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REFERENCE

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10-28

SHEET NO. 4-5 6-9

DESCRIPTION TITLE SHEET LEGEND SITE PLAN PROFILES CROSS SECTIONS BORE LOGS, CORE LOGS, AND CORE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURES #5 AND #6 - DUAL BRIDGES OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238

3449 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	28

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE 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 DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJERACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 CONDENSION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______ HUNSBERGER, W.S.

SUBMITTED BY ______ FALCON ENG.





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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
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 I 206, ASTM DI566). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PERETRATION BY A SPLIT SPON SAMPLER EQUAL TO OR LESS THAN 0.1 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORCANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) (> 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 IN
CLASS. A-1-6 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK. BUT
Z PASSING		SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS (CP) SHELL BEDS, ETC.
*40 30 MX 51 MN 51 MN 51 MN 51 MN 51 MN 55	GRANULAR SILT - CLAY	WEATHERING
Court 13 min 23 min 35 min 35 min 36 min </td <td>URGANIC MATERIAL <u>SUILS SUILS UTHER MATERIAL</u> TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%</td> <td>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO</td>	URGANIC MATERIAL <u>SUILS SUILS UTHER MATERIAL</u> TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO
LL	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	(VSLI) CHYSIALS ON A BHOREN SPECIMEN FACE SHINE BHIGHILY, HOCK HINGS UNDER H OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	ISLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOLO ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING FEFECTS
CEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK.
PIOF A-7-5 SUBGROUP IS ≤ LL - 30 :PIOF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND I
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE (N-VALUE) COMPRESSIVE STRENGTH (TONS/FT ²) GENERALLY VERY LOOSE < 4	HOADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION → OF ROCK STRUCTURES SOIL SYMBOL → SOIL SYMBOL SUPPORT TEST BORING SLOPE INDICATOR INSTALLATION	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS A TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50 VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED SOIL BOUNDARY	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N V COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTEED CONFENTERTIONS ONERTY MAY BE PERSENT AS DIFFE OR STRINGERS
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT	ALSO AN EXAMPLE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
OPENING (mm) 4.76 2.80 0.42 0.23 0.015 0.005 BOULDER COBBLE GRAVEL COARSE FINE SLT CLAY (0) DD (CDD) (CD) SAND SAND (SL) (CL)	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF UNDERCUT UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BU TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE
GRAIN MM 305 75 2.0 0.25 0.05 0.005 GTAT N 12 3 2 0 0.25 0.05 0.005	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BRRING TERMINATER MEA - MEATHERED	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DI BY MODERATE BLOWS.
SOL MOISTURE - CORRELATION OF TERMS	CLCLAY MOD MODERATELY γ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_d - DRY UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_d - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SWALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD POINT OF A GEOLOGIST'S PICK.
GUIDE FOR FIELD MOISTURE DESCRIPTION GATERBERG LIMITS) - SATURATED - USUALLY LIQUID: VERY WET USUALLY	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP, - SAPROLITIC S - BULK OF VOTO PATIO RATIO	SOFT CAN BE GROVED OR GOUGED READLY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
LL LIQUID LIMIT (SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE F - FINE F - FINE FOSS FOSSILIFEROUS SLI SLITY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC - FRACTURED FRACTURES TOR - TELCONE REFUSAL FRAC - FRACTURED FRACTURES TOR - TELCONE REFUSAL FOR - FOR - FRACTURED FRACTURES	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READLY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH FINGERNAIL.
RANGE - WET - (W) SEMISULU; REQUIRES DRYING TO (PI) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
PLL _ PLASTIC LIMIT	EQUIPMENT V - VERT RH IU EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINK Y BEDDED 0.
SLSHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.0 VERY CLOSE 0.16 TO 1 FOOT THICKLY LAMINATED 0.00
PLASTICITY	В + HOLLOW AUGERS	INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS X-N O	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEI
NON PLASTIC Ø-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 10-25 SUBST	VANE SHEAR TEST	FRIABLE ROBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MUDERNIELT PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 28 OR MORE HIGH COLOR COLOR COLOR	PORTABLE HOIST	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
		INDURATED 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.

PROJECT REFERENCE NO.



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	IERMS AND DEFINITIONS
SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS OR HAVING
	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
N VHLUES /	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
CLUDES GRANITE,	SURFACE.
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
C.	OF SLOPE.
MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
STONE, CEMENTED	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
	ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
ONTINCO IE ODEN	HORIZONTAL.
AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
HINER DECKS I	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ICK LIP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
L FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
Y. ROCK HAS	PARENT MATERIAL.
I AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
LLUSPARS DULL	FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	LEDGE - A SHELE-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VIDENT BUT	ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOLL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
RE DISCERNIBLE	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL CROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF	RESIDUAL (RES.) SOTU - SOTU FORMED IN PLACE BY THE WEATHERING OF ROCK
IN SMALL AND	
S. SAPROLITE IS	ROCK SEGMENTS FOUND TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
	RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
s requires	ROCK.
	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
LOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
ETACHED	OR SLIP PLANE.
	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
R PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
BLUWS OF THE	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
EDACMENTO	
T. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
PIECES 1 INCH	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
ED READILY BY	THE TUTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: 67 HLZ 1971
THICKNESS	
4 FEET	ELEVATION: 667.85 FFFT
.5 - 4 FEET	
3 - 0.16 FEET	NOTES:
08 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
0.008 FEET	
AT, PRESSURE, ETC.	
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100	200	PROJECT REFE	RENCE NO.	SHEET NO.
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RACE TO LITTLE G	RAVEL AND TRACE	ASPHALT FRAGMENTS		
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VED FF	ROMS	TANTE		MARCH	2018.			
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GEOTECHNICAL BORING REPORT **BORE LOG**

WBS 34497.1.1 TIP R-2707D COUNTY CLEVELAND GEOLOGIST Goodnight, D. J. SITE DESCRIPTION STRUCTURE #6 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (LEFT LANE) **GROUND WTR (ft)** OFFSET 96 ft LT ALIGNMENT -L-BORING NO. S5_WBL_EB1-A **STATION** 847+39 0 HR. 12.0 COLLAR ELEV. 648.4 ft TOTAL DEPTH 33.1 ft **NORTHING** 557,433 EASTING 1,266,136 24 HR. 9.9 DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILLER Cain. J. **START DATE** 02/15/18 **COMP. DATE** 02/15/18 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT **BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION 0 (ft) (ft) 0.5ft 0.5ft 0.5ft 50 75 (ft) 25 100 NO. MOLIG ELEV. (ft) DEPTH (f 650 GROUND SURFACE 648.4 647. 647.4 1.0 0.7' TOPSOIL - -3 ALLUVIAL М 645.4 _____3.0 BROWN, FINE SANDY SILT (A-4) 645 TAN AND BROWN, SILTY SAND (A-2-4) 644.9 2 W _642.9 _____WITH TRACE GRAVEL BROWN, FINE SANDY SILTY CLAY (A-7) 642.4 6.0 3 . . М 2 - - - -. 8.0 640 639.9 8.5 5 4 RED AND TAN, SILTY CLAYEY SAND (A-2-5) <u>635.4</u> 635 634.9 13.5 WEATHERED ROCK 34 66/0.4 . . . TAN, GRANITE 100/0.9 633.4 15. RESIDUAL . . . TAN, SLIGHTLY SILTY FINE TO COARSE <u>630 629.9 18.5</u> SAND (A-1-b) 12 16 26 М . . - -. . . :042 . <u>∮ 626.4</u> _____ TAN, SILTY SAND (A-2-4) 22.0 625 624.9 23.5 4 4 5 W . . . •9÷ 620 619.9 28.5 15 80 2 W - 61<u>8.4</u> <u>≻•9</u> WEATHERED ROCK TAN, GRANITE 615.3 + 33.1 615.3 33.1 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 615.3 ft ON CRYSTALLINE ROCK: GRANITE 60/0.0 60/0.0 AREA - D

BORE LOG COUNTY **WBS** 34497.1.1 **TIP** R-2707D SITE DESCRIPTION STRUCTURE #6 - BRIDGE OVER BUFFALO CRE BORING NO. S5_WBL_EB1-C **STATION** 847+10 COLLAR ELEV 666.4 ft TOTAL DEPTH 43.5 ft DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILLER Cain. J. START DATE 03/26/18 ELEV DRIVE DEPTH BLOW COUNT **BLOWS PER FOOT** (ft) (ft) 0.5ft 0.5ft 0.5ft 50 (ft) 25 670 665 665.4 1.0 2 662.9 I 35 660 660.4 6.0 2 657.9 8.5 62 655 652.9 13.5 2 2 2 650 647.9 18.5 2 2 645 642.9 23.5 2 2 2 640 <u>637.9 28.5</u> 12 4 •11 635 632.9 33.5 2 3 4 47 **. . .** · 1 · 630 627.9 _ 38.5 - - - -. . . . 2 5 5 **•**10 625 622.9 <u>43.5</u> 60/0.0

GEOTECHNICAL BORING REPORT

CLEVELA	ND			GEOLOGIST Goodnight	, D. J.		
EEK ON US	74 BET\	NEEN	SR 2	325 AND SR 2238 (LEFT L	ANE)	GROUN	ID WTR (ft)
OFFSET 4	42 ft LT			ALIGNMENT -L-		0 HR.	33.2
NORTHING	557,43	38		EASTING 1,266,075		24 HR.	25.1
	DRILL M	ETHOD	H.S.	Augers	HAMME	R TYPE	Automatic
COMP. DA	TE 03/2	26/18		SURFACE WATER DEPT	TH N/A	4	
	SAMP.	▼∕	L		K DESC	RIPTION	
75 100	NO.	мог	G	ELEV. (ft)			DEPTH (ft)
	NO.			SOIL AND ROC ELEV. (ft) 6663.4 GROUND 6663.4 TAN, SILTY SAND (660.4 RED-BROWN, SAN 11TTLE RED-TAN, SILTY TRACE GRAVE FRAG 6649.4 GRAY AND BROW WITH TRA 6649.4 BROWN, CLAYEY 6639.4 FRAG CAN WHITE OF TAN GRAY, SIL	SURFA OPSOIL MBANK (A-2-4) V AVEL GRAVE SAND (HENTS N, SANI CE GRA SILTY S IDUAL SANGE- TY SAN H TRAC		<u>DEPTH (ft)</u> <u>0.0</u> <u>0.0</u> <u>0.0</u> <u>10</u> <u>10</u> <u>11</u> <u>11</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>1</u>
60/0.0				622.9 Boring Terminatec PENETRATION Elevation 622.9 ft ROCK: 1 ARE	I WITH I TEST R ON CR GRANIT	STANDAF EFUSAL I YSTALLIN E	43.5 RD at IE

GEOTECHNICAL BORING REPORT BORE LOG

										-						
	WBS	34497	.1.1			TI	IP R-2707	D	COUNTY	CLEVEI	AND			GEOLOGIST Goodnight, D.	. J.	
	SITE	DESCRI	PTION	STR	UCTU	RE #6	- BRIDGE	OVER BUF	FALO CR	EEK ON U	S 74 BET	WEEN	SR 2	2325 AND SR 2238 (LEFT LAN	E) GROUND V	VTR (ft)
	BORI	NG NO.	S5_W	/BL_E	B1-B	S	TATION 8	47+16		OFFSET	4 ft LT			ALIGNMENT -L-	0 HR.	27.8
	COLI	AR ELE	V . 66	67.2 ft		Т	OTAL DEP	TH 43.1 f	t	NORTHIN	G 557,4	17		EASTING 1,266,043	24 HR.	26.0
	DRILL	RIG/HAM	MER EF	F./DAT	E HPO	C2473 (CME-550 85%	6 01/10/2018			DRILL N	IETHOE) Н.8	S. Augers HA	MMER TYPE Aut	omatic
	DRIL	LER Ca	ain, J.			S	TART DAT	E 02/14/1	8	COMP. D	ATE 02/2	24/18		SURFACE WATER DEPTH	N/A	
	ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		BLOWS	PER FOOT	-	SAMP.	▼∕		SOIL AND ROCK D	ESCRIPTION	
-	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	/5 10	J NO.		G	ELEV. (ft)		DEPTH (ft)
-	670		-											_		
		-	-											- 667.2 GROUND SL	IRFACE	0.0
	665	666.2	1.0	2	1	1						м	È			0.6
	000	663.7 -	- 3.5				²						L	TAN AND RED, SILT	Y SAND (A-2-4)	
		661.2	60	IMOH	2	1	 • 3 : : :					M	L	- WITH TRACE	GRAVEL	
	660		- 0.0	WOH	1	1						м	L	- 		8.0
		658.7 -	- 8.5 -	wон	1	2						w	-N		N, SANDY SILTY	
	GEE	-	-										FN	CLAT (A-7) WITH TA	ACE ONGANICS	12.0
ŀ	000		- - 13.5				 							GRAY AND TAN, SIL	TY SAND (A-2-4)	12.0
		-	-	WOH	WOH	WOH	∳0: : : :					w				
	650	-	_										L	-		
		648.7 -	- 18.5	 WOH	WOH	WOH						W	L	- 647.7		19.5
		-	-											- GRAY, SANDY SILT (A	-4) WITH TRACE	
	645	643.7 -	- 23.5					<u> </u>	+ • • • •				ĒN	BROWN, SILTY SAN	IDY CLAY (A-6)	<u>22.0</u>
				WOH	WOH	3	6 3 · · ·					w	Ŀ			
	640	-	_									–		<u>640.2</u>		27.0
		638.7 -	28.5	3	5	2	1							ALLUVI TAN, SILTY SAND (A-2	AL 2-4) WITH TRACE	
		-	-	ľ	Ŭ		• <u>•</u> 7							GRÂVE	ĒL	
	635	-	-						+ • • • •					GRAVEL LAYER	@ 31.5'-33'	33.0
		- 033.7 -	- 33.5	2	2	4						w		ORANGE AND TAN, SI	AL LTY SAND (A-2-4)
	630	-	-				1							- -	,	,
Ī		628.7 -	- 38.5			2	<u> </u>				1			- ·		
		-	-		4	3	.∳7 · ·					w		- 626.2		41.0
2	625	624.1	-								1			624.1 TAN AND WHITE	D ROCK E. GRANITE	43.1
130/2			-	60/0.0	2					60/0.0	•			Boring Terminated W		
		-	-											Elevation 624.1 ft ON ROCK: GR	CRYSTALLINE	
5.0		-	-											- ARFA -	D	
2		-	-											- -	-	
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GEOTECHNICAL BORING REPORT

						D		UG			-				
WBS	34497.1.1			TI	P R-2707D	COUNT	CLEVELA	ND			GEOLOGI	ST Goodnig	nt, D . J.		
SITE	DESCRIPTION	STR	UCTU	RE #6	- BRIDGE OVER BUF	FALO CR	EEK ON US	74 BET\	NEEN	SR 23	325 AND SR	2238 (LEFT	LANE)	GROUN	ID WTR (ft)
BOR	NG NO. S5_W	/BL_B	1-A	S	FATION 848+47		OFFSET	70 ft LT			ALIGNME	NT -L-		0 HR.	12.0
COL	L AR ELEV. 64	7.7 ft		т	OTAL DEPTH 45.1 ft	:	NORTHING	557,32	24		EASTING	1,266,156		24 HR.	11.5
DRILL	. RIG/HAMMER EF	F./DATI	E HPC	2473 0	CME-550 85% 01/10/2018			DRILL M	ETHOD	H.S.	Augers		HAMMI	ER TYPE	Automatic
DRIL	LER Cain, J.			S	TART DATE 02/15/1	8	COMP. DA	TE 02/ ²	15/18		SURFACE	WATER DEP	TH N//	Ą	
ELEV (ft)	DRIVE ELEV (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	BLOWS 1 0 25 5	PER FOOT	- 75 100	SAMP. NO	МОІ	L O G	ELEV. (ft)	SOIL AND RO	CK DES	CRIPTION	DEPTH (ff
650										-					
645	646.7 - 1.0 	wон	1	2		· · · · ·	· · · · ·		М		.644.7 644.7 - BR	0.7' AL OWN, FINE SA	TOPSOIL LUVIAL		
640	<u>641.7 + 6.0</u>	2	2	3		· · · · ·	· · · · · · · · · · · · · · · · · · ·		M M		`		(N, SILT) A-2-4)	FINE SA	ND
635	-	2	1	2		· · · · ·	· · · · · · · · · · · · · · · · · · ·		M		6 <u>35.7</u>	N AND GRAY,	(A-5)	Y SILTY F	51L I
630	634.2 <u>13.5</u> - - - -	5	7	18	25	 			Sat.		TO	COARSE SAN G	D (A-1-b) RAVEL	WITH LIT	TLE
	629.2 18.5	100/0.4	i				100/0.4				<u>627.7</u> —	TAN, TAN, RE	ERED RO GRANIT SIDUAL		<u>18.</u> <u>20.</u> !
625	624.2 23.5	3	3	57		<u> </u>	+ · · · · · · · · · · · · · · · · · · ·		W		<u>622.7</u>				<u>25</u> .
620	619.2 28.5 615.4 32.3	55	45/0.3				- 100/0.8				615.4	TAN AND BE	KOWN, G	RANITE	32.
610		60/0.0					60/0.0 					CRYSTA LIGHT GF	lline r e Ray, gr <i>i</i>	OCK ANITE	
605															
								_			602.6	· <u>-</u> · ·			45.
	****											GRYSTALLIN	at Eleva E ROCK: REA - D	GRANITE	

WBS	3 34497	.1.1			TIP	R-270	7D	C	OUNT	YC	LEVELA	ND	GEOLO	DGIST Goodnigh	nt, D. J.		
SITE	DESCR	IPTION	STR	UCTURE	#6 - B	RIDGE	OVER E		LO CF	REEK	ONUS	74 BETWEEN SR	2325 AND	SR 2238 (LEFT	LANE)	GROU	ND WTR (ft)
BOR	ING NO.	S5_V	/BL_B	1-A	STA	ΓΙΟΝ	848+47			OF	FSET 7	'0 ft LT	ALIGN	MENT -L-		0 HR.	12.0
COL	LAR EL	EV. 64	7.7 ft		тот	AL DE	PTH 45.	1 ft		NO	rthing	557,324	EASTI	NG 1,266,156		24 HR.	11.5
DRIL	L RIG/HAM	IMER EF	F./DATI	HPC247	73 CME	-550 85	5% 01/10/20)18				DRILL METHOD H	S. Augers		HAMM	ER TYPE	Automatic
DRIL	LER C	ain, J.			STA	RT DA	TE 02/1	5/18		со	MP. DA	FE 02/15/18	SURFA	CE WATER DEP	TH N/.	A	
COR	E SIZE	NQ2			тот	AL RUI	N 12.8 ft	t									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (f	it)	DESCRIPT	ION AND REMARK	٢S		DEPTH (ft)
6153	3	00.0			(2.2)								Begin (Coring @ 32.3 ft			
610	612.4 607.4	- 32.3 - 35.3 - 40.3	3.0 5.0 4.8	3:40/1.0 5:10/1.0 3:50/1.0 4:51/1.0 3:27/1.0 2:24/1.0 3:40/1.0 4:23/1.0 4:36/1.0 5:55/1.0	(2.9) 97% (5.0) 100% (4.8) 100%	(2.7) 90% (4.8) 96% (4.8) 100%		(12.7) 99%	96%		- 615.4 	VERY SLIGHT V LIGHT GRAY FRACTURI	CRY: VEATHERIN GRANITE V E SPACING MI	STALLINE ROCK IG TO FRESH, HA V/ CLOSE TO MOE ; MEDIUM TO COA EGACRYSTIC	ARD TO N DERATEI ARSE GR	/ERY HAF LY CLOSE AINED/	32.3 RD, E
	602.6	45 1		7:45/1.0							- 602.6						45 1
	0.02.0			<u>10.54/0.8</u>							-	Boring Termina	ited at Eleva	ation 602.6 ft IN CR	YSTALL	INE ROCI	ر:
	-	+									-			ARFA - D			
NCDOT CORE SINGLE R2707_GEO_BORINGS CURRENT.GPJ NC_DOT.GDT 12/30/22		* * * * * * * * * * * * * * * * * * * *															

SHEET 12

GEOTECHNICAL BORING REPORT CORE LOG







GEOTECHNICAL BORING REPORT BORE LOG

WBS	34497	.1.1			Т	IP	R-2707D		COUNT	Υ	CLEVELA	ND			GEOLOGIST Goodnight, D	. J.	
SITE	DESCR	IPTION	STR	UCTU	RE #6	-	BRIDGE C	VER BUR	FALO CI	REE	K ON US	74 BET\	WEEN	SR 2	2325 AND SR 2238 (LEFT LAN	E) GRO	DUND WTR (ft)
BOR	NG NO.	S5_W	/BL_B	1-B	S	T/	ATION 84	8+41		OF	FSET	20 ft LT			ALIGNMENT -L-	0 H	R. N/A
COL	LAR ELE	EV . 63	4.4 ft		Т	01	TAL DEPT	H 15.0 f	ft	NC	ORTHING	557,30	09		EASTING 1,266,108	24 H	R. N/A
DRILL	. RIG/HAN	IMER EF	F./DATI	E HPC	2473	CN	ME-550 85%	01/10/2018	;			DRILL M	IETHOD) Mu	Id Rotary HA	MMER TY	PE Automatic
DRIL	LER C	ain, J.	_		S	T/	ART DATE	03/27/	18	co	omp. Da	TE 03/2	27/18		SURFACE WATER DEPTH	N/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0W CO 0.5ft	UNT 0.5ft		0 2	BLOWS 5	PER FOO 50	T 75	100	SAMP. NO.	моі	L O G	SOIL AND ROCK I	ESCRIPT	ION DEPTH (ft
635	634.4	0.0													-634.4 GROUND SI	IRFACE	0.0
630	-		2	6	32		· · · · ·	• 38.	· · · · · · · · · · · · · · · · · · ·		· · · ·		Sat.		- ALLUV - TAN-BROWN, FINE T - 631.4 _ (A-1-b) WITH LIT	AL D COARSI ILE GRAV	E SAND /EL <u></u>
030	629.4	5.0	16	11	37		· · · · · · · · · · · · · · · · · · ·	· · · · ·	● <u>48</u>					TT	TAN, SILTY SAND (A- 627.9 WEATHERE	AL 2-4) SAPR	CLITIC
625	624.4	<u>10.0</u>	100/0.2				· · · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·		100/0.2	•			- TAN, GR/ -	NITE	
620	619.4	15.0	60/0.0				· · · · ·	· · · · ·	· · · ·		60/0.0	-			- - - 619.4 - Boring Terminated W		15.0
	-		00/0.0												PENETRATION TE Elevation 619.4 ft ON ROCK: GR	CRYSTAN ANITE	AL at
	-														AREA	D	
															-		
	-														- - -		
	-														- - -		
	-														- - -		
30/22															- -		
1.601 12	-														- - 		
	-														- - -		
KKENI.GF	 - -														- - -		
KINGS CUT	- - -																
GEO BOF	- - -														- -		
E K2/0/	- - -														- - -		
	- - -														- - -		
	-														- - -		

GEOTECHNICAL BORING REPORT BOREIOG

WBS	34497.1.1			TI	P R-270	7D	COUNT	Y CLEVELA	ND			GEOLOGIST Goodnight, D. J.	
SITE	DESCRIPTION	STR	UCTUF	RE #6	- BRIDGE	OVER BUF	FALO CR	EEK ON US	74 BET	WEEN	I SR 2	325 AND SR 2238 (LEFT LANE)	GROUND WTR (ft)
BOR	NG NO. S5 W	VBI B	2-A	s	TATION	850+07		OFFSET	64 ft I T			ALIGNMENT -I -	0 HR. Drv
		10 / ft	_ / .			оты 249 ft			557.1	75			2/ UD 12.7
	ARELEV. 04	+9.4 IL				24.01		NORTHING	557,1	75		EASTING 1,200,215	24 NK. 13.7
DRILL	RIG/HAMMER EF	F./DATE	E HPC	2473 (CME-550 85	% 01/10/2018			DRILL N	IETHOL	D H.S	Augers	ER TYPE Automatic
DRIL	LER Cain, J.			S	TART DAT	E 03/23/1	8	COMP. DA	FE 03/2	23/18	a	SURFACE WATER DEPTH N/	A
ELEV	DRIVE FLEV DEPTH	BLO	W COL	JNT		BLOWSI	PER FOOT	-	SAMP.	$\mathbf{\nabla}$		SOIL AND ROCK DES	CRIPTION
(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0	25 :	50	75 100	NO.	Имо	G	ELEV. (ft)	DEPTH (ft)
650													
	6484 - 10											-649.4 GROUND SURF/	ACE 0.0
	1	WOH	1	1	∳ 2 : : :					М	Ŀ	646.4 ALLUVIAL	<u> </u>
645	645.9 - 3.5	1	1	1		.				м	80 -	- ⁰⁴⁰ ↔ → RED-TAN, SILTY FINE S WITH TRACE WOOD FF	AND (A-2-4) , 의의 RAGMENTS ၊
	643.4 + 6.0				$\left \begin{array}{c} \P^2 \\ \cdot \\ $					141			(A-4) WITH5.5
	‡	2	2	2	 ∳ 4					М	<u></u> 1, ¹ /-	641.4 TAN-GRAY, CLAYEY SIL	∑/ T (A-5) WITH 8.0
640	640.9 8.5	WOH	1	2						м	N		DOTLETS) /
						.						- <u>639.2</u> GRAY-TAN, SILTY CLAY	(A-7) WITH <u>10.2</u> DOTLETS) <u>14.0</u>
	-637.6 + 11.8	60/0.0			'	+	+		,	-	1		$\sum_{i=1}^{n} \sum_{j=1}^{n} \frac{11.8}{n}$
635	1							60/0.0				-634.6 WITH LITTLE ROCK FR	AGMENTS 14.8
	±										B		
	Ŧ										KA.	LIGHT GRAY, GRA	ANITE
630	1										R#	-	
	1												
	1					.							
625	_								_		<u> </u>	- 624.6	24.8
	Ŧ										I F	CRYSTALLINE ROCK:	GRANITE
	‡											AREA - D	
	+											-	
	+										-		
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TIP R-2707D SITE DESCRIPTION STRUCTURE #6 - BRIDGE OVER BUFFALO CRE BORING NO. S5_WBL_B2-A **STATION** 850+07 COLLAR ELEV. 649.4 ft TOTAL DEPTH 24.8 ft DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILLER Cain, J. **START DATE** 03/23/18 CORE SIZE NQ2 TOTAL RUN 13.0 ft ELEV RUN ELEV (ft) (ft) (ft) DRILL RATE (Min/ft) RUN SAMP. STRATA REC. RQD SAMP. REC. RQD (ft) (ft) NO. (ft) (ft) (ft) % % % % % % $\begin{array}{c|cccccc} 2:22 & (2.9) & (1.9) \\ 1:36 & 97\% & 63\% \\ 1:22 & & & \\ 1:24 & (5.0) & (5.0) \\ 1:30 & 100\% & 100\% \\ 1:40 & & & \\ 1:39 & & & \\ 1:47 & & & \\ 1:49 & (5.0) & (5.0) \\ 2:13 & 100\% & 100\% \\ 2:41 & & & \\ 2:51 & & & \\ 4:07 & & & & \\ \end{array}$ 637.6 _ 11.8 (2.9) (1.9) 97% 63% 3.0 635 634.6 14.8 (10.0) (10.0) 100% 100% 5.0 630 629.6 19.8 5.0 625 624.6 24.8

WBS 34497.1.1

637.6

GEOTECHNICAL BORING REPORT CORE LOG

COUNT	Y CLEVELAND	GEOLOGIST Goodnight,	D. J.		
FALO CF	EEK ON US 74 BETWEEN SR 23	325 AND SR 2238 (LEFT LA	ANE)	GROUN	D WTR (ft)
	OFFSET 64 ft LT	ALIGNMENT -L-		0 HR.	Dry
t	NORTHING 557,175	EASTING 1,266,215		24 HR.	13.7
	DRILL METHOD H.S.	Augers	HAMME	R TYPE	Automatic
8	COMP. DATE 03/23/18	SURFACE WATER DEPT	H N/A	Ą	

