Ö REFERENCE

CONTENTS

DESCRIPTION

BENT ICROSS SECTION

TITLE SHEET LEGEND (SOIL & ROCK)

SITE PLAN

BORE LOGS

PROFILE

SHEET NO.

4-5

5043

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>BEA</u>UFORT

PROJECT DESCRIPTION BRIDGE NO. 20 ON -L- (NC 33) OVER SMITH CREEK

STATE PROJECT REFERENCE NO. B-5413

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, CEDTECHNICAL ENGINEERING UNIT AT (1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNDS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU LINE-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE DESTREED HAVE 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 YARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS,

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- NOTES:

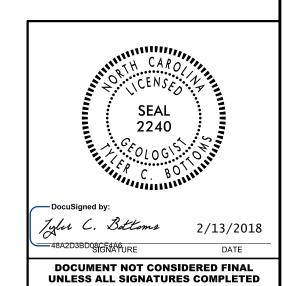
 1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

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

PERSONNEL S.N. ZIMARINO R.E. SMITH J.M. EDMONDSON INVESTIGATED BY __T.C. BOTTOMS DRAWN BY _T.C. BOTTOMS

SUBMITTED BY <u>D.N.</u> ARGENBRIGHT

DATE FEBRUARY 2018



PROJECT REPERENCE NO. SHEET NO.

