### **CONTENTS**

20-21

SHEET NO. - 3 4 5-8 9-19

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REFERENCE

**DESCRIPTION** TITLE SHEET LEGEND SITE PLAN PROFILE(S) CROSS SECTION(S) BORE LOG(S) SOIL TEST RESULTS

### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION DUAL BRIDGES NO. 24 AND NO. 259 ON NC 211 OVER DUTCHMAN CREEK

STATE N.C

SHEETS 21



### 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 REVEWED OR INSPECTED IN RALE(GH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (9)97 07-6850, THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS BUICATED IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY VARY 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 INTERRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMINSELF 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 ACUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PERSONNEL

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D. JENKS

INVESTIGATED BY \_F&R Inc.

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SUBMITTED BY \_P. ALTON

DATE \_SEPTEMBER 2015



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL D	DESCR	RIPTION							GRADATION						ROCK DE	SCRIPTION
SOIL IS BE PENET ACCORDI	CONSIDERED TRATED WITH ING TO THE	) UNCONSOLIDA H A CONTINUOL STANDARD PEI	TED. SEMI-CON S FLIGHT PO METRATION TE	ISOLIDAT WER AUG ST (AAS	ED, OR WEA ER AND YI HTO T 206	ATHERED E ELD LESS , ASTM D1	ARTH MATERI THAN 100 BL 586). SOIL CL	ALS THAT CAN DWS PER FOO ASSIFICATION	N T	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	ES A GOOD R IDICATES THA	REPRESENTATION OF P T SOIL PARTICLES AR OF UNIFORM PARTICL	ARTICLE SIZE E ALL APPRO E SIZES OF	S FROM FINE TO COARSE. XIMATELY THE SAME SIZE. IWO OR MORE SIZES.	HARD ROCK ROCK LINE SPT REFUSA	IS NON-C INDICATE	COASTAL PLA S THE LEVE NETRATION E	AIN MATERIAL THAT N L AT WHICH NON-COA BY A SPLIT SPOON SA MATERIAL THE TRA	WOULD YIELD SPT REFUSAL IF TESTED STAL PLAIN MATERIAL WOULD YIELD MPLER EQUAL TO OR LESS THAN 0.1 NSITION RETWEEN SOIL AND ROCK I
CONSISTE	ENCY, COLOR,	, TEXTURE, MOI	TURE, AASHTO	CLASS	IFICATION,	AND OTHER	R PERTINENT	ACTORS SUC	- t		ANG	ULARITY OF G	RAINS			ED BY A	ZONE OF WE	ATHERED ROCK.	c.
A	S MINERALO VERY STIFF.G	GICAL COMPOS GRAY, SILTY CLAY,	TION, ANGULA IOIST WITH INT	RITY, STI ERBEDDE	RUCTURE, P	LASTICITY ND LAYERS,	,ETC. FOR EX HIGHLY PLASTIC	AMPLE. <i>A-7-</i> 6		THE ANGULARIT	Y OR ROUNDN	ESS OF SOIL GRAINS	IS DESIGNATE	D BY THE TERMS:		THES HR	E TIPICALLY	NON-COASTAL PLAT	SI
	S	OIL LEGE	ND AND	AASH	TO CLA	SSIFIC	CATION			ANGULAR, SUBAN	MINED.	NUNDED, UR <u>RUUNDED</u> .			ROCK (WR)			100 BLOWS PER FO	OT IF TESTED.