L O G		DESCRIPTION AND REMARKS	
-			
7-)	- 637.6	CRYSTALLINE ROCK	11.8
	-	SLIGHT TO VERY SLIGHT WEATHERING, HARD, LIGHT GREEN-TAN,	14.0
	- 034.0	GRANITE WITH CLOSE TO VERY CLOSE FRACTURE SPACING ERESH VERY HARD LIGHT GRAY GRANITE WITH WIDE	/
بسباللج	-	FRACTURE SPACING.	
	-		
	-		
P	-		
	-		
<u>ک</u> اللج	<u>- 624.6</u>	Boring Terminated at Elevation 624.6 ft IN CRYSTALLINE ROCK	24.8
	-	GRANITE	
	-	AREA - D	
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GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.1 TIP R-2707D COUNTY CLEVELAND GEOLOGIST Goodnight, D. J. SITE DESCRIPTION STRUCTURE #6 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (LEFT LANE) GROUND WTR (ft) OFFSET 42 ft LT ALIGNMENT -L-BORING NO. S5_WBL_B2-C **STATION** 849+94 0 HR. Dry COLLAR ELEV. 649.5 ft TOTAL DEPTH 11.3 ft **NORTHING** 557,178 EASTING 1,266,190 24 HR. 9.3 DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILLER Cain. J. START DATE 03/22/18 **COMP. DATE** 03/22/18 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft **BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION 0 0.5ft 0.5ft 0.5ft 50 75 25 100 NO. MOLIG ELEV. (ft) DEPTH (f 650 GROUND SURFACE 649.5 - 648.7 0.8' TOPSOIL 648.5 1.0 - -М ALLUVIAL - -- -646.5 646.0 3.5 TRACE ORGANICS AND MICA 645 М TAN-BROWN, SILT (A-4) MOTTLED AND . . . 643.5 - -TRACE ORGANICS (WOOD 2 М FRAGMENTS) 641.5 641.0 TAN, CLAYEY SILT (A-5) WITH TRACE 8.5 - - - -. . . - -640 WOH 2 2 ORGANICS 1. · v -639.0 638.2 _-----_ _ _ _ _ WEATHERED ROCK 638.2 T 11.3 -60/0.0 0/0TAN, GRANITE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 638.2 ft ON CRYSTALLINE ROCK: GRANITE AREA - D

W	BS	34497	.1.1				ТΙ	Ρ	R-27	'07E)		C	OU	INT
sr	ΓE	DESCR	PTION	STR	UCTU	RE ;	#6	_	BRIDG	SE C	VE	R BU	FFA	NLO	CF
вс	R	NG NO.	S5_W	/BL_B	2-B		SI	٢,		84	9+7	78			
co	CLL	AR ELE	EV . 64	8.1 ft			тс)	TAL D	EPT	Н	10.8	ft		
DR	ILL	RIG/HAN	IMER EF	F./DATE	E HPC	2247	3 C	CN	1E-550	85%	01/1	0/2018	3		
DF	N L	LER C	ain, J.				ST	٢,	ART D	ATE	0	3/22/	18		
ELE	ΞV	DRIVE	DEPTH	BLC	w co	UNT	-				BL	.OWS	PE	RF	00
(ft	:)	(ft)	(ft)	0.5ft	0.5ft	0.5	ōft		0	2	5		50 		
65	0		-												
		-	10										_		
64	5	047.1	- 1.0	wон	4	3			• 7		:	· · ·		· ·	-
		644.6-	- <u>3.5</u> -	wон	2	1	_								
		642.1	6.0	2	1		_		\mathbf{I}_{2} .	•••	:	· · ·		· ·	-
64	0	639.6-	- 8.5						•2.	~					-
		- 637.3 ⁻	- 10.8	WOH	5	3	2		•••	•••	7.	• 37			•
		-	-	60/0.0											
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GEOTECHNICAL BORING REPORT

BORE LOG



GEOTECHNICAL BORING REPORT

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WBS	34497	.1.1			Т	P R-2707	D	COUNT	Y CLEVEL	AND			GEOLOGIST Goodnight, D. J.		
SITE	DESCR	PTION	STR	JCTU	RE #6	- BRIDGE	OVER BU	FFALO CF	REEK ON US	574 BE	WEEN	SR 2	325 AND SR 2238 (LEFT LANE)	GROUND	WTR (ft)
BOR	NG NO.	S5_W	/BL_E	32-A	S	TATION 8	350+68		OFFSET	100 ft L	Т		ALIGNMENT -L-	0 HR.	8.5
COLI	LAR ELE	EV. 65	0.7 ft		Т	OTAL DEP	TH 10.6	ft	NORTHING	5 57,	134		EASTING 1,266,273	24 HR.	Dry
DRILL	. RIG/HAN	IMER EF	F./DATE	E HPC	2473 0	CME-550 85%	% 01/10/2018	}		DRILL	METHOD) H.S.	. Augers HAMN	IER TYPE A	utomatic
DRIL	LER C	ain, J.			S	TART DAT	E 03/22/	18	COMP. DA	TE 03	/22/18		SURFACE WATER DEPTH N	/Α	
ELEV (ft) 655	DRIVE ELEV (ft)	DEPTH (ft)	BLO 0.5ft	W CO 0.5ft	UNT 0.5ft	0	BLOWS	PER FOO ⁻ 50 	Г 7 <u>5</u> 100 _	SAMF NO.	P. MOI	G	SOIL AND ROCK DES	CRIPTION	DEPTH (ft)
<u>655</u> <u>645</u>			2 3 2 60/0.0	3	3 3 2 34		· · · · · · · · · · · · · · · · · · ·		60/0.0 ⁴		M		GROUND SURF 0.5 TOPSOI ROADWAY EMBAN BROWN, FINE SANDY SI TRACE MICA AND 645.2 BROWN AND GRAY, CLA WITH TRACE ORGANIC 640.7 CAU EVALUATION TEST Boring Terminated WITH PENETRATION TEST Elevation 640.1 ft ON CF ROCK: GRAN AREA - D	ACE L KMENT LT (A-4) WIT GRAVEL YEY SILT (A- CS (ROOTS) OCK TE ISTANDARD REFUSAL at YSTALLINE TE	$\frac{0.9}{10.6}$
													-		

								B	<u>ORE L</u>	OG						
WBS	34497	. 1.1			ד	P R-2707	C	COUNT	CLEVEL	ND			GEOLOGIST Goodnig	nt, D. J.		
SITE	DESCR	IPTION	STR	UCTU	RE #6	- BRIDGE (OVER BUF	FALO CR	EEK ON US	74 BET	WEEN	SR 2	2325 AND SR 2238 (LEFT	LANE)	GROUN	ID WTR (ft)
BOR	NG NO.	S5_V	VBL_E	B2-C	S	TATION 8	50+52		OFFSET	33 ft LT			ALIGNMENT -L-		0 HR.	Dry
COL	LAR ELI	E V. 66	67.3 ft		т	OTAL DEPT	TH 23.9 ft		NORTHING	557,1	21		EASTING 1,266,205		24 HR.	FIAD
DRILL	. RIG/HAN	IMER EF	F./DAT	E HPC	2473 0	CME-550 85%	01/10/2018			DRILL N	IETHOD) Н.S	S. Augers	HAMMI	ER TYPE	Automatic
DRIL	LER C	ain, J.			S	TART DATE	E 03/26/18	3	COMP. DA	TE 03/	26/18		SURFACE WATER DEF	PTH N//	4	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	0 :	BLOWS F 25 5	PER FOOT	- 75 100	SAMP. NO.	моі	L O G	SOIL AND RC ELEV. (ft)	CK DES	CRIPTION	I DEPTH (ft)
670		-											-			
665	666.3	1.0	15	9	7			· · · · ·			м		667.3 GROUN 665.8 1.0' BITUMIN 0.5' AGGREGA	D SURF	ACE NCRETE E COURS	0.0 E
660	663.8 · · 661.3 ·	- 3.5 - - 6.0	3	2	2				· · · · · · · · · · · · · · · · · · ·		м		TAN-BROWN, SIL 661.8 LITTLE GRAVE	TY SANE L AND TI	(A-2-4) \ RACE MIC WITH TR/	VITH 2A <u>5.5</u> ACE
	658.8	<u>8.5</u>	4	6	5						м		TAN BROWN, SIL	RAVEL TY SAND E GRAVE) (A-2-4) V EL	8.0 VITH
655	653.8		2	3	5	•					м		BROWN, SILTY (WITH LIT	CLAYEY : TLE GR/	Sand (a- Avel	12.0 2-5)
650	- 	- - 18.5 -	3	3	2	 	· · · · ·	· · · · ·	· · · · ·		м		650.3 BROWN-GRAY	LUVIAL SILTY S RAVEL A	AND (A-2	17.0
645	643.8 - 643.4	- - - <u>23.5</u>	100/0.3			· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · · ·		•			- 643.4 OR - WEATH - 643.4 TAN,	GANICS ERED RO GRANIT	DCK E	23.9
			60/0.0						60/0.0				PENETRATION Elevation 643.4 ROCK	TEST R TEST R CON CR	STANDA EFUSAL YSTALLII TE	at NE
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GEOTECHNICAL BORING REPORT

GEOTECHNICAL BORING REPORT BORE LOG

COUNTY CLEVELAND GEOLOGIST Goodnight, D. J. WBS 34497.1.1 **TIP** R-2707D SITE DESCRIPTION STRUCTURE #6 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (LEFT LANE) GROUND WTR (ft) ALIGNMENT -L-BORING NO. S5_WBL_EB2-B **STATION** 850+47 OFFSET 7 ft LT 0 HR. Dry COLLAR ELEV 667.3 ft TOTAL DEPTH 20.8 ft **NORTHING** 557,115 EASTING 1,266,180 24 HR. Dry DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD H.S. Augers HAMMER TYPE Automatic COMP. DATE 02/16/18 DRILLER Cain, J. **START DATE** 02/16/18 SURFACE WATER DEPTH N/A ELEV (ft) DRIVE DEPTH ELEV (ft) 0.5ft 0.5ft 0.5ft SAMP. **BLOWS PER FOOT** 0 SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 50 75 NO. 25 100 MOI G ELEV. (ft) DEPTH (f 670 GROUND SURFACE 667.3 - 666 0.7' TOPSOIL 666.3 1.0 4 2 665 ROADWAY EMBANKMENT Μ TAN AND GRAY, SILTY SAND (A-2-4) 663.8 WITH TRACE TO LITTLE GRAVEL М 661.3 660 3 М 658.8 8.5 WOH 2 6 М · · · 655 653.8 - 13.5 4 4 М 2 . - -650 648.8 -18.5 4. 4 5 •12 - · · · $-\frac{647.0}{646.8}$ $\frac{20.3}{20.5}$ <u>____</u>____ 646.5 + 20.8 WEATHERED ROCK 60/0 C WHITE AND GRAY, GRANITE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 646.5 ft ON CRYSTALLINE ROCK: GRANITE AREA - D

[WBS	34497	.1.1				TI	Ρ	R-	270)7D)			С	ou	NT	Y
	SITE	DESCR	PTION	STR	UCTU	RE	#5	- E	BRI	DG	ΞO	VE	RB	BUF	FA	LO	CF	REE
	BOR	NG NO.	S6_E	BL_EE	81-A		S	ΓA	ТЮ	N	84	7+2	20					0
	COL	LAR ELE	EV. 66	7.1 ft			т	т	AL	DE	PT	Н	43	.0 fl				N
	DRILL	. Rig/han	IMER EF	F./DATI	E HPC	247	'3 C	CM	E-55	50 8	5% (01/1	0/2	018				
	DRIL	LER C	ain, J .				S	ΓA	RT	DA	TE	0	2/1	4/1	8			С
	ELEV	DRIVE	DEPTH	BLC		UNT	Γ		~		~	BL	-0\	NS	PEF	RFO	20	Г
	(11)	(ft)	(11)	0.5ft	0.5ft	0.8	oft	H)		2	5			50			/5
	670		-															
		-	ŧ.															
	665	666.1	1.0	2	1	1						-						
		- 663.6 -	- 3.5						2—									
				2	2	2	2		4 4	· ·	:	:	:			:		
	660		- 0.0	2	4	3	3		-	 7—-	:	-	•					
		658.6 -	8.5	2	3	3	3		j	· ·	:	:	:	· ·		:		:
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	600	653.6 -	- 13.5							<u> </u>	<u>\</u>					-		
			10.0	6	20	6	6		:	· ·		26	:	· ·		•	-	:
	650	-	L						•	/	<i>i</i> .	•	·	•••		•	• •	
		648.6 -	18.5	WOH	WOH	1			/	ć.	:	:	÷	•••		:	:	
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	645	_	F						-		-							
		- 643.6	<u>= 23.5</u>	1	1	2	2		•3	•••		-			.	-		
	640	-	ŧ								:	-	:		:	-		
	010	638.6 -	- 28.5	_					:									
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	635	-	ŧ.						•	: :¦	· .	-	·			-		
		633.6 -	33.5	2	3	1	0		:	· ·]	•	:	:	· ·		:		:
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	630	628.6 -	- 38 5							. .					+	-		-
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	625	-	Ł						•	•••	•	•	•	•••		•	•	•
0/22		624_1	43.0	60/0.0			_	┝┶										
12/3		-	Ł															
GDT		-	Ł															
DOT.		-	Ł															
S		-	F															
GPJ		-	F															
ENT		-	F															
URR		-	F															
GS C		-	ŧ															
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GEOTECHNICAL BORING REPORT

BORE LOG

CLEVELA	ND			GEOLOGIST Goodnight, D.	. J.		
EEK ON US	74 BETV	VEEN	SR 2	2325 AND SR 2238 (RIGHT LAI	NE)	GROUN	D WTR (ft)
OFFSET 1	1 ft RT			ALIGNMENT -L-		0 HR.	29.1
NORTHING	557,40)7		EASTING 1,266,031		24 HR.	26.0
		ETHOD	н	S Augers HA		R TYPE	Automatic
	E 02/1	//18			NI/A		, latornatio
			L		11/7	۱ ١	
75 100	NO.	моі	O G	SOIL AND ROCK D	DESC	RIPTION	DEPTH (ft)
	NO.	Mol M M M W W M Sat.		SOIL AND ROCK D	DESC SOIL SANY, E GR CS (I NTS) D TO CS (I D TO CAL CS (I D TO CAL CS (I CS (I CS (I D TO CS (I CS (I	RIPTION	0.0 ND 19.5
				- 			
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GDT DOT

GEOTECHNICAL BORING REPORT BOREIOG

											JKL		UG			
WBS	34497	.1.1			Т	I P R-27	07D		COUN	VTY	CLE	/ELA	ND			GEOLOGIST Goodnight, D. J.
SITE	DESCR	PTION	STR	UCTUF	RE #5	- BRIDG	E OVE	ER BUF	FALO	CRE	EK O	N US	74 BET	NEEN	I SR 2	325 AND SR 2238 (RIGHT LANE) GROUND WTR (ft)
BOD		96 E		21.0	e		<u> </u>	.15				т 3				
BUR		30_E		51-0			047 -			-		-1 0				
COL	LAR ELE	-V. 66	57.5 ft			OTAL D	ЕРТН	44.5 f	t	_ r	NORT	HING	557,40)1		EASTING 1,266,004 24 HR. FIAD
DRILL	. RIG/HAM	IMER EF	F./DATE	E HPC	2473 (CME-550	35% 01/	10/2018					DRILL M	ETHO) H.S.	Augers HAMMER TYPE Automatic
DRIL	LER Ca	ain, J.			S	TART D	ATE (03/28/1	8	0	COMP	. DA	FE 03/2	28/18		SURFACE WATER DEPTH N/A
	DRIVE	ПЕРТИ	BLO	w cou	JNT		В	LOWS	PER FO	ют			SAMP.	▼/	1 L	1
(ft)	ELEV	(ft)	0.5ft	0.5ft	0.5ft	10	25		50	7	5	100	NO		0	SOIL AND ROCK DESCRIPTION
	(11)		0.0.1		0.0.1				1	I						ELEV. (ft) DEPTH (ft)
670																
	-														-	
	666.5	- 10							· · ·							667.5 GROUND SURFACE 0.0
665		- 1.0	6	3	3	6	- -		• • •	•••	•••	••		М		666.0 0.4' AGGREGATE COURSE BASE
	664.0	3.5	2	2	3											
	- 		2		3	∮ 6: :					•••	::		М	L E	(A-2-6) WITH LITTLE GRAVEL
660	661.5	<u> </u>	2	2	2						• •			м	L:F	TAN AND RED, SILTY SAND (A-2-4)
000	659.0	8.5							1		•••					WITH LITTLE GRAVEL
	-	ł	1	2	1	∳3	• •				•••	•••		W		
655		F				i :::					•••	::				655.5 12.0
655	654.0	13.5														RED-TAN, SANDY CLAYEY SILT (A-5)
	-	-	WOH		2	∳3	. .			•••				W		WITH LITTLE GRAVEL
o=-		t				i: : :		· · ·			•••	::				650.5 17.0
650	6/9 0	18.5						· · · ·								
	- 043.0	- 10.0	2	2	3	 						::		w		TAN, SILTY SAND (A-2-4) WITH TRACE
	-	-				$ \dot{r} \cdot \cdot$	- -		• • •	•••	•••	••			-	
645						/					· ·				×-	BROWN, SANDY SILTY CLAY (A-7)
	644.0	23.5	WOH	WOH	WOH			· · ·			•••	::		w	N	
	-	-				⊺ °		• • •			• •				N	
640											•••				N	
	639.0	_ 28.5	6	100/0.4			· - - :	_· <u>_·</u> _	<u></u>	·	. <u></u>	<u> </u>				638.5 29.0
		ļ.									· 10	^{5/0.4}				636.5 TAN. GRANITE 31.0
635	-	L					- -				· · · ·	-7			000-	
	634.0	33.5	8	24	25									14/		TAN AND WHITE, SLIGHTLY FINE TO COARSE SAND (A-1-b)
		Ĺ			20				4 9 · · ·		•••	::		vv		
630	-	-					.	. j		•••	•••	••			000	<u>630.5</u> <u>37.0</u>
	629.0	38.5	5	10	14		. /								F	AN, SILTY SAND (A-2-4)
		L	5		14		4 24				•••	::		W	E	
625	-	F													F	
020	624.0	43.5														623 5 44 0
			2	100/0.5			<u> </u>		+		10	J/0.5●	F		Serra-	623.0 WEATHERED ROCK
	1	F													F	LAN, GRANILE
		t i														WEATHERED ROCK: GRANITE
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WBS	34497	1.1			TI	P	R-2	27070)		со		
SITE	DESCR		STR		RE #5	-	BRID	GE C		BUF	FAL	с	RE
BOR		56_E		31-B	<u>- 5</u> - т/				1/+2: •u o	3 1 1 fi			
		IMED EE			2472 (п 3	4.111	•		"
DRIL		ain I		_ 11-0	s	TZ			: 03	/2010	8		
FLEV	DRIVE		BLC	w col	JNT	Π			BLC	ows	PER F	=00	<u>т</u>
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft		0	2	25	:	50		7
660		-											
	-	-											
655	654.0						-				1		
000	- 004.9	- 1.0	1	2	1	11	4 3 ·						-
	652.4 -	<u> </u>	1	3	4		¥.	•••			.		-
650	649.9_	6.0	2	5	4		$\frac{1}{1}$				+-		-
	647.4	8.5	1	2	1		- 7 : - 1	, 	· ·	· · · ·	·	 	:
645	-	F					● 3 . ↓		· ·		·	•••	•
	6424-	-					· ·	· ·	: :	· ·	:	 	:
640		-	2	2	2	1	6 4]	••• •••	· ·	· · · ·	· ·	 	-
040	-	-					<u>.</u>				1:		-
	637.4	18.5	8	6	5		· '	· ·		::	.	· ·	-
635	-	-					• 1		· ·		·	· ·	•
	632.4 -	23.5	50	11/0.0				÷÷.	<u> </u>	<u> </u>	+:-		- -
630	-	E	59	41/0.3									-
	607.4 -						· · · ·	· ·	· ·	· ·	·	· ·	-
005	- 027.4	20.5	100/0.4				· ·	::		::	:		-
020	-	-									<u>.</u>		-
	622.4	33.5	85	15/0.1			•••	· · · ·	· ·	· · · ·	•	 	•
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GEOTECHNICAL BORING REPORT

BORE LOG



GEOTECHNICAL BORING REPORT BORE LOG

GEOLOGIST Goodnight, D. J. WBS 34497.1.1 **TIP** R-2707D COUNTY CLEVELAND GROUND WTR (ft) SITE DESCRIPTION STRUCTURE #5 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (RIGHT LANE) OFFSET 27 ft RT ALIGNMENT -L-**STATION** 848+45 BORING NO. S6_EBL_B1-A 0 HR. N/A COLLAR ELEV. 634.3 ft TOTAL DEPTH 19.4 ft **NORTHING** 557,286 EASTING 1,266,067 24 HR. N/A DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD Wash Boring HAMMER TYPE Automatic DRILLER Cain. J. **START DATE** 03/27/18 **COMP. DATE** 03/28/18 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft **BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION 0 (ft) 0.5ft 0.5ft 0.5ft 50 75 NO. 25 100 MOLG ELEV. (ft) DEPTH (fl 635 GROUND SURFACE 634.3 -634.3 0.1' BITUMINOUS CONCRETE 633.6 2 Sat. 4 - 8 **•**10 0.6' CONCRETE <u>631.8</u> <u>___</u> <u> - - - - -</u> -ALLUVIAL 630 TAN-BROWN, FINE TO COARSE SAND 629.3 5.0 (A-1-b) (W/ CASING ADVANCER SET 70 30/0.1 100/0.6 CASING TO 5') 625.3 TAN, GRANITE (W/ CASING ADVANCER _ 9.0 625 - - - -624.3 10.0 13 39 . . . 34 W _·__ ·__ ·_ 620 619.5 14.8 - -100/0.3 100/0.3 . 615 <u>614.9 19.4</u> °60/0.0€ Boring Terminated WITH STANDARD 60/0.0 PENETRATION TEST REFUSAL at Elevation 614.9 ft ON CRYSTALLINE ROCK: GRANITE AREA - D

	WBS	34497	.1.1				ТІ	Ρ	R	-27	07	D				СС	JUI	TN	Y
	SITE	DESCR	PTION	STR	UCTU	RE #	¥5	- 1	ЗR	DC	E (٥v	'ER	BL	JFI	=AL	0	CF	RE
	BOR	NG NO.	S6_E	BL_B1	-C		S	٢A	T	ON	8	48	+20)					-
	COLI	LAR ELE	EV. 64	0.6 ft			т	וכ	A	. D	EP'	τн	1	6.7	' ft				
	DRILL	. RIG/HAN	IMER EF	F./DATE	E HPC	247	3 (N	IE-5	50	85%	601	1/10	/201	8				_
	DRIL	LER C	ain, J .				S	r,	R	D	ΑΤ	Е	04	/02	/18	3			-
	ELEV	DRIVE	DEPTH	BLC	W CO	UNT							BLC	SW	S F	PER	FC	001	5
	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5	ift		0			25			5	0			7
	645	_	-																
		-																	
	640	-	-																
	040	639.6-	- 1.0	50	6	6					12	+							_
		637.1	3.5	6	7	7			:	Ĩ				:	:	· .	:	· ·	
	635		-	Ū		'			•	•	14			-	•		-		
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	620	- 032.1	0.5	10	16	5			:	:	: •	 2 1		:	:	·	:	· ·	
	030	-	-									ŗ							_
		627.1	13.5	6	18	6					· ·	1	· ·	:	:	·	:	 	
	625	-		Ũ					÷	÷	•••	9 2	4	÷	÷	<u> </u>			
		623.9	- 16.7	60/0.0					•	•			• •	•	•		-	• •	
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GEOTECHNICAL BORING REPORT

BORE LOG

CLEVELA	ND			GEOLOGIST	Goodnight	, D. J.		
EEK ON US	74 BET\	NEEN	SR 2	325 AND SR 223	8 (RIGHT	LANE)	GROUN	ID WTR (ft)
OFFSET 5	55 ft RT			ALIGNMENT	-L-		0 HR.	4.5
NORTHING	557,29	98		EASTING 1,20	66,031		24 HR.	FIAD
	DRILL M	ETHOD	H.S.	Augers		HAMME	R TYPE	Automatic
COMP. DAT	FE 04/0)2/18		SURFACE WA	TER DEPT	'H N/A	۱	
75 100	SAMP. NO.	MOI	L O G	SOIL ELEV. (ft)	. AND ROC	K DESC	RIPTION	DEPTH (ft)
		м		640.6 LOOSE TAN. F	SAND/HR I ALLI INE SAND	<u>BOULDE</u> JVIAL (A-3) W	<u>RS/RIP F</u>	RAP 0.0 CE
			0 0 0 0 0 0 0 0 0 0	MIC	A, LITTLE E		RS AND	
		м	• • • • • • • • • •		DEEO, 7 14D		GIVIVE	-
		Sat.						
			0000 00000	626.6				14.0
╞╧╧╡		w	977	625.5 TAN-E	RES BROWN, SI	DUAL LTY SA	ND (A-2-4	4) $\int_{-\frac{15.1}{10.7}}$
60/0.0	-		-	<u>623.9</u>	WEATHE TAN G		<u>ck</u>	16.7
			-	Boring	Terminated		- STANDAR	RD
			-	Elevati	on 623.9 ft	ON CR	STALLIN	IE
					RUCK	GRANII	E	
					ARE	:A - D		
			-					
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			-					

GEOTECHNICAL BORING REPORT BORF I OG

WBS	34497	.1.1			Т	IP F	R-270)7D			со	UNT	Y C	LEVE	ELA	ND			GEOLOGIST Goodnight, D	. J.
SITE	DESCR	PTION	I STR	UCTL	JRE #5	- BR	IDG	ΞO	VER	BUF	FAL	O CR	REEK	ON	US '	74 BET	WEEN	SR 2	325 AND SR 2238 (R <mark>I</mark> GHT LA	NE) GROUND WTR (f
BOR	NG NO.	S6_E	BL_B1	1-B	S	TAT	ON	848	3+32				OF	FSET	Γ7	6 ft RT			ALIGNMENT -L-	0 HR. Dr
COLI	AR ELE	V. 63	38.6 ft		Т	ΟΤΑΙ	_ DE	PTH	-1 34	4.5 ft			NO	rthi	NG	557,2	78		EASTING 1,266,017	24 HR. FIA
DRILL	RIG/HAM	MER EF	F./DAT	E HP	C2473	CME-	550 8	5% 0	1/10/2	2018			1			DRILL N	IETHO	D Wa	sh Boring	.MMER TYPE Automatic
DRIL	LER Ca	ain. J.			S	TAR	r da	TE	04/	02/1	8		со	MP. I		E 04/0	02/18		SURFACE WATER DEPTH	N/A
	DRIVE		BLC	ow co		Π			BLO	WSF	PERI	FOOT	-			SAMP.		1-1		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25	5	Ę	50		75	1	00	NO.				DESCRIPTION
	(7																			
640																				
040	638.6 -	- 00																	- 638.6 GROUND SU	JRFACE
		-	WOH	1	2	• 3	::	:	::	::	1		:	::	:		М	0000	ALLUVI TAN FINE SAND (A-	AL 3) WITH TRACE
635	635.1	3.5				<u>i</u>	••	•	•••	•••				•••	•			000		
	-	-	5	4	2	•	6	•	• •	•••	.			•••	•		Sat.	000	SAND (A-1-b) WITH LIT	FINE TO COARSE TLE GRAVEL AND
	-	-				1	•••	-	• •		:	· · ·	.	•••	-			000	TRACE ORC	GANICS
630	-	-				-[-	 		·				-				-	
	628.2	10.4	1	2	1	<i>†</i> .	•••	:	••• •••	· · · ·		· · ·		••• •••	:			000		
	-	-	'		'	● 3 •	•••	:	· · · ·	· ·	1	 		· · · ·	:		Sat.			
525	-	-				+					1.		+ :					000	<u>-</u>	
	623.2	15.4	1	2	2			-	• •	•••					-		Sat.		_ <u>623.2</u>	AL
320	-	-				ľ	••••		•••	•••	.	· · ·	.	•••				-	TAN, SILTY SAND (A-2 MICA	2-4) WITH LITTLE
520	610.0	-									1:		1.					-	- 618.4	20
	617.8	<u>- 20.8</u>	100/0.2			.		-7	- - -		17			100/0	2.2					
615	-	-	60/0.0	1			•••	•	•••	•••	·		•					Post.	_ CRYSTALLIN	EROCK
	-	-				.	•••	•	• •	•••	.			• •	·				LIGHT GRAY,	GRANITE
	-	-				:		-	• •		:				-			×		
610	_	-						-					·		-			Ø	-	
	-	-				:	•••	:	•••	· ·		 		••• •••	:					
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605	-	-						-			-				-				604.1	34
		-													-			F	Boring Terminated at E	levation 604.1 ft IN
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WBS	34497.	1.1			TIP	R-270	7D	C	OUNT	ΥC	LEVELA	ND		GEOLOGIST Goodnigh	t, D. J.		
SITE	DESCRIF	PTION	STRI	JCTURE	#5 - B	RIDGE	OVER E	UFFA	LO CF	REE	(ON US	74 BETWEEN	SR 23	325 AND SR 2238 (RIGHT	LANE)	GROUN	ND WTR (ft)
BORI	ng no.	S6_EI	BL_B1	-В	STAT	ION	848+32			OF	FSET 7	'6 ft RT		ALIGNMENT -L-		0 HR.	Dry
COLL	AR ELE	V . 63	8.6 ft		тот	AL DE	PTH 34.	5 ft			RTHING	557,278		EASTING 1,266,017		24 HR.	FIAD
DRILL	rig/hamn	IER EF	F./DATE	HPC247	73 CME	-550 85	6% 01/10/20)18				DRILL METHOD) Was	h Boring	HAMME	ER TYPE	Automatic
DRILI	L ER Ca	in, J.			STAF	RT DA	TE 04/0	2/18		cc	MP. DAT	E 04/02/18		SURFACE WATER DEP	TH N/A	4	
CORE	SIZE N	NQ2			TOT	AL RUI	N 13.7 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (f	t)	D	ESCRIPTION AND REMARK	S		DEPTH (ft)
617.76		00.0												Begin Coring @ 20.8 ft			
615	01/.0 +	20.8	3.7	1:13/1.0 1:11/1.0	(3.7)	(3.6) 97%		(13.6) 99%	(13.5) 99%	1. Contraction of the second s	- 617.8 -	VERY SLIG	HT WE	CRYSTALLINE ROCK EATHERING TO FRESH, HAI	RD TO V	ERY HAF	20.8 RD,
015	614.1	24.5	5.0	1:05/1.0 <u>1:20/0.7</u>	(1.0)	(4.0)					₽ ₽	LIGHT GR	AY, GF	RANITE WITH MODERATEL FRACTURE SPACING	Y CLOSE	E TO WIE	θE
	‡		5.0	1:17/1.0 1:21/1.0	98%	(4.9) 98%					+						
610	609 1	29.5		1:48/1.0							 -						
		2010	5.0	1:48/1.0	(5.0)	(5.0)					-						
605	ŧ			1:45/1.0		100 /0					F						
	604.1	34.5		1:50/1.0						SZ.	604.1	Boring Ter	minate	ed at Elevation 604.1 ft IN CR	YSTALLI		34.5
	Ŧ										-	g		GRANITE			
	Ŧ										-			AREA - D			
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GEOTECHNICAL BORING REPORT CORE LOG







GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.1 **TIP** R-2707D COUNTY CLEVELAND GEOLOGIST Goodnight, D. J. SITE DESCRIPTION STRUCTURE #5 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (RIGHT LANE) **GROUND WTR (ft)** OFFSET 14 ft RT ALIGNMENT -L-BORING NO. S6_EBL_B2-A **STATION** 849+82 0 HR. 6.0 COLLAR ELEV 647.8 ft TOTAL DEPTH 12.0 ft **NORTHING** 557,172 EASTING 1,266,136 24 HR. 5.5 DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILLER Cain. J. START DATE 03/22/18 **COMP. DATE** 03/22/18 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft **BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION 0 0.5ft 0.5ft 0.5ft 50 75 25 100 NO. MOLIG ELEV. (ft) DEPTH (f 650 GROUND SURFACE 647.8 0.6' TOPSOIL 646.8 -- 1.0 - woнwoн - - - -. Μ ALLUVIAL 645 TAN-BROWN AND GRAY, FINE SANDY 644 3 SILT (A-4) WITH TRACE ORGANICS, LITTLE MICA, AND INTERMITTENT LENSES OF SAND woн|woн . . . - - - -. ▼ . . 641.8 60 WOH М - - - -. 640 639.3 + 8.5 638.8 WOH 25 75/0.3 _. _. <u>.</u> . · _ · _ · _ · 47 TAN, GRANITE · · · . . . 100/0.8 635.8 635.8 12.0 12.0 60/0.0 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 635.8 ft ON CRYSTALLINE ROCK: GRANITE AREA - D

WBS	3 34497	.1.1			٦	FIP	R-2	707D			со	UNT
SITE	DESCR	IPTION	STR	UCTUI	RE #	5 -	BRID	GE O	VEF	R BUF	FAL	O CR
BOR	ING NO.	S6_E	BL_B2	2-C		ST.		84	9+7	6		
COL	LAR ELE	EV. 64	7.9 ft		1	го	TAL C	EPT	ΗÝ	13.4 ft		
DRIL	L RIG/HAN	IMER EF	F./DATI	E HPC	2473	CI	ME-550	85% ()1/10)/2018		
DRIL	LER C	ain, J.			5	ST.	ART D	ATE	03	3/23/1	8	
ELEV		DEPTH	BLC	w co	UNT				BL	owsi	PER I	FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5f	:	0	2	5	į	50	
650		L.										
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010	644.4	- <u>3.5</u>	1	2	2	-	. .				1.	
	641.9	6.0	1	1	1	_	T :		•	•••		· · ·
640	639.4	8.5					9 ² ·	• •	•	· · ·	·	· · ·
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635		†							•	· · ·		
	634.5	<u>- 13.4</u>	60/0.0			╈			•			<u> </u>
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GEOTECHNICAL BORING REPORT

BORE LOG



GEOTECHNICAL BORING REPORT RORE I OG

WBS	34497.1.1			TI	P R-2707	D	COUNTY	Y CLE	EVELA	ND			GEOLOGIST Goodnight, I	D. J.	
SITE	DESCRIPTION	STR	UCTU	RE #5	- BRIDGE (OVER BUF	FALO CR	EEK C	N US	74 BET\	NEEN	SR 2	325 AND SR 2238 (RIGHT LA	ANE) GROU	ND WTR (ft)
BOR	NG NO. S6_EI	BL_B2	-В	S	FATION 8	49+73		OFFS	SET 6	9 ft RT			ALIGNMENT -L-	0 HR.	4.9
COLL	AR ELEV. 64	7.6 ft		т	DTAL DEP	FH 25.0 ft		NORT	FHING	557,15	52		EASTING 1,266,080	24 HR.	3.3
DRILL	RIG/HAMMER EF	F./DATE	E HPC	2473 0	CME-550 85%	01/10/2018				DRILL M	ETHOD) H.S	Augers H	AMMER TYPE	Automatic
DRILI	LER Cain, J.	1		S		E 03/23/18	3	COM	P. DAT	TE 03/2	23/18	1	SURFACE WATER DEPTH	N/A	
ELEV (ft)	DRIVE ELEV (ft)	BLO 0.5ft	W COU 0.5ft	UNT 0.5ft	0	BLOWS F 25 5	PER FOOT	75	100	SAMP. NO	MOI	L O G	SOIL AND ROCK	DESCRIPTIO	N DEPTH (1
645 645 635 630 625		2 WOH 2 3 5 60/0.0	2 WOH 2 4								W M M		§47.6 GROUND S 644.6 TAN-BROWN, SAND 642.1 GRAY-TAN, FINE SA (A-7) WITH TRAC (A-2) 633.6 TAN AND GRAY, S 633.6 TAN, SILTY SAND (A 632.8 WEATHERE TAN, GRAY TAN, GRAY, S 622.6 CRYSTALLI 622.6 Boring Terminated at I 622.6 AREA	URFACE SOIL IAL Y SILT (A-4) V F SAND NDY SILTY C E ROOTLET: CY SILTY SA 5) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 5) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 5) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 5) ILTY FINE SA 5) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 5) ILTY FINE SA 5) ILTY FINE SA 4) ILTY FINE SA 4) ILTY FINE SA 5) ILTY FINE SA 5) 1) 1) 1) 1) 1) 1) 1) 1) 1) 1	NITH
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COUNTY WBS 34497.1.1 TIP R-2707D SITE DESCRIPTION STRUCTURE #5 - BRIDGE OVER BUFFALO CRE BORING NO. S6_EBL_B2-B **STATION** 849+73 COLLAR ELEV. 647.6 ft TOTAL DEPTH 25.0 ft DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILLER Cain, J. **START DATE** 03/23/18 CORE SIZE N/A TOTAL RUN 10.0 ft RUN SAMP. STRATA REC. RQD SAMP. REC. RQD (ft) (ft) NO. (ft) (ft) (ft) % % % % % ELEV RUN ELEV (ft) (ft) (ft) DRILL RATE (Min/ft) 632.55 3:05/1.0 (4.9) (4.6) 3:09/1.0 98% 92% 3:41/1.0 4:41/1.0 632.6 - 15.0 (9.9) (9.6) 99% 96% 5.0 630 4:41/1.0 2:49/1.0 1:46/1.0 (5.0) (5.0) 2:05/1.0 100% 100% 2:33/1.0 2:38/1.0 3:16/1.0 627.6 - 20.0 5.0 625 622.6 + 25.0

SHEET 25

GEOTECHNICAL BORING REPORT CORE LOG

CLEVELA	ND	GEOLOGIST Goodnight	t, D. J.		
EEK ON US	74 BETWEEN SR 23	325 AND SR 2238 (RIGHT	LANE)	GROUN	D WTR (ft)
OFFSET	39 ft RT	ALIGNMENT -L-		0 HR.	4.9
NORTHING	557,152	EASTING 1,266,080		24 HR.	3.3
	DRILL METHOD H.S.	Augers	НАММЕ	R TYPE	Automatic
COMP. DA	TE 03/23/18	SURFACE WATER DEP	TH N/A	4	
	DI	ESCRIPTION AND REMARK	s		

G		ELEV. (ft)		DEPTH (ft)
			Pagin Caring @ 15.0 ft	
	Ŀ			
	L		VERY SLIGHT WEATHERING TO FRESH, HARD TO VERY HARD.	
F.	⊢		LIGHT GRAY, GRANITE WITH MOD. CLOSE TO WIDE FRACTURE	
	Ľ		SPACING.	
	Ľ			
	F			
	-			
P.	Ľ	622 6		25.0
	F		Boring Terminated at Elevation 622.6 ft IN CRYSTALLINE ROCK:	20.0
	⊦		GRANITE	
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PHONE: 919.871.0800

GEOTECHNICAL BORING REPORT BORE LOG

COUNTY CLEVELAND GEOLOGIST Goodnight, D. J. WBS 34497.1.1 **TIP** R-2707D SITE DESCRIPTION STRUCTURE #5 - BRIDGE OVER BUFFALO CREEK ON US 74 BETWEEN SR 2325 AND SR 2238 (RIGHT LANE) GROUND WTR (ft) ALIGNMENT -L-**STATION** 850+52 OFFSET 13 ft RT BORING NO. S6_EBL_EB2-A 0 HR. Dry COLLAR ELEV 667.8 ft TOTAL DEPTH 23.4 ft **NORTHING** 557,103 EASTING 1,266,163 24 HR. FIAD DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD H.S. Augers HAMMER TYPE Automatic COMP. DATE 02/16/18 DRILLER Cain, J. **START DATE** 02/16/18 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft SAMP. **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION 0 0.5ft 0.5ft 0.5ft 50 75 NO. 25 100 MOI G ELEV. (ft) DEPTH (f 670 0.4' TOPSOIL 667.8 ROADWAY EMBANKMENT TAN, SILTY SAND (A-2-4) WITH TRACE 666.8 1.0 -<u>664.8</u> -<u>662.3</u> - - -. . . . - -6 М 665 GRAVEL → GRAVEL TAN AND GRAY, SANDY CLAY (A-6) WITH LITTLE GRAVEL TAN, SILTY SAND (A-2-4) WITH TRACE 664.3 М 661.8 60 2 М 2 2 - - - -. 660 TO LITTLE GRÁVEL 659.3 8.5 WOH 1 М . · · · - -655 654.3 13.5 2 2 М •3 . 649.8 645.8 644.4 650 <u>18.0</u> 649.3 18.5 TAN, SANDY SILTY CLAY (A-7) WITH - -W **•**2 LITTLE GRAVEL 1 ·_|_- _ - - - -└└┴┶ 22. 645 WEATHERED ROCK 644.4 + 23.4 23.4 TAN, GRANITE -60/0.0^d 60/0.0 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 644.4 ft ON CRYSTALLINE ROCK: GRANITE AREA - D

WBS	34497	.1.1				TI	Ρ	R-2	7070)		c	OU		Y
SITE	DESCR	PTION	STR	UCTU	RE	#5	-	BRID	GE C	VEF	R BU	FFA	LO	CF	R
BOR	NG NO.	S6_E	BL_EE	32-C		S	r/	ATION	I 85	i0+5	2				
COLL	AR ELE	EV. 66	7.7 ft			т	5	TAL D	EPT	H 2	22.8	ft			Γ
DRILL	RIG/HAN	IMER EF	F./DATE	E HPC	247	3 0	CN	/IE-550	85%	01/10)/2018	3			
DRIL	LER C	ain, J .				S	Γ/	ART D	ATE	03	3/28/	18			Γ
ELEV	DRIVE FLEV	DEPTH	BLC	w co	UNT	Г				BL	ows	PEF	R FC	00	Г
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.9	5ft		0	2	5		50			7
670		-													
	-	-													
0.05	666.7 -	- 1.0	10	9	6	3		· · · ·		.	· · ·	· ·	•••		
665	664.2	3.5	2		L,	<u>, </u>		· /·							
	- 661 7	60	3	3		>		• 6		·	· · ·	. .	•••	• •	
660			4	2	2	2		4 4 ·	•••	-					
	659.2	8.5	11	3	3	3		\. ●6.	•••		· · ·	.	•••	• •	
	-	F						Ĩ				. .			•
655	654.2	 13.5								-		·			
	-	-	4	2	2	2		∮ 4 .	•••			. .	•••		•
650	-	F							· ·	•	· · ·	•	· ·	•••	
	649.2	18.5	1	2		ŀ		1.		-					
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645	645.0	22.7	60/0 1												
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GEOTECHNICAL BORING REPORT

BORE LOG

CLEVELA	ND			GEOLOGIST Goodnight	, D. J.		
EEK ON US	74 BET\	VEEN	SR 2	325 AND SR 2238 (RIGHT	LANE)	GROUND V	VTR (ft)
OFFSET 3	9 ft RT			ALIGNMENT -L-		0 HR.	Dry
NORTHING	557,09	92		EASTING 1,266,140		24 HR.	FIAD
	DRILL M	ETHOD	H.S	. Augers	HAMME	R TYPE Aut	omatic
COMP. DAT	E 03/2	28/18		SURFACE WATER DEPT	H N/A	<u>م</u>	
	SAMP.	▼/	L				
75 100	NO.	MOL	O G	SOIL AND ROC	K DESC	RIPTION	DEPTH (ff)
		/					<u> </u>
				-			
			-	667.7 GROUND	US CON		0.0
		М		0.5' AGGREGAT	E BASE	COURSE	
		м		GRAY AND TAN, S	SILTY S	AND (A-2-4)	
			LF	WITH TRACE G	RAVEL	AND MICA	
····		M		-			
		М					
				<u>_655.7</u>			<u> </u>
			-	- ALLI GRAY AND TAN, C	UVIAL LAYEY	SILTY SAND	
		М	-	(A-2-5) WITH	TRACE	WOOD	
			\sim	650.7 RES			<u> </u>
		М		RED-TAN, SILTY C		SAND (A-2-6)	
			/./.				21.5
			ШĄ.	645.0 WEATHE	RED RO	CK	$\frac{22.7}{1}$
			-	CRYSTAL	LINE RC	оск	-1
				Boring Terminated	WITH	= STANDARD	
				 PENETRATION ⁻ Flevation 644 9 ft IN (TEST RE	EFUSAL at	ζ.
				GRA	ANITE		
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GEOTECHNICAL BORING REPORT BORE LOG

WBS	34497	.1.1			ТІ	P R-2	707D		COUN	ΤΥ (CLEVELA	ND			GEOLOGIST Goodnight.	D. J.		
SITE	DESCR	IPTION	STR	UCTU	RE #5	- BRID	GE OV	/ER BUI	FFALO ((ON US	74 BET\	NEEN	SR 2	2325 AND SR 2238 (RIGHT I	LANE) G	ROUN	D WTR (ft)
BOR	ing no.	S6 E	BL EE	32-B	S		850	+54		OF	FSET 8	3 ft RT			ALIGNMENT -L-	(0 HR.	11.1
COL		EV. 65	 3.8 ft		т		EPTH	15.9	ft		RTHING	557.07	73		EASTING 1.266.100	2	4 HR.	7.5
DRILI	RIG/HAN		F /DATI	F HPC	2473 (CME-550	85% 0	1/10/2018	}	1			FTHOR) Н 9	Augers		TYPE	Automatic
DRI	IFR C	ain .l			s			03/23/	, 18	00		F 03/2	23/18					
ELEV	DRIVE	DEPTH	BLC	W CO			25	BLOWS	PER FO	OT 75	100	SAMP.	<u> </u>	L O	SOIL AND ROCK	K DESCRI	IPTION	
655	(ft)		0.5ft	0.5ft	0.5ft				<u></u>	/5	100	NO.	<u>/ MOI</u>	G	ELEV. (ft) 653.8 0.4' TC			DEPTH (ft) 0.0
650	652.8 - - - 650.3 - - - - 647.8 -	- 1.0 	1 4 21	2 11 17	2 28 13	4	· · · · · · · · · · · · · · · · · · ·	39.	· · · · · · · · · · · · · · · · · · ·				M M		TAN-BROWN, SILTY <u>650.8</u> TRACI RESI TAN, SILTY SAND ((A-2-4) SA	A-2-4) ₩ 	/ITH <u></u>
645	645.3	8.5 	100/0.2			· · · · · · · · · · · · · · · · · · ·	 		· · · · · · · · · · · · · · · · · · ·						<u>645.8</u> WEATHEF TAN, G 	red roc ł Ranite	к	<u>8.0</u>
			100/0.2												637.9 Boring Terminated PENETRATION T Elevation 637.9 ft (ROCK: C ARE	WITH ST TEST REF ON CRYS GRANITE A - D	ANDAF USAL a	15.9 At E

CONTENTS

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2707D

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REFERENCE

ET NO. **DESCRIPTION** TITLE SHEET LEGEND SITE PLAN PROFILE CROSS SECTIONS BORE LOGS, CORE LOGS AND CORE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURE #1 - BRIDGE OVER US 74 BYPASS ON SR 2067 (FAIRVIEW RD.) BETWEEN SR 2052 (ELIZABETH AVENUE) AND NC 150 (CHERRYVILLE RD.)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	12

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE 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 DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJERACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 CONDENSION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES.

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

PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY <u>*HILL, M.J.*</u>

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY ______ FALCON ENG.

DATE APRIL 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	CDARATION		
		RUCK DESCRIPTION	IERMS AND DEFINITIONS
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	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	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	<u>AQUIFER</u> - 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.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFE GRAY SHITY CLAY MOIST WITH INTERREDDED FINE SAND LAYERS HIGHLY PLASTICA-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TIPICALLY DIVIDED AS FULLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
SOUL FORM AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR)	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE AROVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ODCANIC MATERIAL	MINERALOGICAL COMPOSITION	CRYCTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35%, PASSING * 200) (> 35%, PASSING * 200) UKGANIL MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THET ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
ULASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-76 A-7 poooddooodd		ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPF.
SYMBOL COOOGCOOCC	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
X PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MUCK,		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 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	RUCKS OR LUIS MASSIVE RUCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 3% 3 5% TRACE 1 10% LITTLE ORGANIC MATTER 3 5% 5 12% 1111E 10 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
PASSING *40	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LLITTLE OR HIGHLY	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
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	EISCLE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED RADALLEL DLANES
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING FEFETTS IN	FIGAT - BOCK ERACMENTS ON SUPERCE NEAR THEIR ORIGINAL POSITION AND DISLODGED EROM
	∇ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(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		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	CONTRACT STRING OR SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS ALL FELOSPARS DUIL	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.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENEIRATION RESISTENCE COMPRESSIVE STRENGTH (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	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CENEDALLY VERY LOOSE < 4		(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENES 10 TO 20		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED WOULD YTELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-CORESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	I INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF RUCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED. WOULD YIELD SPT N VALUES < 100 BPF	UF AN INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES./ SUL - SUL FORMED IN PLACE BY THE WEATHERING OF RUCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF
(LUHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	RULK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
UIS STD SIEVE SIZE 4 10 40 60 200 270	IXX UNDERCUT IVICLASSIFIED EXCAVATION - IXX UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	CALL EXCAVATION CONTROL INSUITABLE WASTE	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
	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE SD.) (E.SD.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
CPAIN MM 205 75 2.0 0.25 0.05 0.06		HARD EXCAVATED BY HARD BLUW OF A GEULUGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR RPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOU MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE SCALE FIELD MOISTURE SOUTH FERING	CSE COARSE ORG ORGANIC	יטוייו ער א טבערעטנזי ז רוגא. קרד - ראא גד הארער היא גד הארער הא גד בערגעגדבה זא בסאראבאיז פ	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MUISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET. USUALLY	UP1 - UTNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE C - WET - (W) SEMISOLIDE REQUIRES DRYING TO	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-149 N: 573599.52 F: 1259358.58
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	
- MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 15 - 4 FEET	ELEVATION:884.28 FEET
UM UPTIMUM MUISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL WATER TO		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
ATTAIN OPTIMUM MOISTURE	CME-55	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	X 8' HOLLOW AUGERS	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM		CONTRECTOR OF AN ACTION TO THE AND TO THE ATTENT OF A	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS LAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBF:	
		INDUKATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE CULUR UK CULUR CUMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPFARANCE.		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

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GEOTECHNICAL BORING REPORT BORE LOG

1	NBS 34497.1.F56 TIP R-2707D COUNTY CLEVELAND GEOLOGIST Goodnight, D. J.										WBS 34497.1.F56 TIP R-2707D							COUN									
SITE DESCRIPTION US 74 - SHELBY BYPASS								GROUND WTF				「R (ft)	SITE DESCRIPTION US 74 - SHELBY BYPASS														
BORING NO. S1_EB1-A STATION 18+84 OFFSET								FFSET 21 ft LT			ALI	ALIGNMENT -Y1-(D)		0 HR. Dry		BORING NO. S1_EB1-B					ST	STATION 18+72					
COLLAR ELEV. 882.7 ft TOTAL DEPTH 39.9 ft NORTHING								r HING 573,686			EAS	EASTING 1,259,464		24 HR.	FIAD	COLLAR ELEV. 881.6 ft			TOTAL DEPTH 42.0 ft								
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015 I										DRILL METHOD H.S. Augers HAP			HAMN	IER TYPE Autor	R TYPE Automatic DR				DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015								
DRILLER Cain, J. START DATE 02/09/18 COMP. DAT								ATE 02/09/18 :			SUF	SURFACE WATER DEPTH N/A			DRILLER Cain, J.					ST	ART DATE	E 02/09/ [.]	18				
E	LEV	DRIVE	DEPTH	BLC	w co	JNT		BLOWS	PER FOO	Т	SAMP				SOIL AN		CRIPTION		ELEV	, DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FO
	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	/мо	n G	ELEV.	(ft)	BROOKBEC	DE	PTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5	50
	JRIL LEV (ft) 385 386 377 365 365 365 365 365 365 365 365 365 365 365 365 365 365	ER C DRIVE ELEV (ft) 8881.7 879.2 879.2 874.2 874.2 869.2 869.2 869.2 869.2 869.2 869.2 869.2 869.2 859.2 849.2 849.2 849.2 849.2 849.2 849.2 849.2 849.2 849.2 849.2	ain, J. DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5 23.5 28.5 33.5 38.5 39.9	BLC 0.5ft 2 6 4 4 4 4 3 6 6 3 100/0.2 60/0.0	0.5ft 0.5ft 3 10 5 6 6 5 4 9 3 3	S JNT 0.5ft 7 10 4 5 6 8 7 9 4	0 • <t< td=""><td>E 02/09/1 BLOWS 25 20 20 20 20 20 20 20 20 20 20 20 20 20</td><td>18 PER FOO 50 </td><td>COMP. D/ T 75 100</td><td></td><td>/09/18 MO M M M M M M M M</td><td></td><td></td><td>TAN, SANDY TAN, SANDY</td><td>C.5' TOPSOI RESIDUAL D, SANDY SI D, SILTY SAN MICA AND TR. FRAGMENT SILTY SAND SILTY SAND SILTY SAND NDY SILT (A-4) WI SILTY SAND</td><td>/A SCRIPTION DE L LTY CLAY (A-7), ID (A-2-4) WITH ACE ROCK S TH SOME MICA (A-2-4) (</td><td><u>PTH (ft)</u> <u>0.0</u> 3.0 3.0 22.0 27.0 32.0 37.0 39.9</td><td>DRII ELEV(ff) 8885 880 875 870 865 860 855 860 855 860 855 860 845 840</td><td>LER (DRIVE ELEV (ft) 8880.6 878.1 873.1 875.6 873.1 868.1 863.1 858.1 858.1 858.1 858.1 858.1 858.1 848.1</td><td>Cain, J. DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5 23.5 28.5 33.5 33.5 42.0</td><td>BLC 0.5ft 0.5ft 4 5 5 5 5 5 5 5 5 5 5 5 5 5 6 5 25 60/0.0</td><td>0.5ft 0.5ft 2 7 5 6 4 4 8 75/0.2 75/0.2</td><td>UNT 0.5ft 2 9 7 7 7 6 5 8 7 7</td><td>ART DATE 0 2 •4 •4 • 16 • 12 • 13 • 14 • 13 • 15 • 16 • 16 • 17 • 16 • 17 • 16 • 17 • 17 • 18 • 19 • 19 • 19 • 10 • 10 • 11 • 11 •</td><td>E 02/09/ BLOWS 5</td><td>18 PER FO 50 </td></t<>	E 02/09/1 BLOWS 25 20 20 20 20 20 20 20 20 20 20 20 20 20	18 PER FOO 50 	COMP. D/ T 75 100		/09/18 MO M M M M M M M M			TAN, SANDY	C.5' TOPSOI RESIDUAL D, SANDY SI D, SILTY SAN MICA AND TR. FRAGMENT SILTY SAND SILTY SAND SILTY SAND NDY SILT (A-4) WI SILTY SAND	/A SCRIPTION DE L LTY CLAY (A-7), ID (A-2-4) WITH ACE ROCK S TH SOME MICA (A-2-4) (<u>PTH (ft)</u> <u>0.0</u> 3.0 3.0 22.0 27.0 32.0 37.0 39.9	DRII ELEV(ff) 8885 880 875 870 865 860 855 860 855 860 855 860 845 840	LER (DRIVE ELEV (ft) 8880.6 878.1 873.1 875.6 873.1 868.1 863.1 858.1 858.1 858.1 858.1 858.1 858.1 848.1	Cain, J. DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5 23.5 28.5 33.5 33.5 42.0	BLC 0.5ft 0.5ft 4 5 5 5 5 5 5 5 5 5 5 5 5 5 6 5 25 60/0.0	0.5ft 0.5ft 2 7 5 6 4 4 8 75/0.2 75/0.2	UNT 0.5ft 2 9 7 7 7 6 5 8 7 7	ART DATE 0 2 •4 •4 • 16 • 12 • 13 • 14 • 13 • 15 • 16 • 16 • 17 • 16 • 17 • 16 • 17 • 17 • 18 • 19 • 19 • 19 • 10 • 10 • 11 •	E 02/09/ BLOWS 5	18 PER FO 50
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NT	Y CLEVELA	AND			GEOI	OGIS	T Goodnig	ght, D. J.		
									GROUN	ID WTR (ft)
	OFFSET 2	1 ft RT			ALIG	NMEN	IT -Y1- (D)		0 HR.	Dry
	NORTHING	573,7	29		EAST	ING	1,259,467		24 HR.	FIAD
		DRILL M	ETHO	D H.S	6. Augers	;		HAMM	ER TYPE	Automatic
	COMP. DA	TE 02/0)9/18		SURF	ACE	WATER DE	EPTH N/	A	
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WBS	34497	197.1.F56 TIP R-2707D COUNTY CLEVELAND GEOLOGIST Goodnight, D. J.				WBS	3449	7.1.F5	6		TIP	P R-270)7D	COL	JNT	CLEVE	LAND	(GEOLOGIST Good	night, D. J	•																	
SITE	DESCR	RIPTIO	NUS	74 - S	HELB	Y BYF	PASS													GROUM	ND WTR (fi	SITE	DESC	RIPTIC	N US	574 - SH	IELBY	BYPAS	S	•							GROUN	D WTR (ft)
BOR	NG NO	. S1_E	31-A		S	ΤΑΤΙΟ	DN 19	9+88			OFFS	SET 2	21 ft LT			ALIGN	NMENT	' -Y1- (C	D)	0 HR.	28.5	BOR	NG NO	0 . S1_	B1-A		ST	ATION	19+88			OFFSET	21 ft LT		ALIGNMENT -Y1- (D)	0 HR.	28.5
COL	LAR EL	EV. 88	36.4 ft		т	OTAL	DEPT	FH 53	.0 ft		NOR	THING	5 73,6	76		EASTI	ING 1,	,259,362	2	24 HR.	FIAC	COLI	LAR E	LEV. 8	86.4 ft		то	DTAL DE	PTH 53.0	ft		NORTHIN	IG 573,676	1	EASTING 1,259,36	2	24 HR.	FIAD
DRIL	. RIG/HAN	MMER E	FF./DA1	TE H	PC2473	CME-	550 92	% 12/09	9/2015				DRILL M	ETHOD	H.S.	Augers			HAMI	MER TYPE	Automatic	DRILL	. RIG/HA	AMMER	EFF./DA	ATE HPC	C2473 (CME-550	92% 12/09/2	015			DRILL METHOD	H.S. /	Augers	HAMN	IER TYPE	Automatic
DRI	LER C	ain, J.			S	TART	DATE	E 02/C	06/18		СОМ	P. DA	TE 02/0	8/18	:	SURF	ACE W	ATER D	DEPTH N	I/A		DRIL	LER	Cain, J			ST	ART DA	TE 02/06/	18		COMP. D	ATE 02/08/18	5	SURFACE WATER	DEPTH N	/A	
ELEV	DRIVE ELEV	DEPTH	BLO	w co	UNT			BLOV	VS PE	R FOO	Т		SAMP.	▼∕	L O		SO	IL AND F		SCRIPTIO	N	COR	e size	E NQ2			то	TAL RU	N 9.9 ft									
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	2	5	50		75	100	NO.	∕моі	GΕ	LEV. (ft))				DEPTH (1	ELEV	RUN ELEV	DEPT		DRILL RATE	REC	RUN C. RQD	SAMP.	STRAT		L		DES		RKS		
																						(π)	(ft)	(11)	(π)	(Min/ft)) %) (π) 5 %	NU.	(n) (%	(ft) %	G ELEV.	(ft)					DEPTH (ft)
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	-	+													F			0	4 70000			840		+		1 15/1 (0 86%	% 61%	ģ	1% 7	1%			WEATH	ERING TO FRESH, HA	RD TO VE	RY HARD,	PINK
885	885.4	1.0		_					••	• • •	• • • •	• •				36.4		R	ESIDUAL	-	0	040	838.4	+ 48.0		1.42/1.0	ŏ						M	ODERA	TELY CLOSE FRACTU	RE SPACI	NG	
	882.9	35	4	5	6		• 11									33.4		ND RED, S	SANDY S	ILTY CLAY	(A-7) <u>3.</u>			+	5.0	0.56/0.9	9 (4.8 0 96%	8) (4.0) % 80%					*MORE WEAT	HERED	AND FRACTURED W		-RICH ZOI	NES
	-	- 0.0	3	5	5		10							М			RED	AND TA	N, SILTY	SAND (A-2	2-4)	835		+		4.28/1.0 5.11/1.0	0 0											
880	880.4	6.0	4	4	6		10				· · · ·			м									833.4	<u>+ 53.0</u> +		<u>6.24/1.0</u> 9.45/1.0	0 0				. a	833.4	Boring Terminat	ted WIT	H STANDARD PENET	RATION TE	ST REFUS	53.0 AL at
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870		+												* e * e 		<u>69.4</u> Т	TAN, SA	NDY SIL	T (A-4) W	ITH SOME	17. MICA			÷								E						
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ICAL BORING REPORT

