		E	Mottled tan and red	-brown, soft,
	+				\						L					004.7	+ 24.7	1	1 2	2 •	3 · · · · ·				w 🖔	-	non-plastic, micaceous,	sandy SILT (A-4).
	712.2 24.	.5 2	5	9	: : [: :						M L						‡			- [:						681.1		28.3
710	‡	-			• 14						IVI L					680.5	28.9	60/0.0						<u> </u>		680.5		
	<u> </u>				: /: : :						L	70	08.9 RESIDUA	AL 27.8			<u>+</u>	00,010									Biotite Gneiss (inferred b	y drill penetration
	707.2 7 29.	.5 1	2	2	$ _{\mathbf{J}}^{\gamma}$						м	# F	Brown orange soft to	medium stiff			Ŧ										CRYSTALLIN	EROCK
705	‡				14	ļ · · · ·							non-plastic, slightly r micaceous, sandy SIL1	with trace rock	675		‡							41			Biotite Gne	eiss
	‡	_			1							E	fragments and c	lay (A-4).			‡				 							
	702.2 T 34.	3	4	4							м	æŁ					±			11						3		
700	1				1000	ļ									670	_	Ŧ							-		668.3		
9	697.2 39.	_							: :								+	+						Ц	(7)	668.3	Boring Terminated at Ele	41.1 evation 668 3 ft in
/30/	097.2 39.	10	90/0.3	3		- -:-:-	:	÷÷+::-6	0/0.3		9	<u> </u>	96.7 WEATHERED	40.0 ROCK			‡									<u> </u>	Crystalline Rock (Bi	otite Gneiss).
 695	694.6 + 42.	1 60/0	0.0		<u> </u>				0/0.0		*/- */-	69		eiss <u>42.1</u>			†									F		
9	+	00,0										-	Penetration Test Refus	sal at Elevation			+									-		
8	Ŧ											F	694.6 ft on Crystalline Gneiss)	e Rock (Biotite			Ŧ									F		
N N	‡											F	J,				‡									F		
.GPJ	<u> </u>											E					<u> </u>									Ł		
VER	<u> </u>											Ł					<u></u>									Ł		
Ö	Ŧ											F					Ŧ									F		
RO ₄												ļ.					‡									F		
STE	‡											L					‡									L		
띪	<u> </u>											Ł					<u>†</u>									Ł		
RDG	Ţ											F					Ŧ									F		
o O	‡											F					‡									F		
8	‡											ţ					‡									ţ.		
707C	<u> </u>											Ł					<u>†</u>									Ł		
R2.	-											F					+									H		
JBLE	‡											F					Ŧ									F		
DQ	‡											ţ					‡									ţ.		
ORE	‡											F					‡									F		
OT B	t											E					<u>†</u>									Ł		
NCD	<u> </u>											F					+									F		

		CORE LOG												
WBS 34497.1.2	TIP R-2707C COUNT	TY CLEVELAND GEOLOGIST Abernathy, S.												
SITE DESCRIPTION Bridge Nos	s. 466 & 467 over First Broad River of	r on Highway US 74 Bypass Between SR 1005 and SR 1827 GROUND V	WTR (ft)											
BORING NO. B1-A WBL	STATION 383+54	OFFSET 59 ft LT ALIGNMENT -L- 0 HR.	N/A											
COLLAR ELEV. 709.4 ft	TOTAL DEPTH 41.1 ft	NORTHING 581,246 EASTING 1,236,300 24 HR.	12.9											
DRILL RIG/HAMMER EFF./DATE HDF	R0404 CME-45C 91.5% 11/10/2015	DRILL METHOD H.S. Augers HAMMER TYPE Autor												
DRILLER Morgan, M.	START DATE 10/25/16	COMP. DATE 10/25/16 SURFACE WATER DEPTH N/A												
CORE SIZE NQ2	TOTAL RUN 12.2 ft													
ELEV (ft) DEPTH RUN RATE (Min/ft)	REC. RQD SAIVIP. REC. RQD	DECORM HOLVING	DEPTH (ft)											
680.5 680.5 28.9 3.2 4.25/0		Begin Coring @ 28.9 ft												
680.5 — 28.9 2.2 1:35/0. 1:44 1:49 2:07 2:07 2:07 2:07 2:07 2:07 2:07 2:07	2 (2.2) (2.0) (12.0) (11.1) 98% 91% (5.0) (4.7) 100% 94% (4.8) (4.4) 96% 88%	Gray, black, fresh to very slightly weathered, hard, close to moderately close fracture spacing, BIOTITE GNEISS with small pods and veins medium to coarse crystalline feldspar and quartz. 12 0°-15° joints, some with faint iron oxide stain; 1 80° joint at 36.9'-37.8' with some calcite infill, no stain, partially healed to healed GSI=75												
		Boring Terminated at Elevation 688.3 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 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



					\neg												
	34497						R-2707					Y CL					GEOLOGIST Abernathy, S.
SITE	DESC	RIPTIO	N Bric	dge No	s. 466	8 6	467 ov	er F	irst Br	oad I	River	on Hig	hway	US 74 E	Bypas:	s Betv	veen SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO). B1-B	WBL		S.	TA	TION 3	383	+70			OFFS	SET	13 ft LT			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	. EV. 70)9.2 ft		T	ОТ	AL DEF	PTH	45.8	ft		NOR	THING	3 581,2	205		EASTING 1,236,327 24 HR. 12.8
DRILL	_ RIG/HAI	MMER E	FF./DA	TE H	R0404	1 CN	ЛЕ-45С 9	1.59	6 11/10/	2015				DRILL N	ЛЕТНО	D H.	S. Augers HAMMER TYPE Automatic
DRIL	LER N	lorgan.	М.		S	TA	RT DA	ΓΕ	10/25/	16		СОМ	P. DA	TE 10/	25/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE	DEPTH		W CO					BLOWS		FOOT			SAMP.	_	1 - 1	'
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	1 0)	25		50		75	100	NO.	MOI	O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
	()					Ħ										Ĭ	51(v)
740																	
710		<u> </u>				Ш	4									0000	709.2 GROUND SURFACE 0.0
		ł					j::::			. .						0000	ALLUVIAL Red, loose, micaceous, fine SAND (A-3).
705	-	Ŧ					1:::					: :					
	704.4	4.8	4	2	4	$\ \cdot\ $	1					ļ.,			М	0000	-
		‡					Y °		 			: :			""		704.4
700	699.4	<u> </u>					<u> </u>			<u> </u>		<u> </u>					701.1
	699.4	9.8	2	3	2	1	1			. .					М		micaceous, SILT with sand (A-4).
		Ŧ					F					: :				F	696.1 13.1
695	694.4	148				Ц	ļ	_		<u> </u>		<u> </u>					Brown, very loose, micaceous, silty fine SAND (A-2-4).
		‡	2	1	1		2		 			: :	: :		Sat.		SAND (A-2-4).
		<u> </u>				!	-		 			: :	: :				691.1 18.1
690	689.4	19.8			_	╁	├	+		-		+				H	Brown, medium stiff, non-plastic, micaceous, sandy SILT (A-4).
		Ŧ	2	2	3		∮ 5								W	F	. ,
685	-	‡					: : :					: :					
000	684.4	24.8	1	2	3	╂	1			+		 			l w		-
		‡	'	-			•5 •		 			: :			**		201.0
680	680.4	28.8	00/0.0				<u>L</u>	↓.	<u></u>	· _	. <u></u> -:	<u> </u>	 90/0.0	,		97	681.2
	-	Ŧ	60/0.0							Π.							Biotite Gneiss (inferred by drill penetration rate)
		‡										: :					CRYSTALLINE ROCK
675	-	‡							· · · ·	<u> </u>		<u> </u>					Biotite Gneiss
		‡							 			: :		RS-A	_		
		Ì												KS-A	1		
670	_	+						+		+-		+					-
		Ŧ										: :					
665	-	‡							 			: :					
000	-	‡						\dagger		+:		1					- 663.4 45.8
		<u> </u>				Г				-							Boring Terminated at Elevation 663.4 ft in Crystalline Rock (Biotite Gneiss).
	-	+														H	Crystalline Rock (Blottle Griefss).
	-	Ŧ															
		‡															
	-	‡															_
	-	t															
		Ŧ															
	_	‡															-
		‡															
		<u>†</u>															
	_	ŧ															-
	-	Ŧ														F	
	-	‡															
	-	‡														<u> </u>	-
	-	ł														F	
	-	Ŧ														F	
	-	‡															-
		‡															
	-	+														F	

