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810213 SHEET NO.

SF-

REFERENCE

DESCRIPTION TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY SAMPSON

PROJECT DESCRIPTION BRIDGE NO. 213 ON -L- (SR 1710) OVER KILL SWAMP

60 N. m R R PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-810213	1	7

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

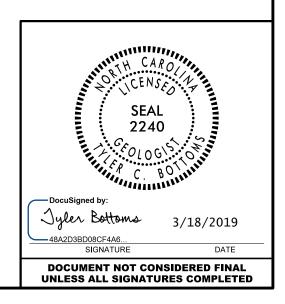
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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 GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

S.N. ZIMARINO
R.E. SMITH
J.P. PEHRSON
INVESTIGATED BY
DRAWN BY
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE



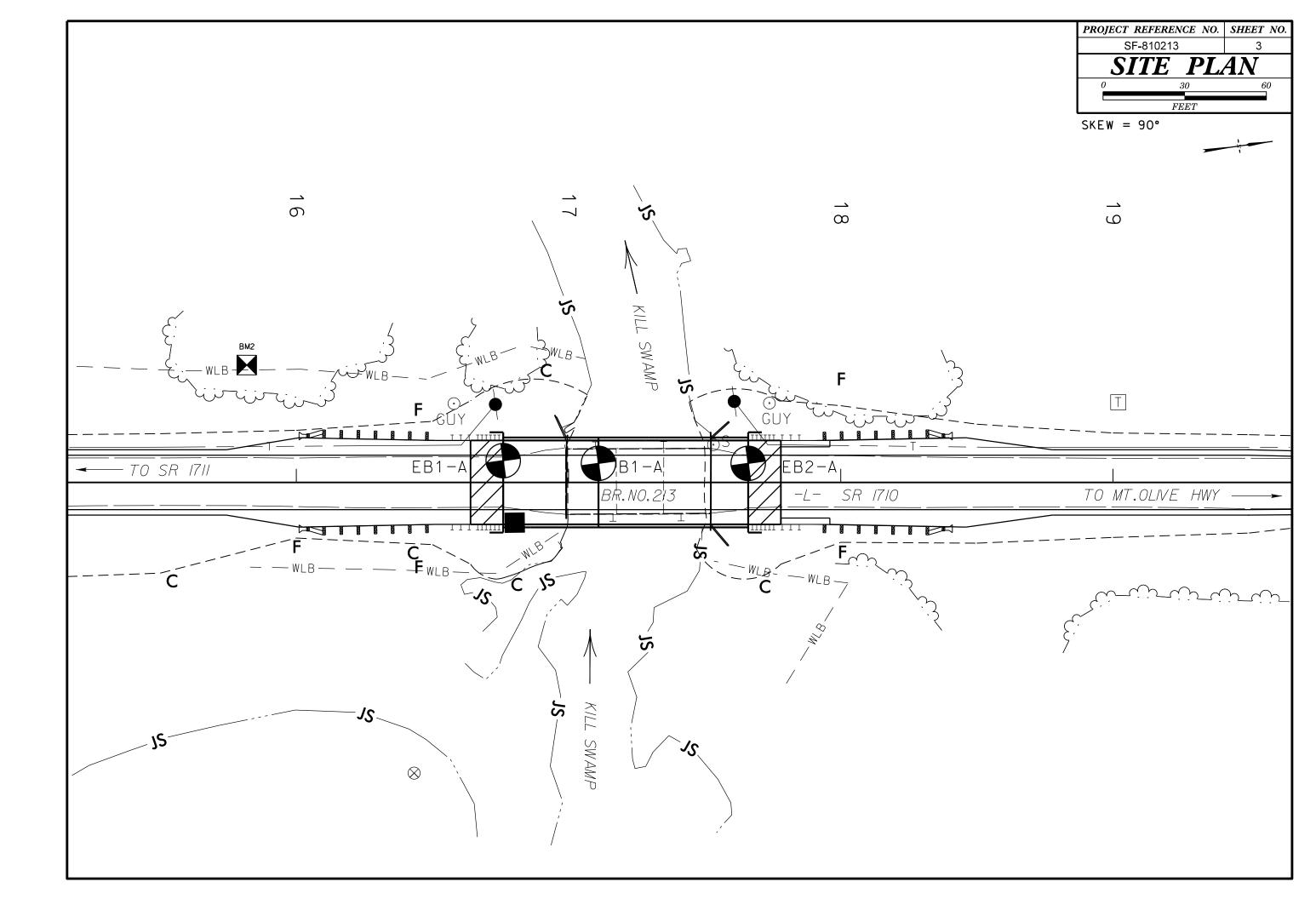
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

