5986B REFERENCE **CONTENTS**

DESCRIPTION

LEGEND (SOIL & ROCK)

CROSS SECTION(S) BORE LOG(S) SITE PHOTOGRAPH(S)

TITLE SHEET

SITE PLAN

PROFILE(S)

SHEET NO.

5-6 7-II

4

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY JOHNSTON

PROJECT DESCRIPTION <u>I-95 FROM NORTH OF SR</u> 1002 (LONG BRANCH ROAD) (EXIT 71) TO I-40 (EXIT 81).

SITE DESCRIPTION BRIDGE 653 ON -Y29- (S. MARKET ST.) OVER -L- (I-95)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
V.C.	I-5986B	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 SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. 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 INCLORDED TO CLIMATIC CONDITIONS INCLORDED TO CLIMATIC CONDITIONS INCLORDING TO CLIMATIC CONDITIONS INCLORDING 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 OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- 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.

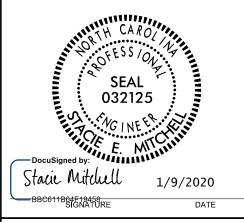
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

E. BLONESHINE J. PREVATTE A. BLYTHE J. SWARTLEY INVESTIGATED BY _____S&ME, Inc. CHECKED BY S. MITCHELL

SUBMITTED BY S. MITCHELL DATE JANUARY 2020



9751 SOUTHERN PINE BLVD CHARLOTTE, NC 28273



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO. SHEET NO.