GENERAL	,	GRANULAR MATER	IALS 2010)	SIL	T-CLAY MATE	RIALS	ORGANIC	MATERIALS	ŀ	MINERAL NAM	MES SUCH AS	QUARTZ, FELDSPAR, MI		LIN. ETC.	CRYSTALLIN	١E	I.I.	FINE TO COARSE O	RAIN IGNEOUS AND METAMORPHIC ROC REFUSAL IE TESTED, ROCK TYPE INC.
GROUP	A-1	A-3	A-2	A-4	A-5 A-6	5 A-7	A-1. A-2 A	4. A-5		ARE USED IN	I DESCRIPTION	NS WHEN THEY ARE CO	JNSIDERED OF	SIGNIFICANCE.	ROCK (CR)			GNEISS, GABBRO, SC	HIST, ETC.
CLASS.	A-1-a A-1-b	A-2-4 A	2-5 A-2-6 A-2	-7		A-7-5, A-7-6	A-3 A	6. A-7			(	COMPRESSIBILI	ΓY		NON-CRYSTA ROCK (NCR)	ALLINE		SEDIMENTARY ROCK	THAT WOULD YEILD SPT REFUSAL IN
SYMBOL				3	1.7.1					SLIGH MODE	ITLY COMPRES RATELY COMP	SSIBLE RESSIBLE	LL < LL =	31 31 - 50	COASTAL PL	AIN		COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT N
% Passing								ILT-		HIGHL	Y COMPRESSI	IBLE		50	SEDIMENTAR (CP)	IY ROCK		SPT REFUSAL. ROC SHELL BEDS.ETC.	K TYPE INCLUDES LIMESTONE, SANDST
*10 *40	50 MX 30 MX 50 MX	51 MN					SOILS	CLAY PE	СК, АТ						-			WEATI	ERING
*200	15 MX 25 MX	10 MX 35 MX 35	MX 35 MX 35 I	4X 36 MN	36 MN 36 M	4N 36 MN		0125		ORGANIC MATERIAL			<u>0</u> TBA	THER MATERIAL	FRESH	ROCK F	RESH, CRYST	ALS BRIGHT, FEW JOIN	S MAY SHOW SLIGHT STAINING. ROCK R
MATERIAL PASSING #40							601 G 1/17	.		LITTLE ORGANIC MAT	TER 3	- 5% 5 - 12%	LIT	LE 10 - 20%	VERY SLIGHT	T ROCK (	GENERALLY F	RESH. JOINTS STAINED.	SOME JOINTS MAY SHOW THIN CLAY CO.
LL	- 6 MX	- 40 MX 4	MN 40 MX 41 M	1N 40 MX	41 MN 40 M	4X 41 MN	LITTLE OF		I Y	MODERATELY ORGANIC HIGHLY ORGANIC	5 - >	- 10% 12 - 20% 10% > 20%	SOMI HIGH	E 20 - 35% ILY 35% AND ABOVE	(V SLI.)	CRYSTA	ALS ON A BRO	OKEN SPECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER HA
GROUP INDEX	0 11/2	0 0	4 MX	8 MX	12 MX 16 M		Moderate Amounts (	ORG	NIC			GROUND WATE	R		SI IGHT	BUCK (	GENERALLY F	RESH. JOINTS STAINED	AND DISCOLOBATION EXTENDS INTO BOC
USUAL TYPES	STONE FRAGS.						ORGANIC	501	LS	$\nabla$	WATER LEV	EL IN BORE HOLE IM	MEDIATELY AF	TER DRILLING	(SLI.)	1 INCH.	OPEN JOINT	S MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL
of Major Materials	GRAVEL, AND	SAND GRAV	el and sand	SO		SOILS	HATTEN			▼	STATIC WA	TER LEVEL AFTER 2	4 HOURS		MODERATE	SIGNIE	ICANT PORTIC	INS OF ROCK SHOW DIS	COLORATION AND WEATHERING FEELTS.
GEN. RATING	0,110						FAIR TO			<b>VPW</b>	PERCHED W	ATER, SATURATED ZON	E, OR WATER	BEARING STRATA	(MOD.)	GRANIT	OID ROCKS, M	IOST FELDSPARS ARE [	ULL AND DISCOLORED, SOME SHOW CLAY
AS SUBGRADE		EXCELLENT TO G	JUU		FAIR TO POL	JR	POOR		ABLE		SPRING OR	SEEP				WITH F	RESH ROCK.	HAMMER BLUWS AND S	HUWS SIGNIFICANT LUSS OF STRENGTH
		PI OF A-7-5 SUB	ROUP IS S LL	- 30 ; PI	OF A-7-6 SU	BGROUP IS >	> LL - 30				MICC				MODERATELY	ALL RC	JCK EXCEPT (	QUARTZ DISCOLORED O	STAINED. IN GRANITOID ROCKS. ALL FE