CORE LOG





WBS	34497	.1.F56			Т	IP R-270	7D	COUNT	Y C		AND			GEOLOG	IST Goodnigl	ht, D. J.		
SITE	DESCR	IPTION	I US	74 - S	HELB	Y BYPAS	S							1			GROUN	D WTR (ft)
BOR	ing no.	S1_E	31-B		S	TATION	19+77		OFF	SET 2	21 ft RT			ALIGNME	NT -Y1- (D)		0 HR.	Dry
COLI	LAR ELE	V. 88	37.3 ft		Т	OTAL DEF	PTH 44.4 f	t	NO	RTHING	5 73,7	'03		EASTING	1,259,362		24 HR.	FIAD
DRILL	RIG/HAN	/MER E	FF./DA	TE HF	PC2473	6 CME-550 9	2% 12/09/20	15			DRILL N	NETHO	D H.S	S. Augers		HAMM	ER TYPE	Automatic
DRIL	LER C	ain, J.			S	TART DAT	E 02/06/1	8	CO	MP. DA	TE 02/	06/18		SURFACE	E WATER DEP	TH N/	A	
ELEV (ft)	DRIVE ELEV	DEPTH	BLC	W COL	JNT		BLOWS	PER FOOT	75	100	SAMP.		L O		SOIL AND ROO	CK DESC	CRIPTION	
. ,	(π)		0.51	0.51	0.511					100	NO.		G	ELEV. (ft)				DEPTH (ft)
890		-												-				
	886.3	-				· · · ·			· ·				Ļ	887.3	0.3' T			0.0
885			4	6	7	13.			·			м		- 884.3	ED AND BROWN	I, SAND	SILTY CL	.AY 3.0
	883.8 -	- 3.5 -	6	7	10		 7	· · · ·	.	· · ·		м	-	1	TAN AND RED, S		AYEY SAN	ID
880	881.3	6.0	5	5	6		· · · · · ·		.	· · · ·			-		AN, SILTY SAND	(A-2-5)	WITH LITT	LE 5.5
000	878.8 -	- 8.5	5	6	0	♥''' · ·\· ·			1.				-	-	Ν	/ICA		
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860	-	-							·					860.3		A 4) \A/IT		27.0
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800	853.8 -	- - 33.5				``			+:				-	-	TAN, SILTY	SAND (A-2-4)	52.0
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Ś	SITE	DESC	RIPTI	ON U	S 74 -	SHELI	BY B	BYPASS											GROUND WTR (ft)	SIT	E DESC	riptio	N US	74 - S	HELBY	BYPASS		
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REFERENCE

CONTENTS SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND 2 SITE PLAN 3 PROFILE 5-7 CROSS SECTIONS BORE LOGS, CORE LOGS, AND CORE PHOTOGRAPHS 8-12

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _CLEVELAND

PROJECT DESCRIPTION _US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURE #2 - BRIDGE ON ELIZABETH AVE. (-Y2-) OVER US 74 BYPASS (-L-) BETWEEN SR 2067 (FAIRVIEW RD.) AND SR 2047 (BORDERS RD.)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	12

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE 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 DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 CONDENSION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______ HUNSBERGER, W.S.

SUBMITTED BY ______ FALCON ENG.

DATE AUGUST 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
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 01586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PERETRATION BY A SPLIT SPON SAMPLER EQUAL TO OR LESS THAN 0.1 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPCOMIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) (> 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 IN
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6 A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT
7 PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SEDIMENTARY ROCK SANDS SEDIMENTARY ROCK SANDS SEDIMENTARY ROCK SANDS SHELL BEDS, ETC.
*40 30 MX 50 MX 51 MN *30 X 51 K V 25 KV		WEATHERING
Code 10 mx 20 mx 30 mx	URGANIL MATERIAL <u>SUILS</u> <u>UTHER MATERIAL</u> TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE DRGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CI (V SLI) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS LINDER H
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.
CROUP INDEX 0 0 0 0 4 MX 8 MX 12 MX 16 MX IND MX AMOUNTS OF USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROU (SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS SAND	∇ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR UNSUITABLE	·····································	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND N
PRIMARY SUIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH GENERALLY VERY LOOSE < 4	HUAUWAY EMBANKMENT (HE) WITH SOIL DESCRIPTION → OF ROCK STRUCTURES OF SPT SOIL SYMBOL → SOIL SYMBOL → SOIL SYMBOL → SOIL SYMBOL	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS A TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED SOIL BOUNDARY	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DECREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS, OLIGATZ MAY BE PRESENT AS DIKES OR STRINGERS
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053 BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY (0.DD.) (COB.) (CB.) SAND SAND (SL.) (CL.)	UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BU TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN 12 3 1 </td <td>ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED</td> <td>HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DI BY MODERATE BLOWS. MEDIUM CAN BE GRONVED OR GOUGED 4245 INCHES DEEP BY FIRM PRESSURE OF KNIFF D</td>	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DI BY MODERATE BLOWS. MEDIUM CAN BE GRONVED OR GOUGED 4245 INCHES DEEP BY FIRM PRESSURE OF KNIFF D
SOIL MOISTURE - CORRELATION OF TERMS	CLCLAY MODMODERATELY γ -UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m A}$ -DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD POINT OF A GEOLOGIST'S PICK.
SOIL MOISTURE SCALE FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
- SATURATED - USUALLY LUUID; YERY WEI, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE PLASTIC	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE - FOSS, - FOSSLIFEROUS SLI SLIGHTLY RS - ROCK - FOSSLIFEROUS SLI SLIGHTLY RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH FINGERNALL.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRACS FRACHDRES THE THEORE AFTER AND A THE RECOMPACIED THATHE	FRACTURE SPACING BEDDING
" PLL _ PLASTIC LIMIT		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED
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	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1 CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.0
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 G' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINK LESS INHINE IN FEEL HILKET LAMINATED 4.00 THINKY LAMINATED
PLASTICITY		INDURATION
PLASTICITY INDEX (PI) DRY_STRENGTH NON_PLASTIC Ø-5 VERY_LOW SLIGHTLY_PLASTIC 6-15 STICHT	X CME-5500X HARD FACED FINCER BITS VANE SHEAR TEST TUNGCARBIDE INSERTS	FUR SEUMENIARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; CENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE W/ ADVANCER POST HOLE DIGGER HAND AUGER TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.

PROJECT REFERENCE NO.

2



D. AN INFERRED SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60 IS OFTEN	ADUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEDUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALES LATE, ETC. <u>A NOTABLE PROPORTION OF CLAY</u> IN THEIR COMPOSITION, SUCH AS SHALES LATE, ETC. <u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT CLUDES GRANITE.	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
L PLAIN IF TESTED.	<u>CALCAREOUS (CALC.)</u> - SOLS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF CHORE
MAY NOT YIELD TONE, CEMENTED	OF SUCE. <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	$\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO _ FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
BLOWS. S. IN Y BOCK HAS	<u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM DADRIM MATERIAL
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIFT D.
DSS OF STRENGTH WHEN STRUCK. VIDENT BUT	<u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
RE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
E DISCERNIBLE STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR ALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES)SOUL - SOUL FORMED IN PLACE BY THE WEATHERING OF ROCK
IN SMALL AND . SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
OWS REQUIRED	<u>SILL</u> - 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.
EP CAN BE ETACHED	$\underline{\rm SLICKENSIDE}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
R PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS T. SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH ED READILY BY	<u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO ON GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
THICKNESS	BENCH MARK: BL-152
4 FEET 5 - 4 FEET	N: 571156.9, E: 1259127.9 ELEVATION: 900.20 FEET
6 - 1.5 FEET	NOTES:
8 - 0.03 FEET 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	
:	DATE: 8-15-14





100	200	PROJECT	REFER	ENCE N	O. SHE	ET NO.
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GEOTECHNICAL BORING REPORT BORE LOG

WB	S 3449	97.1.1			TI	P R-2707D	со	UNTY (CLEVEL	AND			GEOLO	OGIST Goodnig	ht, D. J.		WBS	3 34497	7.1.1			TIF	R -2707	νD	COUNTY
SIT	E DESC	RIPTION	I STF	ΝΟΟΤΙ	JRE #	2 - BRIDGE (ON ELIZABE	TH AVE	E. (-Y2-) C	OVER U	S 74 B	SYPA	ASS (-L-)			GROUND WTR (ft)	SITE	DESCR		N STF	ΝΟΟΤΙ	JRE #2	- BRIDG	E ON ELIZ	ABETH A
BO	RING NO) . S2_E	EB1-A		S	TATION 194	+15	OF	FFSET 2	21 ft LT			ALIGN	MENT -Y2- (D)		0 HR. 48.8	BOR	ING NO.	. S2_F	EB1-B		ST	ATION 1	9+28	
CO	LAR E	.EV. 89	91.9 ft		Т	OTAL DEPTH	H 61.5 ft	NC	ORTHING	5 571,0)39		EASTI	NG 1,259,277		24 HR. Dry	COL	LAR ELE	EV. 89	92.7 ft		то	TAL DEP	TH 53.5 f	t
DRI	L RIG/H	AMMER E	FF./DA	TE HF	PC2473	CME-550 85%	01/10/2018			DRILL N	NETHO	DH	.S. Augers		HAMME	ER TYPE Automatic	DRIL	L RIG/HAI	MMER E	FF./DA	TE HF	PC2473	CME-550 8	5% 01/10/201	18
DRI	LLER	Cain, J.			S	TART DATE	02/01/18	cc	OMP. DA	TE 02/	01/18		SURFA	CE WATER DEP	TH N//	٩	DRIL	LER C	ain, J.	_		ST	ART DAT	E 02/01/1	18
ELE	/ DRIVE		BLC	w cou	JNT		BLOWS PER F	TOOT		SAMP.	▼∕	L		SOIL AND RO	CK DESC	RIPTION	ELEV	DRIVE ELEV	DEPTH	BLC	W COL	JNT	-	BLOWS	PER FOOT
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0 25	5 50	75	100	NO.	И	G	ELEV. (ft)			DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50 7
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		+	4	5	6] • 11 [· · · · ·				М		- r 886.4	KED AND TAN, CLA	ATET SAN	5.5		- 886.7 -	6.0					8	
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GEOTECHNICAL BORING REPORT BORE LOG

WBS	34497	.1.1			TI	P R-2707	D	COUNT	Y CLEVE	LAND			GEOLOGIST Goodnight, D. J.	
SITE	DESCR	IPTION	I STF	RUCTI	JRE #	2 - BRIDGE	E ON ELIZ	ABETH A	VE. (-Y2-)	OVER U	IS 74 E	BYPA	SS (-L-)	GROUND WTR (ft)
BOR	ING NO.	S2_E	31-A		S	TATION 2	0+11		OFFSET	17 ft LT			ALIGNMENT -Y2- (D)	0 HR. Dry
COLI	LAR ELE	IV. 89	96.6 ft		т	OTAL DEP	FH 50.3 f	ť	NORTHIN	IG 571,0	071		EASTING 1,259,186	24 HR. Dry
DRILL	. RIG/HAI	MMER E	FF./DA	TE HI	PC2473	CME-550 85	% 01/10/20 ⁻	18		DRILL	METHO	DH.	S. Augers HAMM	ER TYPE Automatic
DRIL	LER C	ain, J.			S	TART DATI	E 01/31/1	18	COMP. D	ATE 01/	/31/18		SURFACE WATER DEPTH N/	A
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOOT	-	SAMP.			SOIL AND ROCK DESC	RIPTION
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	75 10	⁰ NO.	И	G	ELEV. (ft)	DEPTH (ft
900		-											_	
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805	- 895.6 -	- - 1.0										N	- 896.6 0.4' TOPSOIL - RESIDUAL	0.0
095		-	2	3	4						М	N	TAN AND RED, SANDY SIL	TY CLAY (A-7)
	- 893.1	<u>3.5</u>	5	7	9	. ●16					м	N	-	5.0
890	890.6 -	- 6.0	4	5	6	/				41	М		ORANGE AND TAN, SILTY	SAND (A-2-4)
	888.1	8.5				:/"::								
	-	-	3	3	4	 • ⁷ · · ·					M			
885	-	-						<u> </u>					-	
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865	-	-											- 864.6	32.0
	863.1	33.5	6	12	13								- TAN, SILTY SAND (A-2-4)
860	-	-					• 25 · · · ·				IVI			
	050 1	-				· · · /.						-	- 859.6 - TAN, SANDY SILT (A-4) WIT	H SOME MICA
			3	4	7						м		- -	
855	-	-				· · · · · · · · · · · · · · · · · · ·							- 854.6	42.0
0	853.1	43.5	12	15	24								TAN AND WHITE, SILTY S	SAND (A-2-4)
850	-	-	'2		27		· · • • 39				M		• •	
000		-											-	
	848.1 946.2 -	48.5	15	33	67/0.3		: : !	+÷÷÷:				977	- 847.6 - 846.3 WEATHERED RC	49.0 OCK 50.3
			60/0.0						100/0. 60/0.	3 ∎-			WHITE AND TAN, G	
5	-	-											PENETRATION TEST R	EFUSAL at
	-	-											Elevation 846.3 ft IN CRYST/ GNEISS	ALLINE ROCK:
	_	-											-	
	-	-												
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2	-	F									1	I F	-	

GEOTECHNICAL BORING REPORT PODEIOC

								В	JRE	L	UG			-				
WBS	34497.1.1			ד	P R-270	7D	cc	DUNTY	CLE	/EL/	AND			GEOLOG	ST Goodnig	ght, D. J.		
SITE	DESCRIPTION	I STR	RUCTI	JRE #2	2 - BRIDG	E ON E	LIZABE	ETH A	VE. (-Y2	2-) C	VER US	6 74 E	SYPA	SS (-L-)			GROUN	D WTR (ft)
BOR	NG NO. S2_E	31-B		SI	TATION	20+22			OFFSE	Τ´	16 ft RT			ALIGNME	NT -Y2- (D)		0 HR.	Dry
COLL	AR ELEV. 89	96.8 ft		т	OTAL DEF	TH 56	6.9 ft		NORTH	ING	571,1	06		EASTING	1,259,186		24 HR.	Dry
DRILL	. RIG/HAMMER E	FF./DA	TE H	- PC2473	CME-550 8	5% 01/10)/2018				DRILL M	ETHO	DH.	S. Augers		НАММЕ	ER TYPE	Automatic
DRIL	LER Cain, J.			ST		E 01/3	31/18		COMP.	DA'	TE 02/0)2/18		SURFACE	WATER DE	PTH N//	4	
ELEV	DRIVE DEPTH	BLC	ow co	UNT		BLO\	WS PER	FOOT			SAMP.	▼/	L	-				
(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0	25	50		75 [·]	100	NO.	<u>/моі</u>	G	ELEV. (ft)	SUIL AND RU	JUK DESU	RIPTION	DEPTH (ft)
900																		
	Ŧ													-				
									1					896.8	0.4			0.0
895		3	4	6	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓				+ • • •	·		М		- TAI	N AND RED, SA	ANDY SILT	Y CLAY (A-7)
	893.3 7 3.5	4	6	6			.	· · · ·		:		м		•				
800	890.8 - 6.0			_	₽ 12.		· · · · · ·	· · · · · ·		·		IVI		- 891.3 - O	RANGE TAN A	ND RED S	SILTY SAN	5.5 JD
030	888 3 + 85	4	5	5	• 10							М		- °	(A-2-4) WI	THLITTLE	MICA	
		3	4	5	. ∳ 9		· · ·	· · · · · ·	· · · · · ·	:		М						
885	±					· · ·	· · ·		· · ·	·				- 				
	883.3 13.5	4	5	6		· ·	· · ·	· · ·	· · ·	:			_					
	÷	4			. ● 11 .	· ·	· · ·	· · ·	· · ·	:		М		-				
880	+													-				
	<u>878.3 18.5</u>	5	6	5	↓ ↓ ↓ ↓ ↓ ●11		•••	• • •				М		•				
875	Ŧ												-	-				
	873.3 + 23.5													-				
	+	7	9	9	.	18	· · ·	· · · · · ·		:		М		•				
870	+					· · ·	· · ·			·				-				
	868.3 28.5	5	9	10	· · · · · · · <u> </u> ·		· · · · · ·	· · · · · ·		:		м		- -				
005	±					19	· · · · · ·	· · ·	· · ·	:		IVI						
605						<u> </u>			1					864.8	TAN, SANDY	SILT (A-4)	HIGHLY	32.0
	863.3 33.5	4	6	9			· · ·	· · ·	· · ·	:		М		-	MIC	ACEOUS		
860	±						.			•				- 859.8				37.0
	858.3 38.5				\					•				-	TAN, SILT	Y SAND (/	4-2-4)	
	Ŧ	11	12	11		• 23	.	• • •				М		-				
855	Ŧ								+ • • •							(<u>A_4) \A</u> /IT		42.0
	853.3 43.5	10	9	11				• • •				м		- 174	, OANDT OLT	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		MOA
850	400 [†]					_	· · · ·		_ <u></u>					850.9 849.9			CK	45.9
	<u> 049.9 40.9</u> +	60/0.0	7						. 60/	0.0	,			- <u> </u>	RAY AND WH	TE, BIOTI	TE GNEIS	s
	÷.						· · ·	· · · · · ·		:				- FRI - HAF	ESH TO VERY RD TO VERY H	SLIGHT W ARD, GRA	/EATHERI Y AND WI	NG, HITE
845	‡				· · · ·	· · ·	· · ·	· · ·						-	BIOTITE GNEI: MODERATLEY	SS WITH (CLOSE F	CLOSE TO RACTURE) E
	±						· · ·	· · ·		:				-	SI	PACING		
040	±						· · ·	· · ·	· · ·	:				•				
840	_							••••	1	- 1	-		<u>الم</u>	_ <u>839.9</u> . Bo	ring Terminated	l at Elevati	on 839.9 f	56.9 t IN
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WBS	3 3449	7.1.1			TIP	R-270)7D	C	OUNT	ΥC	LEVEL	AND		GEOLOGI	ST Goodnig	ght, D	J.	
SITE	DESC	RIPTION	I STI	RUCTUR	E #2 -	BRID	GE ON E	LIZAB	ETH /	AVE.	(-Y2-) C	OVER US 7	4 BYPAS	S (-L-)				ID WTR (ft)
BOR	ING NC	. S2_I	31-B		STA	TION	20+22			OF	SET [·]	16 ft RT		ALIGNME	NT -Y2- (D)		0 HR.	Dry
COL	LAR EL	EV. 89	96.8 ft		Тот	AL DE	PTH 56	.9 ft		NO	RTHING	571,106		EASTING	1,259,186		24 HR.	Dry
DRIL	L RIG/HA	MMER E	FF./DA	TE HPC2	473 CM	ME-550	85% 01/10	/2018				DRILL MET	HOD H.S.	Augers		HAMN	IER TYPE	Automatic
DRIL	LER	Cain, J.			STA	rt da	TE 01/3	31/18		co	MP. DA	TE 02/02/	18	SURFACE	WATER DEI	PTH N	I/A	
COR		NQ	1	T	TOT	AL RU	N 10.01	t L ctr										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	I RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	UN RQD (ft) %	SAMP. NO.	81F REC. (ft) %	RQD (ft) %	L O G	ELEV. (1	t)	DE	ESCRIPTION	AND REMARK	(S		DEPTH (f
849.86	849.9	46.9	20	1:40/1.0	(2.0)	(2.2)		(0.0)	(0.2)		940.0			Begin Cori	ng @ 46.9 ft			
845	846.9	49.9 49.9	5.0	1:40/1.0 1:36/1.0 2:37/1.0 2:50/1.0 2:21/1.0 1:48/1.0	(2.9) 97% (5.0) 100%	(2.3) 77% (5.0) 100%		99%	93%		- 849.9 - - - -	AND WHIT	TE BIOTITE	GNEISS WI FRACTU	TH CLOSE TO RE SPACING	MODER	ATLEY CL	OSE
	841.9	54.9		2:40/1.0 5:15/1.0		(2.0)					-							
840	839.9	56.9	2.0	9:35/1.0	(2.0)	(2.0)				X	_ 839.9	Doring Tor	nein ata di at I	Elevation 820				56.9

GEOTECHNICAL BORING REPORT 0005100







GEOTECHNICAL BORING REPORT BORE LOG

WR	3440	7 1 1			т	P R-2707	D	COLINT	Y CLEVE				GF	OLOGIST Goodnight	t D J		WR	3440	7 1 1			ТІ	• R-2707	<u></u>	COUNTY
SITE			I STF	RUCTI	 JRE #:	2 - BRIDGE	- 	ABETH	AVE. (-Y2-) (OVER	JS 74 I	BYP	ASS (-1		., 5. 0.		SITE	DESCR		STF	RUCTI	 JRE #2	- BRIDGE	ON FI 17	
BOF). S2 E	EB2-A		s	TATION 2	1+09		OFFSET	21 ft LT		,		, GNMENT -Y2- (D)		0 HR. 53.1	BOF		. S2 I	EB2-B		ST	ATION 2'	1+22	
COL	LAR EL	EV. 90)1.6 ft		Т	OTAL DEPI	TH 54.8 f	t	NORTHING	G 571.	096		EAS	STING 1.259.092	2	24 HR. Drv	COL	LAR EL	EV. 90)1.9 ft		тс	TAL DEPT	H 52.0 f	it
DRIL	L RIG/HA	MMERE	FF./DA	TE HF	PC2473	CME-550 85	% 01/10/20	8	1		METHO	DD ⊦	1.S. Auae	ers I	HAMMEI	R TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE HP	PC2473	CME-550 859	% 01/10/20	I 18
DRI	LER (Cain, J.			S		E 01/30/1	8	COMP. DA	TE 01	/31/18	;	SUF		H N/A	<u> </u>	DRII	LER C	ain, J.			ST	ART DATE	01/31/1	18
ELEV	DRIVE	DEPTH	BLC	w cou	JNT		BLOWS	PER FOO	г	SAMP	. 💙/	L					ELEV	DRIVE	DEPTH	BLC	w cou	JNT		BLOWS	PER FOOT
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 100	NO.	Имо	O I G	ELEV.	(ft)	K DESCH	RIPTION DEPTH (ft	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	.5	50
905																	905								
		Ŧ											E						Ŧ						
	000.6					<u> </u>	<u> </u>	1					901.6	0.5' TO		0.0		900.9	$\frac{1}{10}$						
900	900.6	<u> </u>	2	4	7	•11				-	м		-	TAN AND RED, SAND	DY SILT	Y CLAY (A-7)	900		<u> </u>	3	3	5			+
	898.1	3.5	4	7	7						М		898.1	RED AND TAN, FINE	E SAND	3.5 Y SILT (A-4)	-	898.4	<u> </u>	4	6	6	12		
895	895.6	6.0		5	5	7 .**.							E	WITH LITT	TLE MIC	A	895	895.9	6.0	3	5	6			
	893.1	8.5			5	• ¹⁰					M		E					893.4	8.5		4	F	· 7 ¹¹ · ·		
		Ŧ	3	4	4	.•8					м		<u>891.8</u>	TAN WHITE AND BR	ROWN S	9.8 SILTY SAND	4		Ŧ	3	4	5	. • 9		
890		Ŧ								-				(A-2-4) WITH SOME I	ROCK F	RAGMENTS	890	-	<u> </u>						+
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885		Ŧ				· •											885		Ŧ						
	883.1	T 18.5																883.4	18.5	F					
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880		Ŧ								-							880	-	<u> </u>						+
	878.1	23.5	13	9	7						М							8/8.4	<u> 23.5</u> 	7	41	11			•52 · · ·
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	873.1	28.5																873.4	28.5		14/0.0				İ <u></u> -
		Ŧ	13	12	6	· · · • 18	3				м								Ŧ	00	14/0.2				+
870		Ŧ								-							870	-	<u> </u>					<u> </u>	+
	868.1	33.5	6	7	7						М							868.4	<u> </u>	5	6	7	 ●13.		
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	863.1	38.5																863.4	38.5		0		:: 1:		
		Ŧ	18	20	26			46 • • •			M								ŧ	°	9	9	● 18		
860		ŧ				· · · · ·	1	 		-			-				860	-	+					<u> </u>	+
3/18	858.1	43.5	10	11	9	 .					м							858.4	43.5	3	6	5			
∞ <u>– 855</u>		Ŧ				· · · Ĭ	<u>+</u>	<u></u>				411	- 855.6	WEATHER		46.0	855		ŧ						
OT.G	853.1	48.5		05/0.0			· · · ·							TAN AND WHI	IITE, GRA	ANITE		853.4	48.5	15	35	16			
		±	65	35/0.2			· · · · ·	· · ·	· · 100/0.7	•							050		ŧ			10			<u>51</u> <u></u>
2 850 G	-	±											_				850	849.9	<u> </u>	60/0.0				L	
D.T.O	848.1 846.8	<u> </u>	100/0.2				· · · · ·	· · · ·	100/0.2				846.8			54.8			ŧ						
URRE	-	1	60/0.0						60/0.0				-	Boring Terminated PENETRATION T	WITH ST	TANDARD FUSAL at			<u>†</u>						
GS CI		ŧ											F	Elevation 846.8 ft ON C	CRYSTA	LLINE ROCK:			ŧ						
DRING		ŧ											F	0.01					ŧ						
O ^B	-	ŧ											F					-	ŧ						
<u>_</u> GE		ŧ											F						ŧ						
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CONTENTS

DESCRIPTION

TITLE SHEET LEGEND

SITE PLAN

PROFILE CROSS SECTIONS BORE LOGS

<u>SHEET NO.</u>
1
2
3
4
5-7
8-12

27071

R

REFERENCE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION _US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURE #3 - BRIDGE OVER US 74 BYPASS ON SR 2047 (BORDERS RD.) BETWEEN SR 2052 (ELIZABETH AVE.) AND US 74 BUS. (E. MARION ST.)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	12

CAUTION NOTICE

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PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY <u>*HILL, M.J.*</u>

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY ______ FALCON ENG.