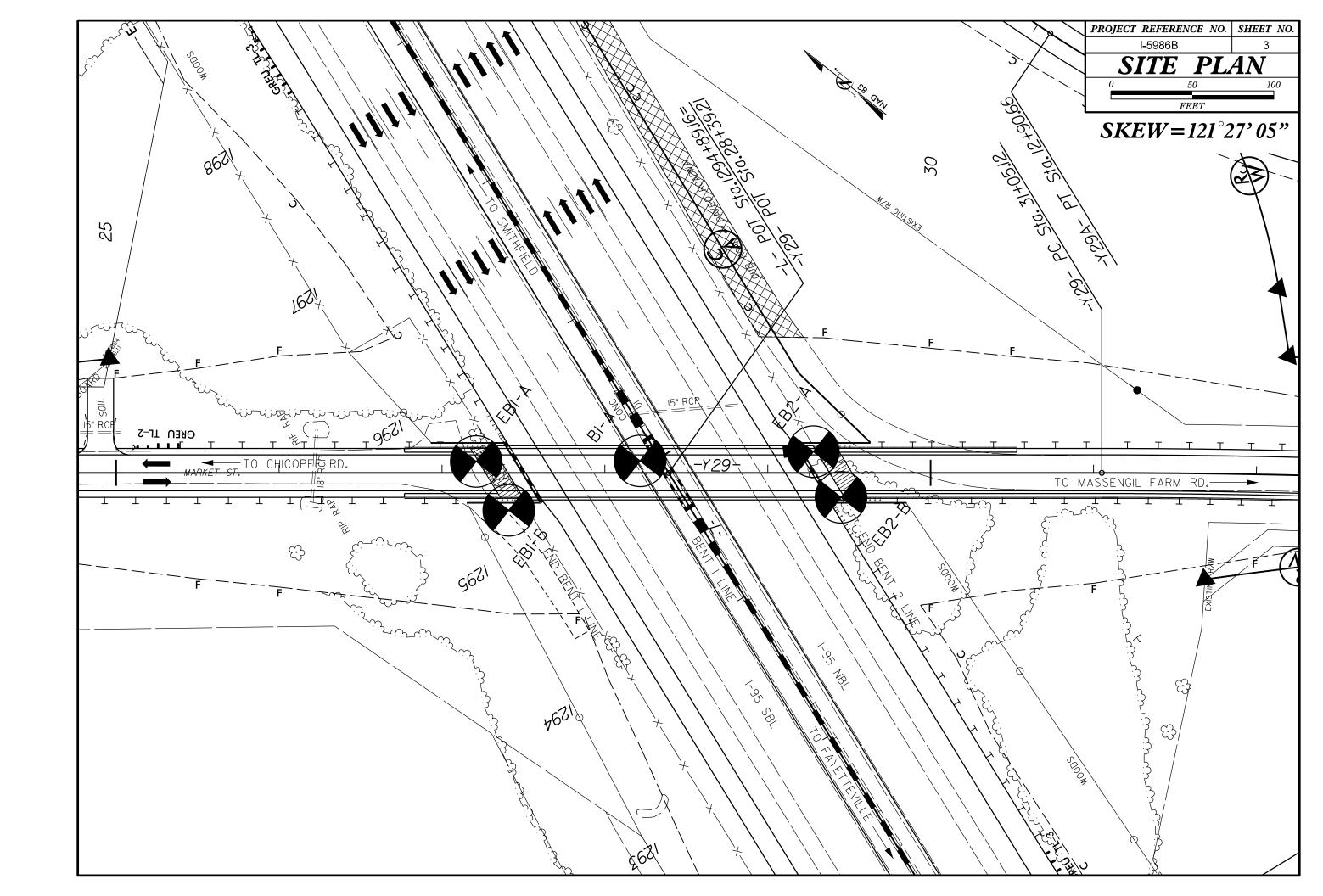
1-5986B
2

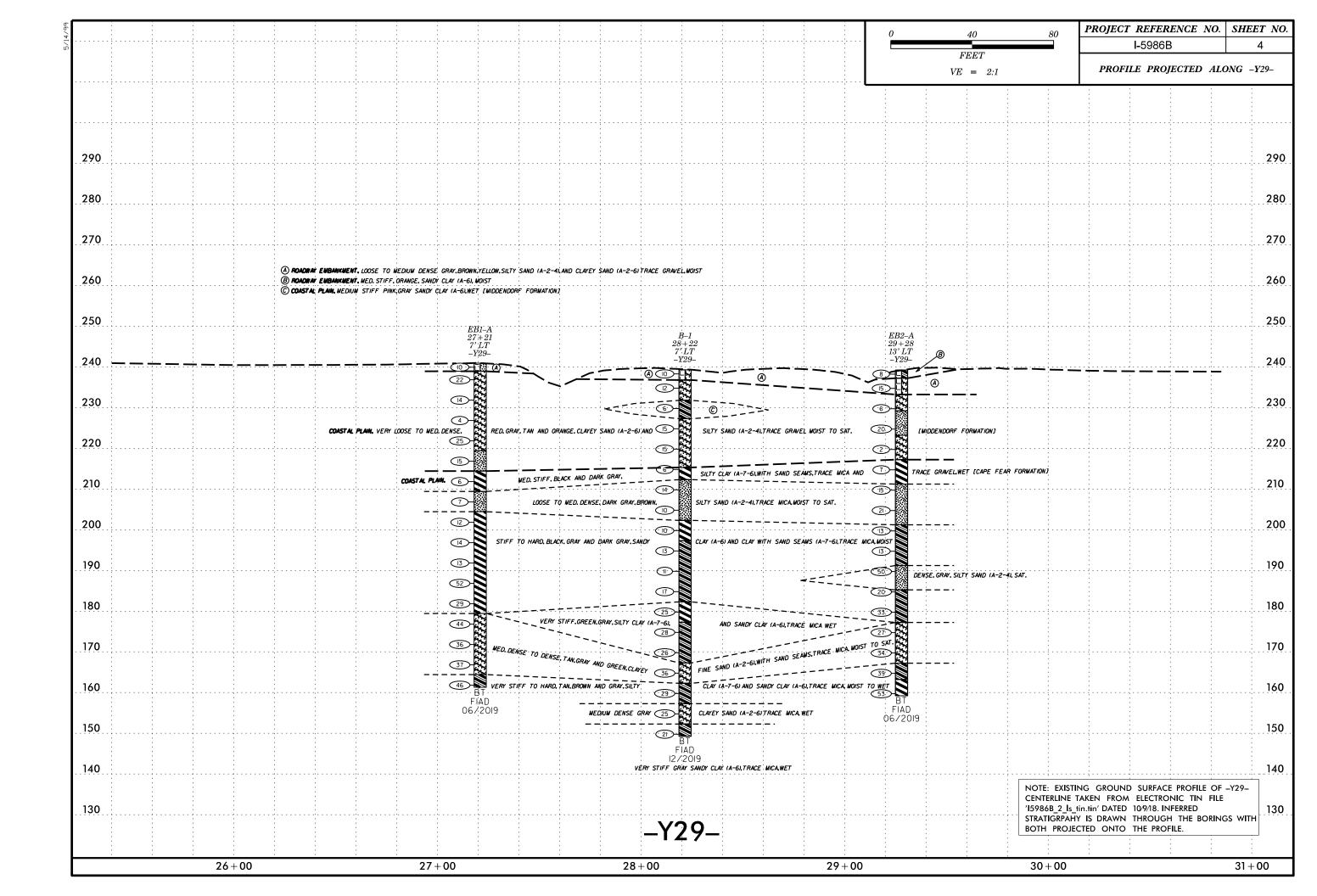
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