									C	U	E LOG									
WBS	34497	.1.2			TIP	R-270)7C	C	OUNT	Υ (EVELAND	GEOLOGIST Abernathy, S.								
SITE	SITE DESCRIPTION Bridge Nos. 466 & 467 over First Broad River						ver First I	Broad	River	on I	hway US 74 Bypass Betw	veen SR 1005 and SR 1827	GROUND V	VTR (ft)						
BORII	NG NO.	. B1-B	WBL		STA	TION	383+70			OF	SET 13 ft LT	ALIGNMENT -L-	0 HR.	N/A						
COLL	AR ELI	EV. 70	9.2 ft		тот	AL DE	PTH 45	.8 ft		NC	THING 581,205	EASTING 1,236,327	24 HR.	12.8						
DRILL RIG/HAMMER EFF./DATE HDR0404 CME-45C 91.5% 11/10/2015								10/2015		DRILL METHOD H.S. Augers HAMMER TYPE Auton										
DRILL	ER M	organ,	M.		STA	RT DA	TE 10/2	5/16		CC	P. DATE 10/25/16	SURFACE WATER DEPTH N	/A							
CORE	SIZE	NQ2			тот	AL RU	N 17.0 f	t												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC.	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	D ELEV. (ft)	ESCRIPTION AND REMARKS	I	DEPTH (ft)						
6 <u>89</u> 04												Begin Coring @ 28.8 ft								
675	678.4 - 678.4 - 678.4 -	- 30.8 - 30.8 - - -	5.0	1:56 1:45 1:53 2:00 2:07 2:02 2:08 2:23 2:23	(2.0) 100% (5.0) 100% (5.0) 100%	(5.0) 100% (4.9)	RS-A	(16.9) 99%	(16.5) 97%		close to wide fractu in parts, BIOTITI quartz, feldspar, an	CRYSTALLINE ROCK traces dark green-black, fresh to sligh tre spacing, hard with very hard interverse GNEISSwith intervals and pods coad biotite with traces pyrite at 41.5'-42 and 44.3'-44.7'. population of the property of	rals, schistose rse grained .6', 42.9'-43.1'							
665	668.4	-	5.0	2:20 2:08 2:09 3:07 3:38 2:39 3:01	(4.9) 98%	(4.8) 96%														
-	663.4	- 45.8 -		3:20							663.4 Boring Terminate	d at Elevation 663.4 ft in Crystalline F	Rock (Biotite	45.8						

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

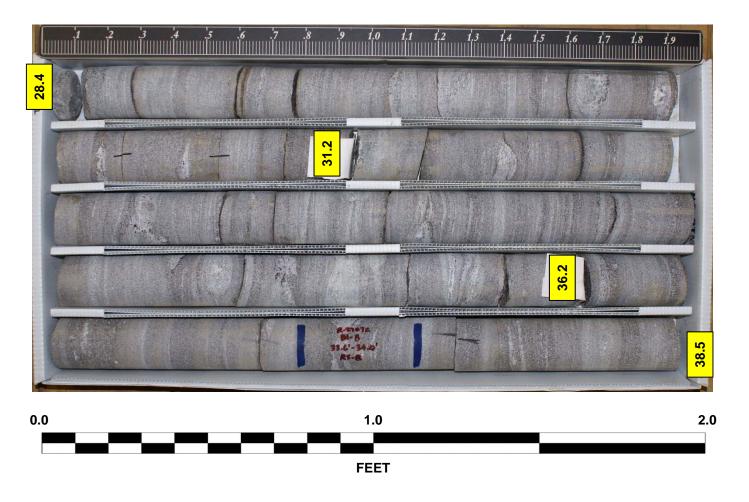


															.00	_						
	34497						R-27							EVEL						OGIST Abernathy, S.	1	
SITE	DESC	RIPTIO	N Brid	dge No	os. 466	8 6	467 d	over	Firs	t Broa	ad Riv	ver o	n Hig	hway	US 7	4 B	ypass	Betv	veen SR	1005 and SR 1827	GROUNE	WTR (ft)
BOR	ING NO	. B1- <i>A</i>	A EBL		S ⁻	TAT	TION	38	3+82	2			OFF	SET	19 ft F	RT			ALIGN	MENT -L-	0 HR.	N/A
COLI	LAR EL	EV. 70	08.8 ft		TO	OT/	AL D	EPT	H 4	6.2 ft			NOR	THIN	G 58	1,17	78		EASTI	NG 1,236,347	24 HR.	12.8
DRILL	RIG/HAI	MMER E	FF./DA	TE H	DR0404	- CM	1E-450	91.	5% 11	1/10/20	015				DRIL	L M	ETHO	D H.	S. Augers	HAMN	IER TYPE A	utomatic
DRIL	LER N	lorgan.	М.		S	TAF	RT D	ATE	10	/18/1	6		COM	IP. DA	TE 1	0/1	8/16		SURFA	ACE WATER DEPTH N	/A	
LEV	DRIVE	DEPTH	1	ow co	UNT				BLC)WS F	PER F				SAN	- 1	▼/	1 L				
(ft)	ELEV (ft)	(ft)	' —	0.5ft	<u> </u>	0	١	2			50		75 	100	NC		MOI	O G	ELEV. (ft)	SOIL AND ROCK DES	CRIPTION	DEPTH (ft)
710																			708.8	GROUND SURF		0.0
		t				H¦	 -	:			: :		: :					0000		ALLUVIAL Red, very loose, fine S		
705	•	+				Ηį		-										0000		. 100, 101, 10000, 1110	(/ (0)	
	704.1	4.7	2	1	2	$\ \cdot\ $							T				М	0000	_			
		‡	-	'	-	•	3				: :		: :				IVI	0000				
700	<u>-</u>	<u> </u>						-		• •		• •	<u> </u>						700.8	Red, soft, non-plastic, mic	aceous, sand	ly — 8.0
	699.1	9.7	1	1	1	١L		-					• •				W	-		SILT (A-4).	,	, l
		Ŧ				[.			: :		: :				\blacksquare	F	695.8			12.0
695	694.1	‡,,,				i		-					<u> : :</u>			ı				Brown, loose, micaceous,	silty fine SAN	ID 13.0
	094.1	14./	2	2	2	}	 ●4				: :		: :				W			(A-2-4).		
	•	ł				i	i : : :						: :						690.8			18.0
690	689.1	197				H	<u> </u>	-					<u> </u>					-		Brown, soft, non-plastic,	micaceous,	
		10.7	1	2	2		 •4				: :		: :				W			sandy SILT (A-	4).	
		‡				!	<u> </u> : : :				::		: :						685.8			23.0
685	684.1	24.7				╽╫	! 	_			-		+					<u> </u>	-	Brown, soft, non-plastic, slightly sandy, clayey	micaceous,	
		Ŧ	1	1	2	•	3	.					: :				W	`^.\·[Slightly Sariay, Glayey	JILI (71 0).	
680	680.4	28.4				H					: :		: :					.1 .	680.8			<u>28.0</u>
000			60/0.0	0		ľ					T .		T	60/0.0	"					WEATHERED R Biotite Gneiss (inferred by		
		ł																	L	rate) CRYSTALLINE I	•	
675		Ŧ						-												Biotite Gneis		
	-	‡						-					 		RS-	В			_			
	•	‡											: :									
670		t						•				• •	<u> </u>						_			
		+						-														
		‡											: :									
665	-	‡						-	· ·	- :	· ·	• •	<u> : :</u>	• •					_			
		t			1			:					: :						662.6			46.2
		F				Γ'		•					1							Boring Terminated at Eleva	ation 662.6 ft	
	_	‡																	_	Crystalline Rock (Biotit	e Gneiss).	
		‡																				
		ł																l				
	_	Ŧ																l F	_			
		‡																				
		t																				
	-	+																	_			
		Ŧ																				
		‡																				
	-	‡			1														_			
		ł			1													F				
		Ī			1																	
	-	‡			1														_			
		ł			1													F				
		Ŧ			1																	
	-	‡			1														_			
		t																				
		Į													1							