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 FLIGHT 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. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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:		BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS 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
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 > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPENING MATERIALS	MINERALOGICAL COMPOSITION	THE TO COARSE CRAIN ICHEOUS AND METAMORPHIC POCK THAT	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
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 CLASS A-1 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.	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLH55. A-1-8 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-7-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SINCE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL	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
7. PASSING 10 50 MX GRANULAR SILT- CRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*40 30 MX 50 MX 51 MN SOILS CLAY PEAT	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
NM 62 MM 62 MM 62 MM 62 MM 62 KM 62 KM 62 KM 62 KM 62 KM 62 KM 64 MM 64 KM 64 MM 64	ORGANIC MATERIAL SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.
LL – – 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN LITMU DRED F	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
	GROUND WATER	OF A CRYSTALLINE NATURE. 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 EDADS	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.
OF MAJOR GRAVEL, AND FINE SILLT UK LLATEY SILLT LLATEY MATTER	STATIC WATER LEVEL AFTER <u>24</u> HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MAIEMIALS SANU	∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
CEN.RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBCROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBCROUP IS > LL - 30	O-MA- Spring or seep	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	
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>	<u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY (N-VALUE) (TONS/FT ²)		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4 DOUBLE 4 TO 10	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.
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 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	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <u>PERCHED WATER</u> - 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 < 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	THETTE INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER - 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		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNSUITABLE 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
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TUP 3 FEEL OF UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SAND SAND (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL 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 γ - 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	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 (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	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. PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD)- A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUALITO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULID; REUDIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BM2
	HIHIGHLY V-VERY RATIO	TERM SPACING TERM THICKNESS	N 541872 E 2207287
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 158.29 FEET
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE; X CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
ATTAIN OPTIMUM MUISTURE	CME-55 CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY		INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 L_ HARD FACED FINGER BITS	DUDDING WITH EINGED EDEES NUMEDOUS COATNO.	
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 STEEL PROBE;	
COLOR		BREAKS EASILY WHEN HIT WITH HAMMER.	
		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
The second of the stand stand strand st		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO. SF-810213

A WATER BEARING FORMATION OR STRATA.
JS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM
<u>OUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS S
- GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE T IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE
JS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS C
- ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRA
<u>DVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERE LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE CUTS MASSIVE ROCK.
ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS
TION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE IP, MEASURED CLOCKWISE FROM NORTH.
FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS ATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARA



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160												- <u></u>		<u> </u>
			SE GRAY AND TAN SAN VEL, MOIST (ROADWAY				SURFACE WATER	03/19 / 5	AND GRAVEL MOIST (ROADW	AY AND TAN'SAND AY EMBANKMENT) 	1] 	-
150		ERY LOOSE TO M	EDIUM DENSE GRAY AL	JD' BROWN		<u> </u>		@				, 	 	
				U, (ALLUVIA					VERY LODSE TO LOOSE CRA SAND AND GRAVEL. MOIST	TO SATURATED (ALLUVIAL			1	-
140			 	- 4		()		@+	LOOSE TO MEDIUM DENSE GI SATURATED (BLACK CREEK I	AY CLAYEY SAND.		 	 / !	
130		STIFF TO VE	RY STIFF GRAY SANDY WET (BLACK CREEK F	ORMATION)		+ ₩		- •					1	-
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		STIFF TO VER	RY STIFF GRAY SANDY WET (BLACK CREEK F	ORMATION)	23-	8		32				. I I I I I	1 1 1	- - - -
100								2	MEDIUM DENSE TO DENSE GR SAND SATURATED (BLACK C	Y SAND AND CLAYEY EEK FORMATION)		i i		
00		MEDIUM DEN SAND, SATU	SE TO DENSE GRAY SA	AND AND CLA	үе ү • ө • ө		9 						1 I I	
90									VERY STIFF TO HARD GRAY SILTY CLAY, WET (BLACK C			. 	,	
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	B VERY STIFF GRAY SILTY CLAY, WET (BLACK CREE C DENSE GRAY SAND, SATURATED (BLACK CREEK FOR	1 1									1	NOTE:	FROM BF	RIDG
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ANDY AND EEK FORMATION)	
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-▼* APPROXIMATE ELEVATION OF ARTESIAN HEAD	
NOTE: GROUNDLINE PROFILE ALONG -L-)
TAKEN FROM BRIDGE SURVEY AND	
HYDRAULIC DESIGN REPORT DATED 2/7/2019)
THROUGH THE BORINGS WITH BOTH	
PROJECTED ONTO THE PROFILE	
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GEOTECHNICAL BORING REPORT BORE LOG