			15151ENC			NDARD	RANGE (		n		MISC	ELLANEUUS ST	MBULS		(MOD. SEV.)	AND DI	AN BE EXCAV	ATED WITH A GEOLOGIS	T'S PICK. ROCK GIVES "CLUNK" SOUND W
PRIMARY S	RY SOIL TYPE CUMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE (N-VALUE) (TONS/									L ROADWAY EMB	ANKMENT (RE)	25/025 DIP & DIF	DIRECTION			<u>IF TES</u>	TED. WOULD	YIELD SPT REFUSAL	
	RALLY VERY LOOSE < 4										SCIAL LIGH	SPT SPT		SLOPE INDICATOR	(SEVERE	ALL RU REDUCE	ED IN STRENC	GUARTZ DISCOLURED UN	N GRANITOID ROCK FABRIC CLEAR AND EV
GENERAL	RALLY VERY LUUSE C 4 IULAR LOOSE 4 TO 10 IULAR MEDIUM DENSE 10 TO 30 N.									SUIL SYMBUL			BURING (	_/ INSTALLATION		TO SOM	HE EXTENT. S	SOME FRAGMENTS OF S	TRONG ROCK USUALLY REMAIN.
MATERIA (NON-CO	AL NHESIVE)	MEDIOM 13D	ISE		30 TO 5	0		N/H		ARTIFICIAL FI	ILL (AF) OTHER	R 🕀 AUGER BO	RING (	CONE PENETROMETER TEST	VERY	ALL RC	DCK EXCEPT (	QUARTZ DISCOLORED O	STAINED. ROCK FABRIC ELEMENTS ARE
		VERY	DENSE		> 50								INC		SEVERE	BUT MA	ASS IS EFFEC	CTIVELY REDUCED TO S	OIL STATUS, WITH ONLY FRAGMENTS OF
GENERAL	LLY	SO	FT		2 TO 4		0.2	5 TO Ø.5		INFERRED SUI	L BUUNDHRT					VESTIG	ES OF ORIGIN	NAL ROCK FABRIC REM	AIN. <u>IF TESTED, WOULD YIELD SPT N VA</u>
SILT-CL MATERIA	_AY AL	MEDIUM	STIFF FF		4 TO 8 8 TO 15	i	0.	5 TO 1.0 TO 2		INFERRED ROC	K LINE		IG WELL -	WITH CORE	COMPLETE	ROCK P	REDUCED TO S	SOIL. ROCK FABRIC NO TRATIONS, QUARTZ MAY	DISCERNIBLE, OR DISCERNIBLE ONLY IN BE PRESENT AS DIKES OR STRINGERS.
(COHESI	VE)	VERY	STIFF		15 TO 30	0	-	TO 4		ALLUVIAL SOI	L BOUNDARY	△ PIEZOMET INSTALLA	ER TION	- SPT N-VALUE		ALSO A	AN EXAMPLE.		
		T	EXTURE	OR G	RAIN S	IZE		/ 1	_		RECO	MMENDATION S	YMBOLS					ROCK H	ARDNESS
	EVE SIZE		4 10	40	n 60	200	270				ZZ UNCLAS!	SIFIED EXCAVATION -	শ্য দিল্লু ব	CLASSIFIED EXCAVATION -	VERY HARD	CANNOT SEVER(	I BE SCRATCH	HED BY KNIFE OR SHA WS OF THE GEOLOGIST	RP PICK. BREAKING OF HAND SPECIMENS
OPENING (M	M)		4.76 2.00	0.4	2 0.25	0.075	0.053			EXCAVATION L		ABLE WASTE	AC احتً⊁أ ≀U	CEPTABLE, BUT NOT TO BE ED IN THE TOP 3 FEET OF	HARD	CAN BE	E SCRATCHED	BY KNIFE OR PICK ON	LY WITH DIFFICULTY. HARD HAMMER BL
BOULDE	R CO	BBLE G	RAVEL	COAR	RSE	FINE	SILT	CLA	r			ABLE DEGRADABLE RO	ск Ем	BANKMENT OR BACKFILL	100550 TEL 11	TO DET	FACH HAND SE	PECIMEN.	
(BLDR.)	) ((	COB.)	(GR.)	CSE.	SD.)	(F SD.	(SL.	(CL.	' I			ABBREVIATION	S		HARD	EXCAVE	ATED BY HAR	D BLOW OF A GEOLOGI	ST'S PICK. HAND SPECIMENS CAN BE DE
GRAIN MM	1 305	75	2.0		0.25		0.05	0.005		AR - AUGER REFUSAL	0	MED MEDIUM	V.	ST - VANE SHEAR TEST	MEDUW	BY MOD	JERATE BLOW	S.	
SIZE IN.	. 12		TUDE							CL CLAY	,	MOD MODERATELY	, ,	Y - UNIT WEIGHT	HARD	CAN BE	E EXCAVATED	IN SMALL CHIPS TO P	EICES I INCH MAXIMUM SIZE BY HARD E