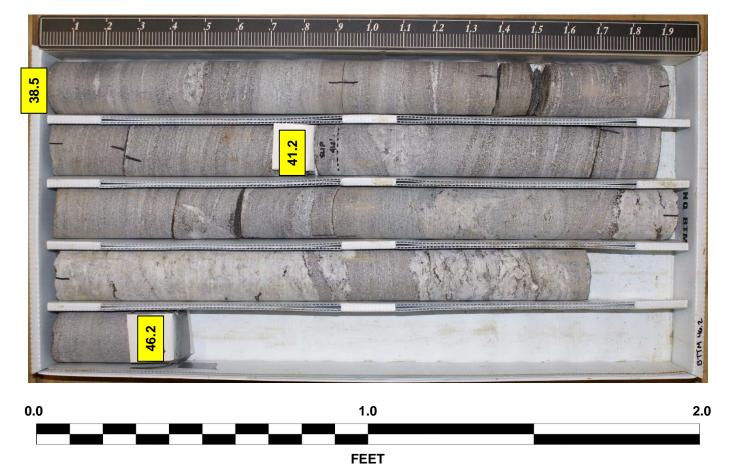
		ORE LOG
WBS 34497.1.2	TIP R-2707C COUNTY	Y CLEVELAND GEOLOGIST Abernathy, S.
SITE DESCRIPTION Bridge Nos. 4	466 & 467 over First Broad River of	on Highway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (ft)
BORING NO. B1-A EBL	STATION 383+82	OFFSET 19 ft RT ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 708.8 ft	TOTAL DEPTH 46.2 ft	NORTHING 581,178 EASTING 1,236,347 24 HR. 12.8
DRILL RIG/HAMMER EFF./DATE HDR04		DRILL METHOD H.S. Augers HAMMER TYPE Automatic
"		COMP. DATE 10/18/16 SURFACE WATER DEPTH N/A
DUN DDILL	TOTAL RUN 17.8 ft RUN STRATA	L
ELEV (ft) (ft) (Ft) (Ft) (Ft) (Ft) (Ft) (Ft) (Ft) (F	REC. RQD SAMP. REC. RQD	O DESCRIPTION AND REMARKS G ELEV. (ft) DEPTH (ft)
6804	(2.8) (1.5) 100% 54% (17.4) (13.9) 98% 78% (15.0) (4.5) 100% 90% (5.0) (4.8) 100% 96%	Begin Coring @ 28.4 ft GRYSTALLINE 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 with intervals, very hard, close to wide fracture spacing. BIOTITE GNEISS with intervals coarse crystalline feldspar and quartz with traces biotite, homblende and pyrite and small pools gametiferous - pyritic quartz and leidspar and white mit ston 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



												<u> </u>	.00			1	
	3449						R-270			COUN						GEOLOGIST Abernathy, S.	
SITE	DESC	RIPTIC	N Brid	dge No						ad River	_				s Betw	veen SR 1005 and SR 1827	GROUND WTR (ft)
BOR	ING NO). B1-	B EBL		s	TA	ATION :	384	+04		OF	FSET	88 ft RT	•		ALIGNMENT -L-	0 HR. N/A
COLI	LAR EL	.EV. 7	'09.5 ft		т	ОТ	TAL DEF	PTH	f 50.7 f	t	NO	RTHIN	G 581,	117		EASTING 1,236,386	24 HR. 13.2
RILL	. RIG/HA	MMER I	EFF./DA	TE H	DR040	4 CI	ME-45C 9	1.59	% 11/10/2	015			DRILL I	METHO	D H.S	S. Augers HAMM	IER TYPE Automatic
DRIL	LER N		, M.		s	TA	ART DAT	ΓE	10/17/1	6	СО	MP. DA	TE 10	/18/16		SURFACE WATER DEPTH N	I/A
LEV	DRIVE ELEV	DEPTI	''├──	ow co		41				PER FOO			SAMP.	. ▼/		SOIL AND ROCK DES	CRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	4	0	25	;	50	75	100	NO.	МО		ELEV. (ft)	DEPTH (ft
710		<u> </u>				Ш										-709.5 GROUND SURF	
		‡				Ш	· · · ·				: :					ALLUVIAL Red, brown, soft, low	plasticity,
705	705.1	† † 4.4				Ш	: : : :				: :					micaceous, SILT with some trace clay (A-5	e fine roots and
. 00	703.1_	† ""	2	1	1	1	2	T			. .			М			•
		‡				Ш	· · · · · · · ·										
700	700.1	9.4	1	1	1	41	<u> </u>	\perp			<u> </u>			١.,			
		‡	'	'	`	ľ	•2 · · · • · · · ·				: :			M		000.0	40.5
695	695.1	† 14.4					· · · · · · · ·				: :					Brown, soft, non-plastic,	micaceous,
393	095.1_	+ 14.4	WOH	1	1	1	2				. .			w		slightly clayey in part, san	dy SILT (A-4).
		‡				Ш	ļ: : : :				: :						
690	690.1	19.4	1	2	2	4	· · · ·	1			<u>. .</u>			1			
		‡	'	-	-		•4 · · ·					: : :		W			
685	005.4	‡ , , ,					¦: : : :				: :						
000	685.1	24.4	1	1	1	1	•2 · · ·	$^{+}$			 			Sat.			
		‡					<u> </u>				: :				 	681.5	28.0
680	680.1 679.5	± 29.4 38.4	29	60/0.1		$\ \cdot\ $	<u> </u>	₹.	 		· .					RESIDUAL 679.6 Brown, hard, non-plastic	
	. 073.0	1 30.0	60/0.0	4	1			T				.60/0.0 .60/0.1	1			micaceous, sandy SIL fragments (A-2	I WILLI TOCK
275		‡				Ш					: :					CRYSTALLINE F	ROCK
675	-	‡				$\ \cdot\ $		+			+					Biotite Gneis: Biotite Gneis:	
		‡									: :						
670	-	‡						\perp			<u>: :</u>						
		‡									: :						
205		‡				Ш											
665	-	‡				$\ \cdot\ $		+			 						
		‡									: :						
660	-	‡						\perp			<u>: :</u>						
		‡				╀				1	. .		4			658.8 Boring Terminated at Eleva	
		‡														Crystalline Rock (Biotit	,
	-	‡														 Boring was offset due to a ditch and new location was 	large drainage obtained using
		<u> </u>													1 -	a handheld GPS	
		ŧ													ΙĿ		
		ŧ													<u> </u>		
		Ŧ													1 - E		
	-	<u> </u>													[-	•	
		Ŧ													E		
		Ŧ													F		
		Ŧ													F	•	
		Ŧ															
	-	‡														-	
		‡															
		‡															

