# **CONTENTS** 240066 SHEET NO.

SF-

REFERENCE

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

**DESCRIPTION** 

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CRAVEN

PROJECT DESCRIPTION BRIDGE NO. 66 ON -L- (SR 1232) OVER GRAPE CREEK AT STA. 20+61

# ROOI **P**2. R PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-240066	1	6

#### **CAUTION NOTICE**

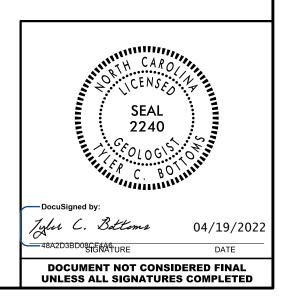
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 TO7-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAIL

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 UNPELACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY YARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR 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 OF FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR CUARANTEED BY THE N.C.DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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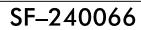


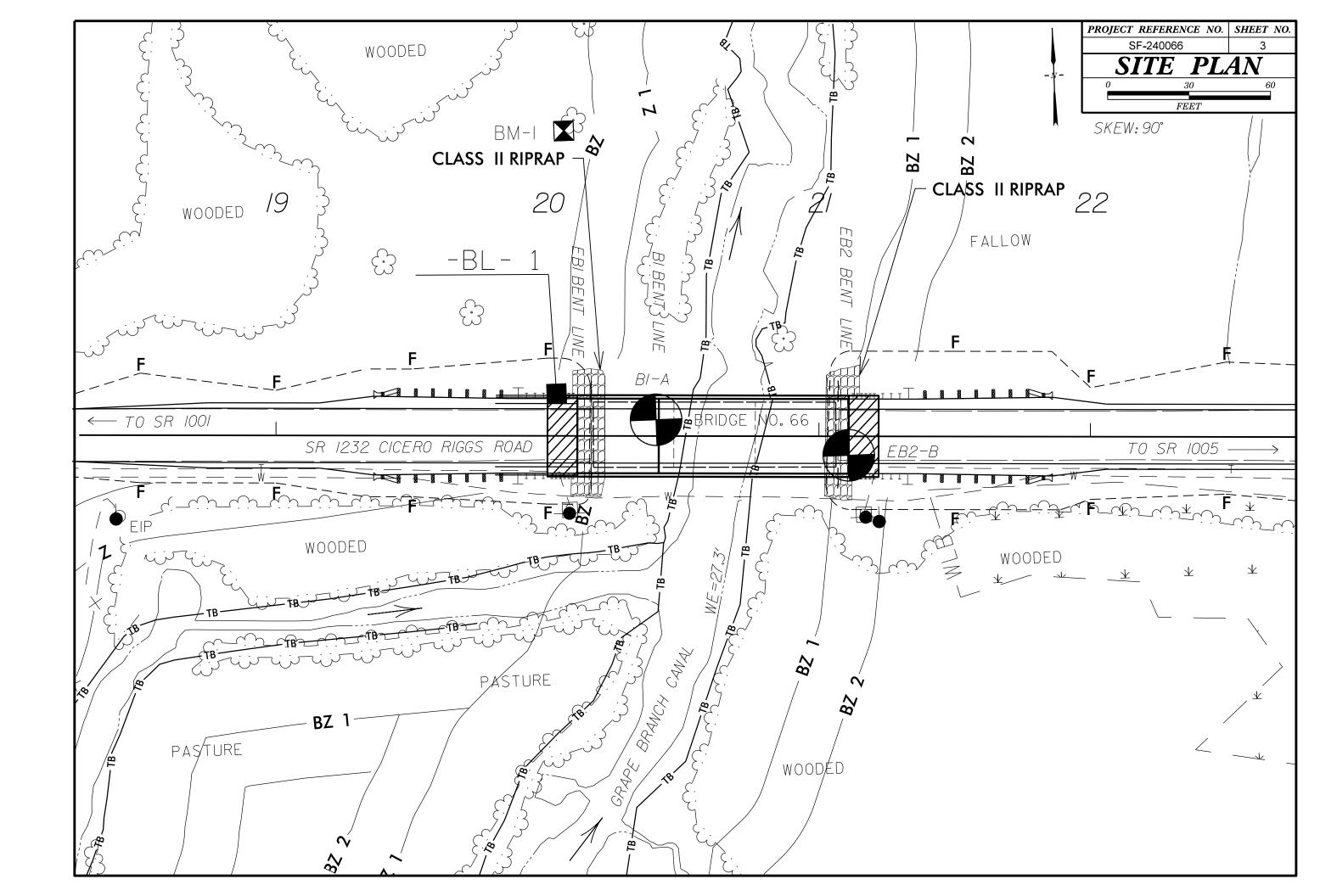
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