DATE MARCH 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL D	ESCR'	IPTION	·				T		GF	RADATION			T				ROCK D	ESCRIPTION	
SOIL IS CON BE PENETRAT ACCORDING IS BASE	ISIDERED UNI TED WITH A TO THE STA TO ON THE A	CONSOLIDATE CONTINUOUS NDARD PENE ASHTO SYST	D, SEMI-CONS FLIGHT POW TRATION TES EM. BASIC D	OLIDATE ER AUGE T (AASH ESCRIPT	D, OR WEA R AND YI ITO T 206 IONS GEN	ATHERED E ELD LESS , ASTM DI ERALLY IN	ARTH MATE THAN 100 586). SOIL CLUDE THE	RIALS THA BLOWS PER CLASSIFIC FOLLOWIN	AT CAN R FOOT ATION IG:	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	IES A GO NDICATES IS A MIX	OD REPRESE S THAT SOIL KTURE OF UN	NTATION OF PARTI PARTICLES ARE AL IFORM PARTICLE SI	CLE SIZES LL APPROX IZES OF T	FROM FINE TO COARSE. IMATELY THE SAME SIZE. WO OR MORE SIZES.	HARD ROCK I ROCK LINE IN SPT REFUSAL BLOWS IN NO REPRESENTED	3 NON- IDICATE IS PE IN-COA	COASTAL PL S THE LEV NETRATION STAL PLAIN ZONE OF W	LAIN VEL A BY A N MA1 WEATH	MATERIAL THAT T WHICH NON-C SPLIT SPOON TERIAL, THE T ERED ROCK.	WOULD YIELD SPT R JASTAL PLAIN MATER SAMPLER EQUAL TO (RANSITION BETWEEN	EFUSAL IF TESTE IAL WOULD YIELD JR LESS THAN 0.1 SOIL AND ROCK
AS MI	INERALOGICA	L COMPOSIT	ON, ANGULAR	ITY, STR	UCTURE, P	LASTICITY	ETC. FOR	EXAMPLE.	5 5000	THE ANGULARIT	Y OR R	OUNDNESS OF	SOIL GRAINS IS D	DESIGNATED	BY THE TERMS:	- ROCK MATERI	ALS AF	E TYPICALL	LY DI	VIDED AS FOLL	OWS:	
VERY	STIFF,GRAY.	SILTY CLAY, MO		RBEDDEL		ID LAYERS,	HIGHLY PLAST	T/C.A-7-6		ANGULAR, SUBAN	IGULAR,	SUBROUNDED,	OR <u>ROUNDED</u> .			WEATHERED			N N	ION-COASTAL PL 00 BLOWS PER	AIN MATERIAL THAT	WOULD YIELD SPI
GENERAL	GRAN	ULAR MATERIA	<u></u> S	SILT	-CLAY MAT	RIALS			N.C.		MIN	NERALOG	ICAL COMPOS	ITION				2.2	₹ F	INE TO COARSE	GRAIN IGNEOUS AND	METAMORPHIC RC
CLASS.	(≤ 35	% PASSING #20	Ø)	(>3	5% PASSING	· •200)			+L5	MINERAL NAM	MES SUC	TH AS QUART	Z, FELDSPAR, MICA, ' N THEY ARE CONSI	TALC, KAOL	IN, ETC. SIGNIFICANCE.	ROCK (CR)			1 v	OULD YIELD SF	T REFUSAL IF TESTE SCHIST, ETC.	.D. ROCK TYPE IN
GROUP CLASS. A-1-c	A-1 A-3 a A-1-b	A-2-4 A-2-	4-2 5 A-2-6 A-2-	A-4	A-5 A-6	5 A-7 A-7-5.	A-1, A-2 A-3	A-4. A-5 A-6. A-7				COMP	RESSIBILITY			NON-CRYSTAL	LINE		F	INE TO COARSE	GRAIN METAMORPHIC	AND NON-COASTA
SYMBOL 0000										SLIG	HTLY CO	MPRESSIBLE		LL < 3	31	ROCK (NCR)			Ē	OCK TYPE INCL	UDES PHYLLITE, SLAT	E, SANDSTONE, ETC
% PASSING		**********						CIL T		2 MODE HIGHL	LY COMP	RESSIBLE			50	SEDIMENTARY	ROCK		Ξş	PT REFUSAL. R	OCK TYPE INCLUDES	LIMESTONE, SANDS
*10 50 M	IX 50 MY 51 M	N					GRANULAR	CLAY	MUCK, PEAT		P	ERCENTA	GE OF MATER	RIAL					<u> </u>	WEA	THERING	
*200 15 M	X 25 MX 10 M	x 35 MX 35 M	х 35 мх 35 м	X 36 MN	36 MN 36 I	MN 36 MN	50125	SOILS	1241	ORGANIC MATERIAL	-	GRANULAR SOILS	SILT - CLAY <u>SOILS</u>	<u>01</u>	HER MATERIAL	FRESH	ROCK '	FRESH, CRYS	STALS	BRIGHT, FEW JO	INTS MAY SHOW SLIGH	T STAINING. ROCK
MATERIAL PASSING #40 LL PI 6		40 MX 41 M 10 MX 10 M	N 40 MX 41 MI X 11 MN 11 MI	N 40 MX	41 MN 40	MX 41 MN 4N 11 MN	SOILS V LITTLE	WITH OR	HIGHL Y	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER TER	2 - 3% 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% > 20%	TRACE LITTL SOME HIGHL	E 1 - 10% E 10 - 20% 20 - 35% .Y 35% AND ABOVE	VERY SLIGHT (V SLI.)	ROCK I CRYST	R IF CRYSTA GENERALLY F ALS ON A B	FRESH BROKEN	E. H.JOINTS STAINE N SPECIMEN FACI	D, SOME JOINTS MAY S SHINE BRIGHTLY. ROI	3HOW THIN CLAY C CK RINGS UNDER H
GROUP INDEX	0 0	0	4 MX	8 MX	12 MX 16 J	MX NO MX	AMOUNTS	S OF	ORGANIC			GRO	UND WATER			SLIGHT	ROCK	GENERALLY	FRESH	I, JOINTS STAINE	D AND DISCOLORATION	EXTENDS INTO RO
USUAL TYPES STONE OF MAJOR GRAV	E FRAGS. VEL, AND SAND	E SILTY GRAVEL	JR CLAYEY AND SAND	SIL' SOI	TY (LS	LAYEY SOILS	ORGAN MATTE	NIC Er	50125		WATEF STAT	R LEVEL IN IC WATER LE	BORE HOLE IMMEDI	ATELY AFT HOURS	ER DRILLING	(SLI.)	1 INCH. CRYST	. OPEN JOIN ALS ARE DUI	NTS MA JLL AN	AY CONTAIN CLA ND DISCOLORED. OF ROCK SHOW J	r. IN GRANITOID ROCKS CRYSTALLINE ROCKS R	SOME OCCASIONAL ING UNDER HAMMER
GEN, RATING	5405			+			FAIR TO			P₩	PERCI	HED WATER, S	SATURATED ZONE, OF	R WATER B	EARING STRATA	(MOD.)	GRANIT	TOID ROCKS,	, MOST	FELDSPARS ARE	DULL AND DISCOLORE	.D, SOME SHOW CLA
AS SUBGRADE	EXUE	LLENI IU GUU	, 	'	AIR TU PU	JR	POOR	PUUR	UNSULTABLE		SPRIN	NG OR SEEP					WITH (FRESH ROCK.	ार н∩м <.	MER BLUWS AND	SHUWS SIGNIFICANT L	JUSS OF STRENGTH
	PI OF	A-7-5 SUBGRO	UP IS ≤ LL -	30;PI0	F A-7-6 SU	BGROUP IS	> LL - 30							01 0		MODERATELY	ALL R	OCK EXCEPT	(QUAF	TZ DISCOLORED	OR STAINED. IN GRANI	TOID ROCKS, ALL F
		CUNC		RAN	GE OF ST	NDARD	RANGE	OF UNCO	DNFINED			IJUELLH		013		(MOD. SEV.)	AND D	AN BE EXCA	AVATEC) WITH A GEOLO	SIST'S PICK. ROCK GIVE	ES "CLUNK" SOUND
PRIMARY SOIL	. TYPE	COMPACINE CONSISTI		PENETR	(ATION RES (N-VALUE)	SISTENCE	COMPRE	ESSIVE ST (TONS/FT	TRENGTH 2 ₎		ANKMENT SCRIPTI				¬ SLOPE INDICATOR	SEVERE (SEV.)	<u>IF TES</u> ALL R⊨ REDUC	<u>STED, WOULD</u> OCK EXCEPT ED IN STREM	<u>) yieli</u> I Quafi Ngth	<u>D SPT REFUSAL</u> RTZ DISCOLORED TO STRONG SOIL	OR STAINED. ROCK FAI IN GRANITOID ROCKS	BRIC CLEAR AND E ALL FELDSPARS 6
GRANULAR		LOOS MEDIUM (ENSE		4 TO 10) 0		N/A				D	VST PMT		/ INSTALLATION		to soi IF TE:	ME EXTENT. STED, WOULD	. SOME J <u>YIEL</u>	FRAGMENTS OF D SPT N VALUES	STRONG ROCK USUALL	Y REMAIN.
MATERIAL (NON-COHES	IVE)	DENS VERY DE VERY S	INSE OF T		30 TO 5 > 50 < 2	0		< 0.25		ATTIFICIAL FI	ILL (AF) Y EMBAN		-) AUGER BORING	, ((SOUNDING ROD	VERY SEVERE (V SEV.)	all Ri But M Remaii	OCK EXCEPT IASS IS EFFE NING. SAPROI	F QUAR FECTIVI DLITE	RTZ DISCOLORED ELY REDUCED TO IS AN EXAMPLE	OR STAINED. ROCK FAU) SOIL STATUS, WITH O OF ROCK WEATHERED	BRIC ELEMENTS AR NLY FRAGMENTS OF TO A DEGREE THAT
GENERALLY SILT-CLAY MATERIAL		SOF1 MEDIUM S STIFI	TIFF		2 TO 4 4 TO 8 8 TO 15	5	e e	0.25 TO 0 0.5 TO 1. 1 TO 2	0.5 Ø	INFERRED ROC	CK LINE	MWC) MONITORING W		TEST BORING WITH CORE	COMPLETE	VESTIC ROCK I SCATT	SES OF ORIG	JINAL J SOIL ENTRA1	ROCK FABRIC RE . ROCK FABRIC I IONS. QUARTZ M	MAIN. <u>IF TESTED, WOUN</u> NOT DISCERNIBLE, OR D NAY BE PRESENT AS DI	<u>LD YIELD SPT N N</u> IISCERNIBLE ONLY KES OR STRINGERS
(COHESIVE)		VERY S HAR	1++		15 10 3 > 30	٥		2104		ALLUVIAL SOI	L BOUND	DARY Z	INSTALLATION		- SPT N-VALUE		ALSO (AN EXAMPLE.	<u>.</u>	DOCK		
		TE	XTURE (JR GF	AIN S	IZE	•				R	ECOMMEN	DATION SYME	30LS							HARDINE 55	DE HAND SPECIMEN
U.S. STD. SIEVE	SIZE		i 10	40	60	200	270					NCLASSIFIED	EXCAVATION -		LASSIFIED EXCAVATION -		SEVER	AL HARD BL	LOWS (OF THE GEOLOGI	ST'S PICK.	in their of Eethers
BOULDER	COBBL	E GRA	VEL	COARS SAN(3E	FINE SAND	8.853 SI		CLAY	SHALLOW UNDERCUT		NCLASSIFIED	EXCAVATION - EGRADABLE ROCK	USE EME	D IN THE TOP 3 FEET OF BANKMENT OR BACKFILL	HARD	CAN BE	E SCRATCHED TACH HAND !	ED BY SPECI	KNIFE OR PICK	ONLY WITH DIFFICULTY	TO 0 25 INCHES DE
GRAIN MM	305	75	2.0	(CSE.S	.D.) Ø.25	(F SD.	0.05	0.005	(CL.)	AR - AUGER REFUSAL		ABBI MED	REVIATIONS MEDIUM	VS	T - VANE SHEAR TEST	HARD	EXCAVA BY MO	ATED BY HAF	ARD BL OWS.	OW OF A GEOLO	GIST'S PICK. HAND SPE	ICIMENS CAN BE D
SIZE IN.	12 SOI	3 L MOIST	URE - (ORRE	LATIO	N OF	TERMS			- CL CLAY CPT - CONE PENETRATIO	J IN TEST	MICA MOD NP - N	- MICACEOUS MODERATELY NON PLASTIC	VEI V V	A WEATHERED - UNIT WEIGHT J- DRY UNIT WEIGHT	MEDIUM HARD	can Bi Can Bi Point	E GROOVED C E EXCAVATE OF A GEOL(OR GO ED IN OGIST	DUGED 0.05 INCH SMALL CHIPS TO 'S PICK.	ES DEEP BY FIRM PRE	SSURE OF KNIFE O UM SIZE BY HARD
SOIL MOI (ATTERB	ISTURE SCA BERG LIMITS	LE S)	FIELD MO DESCRIF	ISTURE 'TION	GUII	JE FOR F	IELD MOIST	TURE DESC	CRIPTION	CSE COARSE DMT - DILATOMETER TES DPT - DYNAMIC PENETRA	TION TE	ORG PMT - ST SAP	ORGANIC PRESSUREMETER T SAPROLITIC	EST	SAMPLE ABBREVIATIONS - BULK	SOFT	CAN BI FROM PIECES	E GROVED OF CHIPS TO SE S CAN BE BF	JR GOU SEVERA BROKEN	JGED READILY BI AL INCHES IN SI. BY FINGER PRE	' KNIFE OR PICK. CAN ZE BY MODERATE BLOW SSURE.	BE EXCAVATED IN 'S OF A PICK POIN
	LIQUID LIM	ит _	- SATURA (SAT.)	TED -	USU FR0	M BELOW	THE GROU	WEI, USUA ND WATER	R TABLE	e - VOID RATIO F - FINE - FOSS FOSSILIFEROUS		SD 9 SL 9 SL1	SAND, SANDY SILT, SILTY SLIGHTLY	SS ST RS	- SPLIT SPOON - SHELBY TUBE - ROCK	VERY SOF T	CAN BE OR MO	e carved W? JRE IN THICK	VITH K KNESS	NIFE. CAN BE E CAN BE BROKEN	<pre>KCAVATED READILY WIT BY FINGER PRESSURE</pre>	H POINT OF PICK. . CAN BE SCRATCH
RANGE <			- WET - 1	(W)	SEM	ISOLID: R	EQUIRES DE	RYING TO		FRAC FRACTURED, FRAC FRAGS FRAGMENTS	TURES	TCR - <i>w</i> - M	TRICONE REFUSAL	RT CB	- RECOMPACTED TRIAXIAL R - CALIFORNIA BEARING	F	RAC	TURE SF	PACI	ING		BEDDING
	PLASTIC L	IMIT								HI HIGHLY		V - VE	ERY		RATIO	TERM			SP	ACING	TERM	
ом SL	OPTIMUM M SHRINKAGE	IOISTURE LIMIT	- MOIST -	· (M)	SOL	ID; AT OR	NEAR OPT	'IMUM MOI	ISTURE			NT USED	ON SUBJEC			WIDE WIDE MODERATE	: LY CLC	JSE	RE TH 3 TO 1 TO	HAN 10 FEET 10 FEET 3 FEET	VERY THICKLY THICKLY BEDD THINLY BEDDI	7 BEDDED DED 1. ED 0.1
			- DRY - (ט	REO ATT	UIRES AD AIN OPTI'	DITIONAL W MUM MOIST	WATER TO URE		CME-490		6' CONTINUOU	S FLIGHT AUGER	CORE		VERY CLO	3E	LESS	S THE	AN 0.16 FEET	THICKLY LAM	INATED 0.00 NATED <
			PLA	STICI	TY					1		8"HOLLOW AU	JGERS	-в	· []-+					INDU	JRATION	
NON PL	ASTIC		<u>PLASTI</u>	0-5 6-15	DEX (PI)		DRY V	<u>STRENGT</u> ERY LOW	<u>гн</u>	X CME-550X		HARD FACED	FINGER BITS DE INSERTS			FOR SEDIMEN	TARY R _E	IUCKS, INDUR	RATIO	IN IS THE HARD RUBBING WIT GENTLE BLO	ENING OF MATERIAL E H FINGER FREES NUM W BY HAMMER DISINT	3Y CEMENTING, HE EROUS GRAINS; EGRATES SAMPLE.
MODERA HIGHLY	PLASTIC	TIC	26	16-25 3 OR MC	JRE			MEDIUM HIGH				CASING	W/ ADVANCER STEEL TEETH		POST HOLE DIGGER	MODER	ATELY	INDURATED)	GRAINS CAN BREAKS EASI	BE SEPARATED FROM	SAMPLE WITH ST AMMER.
			C	<u>.OLOR</u>						4 🗖		TRICONE	TUNGCARB.		SOUNDING ROD	INDUR	4TED			GRAINS ARE	DIFFICULT TO SEPAR	ATE WITH STEEL
DESCRIPTION	IS MAY INCL IERS SUCH	UDE COLOR AS LIGHT,D	OR COLOR ARK, STREAN	COMBINA <ed, etc<="" td=""><td>ATIONS (T</td><td>AN, RED, Y ED TO DE</td><td>YELLOW-BRO SCRIBE APP</td><td>DWN, BLUE PEARANCE.</td><td>-GRAY).</td><td></td><td></td><td>CORE BIT</td><td></td><td>. 🗍 `</td><td>VANE SHEAR TEST</td><td>EXTRE</td><td>MELY I</td><td>NDURATED</td><td></td><td>SHARP HAMM</td><td>ER BLOWS REQUIRED</td><td>TO BREAK SAMPLE</td></ed,>	ATIONS (T	AN, RED, Y ED TO DE	YELLOW-BRO SCRIBE APP	DWN, BLUE PEARANCE.	-GRAY).			CORE BIT		. 🗍 `	VANE SHEAR TEST	EXTRE	MELY I	NDURATED		SHARP HAMM	ER BLOWS REQUIRED	TO BREAK SAMPLE

PROJECT REFERENCE NO.



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	TERMS AND DEFINITIONS
D. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS OR HAVING
	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
N VHLUES /	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ГК ТНАТ	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLUDES GRANITE.	SURFACE.
DI ATA	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
	OF SLOPE.
MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
TONE, CENENTED	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
RINGS UNDER	RULKS UR LUIS MASSIVE RULK.
	UIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
OATINGS IF OPEN,	
AMMER BLOWS IF	UP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
	EAULT - A EPACTURE OF EDACTURE TONE ALONG WHICH THERE HAS BEEN DISDLACEMENT OF THE
CK UP TO	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
L FELUSMAR R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S IN	ELIGAT - DOCK EDACMENTS ON STEETTING HEAD THEID ODIC, MAL DOCTTON AND DIS ODCCD FROM
Y. ROCK HAS	PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING & STREAM RUIL T OF SEDIMENTS DEPOSITED BY THE STREAM
	FORMATION (FM) A MARRADIE CEOLOGIC UNIT THAT CAN BE DECOMPTED AND TRACED IN THE
ELDSPARS DULL	FURMINITION (FM.) - A MAPPABLE GEOLOGIE UNIT THAT LAN BE KELUGNIZED AND TRALED IN THE
USS OF STRENGTH	י 101NT - FRACTURE IN ROCK ALONG WHICH NO APPRECIADLE MOVEMENT HAS OCCURDED
WHEN STRUCK.	JUNI - THEFTONE IN NOCK HEUND WHICH NO HEFTECTHOLE MOVEMENT HIS OCCUMED.
VIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OK PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
ARE KAOLINIZED	
	MUTTLED (MUT,) - IRREGULARLY MARKED WITH SPUIS OF DIFFERENT CULURS, MUTTLING IN SUILS
E DISCERNIBLE	DEPCHER WATER - WATER MAINTAINER AROUE THE NORMAL CROWN WATER LEVEL BY THE RECENCE
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF	Residual (Res.) Soul - Soul formed in Place by the Weathering of Rock.
IN SMALL AND	
S. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
	RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
S REQUIRES	ROCK.
	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
LOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	THE BEDDING ON SCHIEFTOSTT OF THE INTRODED RUCKS.
EP CAN BE	SLICKENSIDE - PULISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
ETACHED	
R PICK POINT	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
T. SMALL, THIN	TRATA DOCK ONALITY OF CIONATION (CDOD) A MENOUS OF DOCK ONALITY OF CODERS
DIECES 1 THOU	STRATA KULK UUALITY DESIGNATION (SKUD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
ED READILY RY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	DENICH MADY. BY28-19 / CDS DOINT 19
THICKNESS	 ΔΕΙΝΟΠ Ι'ΗΠΛΚ: ΒΙΖΟΤΙΣ / GES FUINT ΙΣ ΣΤΛΤΙΩΝ -L - ΡΩΤ 757+63 Ω2 Ι3 28/LT
4 FEET	N. 565153 7 F. 1261859 6 ELEVATION. 836 03 EEET
.5 - 4 FEET	N. JUJIJJ, L. IZUIUJJ,U ELEVHITUN: 0J0.UJ FEL
16 - 1.5 FEET 3 - 0.16 FFFT	NOTES:
18 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
0.008 FEET	
AT, PRESSURE, ETC.	
FFI PROBE	
PROBE	
	DATE: 8-15-14





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WBS 34497.1.F56 TIP R-2	-2707D COUNTY CLEVELAN	ID	GEOLOGIST Goodnight, D. J	l.	WBS	34497.1.F5	6	Т	P R-2707D	COUNTY
SITE DESCRIPTION STRUCTURE #3 - BR	RIDGE OVER US 74 BYPASS ON SR 2	047 (BORDERS I	RD.)	GROUND WTR (ft)	SITE	DESCRIPTIO	N STRUCTU	JRE #3	3 - BRIDGE OVER U	S 74 BYP/
BORING NO. S3_EB1-A STATIO	OFFSET 21	ft LT	ALIGNMENT -Y3-	0 HR. 55.5	BOR	NG NO. S3_	_EB1-B	SI	CATION 22+34	
COLLAR ELEV. 839.1 ft TOTAL	DEPTH 71.9 ft NORTHING	565,313	EASTING 1,261,808	24 HR. N/A	COLI	AR ELEV. 8	339.1 ft	т	DTAL DEPTH 67.9 f	t
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-5	-550 92% 12/09/2015 DI	RILL METHOD H.S	S. Augers HAMM	IER TYPE Automatic	DRILL	RIG/HAMMER	EFF./DATE HF	PC2473	CME-550 92% 12/09/201	15
DRILLER Contract Driller START	DATE 12/13/17 COMP. DATE	12/13/17	SURFACE WATER DEPTH N	/A	DRIL	LER Contrac	ct Driller	ST	ART DATE 12/13/1	.7
ELEV DRIVE DEPTH BLOW COUNT	BLOWS PER FOOT		SOIL AND ROCK DES	CRIPTION	ELEV	DRIVE ELEV DEPT	H BLOW COU	UNT	BLOWS	PER FOOT
(π) (ft) (π) 0.5ft 0.5ft 0.5ft 0		NO. MOI G	ELEV. (ft)	DEPTH (ft)	(π)	(ft) ^(ft)	0.5ft 0.5ft	0.5ft	0 25	50 7
840			-839.1 GROUND SURF	ACE 0.0	840	839.1 0.0				
838.1 1.0 3 4 6			RESIDUAL RED AND BROWN SAND	Y SILTY CLAY			3 4	4		
835 835.6 - 3.5			836.1 (A-7)	3.0	835	835.6 - 3.5			: \ : : : : : :	
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	••••••••••••••••••••••••••••••••••••••	M	RED TAN AND WHITE, SILT	Y SAND (A-2-4)		-	4 5	6	$\begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \bullet \\ 11 \cdot \end{vmatrix} \cdot \cdot \cdot \cdot$	
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	•15	M	-			Ŧ		Ů		
			792.1 TAN, SANDY SILT	47.0						
	15	м	-		790		3 3	3	• 6	+
	· <u> </u> · · · · · · · · · · · · · ·					Ŧ				
785 785.6 53.5 4 6 6	· <u> ···</u> · · · · · · · · · · · · · · · · ·		_		785	785.6 + 53.5	3 3	5		
	•12 · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ·					ŧ				
	· · · · · · · · · · · · · · · · · · ·					780.6 - 58.5				
	• • 16 · · · · · · · · · · · · · · · · · ·	м	-		780		3 4	6		+
	· · · · · · · · · · · · · · · · · · ·	-				ŧ				
			_		775	775.6 + 63.5	6 9	51	· · · · · · · · · · ·	
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $					ŧ		-		. <u>P60</u>
	· · [. · · · · · · · · · · · · · · · · · · · · · · · · · · · ·		770.9	68.2		771.2 67.9	60/0 0			
	100/0.6		_ WEATHERED RO TAN AND BROWN, G	OCK GRANITE		+	00/0.0			
g 767.2 71.9 60/0 0 · · ·			767.2			‡				
	00,0.0		PENETRATION TEST R	REFUSAL at		‡				
			MICA SCHIS	T		‡				
						‡				
								I		

CLEVELA	ND			GEOLOGIST Goodnight, D.	J	
ASS ON SR	2047 (I	BORD	ERS	RD.)	GROUND V	VTR (ft)
OFFSET 2	1 ft RT			ALIGNMENT -Y3-	0 HR.	52.3
NORTHING	565,3	46		EASTING 1,261,780	24 HR.	N/A
		IETHO	р на	S Augers HAM	 MER TYPE Aut	omatic
	E 12/	12/17				omado
			L	SURFACE WATER DEPTH	WA	
75 100	SAIVIE.		0	SOIL AND ROCK DE	SCRIPTION	
	NO.	/ MOI	G			
				-839.1 GROUND SUR	FACE	0.0
		М	$\mathbf{\nabla}$	RESIDUAL		
				<u>_836.1</u> (A-7)	JY SILTY CLAY	3.0
<u> </u>		М		- TAN AND RED, SAND	Y SILT (A-4)	- 55
		м		RED AND TAN, SILTY	SAND (A-2-4)	0.0
		101				
		М		-		
				825.1		14.0
.100/0.9		М		823.6 WHITE GRANITI	ROCK	15.5
				RESIDUAL	-	_
		M		TAN, SILTY SANE) (A-2-4)	
		IVI				
				817.1 TAN FINE SANDY	SII T (A-4)	22.0
· · · ·		м		-		
			s: t	040.4		07.0
				TAN, SILTY SANE) (A-2-4)	27.0
		М		-	. ,	
· · · · · · · · · · · · · · · · · · ·						
<u> </u>		М		-		
				802.1		37.0
			F	TAN AND BROWN, FINE S	ANDY SILT (A-4)
		М	- -	-		
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		IVI	-			
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• • • •			-			
			477	774.1 WEATHERED I	ROCK	65.0
				TAN AND BROWN, M	ICA SCHIST	67.9
. <u> </u>				Boring Terminated WIT		01.0
			E	Elevation 771.2 ft ON CRYS	TALLINE ROCK	:
			F	MICA SCHI	ST	
			F	-		
			ļ			