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		2.3.R.66				P SF-8102			Y SAMPSO	N			GEO	OGIST Zimarino, S. N.	000000000000000000000000000000000000000			17BP.3			05.1		P SF-8102		COUN	
				DGE N		213 ON -L- (SR 1710) OVER KILL SWAMP STATION 16+76 OFFSET 8 ft LT											DGE N	GE NO. 213 ON -L- (SR 1710) OVER KILL STATION 16+76								
		. EB1-/																								
		.EV. 16							NORTHING								COLLAR ELEV. 160.9 ft TOTAL DEPTH 84.6 ft					N				
				E GFC		XME-45C 89%							Id Rotary HAMMER TYPE Automatic			;	DRILL RIGHAMMER EFF, DATE GF00075 CME-45C 89%08/13/2018							Τ.		
		Smith, R.							COMP. DATE 03/06/19 T SAMP. ✓ └				SURF	ACE WATER DEPTH N/	A			LER Sr					START DATE 03/06/19			C
ELEV (ft)		DEPTH (ft)	<u> </u>	0W COU				PER FOOT	г 7 <u>5</u> 100		17	Ō		SOIL AND ROCK DES			ELEV (ft)	DRIVE	DEPTH (ft)	BLO	W CO 0.5ft		0 2	BLOWS I	PER FOC 50	
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		‡	9	5	3								157.9	ROADWAY EMBAN GRAY AND TAN SAND A		3.0		77.8	- - 83.1					$\left[\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \end{array} \right]$	· · ·	
455	156.9	4.0	4	3	3								-	MOIST					-	7	12	18		● 30 · ·		•
155	-	ŧ											<u>154.9</u>			6.0		-	-							
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145	-	‡				- ::: :							<u>144.9</u>	COASTAL PLA	JN	<u>16.0</u>		-	-							
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120	-	‡					/····			-			-					-	-							
	117.8	43.1		10	40		1 : : : :						-					-	-							
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	112.8	<u>+ 48.1</u> +	6	8	15		23						-	GRAY SANDY CLA	Y, WEI			-	-							
110	-	‡				1	· · · ·			-			-					-	-							
110	107.8	53.1		10	- 4 4		· · · · ·						-					-	-							
105		‡	6	10	14		24						-					-	-							
105	-	‡											-					-	-							
	102.8	<u>+ 58.1</u> +	5	9	10	/ 6 19	 9						-					4	-							
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I	97.8	63.1			10		· · · ·					///	-	GRAY CLAYEY SAN	ID, WET			4	-							
05		‡	4		12		9						-					+	-							
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	92.8	<u>+ 68.1</u> +	6	8	10	 						/./.	-					4	-							
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90	87.8	+ - 73.1			_	:::::	· · · · ·						-	GRAY SANDY AND SILTY	Y CLAY, WET			4	-							
		‡	6	7	8	15							-					4	-							
85						·····	L													I						