B-5413

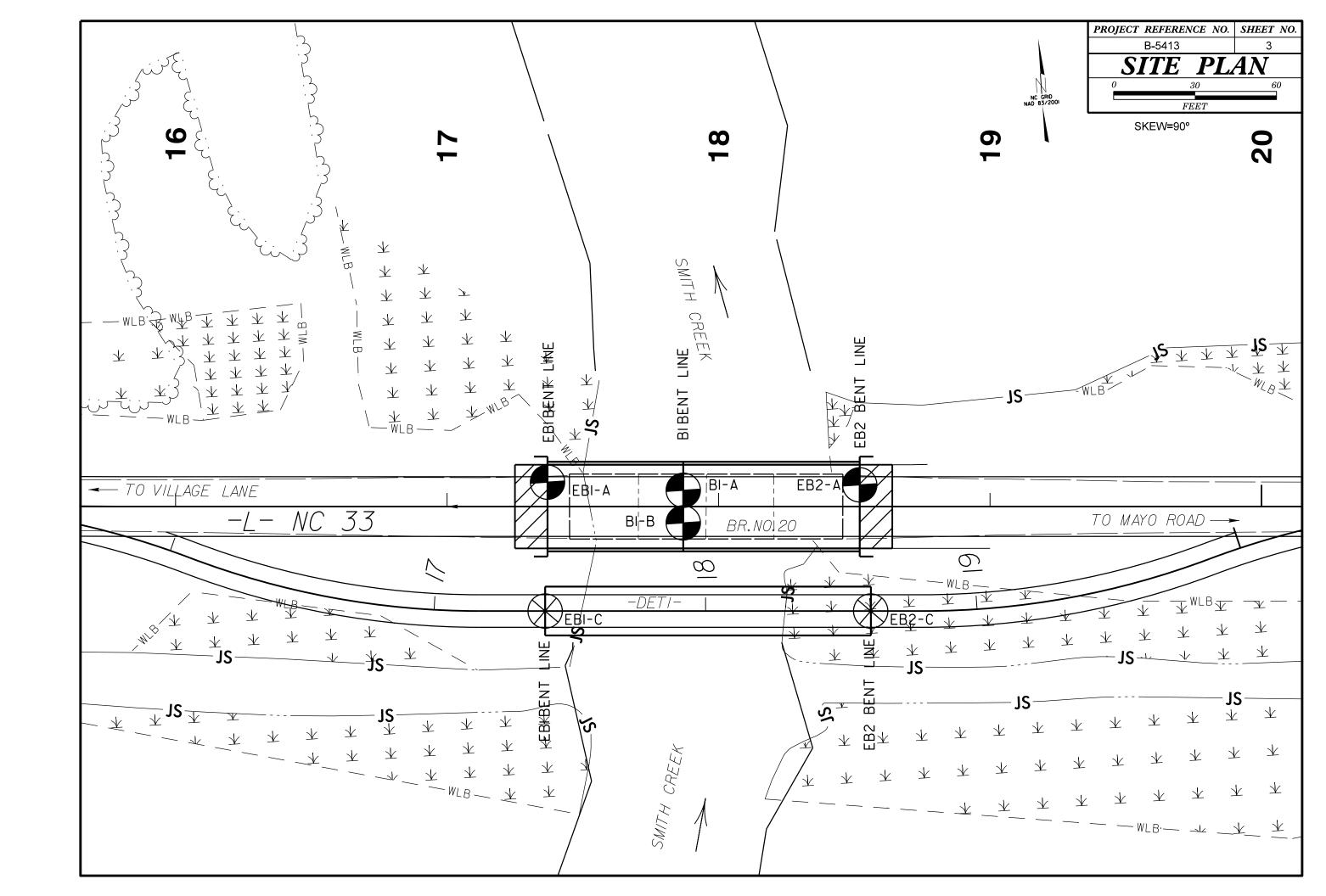
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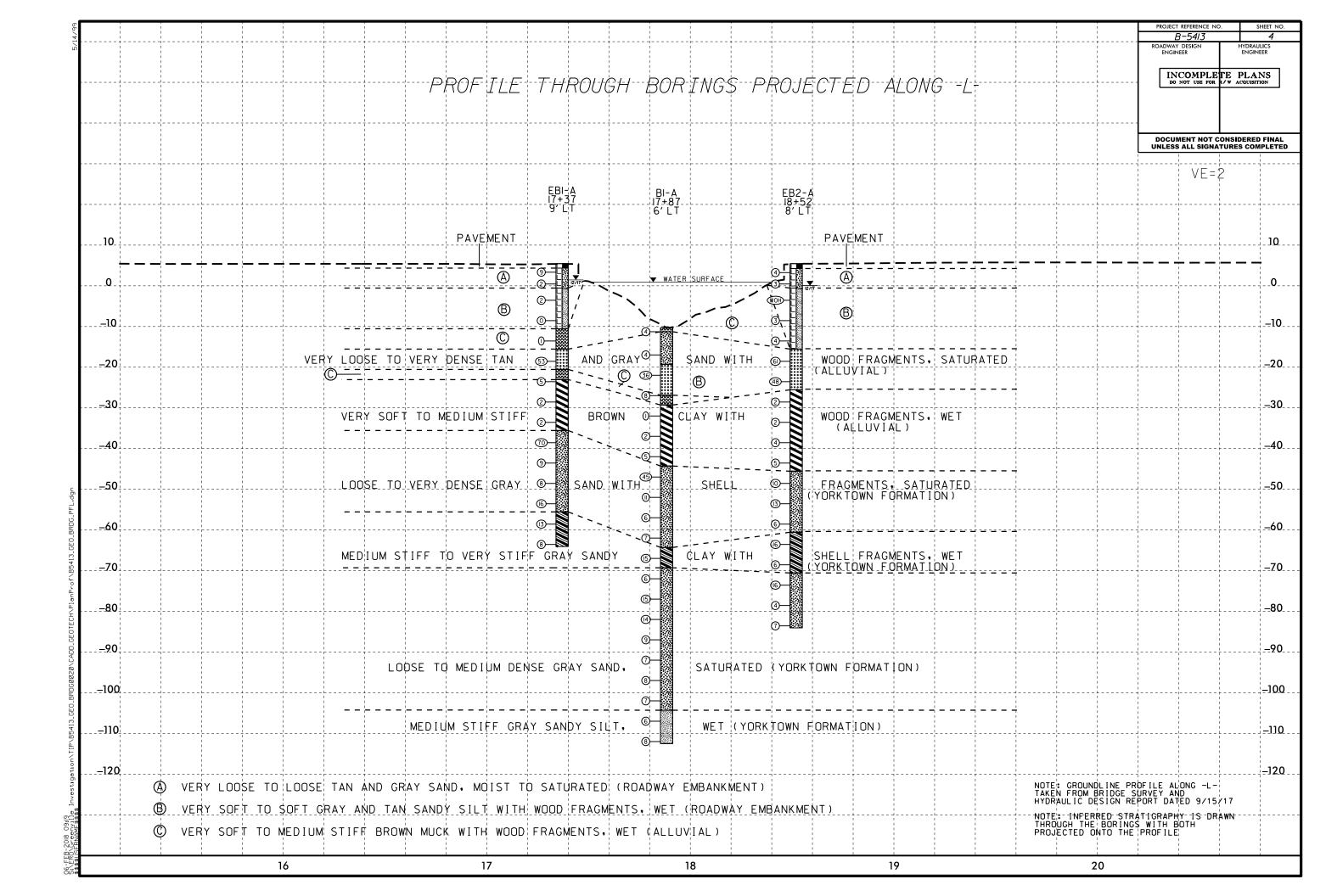
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN			
	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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 IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS.HIGHLY PLASTIC.A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	NI//AI//A	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED WON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE 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. (\(\sigma \) 39% PASSING "200) (> 39% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-6 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 B-2-6 A-2-7 B-2-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
Z. PASSING GRANULAR SILT-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*40 30 MX 50 MX 51 MN SOILS CLIAY PEAT	GRANULAR SILT - CLAY	- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
25 MX 25 MX 25 MX 25 MX 35 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MX 36 MX 36 MX	ORGANIC MATERIAL SOILS 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.	<u>DIP</u> - 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 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN UITLE OR	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.