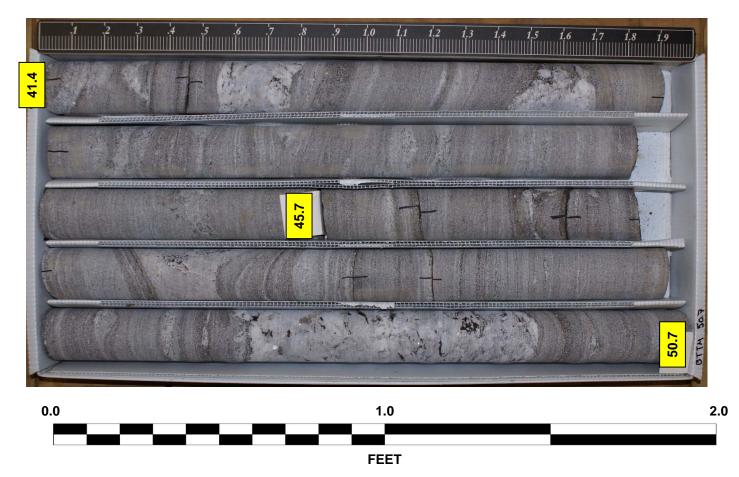
									<u> </u>	<u>U</u>	LOG
WBS	34497.	1.2			TIP	R-270)7C	C	OUNT	Υ	ELAND GEOLOGIST Abernathy, S.
SITE D	ESCRI	IPTION	N Brid	lge Nos.	466 &	467 o	ver First I	Broad	River	on F	ay US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (
BORIN	IG NO.	B1-B	EBL		STA	TION	384+04			OF	T 88 ft RT ALIGNMENT -L- 0 HR. N/A
COLLA	AR ELE	EV. 70	9.5 ft		TOT	AL DE	PTH 50	.7 ft		NC	ING 581,117 EASTING 1,236,386 24 HR. 13.
DRILL R	RIG/HAMI	MER EI	FF./DA	TE HDRO	404 CN	1E-45C	91.5% 11/1	10/2015)		DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRILLE	ER Mo	organ,	M.		STA	RT DA	TE 10/1	7/16		CC	DATE 10/18/16 SURFACE WATER DEPTH N/A
CORE	SIZE	NQ2			TOT	AL RU	N 20.7 f				
CLE V E	RUN ELEV (ft)	OEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC.	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RATA RQD (ft) %	L O G	DESCRIPTION AND REMARKS V. (ft) DEPTH
679.5	670 5	20.0							(1.5 =)		Begin Coring @ 30.0 ft
675	679.5	30.7	5.0	2:00/0.7 1:36 0:30 1:54 2:17 2:47 1:55 1:59 2:00 2:06	(3.5) 70% (5.0)	(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, BIOTITE GNEISS 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
665	-	40.7	5.0	2:17 2:11 2:19 2:07 2:21 2:42	(5.0) 100%	(5.0) 100%					
660	-	50.7	5.0	2:34 2:37 2:14 3:28 2:35	(5.0) 100%	(5.0) 100%					8 50
	‡										Boring Terminated at Elevation 658.8 ft in Crystalline Rock (Biotite Gneiss).
											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



																			1
	34497				_		R-27							EVEL					GEOLOGIST Abernathy, S.
SITE	DESCR	RIPTIO	N Brid	dge No	os. 466	6 &	467 o	ver	Firs	t Bro	ad R	iver	on Hi	ghway	US	3 74 B	ypas	s Betv	veen SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO	. B2- <i>A</i>	WBL		S	TΑ	TION	38	4+9	4			OFF	SET	59	ft LT			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	EV. 70	08.4 ft		T	οт	TAL DE	PT	H 5	0.9 ft			NOF	RTHIN	G	581,2	81		EASTING 1,236,436 24 HR. 13.9
DRILL	RIG/HAM	MMER E	FF./DA	TE HI	DR0404	1 CN	ME-45C	91.	5% 1	1/10/2	015				DI	RILL M	ETHO	D H.:	S. Augers HAMMER TYPE Automatic
DRIL	LER M	lorgan,	M.		S	TΑ	RT DA	١TE	10	/29/1	6		CON	/IP. D	ATE	10/2	29/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT				BLC)WS F	PERI	FOOT			S	AMP.	$\overline{f V}/$	LO	SOIL AND ROCK DESCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft		0	2	5	5	0		75	100		NO.	<u>/MOI</u>	G	ELEV. (ft) DEPTH (ft)
710																			
7.10	_	‡																	708.4 GROUND SURFACE 0.0
	-					П		:											ALLUVIAL Red, soft, non-plastic, micaceous, sandy
705	-	t				$\ \ $	<u>i: : :</u>	•			<u> </u>		<u> </u>						SILT (A-4).
	703.4	5.0	1	2	1	\prod	l						.					H	
	-	F	'		'	IJ٩	• 3				:		:				М	F	
700	_	F				Н	ļ	-		· ·	<u> </u>		<u> </u>						700.1 Red, soft, low plasticity, micaceous, 8.3
	698.4	10.0	2	1	1	إ	<u>i</u> : : :					 					М		clayey SILT with sand (A-5).
005	-	‡					₹2 				:	 	:				IVI		005.4
695	-	<u> </u>				ľ		_			+-		+-		1	-	V		695.1
	693.4	15.0	WOH	WOH	WOH	11							.				W		tan, very soft to soft, medium plasticity, micaceous, silty CLAY with fine roots and
690	-	Ī				IJ					:	 	:						trace sand (A-6).
	688.4	20.0				١ţ					T :		1.						-
	-		WOH	1	1	<u>ن</u> ا	2				:	 					W		
685	_	Ł					ļ				·								
	683.4	25.0	1,4/011		00/0.0	l li	j - - -	.					-						
	-	Ŧ	WOH	2	98/0.3	ין ן'	٠ <u>- :-</u> -:-		· -	-:-:-	 - -	 -	- -:-	100/0.8					682.4 26.0 WEATHERED ROCK
680	_	‡				╟		-		· ·	<u> </u>		<u> </u>		!				Biotite Gneiss
	678.4	30.0	60/0.0	1							:	 	:	· · · · · · · · 60/0.0					678.4 30.0 CRYSTALLINE ROCK
	-	ŧ	00,0.0								:								Biotite Gneiss
675	_	+				╟		-			-		-		-				-
	_	Ī						.			:		:						
670	-	‡									:	 	:						
070	-	‡									T .		+-		F	RS-D			-
	-	t									:	 							
665	-	+						-			-		-						
	-	+																	
	-	Ŧ						$\cdot \mid$:		:						
660	_	‡				$ \cdot $		-			<u> </u>		<u> </u>						
	-	‡						:			:								657.5 50.9
	-																		Boring Terminated at Elevation 657.5 ft in
	_	-																	Crystalline Rock (Biotite Gneiss).
	-	Ŧ																l F	
	-	ļ																	
	-	‡																	-
	-	t																	
	-	+																-	
	_	F																F	
	-	‡																	
	_	‡																<u> </u>	
	-	+																F	
	-	Ī																	
	_	‡																	
	-	‡																<u> </u>	
	_	+																F	
	-	+	1	1	1	1									- 1	- 1		1 F	