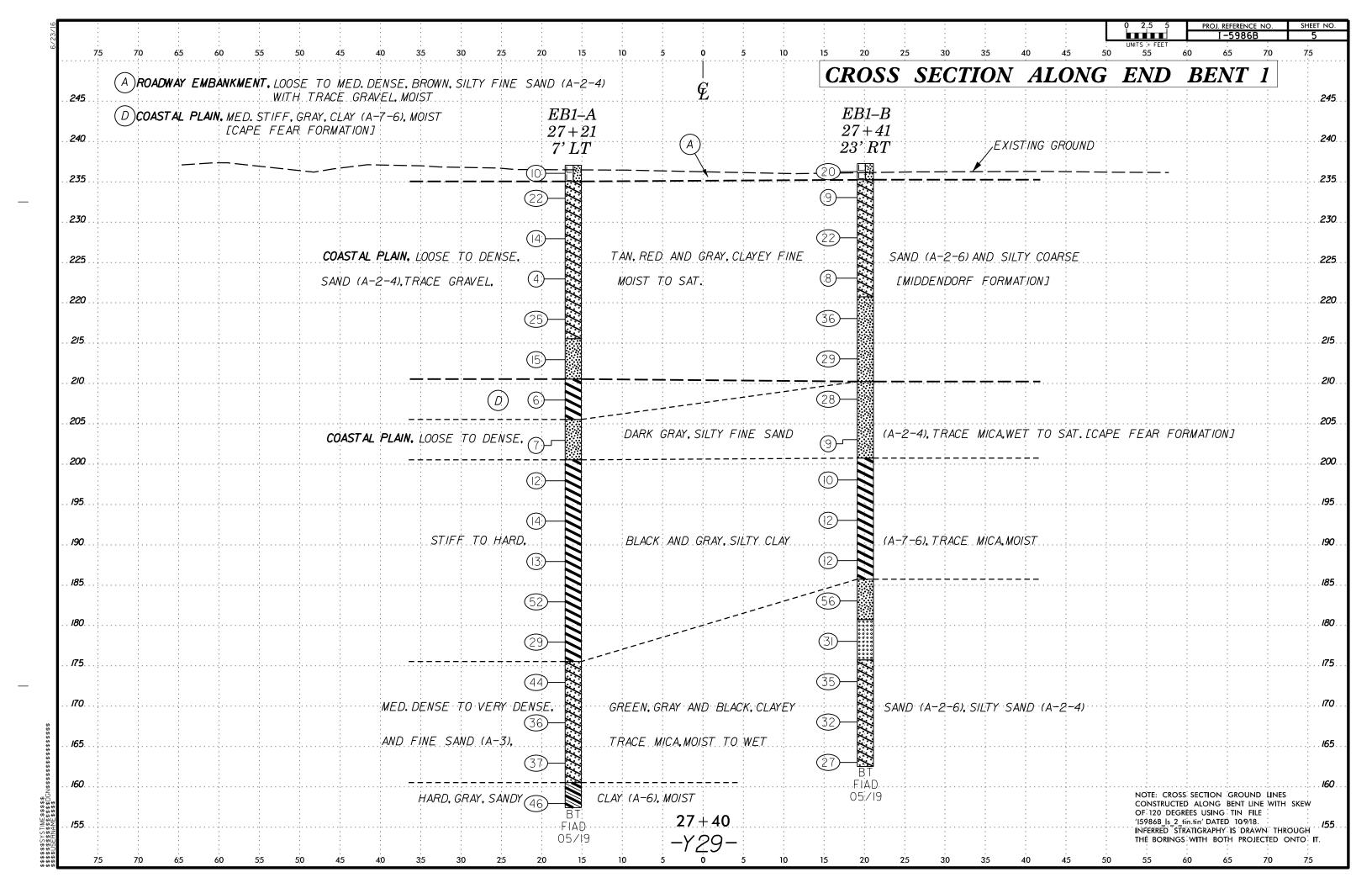
SUBSURFACE INVESTIGATION

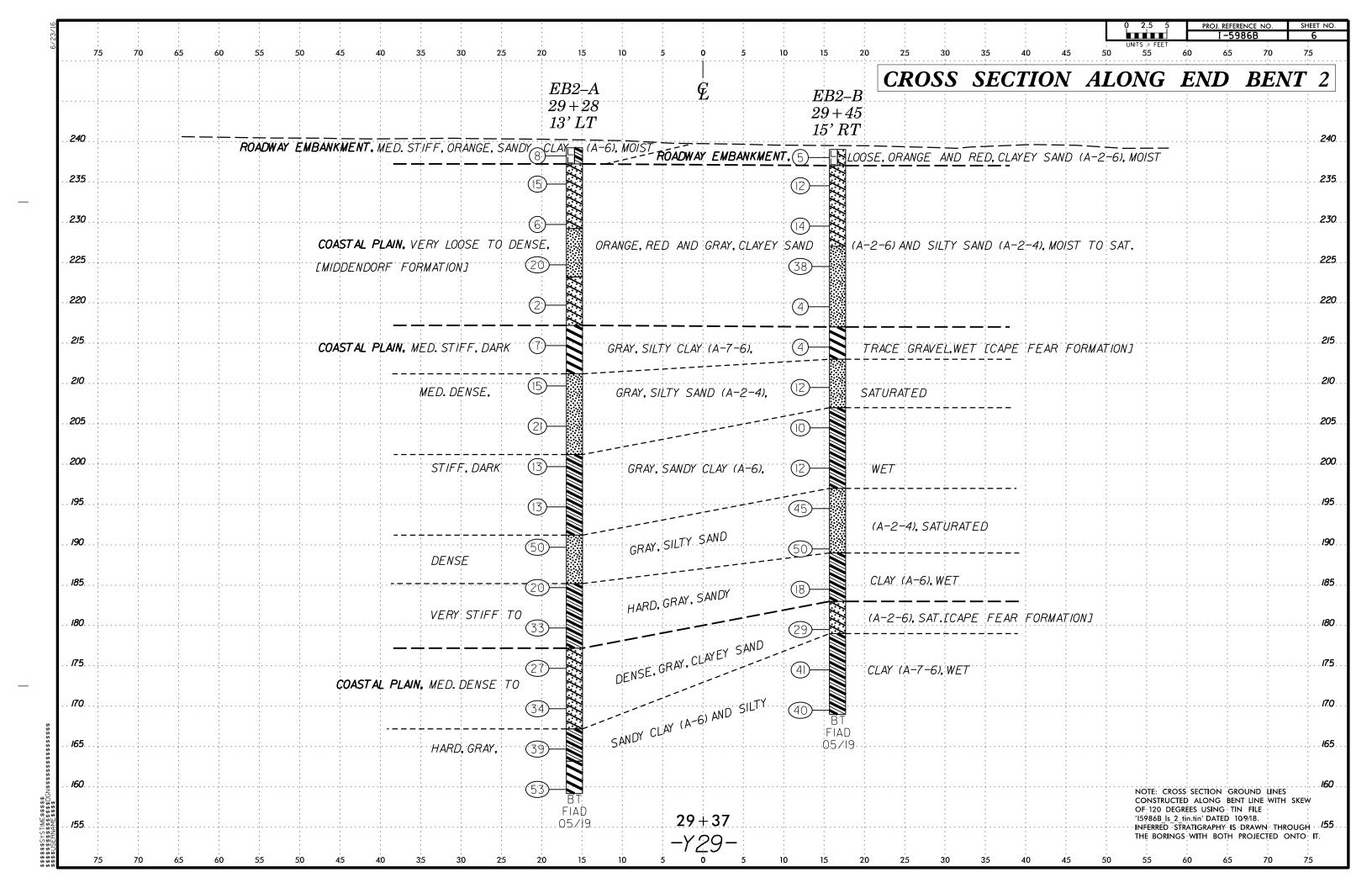
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