WBS 34497.1.F56	TIP R-2707D COUNTY CLEV	'ELAND	GEOLOGIST Goodnight, D. J.		WBS 34497.1.F56	TIP R-2707D COUNT
SITE DESCRIPTION STRUCTUR	RE #3 - BRIDGE OVER US 74 BYPASS ON	I SR 2047 (BORDERS F	RD.)	GROUND WTR (ft)	SITE DESCRIPTION	STRUCTURE #3 - BRIDGE OVER US 74 BYP
BORING NO. S3_B1-A	STATION 22+88 OFFSET	T 16 ft LT	ALIGNMENT -Y3-	0 HR. Dry	BORING NO. S3_	B1-A STATION 22+88
COLLAR ELEV. 848.0 ft	TOTAL DEPTH 86.0 ft NORTH	ING 565,290	EASTING 1,261,746	24 HR. 55.7	COLLAR ELEV. 8	48.0 ft TOTAL DEPTH 86.0 ft
DRILL RIG/HAMMER EFF./DATE HPC2	2473 CME-550 92% 12/09/2015	DRILL METHOD H.S	. Augers HAMM	ER TYPE Automatic	DRILL RIG/HAMMER	FF./DATE HPC2473 CME-550 92% 12/09/2015
DRILLER Contract Driller	START DATE 12/15/17 COMP.	DATE 12/15/17	SURFACE WATER DEPTH N/	'A	DRILLER Contract	t Driller START DATE 12/15/17
ELEV DRIVE DEPTH BLOW COUN	IT BLOWS PER FOOT	SAMP.	SOIL AND ROCK DESC	CRIPTION	ELEV DRIVE DEPTH	BLOW COUNT BLOWS PER FOOT
(π) (ft) (π) 0.5ft 0.5ft 0	0.5ft 0 25 50 75 1	100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	(π) (ft) (π)	0.5ft 0.5ft 0.5ft 0 25 50
850					770 769.5 78.5	Match Line
847.0	<u> </u>		848.0 GROUND SURFA	ACE 0.0		$\begin{bmatrix} 6 & 10 & 11 \\ & & & \\ & & & \\ \end{bmatrix} $
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $: м 🕅	RED, SANDY CLAY (A-7) V 845.0 GRAVEL	WITH TRACE 3.0	765	
844.5 - 3.5 - 3 4	6	- м	TAN, SILTY SAND (A-2-4) V	WITH TRACE	764.5 + 83.5	35 65/0.4
842.0 6.0 9 20 2	27		RESIDUAL	5.5	762.0 86.0	60/0.0
840 839.5 8.5 21 26	10		RED AND TAN, SILTY SA	AND (A-2-4)		
835						
834.5 - 13.5 - 12 21	14	- M				
			831.0	17.0	I I I	
830 829.5 18.5			TAN, SANDY SILT	(A-4)		
					I I I	
825 004 5 00 5			826.0 TAN AND WHITE, SILTY S	22.0 SAND (A-2-4)	Ī	
	20	M		. ,	III	
			821.0	27.0	I I I	
820 819.5 28.5	7		RED AND TAN, FINE SANDY (A-5)	Y CLAYEY SILT		
	· • • • • • • • • • • • • • • • • • • •		ζ, γ		I I I	
815 914 5 99 5			816.0 TAN, FINE SANDY SI	32.0 LT (A-4)	Ī	
814.5 33.5 4 6	7	: М			III	
			810.5	37.5		
810 809.5 38.5						
		0.6	806.5	41.5		
805 804 5 43 5			RESIDUAL TANI SANDY SILT (A-4) WIT			
	9	: м				
	$ \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot $: 				
^m 800 799.5 + 48.5 5 5	6 - <u>/</u> · · · · · · · · · · · · · · · · ·					
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¹ / ₂ / ⁰ / _{779.5} + 68.5 ↓ + 6 8						
	$\left \begin{array}{cccc} \cdot & \cdot & \cdot & \P^{18} \\ \cdot & \cdot & \cdot & 1 \end{array} \right \left \begin{array}{cccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & 1 \end{array} \right \left \begin{array}{cccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & 1 \end{array} \right \left \begin{array}{cccc} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & 1 \end{array} \right $				‡	
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$: w 🖾 🗄				
					‡	

CLEVELAND)		GEOLOG	IST Good	dnight, D. J.		
ASS ON SR 204	47 (BORDE	ERS F	RD.)			GROUN	ID WTR (ft)
OFFSET 16 ft	LT		ALIGNME	NT -Y3-		0 HR.	Dry
NORTHING 56	65,290		EASTING	1,261,74	46	24 HR.	55.7
DRI	ILL METHOD) H.S	Augers		HAMM	ER TYPE	Automatic
COMP. DATE	12/15/17		SURFAC	E WATER I	DEPTH N/	A	
75 100 N	MP.	L O G		SOIL AND	ROCK DESC	RIPTION	
COMP. DATE	ILL METHOD 12/15/17 MP. IO. MOI W W		Augers SURFAC	E WATER I SOIL AND	HAMM DEPTH N/ ROCK DESC RESIDUAL LT (A-4) WIT (continued) ATHERED RC BIOTITE GN inated WITH TION TEST R ft ON CRYST GNEISS	A CRIPTION C	Automatic
		F					

WB	S 344	97.1.F5	6		Т	IP R-2707	D	COUNT	Y CLEVEL	AND.			GEOLO	OGIST Goodnig	jht, D. J.			WBS	3449	7.1.F56			ТІ	P R-2707	Ď	COUNTY
SIT	E DES	CRIPTIO	N ST	RUCT	JRE #	3 - BRIDGE	OVER U	S 74 BYF	PASS ON SI	R 2047 ((BORI	DERS	S RD.)		0	GROUND	WTR (ft)	SITE	DESCR	RIPTION	I STR	 RUCT	JRE #	3 - BRIDGI	Ξ OVER ι	JS 74 BYP
BO	RING N	O . S3_	B1-B		S	TATION 2	3+39		OFFSET	25 ft RT	-		ALIGN	MENT -Y3-		0 HR.	N/A	BOR	ING NO	. S3_E	31-B		S	TATION 2	3+39	
со	LLAR E	LEV. 8	47.6 ft	t	Т	OTAL DEPT	TH 97.1 f	t	NORTHING	G 565,3	308		EASTIN	NG 1,261,683	2	4 HR.	N/A	COL	LAR EL	EV . 84	47.6 ft		т	OTAL DEP	TH 97.1	ft
DRI	LL RIG/I	AMMER	EFF./DA	ATE H	PC2473	CME-550 92	% 12/09/20	15		DRILL	METHO	DD H	I.S. Augers		HAMMER	R TYPE	Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE HF	PC2473	CME-550 92	2% 12/09/20	15
DR	LLER	Contrac	t Drille	er	S	TART DATE	12/14/ 1	7	COMP. DA	TE 12	/14/17	,	SURFA	CE WATER DEP	· •TH N/A			DRIL	LER (Contract	t Drille	r	S	TART DAT	E 12/14/	17
ELE			H BL	ow co	UNT		BLOWS	PER FOOT		SAMP.		L	[¹					ELEV	DRIVE	DEPTH	BLC	JW COI	JNT		BLOWS	PER FOOT
(ft)	(ft)	v (ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 100	NO.	Имо	O G	ELEV. (ft)	SOIL AND RO			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
																						ľ				
850																		770		L	<u> </u> .	L			Mat	ch Line
		ŧ											847.6	GROUN	ID SURFAC	E	0.0		769.1	<u> </u>	4	5	8	· · · · · ·		
	846.	6 = 1.0	5	14	17		• • • •				N4				SIDUAL	ID (A-2-4)				ŧ		ľ				
845		1 3.5					9 31						*		OILT TOTAL	0 (/ 2 4)		765	764.1	83.5					\uparrow	+
	8/1	_ <u> </u>	5	10	16		•26 · · ·				M									Ŧ	8	16	24		· · • • 40	
840	041.		10	6	7	· ·•13					м		- - 839 6				8.0	760		ł		1			.	
	839.	1 8.5	3	5	6						М		-	TAN, SAN	NDY SILT (A	\-4)	0.0		759.1	88.5	13	37	63/0.4		· · Ŀ.	
		Ŧ											835.6				12.0			Ŧ		ľ				
835	834.	$1 + \frac{1}{13.5}$				+ + + +		+ • • • •					- 000.0 •	TAN, SILT	Y SAND (A-	-2-4)	12.0	755	754.1	T 93.5		1			+	+
		+	5	9	9	● 18	3				м		, •							Ŧ	18	82/0.1				
830		Ŧ																	750.5	+ + 97.1						
	829.	1 + 18.5	13	29	71/0.2	· · · <u>·</u>		_ <u></u>	_ <u></u>				- 828.6				19.0		-	ŧ	60/0.0	1				
		ŧ				· · · · · · · · r-			100/0.7	P			827.1	WEATHI RED AND TAN	I, BIOTITE (S K GNEISS	20.5			ŧ		1				
825	024	1 + =							· · · ·				,	RES TAN AND BROWN	SIDUAL	AND (A-2-4	4)		-	‡		1				
	024.	+ 20.0	5	5	14	. ∳1!	 9				м		- -		,		.,			‡		ľ				
000		‡					· · · ·						<u>,</u>							‡		ľ				
020	819.	1 1 28.5	20	80/0.2	-	!		<u> </u>					- 818.6				29.0		-	ŧ		1				
		ţ	20	00/0.2					100/0.7				-	WEATHI WHITE AND	ERED ROC		0.1.5			t		1				
815	_	±				- <u>-</u>		+				<u>An</u>	2 816.1	RE	SIDUAL		31.5			ŧ		I				
	814.	1 33.5	6	8	7						м			TAN, SILT	Y SAND (A-	-2-4)				ŧ		I				
		ŧ					· · · ·						1 - 810.6				37.0			ŧ		ľ				
810	809.	1 38.5			_	 		+	+				-	TAN, FINE S	SANDY SILT	Г (А-4)			-	Ŧ		I				
		Ŧ	4	6	7						M		F							Ŧ		I				
805		Ŧ											805.6			2.4	42.0			Ŧ		I				
	804.	1 43.5	13	13	17		N				М			TAN, SILT	t Sand (A-	-2-4)			-	Ŧ		I				
1/18		Ŧ															47.0			Ŧ						
800	799	1 + 48.5											- 000.0	TAN, FINE S	SANDY SILT	Г (А-4)	47.0		-	Ŧ		I				
T.GD		Ŧ	10	7	10	· · · • • • • • • • • • • • • • • • •					м		F							Ŧ						
0 795		Ŧ				:::``							795.6			•	52.0			ŧ						
N 100	794.	1 1 53.5	14	17	17		<u> </u>						* *	TAN, SILT	Y SAND (A-	-2-4)			-	ŧ		1				
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ල <u>ි</u> 790	700	1 ± 50 5					/		· · · ·				- 790.6 	TAN, SAN	NDY SILT (A	\-4)	57.0		-	‡		1				
- GS	_/09.	- <u></u>	8	6	10	 ● 16	· · · ·				м		-							‡		1				
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0 /00		1 1 63.5	7	12	14	` `							-						-	ŧ		1				
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027 780		. ±					<u>i · · · ·</u>		· · · ·				L						-	‡						
BLE	779.	1 68.5	13	13	15		↓ ↓28				м		L							ŧ						
DOUL		Ŧ					1						L							ŧ						
- 775 - 175	774.	1 ± 73.5					<u> </u>	+	+				F						-	ŧ						
DT B(Ŧ	5	9	14		23				W		773.1	TAN, SILT	Y SAND (A-	-2-4)	74.5			£						
Q 270		Ŧ											*	, -		<i>,</i>				Ŧ						

CLEVELAND		GEOLOGIST Goodnight, D. J	
ASS ON SR 2047 (BORDERS	RD.)	GROUND WTR (ft)
OFFSET 25 ft RT		ALIGNMENT -Y3-	0 HR. N/A
NORTHING 565,3	08	EASTING 1,261,683	24 HR. N/A
DRILL	NETHOD H.	S. Augers HAMN	IER TYPE Automatic
COMP. DATE 12/	14/17	SURFACE WATER DEPTH N	/A
75 100 NO.		SOIL AND ROCK DES	CRIPTION
· · · · ·	<u>∕ MOI G</u>	——————————————————————————————————————) (continued)
	м	.764.6 TAN AND GRAY, FINE SAI WITH LITTLE M	83.0 NDY SILT (A-4) ICA
. 100/0.9 . 100/0.6		758.6 WEATHERED R TAN AND WHITE, BIOT	89.0 DCK ITE GNEISS
60/0.0		750.5 Boring Terminated WITH PENETRATION TEST F Elevation 750.5 ft ON CRYS BIOTITE GNEI	97.1 STANDARD REFUSAL at TALLINE ROCK: SS

WBS	3449	7.1.F56			Т	IP R-270	7D	(COUNT	Y CLEVEI	AND				GEOLOGIST Goodnigh	it, D. J	J.	WB	S 3449	7.1.F56			TIF	• R-270	7D	СО	UNTY
SITE	DESCR	RIPTION	STF	ΝΟΟΤΙ	JRE #	3 - BRIDG	E OVE	R US	74 BYP	ASS ON S	R 2047	(BORI	DER	S RI	D.)		GROUND WTR (ft)	SIT	E DESCI	RIPTION	I STF	ΝΟΟΤ	JRE #3	- BRIDG	E OVEF	≀US 74	BYP
BOR	ING NO	. S3_E	B2-A		S	TATION 2	24+43			OFFSET	21 ft LT				ALIGNMENT -Y3-		0 HR. 66.9	BOF	RING NC) . S3_E	EB2-A		ST	ATION 2	24+43		
COL	LAR EL	EV. 85	5.2 ft		<u>т</u>	OTAL DEP	PTH 92	2.3 ft		NORTHIN	G 565,2	227			EASTING 1,261,604		24 HR. N/A	COL	LAR EL	. EV. 85	55.2 ft		то	TAL DEP	TH 92	3 ft	
DRIL	L RIG/HA	MMER EI	FF./DA	TE H	PC2473	3 CME-550 9	2% 12/09	9/2015			DRILL	METHO	DD	H.S. /	Augers	HAMM	IER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE HP	C2473	CME-550 9	2% 12/09/	/2015	
DRIL	LER C	Contract	Driller		S	TART DAT	E 12/ ⁻	14/17		COMP. DA	ATE 12	/14/17			SURFACE WATER DEP	TH N/	I/A	DRI	LLER	Contract	Drille	r	ST	ART DAT	E 12/1	4/17	
ELEV	DRIVE ELEV	DEPTH	BLC	W CO			BLO	WS PE	R FOOT		SAMP	· 🔨			SOIL AND ROC	K DES	CRIPTION	ELE\	/ DRIVE ELEV	DEPTH	BLC		JNT		BLOW	VS PER F	FOOT
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50		75 100	NO.	Имо	I G	E	.EV. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	
860		+												+				780	+	+		+	+		- <u></u>	atch Lin	ne
		ŦI												F					770 7	Ŧ							
855		Ŧ												F 8!	5.2 GROUND	SURF	ACE 0.0	775	//6./	+ /8.5 +	7	7	11	↓	18		
	854.2	1.0	4	7	10							М	\overline{II}	Ŧ	RED AND BROWN,	IDUAL SAND	Y SILTY CLAY			Ŧ							
	851.7	3.5	8	11	14	::								8		4-7) IE SAN	3.0 JDY SILT (A-4)		771.7	83.5	70	30/0 1					
850	849.2	Ŧ _{6.0}	0		14		25			+ • • • •		M		8	9.7 TAN PROVIN PED			770		Ŧ	'0	30/0.1			+		
	0.40 7	Ŧ	6	17	18		3					м			SAND (A-2-4) WITH	H TRAC	CE TO LITTLE			Ŧ							
845	846.7	+ 8.5	5	7	8		5		· · · · ·			м			M	ICA		765	/66./	<u>+ 88.5</u> T	100/0.5						· · · · · ·
	-	‡									1			-					763.0	+					<u> </u>		
	841.7	- 13.5	6		7] ::[:													705.0	+ 32.2	60/0.1					<u>· · · ·</u>	<u></u>
840	-	‡	0	/		• • • 14			· · · ·			M								Ŧ							
		‡						::												Ŧ							
835	836.7	+ 18.5 +	4	5	5	$\begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \\ \bullet 10 \end{vmatrix}$		· · ·	· · · · ·			м								ŧ							
000	-	‡									11									ŧ							
	831.7	23.5				· · · · ·		· · ·	· · · · ·											ŧ							
830	-	‡	4	6	′	· · •13		•••				M								ŧ							
		‡												8	8.2 RED AND TAN FIN	JE SAN	27.0 JDY SII T (A-4)			ŧ							
825	826.7	+ 28.5	4	6	6	 		· · ·	· · · · ·			м		- -	WITH TR	ACE M	/ICA			ŧ							
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DRIL	LER C	ontract	Driller		S	TART DATE 12/13/1	7	COMP. DA	TE 12/	/14/17		SURFACE WATER DEP	TH N/A		DRIL	LER C	Contract	Driller		ST	ART DAT	TE 12/13/	17
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REFERENCE

CONTENTS SHEET NO. 2 - 3 5-7 8-12

DESCRIPTION

TITLE SHEET

CROSS SECTIONS

LEGEND

SITE PLAN

BORE LOGS

PROFILE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURE #4 - BRIDGE OVER US 74 BYPASS ON US 74 RAMP/LOOP BETWEEN ANTHONY FARM RD. AND US 74

STATE PROJECT REFERENCE NO. STATE SHEETS NO. 12 N.C. R-2707D 1

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6860. 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 CONSDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION FAME AS RECORDED AT AND AND AND AND AND AND AND AND THE SUBSURFACE MOISTURE CONDITIONS MAY VARY CONSDERABLY WITH TWE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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 ADDITIONS TO DEENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

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

PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY ____CROCKETT, S.C.

SUBMITTED BY ______ FALCON ENG. DATE DECEMBER 2022



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586), 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.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZUNE OF WEATHERED RUCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200) (> 35%, PASSING *200) CD010 A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1 A-2	MINERAL NAMES SUCH AS UUARTZ, FELDSPAR, MICA, TALL, KAULIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WUULD YIELD SPI REFUSAL IF TESTED. ROCK TYPE IN
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-75 A-76 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
SYMBOL STORE	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN
Z PASSING		SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS CP) SHELL BEDS, ETC.
*40 30 MX 50 MX 51 MN CLAY PIOUS		WEATHERING
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	<u>ORGANIC MATERIAL</u> <u>SOILS</u> <u>SOILS</u> <u>OTHER MATERIAL</u> TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK HAMMER IF CRYSTALLINE.
PASSING #40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO
LL – – – 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN MOREDATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.
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 RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS
GEN. RATING S. SUBCRANE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	\bigtriangledown PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH
PI 0F A-7-5 SUBGROUP IS ≤ LL - 30 ; PI 0F A-7-6 SUBGROUP IS > LL - 30	OMM- Spring or seep	WITH FRESH ROCK.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LI
PRIMARY SOIL TYPE COMPACTNESS OR PANCE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND Y IF TESTED, WOULD YIELD SPT REFUSAL
CONSISTENCY (N-VALUE) (TONS/FT ²)		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E
GENERALLY VERY LOOSE < 4 CRANNER LOOSE 4 TO 10	SOIL SYMBOL OF OWT TEST BORING SLOPE INDICATOR	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
MATERIAL DENSE 10 TO 30 N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NON-COHESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF
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 V</u>
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY 🛆 PIEZOMETER - SPT N-VALUE	ALSO AN EXAMPLE.
	RECOMMENDATION SYMBOLS	ROCK HARDNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	[XX] UNDERCUT [77] UNCLASSIFIED EXCAVATION - [75] UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	STALLOW UNSUITABLE WASTE STALLOW USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT	TO DETACH HAND SPECIMEN.
(BLDR.) (CBL) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DI
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE O
SOIL MOISTURE - CORRELATION OF TERMS	CLCLAY MODMODERATELY γ -UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE - COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN
(ATTERBERG LIMITS) 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 POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT.SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRAICH FINGERNAIL.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRACS FRACHERS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED
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.
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.0
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6* CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00
PLASTICITY	□ □	INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEI
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST
COLOR		BREAKS EASILY WHEN HIL WITH HAMMER.
		INDURATED 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

PROJECT REFERENCE NO.

2



	TERMS AND DEFINITIONS
D. AN INFERRED	
SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	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
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLUDES GRANITE,	SUM REE.
L PLAIN	LALLAREUUS (LALL.) - SUILS THAT LUNIAIN APPRELIABLE AMUUNTS OF CALCIUM CARBONATE.
IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
MAY NOT YIELD	
TONE, CEMENTED	CURE RECOVERY (REL) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
	HORIZONTAL.
DATINGS IF OPEN.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
HINEN DEORS I	LINE OF DIP. MEASURED CLOCKWISE FROM NORTH.
CK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
5. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
Y. ROCK HAS	PARENT MATERIAL.
AS CUMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH	FIELD.
WHEN STRUCK.	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
VIDENT BUT	ITS LATERAL EXTENT.
RE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
E DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
SHPRULITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
	RUN HNU EXFRESSED HS H FERCENTHUE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
5 REQUIRES	
	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT. THAT HAS BEEN EMPLACED PARALLEL TO
LUWS REQUIRED	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
FP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
ETACHED	OR SLIP PLANE.
	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
R PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
BLOWS OF THE	WITH A 2 INCH UUTSIDE DIAMETER SPLIT SPUUN SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0 I FOOT PER 60 BLOWS
504045470	
FRAGMENIS T. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
PIECES 1 INCH	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
ED READILY BY	THE TUTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BY28-19 / GPS POINT 19
THICKNESS	STATION -L- POT 757+63.92, 13.28' LT
4 FEET	N: 565153.7, E: 1261859.6 ELEVATION: 836.03 FEET
6 - 1.5 FEET	
3 - 0.16 FEET	NUTES:
08 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
0.008 FEEI	
AT, PRESSURE, ETC.	
EEL PROBE:	
PROBE:	





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δU	50		120 130 140	150





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INDUINE CROSS	SECTION ALONG BE	NT LINE DRAWN RONIC FILES	
RED FROM STAN	NTEC DATED AUGUS	or 2017.	640
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GE SKEW: 79°52'3	3" AT END BENT #2		.630
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GEOTECHNICAL BORING REPORT BORE LOG

WB	S 344	497.1.1				TIP	R-2707E)	COUNT	Y CLEVE	LAND			GE	OLOGIST Goodnight	t, D. J.		WB	S 34497	7.1.1			ТІ	P R-2707E)	COUNTY
SITE	SITE DESCRIPTION STRUCTURE #4 - BRIDGE OVER US 74 BYPAS					3S ON US 74 RAMP/LOOP BETW				WEEN	/EEN ANTHONY FARM RD AND USROUND WTR (ft)			SITE DESCRIPTION STRUCTURE						E #4 - BRIDGE OVER US 74 E						
BOF	ring M	IO . S4	L_EB1-/	4		STA	TION 35	5+37		OFFSET	55 ft LT	-		ALI	GNMENT -RAMP_A	۱-	0 HR. 20.9	0.9 BORING NO. S4_EB1-C			ST	ATION 35	+59			
COL	COLLAR ELEV. 715.6 ft TOTAL DEPTH 55.9 ft			NORTHING 559,484			EA	EASTING 1,265,239 24 HR. 17.0			COLLAR ELEV. 729.0 ft					тс	DTAL DEPT	H 53.8 ft								
DRIL	DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85%01/10/2018			1	DRILL METHOD H.S.			I.S. Auge	rs	HAMM	ER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE HPC2						ME-550 85%	01/10/2018							
DRI		Cain,	J.			STA	RT DATE	01/09/1	8			/09/18	<u>/ </u>	SUI	RFACE WATER DEP	TH N/A	Α	DRI		Cain, J.			ST		01/12/18	8
ELE\ (ft)			TH B			+) 2	BLOWS	PER FOO 50	75 10		². ▼ ∕	0		SOIL AND ROC	CK DESC	CRIPTION	ELE\ (ft)		DEPTH (ft)	BLO			0 2	BLOWSF	2ER FOOT
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CLEVELA	ND			GEOLOGIST Goodnight	, D. J.					
S ON US 74	RAMP/L	OOP	BETV	EEN ANTHONY FARM RD AND USROUND WTR (ft)						
OFFSET 2	20 ft LT			ALIGNMENT -RAMP_A	0 HR.	N/A				
NORTHING	559,52	21		EASTING 1,265,220		24 HR.	24.7			
	DRILL N	ETHO) H.S	S. Augers	HAMME	RTYPE	Automatic			
COMP. DAT	FE 01/*	12/18		SURFACE WATER DEPT	H N/A	4				
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GEOTECHNICAL BORING REPORT BORE LOG

SITE DESCRIPTION STRUCTURE #4 - BRIDGE OVER US 74 BYPASS ON US 74 RAMP/LOOP BETWEEN ANTHONY FARM RD AND USROUND WTR (ft) SITE DESCRIPTION STRUCTURE # BORING NO. \$4_EB1-B STATION 35+66 OFFSET 16 ft RT ALIGNMENT -RAMP_A- 0 HR. Dry COLLAR ELEV. 741.6 ft TOTAL DEPTH 69.2 ft NORTHING 559,556 EASTING 1,265,214 24 HR. FIAD DRILL RGHAMMER EFF, DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD HS. Augers HAMMER TYPE Automatic DRILL RGHAMMER EFF, DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD HS. Augers HAMMER TYPE Automatic DRILL RGHAMMER EFF, DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD HS. Augers HAMMER TYPE Automatic DRILL RG HAMMER EFF, DATE HPC2473 CME-550 85% 01/10/2018 DRILL METHOD HS. Augers DRILL RG HAMMER EFF, DATE HPC2473 DRILL ER Cain, J. START DATE 01/15/18 COMP. DATE 01/15/18 SURFACE WATER DEPTH N/A DRILL ER Cain, J. ELEV (ft) DEPTH (ft) D	#4 - BRIDGE OVER US 74 BYPAS STATION 36+59 TOTAL DEPTH 43.6 ft 73 CME-550 85%01/10/2018 START DATE 01/04/18 T BLOWS PER FOOT 5ft 0 25 50 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
BORING NO.S4_EB1-BSTATION 35+66OFFSET 16 ft RTALIGNMENT -RAMP_A-0 HR.DryBORING NO.S4_B1-ACOLLAR ELEV.741.6 ftTOTAL DEPTH 69.2 ftNORTHING 559,556EASTING 1,265,21424 HR.FIADCOLLAR ELEV.732.7 ftDRILL RIGHAMMER EFF./DATEHPC2473 CME-550 85% 01/10/2018DRILL METHODHS. AugersHAMMER TYPEAutomaticDRILL RIGHAMMER EFF./DATEHPC2473 CME-550 85% 01/10/2018DRILL METHODHS. AugersHAMMER TYPEAutomaticDRILL RIGHAMMER EFF./DATEHPC2473DRILL	STATION 36+59 TOTAL DEPTH 43.6 ft 73 CME-550 85%01/10/2018 START DATE 01/04/18 T BLOWS PER FOOT 5ft 0 25 50 4 · · · · · 2 I. ·<
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GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT BORE LOG

WBS	3 34497	7.1.1			Т	IP R-2707	D	COUNT	Y CLEVEL	AND			GEO	DLOGIST Goodnight, D. J.			WB	S 3449	7.1.1			TIF	R -2707	D	COUNTY
SITE	DESCR		STR	UCTU	RE #4	- BRIDGE	OVER US	74 BYPA	SS ON US 74	4 RAMP	LOOF	P BET		ANTHONY FARM RD AND		R (ft)	SITI	E DESCR	RIPTION	STR	UCTUF	 RE #4 -	BRIDGE	OVER US	74 BYPAS
BOR	ING NO.	S4 E	B2-A		S	TATION 3	37+83		OFFSET	57 ft LT			ALI	GNMENT -RAMP A-	0 HR.	Dry	BOF	RING NO.	. S4 E	B2-C		ST	ATION 3	7+86	
COL	LAR EL	 EV. 74	4.4 ft			OTAL DEP	TH 37.7 f	ť	NORTHING	G 559.4	164		EAS			Drv	COL	LAR EL		58.5 ft		то	TAL DEP	TH 53.5	ft
DRIL	L RIG/HAN	/IMER EF	F./DATI	E HPC	2473	CME-550 859	%01/10/2018	;		DRILL	METHO	DD H	I.S. Auger	s HAMI	J MER TYPE Automa	atic	DRIL	L RIG/HAI	VIMER EF	F./DAT	E HPC	 22473 C	ME-550 85%	601/10/201	3
DRIL	LER C	ain. J.			S	TART DAT	E 01/04/1	8	COMP. DA	TE 01/	/04/18	}	SUF		/A		DRI	LLER C	ain. J.			ST	ART DAT	E 01/15/	18
ELEV	DRIVE	DEPTH	BLC	w co	UNT		BLOWS	PER FOO	T	SAMP	. 🗸						ELE\	DRIVE		BLC	w col	JNT		BLOWS	PER FOOT
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имс	DI G	ELEV.	(ft) SOIL AND ROCK DES	SCRIPTION DEF	PTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
745																	760								
	743.4	1.0				<u> </u>							744.4		-ACE IL	0.0			Ŧ						
	740.0	1 35	2	2	2	•4					M			RED AND TAN. SILTY S	Sand (a-2-4)			757.5	<u>+ 1.0</u> +	10	28	36			· · · •
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	715.9	28.5																	ŧ					1:::	
715	-	t	10	16	9]	•25				W		713.9			30.5	730	730.0	28.5	7	9	9		8	
		ł]				WEATHERED R TAN, GRANI	ROCK TE				ŧ				· · · · · · · · · · · · ·	· · ·	
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	706.7	37.7	60/0 0						60/0.0			<i></i>	706.7	Boring Terminated at Fleva	ation 706 7 ft ON	37.7			Ŧ						
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CLEVELA	ND			GEOLOGIST Goodnight	, D. J.							
S ON US 74	RAMP/L	OOP	BETV	/EEN ANTHONY FARM RD AND ψ SROUND WT								
OFFSET	17 ft LT			ALIGNMENT -RAMP_A		0 HR.	Dry					
NORTHING	559,50)2		EASTING 1,264,999		24 HR.	Dry					
	DRILL M	ethod) H.S	S. Augers	HAMME	RTYPE	Automatic					
COMP. DA	TE 01/1	5/18		SURFACE WATER DEPT	H N/A	۸						
75 100	SAMP.		L O	SOIL AND ROC	K DESC	RIPTION						
1			0									
					SURFA	CE	0.0					
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			477	- 755.5 - WEATHE	RED RO	CK	3.0					
- 100/0.6	2			753.0 TAN AND BROW	VN, MIC	A SCHIST	5.5					
		М		TAN BROWN AND	I DUAL WHITE,	SILTY SA	ND					
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• 100/0.7	'			TAN, G	RANITE							
				705.0			53 F					
60/0.0	4		-	Boring Terminated a	t Elevati	on 705.0 ft	: ON					
				UKTSTALLINE	NUCK:	GRANITE						
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				-								