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE OPCOMIC	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX 8 8 AX 12 MX 16 MX NU MX AMUUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND CAMP CRAVEL AND	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	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 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL		(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. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
AS SUBGRADE P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	- O-MG- SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
DANCE OF CTANDARD DANCE OF UNCONFINED	T130222FN40003 31110023	(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 COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (IV-VALUE) (TONS/FT²)	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE < 4	SPT CLORE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLT LOOSE 4 TO 10	SOIL SYMBOL OPT ONT TEST BORING INSTALLATION SLOPE INDICATOR INSTALLATION	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. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAIN RUADWAY EMBANKMENT 1	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 VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MN MONITORING WELL TEST BORING	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A DIEZOMETED	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	TTT ALLUVIAL SOIL BOUNDARY A PIEZUME IRSTALLATION 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 ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - 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	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
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SHND (SL.) (CL.)			CLICKENCIDE DOLICHED AND CIDIATED CHDEACE THAT DECHLIC EDOM EDICTION ALONG A FALL T
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0,25 INCHES DEEP CAN BE HARD FXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	ABBRE VIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	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 BY MODERATE BLOWS.	OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
(CSE, SU.) (F SU.)	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 DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR COUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	OR SLIP PLANE. 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
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
CLSE. SUJ. (F SUJ.)	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - COME PENETRATION TEST NP - NON PLASTIC CSE COARSE ORG ORGANIC	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	OR SLIP PLANE. 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 _G - DRY UNIT WEIGHT	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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	OR SLIP PLANE. 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) SOIL MOISTURE DESCRIPTION FIELD MOISTURE FOR FIELD MOISTURE DESCRIPTION - SATURATED - USUALLY LIQUID; VERY WET, USUALLY	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAPPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REDUIRED 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK OUALITY 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
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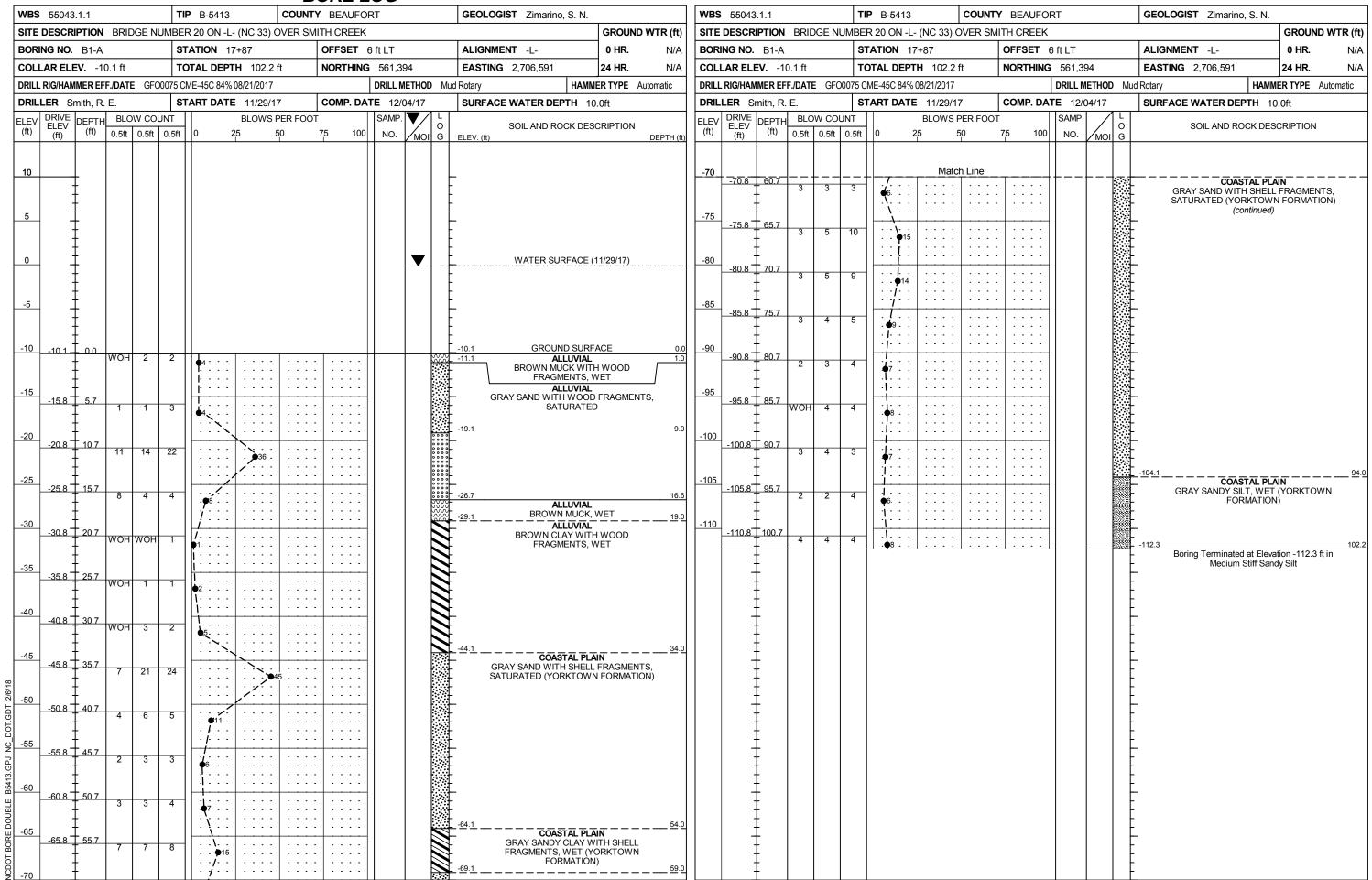