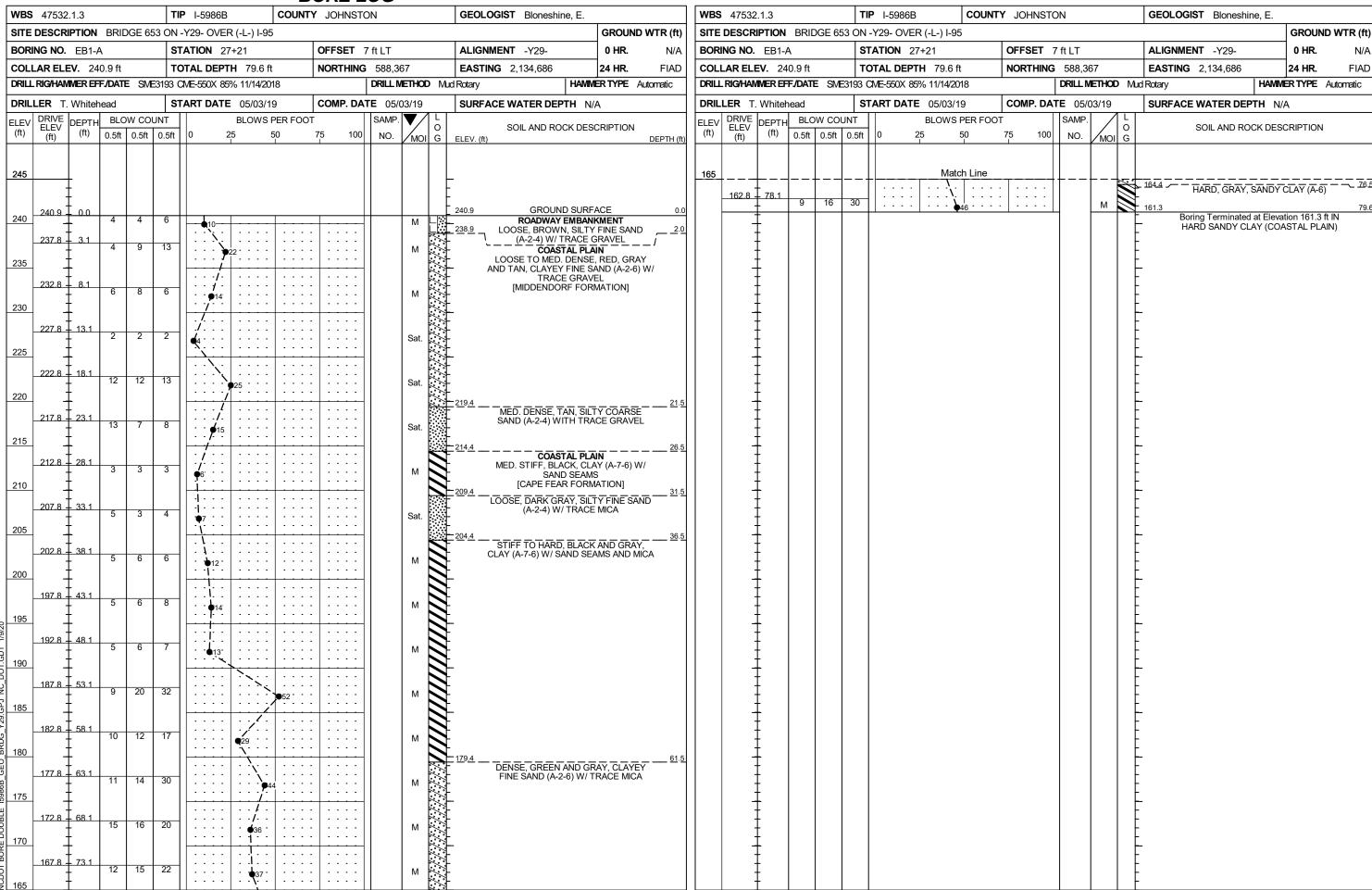
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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 D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - 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	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.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC ROCK 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.	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.	UNEISS, OHOBRU, SCHIST, ETC.	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-7-6	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 0000 d000000	SLIGHTLY COMPRESSIBLE LL < 31 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
% PASSING SUIT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MUCK, *40 30 MX 50 MX 51 MN SOILS SOILS SOILS PEAT	PERCENTAGE OF MATERIAL	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	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS 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.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 48 MX 41 MN	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 11 MN 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 SOUS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAYEL, AND MATERIALS SAND GRAYEL 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
CEN PATING		(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 POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI 0F A-7-5 SUBGROUP IS ≤ LL - 30 ;PI 0F 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.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE 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	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE	SOIL SYMBOL SOIL SYMBOL SUPPLINT TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	NT - STAN	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	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	TEST BORING	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	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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	→ → → → → → → ALLUVIAL SOIL BOUNDARY △ PIEZOMETER INSTALLATION → SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4 TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		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 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
COARSE FINE	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND (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
(CSE, SD.) (F SD.) (GE.)	ABBRE VIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	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
GRAIN MM 305 75 2.0 0.25 0.05 0.005 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 7 - 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 TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOU MOISTURE SCALE FIELD MOISTURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. 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 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	DPT - DYNAMIC 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 (SRQD) - 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 I 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.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RAINGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BY6-202 N: 588609 E: 2134438
" 1' PL L PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 241.76 FEET
SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C X CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO	CI CONTINUOUS ELICUT AUSED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD = FILLED IMMEDIATELY AFTER DRILLING
ATTAIN UPTIMUM MUISTURE	LURE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	X 8* HOLLOW AUGERS	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X CME-750 TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
		1	1