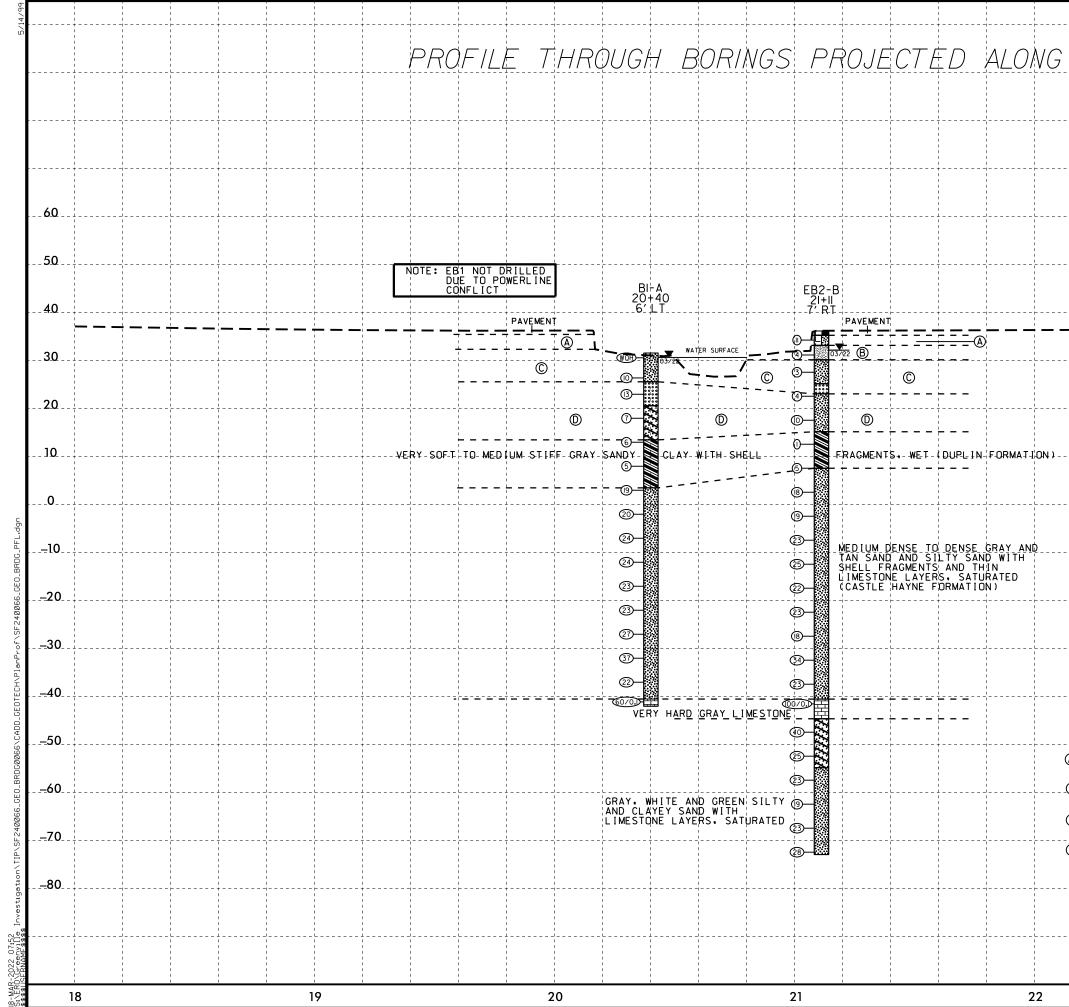
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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.				
BE PENETRATED WITH A CONTINUOUS FLICHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	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. 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:	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 IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.				
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:					
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	50//650///2	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.				
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT				
	MINERALOGICAL COMPOSITION	THE TO COARSE CRAIN ICHEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND				
CLASS. (≤ 35% PASSING #200) (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	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 THEY ARE CONSIDERED OF SIGNIFICANCE.	EINE TO COAPES CRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.				
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	BOCK (MCD) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM				
SYMBOL COCCOCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	SLIGHTLY COMPRESSIBLE LL < 31		OF SLOPE.				
	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK STORE, CEMENTED SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.				
7. PASSING 10 50 MX GRANULAR SILT-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.					
■40 30 MX 50 MX 51 MN SOILS SOILS SOILS SOILS	GRANULAR STLT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.				
• 200         15         MX         25         MX         35         MX         35         MX         35         MX         36         MN         36         MN	URGANIC MATERIAL SULS SULS UTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE				
MATERIAL	TRACE OF ORGANIC MATTER         2         -3%         3         -5%         TRACE         1         -10%           LITTLE ORGANIC MATTER         3         -5%         5         -12%         LITTLE         10         -20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.				
PASSING *40	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	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.				
	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 STORE FRACS.	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.				
DE MAIDE GRAVELAND FINE SILIY OR CLAYEY SILIY CLAYEY MAITER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.				
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM				
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.				
AS SUBURAUE PUUR		WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.				
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.				
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.					
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.				
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.				
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.				