SOTI			FIELD M			N UF	LERMS			CPT - CONE PENETRATION CSE COARSE	N TEST	NP - NON PLASTIC ORG ORGANIC	7	d - DRY UNIT WEIGHT	COLT	POINT	OF A GEOLOG	SIST'S PICK.	
(ATT	TERBERG LI	MITS)	DESCRI	PTION	GUI	DE FOR F	IELD MOISTU	RE DESCRIPT	ION	DMT - DILATOMETER TES	T Teore	PMT - PRESSUREMETI	ER TEST	SAMPLE ABBREVIATIONS	SUFI	FROM (	CHIPS TO SE	VERAL INCHES IN SIZE	BY MODERATE BLOWS OF A PICK POINT
			- SATUR	ATED -	USU	ALLY LIO	UID; VERY WE	I, USUALLY		e - VOID RATIO	IIUN IESI	SAP SAPROLITIC	S	- BULK S - SPLIT SPOON	VERY	PIECES	CAN BE BRO	DKEN BY FINGER PRESS	URE.
LL		LIMIT	(SAT.	)	FRO	M BELOW	THE GROUND	WATER TAB	LE	F - FINE FOSS - FOSSILIEFROUS		SL SILT, SILTY	S	T - SHELBY TUBE	SOFT	OR MOF	RE IN THICKN	ESS CAN BE BROKEN E	Y FINGER PRESSURE. CAN BE SCRATCHE
			- WET -	0.0	SEM	ISOLID; R	EQUIRES DRY	NG TO		FRAC FRACTURED, FRAC	TURES	TCR - TRICONE REFU	SAL R	T - RECOMPACTED TRIAXIAL		FINGER	NAIL.		BEDDING
(PI) PI	NGE - WET - (W) ATTAIN OPTIMUM MOISTURE									FRAGS FRAGMENTS HI HIGHLY		w - MOISTURE CONTE V - VERY	INT CI	BR - CALIFORNIA BEARING RATIO	TERM	FRACI	URE SPA		TERM T
	T		MOLET		601	10. AT 00				EQ	UIPMENT	USED ON SUBJ	ECT PRO	JECT	VERY WI	DE	MORE	THAN 10 FEET	VERY THICKLY BEDDED
OM SI		M MOISTURE	- MOIST	- (14)	50L	ID; HI ON	NEAR OF TH		-	DRILL UNITS:	ADVANCING	TOOLS:	HAMM	ER TYPE:	MODERAT	ELY CLO	ISE I	I TO 3 FEET	THICKLY BEDDED 1.5
	T				REO	UIRES AD	DITIONAL WA	ER TO		CME-45C		BITS		AUTOMATIC MANUAL	CLOSE VERY CL	OSE	0. LESS	16 TO 1 FOOT THAN 0.16 FFFT	VERY THINLY BEDDED 0.03 THICKLY LAMINATED 0.008
			- DRY -	([])	ATT	AIN OPTI	MUM MOISTUR	E		X CME-55	6. COM	NTINUOUS FLIGHT AUGE	CORE	SIZE:					THINLY LAMINATED <1
			PLA	ASTIC	ITY						X 8" HOL	LOW AUGERS	🗆-	в П-н				INDUF	ATION
			PLAST		NDEX (PI)		DRY	TRENGTH		CME-550		FACED FINGER BITS	🗆-	N	FOR SEDIME	.NTARY R	OCKS, INDURA	ATION IS THE HARDEN	ING OF MATERIAL BY CEMENTING, HEA
NON SLIC	I PLASTIC GHTLY PLAS	STIC		Ø-5 6-15			VEF SI	Y LOW IGHT		VANE SHEAR TEST		-CARBIDE INSERTS	HAND	TOOLS:	FRIA	BLE		GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.
MOD	ERATELY P	LASTIC	2	16-25 6 ОК М	6 IORE		м	DIUM IGH				W/ ADVANCER		POST HOLE DIGGER	MODE	RATELY	INDURATED	GRAINS CAN BE	SEPARATED FROM SAMPLE WITH STE
COLOR										PURTABLE HOIST		INE STEEL TI		HAND AUGER				BREAKS EASIL	WHEN HIL WILH HAMMER.
	COLON									□		IUNGCA		SOUNDING ROD	INDUF	RATED		DIFFICULT TO	BREAK WITH HAMMER.
DESCRIPT MO	DIFIERS SU	INCLUDE COLO UCH AS LIGHT	DARK, STREA	CUMBIN KED, ET	NATIONS (T	AN, RED, 1 ED TO DE	SCRIBE APPE	N. BLUE-GRAY	<i>.</i>			G BIT		VANE SHEAK (EST	EXTR	EMELY IN	NDURATED	SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE:
•	MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.									└			I L		1			SAMPLE BREAK	5 ALKUSS GRAINS.