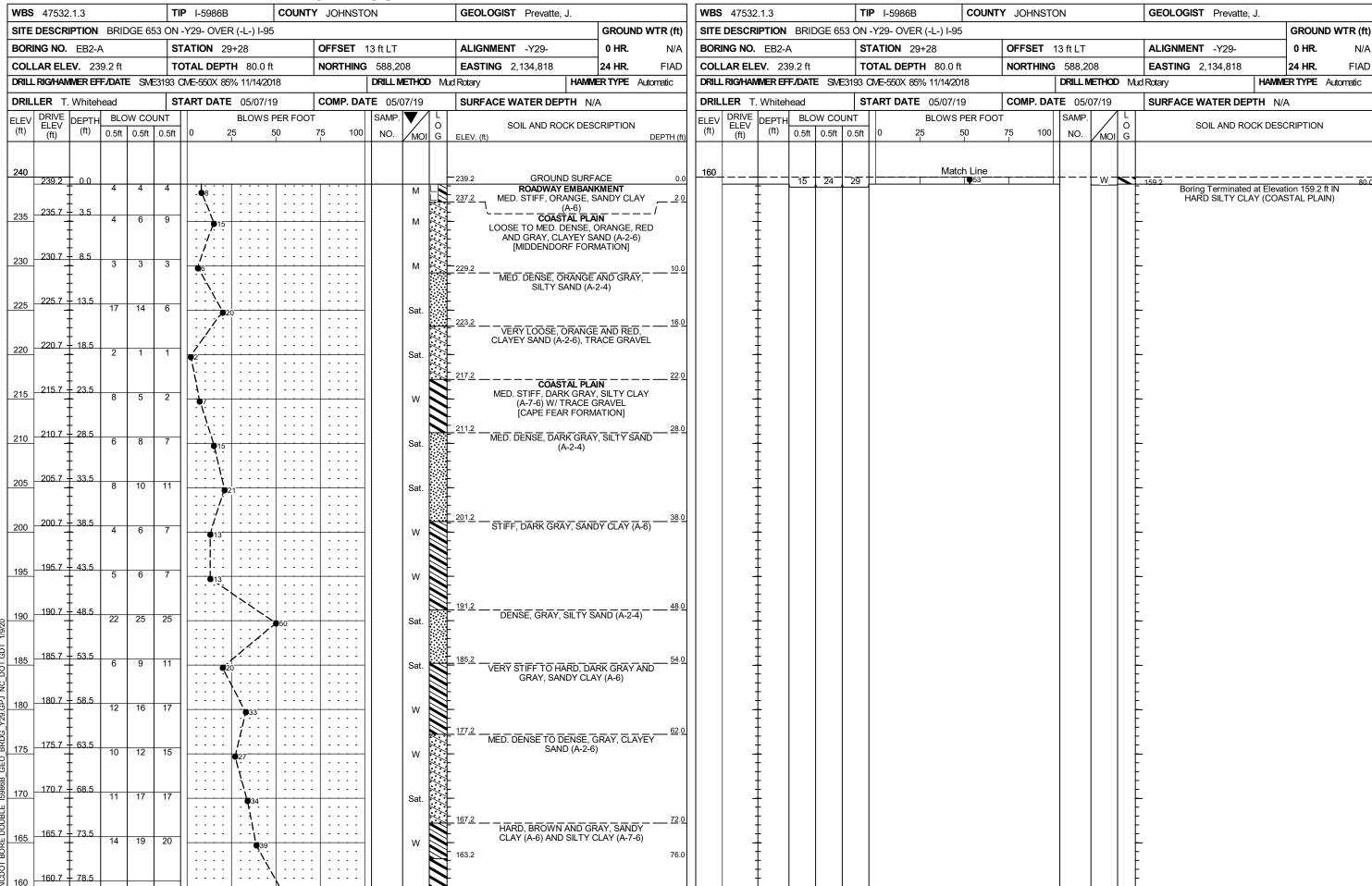






14/2-		0.4.0				'ID 50000			DUKE TV 1011				10-	OL OC!OT =:	=			MOC	47500 : -			TID : -	2005		UT\(:-		\ A .1			OFOLOGIOT SI	-	
-	4753		N 55	1005		IP I-5986			ITY JOHN	IS TON			GEO	OLOGIST Blon		ODOLING:	(TD (51)	-	47532.1.3		IDOE 050	TIP 1-59			NTY JO	HNSTO	ΝN			GEOLOGIST Bloneshine		
				IDGE 6		1 -Y29- OVE		<i>J</i> D	0====	.			1	ONDERE TO THE REAL PROPERTY OF THE PERTY OF		GROUND W	` '				IDGE 653	ON -Y29- 0	•	·		OFT :	0 % ==			ALIONINES : 175		GROUND WTR (f
	ING NO				-+	STATION 2			OFFSE				-+	GNMENT -Y29		0 HR.	N/A		S NO. E			STATION				SET 2				ALIGNMENT -Y29-		0 HR. N/.
	LAR EL					OTAL DEP			NORTH					STING 2,134,6		24 HR.	FIAD		R ELEV.			TOTAL [NOR	THING				EASTING 2,134,674		4 HR. FIA
				TE SIV		CME-550X 8			_				Mud Rotar	У	HAMIMI	ER TYPE Auto	omatic				TE SME31	193 CME-550					DRILL N		Mud	d Rotary	HAMMER	RTYPE Automatic
DRIL	LER 1					TART DAT			COMP.					RFACE WATER	DEPTH N/	A			R T. Wh			START [IP. DAT				SURFACE WATER DEPT	H N/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPT (ft)	0.5f	OW CC	OUNT 0.5ft	0	BLOWS 25	50			NO.	MOI C)		D ROCK DESC		DEPTH (ft)	ELEV E	RIVE ELEV (ft) (f	PTH BL ft) 0.5ft	OW COUN	.5ft 0	25 1	OWS PER FO	75 1	100	SAMP.	MOI	O G	SOIL AND ROC	K DESCF	RIPTION
245		_																165						Match Line								
	241.1	0.0				<u> </u>		. ,					241.1		OUND SURF		0.0		‡										-	MED. DENSE CLAYI PL	AIN)	O (COASTAL
240		†	6	11	9	 	20					М	239.1	MED. DEN	WAY EMBANI SE, BROWN,	SILTY FINE			+											-		
	237.9	3.2	3	3	6	┤│ : ╭ ′: :		. .				M %			SAND (A-2-4) OASTAL PLA		1		‡										Ŀ			
235] .	1				. 3		.		-		···/:;;		LOOSE TO M	ED. DENSE, F Y FINE SAND	RED AND TAN,	,		<u> </u>										Ŀ	_		
	232.9	1 8.2				\		.				! %!:		[MIDDE	NDORF FORM	MATION]			±										E			
	_02.0	Ŧ	9	11	11] :::}	22			-		w 🔆	\						Ŧ										F			
230		Ŧ					+					/ %.	: -						Ŧ										F	-		
	227.9	13.2	4	4	4			.				w //	\{						Ŧ										F			
225		Ŧ						.				vv %%:					40.5		Ŧ										F			
	222.9	T 18.2	.							$\overline{\cdot}$		*	224.6	MED. DENS	E TO DENSE	, TAN, SILTY	16.5		Ŧ										F	-		