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	H WOOD FRA		 - -		 		FRACMENTS. SATURATED (YORKTOWN FORMATION)		 - - - -	VERY STIFF GF FRAGMENTS.	 - • •	 			 - -		VERY	 			! ! !	 						
ა -	GMENTS. WI	WEDIUM STIF	1 1 1				NSE GRAY S		 	NET (YORKT			L00SE 1				OFT TO ME			/ERY LOOSE						(\supset	
	T (ALLUVI	STIFF GRAY SAI	 				AND WITH		 	AY SANDY OLAY WITH SHELL WET (YORKTOWN FORMATION)	 		DENSE GR				DIUM STIFF	 0		TO DENSE		 				Ć	ROS	
	(0	SANDY SILT.) (2) (6	∞ (-	7) (O L	<u> </u>	(S)	' _		(a)	AY SAND WIT	(45		\sim	BROWN CLA	1 (8)	(36)	GRAY SAND	1	·					<u> </u>	
5			I	000000000000000000000000000000000000000		000000000000000000000000000000000000000													000000000000000000000000000000000000000	Ŧ	, , , , , , , , , , , , , , , , , , , ,	Υ 1	BI-A 6' 1-7	•		<u>†</u>		
	17															<i>[- - - </i>	<u> - - - -</u>	\\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1			Г- 		WATE			NOZ	
) 	+ ∞			 		+				1 1 1 1 1 1 1 1 1 1			1 - 1	$\mathbb{T} \cap \mathbb{T}$				(D)',		40	\mathcal{T}		<u> </u>				7	
	7															////		///					BI-B 17+87 6/ BT	JRF AC			A	
5			 			 			 		 	· 	HELL FRAGN		- - 	 - 		 	I⊦ I I I	WOOD FRACE	 	;					<u>J</u>	
				 		 						- 	MENTS. SATI				FRAGMENT	 		WENTS. SAT	-	 ₁					Ð	
3	 			 		1						. 	URATED (YO		- 		S. WET (AL	 	1	URATED (AL							7	
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						ORE LO		ı	
	55043.1.1					Y BEAUFORT		GEOLOGIST Zimarino, S. N.	T
SITE	DESCRIPTION	N BRII	DGE NU	IMBE	ER 20 ON -L- (NC 33) OVER SM	ITH CREEK			GROUND WTR (ft)
BORI	NG NO. EB1	-A		S	TATION 17+37	OFFSET 9 ft L	Г	ALIGNMENT -L-	0 HR. N/A
COLL	AR ELEV. 5	.5 ft		TO	OTAL DEPTH 69.5 ft	NORTHING 56	1,400	EASTING 2,706,542	24 HR. 4.0
DRILL	RIG/HAMMER E	FF./DAT	E GEOO)075 C	CME-45C 84% 08/21/2017	DRIL	L METHOD Mud	Rotary HAMM	ER TYPE Automatic
	LER Edmond			_	TART DATE 12/05/17	COMP. DATE		SURFACE WATER DEPTH N/	
	DD1 /E		OW COU		BLOWS PER FOOT			CONTACE WATER DELTHI 14/	1
ELEV (ft)	ELEV (ft)	'-		0.5ft	4	75 100 NO	. '/ 0	SOIL AND ROCK DESC ELEV. (ft)	CRIPTION DEPTH (ft)
10									
_	‡							5.5 GROUND SURFA	ACE 0.0
5	4.4 1.1	1		_				4.4 PAVEMENT	1.1
	-	2	4	5	9			ROADWAY EMBANI GRAY AND TAN SAND,	
0	1.5 + 4.0	1	1	1	 			SATURATED	
J	‡				1	 		ROADWAY EMBANI	KMENT — — —6.0
	-2.5 + 8.0	WOH	1 1	1		1::::		GRAY AND TAN SANDY	
-5	Ŧ	I VV OH	'	1	$ \hat{\mathbf{p}}^2 \dots \dots $				
	‡								
	<u>-7.5 </u>	1	0	0	<u> </u>				
-10	1	'		-	P ⁰			-10.5	16.0
	Ŧ							ALLUVIAL	
	-12.5 † 18.0 †	WOH	1 1	0	┦ <u>┎</u> ┇┇┇┇			BROWN MUCK, V	WET
-15	1				• · · · · · · · · · · · · · · · · · ·		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-15.5	21.0
	, <u> </u> † .				· · · · · · · · · · · · · · · · · ·		0000	ALLUVIAL	
	-17.5 † 23.0 †	12	21	32				GRAY SAND, SATU	KATED
-20	‡						0000	-20.5	26.0
	- + -						**** <u>****</u>	ALLUVIAL	
	-22.5 † 28.0 †	3	3	2	<u> </u>			-23.0 BROWN MUCK, V	NET 28.5
-25	‡				 			BROWN CLAY WITH	
	27.5 1 22.5							FRAGMENTS, V	/ET
	-27.5 + 33.0 +	WOH	I WOH	2					
-30	‡								
	22.5								
	-32.5 + 38.0 +	1	0	2					
-35	‡							-35.5	41.0
	-37.5 + 43.0				:::: ::::::::::::::::::::::::::::::::			COASTAL PLA GRAY SAND WITH SHELL	IN
	-31.5 43.0	11	27	43	:::: ···· ` `>			SATURATED (YORKTOWN	FORMATION)
-40	Ŧ								
	+ -42.5 + 48.0								
	72.5	3	4	5] : ••• [: : : : : : : : : : : : : : : : : :				
-45	Ŧ					 			
	47.5 + 53.0] : ::: :::: ::::				
	1 23.9	4	3	5] :• :::::::::::::::::::::::::::::::::				
-50	+								
	-52.5 [†] 58.0] ::/:: :::: ::::				
	‡	4	8	8	16				
-55	+					 		- <u>55.5</u>	61.0
	57.5 63.0	1	\perp _ \perp	0]			GRAY SANDY CLAY W	ITH SHELL
60	‡	3	7	6	13			FRAGMENTS, WET (YO FORMATION	ORKTOWN
-60	‡					 		IONWATION	,
	-62.5 68.0	1	$\perp \downarrow \downarrow$	4	<u> </u>				
	 ‡	2	4	4	8			-64.0	69.5
	‡							Boring Terminated at Eleva Medium Stiff Sand	(Clay
	1								
	‡						[