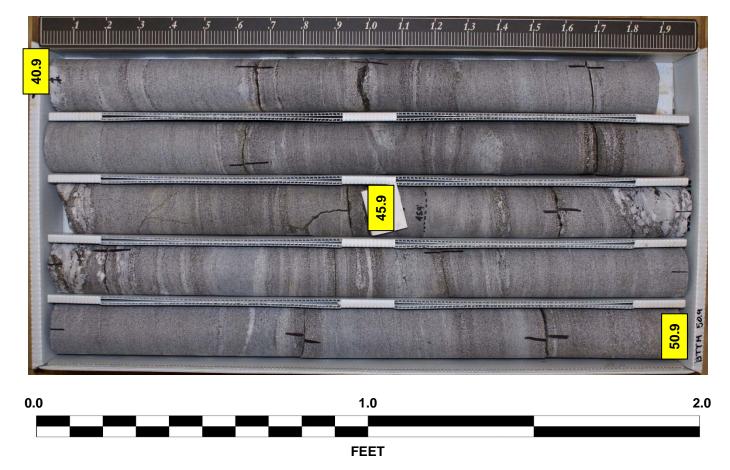
									C	U	E LOG
WBS	34497	7.1.2			TIP	R-270)7C	C	OUNT	Υ	EVELAND GEOLOGIST Abernathy, S.
SITE	DESCF	RIPTIO	N Brid	dge Nos.	466 &	467 o	ver First I	Broad	River	on I	nway US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO	. B2-A	WBL		STA	TION	384+94			OF	ET 59 ft LT ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	EV. 70	08.4 ft		тот	AL DE	PTH 50	.9 ft		NC	THING 581,281 EASTING 1,236,436 24 HR. 13.9
DRILL	. RIG/HAI	MMER E	FF./DA	TE HDRO	0404 CN	1E-45C	91.5% 11/1	10/2015			DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRIL	LER N	lorgan,	M.		STA	RT DA	TE 10/2	9/16		CC	P. DATE 10/29/16 SURFACE WATER DEPTH N/A
COR	E SIZE	NQ2			тот	AL RU	N 20.9 f				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC.	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft)
678.4		20.0									Begin Coring @ 30.0 ft
675 670	677.5 / 677.5 / - - 672.5 -	30.9	5.0	0:53/0.9 0:56 1:05 1:31 1:50 2:05 1:55 2:08 2:02	(4.1) 82% (5.0)	(0.0) (4.0) 80% (4.6) 92%	DO D	(19.1) 91%	(17.9) 86%		Gray, black, very slight weathering with seam moderately severely weathered at 30.0'-31.6', hard, close to wide fracture spacing, BIOTITE GNEISS with coarsely crystalline quartz and feldspar veins, traces pyrite. 18 0°-10° joints, some with heavy iron oxide stain; 1 25° joint with muscovite <1mm; 1 45° joint healed; 2 90° joints healed UCS=14,262 PSI, GSI=69
665	667.5 - 662.5 -	40.9	5.0	1:57 2:24 1:50 1:45 1:48 1:40 1:36		(4.5)	RS-D				
660	- - -	F0.0	5.0	1:38 1:47 1:38 1:46	96%	(4.8) 96%					
	657.5 -	50.9		2:00							50.5 Boring Terminated at Elevation 657.5 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

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



10																				I
ORING NO. B2-B WBL STATION 385+10 OFFSET 13 ft LT ALIGNMENT -L- O HR. N/A																				
Column C	SITE	DESCF	RIPTIO	N Bri	dge No	os. 460	6 & 4	467 c	over	First	Broa	ad R	iver o	on Hi	ghway	y L	JS 74 B	ypas	Betv	veen SR 1005 and SR 1827 GROUND WTR (ft
RILLER Morgan, M. START DATE 10/29/16 COMP. DATE 10/29/16 SURFACE WATER DEPTH N/A EV OR POWER (II) O.5 II	BOR	NG NO	. B2-E	B WBL	-	s	TAT	ION	38	5+10)			OFF	SET	1	3 ft LT			ALIGNMENT -L- 0 HR. N/A
RILLER Morgan, M. START DATE 10/29/16 COMP. DATE 10/29/16 SURFACE WATER DEPTH N/A EV PRIVE ELEV (H)	COLI	AR EL	EV. 70	08.3 ft		Т	ОТА	AL DI	EPT	H 40	0.7 ft			NOF	RTHIN	IG	581,2	40		EASTING 1,236,463 24 HR. 13.5
DRIVE DEPTH BLOW COUNT	DRILL	RIG/HAI	MMER E	FF./DA	TE H	DR0404	4 CMI	E-45C	91.5	5% 11	/10/20	015				Τ	DRILL N	IETHO	D H.:	S. Augers HAMMER TYPE Automatic
10	DRIL	LER N	lorgan,	М.		s	TAR	RT D	ATE	10/	29/1	6		CON	/IP. D	A٦	Γ E 10/2	29/16		SURFACE WATER DEPTH N/A
(ft) 0.5ft	ELEV	DRIVE	DEPTH	BLO	ow co	UNT				BLO	WS F	PER F	OOT				SAMP.	V /		COIL AND DOCK DESCRIPTION
Total Property	(ft)				0.5ft	0.5ft	0		25	5	5	0		75	100		NO.	моі		
Total Property																				
Total Property	710																			
05			Ī																	
05			ļ .					1 · ·				: :								Red-brown, brown, very loose to loose.
703.4	705	-	‡				H	įЩ	-		• •	<u> </u>		+:-		-				micaceous, slightly clayey, silty fine
00 698.4 9.9 2 2 1 1 93	-	703.4	4.9	2	3	3		 				: :						М		<i>5,415</i> (7,2 1).
95 693.4 14.9 2 1 1 1 90 688.4 19.9 2 2 2 2 85 681.9 26.4 60/0.0 681.9 26.4 60/0.0 667.6 ft in 667.6	700	-	‡					7 6 .	:			: :						IVI		
95 693.4 14.9 2 1 1 1 90 688.4 19.9 2 2 2 2 85 683.4 24.9 60/0.0 688.9 26.4 60/0.0 60/	700	608 4	- 00				i			. .		ļ		 .		+				•
693.4 14.9 2 1 1 1		. 030.4	3.3	2	2	1	<i> </i>	 3				: :		:				М		
80 683.4 7 14.9 2 1 1 1	695	-	Ł							• •	• •							\blacksquare		695.1 13.2
90 688.4 19.9 2 2 2 2		693.4	14.9	ļ _	1] :		.									Ī		Light brown, mottled tan and light brown, soft, non-plastic, micaceous, sandy SILT
85 683.4 24.9 5 95/0.5 681.9 26.4 60/0.0 681.9 26.4 60/0.0			Ŧ	_	'	'	\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	2	.			: :		:				W	F	
80 683.4 24.9 5 95/0.5 681.9 26.4 5 60/0.0 6	690	-	F				\mathbb{H}		-					<u> </u>		$\frac{1}{2}$			F	-
85 683.4 24.9 5 95/0.5 681.9 26.4 5 95/0.5 60/0.0 6		688.4	19.9	2	2	2			:			: :		:				w		
683.4 24.9 681.9 26.4 5 80/0.0 80 60/0.0 80 60/0.0	695	-	‡				T		:			: :		:						
80 681.9 26.4 5 95/0.5 60/0.0 60/0.0 60/0.0 681.9 26.4 5 60/0.0 60/0.0 681.9 WEATHERED ROCK Biotite Gneiss CRYSTALLINE ROCK Biotite Gneiss 667.6 ft in	303	683.4	2/ 0				†							+-						-
75 70 Boring Terminated at Elevation 667.6 ft in		_	_	1		5		 :	-:+	: :	-:-	 		- -:-	100/1.0	8			97/	682.7 25.6 681.9 WEATHERED ROCK 26.4
75 Biotite Gneiss 70 Boring Terminated at Elevation 667.6 ft in	680	-	ţ	60/0.0)		IĿ		-	• •	• •	<u> </u>		<u> </u>	. 60/0.0					
75		-	ł									: :		:						
75		-	1											•						
70 - 667.6 - 667.6 - Boring Terminated at Elevation 667.6 ft in	675	=	F				H					<u> </u>		+-		$\frac{1}{2}$				-
70 - 667.6 - 667.6 - 40.7 - Boring Terminated at Elevation 667.6 ft in			Ŧ						.			: :		:						
667.6 40.7 Boring Terminated at Elevation 667.6 ft in	670		Ŧ						.			: :								
- Boring Terminated at Elevation 667.6 ft in		-	ļ.				-		-			١		1.						
Crystalline Rock (Biotite Gneiss).			-				Η.	· · ·	•	• •	• •				· · ·					Boring Terminated at Elevation 667.6 ft in
		-	‡																	Crystalline Rock (Biotite Gneiss).
		-	‡																	
		-	<u> </u>																	
		-	<u> </u>																	
		-	ł																	
		-	F																	
		-	Ŧ																	•
			ļ																	
		_	‡																	-
		-	‡																	
		-	<u> </u>																	
		-	†																<u> </u>	
			ł																F	
		-	Ŧ																	
		-	‡																	-
		-	‡																	
		-	‡																	-
		-	‡																E	
			+	1		1													F	