#### PROJECT REFERENCE NO.



TERMS AND DEFINITIONS

PT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
OOT PER 60 OFTEN	ADUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <u>ARGILACEOUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION. SUICH AS SHAIF.SI ATF.FTC.
VALUES >	ARCHAELE FIGURE OF THE THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
THAT JDES GRANITE,	WHICH II IS ENCOUNTERED, BUT WHICH DUES NOT NELESSAHILT KISE TO OK ABOVE THE GROUND SURFACE. CALCADEDING (CALC) - SOTIS THAT CONTAIN APPECTABLE AMOUNTS OF CALCUM CADEDNATE
PLAIN TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
NOT YIELD NE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
IGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
INGS IF OPEN. MER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
UP TO ELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
LOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
IN ROCK HAS	<u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
S COM HILED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
DSPARS DULL S OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
EN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
ENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
<u>UES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SMALL AND SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
VS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUGED ROCKS.
CAN BE ACHED	$\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
PICK POINT. OWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
AGMENTS SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
NEHDILI BI	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
ICKNESS	BENCH MARK: NCGS MONUMENT 'UIGI': BRASS DISC IN BRIDGE WING WALL
FEET	AI STATION 346+22, 61 LI. N:14,134 L: 2,291,688 FI FVATION: 11.27' FFFT
- 4 FEET - 1.5 FEET	
0.16 FEET	NOTES:
- 0.03 FEET 008 FEET	FIAD: FILLED IMMEDIATELY AFTER DRILLING
PRESSURE, ETC.	
L PROBE;	
OBE.	
UDĽ;	
	DATE: 0-15-14
	DATE: 8-15-14