GRANILAR LOOSE 4 TO 10	SOIL SYMBOL OF DAT TEST BORING SLOPE INDICATOR	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS				
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER OUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.				
(NON-COHESIVE) VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE				
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING • SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.				
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.				
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF				
MATERIAL         STIFF         8 T0 15         1 T0 2           (COHESIVE)         VERY STIFF         15 T0 30         2 T0 4	TTTTTT	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE				
HARD > 30 > 4		ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.				
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS		SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.				
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - MARTIN -	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	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				
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.				
(PLDR) (CDR) (GR) SAND SAND (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				
(CSE. SD.) (F SD.) (CSE. SD.)	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 CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL				
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.				
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 FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY				
(ATTERBERG LIMITS) DESCRIPTION OF DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.				
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST         SAP         SAPROLITIC         S - BULK           e - VOID RATIO         SD         SANDY         SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY				
(SAT.) FROM BELOW THE GROUND WATER TABLE	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) SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES         TCR - TRICONE REFUSAL         RT - RECOMPACTED TRIAXIAL           FRAGS FRAGMENTS         w - MOISTURE CONTENT         CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING					
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BL-I N 521666.5570 E 2503761.0930				
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 35.02 FEET				
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE         3 TO 10 FEET         THICKLY BEDDED         1.5 - 4 FEET           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET					
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	_				
ATTAIN OPTIMUM MOISTURE	CME-55	THINLY LAMINATED < 0.008 FEET	4				
PLASTICITY		INDURATION	4				
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
NON PLASTIC 0-5 VERY LOW	TUNG-CARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS: GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST						
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.					
COLOR							
	TINGCARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT						
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14				