	222.9	+ 10.2	9	19	17	† : : : :	36	.		1 1		w	-	COARSE SAN	ND (A-2-4), TR	RACE GRAVEL			‡										F			
220		‡											-						‡										F	-		
	217.9	23.2	8	10	11	4 ::::	: :/:::	.											‡										F			
215		‡	°	10	''		∳ 29	.				W							‡										þ			
213		‡					.						214.1		OASTAL PLA		<u>27.0</u>		‡											-		
	212.9	28.2	8	14	14	┧ : : : :	. - · · • •28- ·	.				w		LOOSE TO N	MED. DENSE,	DARK GRAY,			‡										-			
210		‡											<u></u>		SAND (A-2-4), FEAR FORM	TRACE MICÁ ATION]													Ŀ	_		
	207.9	33.2] : : <i>;</i> /:		. .											‡										E			
		‡	5	4	5	- ø 9		· · · · ·				W							‡										Ŀ			
205		†				 : t : :							204.6	STIFF BLA	ACK, SILTY CI	AY (A-7-6)	36.5		+											-		
	202.9	38.2	2	5	5	- - -		.				м	}		TRACE MICA				ŧ										E			
200] .	1				- 10		.		1 1			}_						<u> </u>										Ŀ	_		
	197.9	43.2	,			: }::		.					3						±										E			
		Ŧ	5	5	7	12		.		:		М	3						Ī										E			
195		\pm											\						Ŧ										F	-		
3,1	192.9	¥8.2	4	5	7	-{ · - : . ·				$\cdot \mid \mid$		м	3						Ŧ										E			
190		Ŧ				12				-		<i>"</i>	100.6				E1 E		Ŧ										F	_		
3	187.9	Ī 53.2	,										109.0	DENSE TO V	ERY DENSE,	BLACK, SILTY	و.ان		Ŧ										F	-		
ט' ב	.01.3	Ŧ 33.2	19	29	27] ::::		. 56				W	∰.	COARSE SA	ND (A-2-4) AN (A-3)	ID FINE SAND			Ŧ										F			
185 5		Ŧ						4				0.0	184.6				56.5		‡											-		
7.7	182.9	58.2	9	14	17	4 ::::		.				\A/							‡													
180 180		Ŧ			''		931	.				W							‡													
	477.0	‡								-		%	179.6	MED. DENSI	E TO DENSE,	GREEN AND	61.5		‡										F	-		
9	177.9	63.2	12	15	20		35	: : : :				М 🔆	<u> </u>	GRAY, CLA	AYEY FINE SA TRACE MICA	AND (A-2-6), A			‡													
175		‡					<u> </u>					*, *,*,*	<u>;</u>						‡											-		
OOBLE	172.9	68.2	10	11	18] ::::	. .	.				/ */.	\						‡													
170		‡	"	14	10		P 32	.		-		M %	**						‡													
S 1/0		‡_					 			-		/ */.	\						‡										-	-		
5	167.9	73.2	10	12	15	┤│ : : : :	j	: : : :		:		M %	166.4				74.7		‡													
		ŧ				1		1	1			,	1	Boring Termi	nated at Elevat	tion 166.4 ft IN			+										 -			