						BUKE L			1	
WBS	55043.1.1			TI	IP B-5413 COU	NTY BEAUFOR	RT		GEOLOGIST Zimarino, S. N.	
SITE	DESCRIPTION	I BRII	DGE N	JMBE	ER 20 ON -L- (NC 33) OVER	SMITH CREEK				GROUND WTR (ft)
BORI	ING NO. B1-B	,		S	TATION 17+87	OFFSET 6	6 ft RT		ALIGNMENT -L-	0 HR. N/A
COLI	LAR ELEV9	9.6 ft		Т	OTAL DEPTH 52.0 ft	NORTHING	561,38	32	EASTING 2,706,591	24 HR. N/A
DRILL	RIG/HAMMER EI	FF./DAT	E GEO	0057 C	CME-550X 76% 06/13/2017		DRILL MI	ETHOD Mu	d Rotary HAMM	ER TYPE Automatic
	LER Edmonds			_	TART DATE 02/05/18	COMP. DAT			SURFACE WATER DEPTH 9.	
	DD1 /E	1	OW COL		BLOWS PER FO		SAMP.	V /L	CONTACE WATER DEI III 9.	OIL .
ELEV (ft)	ELEV PLIN	·—	0.5ft		-	75 100	NO.		SOIL AND ROCK DES	
	(ft)	0.010	0.010	0.010		1,7	110.	MOI G	ELEV. (ft)	DEPTH (ft)
0	 								WATER SURFACE (02/05/18)
	ļ <u></u>							F		
-5	‡									
:	‡								_	
	<u> </u>							1 - E		
-10	-9.6 + 0.0	1000	1000						-9.6 GROUND SURF	ACE 0.0
		WOH	WOH	2	Q 2			5550	——— ALLOVIAL	WET
	-13.6 + 4.0								-12.6 ALLUVIAL	3.0
-15	10.0	1	3	3	1				GRAY SAND, SATL	IRATED
	<u> </u>									
	-18.6 9.0		10	0.4] · · · · · \					
-20	∤	8	16	24	40				-	
	-22.6 + 13.0									
0.5	1	17	12	6	18				-23.6 ALLUVIAL	14.0
-25	† †								BROWN MUCK,	WET <u> 16.0</u>
	-27.6 18.0			4	:/				ALLUVIAL GRAY CLAY WITH WOOD	FRAGMENTS,
-30	l Ŧ	1	1	1	•2 · · · · · · · · · · · · · · ·				WET	
	‡								-	
	-32.6 + 23.0	1	0	1						
-35	-35.1 - 25.5				1				_	
	1 1	1	1	0	1					
	-37.6 † 28.0	WOH	WOH	1	┤					
-40	-40.1 - 30.5	1	1	2					-	
	-42.6 733.0		'		1 1 3 · · · · 1 · · · · · · · · · · · · · · · · · · ·					
45		2	5	3] : •8 : : : : : : : : :				-43.3 COASTAL PLA	33.7 JN
-45	-45.1 - 35.5	5	3	1	1 4				 GRAY SAND WITH SHELL SATURATED (YORKTOW) 	FRAGMENTS,
	-47.6 1 38.0	5	6	7					3,113,111,125 (13,111,13,11)	
-50	-50.1 40.5	"		,	13.					
	-50.1 - 40.5	3	4	5	9				_	
	-52.6 + 43.0	4	4	9	+ : // : : .					
-55	-55.1 45.5				13				_	
	57.6 + 40.0	3	3	4	. • 7					
	-57.6 + 48.0	4	3	4	1 1 2 2 3 2 4 2 4 2 4 2 4 3 4 3 4 4 5 4 6 4 7 4 8 4 8 4 8 4 9 4 10 4 <td> </td> <td></td> <td></td> <td></td> <td></td>					
-60	-60.1 = 50.5	5	8	9	17				-	
		+		-	17	• • • •	┨	- ***	-61.6 Boring Terminated at Eleva	
	‡								Medium Dense S	Sand
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