#### PROJECT REFERENCE NO.







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C	VERY LO WITH WO	IOSE TO	MEDIUM MENTS.	DENSE B MOIST T	ROWN AND O SATUR/	D GRAY S ATED (AL	SAND	IAL)70				
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	SAND AN	ID CLAYE ITS: SAT	URATED	WITH SH	ELL ¦FORMAT	ION)	   					
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	NOT	E: GROU	NULINE F		ALONG - SURVE DATED 2	L- (AND	~					
	HYD	RAULIC	UESIGN F	KFORI	UAIED 2	(/14/202	2	1				
	NOT				HY IS CS WITH	<b></b>						
	BOT	H PROJ	ECTED O	NTO THE	PROFIL	E						
			I	<u> </u>	23		1					

### GEOTECHNICAL BORING REPORT BORE LOG

						Ľ	BORE L	UG			
WBS	BP2.R	001.1			TI	SF-240066 COUN	TY CRAVEN			GEOLOGIST Miller, T. W.	
			BRID	DGE N	O. 66	N -L- (SR 1232) OVER GRA	PE CREEK				GROUND WTR (ft
BORI	NG NO.	B1-A			S	ATION 20+40	OFFSET	6 ft LT		ALIGNMENT -L-	0 HR. N/A
COLL	AR ELE	<b>EV.</b> 31	.5 ft		Т	TAL DEPTH 73.6 ft	NORTHING			EASTING 2,503,797	<b>24 HR.</b> 0.9
DRILL	rig/haiv	IMER EF	F./DAT	E GFC	20075 C	/E-45C87%11/23/2021		DRILL M	<b>ETHOD</b> M	ud Rotary H	AMMER TYPE Automatic
DRILL	ER W	alker, 0	C. M.		S	<b>ART DATE</b> 03/15/22	COMP. DA	<b>TE</b> 03/1	5/22	SURFACE WATER DEPTH	N/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	OW CO 0.5ft		BLOWS PER FOO 0 25 50	DT 75 100	SAMP. NO.	MOI G	SOIL AND ROCK	DESCRIPTION
35		-									
-	31.5	0.0	WOH	WOH	WOH					- 31.5 GROUND S	
30	-	-				•				BROWN AND GRAY S	AND WITH WOOD
	27.3	4.2			_					FRAGMENTS, MOIST	IU SATURATED
25	-	Ł	3	3	'						
┤	23.9	7.6	7	6	7					GRAY SAND AND CL	AYEY SAND WITH
	-	F	'		'		· · · · · · · ·		0 0 0 0 0 0 0 0	SHELL FRAGMENT	RMATION)
0										- 20.5	1
ł		- 12.6 -	4	3	4	$\left \begin{array}{c} \cdot \\ \bullet \\$	· · · · · ·			-	
5	-	-				.        .	· · · · · ·			-	
5	13.9 -	17.6									1
	-		3	3	3	$  \bullet_{6} \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 \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   \cdot \cdot \cdot   \cdot \cdot   \cdot \cdot \cdot   \cdot   \cdot \cdot   \cdot   \cdot \cdot   \cdot $	· · · · · ·			GRAY SANDY	
)	-	Ł				4				-	
	8.9 -	22.6	4	2	3					-	
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5	-	-				· `` · · · · · · · · · · · · ·				-	
+	3.9 -	- 27.6	5	13	6		· · · · · ·			TAN AND GRAY	
	-					· · · • • • • • • • • • • • • • • • •	· · · · · ·			SATURATED (CA	ASTLE HAYNÉ
)	-1.1 -	32.6				<b>i</b>				F FORMAT	I ION)
Ī	- 1.1	- 02.0	9	10	10	$\begin{vmatrix} & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet$				-	
5	-	F				· · · · ·   · · · ·   · · ·				-	
_	-6.1 -	37.6		10	14					<del>-</del>	
	-	ţ	8	10	14	24 · · · · · · · · · · · · · · · · · · ·	·   · · · ·   ·   · · · ·			+ -	
0	-	F					-			-	
┝	-11.1 -	42.6	7	11	13		·   · · · ·				
	-	Ł								-	
5	-16.1 -	47.6								<b>–</b>	
F	- 10.1 -		8	11	12	· · · · <b>↓</b> 23 <sup>.</sup> · · · · · · · ·					
0	-	F									
-	-21.1 -	52.6	44	10	40					<del> -</del> -	
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5	-	F				· · · · · · · · · · · · · · · · · · ·	-			-	
╞	-26.1 -	57.6	15	13	14					-	
	-	F				$\begin{vmatrix} & \ddots & \cdot \\ & \cdot & \cdot$				F	
0	24 4	60.0				····				-	
ł	-31.1 -	- 62.6 -	13	15	22	$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$	· · · · · · · · · · · · · · · · · · ·			F F	
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35	-36.1 -	_ _ 67.6								<b>-</b>	
ſ	-		7	10	12	$  \cdot \cdot \cdot \bullet_{22}^{ } \cdot \cdot \cdot \cdot   \cdot \cdot \cdot$				-	
40	-	F									
	-41.1 -	72.6	60/0.1			· · · · · · · · · · · · · · · · · · ·	60/0.1			- <u>40.6</u> VERY HARD GRA	
ł		_	00/0.1	<u> </u>			00/0.1	┥╽	<u> </u>	Boring Terminated by	Tricone Refusal at
	-	╞								Elevation -42.1 ft in Ve	ery Hard Limestone