								0	20 40	PROJECT	REFERENCE NO	SHEET NO.
		 				- 				F	R-5021	4
									FEET $VE = 1:1$	PROF	ILE BORINGS PR ALONG –L	OJECTED
40		EB1–C 368+68 16' RT	B 369 16	1–C 9 + 03 RT		B2–C 369 + 73 6' RT		EB2–C 370 + 09 5' RT	)			
20	IF ASPHALT		12° ASPHALT AND I	2° ABC STONE								
			A 6		MAN CREEK			<u>-</u> G				
0					R SURFACE 7/29/14			3		   		0
	VERY LOOS	5 E TO MEL	DIUM DENSE. MOIST	TO SATURATED. GRAY-BROW	NN AND BLACK, SILT		SAND (A-2-4)	w/TH <sup>@</sup>	TRACE ORGANICS			
		AND SI	HELL FRAGMENTS.	AND GRAY, CLAYEY FINE	\$AND (A-2-6) WITH	(I)— (I)— (I)—	TRACE TO LI	TTLE (II)	SHELL FRAGMENTS			
20		5 <b></b> 3	(3)	-coa	ISTAL PLAIN-		; ; ; ; ; ; ;					-20
	@ <u> </u>	/0.6 = =	= = = $(00/0.2)$	========	=====	-100/0.1	====	100/0.2	==========	-@		
40.	LOOSE TO	VERY D	ENSE, SATURATED,	GRAY AND BLACK, SILTY F	INE SAND (A-2-4)	₩/ТН <sup>(II)</sup> т 30	HIN CLAY SEAMS	5 AND <sup>9</sup>	CLAYEY FINE SAND (A-2-6)			<b>40</b>
	STIFF TO HAR		22- \$ATURATED. GRAY.	AND BLACK, SILTY CLAY (A	-7-6) WITH TRACE	FINE THE SAV	STIFF TO F	- + <b>**</b> HARD, 62 - 30 - 30 - 100	SATURATED, GRAY AND BLACK. SANDY SILT (A-4)	-		
60			() () () ()					23- 				60
	LOOSE TO MEDIUM D	ENSE. BT FIAD	ATED. GRAY AND	BLACK, SILTY FINE SAND (A-2	 2+4)			(4) BT 0 HR: NN FIAD 07/15	1			
80		07/15				0 HR: NM FIAD	 		 , ,	·		
			CEMENTED -COASTAL PLA	FIAD SAND 17/15 I <b>N SEDIMENTARY ROCK-</b>		07715						
-100 (A) M	EDIUM DENSE TO LOOSE. MOIST	, GRAY-BROWN, SIL	TY FINE TO COARSE	SAND (A-2-4)						·		-100
B	WITH T OOSE. MOIST TO WET. GRAY. BRC SHELL FRAGMENTS	RACE TO LITTLE ( WN. AND BLACK. SI AND TRACE ORGAN	JRAVEL <b>-ROADWAY E</b> LTY FINE SAND (A-2 NICS (ROOTS) <b>-COAST</b>	MBANKMENT – 								
-120 © V	YERY SOFT TO SOFT, SATURATE	D. GRAY. SILTY CLAY ACE <sup>-</sup> SHELL FRAGN	(A-7-6)WITH LITTL ENTS - <b>-COASTAL PL</b>	e fine sand Ain-		           	         					<b>-</b> 120
0	CEMENTED SAND -COASTAL PL	AIN SEDIMENTARY	ROCK-									
			369+	00			3	370+00				



20 40	PROJECT REFERENCE	CE NO.	SHEET NO.
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TRACE			
ND SHELL FRAGMENTS			
			<b>_</b> 20
THIN CLAY SEAMS			_40
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-			
ACE FINE SAND			
			<b>_</b> 60_
			-100
			<b>-</b> 120



20		40	PROJECT	REFERENCE	NO.	SHEET NO.
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						, 1 1 1 1	VE =	1:1	CROS	SS SECTION T END BENT	THROUGH
40	E. 37 27	2B2–A 70 + 50 7' LT	Y	EB2–C 370+09 5' RT	EB2–B 370+01 35' RT						40
20						ASPHALT					20
				AND BROW	NSE TO TO LOO N. SILTY G FIL POADWAY E	DSE. MOIST. GRA NE SAND (A-2 MBANKMENT-	₩ <sup>−</sup> − − − − − , -4)				
	VERY LOOSE TO 	SAT	URATED.	TO SATURAT SILTY FIN CE SHELL AND	ED. BLACK. S SAND CEMENTED SAND CEMENTED S	ROWN, AND GR. A-2-4) WITH T AND FRAGMEN	AY, FINE SAND (A-3) RACE ORGANICS, THIN CLAY S TS AND CLAYEY FINE SAND	EAMS (A-2-6)			0
20	(WACCAMAW FORMATION) @- 	 	WIT 	COASTAL	UTTLE S PLAIN- == (00/0.0)	HELL FRAGMEN	ITS 	<u> </u>			-20
40	سے۔ (3– (2)– SATURATED, (3)–	 	AND	SILTY FIN	E SAND ()	2-4) 					-40
60	ଞ- 		Ċ	>	39-  0						
80	(COAST AL PLAN	BT ID/14 IN SEDIME	UMESTONE ENTARY ROCK-	9 HR: NM 6 HR: NM FIAD 07/15 G	RAY AND 3-BI 0 HR: NM FIAD 077/5	DIUM DENSE. ACK.CLAYEY F	SATURATED. INE SAND (A-2-6)				
- =100											<u>-</u> 100
120	SOFT TO MEDIUM STIFF. SATURATED, GRAY, SILTY CLAY (A-6) WITH TRACE FINE     B. GRAY CEMENTED SAND -COASTAL PLAIN SEDUMENTARY POCK-	E SAND	-COASTAL PLAIN-								-120
	© VERY DENSE, SATURATED, MEDIUM GRAY, SILTY FINE SAND WITH CEMENTED SA	AND FRAG	MENTS <b>-COASTAL P</b>	LAIN -							