GEOTECHNICAL BORING REPORT BORE LOG

WBS	34497	.1.1			TI	P R-2707		ITY CLE	EVELA	ND			GEOLOGIST C	rockett, S	S. C.		
SITE	DESCR	IPTION	STR	UCTU	RE #4	- BRIDGE C	OVER US 74 BYP	ASS ON	US 74	RAMP/L	LOOP E	BETW	EEN ANTHONY F	ARM RD) AND U	GROUN	ID WTR (ft)
BOR	ing no.	S4_E	B2-B		S	TATION 37	′ +97	OFFS	SET 1	9 ft RT				RAMP_A	-	0 HR.	Dry
COL	LAR ELE	IV. 76	7.6 ft		т	OTAL DEPT	H 45.0 ft	NOR	THING	559,30	04		EASTING 1,264	4,998		24 HR.	Dry
DRILL	RIG/HAN	IMER EF	f./Dati	E HPC	2473 (CME-550 85%	01/10/2018			DRILL N	IETHOD	НS	. Augers		HAMME	RTYPE	Automatic
DRIL	LER C	ain, J.			S	TART DATE	12/21/17	COM	COMP. DATE 12/21/17 SURFACE WATER DEPTH N/A								
ELEV	DRIVE	DEPTH	BLC				BLOWS PER FO	OT 75	100	SAMP.		0	SOIL A	AND ROC	K DESC	RIPTION	
(11)	(ft)	(14)	0.5π	0.51	0.511			75	100	NO.	/ MOI	G	ELEV. (ft)				DEPTH (ft)
770												F					
	766 6 -	- 10					<mark>.</mark>						767.6	0.4' TO RES	OPSOIL		0.0
765			7	13	26		• • • • • • • • • • • • • • • • • • •		• •		D	St.	ORANGE (A-4), I	E AND BR	ROWN, S	SANDY SI PROLITIC	ILT C
		3.5	21	34	34		`	• • • •68 • •	::		D	<u></u>	763.6 ORANGE	E AND BR	ROWN, S	SILTY SAM	4.0 ND
760	761.6 -	- <u>6.0</u>	17	50	50				·			-	(A-2 FRA	2-4) WITH AGMENTS	TRAĆE 5, MICAC	ROCK	
760	759.1	8.5	16	30	42				00/1.0			-	-				
	-	-			72		· · · · · · ·	▶72 · ·	::								
755	-	125						· · · ·	•••								
		- 13.5	18	25	22		· · · • • • • • • • • • • • • • • • • •	· · · ·			D						
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740	-	F					: : : : / : : :		::			-					
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735	734.1	33.5											-				
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730	-	_					 						/				
	729.1	38.5	40	60/0.3				·			-••2		729.1	WEATHE	RED RO	CK	38.5
705	-	_					· · · · · · · ·	-:+÷÷					726.6 ORANG	GE AND E GN	IEISS	BIOTITIE	= 41.0
725	724.1	43.5	10	10	28								- ORANGE	RES E AND BR	idual Rown, S	SILTY SAI	ND
177	-	-		19	20		•••• <u>47</u> •••			-		<u>-</u>	722.6 (A-2 FRA	2-4) WITH AGMENTS	TRACE	ROCK	45.0
	-	-										F	Boring Ter	rminated a	at Elevati TY SAN	ion 722.6 D (A-2-4)	ft IN
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REFERENCE

CONTENTS

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SHEET NO. 4-5 6-7 8-11

DESCRIPTION TITLE SHEET LEGEND SITE PLAN PROFILES CROSS SECTIONS BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _CLEVELAND

PROJECT DESCRIPTION _US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION STRUCTURES #8 & #9 - DUAL BRIDGES ON US 74 BYPASS (-L-) OVER -SRVRD 5-BETWEEN SR 2047 (BORDERS RD.) AND US 74 BUSINESS (E. MARION ST.)

3449 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	11

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE 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 DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 CONDENSION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

PERSONNEL

HPC

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE AUGUST 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586), SOIL CLASSIFICATION	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.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA,
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF.GRAY, SULTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
$(1ASS. (\leq 352 PASSING 200) (> 352 PASSING 200)$	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC,) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL DOCODOCOC		ROCK INCHI ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX GRANULAR SILI- MUCK, SOLIC CLAY DEAT	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
■200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS</u> OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 -3% 3 -5% TRACE 1 -10% LITTLE ORGANIC MATTER 3 -5% 5 -12% LITTLE 10 -20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
LL 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 10 MX 10 MX 11 MN 11 MN MODERATE ORGANIC	HIGHLY URGANIC > 10% > 20% HIGHLY 35% AND ABUVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED ULUUKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STURE FRAUS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SHIND UNAVEL HIND SHIND SUILS SUILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) CRANITOID ROCKS MOST FEIDSPARS ARE DUIL AND DISCOLORED SOME SHOW CLAY ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	- Oulli- Spring or seep		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.
RANGE OF STANDARD RANGE OF UNCONFINED		(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.
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	LEDGE - A SHELF-LIKE RIDGE OF PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL	(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 TU 10 MATERIAL MEDIUM DENSE 10 TO 30 N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
(NON-COHESIVE) DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES FOUR ARRATION AND LACK OF GOOD DRAINAGE.
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING • SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		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.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER OF SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LXX EXCAVATION LZZ UNSUTABLE WASTE LXZ ACCEPTABLE, BUT NOT TO BE	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	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	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
	$- CL CLAY MOD MODERATELY \gamma - UNIT WEIGHT$	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	IU UK LESS IHAN 0.1 FUUL PER 60 BLUWS.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	UP1 - UYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT,) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	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.
RANGE < - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-176
		VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	STATION -L- POT 809+59.85, 18.35' RT
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 THIN Y BEDDED 0.16 - 15 FEET	
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.03 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 F 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY		INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
MODERATELY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM		CRAINS CAN BE SECRADATED EDOM CAMPLE WITH STEEL BOODE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMEN BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



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GEOTECHNICAL BORING REPORT BORE LOG

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GEOTECHNICAL BORING REPORT BORE LOG

WB	S 34497	7.1.1			T	IP R-270	7D		COUNT	Y CLEVEL	AND			GEC	DLOGIST Goodnigh	nt, D. J.		WBS	3 34497	.1.1			TIF	P R-2707	C	COUNT
SITI	E DESCR	RIPTION	STR	UCTU	RE #8	- BRIDGE	ON US	574 B	BYPASS ((-L-) OVER -	SRVRD	_5-					GROUND WTR (ft)	SITE	DESCR	IPTION	STR	UCTU	RE #8 -	BRIDGE	ON US 74	BYPASS
BOF	ring no.	. S8_E	B2-A		S	TATION	810+55			OFFSET	55 ft LT			ALIC	GNMENT -L-		0 HR. 33.5	BOR	ing no.	S8_E	B2-B		ST	ATION 8	10+43	
COL	LAR EL	EV. 73	3.8 ft		Т	OTAL DE	PTH 43	3.6 ft		NORTHING	5 60,7	'86		EAS	STING 1,264,609		24 HR. 30.8	COL	LAR ELI	EV. 73	8.6 ft		тс	TAL DEP	FH 31.5 f	ť
DRIL	L RIG/HAI	MMER EF	F./DAT	E HPO	2473 (CME-550 85	i% 01/10/2	2018			DRILL	METHC	DD H	I.S. Auger	s	HAMM	IER TYPE Automatic	DRIL	RIG/HAN	IMER EF	F./DAT	E HPC	2473 C	ME-550 85%	01/10/2018	
DRI	LER C	Cain, J.			S	TART DA	TE 01/	17/18	3	COMP. DA	TE 01/	17/18	3	SUR	RFACE WATER DEP	TH N/	/Α	DRIL	LER C	ain, J.			ST	ART DATI	E 01/10/1	18
ELE\	DRIVE	DEPTH	BLC	ow co	UNT		BLO	WS P	PER FOOT	г Г	SAMP	· 💙		·				ELEV	DRIVE	DEPTH	BLC	OW CO	JNT		BLOWS	PER FOO
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	60 	75 100	NO.	Имс	DI G	ELEV.	(ft)	0.1.0.2.0	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
735		Ļ												L				740		Ļ						
	732.8	- 1.0		_		<u> I</u>						+		733.8		D SURF.	ACE 0.0 L / 0.6		737.6	- 1.0						
720	730.3	+ 35	3	· /	8	::•	5	•••	 			M		-	TAN AND WHITE	SIDUAL	SAND (A-2-4)	725	705 4	-	14	25	40			
730		+	6	7	10	1	17					м		-	WITH T	RACE N	/ICA	/35		3.5	11	48	52/0.2		· · · · ·	
	727.8	<u>+ 6.0</u> +	4	7	7		 1	· · · ·	· · · · ·			м		-					732.6	6.0	12	16	20		· · · ·	· · · ·
725	725.3	8.5	5	5	7	<i>T</i> .' <i>J</i>		•••						-				730	730.1	8.5	63	37/0 3				<u> </u>
		‡				9 12 	· · · ·	••• •••	 					-						ŧ		5770.5			· · · ·	· · · ·
700	720.2	+				:/::		•••						-				705	705.4	-						
720		+ 13.5	3	4	3			• •				м		-				/25		13.5	14	14	20		. •34 -	+
		‡					 	· · · ·	 											ł					· · · · ·	
715	715.3	18.5	5	6	7	$ \cdot \cdot \cdot$		•••										720	720.1	18.5	12	10	24		·· \ ·	
		‡		Ű	·	●13 / .		· · · ·	 										-	ł	12	10	24		· · · • 42	2
740	710.2	+ =						· ·	 									745		- -					/	
710		- 23.5	4	5	4	. 4 9.						м						/15	<u></u>	23.5	9	9	9		· · · · · · · · · · · · · · · · · · ·	
		ŧ						· · · ·	 											ł						
705	705.3	28.5	5	7	11	\		•••										710	710.1	28.5	5	10	10		λ	
		‡	ľ				118	· ·	· · · ·										-			10	19		4 29	
700	700.2	+ =					- - ` .	· · ·	 				000	701.8	WHITE, SLIGHT	TLY SILT	32.0 TY FINE TO			31.5	60/0.0					
700		<u>+</u> 33.5 +	7	33	28				. •61 .			w	000		COARSE	SAND (/	A-1-b)		-	÷						
		‡					· · · ·	· · · ·	· · · · ·											ł						
695	695.3	38.5	25	55	45/0 3			•••					000	694.8			39.0		-	ŧ						
		‡					· · · ·	••• •••	 	100/0.8					WEATHE TAN AND W	Ered R ('HITE, G	OCK GRANITE			ŧ						
	600.3	+					: : :	•••	· · · · ·					690.3			43 5		-	ŧ						
8	090.3	+	60/0.1						I	60/0.1			5477	<u>690.2</u>		LLINE R			-	ŧ.						
8/27/1		‡												È.	Boring Terminate	d WITH	ISTANDARD			ł						
TOS	-	‡												F	Elevation 690.2 ft IN	CRYST	REFUSAL at FALLINE ROCK:		-	ŧ						
00T.0		‡												È.	GR	ANITE				ŧ						
		‡												È.					-	ł						
l LdS	-	ŧ												F					-	ŧ						
ENT.0		‡												Ł						ŧ						
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22707		Ŧ												E						E						
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DOUE		Ŧ												F						F						
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NCDC		Ŧ												F					.	Ŧ						



GEOTECHNICAL BORING REPORT BORE LOG

WB	S 34497	7.1.1			ТІ	P R-2707	D	COUNT	Y CLEVEL	AND				GEOLOGIST Goodnight,	D. J.		WBS	34497	7.1.1			ТІ	P R-2707)	COUNTY
SIT	E DESCR	IPTION	STR	UCTU	RE #9	- BRIDGE	ON US 74	BYPASS	(-L-) OVER -	-SRVRD	_5-					GROUND WTR (ft)	SITE	DESCR	IPTION	STR	UCTU	RE #9 ·	- BRIDGE C)N US 74 E	BYPASS (
BO	ring no.	S9_E	B1-A		S	TATION a	309+43		OFFSET	20 ft RT	-			ALIGNMENT -L-		0 HR. Dry	BOR	ing no.	S9_E	B1-B		ST	ATION 80	9+52	
CO	LAR EL	EV. 74	1.6 ft		т	OTAL DEF	TH 33.7	ft	NORTHING	G 560,8	358			EASTING 1,264,495		24 HR. Dry	COL	LAR EL	EV . 74	43.2 ft		тс	DTAL DEPT	H 33.8 ft	
DRI	L RIG/HAN	/MER EF	F./DAT	E HPC	2473 (CME-550 859	% 01/10/201	3	•	DRILL	METHO	DD ⊦	H.S. /	Augers	HAMM	ER TYPE Automatic	DRILL	RIG/HAN	MMER EF	F./DAT	E HPC	2473 C	ME-550 85%	01/10/2018	
DRI	L LER C	ain, J.			S	TART DAT	E 01/19/	18	COMP. DA	TE 01	/19/18			SURFACE WATER DEPT	H N/.	A	DRIL	LER C	ain, J.			ST	ART DATE	01/19/18	В
ELE		DEPTH	BLC	W CO	JNT		BLOWS	PER FOO	T	SAMP	. 🗸		Τ.				ELEV	DRIVE	DEPTH	BLC	on wo	UNT		BLOWS F	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	DI G	E	ELEV. (ft)	V DLO	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 5	50
745		Ļ															745		Ļ						
740	740.6	- - - 1.0	3	6	9		<u> </u>		· · · · ·		м		Ę	741.6 GROUND 741.1 0.5' TC	SURF	ACE 0.0	740	742.2	1.0 - 3.5	6	11	19		3 0	· · · · ·
705	738.1	<u>3.5</u>	11	12	13		• 25 • •		 		м			738.6 TAN, SANDY SILT MI TAN AND GRAY, S	(A-4) V CA SILTY S	MITH LITTLE 3.0	705	737.2	- 6.0	14 14	20 25	24 30	· · · · · · · · · · · · · · · · · · ·		4 · · · · · · · · · · • · · · ·
_735	733.1	8.5	11 6	13 7	12 9		25 6		 		M M			LITTLE TO HIGH		CACEOUS	735	- 734.7 -	- 8.5 - -	11	14	18	· · · · · · · · · · · · · · · · · · ·		
730		‡				· · · · · · · · · · · · · · · · · · ·											730	729.7 -	+ + 13.5					· · \ · ·	
	728.1	13.5	11	11	15				· · · · · ·										‡	16	22	23	· · · ·	· · · •	5 · · · · · · · ·
705		‡			15		26		· · · · · ·		M						705		‡					:::i	
125		+ 10 5					/										125	- 724.7 -	+ 18.5 +	11	22	25		· · · ·	47
		+ 10.5 +	3	5	11	/. ●1	6 6		· · · · · ·		м								ŧ					· · · / ·	[
720		ŧ				· · · · · ·											720	719.7-	23.5			10			
	718.1	23.5	6	9	14				· · · · · ·				1						ŧ	10	16	12		● 28 [*] · · ·	
715		ŧ					•23 						-				715		ŧ					···· └-·	· · · ·
710	713.1	+					╹┝╌╌╌		+++++++++++++++++++++++++++++++++++++++	1		<i>91</i>	<u>;</u> 7	714.6 WEATHEF	RED RO	27.0 OCK	715	- 714.7-	+ 28.5 +	34	66/0.3				
		+ 20.3	48	52/0.3					- 100/0.8	♦				GRAY, MI	CA SCI	HIST			ŧ					· · · · ·	
710		ŧ								Į							710	709.7-	- 33.5	100/0 (
	708.1	33.5	100/0 :						100/0 2	↓				707.9		33.7			+	100/0.3	1				
F 8/27/18	-													WEATHERED RC	CK: M	ICA SCHIST									
NC_DOT.GD1		+																-	+						
RENT.GPJ		+ + +																-	+ - - -						
INGS CURF	-												Ē					-	+						
SEO_BORI	-	- -											E					-							
E R2707_(+																	+						
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GEOTECHNICAL BORING REPORT BORE LOG

UNB 4497.11 TPF R-27070 COUNTY	_																	_									
Int E DESCRPTION STRUCTURE #RODOR ON US 74 977832 OPT E DESCRPTION STRUCTURE #RODOR ON US 74 97783 DOULAD ELEV. 76.8.0 TOTAL DEPTH 48.8.1 NORTHON 05070 EASTING 120:4.68 3448 TOTAL DEPTH 40.8.1 DOULAD ELEV. 76.8.1 TOTAL DEPTH 48.8.1 NORTHON 05070 EASTING 120:4.68 3448 TOTAL DEPTH 40.8.1 REIL ROMANCES ELEV. 76.8.1 TOTAL DEPTH 48.8.1 NORTHON 05070 EASTING 120:4.68 Structure #- ROMONE 0500.00 REIL ROMANCES FLOCID CONSTRUCTURE #- ROMONE 0500.00 STATUR 100:0000 COMACE MARKET FLOCID CONSTRUCTURE #- ROMONE 0500.00 REIL ROMANCE FLOCID CONSTRUCTURE #- ROMONE 0500.00 STATUR 100:0000 COMACE MARKET FLOCID CONSTRUCTURE #- ROMONE 0500.00 REIL ROMANCE FLOCID CONSTRUCTURE #- ROMONE 0500.00 SOL MC ROCK CLOCOPHIN 00 SOL MC ROCK CLOCOPHIN 00 REIL ROMANCE FLOCID CONSTRUCTURE #- ROMONE 0500.00 SOL MC ROCK CLOCOPHIN 00 SOL MC ROCK CLOCOPHIN 00 REIL ROMANCE FLOCID CONSTRUCTURE #- ROMONE 0500.00 SOL MC ROCK CLOCOPHIN 00 SOL MC ROCK CLOCOPHIN 00 ROMONE FLOCID CONSTRUCTURE #- ROMONE 0500.00 SOL MC ROCK CLOCOPHIN 00 SOL MC ROCK CLOCOPHIN 00 ROMONE FLOCID CONSTRUCTURE #- ROMONE 0500.00 SOL MC ROCK CLOCOPHIN 00 SOL MC ROCK CLOCOPHIN 00 ROMONE FLOCID CONSTRUCTURE #- ROMONE 0500.00<	WBS	34497	.1.1			Т	IP R-2707	D	COUNT	Y CLEVEL	AND			GE	OLOGIST Goodnight, D. J.			WBS	3 34497	7.1.1			ТІ	R-270	7D	C	OUNT
DORMON 00 SPLECA STATION 81-04-0 OPFREE 2017 BORNO 00. 59_ECS 0 STATION 81-05-0 COLLARAELLEY 70.08 /T TOTAL DEPTH 45.01 NORTHING 00070 LASHING 10.54.01 TOTAL DEPTH 45.01 TO	SITE	DESCR	IPTION	STR	UCTU	RE #9	- BRIDGE	ON US 74	BYPASS	(-L-) OVER ·	-SRVRD	_5-				GROUND	WTR (ft)	SITE	DESCR	IPTION	STR	UCTU	RE #9	BRIDGE	EON US 7	74 BYF	PASS (
COLLAR ELEV. 70.8 A TOTAL DEPTH 43 n NOTINE 500 DELINO 4000 ALTE 0100 100 ALTE 0100 10000 DOULD RELEV. 72.0 fm TOTAL DEPTH 40 n DBULROWANDE FEXALUE (SCO) 4000 SUBJURICES START DATE 01/01/01 COMPACE MATCH 0000 COMPACE 01/01/01 SUBACE WATER DEPTH NA SUBACE WA	BOR	NG NO.	S9_E	B2-A		S	TATION 8	10+48		OFFSET	9 ft RT			AL	IGNMENT -L-	0 HR.	Dry	BOR	Ring No.	S9_E	B2-B		ST	ATION	810+56		
DRL. ROMAINER FLOXE DRL. RETION DRL. RETION MAMEENT FLAXES DRL. RETION DRL. RETION DRL. PROMINER FLAXES SOL AND ADDE 10/1000 DOPLASE SOL AND ROCK DESCRIPTION	COL	AR ELE	EV. 74	0.8 ft		Т	OTAL DEP	TH 48.6 f	ť	NORTHING	G 560,7	766		EA	STING 1,264,548	24 HR.	FIAD	COL	LAR ELI	EV . 74	42.6 ft		т	TAL DE	PTH 39.	7 ft	
DBALLER Can, J. START DATE DUMON PATE DU	DRILL	RIG/HAN	IMER EF	F./DAT	E HPC	2473	CME-550 85%	6 01/10/2018			DRILL	METHO	DH	I.S. Auge	rs HAMMI	ER TYPE Au	utomatic	DRIL	L RIG/HAN	/MER EF	F./DAT	E HPO	C2473 C	ME-550 85	5% 01/10/20)18	
CLLV Decr ELOV COUNT	DRIL	LER C	ain, J.			S	TART DAT	E 01/10/	8	COMP. DA	ATE 01	/10/18		SU	RFACE WATER DEPTH N//	A		DRIL	LER C	ain, J.			ST	ART DA	TE 01/1	0/18	
IP 00 07 0.0 07 0.0 </td <td>ELEV</td> <td>DRIVE ELEV</td> <td>DEPTH</td> <td>BLC</td> <td>ow co</td> <td>UNT</td> <td></td> <td>BLOWS</td> <td>PER FOO</td> <td>т</td> <td>SAMP</td> <td>. V/</td> <td></td> <td></td> <td>SOIL AND ROCK DES</td> <td>CRIPTION</td> <td></td> <td>ELEV</td> <td>DRIVE</td> <td>DEPTH</td> <td>BLC</td> <td>ow co</td> <td>UNT</td> <td></td> <td>BLOW</td> <td>/S PEF</td> <td>R FOOT</td>	ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	т	SAMP	. V /			SOIL AND ROCK DES	CRIPTION		ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOW	/S PEF	R FOOT
29. 20.0	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	I G	ELEV	′. (ft)		DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	
25 10 6 12 10 6 12 10 6 12 10																											
740 733 10 6 12 10 <t< td=""><td>745</td><td></td><td>Ļ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>F</td><td></td><td></td><td></td><td>745</td><td></td><td>Ļ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	745		Ļ											F				745		Ļ							
3/20 10 <		-	ŧ											Ę						<u>†</u>							
1/201 2/212 1/213 3/2 2/213 1/213 3/2 2/213 1/213 3/2 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 2/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 3/213 1/213 1/213 3/213 1/213	740	-	<u> </u>						_					740.8	GROUND SURF	ACE	0.0	740	741.6	+ 1.0 +	3	4	6		· · · · ·	: :	· · · ·
1723 1.3.5 0 1<	740	739.8 -	+ 1.0 +	6	12	19		31			11	D		-	RESIDUAL ORANGE, SANDY CL	_AY (A-6)		740	739.1	3.5	23	31	44				
282 728 10 12 18 12 18 12 18 11 12 13 12 13 14 <		737.3	3.5	8	10	11								<u> </u>	MICACEOUS ORANGE. SILTY SAN	S ID (A-2-4)			736.6 ·	6.0	20			· · · · · ·		: :	
120 18 12 18 12 18 10 10 10 120 135 12 135 12 135 12 135 12 135 12 135 12 135 12 135 12 135 13 13 17 24 135 13 13 17 24 13 13 17 24 13 13 17 24 13 13 13 17 13 17 13 </td <td>735</td> <td>734.8-</td> <td>6.0</td> <td></td> <td></td> <td></td> <td></td> <td>121 </td> <td></td> <td>· · · · ·</td> <td></td> <td></td> <td></td> <td></td> <td>MICACEOUS, SAPR</td> <td>ROLITIC</td> <td></td> <td>735</td> <td></td> <td>‡</td> <td>26</td> <td>36</td> <td>44</td> <td></td> <td></td> <td>· ·</td> <td></td>	735	734.8-	6.0					121 		· · · · ·					MICACEOUS, SAPR	ROLITIC		735		‡	26	36	44			· ·	
1/20 10 <		-		12	18	22		40		· · · · · ·		D							/34.1	- 8.5 -	29	57	43/0.3	· · · ·	· · · · ·	: :	
130 720.1 13.4 22 31.5 9 11 18 72 72.1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 1 13.5 17 21 28 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11 38 11	700	- 132.3 -	- 0.5	18	23	26	1		49			D						700		ŧ				· · · ·	:	: :	· · · ·
122.3 13.5 12 31 25 11 16 11	730	-	ŧ						1		11			1				730	729.1	13.5	17	21	25		· · · · ·	<u>;+</u> ;	
728 735 73 <		727.3	13.5	22	31	25														ŧ		21	25			●46 · ►	
720 723 18.5 9 11 10 11 10 11 10 11 10 11 10	725	-	ŧ			25			6 56									725		ŧ							<u> </u>
2023 108.5 9 11 16		-	± =																724.1	18.5	23	39	32		· · · · ·	: :	
7720 773 22.5 100.7 117.3 22.5 117.3 23.5 117.3 36 540.3 7105 702.3 33.5 10 25 39 100.4 1000.4 <td></td> <td>/22.3</td> <td>18.5 L</td> <td>9</td> <td>11</td> <td>16</td> <td> </td> <td>•27 · · ·</td> <td></td> <td></td> <td></td> <td>м</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ŧ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>: :</td> <td></td>		/22.3	18.5 L	9	11	16		•27 · · ·				м								ŧ						: :	
1713 223.5 32 130.1 1 1 30 640.3 <td< td=""><td>720</td><td>-</td><td>ŧ</td><td></td><td></td><td></td><td></td><td></td><td></td><td><u></u></td><td></td><td></td><td></td><td>ł</td><td></td><td></td><td></td><td>720</td><td>719.1</td><td>23.5</td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td></td></td<>	720	-	ŧ							<u></u>				ł				720	719.1	23.5					<u> </u>		
715 -		717.3	23.5	00	10/0 1			L			1		47	717.8	WEATHERED RO	ОСК	23.0			ł	11	36	64/0.3			: :	
710 7	715	-	Ł	82	18/0.1					100/0.6	•				GRAY, TAN, AND ORANG	GE, GRANITE	E	715		Ŧ							
712.3 28.5 29 710.3		-	Ŧ]			Ŧ					714.1	28.5	20	33	42				
710 700 7		712.3	<u> 28.5 </u>	29	71/0.4					100/0.9										Ŧ							• • •
705 707.3 33.5 10 25 39 10	710	_	Ŧ								41							710	709.1	33.5							
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9 - - PENETRATION TEST REFUSAL at - 1 - Elevation 692.2 ft IN CRYSTALLINE ROCK: - 0 - - 0	z L	-	Ŧ											F	GRAY, GRANI Boring Terminated WITH	TE STANDARD			-	Ŧ							
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2707D

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REFERENCE

CONTENTS

<u>SHEET NO.</u>	DESCRIPTION
I	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION CULVERT #1 - CULVERT ON -L-(US 74 BYPASS) STATION 717+13 OVER UNNAMED TRIBUTARY TO BUFFALO CREEK

3449 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	6

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL CONDENSATIONS FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

GOODNIGHT, D.J.