#### SHEET 5 OF 6

## GEOTECHNICAL BORING REPORT BORE LOG

	BP2.F					P SF-24				Y CRAVEN	1			GEOL	OGIST Miller, T. W.	1	-	BP2.R0					P SF-24		COUN	
				DGE N				) OVEF	R GRAP	E CREEK						GROUND WTR (ft)					DGE N				OVER GRA	PEC
BOR	ING NO.	EB2-I	В		S	TATION	21+11			OFFSET	7 ft RT			ALIGN	NMENT -L-         0 HR.         N/A         BORING NO.         EB2-B         STATION         21+11									0		
	LAR EL					OTAL DE				NORTHING					NG 2,503,868	<b>24 HR.</b> 4.0		COLLAR ELEV. 36.1 ft TOTAL DEPTH DRILL RIG/HAMMER EFF./DATE GF00075 CIVE-45C 87%11/								
DRILL	RIG/HAI	VIMER EF	-F./DAT	EGF	00075 (	ME-45C 87	7%11/23	/2021			DRILLI	METHO	DM	ud Rotary	HAMIN	<b>ERTYPE</b> Automatic	DRIL	L RIG/HAMIN	IER EFI	F./DATE	E GFC					
DRIL	LER V					TART DA				COMP. DA				SURF	SURFACE WATER DEPTH N/A	DRIL	LER Wa					ART DA	TE 03/14		C	
ELEV	DRIVE ELEV	DEPTH	BLO						ER FOOT		SAMP				SOIL AND ROCK DES	CRIPTION	ELEV	DRIVE ELEV	EPTH	BLO	W CO				S PER FOC	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	)	75 100	NO.	Имо	I G	ELEV. (ft		DEPTH (f	) (ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
1																										
40		ł												_			-40	<u> </u>		+		+		M	atch Line	
ł		Ŧ												-				-41.5 +	77.6	100/0.1						
35	35.2	0.9				· 1 ·				· · · · · ·				36.1 35.2	GROUND SURF PAVEMENT			‡								<u> </u>
	-	Ŧ	3	4	7	. • 11								33.1	ROADWAY EMBAN TAN SAND, MC	KMENT		-46.5 -	82.6	01		- 00				•
	32.1	4.0	1	2	2	<i>i</i>									ALLUVIAL	/	11	‡		21	20	20		:   : :,•	4 <u>0</u>	
30	-	ŧ												30.1	BROWN AND GRAY SAN WOOD FRAGMENTS, M	DIST TO WET 1	-50	#								<u> </u>
	28.5	+ 7.6 +	1	1	2					·   · · · · ·				-	BROWN AND GRAY SAND FRAGMENTS, SATU			-51.5 +	87.6	8	11	14				:
25		ŧ					: : :							- 25.1		11.0	-55	‡								:
20	23.5	+ 12.6									1		0000	23.0		13.		-56.5 +	92.6					<u>.  </u>		
		ŧ	2	2	2	4									GRAY SILTY SAND W		1	‡		10	11	12				:
20	-	‡				-;								-	FRAGMENTS, SATURA	TED (DUPLIN	-60	‡						·/ · · ·		·
	18.5	+ 17.6 +	5	4	6									-	FORMATION	N)		-61.5 +	97.6	9	8	11		<u>i</u>   : : :		:
15		ŧ					: : :	:::						- 15.1		21.0	65	‡								:
15	13.5	- 22.6				<del> </del>								<u></u>	GRAY SANDY CLA	<u>Y, WET 21.9</u>	-65	-66.5 +	102 6					$\frac{1}{1}$		