WBS 4753	22 1 2				TID	I-5986E	2		NTY JOH				GEOL	LOGIST	Goslin, G.				WRS	47532.	1 2			TIE	P I-5986B		COLINT	Y JOHNS	TON.			GEOL	OGIST Go	elin G		
SITE DESC			DIDGE						1411 3011	INSTOR	<u> </u>		GLOL	LOGIST	Gosiiri, G.	GP	ROUND WTI	—— ⊢				BBIDG	E 653		-Y29- OVEF			1 JOHNS	TON			GLOL	JGIJ1 G0	isiiri, G.	GPOI	JND WTR (ft)
BORING NO			NIDGE			TION 2		.33	OFFSE	ET 74	# I T		ALIGN	NMENT	V20		HR.	` ´ I F		IG NO.		DIVIDO	JL 000		ATION 28	• ,		OFFSET	7 ft l T			ALIGN	MENT -Y2	20	O HR	` ,
			£1						_				_					- 1 ⊦						_						200						
DRILL RIG/H							TH 90.0		NORTI		588,288 DRILL METH	10D M		FING 2,13		24 I	YPE Automa			AR ELE			SI/IEO		TAL DEPT ME-750 74%			NORTHII			D 14	Id Rotary	NG 2,134,		24 HR	. FIAD E Automatic
			AIL 3						1								TPE AUTOTE						SIVIES					1								- AUIOTTAIIC
DRILLER ELEV DRIVI	- 1		1 0 1 1 0			RIDAI	E 12/09				12/10/1 SAMP.		SURF	ACE WA	TER DEPTH	H N/A				ER R.			, <u>0011</u>		ART DATE			COMP. D			/ 	SURFA	CE WATE	R DEPTH	N/A	
ELEV DRIVI	/	111	SEOW C			0	25 	S PER FO	75 	100	1 2	OI G	ELEV. (ft		AND ROCK	K DESCRIP		PTH (ft)	(ft)	DRIVE ELEV (ft)	OEPTH_ (ft)	0.5ft C			0 2		PER FOO		SAMF NO.	1 /	O I G		SOIL AN	ND ROCK I	DESCRIPTIO	DN
240	3 0.												-239.3		GROUND S			0.0	160							Mate	ch Line	. T		w -			VERY STIF	F TAN. GR	ZAY. SANDY	CLAY
	Ī	3	4	6	5	. •10 .					l M	- <u> </u> //	31		OADWAY EN			2.5		1								.	.			1 <u>57.3</u>	(A-6) ⁻	TRACÉ MIC	CA (continue)	
235.8	3 + 3.	5 4	6	- 6	3						l w	,	E7	\	YELLOW BRI ARSE SAND (GRA	· · · · · · · · · · · · · · · · · · ·	TRACE /-		155	155.8	83.5	6	12	13		j				l w	///	- -	SANE	ENSE, GR. D (A-2-6), T	RACE MICA	FINE
	<u>†</u>					. 1				11	'	///	1	MEDIUM	COASTA I DENSE, RE	ED, GRAY,	CLAYEY			1	.				::::	25			1 1	'		- 450.0				07.0
230.8	± 8.	5				:/: : :				11			231.8	_ FINE	TO COÁRS DDENDORF	SE SAND (A	\-2-6) <u> </u>	7.5		150.8	. 88.5				: : : :/				1 1			<u>152.3</u> -	VERY STIFE	F, GRAY, S	ANDY CLAY	$\frac{7}{(A-6)}, \frac{87.0}{}$
230	+	2	3	3	3	6	<u> </u>				w		}_		√STIFF, PIN	IK GRAY, C			150		-	10	9	12		1 21		$+\cdots$	Щ	W		149.3		IIVACLI	WICA	90.0
	f					. /							<u>227.3</u>		SANDY CL		7 3 3 5 5 7	12.0		<u> </u>												-	Boring Term VERY STIF	FF SANDY	CLAY (COA	
225.8	3 13	5.5	7	1 8	_	\	<u> </u>			11	_w	, ,	_	MEDIUM I FINE	DENSE, TAN TO COARS	N, YELLOW SE SAND (A	r, CLAYEY \-2-6)															_		PLAIN	N)	
	Ŧ			`		15				11	"	<i>////</i>	_ 							7	·											-				
220.9	I 3 + 18						: : :					<i></i>	Ε.							Ŧ	.											- -				
220	Ŧ"°	3	1	1	4	15	+				l w	/ 📈	_							7	.											-				
	Ŧ					. , ,							-							‡												-				
215.8	3 23	5.5	4	٠,	_	:/: : :				11	"	,	215.3					24.0		Ŧ												-				
	Ŧ			^		-\(\				11	"		F		COASTA	GRAY, SILT	TY CLAY			Ŧ	.										1 F	-				
	, ‡	_				: / : :							212.3	۱ (A-7-6) ر اک	W/ SAND SE CAPE FEAR F	EAMS, TRAC FORMATIO	CE MICA _	27.0		1	.											- -				
210	3 <u>+ 28</u> +	1	5	1	∍ 	14					l w	<i>,</i>	‡	MEDIL	JM DENSE T	TO LOOSE,	DARK			- ‡	.											_				
	‡									11			‡	GRAT,	, SILTY FINE TRACE	E MICA	2-4) VV/			‡	.											- -				
205.8	3 + 33	5.5			_	: : : :				11			‡							‡	.											- -				
200	‡	4	3	'	′	10					W	<i>'</i>	-							†	-											-				
	‡					.							202.3	STIFF D	ARK GRAY,	SILTYCLA	AY (A-7-6)	37.0		‡	.											- -				
200	3 + 38	2	4	- 6	3	· · ·					l w		‡	W/ S	SAND SEAMS	S, TRACE	MICA			#	·											-				
	‡					:] : :				: :			1 <u>9</u> 7.3					42.0		‡	.											- -				
195.8	3 + 43	5.5								: :				STIFF	TO VERY ST CLAY (A-6), T	TIFF GRAY,	SANDY			‡	.											- -				
195	‡	3	6	'	′	13					W		<u> </u>) Li (/ (-0), 1	TTO TOLL WILL	<i>,</i>			‡	.											-				
	‡					: iį: :				: :			‡							‡	:											-				
190.8	3 + 48	3.5 4	4	1 7	7	 		-			l w		‡							‡	-											- -				
	‡					/				::			<u>}</u>							‡	:											-				
185.8	+ 3 + 53	5.5		\perp		:: <i>j</i> ::				: :			<u>}</u>							‡	.											- -				
185	‡	28	3 8	9)	17	7				W		<u></u>							†	.											-				
2	‡					<i>j</i> ′ : : : <i>j</i>				: :			182.3	_\Æ₽ <u>\</u> 5+	TFF, GREEN			<u>57</u> .0		‡	.											-				
180.8	3 + 58	5.5 7	10) 1	5	'	25	-			l w		<u> </u>	(A-7-5) \	W/ SAND SE	EAMS, TRAC	CE MICA				.											- -				
	‡						\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			: :			177 9					62.0		‡	.											-				
175 8	$\frac{1}{3} + 63$	3.5		\perp			Ĭ:::			: :			‡ <i>'''</i> -	VERY S	TIFF GRAY,	SANDY CL	AY (A-6),	_ 52.0		1	.											-				
175	+	13	3 9	1	9]		28				l w		}		TRACE	= IVIICA				1	.											-				
	‡									: :			}							1	.											-				
170.8	8 4 68	5.5	12	2 1	4		i	-			l w	,	<u> </u>							<u> </u>	_											-				
	Ŧ						\ \ \			: :]	"		1					76.5		7	<u> </u>											-				
165 0	3 - 73						17.1			- [167 <u>.3</u> _	DENSE	E, GRAY, CL	AYEY FINE	SAND -	<u> /2.0</u>		Ŧ	.											-				
165	+'3	11	1 14	2	2		36				w	/ //	-		(A-2-6), TR	RACE MICA				‡	-											-				
	Ŧ						: /: :			: :			162.3			 _ =		77.0		‡												-				
160.8	3 ‡ 78	5.5	2 14	1	_		17: :			: :			Į - 	VERY S	TIFF TAN, G (A-6), TRA		DY CLAY	-]		‡	.											-				
			14		J		1.1						J		\ -,,																					