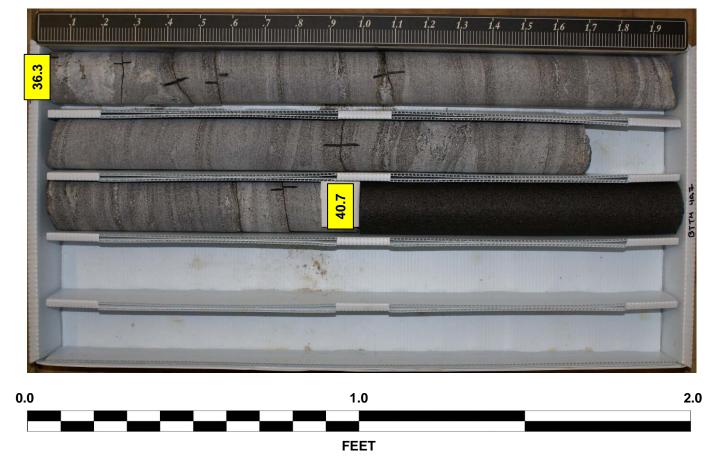
									<u> </u>	U	RE LOG		
WBS	34497	'.1.2			TIP	R-270)7C	C	OUNT	Υ	LEVELAND	GEOLOGIST Abernathy, S.	
SITE	DESCR	IPTIO	N Bric	lge Nos.	466 &	467 ov	er First E	Broad	River	on I	ighway US 74 Bypass Betw	een SR 1005 and SR 1827	GROUND WTR (ft
BORI	NG NO	. B2-B	WBL		STA	TION	385+10			OF	FSET 13 ft LT	ALIGNMENT -L-	0 HR. N/A
COLL	AR EL	EV. 70	08.3 ft		тот	AL DE	PTH 40.	.7 ft		NC	RTHING 581,240	EASTING 1,236,463	24 HR. 13.5
DRILL	RIG/HAN	/MER E	FF./DA	TE HDRO	404 CN	1E-45C	91.5% 11/1	0/2015			DRILL METHOD H.S	. Augers HAMM	ER TYPE Automatic
DRILI	LER M	lorgan,	M.		STA	RT DA	TE 10/2	9/16		CC	MP. DATE 10/29/16	SURFACE WATER DEPTH N	/A
CORE	E SIZE	NQ2			тот	AL RU	N 14.3 f						
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	DE ELEV. (ft)	ESCRIPTION AND REMARKS	DEPTH (ft
681.9	681.0	26.4	10					(40.0)	(40.0)	- Caree .	204.0	Begin Coring @ 26.4 ft	
675	681.9 _ - 677.6 - - - - 672.6 -		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%	(3.9) 91% (4.3) 86%		(13.8) 97%	(13.2) 92%		weathering with sear close to wide fractule coars	CRYSTALLINE ROCK Ittered brown-orange stain, very sligh m moderately severely weathered 32 re spacing, BIOTITE GNEISS with pot sely crystalline feldspar and quartz. 15° joints, some with iron oxide stain GSI=76	.7'-32.9', hard, ods and veins
670	11.		5.0	1:51 1:35 1:42 1:42	(5.0) 100%	(5.0) 100%					- - -		
	667.6	40.7		1:51							- 667.6	d at Elevation 667.6 ft in Crystalline R	40.7

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



						_							<u> </u>		<u>.UG</u>			
WBS	3449	7.1.2				TIF	P R-27	707C			COU	JNTY	/ CL	EVEL	AND			GEOLOGIST Abernathy, S.
SITE	DESC	RIPTIO	N Bri	dge N	los. 4	466	& 467 d	over	First	Broa	ad Riv	ver o	n Hig	hway	US 74 E	Bypass	Betv	veen SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO). B2-A	A EBL			ST	ATION	38	5+22				OFFS	SET	19 ft RT			ALIGNMENT -L- 0 HR. N/A
COL	LAR EL	EV . 7	04.8 ft			то	TAL D	EPT	H 40).9 ft			NOR	THING	3 581,2	212		EASTING 1,236,482 24 HR . 10.2
DRILL	RIG/HA	MMER E	FF./DA	TE +	HDR0	404 (CME-450	C 91.	5% 11	/10/20)15				DRILL N	ЛЕТНО	D H.S	S. Augers HAMMER TYPE Automatic
DRIL	LER N	/lorgan	, M.			ST	ART D	ATE	10/	28/1	6		СОМ	P. DA	TE 10/	28/16		SURFACE WATER DEPTH N/A
ELEV	DRIVE		1	OW C	TNUC	г			BLO	WS P	ER F	OOT			SAMP.	V /	L	1
(ft)	ELEV (ft)	(ft)		0.5f	t 0.	5ft	0	2	5	5	0	7	75	100	NO.	МОІ	O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
								·										
705																		_704.8 GROUND SURFACE 0.0
		‡					ļ											ALLUVIAL
		Ŧ											: :					Red-brown, very loose, silty fine SAND with some roots (A-2-4).
700	699.8	5.0	2	1	<u> </u>	2	1		• •				ļ : :					_
		‡	_	'	1	_	∮ 3 : :									M		
695		‡					: : :			: :			: :	: :		_	===	
<u> </u>	694.8	10.0	WOH	WOH	1 1	1	1									W		non-plastic, slightly sandy to sandy SILT with trace roots (A-4).
		‡					[: : :						: :			''	t	war daee reeds (* 1).
690	689.8	15.0					1	-		• •			<u> </u>				Ŀ	_
		‡	1	1	2	2	♦ 3 : :									W	l t	
		ŧ					: : :										t	
685	684.8	20.0	2	1	- 5	5	1						 			l w	<u> </u>	_
		Ŧ					1	.								**	:::: -	RESIDUAL
680	679.8	T 25 0] : :						: :				:::: <u>:</u>	Dark yellow-brown, dark gray, loose, faintly saprolitic, fine SAND with silt
	0/9.0-	+ 23.0 +	60/0.0	0								: :	T	60/0.0 [©]	'			CRYSTALLINE ROCK
		Ŧ					: : :											Biotite Gneiss
675	-	‡						-					: :					_
		‡																
670		‡								: :			: :	: :				
670	-	‡											.					-
		‡											: :	: :				
665	-	‡								• •		• •	<u> </u>					_
		 	1			\dashv	<u> </u>				L		١					Boring Terminated at Elevation 663.9 ft in
		ł															l	Crystalline Rock (Biotite Gneiss).
	=	Ŧ															ΙF	-
		Ŧ															F	
		‡															F	
		‡																=
		‡																
	_	‡															l Ŀ	_
		ŧ															<u> </u>	
		ŧ															l E	
	-	+															-	-
		Ŧ															l F	
		Ŧ															F	
	- -	Ŧ																-
		‡																
	_	‡																_
		‡															<u> </u>	
		±															F	
	_	Ŧ															F	_
		Ŧ																
	,	‡																