WBS	41582	2.1.1			Т	IP	R-5	5021				С	טכ	NT
SITE	DESCR		DUA	AL BR	IDGE	S N	0.2	24 AI	ND	NC	). 25	59 C	)N	NC
BOR	ING NO.	EB1-	A		s	TA	τιοι	N 3	68+	71				
COLI	LAR ELI	<b>EV.</b> 4.3	3 ft		Т	от	AL [	DEPT	Н	70	.0 f	t		
DRILL	RIG/HA	MMER E	FF./DA	TE F8	&R5785	CN	/E-5	5 80%	6 04	4/23	/201	5		
DRIL	LER S	. DAVIS	3		S	TAF	RT I	DATE		)7/0	)7/1	5		
ELEV	DRIVE ELEV	DEPTH	BLC	W CO					В	LO\	NSI	PER	FC	ют
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	)	2	25			50		
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WBS	<b>3</b> 4158	2.1.1			TIP R-5021 COUNTY BRUNSWICK									GEOL	LOGIST C. WAN	١G			WB	<b>S</b> 4158	32.1.1			ТІ	P R-5	5021		COUNT	<b>τγ</b> Β	
SITE	DESCR	RIPTION	I DUA	AL BR	IDGE	S NO. 24	AND N	VO. 259	9 ON N	C 211 OV	'ER D	UTCH	MAN (	CRE	EK			GROUN	D WTR (ft)	SITE	E DESC	RIPTION	DU/	AL BR	IDGES	6 NO. 2	24 ANI	) NO. 25	9 ON N	C 21
BOF	RING NO	. EB1-	C		S	TATION	368+6	68		OFFSE	<b>T</b> 16	ft RT			ALIG	NMENT -L-		0 HR.	10.0	BOF	ring no	<b>).</b> EB1-	-C		S		<b>1</b> 368	\$+68		OF
COL	LAR EL	<b>EV.</b> 11	.4 ft		Т	OTAL DE	PTH	85.0 ft		NORTH	ING	74,15	Э		EAST	<b>ING</b> 2,291,605		24 HR.	FIAD	COL	LAR EI	<b>.EV.</b> 11	1.4 ft		т	DTAL [	DEPTH	85.0 ft		NO
DRIL	L RIG/HA	MMER E	FF./DA	TE F8	R5785	6 CME-55	80% 04/	/23/2015			D	RILL M	ETHO	D M	ud Rotary		HAMM	ER TYPE	Automatic	DRIL	L RIG/H	AMMER E	FF./DA	TE F8	R5785	CME-5	5 80%	04/23/201	5	
DRI	LER S	. DAVIS	5		S	TART DA	<b>TE</b> 07	7/13/15	5	COMP.	DATE	07/1	4/15		SURF	ACE WATER DE	PTH N	/A		DRI	LLER	S. DAVI	s		ST		DATE	07/13/1	5	СО
ELEV	DRIVE	DEPTH	BLC	w cou	JNT		BL	OWS P	ER FOO	Г	5	SAMP.	▼∕	L		SOIL AND R	OCK DES	CRIPTION		ELEV		DEPTH	BLC	ow co	UNT			BLOWS F	PER FOO	т
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	0	75 '	100	NO.	моі	G	ELEV. (fl	t)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	i0 I	75
20		+												ļ	_					-60	<u> </u>	+		<u> </u>			— — F	Match	n Line	
		ŧ												ļ	-						-62.1	73.5	7	0	12			, 		
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		<u> </u>													- - 11.4	GROU	ND SURF	ACE	0.0		-07.1	+ /0.5	7	7	8		•15			
10	10.5	+ 0.9 +	8	7	5		· ·				·		м		- 10.5		SPHALT	KMENT	0.9	-70	-	Ŧ					<u>i</u> ∔	· · · ·		·   ·
	7.9	3.5	8	6	8				· · · ·	·   · · · ·   · · ·	:				-	GRAY-BROWN, S	SILTY FIN		RSE		-72.1	83.5		5	6			· · · · · · · ·		
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	2.9	+ 0.0	wон	WOH	1				· · · ·	·   · · · ·   · · ·	:		Sat.		-	COAS GRAY-BROWN, S	<b>STAL PLA</b> BILTY FINE	<b>IN</b> E SAND (A-	2-4)			Ŧ								
0		ŧ					· ·				·				-	WITH TRACE	ORGANIC	S (ROOTS	)			Ŧ								
	-2.1	13.5	3	3	2				· · · · · · ·		:		<u> </u>		-							ŧ								
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	-7.1	+ 10.5 +	3	2	7	- · · · · · · · · · · · · · · · · · · ·			· · · · · ·	·   · · · ·	:		Sat.		-							Ŧ								
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	-12.1	23.5	3	2	2	:::			· · · · · · ·		:		0.1	$\sim$	<u>11.6</u>	GRAY, CLAYEY F		D (A-2-6) W	<u>1TH 23.0</u>			ŧ								
-15		ŧ			2	$   \stackrel{\bullet}{\bullet}_4 \cdot \cdot \cdot \\   \stackrel{\bullet}{\bullet}_1 \cdot \cdot \cdot $	· · ·	· · · ·	· · · ·	.   .	:		Sat.	$\sim$	-	TRACE SH	ELL FRAG	<b>BMENTS</b>				Ŧ								
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	-22.1	33.5	5	4	4	:\: :					:		Ort		21.6	GRAY, SILTY	FINE SA	ND (A-2-4)	<u> </u>			Ŧ								
-25		Ŧ					· · ·		· · · · · ·		·		Sat.		-							Ŧ								
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-30		Ŧ													_		INTED SA	ND MN				Ŧ								
GDT	-32.1	43.5	6	5	6	$ \cdot  $					.		Set		-	GRAY, SILTY	FINE SA	ND (A-2-4)				Ŧ								
-35		Ŧ			-						:		Jai.		-							Ŧ								
NC	-37 1	T 48 5						·			•				-							Ŧ								
GPJ		+ +0.0	5	14	45				<b>9</b> 59		.		Sat.		-							Ŧ								
-40		Ŧ					· ·		- <u>È-</u>						-40.6				52.0			Ŧ								
BRDG	-42.1	53.5	60/0.0	-				· · · ·	<u> </u>		0.0				-42.6	COASTAL PLAIN	NTED SA	<b>ntary ro</b> .Nd	54.0			Ŧ								
Ha -45		Ŧ						· · · ·			.			N	-	GRAY AND BLA	STAL PLA CK, SILTY	<b>IN</b> CLAY (A-7	-6)			Ŧ								
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021		1	9	20	19			●39		.	$\left  \right $		Sat.	N	-							Ŧ								
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BOR	57.1	68.5					: .				:			3	-							ŧ								
DOT		1	16	25	22			· · •	7 · · ·	.	$\left  \right $		Sat.	S	-							£								
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### SHEET 10 OF 21