						BURE LUG	<u>'</u>		
WBS	47532	.1.3			TII	I-5986B COUNTY JOHNSTON		GEOLOGIST Prevatte, J.	
SITE	DESCR	PTION	BRID	OGE 65	3 ON	/29- OVER (-L-) I-95			GROUND WTR (ft)
BORI	ING NO.	EB2-l	3		SI	ATION 29+45 OFFSET 15 ft R	Т	ALIGNMENT -Y29-	0 HR. N/A
COLI	LAR ELE	V . 23	9.0 ft		TC	TAL DEPTH 70.0 ft NORTHING 588	,177	EASTING 2,134,807	24 HR. FIAD
DRILL	.RIG/HAIV	MER EF	F/DATE	E SME	3193 (/E-550X 85% 11/14/2018 DRILL	.METHOD Mud	Rotary HAMIN	ERTYPE Automatic
DRIL	LER T.	Whitel	nead		ST	ART DATE 05/08/19 COMP. DATE 0	5/08/19	SURFACE WATER DEPTH N/	Ά
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)		W COL	JNT 0.5ft	BLOWS PER FOOT SAM 0 25 50 75 100 NO	17/101	SOIL AND ROCK DES	CRIPTION DEPTH (ft)
240	239.0	- 0.0	5	3	2	1_	M	239.0 GROUND SURF	
235	235.5	- - - 3.5 -	5	6	6	12.	M W	237.0 LOOSE, ORANGE AND F SAND (A-2-6 COASTAL PLA MED. DENSE, ORANGE	RED, CLAYEY2.0_ (i) / NIN
230	230.5	- - - 8.5	7	6	8	•14	M	CLAYEY SAND (A [MIDDENDORF FOR -	A-2-6)
225	225.5	- - - 13.5	14	17	21		Sat.	227.0 LOOSE TO DENSE, ORAN SILTY SAND (A-	
220	220.5 -	- - - - 18.5	5	1	3	• • • • • • • • • • • • • • • • • • • •			
215	215.5 -	- - - - 23.5				4	Sat.	217.0 COASTAL PLA SOFT, DARK GRAY, SILTY	22.0 NN Y CLAY (A-7-6)
	210.5	- - -	1	2	2	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	W	213.0 MED. DENSE, GRAY, SILT	MATION]
210	205.5	- - -	4	5	7	• 12 · · · · · · · · · · · · · · · · · ·	Sat.		DY CLAY (A-6) 32.0
200	200.5	- - - - 38.5 -	4	6	6	• • • • • • • • • • • • • • • • • • •			
195	195.5	- - - 43.5	17	23	22	1 445	Sat.		
190	190.5 -	- - - 48.5 -	9	28	22		Sat.	- 189.0	50.0
185	185.5 - - -	- - - 53.5 -	7	8	10			VERY STIFF, GRAY, SANI	
180	180.5 - -	- - - 58.5 -	8	11	18	29	Sat.	MED. DENSE, GRAY, CL (A-2-6)	60.0
175	175.5 -	- - - 63.5 -	10	12	29	41		HARD, GRAY, SANDY	CLAY (A-6)
170	170.5 <u>-</u>	- - - 68.5 -	13	18	22	440	w W	- 169.0	70.0
	- - -	- - - - -						Boring Terminated at Eleva HARD SANDY CLAY (CO/	tion 169.0 ft IN



SITE PHOTOGRAPH

Bridge 653 on -Y29- over -L- (I-95)