SHEET 5 OF 7

SAMPSON		GEOLOGIST Zimarino,	S. N.					
SWAMP				GROUN	ID WTR (ft)			
OFFSET 8 ft L	Т	ALIGNMENT -L-		0 HR. N/A				
NORTHING 54	1,961	EASTING 2,207,335		24 HR.	6.1			
DRIL	LL METHOD M	ud Rotary	HAMME	RTYPE	Automatic			
COMP. DATE	03/06/19	SURFACE WATER DEPT	TH N/A	4				
	MP. L	SOIL AND ROC	K DESC	RIPTION				
75 100 NO	0. MOI G							
				<u> </u>				
		GRAY SANDY AN	D SILTY	CLAY, W	/ET			
			unueu)		81.0			
					01.0			
		- - 76.3			84.6			
		Boring Terminated Very Stif	at Eleva f Siltv Cl	tion 76.3 av	ft in			
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GEOTECHNICAL BORING REPORT BORE LOG

WBS	17BP.	3.R.66			Т	P SF-810)213	1	Y SAMPSO				GEOLOG	GIST Zimarino,	, S. N.			WBS	17BP.3	3.R.66			ти	P SF-8102	213	COUNT	Y
SITE	DESCR	IPTION	BRID	DGE N	0. 213	3 ON -L- (S	R 1710) O	/ER KILL	SWAMP							GROUND W	TR (ft)				BRID	JGE N			R 1710) OV	/ER KILL	SV
BORI	NG NO.	B1-A			S	TATION 1	17+11		OFFSET	7 ft LT			ALIGNM	ENT -L-		0 HR.	N/A	BORING NO. B1-A STATION 17+11					7+11	,	C		
COLL	AR ELE	EV. 14	7.1 ft		т	OTAL DEP	TH 85.7 f	t	NORTHING	G 541,9	95		EASTING				N/A	COLLAR ELEV. 147.1 ft TOTAL DEPTH 85.7 ft						N			
DRILL	RIG/HAN	/IMER EF	F./DAT	E GFO	20075 C	XME-45C 89%	608/13/2018			DRILL	VIETHOD) M	d Rotary HAMMER TYPE Automatic			matic	DRILL RIG/HAMMER EFF./DATE GFC0075 CWE-45C 89%08/13/2018							_			
	L ER Si				S	TART DAT	E 03/04/1	9	COMP. DA	ATE 03/	/04/19		SURFAC	E WATER DEP	TH 8.11	ft		DRIL	LER Sr		. E.		ST	ART DATE	E 03/04/19	9	0
ELEV	DRIVE ELEV	DEPTH	BLC	W CO				PER FOO		SAMP.	. V	L O		SOIL AND RO	CK DESC	RIPTION		ELEV	DRIVE ELEV	DEPTH	·	W COL			BLOWS F		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	ИОІ	G	ELEV. (ft)			D	EPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 5	50	75
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160		+											_					80				+'	 		Match	h Line	
	-	F											-						77.9	69.2	10	11	18				•
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	-	F											-						72.9	74.2		ľ			1		
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	141.9 _	5.2	4	5	8	. \			.			//	-	GRAY CLAYEY : (BLACK CRE	SAND, SA EK FORN	ATURATED MATION)			-		9	10	16		4 26		
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	137.9 -	9.2	4	5	10								- 0	GRAY SANDY AN	ND SILTY	CLAY, WET						ľ					
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2	102.9	44.2	5	8	14							///	-	GRAY CLAYEY						-		ľ					
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į –	97.9	49.2												GRAY SAN	TAL PLAI					•							
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95	-	E				<u> ``</u>							95.1	COAS		<u></u>	<u>52.0</u>		-	-							
95	92.9	54.2	8	13	16				· · · · · · · ·				92.1	GRAY SANI	D, SATUR	RATED	55.0		1	-							
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	87.9	59.2					1													•							
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SHEET 6 OF 7

SAMPSON	1			GEOLOGIST Zimarino, S.	N					
SWAMP					G	GROUND WTR (ft)				
OFFSET 7	ft LT			ALIGNMENT -L-	0	HR.	N/A			
NORTHING	541,99	95		EASTING 2,207,340	24	HR.	N/A			
	DRILL M) Mu				Automatic			
COMP. DAT	E 03/0	04/19		SURFACE WATER DEPTH	8.1ft					
75 100	SAMP. NO.		LO	SOIL AND ROCK I	DESCRI	PTION				
	NO.	<u>/ MOI</u>	G							
<u> </u>										
· · · · · · · · · · · · · · · · · · ·				_75.1			72.0			
				GRAY SAND, S	PLAIN ATURA	TED				
			-	_70.1			77.0			
			N	GRAY SILTY C	PLAIN CLAY, W	ET				
			N							
			N	-						
			N	61.4			05.7			
1			Ì	61.4 Boring Terminated at	Elevation	n 61.4 f	85.7 ft in			
				- Very Stiff Si	iity Clay					
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GEOTECHNICAL BORING REPORT BORE LOG