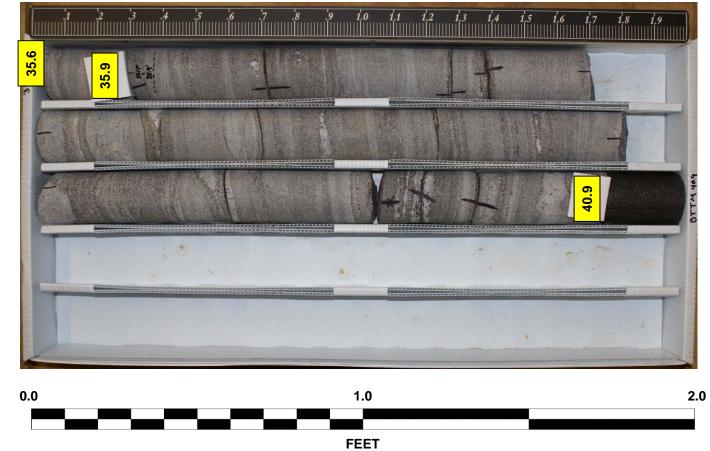
	_	ORE LOG		
WBS 34497.1.2	TIP R-2707C COUNT	Y CLEVELAND	GEOLOGIST Abernathy, S.	
SITE DESCRIPTION Bridge Nos.	466 & 467 over First Broad River of	on Highway US 74 Bypass Betwe	een SR 1005 and SR 1827	GROUND WTR (ft)
BORING NO. B2-A EBL	STATION 385+22	OFFSET 19 ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 704.8 ft	TOTAL DEPTH 40.9 ft	NORTHING 581,212	EASTING 1,236,482	24 HR. 10.2
DRILL RIG/HAMMER EFF./DATE HDR0	-	DRILL METHOD H.S.		ER TYPE Automatic
DRILLER Morgan, M.	START DATE 10/28/16	COMP. DATE 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) (3.2) (4.9) (4.3) 98% 86%	Gray, black, brown moderately severely hard, close to mod with veins and	r-orange stain, very slight weathering weathered 26.6'-27.3', 28.9'-29.8' at erately close fracture spacing, BIOT pods coarsely crystalline feldspar an e with iron oxide stain, some with mu GSI=65	ywith seams nd 34.2'-34.3', ITE GNEISS d quartz.
5.0 1:58 1:48 1:58 2:10	(4.9) (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

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



														<u>.UG</u>			1	
	3449						-2707						EVEL				GEOLOGIST Abernathy, S.	
SITE	DESC	RIPTIO	N Bri	dge No	os. 466	8 46	37 ove	er Firs	st Bro	ad Riv	er o	n Hig	hway	US 74 I	Bypas	s Betw	veen SR 1005 and SR 1827	GROUND WTR (
BOR	ING NO	. B2-E	B EBL		S.	TATIO	3 NC	85+3	36		- 1	OFFS	SET 5	59 ft RT	•		ALIGNMENT -L-	0 HR. N/
COL	LAR EL	EV. 70	03.8 ft		TO	OTAL	. DEP	TH :	36.3 f	t		NOR'	THING	5 81,	176		EASTING 1,236,505	24 HR. 9.
DRILL	RIG/HA	MMER E	FF./DA	TE H	DR0404	CME-	45C 91	1.5% 1	11/10/2	015				DRILL I	METHO	D H.S	S. Augers HAMME	ER TYPE Automatic
DRIL	LER N	lorgan,	М.		S.	TART	DAT	E 10	0/28/1	6		СОМ	P. DA	TE 10	/28/16		SURFACE WATER DEPTH N/	A
ELEV	DRIVE	DEPTH	1	ow co	UNT			BL	OWS F	PER FO	DOT			SAMP		1 - 1		
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	О	:	25	Ę	50	7	7 5	100	NO.	МО	O G	SOIL AND ROCK DESC	CRIPTION DEPTH
	. ,																()	
705																		
100		<u> </u>				Ц											703.8 GROUND SURFA	ACE (
		‡				¦:		:								0000	ALLUVIAL Red-brown, brown, very lo	ose, slightly
700	-	‡						<u> :</u>		· ·	• •					0000	silty, fine SAND (A	ı-3).
	698.8	5.0	1	1	1			:							M	0000		
		ŧ				T 2		:								0000		
695	693.8	100				 -		+-		 		-				0000		
	000.0	10.0	1	1	WOH	1		.							W			
690		Ŧ				\!		:		: :		: :	: :			0000	690.5	13
	688.8	15.0	2	1	3	1.		١.							l	1, 1	Mottled red-brown, tan, soft, SILT with clay and trace fin	low plasticity, e sand (A-5).
		‡	_	'	3	●4	÷÷÷	-	· · ·						W		·	
85	_	‡						<u> :</u>					-::-			7	. 685.5 WEATHERED RO	<u>л</u> .
	683.8 682.5		76	24/0.1	1	:		:					 00/0.6				Hornblende Gne	
	002.0	1	60/0.0	D				:					60/0.0				Hornblende Gne	iss
80	-	ŧ				 -		+-		 		-					680.1 Biotite Gneiss	23
		+																
675		Ŧ						:		: :		: :	: :					
	_	Ŧ												RS-C	7		•	
		‡						:										
670	-	‡				<u> </u>		<u> </u>		<u> </u>							•	
		‡						:									667.5	36
		t						•					•			T E	Boring Terminated at Elevat Crystalline Rock (Biotite	tion 667.5 ft in
	-	‡															·	- G110100).
		ŧ														l E		
		ł														H		
	-	F														F		
		Ŧ														l F		
	=	‡														F		
		‡																
	,	‡																
	-	‡															-	
		ŧ														l E		
	,	Ŧ														l F		
	-	Ŧ														l F		
	•	Ŧ														l F		
	-	‡															-	
		‡																
		‡																
	_	ł														F		
		Ŧ														F		
		‡																
	-	‡																
		‡														<u> </u>		
	,	1		1												ΙF		