HPC

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE OCTOBER 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND, OTHER PERTINENT FACTORS, SUCH		REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROLINDNESS OF SOLL GRAINS IS DESIGNATED BY THE TERMS	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC, A-7-6	- ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		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		CRYSTALLINE	SURFACE.
	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOU S THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. 4-1-6 4-2-4 4-2-5 4-2-6 4-2-7 4-7 4-7 4-7 4-1, 4-2 4-4, 4-5	COMPRESSIBILITY		
	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
51MBUL 000000000000000000000000000000000000		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
X PASSING SILT-		(CP)	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MULK, SOLI S CLAY PEAT		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 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	RUCKS OF CUTS MASSIVE RUCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATOM OR ANT PLANAR FEATORE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 10 MX 11 MN	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLL) CRYSTALS ON A BRUKEN SPECIMEN FACE SHINE BRIGHTLY. RUCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS. ORGANIC SOILS		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND CRAVEL AND SAND SOLLS SOLLS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SIND CHARLE AND SHID SOLES SOLES	■ STATIC WATER LEVEL AFTER <u>2</u> ¬ HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	ϵ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FRENT PRETERINE,
AS SUBGRADE POUR	- O-MA- SPRING OR SEEP	WITH FRESH ROCK.	FLUUD PLAIN (FF) - LAND BURDERING A SIREAM, BUILT OF SEDIMENTS DEPUSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CUNSISTENCY OR DENSENESS	MISUELLANEUUS SYMBULS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	INTE - FRACTURE IN ROCK ALONG WHICH NO APPRECIARLE MOVEMENT HAS OCCURRED
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	
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.
CENERALLY VERY LOOSE < 4		(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30	VIST PMT	IT SUME EXTENT. SUME FRAGMENTS OF STRUNG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	UF AN INIERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5			RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZUMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
IEXTURE OR GRAIN SIZE		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 -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
UPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE REDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	TU DETAUH HAND SPECIMEN.	SUICKENSIDE - POUSHED AND STRIATED SURFACE THAT RESULTS FROM ERICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	- CLCLAY MODMODERATELY γ -UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHURE FOR FIELD MOISTURE	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READULY BY KNIFE OR PICK CAN BE EXCAVATED IN ERACMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID: VERY WET. USUALLY		PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	- FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL		
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: ELEVATIONS TAKEN FROM R2707_LS_TNL_180509.TIN DATED
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 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	
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
			4
PLASTICITY			
PLASTICITY INDEX (PI) DRY STRENGTH	LX CME-550X L HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM		CRAINE CON DE CERARATER ERON CAURIES VIEN CTES PROPE	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
MUDIFIEMS SUCH AS LIGHT, DAMK, STMEAKED, ETC. AME USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



2







GEOTECHNICAL BORING REPORT BORE LOG

۱	VBS	3449	97.1.1			TI	P R-2707D		COUNT	Y CLEVELA	ND			GEO	LOGIST	Goodnight	t, D. J.			WBS	34497	7.1.1			TIF	P R-2707	D	COUNTY
5	ITE	DESC	RIPTIO	N US	74, She	lby By	bass from Eas	st of NC ²	150 to Exi	sting US 17,	West of	SR 22	238 (I	_ong Bra	anch Rd)			GROUND W	TR (ft)	SITE	DESCR	IPTION	US	74, She	elby Byp	ass from	East of NC	150 to Exis
E	BORI	NG NG). L_7	1582		ST	ATION 715	+82		OFFSET	96 ft RT			ALIG	SNMENT	-L-		0 HR.	Dry	BOR	ing no.	L_71	689		ST	ATION 7	16+89	
C	OLL	AR E	LEV. 8	12.2 ft		тс	DTAL DEPTH	l 11.7 ft		NORTHING	568,7	00		EAS	TING 1,2	259,470		24 HR.	FIAD	COL	LAR ELI	EV. 80	08.4 ft		тс	TAL DEP	TH 27.4 f	t
0	RILL	RIG/H/	AMMER E	FF./DAT	E HPC	2473 C	ME-550 85% 01	1/10/2018			DRILL N	IETHO	D H.:	S. Augers	;		HAMME	ER TYPE Auto	matic	DRILL	. RIG/HAN	MMER EF	F./DAT	E HPC	C2473 C	ME-550 85%	6 01/10/2018	
0	RILI	LER	Cain, J.			ST	ART DATE	01/29/18	3	COMP. DA	TE 01/2	29/18		SUR	FACE WA	TER DEP	TH N/A	A		DRIL	LER C	ain, J.			ST	ART DAT	E 01/29/1	8
E	LEV	DRIVI ELEV	DEPT	H BLO	ow co	JNT		BLOWS F	PER FOOT	-	SAMP.	∇			SO	IL AND ROO	CK DESC	CRIPTION		ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOOT
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GEOTECHNICAL BORING REPORT BORE LOG

WBS 34497.1.1 TIP R-2707D COUNTY CLEVELAND					GEOLOGIST Goodpight D. I											
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DRIL	LER C	ain, J.			S	TA	RT DA	TE	01/29/1	8	CO	MP. DA	TE 01/2	29/18		SURFACE WATER DEPTH N/A
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REFERENCE

CONTENTS

<u>SHEET NO.</u>	DESCRIPTION
I	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION CULVERT #2 - CULVERT ON -L-(US 74 BYPASS) STATION 743+18 OVER UNNAMED TRIBUTARY TO BUFFALO CREEK

3449 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	6

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL CONDENSATIONS FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

GOODNIGHT, D.J.

HPC

INVESTIGATED BY _____GOODNIGHT, D.J.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE OCTOBER 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND, OTHER PERTINENT FACTORS, SUCH		REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR BOLINDNESS OF SOLL GRAINS IS DESIGNATED BY THE TERMS	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC, A-7-6	- ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		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		CRYSTALLINE	SURFACE.
	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOULS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. 4-1-6 4-2-4 4-2-5 4-2-6 4-2-7 4-7 4-7 4-7 4-1, 4-2 4-4, 4-5	COMPRESSIBILITY		
	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
51MBUL 000000000000000000000000000000000000		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
X PASSING SILT-		(CP)	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MULK, SOLI S CLAY PEAT		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	RUCKS OF CUTS MASSIVE RUCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATOM OR ANT PLANAR FEATORE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 10 MX 11 MN	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLL) CRYSTALS ON A BRUKEN SPECIMEN FACE SHINE BRIGHTLY. RUCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS. ORGANIC SOILS		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND CRAVEL AND SAND SOLLS SOLLS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SIND CHARLE AND SHID SOLES SOLES	✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u>▶ PERCHED</u> WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FRENT PRETERINE,
AS SUBGRADE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLUUD PLAIN (FF) - LAND BURDERING A SIREAM, BUILT OF SEDIMENTS DEPUSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CUNSISTENCY OR DENSENESS	MISCELLANEUUS SYMBULS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	INTE - FRACTURE IN ROCK ALONG WHICH NO APPRECIARLE MOVEMENT HAS OCCURRED
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	
CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION DF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
CENERALLY VERY LOOSE < 4	SOTI SYMBOL STATEST BORING SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30		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	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTICES OF ORIGINAL ROCK FARRIC REMAIN JE TESTED WOULD VIELD SPT N VALUES (100 RPE	UF AN INIERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5			RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SOIL BOUNDARY A PIEZUMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
IEXTURE OR GRAIN SIZE		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		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
UPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE REDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	TU DETAUH HAND SPECIMEN.	SUICKENSIDE - POUSHED AND STRIATED SURFACE THAT RESULTS FROM ERICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	- CL CLAY MOD MODERATELY γ - UNIT WEIGHT γ	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A CEDLOGIST'S PICK	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHURE FOR FIELD MOISTURE	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READULY BY KNIFE OR PICK CAN BE EXCAVATED IN FRAMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID: VERY WET. USUALLY	DPT - DINAMUC PENEIRATION TEST SAP SAPROLITIC S - BULK e - VNID RATIO SD SAND SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	- FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS /// - MOISTURE CONTENT CRR - CALIFORNIA REARING		
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: ELEVATIONS TAKEN FROM R2707_LS_TNL_180509.TIN DATED
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM _ OPTIMUM MOISTURE - MOIST - (M) SULIU; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
			4
PLASTICITY			4
PLASTICITY INDEX (PI) DRY STRENGTH	ARD FACED FINGER BITS	FUR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM			
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PRORE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOUSE LEND DUCH HO LIUHT, DHAN, DINEHNED, EIL, ARE USED IU DESURIBE AFFEAKANLE.		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



2





GEOTECHNICAL BORING REPORT BORE LOG

WB	3449	97.1.1	l				TIP	R-2	27070)		COU	NTY	CLEV	ELAN	ID			G	EOLOGIST G	odnight, D. J			WB	S 344	497.1.1				TI	P R-27	707D		COL	JNTY	CLEVE	ELAND)			GEO	LOGIS	T Goor	dnight, C). J.		
SITE	DESC	ripti	ION	US 7	74, Sł	nelby	Вура	ass fr	om E	ast of	NC 1	50 to	Existi	ing US	17, V	Vest of	SR 2	238 (Long	Branch Rd)		GROUND	WTR (ft)	SITE	DES	CRIPT	ION	US 74	4, She	lby By	pass fro	om Eas	st of NC	150 to	o Exist	ng US ′	17, We	est of S	SR 22	238 (L	ong Bra	anch Ro	d)		GRC	DUND W	TR (ft)
BOF	NG NC) . L_	_7426	61			STA		N 74	2+61			c	OFFSE	T 13	84 ft L1	-		A	LIGNMENT -L		0 HR.	2.0	BOF	ring n	10 . L <u></u>	_7430	00		SI	TATION	I 743	+00			OFFSET	CL				ALIG	INMEN	π -L-		0 H	R.	7.9
COL	AR E	LEV.	751	.0 ft			тот		DEPT	H 24	4.9 ft		N	ORTH	ling	566,4	61		E	ASTING 1,260	,921	24 HR.	1.5	COL	LAR I	ELEV.	759	.4 ft		т	DTAL D	EPTH	24.01	ť	1	IORTHI	NG 5	66,34	7		EAS	ΓING	1,260,84	40	24 H	R.	6.8
DRIL	RIG/H/	MME	R EFF.	/DATI	E HF	PC247	3 CN	1E-55(0 85%	01/10/	2018					DRILL	IETHO	D H	.S. Aug	gers	HAM	MER TYPE A	utomatic	DRIL	L RIG/H	HAMME	R EFF.	/DATE	HPC	2473 C	CME-550	85% 01	/10/2018				DF	RILL ME	THOD) H.S	6. Augers			H/	AMMER TYP	PE Autor	matic
DRI	LER	CAIN	, J.				STA	ART I	DATE	01/	/24/18	3	C	COMP.	DAT	E 01/	24/18		SI	URFACE WATE	R DEPTH N	I/A		DRI	LER	Cain,	J.			ST		ATE	01/24/	8	0	COMP. [DATE	01/2	5/18		SURF	FACEV	NATER	DEPTH	N/A		
ELE\ (ft)	DRIVE ELEV (ft)	, DEI (1	PTH ft)	BLC 0.5ft	0W C0	DUNT	5ft	0	2	BLC	WS P 5	PER FC	OOT 75	5	100	SAMP. NO.	мс		ELE	SOIL A EV. (ft)	ND ROCK DES	SCRIPTION	DEPTH (ft)	ELEV (ft)	/ DRIN ELE (ft)	VE EV DE) (PTH ft) (BLO\ 0.5ft	W COU 0.5ft	JNT 0.5ft	0	25	BLOWS	PER F 50	OOT 7	5 1	00 S	AMP. NO.	моі	C G		<u>ج</u>	30IL ANE	D ROCK I	DESCRIPT	ION	
755																			_					760																	-759.4			0.3' TOP	SOIL		0.0
																			- - - 751	.0 0	ROUND SUR	FACE	0.0	755	758 755	1.4 <u>+</u> 1 - - 	.0 6.5	1 NOH 1	2 WOH	2	• 4	· · · · · · · · · · · · · · · · · · ·	· · · · ·		· · ·	· · · · · · ·	- - -		М			REI	D BROW (A-2-4) '	ALLUV N AND T WITH SC	IAL AN, SILTY ME GRAVI	SAND EL	
750	750.0	1	.0	2	3	2	,	1							_				-	TAN ME		SILTY SAND)	100	753		i.0		won		₽1						-		W		753.9				<u> </u>		5.5
	747.5	+ + 3 + 3	5.5	1	2	2	: :	∳5 	· · · ·	 	· · · ·	· · · ·	 	· · · ·	- -	SS-64	5%		748	(A-2-4)	VITH SOME G COBBLES	RAVEL AND		750	750		8.5 V	з NOH	1 WOH	1	●2 · · · · ·	· · ·	· · · · ·		· · ·	· · · ·			w			TAN	AND GR. HIG	AY, FINE HLY MIC	SANDY SI ACEOUS	LT (A-4)	
745	745.0		.0	1	2	2	2	¶4 · 	•••	•••	•••	· ·	· ·	· · · ·	• 	SS-65	41%	X X X X		BROWN G (A-5) WI	RAY AND TAN TH LITTLE TO	I, CLAYEY SII SOME MICA	LT		745		3.5					· · · ·	· · · · ·	· · · ·	• • • •	· · · · · ·	. .				747.4		ROWN, S		ND (A-2-4)	with -	<u> </u>
	742.5	<u>+</u> 8	5	1	1	2	2	■3	 				 	 	-		w	レ マ レ マ マ レ マ マ レ マ						745			5.0	2	1	2	•3	· · ·	· · · · ·			· · · ·	- - -		Sat.		- 742.4			SOME	/ICA		17.0
740		Ŧ						1.										レス	739	.0 GRAY AND	BROWN, SILT	Y SAND (A-2	<u> 12.0</u> -4)	740	740		8.5	2	9	7	· · · ·	•16	· · · · ·		· · ·	· · · ·			W			TAN	VAND BE WITH SC	ROWN, S DME MIC FRAGME	ANDY SIL A AND RO NTS	T (A-4) CK	
735		<u>+ 1</u> ; + +	3.5	10	4	4		•	 	· · · · ·	· · · ·	· · · ·	· · · ·	· · · · · ·			w			WITH S	OME ROCK FI	RAGMENTS			<u>735</u> 735		3.5	00/0 4			· · · · · · · · · · · · · · · · · · ·	· · ·	 : 								735.4	TA	WE N AND B	ATHERE ROWN, I	D ROCK BIOTITE G	NEISS	24.0
	732.5		8.5		5			+ + + + + +		· · · ·	•••	•••	 	· · ·					7 <u>34</u>	<u></u> BRO	WN, SANDY S	BILT (A-4)	<u> </u>			-	6	60/0.0								60/0	0.0				—	Borinç CRY	g Termina STALLIN	ated at E IE ROCK	levation 73 BIOTITE (5.4 ft ON GNEISS	
730		ļ		4	5		,	· · ·	•13 	· · ·	· · · ·	· · · ·	· ·	· · · ·	• •		M		- - - 729	10			22.0			+															—						
	727.5	+ + 23 +	3.5	21	27	73/0	0.4	· · · ·	· · ·			 	· · ·	· · · ·					726	TAN AND	Veathered F Brown, Bio	R OCK TITE GNEISS	S 24.9																		—						
		+												100	/0.9 [●]				-	Boring Terr WEATHEF	ninated at Elev RED ROCK: Blo	ation 726.1 ft OTITE GNEIS	IN SS			ļ																					
																			F																						—						
/18		+																	-																						- -						
GDT 10/1																																									_						
NC_DOT.																			-							ļ																					
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NCDOT		+																	-							ļ																					

GEOTECHNICAL BORING REPORT BORE LOG

WBS	34497	.1.1			T	P R-2	2707D)	CC	OUNTY	CL	EVELA	ND			GEOLOGIST Goodnight	t, D. J.		
SITE	DESCR	IPTION	US 7	74, She	elby By	pass fr	om E	ast of N	C 150	to Exis	sting l	JS 17,	West of	SR 22	238 (I	Long Branch Rd)		GROUN	D WTR (ft)
BOR	ing no.	L_74	390		S	ΤΑΤΙΟ	N 74	3+90			OFF	SET ·	126 ft R1	-		ALIGNMENT -L-		0 HR.	9.3
COL	LAR ELE	EV . 76	2.3 ft		Т	OTAL	DEPT	H 19.3	3 ft		NOR	THING	566,19	98		EASTING 1,260,798		24 HR.	7.6
DRILI	RIG/HAN	IMER EF	F./DATI	E HPC	C2473 (CME-55	0 85%	01/10/20 [/]	18	1			DRILL M	ETHO	о н.:	S. Augers	HAMM	ER TYPE	Automatic
DRIL	LER C	AIN, J.			S	TART	DATE	01/24	/18		COM	P. DA	FE 01/2	24/18		SURFACE WATER DEP	TH N//	A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W CO 0.5ft	UNT 0.5ft	0	2	BLOW	S PER 50	FOOT	75	100	SAMP. NO.	моі	L O G	SOIL AND ROC	X DES	CRIPTION	DEPTH (ft)
765 760		- - - - 3.5	1	1	1	• • • • • • • • • • • •	· · ·	· · · ·	 	· · · ·				M		762.3 GROUNE 761.6 0.7' T ALL TAN, SILTY 757.8) SURF/ OPSOIL UVIAL SAND	ACE - (A-2-4)	0.0
755	756.3	6.0 - 8.5	2	9	10		19		· ·	· · · ·						RES BROWN, SILTY -754.3 SOME ROCH	SAND (A	A-2-4) WIT MENTS	H T T
750	748.8	- 13.5	1	2	2 36	•4			• • •	· · · ·				w		AND BROWN (A-4) WITH 750.3 BROWN AND GRA WITH SOME RO	Y, SILTY	MICA <u>SAND</u> (A AGMENTS	<u>12.0</u> -2-4)
745	743.8 -	- 18.5	20	80/0.3			· · ·						-			746.3 TAN AND BROW 743.0	RED RO	DCK TTE GNIES	16.0 SS 19.3
																Boring Terminated WEATHERED ROU	at Eleva CK: BIO	tion 743.0 TITE GNE	ft IN ISS

2707D

R

REFERENCE

CONTENTS

<u>SHEET NO.</u>	DESCRIPTION
I	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION _US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD.)

SITE DESCRIPTION CULVERT #3 - CULVERT ON -L-(US 74 BYPASS) STATION 796+86 OVER UNNAMED TRIBUTARY TO BUFFALO CREEK

3449 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	6

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS 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 OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL CONDENSATIONS FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

GOODNIGHT, D.J.

INVESTIGATED BY _____GOODNIGHT, D.J.

HPC

DRAWN BY _____CROCKETT, S.C.

CHECKED BY HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE OCTOBER 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND, OTHER PERTINENT FACTORS, SUCH		REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR BOLINDNESS OF SOLL GRAINS IS DESIGNATED BY THE TERMS	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC, A-7-6	- ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		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		CRYSTALLINE	SURFACE.
	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOU S THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. 4-1-6 4-2-4 4-2-5 4-2-6 4-2-7 4-7 4-7 4-7 4-1, 4-2 4-4, 4-5	COMPRESSIBILITY		
	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
51MBUL 000000000000000000000000000000000000		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
X PASSING SILT-		(CP)	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MULK, SOLI S CLAY PEAT		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	RUCKS OF CUTS MASSIVE RUCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATOM OR ANT PLANAR FEATORE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 10 MX 11 MN	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLL) CRYSTALS ON A BRUKEN SPECIMEN FACE SHINE BRIGHTLY. RUCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS. ORGANIC SOILS		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND CRAVEL AND SAND SOLLS SOLLS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SIND CHARLE AND SHID SOLES SOLES	✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u>▶ PERCHED</u> WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FRENT PRETERINE,
AS SUBGRADE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLUUD PLAIN (FF) - LAND BURDERING A SIREAM, BUILT OF SEDIMENTS DEPUSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CUNSISTENCY OR DENSENESS	MISCELLANEUUS SYMBULS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	INTE - FRACTURE IN ROCK ALONG WHICH NO APPRECIARLE MOVEMENT HAS OCCURRED
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	
CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION DF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
CENERALLY VERY LOOSE < 4	SOTI SYMBOL STATEST BORING SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30		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	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTICES OF ORIGINAL ROCK FARRIC REMAIN JE TESTED WOULD VIELD SPT N VALUES (100 RPE	UF AN INIERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5			RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SOIL BOUNDARY A PIEZUMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
IEXTURE OR GRAIN SIZE		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		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
UPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE REDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	TU DETAUH HAND SPECIMEN.	SUICKENSIDE - POUSHED AND STRIATED SURFACE THAT RESULTS FROM ERICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	- CL CLAY MOD MODERATELY γ - UNIT WEIGHT γ	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A CEDLOGIST'S PICK	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHURE FOR FIELD MOISTURE	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READULY BY KNIFE OR PICK CAN BE EXCAVATED IN FRAMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID: VERY WET. USUALLY	DPT - DINAMUC PENEIRATION TEST SAP SAPROLITIC S - BULK e - VNID RATIO SD SAND SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	- FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS /// - MOISTURE CONTENT CRR - CALIFORNIA REARING		
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: ELEVATIONS TAKEN FROM R2707_LS_TNL_180509.TIN DATED
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM _ OPTIMUM MOISTURE - MOIST - (M) SULIU; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
			4
PLASTICITY			4
PLASTICITY INDEX (PI) DRY STRENGTH	ARD FACED FINGER BITS	FUR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM			
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PRORE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOUSE LEND DUCH HO LIUHT, DHAN, DINEHNED, EIL, ARE USED IU DESURIBE AFFEAKANLE.		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



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GEOTECHNICAL BORING REPORT BORE LOG

WE	S 3449	7.1.1			Т	IP R-2707	D	COUNT	Y CLEVEL	AND			GEO	OGIST Weis, J.	M.		WB	S 3449	7.1.1			ТІ	P R-27		CO	UNT
SIT	E DESC	RIPTION	US 7	'4, She	elby By	/pass from E	East of NC	150 to Ex	isting US 17	, West o	f SR 2	238 (Long Bra	nch Rd)		GROUND WTR (ft)	SITI	E DESCR		US	74, She	lby By	bass from	n East of	NC 150 t	o Ex
во	RING NO) . L_79	685_L ⁻	Г	S	TATION 7	96+85		OFFSET	149 ft L ⁻	т		ALIG	NMENT -L-		0 HR. 4.8	BOF	RING NO.	L_79	685_R	т	ST	ATION	796+85		
со	LLAR EI	EV . 67	76.4 ft		т	OTAL DEP	TH 20.0 f	ť	NORTHING	G 562,0)77		EAST	ING 1,264,141		24 HR. 4.7	COL	LAR EL	EV. 6	76.7 ft		тс	DTAL DE	PTH 19	.8 ft	
DRI	LL RIG/HA	MMER EF	F./DAT	E HPC	2473 (CME-550 85%	6 01/10/2018		•	DRILL	METHO	DD H	.S. Augers		HAMM	ER TYPE Automatic	DRIL	L RIG/HAI	MMER EI	F./DAT	E HPC	2473 C	ME-550 8	5% 01/10/2	018	
DR	ILLER	Cain, J.			S	TART DAT	E 04/30/1	18	COMP. DA	TE 04/	/30/18		SURF	ACE WATER DEF	TH N/	A	DRI	L LER C	ain, J.			ST	ART DA	TE 05/(01/18	
ELE		DEPTH	BLC	w co	UNT		BLOWS	PER FOOT	Γ	SAMP	. 🔨					CRIPTION	ELE\		DEPTH	BLC	ow co	UNT		BLO	WS PER F	:00
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GEOTECHNICAL BORING REPORT BORE LOG

STE DESCRIPTION 274. Shelty Bypass from East of NC 150 to Existing US 17. West of SR 2238 (Long Branch R0) GROUNI BORING ND. L. 79700 STATION 757-00 OPFSET CL. ALIGNMENT -L. GROUNI COLLAR ELEV 678.9 ft TOTAL DEPTH 19.9 ft NORTHING 502.003 EASTING 1.264.011 24 HR. DBILL RICHAMMER EFF.DATE HPC2/07 CME-580 8% 01/10/2018 DBILL METHOD H3. Auges HAMMER TYPE DRULE RE Can, J. START DATE 04/3018 COMP. DATE 04/3018 SURFACE WATER DEFTH NA ELEV DRV 0.11 0.21 0.25 0.07 NO. NO. SOL AND ROCK DESCRIPTION 680	WBS	34497	.1.1			Т	IP R-	27070)		COUN	ITY	CLEVE	LAND			GEOLO	GIST Weis, J. I	M.			
BORNNO NO. L_TS700 STATION 797-00 OFFSET ALLGAMENT 0 HR. COLLAR ELEV. 678.9 ft TOTAL DEPTH 19.9 ft NORTHING 562.003 EASTING 124.011 24 HR. DRILL RCHAMMER EFFLDATE IPC247 3 CME5008850 (0102016 DRILL MEHTOH 14.040.011 24 HR. DRILL RCHAMMER EFFLDATE IPC247 3 CME500850650 (0102016 DRILL MEHTOH 14.040.011 3URFACE WATER DEPTH NA DRILL RCHAMMER TF_LOT ISTART DATE 043018 COMP. DATE 043018 SURFACE WATER DEPTH NA DEV UN 0.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	SITE	DESCR	IPTION	US 7	74, She	elby By	/pass f	rom E	ast of I	NC 1	150 to I	Existir	ng US 1	7, West o	of SR 22	238 (Long Branc	h Rd)		GROU	ND W	۲R (ft)
COLLAR ELEV. 078.0 ft TOTAL DEPTH 19.0 ft NORTHING 562.03 EASTING 1,264,011 24 HR. DRILL RICHAMMER EF.0.014 CMP.DATE INCATA START DATE 04/30/18 COMPLOTE CASUNG 1,264,011 24 HR. DRILL RICHAMMER EF.0.01 START DATE 04/30/18 COMPLOTE CASUNG SURFACE WATER DEPTH INA ELEV DRIVE (10) 0.51 0.425 50 75 100 SURFACE WATER DEPTH INA ELEV DRIVE (10) 0.51 0.51 0.25 50 75 100 Lev.m. SOIL AND ROCK DESCRIPTION 080	BORI	NG NO.	L_79	700		S	TATIC	N 79	97+00			0	FFSET	CL			ALIGN	MENT -L-		0 HR.		13.7
DRILLER Cain, J. START DATE UAX018 DRILLER MITHO I.S. Agent HAMMER TYPE DRILLER Cain, J. START DATE 0.430/18 COMP. DATE 0.430/18 SURFACE WATER DEPTH NA ELEV DEVT MOUNT BLOWS PERFOOT SURFACE WATER DEPTH NA SURFACE WATER DEPTH NA 680	COLI	LAR ELI	EV. 67	'8.9 ft		Т	OTAL	DEPT	H 19	.9 ft		N	ORTHIN	IG 562,	003		EASTIN	IG 1,264,011		24 HR.		3.9
DRULER Cain, J. START DATE DATA DATE OLOWP. DATE <tholowp. date<="" th=""> OLOWP. DATE <tholowp.< td=""><th>DRILL</th><td>RIG/HAN</td><td>IMER EF</td><td>F./DATI</td><td>E HPO</td><td>C2473</td><td>CME-58</td><td>50 85%</td><td>01/10/2</td><td>018</td><td></td><td></td><td></td><td>DRILL</td><td>Metho</td><td>DH.</td><td>S. Augers</td><td></td><td>HAMM</td><td>ER TYPE</td><td>Autor</td><td>natic</td></tholowp.<></tholowp.>	DRILL	RIG/HAN	IMER EF	F./DATI	E HPO	C2473	CME-58	50 85%	01/10/2	018				DRILL	Metho	DH.	S. Augers		HAMM	ER TYPE	Autor	natic
ELEV DENVE (II) DELOW COUNT (III) DELOWS PER FOOT SAMP Sold and count of the second second of the second	DRIL	LER C	ain, J.			S	TART	DATE	04/3	80/18	3	C	omp. d	ATE 04	/30/18		SURFA	CE WATER DEP	TH N/2	A		
680 072.0 1.0 2 3 3 5 0.0	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W CO 0.5ft	UNT 0.5ft	0	2	BLOV 25	NS P 5	PER FO	OT 75	10	0 SAMI	Р. Т МОІ	L O I G	ELEV. (ft)	SOIL AND RO	CK DES	CRIPTION	N D	<u>EPTH (f</u> i
	ELEV (ft) 680 675 670 665 660 660	DRIVE ELEV (ft) 677.9 675.4 675.4 675.4 667.4 667.4 6665.4 6665.4 6660.4 6 6660.4 6 6660.4 6 6 6 6 6 6 6 6 6 6 6 7 8 6 7 8 6 7 8 7 8	DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5	BLC 0.5ft 2 3 18 20 14 18	0.5ft 2 3 21 32 26 49	UNT 0.5ft 3 3 3 3 5 3 4 28 3 5 1/0.4 5 1/0.4			BLOV 25	WS P 5				SAMI			ELEV. (ft)	GROUN 0.5'T ALI BROWN, CLAYE BROWN, CLAYE TAN, GRAY AND (A-2-4) WITH FRAC WEATHI TAN AND WH Boring Terminated WEATHERED R	CK DESC D SURF, TOPSOIL LYNAL XSAVEL NDY CL SIDUAL WHITE, H TRACI GMENTS	ACE (A-2-6) W AY (A-6) SILTY S/ E ROCK S OCK A SCHIS ⁻ tion 659.0 ICA SCHI	N D	<u>PTH (ff</u>