CLEV ELEV DEI 111 O 25 50 75 100 NO. NO. SOIL AND ROCK DESCRIPTION ELEV ELE	0
BORING NO. EB2:A STATION 17+66 OFFSET 7 ft LT ALIGNMENT 0 N/A COLLAR ELEV. 160.8 ft TOTAL DEPTH 84.5 ft NORTHING 542.050 EASTIN 2/7.348 24 HR. 0.5 ART DRUL RGMAMMER EFFADATE GF000750:AE-45C 89%(09132018 DRUL RGMAMMER TYPE ALIGNMENT +L. 0.5 ART DRUL RG SUBAR DATE SUBAR DATE O200750:AE-45C 89%(09132018 DRUL RGMAMMER EFFADATE GF000750:AE-45C 89%(09132018 DRUL RG SUBAR DATE O200579	0
COLLAR ELEV. 160.8 ft TOTAL DEPTH 84.5 ft NORTHING 642.050 EASTING 2.207.348 24 HR. 0.5 ART DRILLER Smith, R. E. START DATE GTOUD SOL45C 89%/08132018 DRILLMETHOD MudRary HAMMER TYPE Automatic DRILLER Smith, R. E. START DATE GTOUD SOL45C 89%/08132018 DRILLMETHOD MudRary HAMMER TYPE Automatic LEV DRILLER Smith, R. E. START DATE 0.0305/19 SURFACE WATER DEPTH NA DRILLER Smith, R. E. START DATE START DATE 0.0561 0.57 0.25 59 75 100 NO. NO. SOL AND ROCK DESCRIPTION ELEV. (BW) DepTH BLOW COUNT ELEV. (BW) DepTH BLOW COUNT BLOW COUNT BLOW COUNT BLOW COUNT SOL AND ROCK DESCRIPTION ELEV. (B) ELEV. (B) <t< td=""><td></td></t<>	
DRILL RIGHAWINER EFF-DATE GROUND SUFFACE ORILL METHOD Mod Rotary HAVMER TYPE Automatic DRILLER START DATE 03/05/19 SURFACE WATER DEPTH N/A SURFACE WATER DEPTH N/A ELEV DRILL BLOW COUNT BLOW SPER FOOT SAMP SOIL AND ROCK DESCRIPTION DRILLER SMIL NETHOD BLOW COUNT BLOW	
DRILLER START DATE 03/05/19 COMP. DATE 03/05/19 SURFACE WATER DEPTH N/A ELEV DEPTH (ft) ELEV. (ft) SOIL AND ROCK DESCRIPTION (ft) DEPTH (ft) ELEV. (ft) DEPTH (ft) ELEV. (ft) <td< td=""><td></td></td<>	
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(ft) Cft) 0.5ft 0	
100 100 <td>DWS PER FOOT 50 75</td>	DWS PER FOOT 50 75
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160 159.9 0.9 12 10 10 159.9 PAVEMENT 0.5 156.8 4.0 4 3 2 1 1 17.8 GRAY AND TAN SAND AND GRAVEL, MOIST 3.0 155. 152.8 8.0 -	Match Line
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160 159.9 0.9 <td< td=""><td>• • • • • • • • • • • • • • • • • • •</td></td<>	• • • • • • • • • • • • • • • • • • •
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SHEET 7 OF 7

SAMPSON	l			GEOLOGIST Zimarino,	S. N.					
SWAMP				•		GROUN	ID WTR (ft)			
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	542,05	50		EASTING 2,207,348		24 HR.	0.5 ART			
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COMP. DAT	E 03/0)5/19		SURFACE WATER DEP	TH N/A	۸				
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75 100	NO.	моі	O G	SOIL AND ROO	CK DESC	RIPTION				
· · · ·				GRAY SANDY AN			————— /FT			
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