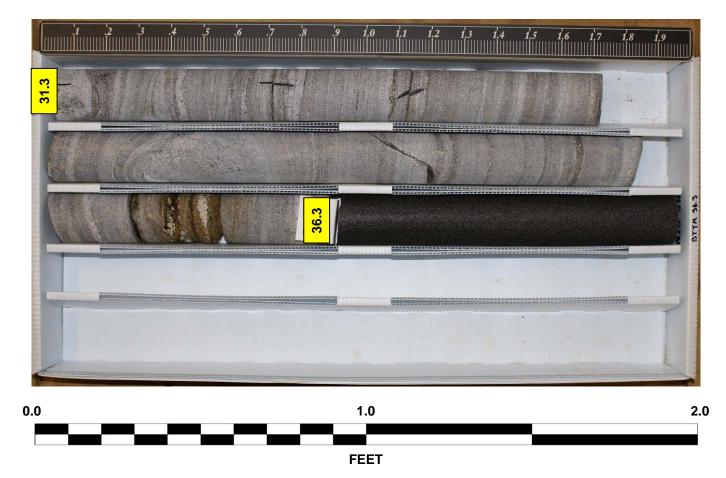
									<u></u>	<u>U</u>	: LOG
WBS	34497	'.1.2			TIP	R-270)7C	C	OUNT	Υ	VELAND GEOLOGIST Abernathy, S.
SITE	DESCR	IPTIO	N Brid	lge Nos.	466 &	467 o	ver First I	Broad	River	on	way US 74 Bypass Between SR 1005 and SR 1827 GROUND WTR (ft)
BOR	ING NO	. B2-B	BEBL		STA	TION	385+36			O	ET 59 ft RT ALIGNMENT -L- 0 HR. N/A
COLI	LAR EL	EV. 70	03.8 ft		тот	AL DE	PTH 36	.3 ft		N	HING 581,176 EASTING 1,236,505 24 HR. 9.3
DRILL	. RIG/HAN	/IMER E	FF./DA	TE HDRO	0404 CN	1E-45C	91.5% 11/1	10/2015			DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRIL	LER M	lorgan,	M.		STA	RT DA	TE 10/2	8/16		C	. DATE 10/28/16 SURFACE WATER DEPTH N/A
COR	E SIZE	NQ2					N 15.0 f				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS LEV. (ft) DEPTH (ft)
682.5	682.5 -	- 21.3	5.0	4.47	(4.0)	(0.0)		(4.7)	(0.7)	2500	Begin Coring @ 21.3 ft
680	<u>-</u>	- 21.3 - - - 26.3	5.0	1:17 1:20 1:44 1:45 1:51 1:58	(4.3) 86% (5.0)	(3.0) 60% (4.9)		(1.7) 71% (12.1) 96%	(0.7) 29% (11.1) 88%		Light to dark gray, white, black, brown-orange stain, moderately to 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	-	-	3.0	1:46 2:02 1:59		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 0º-15º joints, some with iron oxide stain and/or clay <1mm; 1 60º joint with slightly rough walls UCS=11,848 PSI, GSI=71
	667.5 -	- 36.3		1:46 1:29							37.5 Boring Terminated at Elevation 667.5 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

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



		BORE LOG							
WBS 34497.1.2	TIP R-2707C COUN	ITY CLEVELAND	GEOLOGIST Abernathy, S.		WBS 34497.1.2	TIP R-2707C C	OUNTY 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	River on Highway US 74 Bypass Be	tween SR 1005 and SR 1827	GROUND WTR (ft)
BORING NO. EB2-A	STATION 386+32	OFFSET 59 ft LT	ALIGNMENT -L-	0 HR. Dry	BORING NO. EB2-C	STATION 386+56	OFFSET CL	ALIGNMENT -L-	0 HR. Dry
COLLAR ELEV. 717.6 ft	TOTAL DEPTH 14.5 ft	NORTHING 581,313	EASTING 1,236,572	24 HR. Dry	COLLAR ELEV. 721.2 ft	TOTAL DEPTH 5.1 ft	NORTHING 581,261	EASTING 1,236,608	24 HR. 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	I.S. Augers HAMI	MER TYPE Automatic
DRILLER Morgan, M.	START DATE 10/27/16	COMP. DATE 10/27/16	SURFACE WATER DEPTH N	I/A	DRILLER Morgan, M.	START DATE 10/27/16	COMP. DATE 10/27/16	SURFACE WATER DEPTH	1/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			SOIL AND ROCK DE	SCRIPTION
715 713.8 - 3.8 710 708.8 - 8.8 3 15	4		717.6 GROUND SURF RESIDUAL Yellow-red, yellow-brown, hard, non-plastic, micace SILT with sand in pa	medium stiff to lous, saprolitic art (A-4).	720 716.6 - 4.6 4 60/0.0		60/0.0	721.2 GROUND SUR RESIDUA Inferred as yellow-red, medium stiff to hard, micaceous, SILT with 716.1 Boring Terminated with Penetration Test Refuse 716.1 ft on Crystalline Gneiss).	L yellow-brown, non-plastic, sand (A-4). 5.1 th Standard al at Elevation
7050T BORE DOUBLE R2707C_GEO_BRDG_FIRST BROAD RIVER GPJ NC_DOT.GDT 11/30/16 1		100/0.2	703.1 Biotite Gneis Boring Terminated wit Penetration Test Refuse 703.1 ft on Crystalline Figure Gneiss).	h Standard al at Elevation				SPT refusal suspected to oboulder. Boring was offset as EB2-C(2	ccur on colluvial 10' and redrilled

	BORE LOG				
WBS 34497.1.2 TIP R-2707C COUN	TY CLEVELAND	GEOLOGIST Abernathy, S.	WBS 34497.1.2 TIP R-	2-2707C COUNTY CLEVELAND	GEOLOGIST Abernathy, S.
SITE DESCRIPTION Bridge Nos. 466 & 467 over First Broad Rive		tween SR 1005 and SR 1827 GROUND WTR (ft)	_	67 over First Broad River on Highway US 74 Bypass Be	etween SR 1005 and SR 1827 GROUND WTR (ft)
BORING NO. EB2-C(2) STATION 386+47	OFFSET 3 ft RT	ALIGNMENT -L- 0 HR. Dry	BORING NO. EB2-B STATIO	ON 386+78 OFFSET 59 ft RT	ALIGNMENT -L- 0 HR. Dry
COLLAR ELEV. 721.2 ft TOTAL DEPTH 16.3 ft	NORTHING 581,257	EASTING 1,236,600 24 HR. Dry	COLLAR ELEV. 721.4 ft TOTAL	L DEPTH 7.0 ft NORTHING 581,208	EASTING 1,236,642 24 HR. Dry
DRILL RIG/HAMMER EFF./DATE	DRILL METHOD	I.S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE HDR0404 CME-		H.S. Augers HAMMER TYPE Automatic
DRILLER Morgan, M. START DATE 10/27/16	COMP. DATE 10/27/16	SURFACE WATER DEPTH N/A		T DATE 10/27/16 COMP. DATE 10/27/16	SURFACE WATER DEPTH N/A
DRIVE DEPTH BLOW COUNT BLOWS PER FOOT		SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	DENT DEPTH BLOW COUNT	BLOWS PER FOOT SAMP. CONTROL S	
716.9 4.3 33 32 68/0.3	100/0.89	- RESIDUAL		100/0.8	721.4 GROUND SURFACE 0.0 RESIDUAL Inferred as yellow-red, yellow-brown, medium stiff to hard, non-plastic, micaceous, SILT with sand (A-4). 715.9 WEATHERED ROCK Biotite Gneiss Boring Terminated with Standard
711.9 9.3 6 21 52		RESIDUAL Brown, white, very dense, fine to coarse, silty SAND with high fraction of metamorphosed granitic rock fragments (A-1). 706.4 WEATHERED ROCK Biotite Gneiss Boring Terminated with Standard Penetration Test Refusal at Elevation 704.9 ft on Crystalline Rock (Biotite Gneiss). Boring location obtained using a handheld GPS unit.	7.14.24	60/0.0	Biotite Gneiss



	P	roject reference no).	SHEET NO.					
		R-2707C							
_	RW SHEET NO.								
1	RC	DADWAY DESIGN ENGINEER							
		INCOMPLE DO NOT USE FOR							
			RY PLANS CONSTRUCTION						

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES												
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.

\$\$\$\$\$\$\STIME\$\$\$\$\$