		+	WOH	WOH	1		: : :							-				1		18	12	11		• <u>2</u> 3		:
10		‡												-			-70	‡						• • • • •		·
	8.5	27.6	WOH	1	4	<u> </u> · · · ·	· · · ·			·   · · · · ·				- - 7.5		28.0	5	-71.5 +	107.6	10	13	15	· · · ·	· · · · · ·		
-		ŧ													TAN AND GRAY SILTY SHELL FRAGMENTS	SAND WITH	1							<b>Q</b> 28	<u> </u>	
5	3.5	+ 32.6												-	LIMESTONE LAYERS, S (CASTLE HAYNE FOI	SATURATED		+								
	0.0	<u></u>	6	8	10		18							-				1								
0		ŧ					.    -							-												
l	-1.5	37.6	7	9	10		<u> </u>   : :							-				‡								
_		ŧ					•19 \  ] ]							-				1								
-5	-65	+ + 42.6					1											+								
ĺ		+	8	10	13	1   : : :		: : :						-				±								
-10	-	±					-							-				±								
	-11.5	47.6	8	12	13									-				±								
		ŧ					. 25			.				-				1								
-15	-16.5	+ 52.6					:1:											+								
-15 -20 -25 -30	- 10.5	- 32.0	10	10	12		• • • • • • • • • • • • •							-				±								
-20		ŧ					·i · ·							-				±								
	-21.5	57.6	10	11	12		:] : :	:::						-				<u>f</u>								
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-25	26.5	- - 62.6					<u>i</u>	+						-				<del>]</del>								
	-26.5	1 02.0	7	8	10		1 18							-				Ŧ								
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	-31.5	67.6	10	13	21									-				Ŧ								
		Ŧ		13			.   .,ª	34		.				-				‡								
-35		Ŧ					-   <i>[</i> -							-				+								
	-36.5	+ 72.6 T	7	9	14									-				‡								
-40		Ŧ							· · · · ·					-				‡								
<u>-+</u> 0	-	<u> </u>			-							-														

#### SHEET 6 OF 6

CRAVEN				GEOLOGIST Mille	er, T. W.		
CREEK						GROUN	ID WTR (ft)
OFFSET	7 ft RT			ALIGNMENT -L-		0 HR.	N/A
NORTHING	521,64	40		EASTING 2,503,8	368	24 HR.	4.0
	DRILLN	iethod	Mud	Rotary	HAMM	RTYPE	Automatic
COMP. DA	TE 03/*	14/22		SURFACE WATER	R DEPTH N//	4	
	SAMP.						
75 100	NO.		G	SOIL AN	D ROCK DESC		
· 100/0.1					ARD GRAY LIN	ESTONE	<u>7</u> 6.Z
				44.7			90.9
+		<u>%</u> • %			E AND GREE		<u>ND</u> <u>80.8</u>
		%• %			SAND WITH LI 'ERS, SATURA		<b>-</b>
		%•%					
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			$\geq$	-54.9			91.0
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••••	-			-73.0 Boring Term	inated at Eleva	tion -73 0	109.1 ft in
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