JNT	ΥB	RU	NS\	N	ICK			GEOLOG	IST C. WANG	;		
I NC	; 21 <sup>-</sup>	0	VER	2 0	DUTCH	MAN	CRE	EK			GROUN	D WTR (ft)
	OF	FSE	т	16	6 ft RT			ALIGNME	NT -L-		0 HR.	10.0
	NO	RTI	HING	3	74,15	9		EASTING	2,291,605		24 HR.	FIAD
					DRILL N	IETHO	D M	ud Rotary		HAMME	ER TYPE	Automatic
	со	MP	. DA	T	E 07/	14/15		SURFACE		<b>FH</b> N//	Ą	
оот					SAMP.		L	-				
	75		100		NO.	моі	G		SUIL AND RUC	r desc	RIPTION	
е												
• •		•	• •					G	COAST	AL PLAI . SILTY	N CLAY (A-7	
						Sat.		-	(con	tinued)	- (	- /
								-				
						Sat		<u>66.6</u>	RAY AND BLACK	K, SILTY	FINE SAN	ID <u>78.0</u>
•••	.	•				Sal.		-	(A	-2-4)		
								-				
		•				Sat.		- 73.6				85.0
								- Bo	oring Terminated a SAND (COA	at Elevat	ion -73.6 f LAIN)	t in
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WE	<b>3S</b> 4	1582	2.1.1		TIP R-5021 COUNTY BRUNSWICK									GEOL	LOGIST C. WA	NG		WBS	<b>3</b> 41582	2.1.1			TI	<b>P</b> R-502	1	COUNT				
SIT	E DE	SCR	IPTION	DU.	AL BR	IDGE	ES N	NO. 24 A	ND N	0. 25	9 ON I	NC 211 C	VER	DUTCH	IMA	N CF	REE	K			GROUND WTR (ft	SITE	DESCR	RIPTION	UDU	AL BR	IDGES	5 NO. 24 A	AND NO. 2	59 ON NC
BC	RING	g no.	EB1-	В		:	STA	TION 3	368+5	5		OFFS	ΞT	44 ft RT				ALIG	NMENT -L-		0 HR. N/A	BOF	RING NO	. B1-A	۱ <u> </u>		S	TATION	369+19	
co	ILLAF	R ELE	<b>EV.</b> 10	).0 ft		·	тот	AL DEP	<b>TH</b> 7	'5.0 ft		NORT	HING	<b>G</b> 74,13	38			EAST	<b>ING</b> 2,291,582		<b>24 HR.</b> 3.0	COL	LAR EL	<b>EV.</b> 4.	3 ft		Т	OTAL DEF	<b>'TH</b> 70.0 f	ft
DR	ILL RI	G/HAN	MMER E	FF./DA	TE F	&R578	85 CI	ME-55 80	0% 04/2	23/2018	5			DRILL	METH	OD	Mu	d Rotary		HAMM	IER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE F8	R5785	CME-55 80	04/23/20	15
DR	ILLE	R S	DAVIS	5		:	STA	RT DAT	<b>E</b> 07.	/08/1	5	COMF	. DA	<b>TE</b> 07/	08/1	5		SURF	ACE WATER DE	EPTH N	/A	DRII	LER S	. DAVIS	S		S	TART DAT	E 07/06/	15
ELE	VDF	RIVE LEV	DEPTH	BLC	ow co	UNT			BLC	OWS F	PER FO	ОТ		SAMP.					SOIL AND R	OCK DES	CRIPTION	ELEV	DRIVE	DEPTH	BLC	W COL	JNT		BLOWS	PER FOOT
(π)	)	(ft)	(π)	0.5ft	0.5ft	0.5f	t C	0	25	5	60 I	75	100	NO.	/м	OI G		ELEV. (ft	t)		DEPTH (1	) (π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50
10		0.0	0.0		4	5	++	- 1	_		1							10.0	GROU ROADWA	ND SURF	ACE 0	5	4.3	+ 0.0						
		-	F					. <b>P</b> <sup>9</sup>		•••						┍╞	ļ		GRAY AND BRC	WN, SILT	Y FINE SAND			ŧ	2	1	2	<b>•</b> 3		
5		6.5 -	<u>- 3.5</u>	3	2	2	-11			•••			· ·		м		F		(A-2-4) Will			0	0.8	3.5	3	2	3	<u>ן ר</u> יי ביו		
		-	F					1										3.0			7.			Ŧ			Ŭ	• <u>5</u>		
		1.5 -	8.5					1:::		•••			· ·						GRAY AND BRO	STAL PLA	NN Y FINE SAND	1	4.2	Ŧ 。_						
0	_	-	F		3	4		• <del>•</del> 7		· ·					w		-		(A-2-4) WITH	I TRACE C	DRGANICS	-5	-4.2	+ 0.0 +	3	7	8	1	;	
		-	F							•••							F	-3.0			13.			Ŧ						
-5	-	-3.5 -	<u>- 13.5</u>	1	2	6	-11			•••					Sat	₩./.			GRAY, CLAYEY I TRACE	FINE SAND	D (A-2-6) WITH SAND	-10	-9.2	13.5	2	4	3	.,		
		-	F					· ŀ · ·								<i>%</i> .,,		•					] -	Ŧ	-		Ū	• • • • • • • • • • • • • • • • • • •		
		8.5	18.5							•••						<u> </u>		- <u>8.0</u>		OARSE TO	0 FINE SAND 18	<u>)</u>	-14.2							
-10	)		F	4	4			<u>●12</u>	+		· · ·				Sat	l.	F	-	(A-2-4) WITH	I THIN CLA	AY SEAMS	-15		+ 10.5	WOH	1	1	<b>•</b> 2	+	+
								./									E							Ŧ						
-15	5	13.5	23.5	WOH	1	1		2		• •				SS-23	41%	6	F					-20	-19.2	23.5	2	3	3			
			E					<u>.</u>									E							Ŧ			-			· · · ·
		18.5 -	28.5							•••						~~~~		- <u>18.0</u>	- GRAY, CLAYEY	FINE SAND	D (A-2-6) WITH 28	<u>)</u>	-24.2	T 28 5						
-20	)		E			4		<u>q</u> 7	+	<u> </u>					Sat	<u>/°,/</u> °			TRACE CEMEN	TED SAND	D ÀND ŚHELL S	-25		<u> </u>	5	10	36		+	46
																<u>/</u> °,/°		-23.0			33.	)		Ŧ						
-25	5	23.5	<u>    33.5    </u>	5	7	11		· · · · ·	18						Sat	t.			GRAY, SILTY FI TRACE SHEL	INE SAND	(A-2-4) WITH ENTS AND	-30	-29.2	33.5	37	21	22			
			E					· · · [			<u> </u>		<u> </u>				E	-26.5	CEME	ENTED SA	ND 36.	5		Ŧ					4	.3
	-2	28.5 -	38.5	60/0.0						•••		 				Ξ	Ŧ	-29.0	COASTAL PLAII CEME	ENTED SA	ND 39.	)	-34.2	T 38 5						
-30	)		E	00/0.0	΄				$\mp$								E		COA GRAY AND BLA	STAL PLA ACK, SILTY	<b>NN</b> Y FINE SAND	-35		<u> </u>	4	4	6	<b>•</b> 10	+	+
																	E			(A-2-4)				Ŧ						
-35	5	33.5	<u>    43.5    </u>	2	4	9									Sat	t.	E					-40	-39.2	43.5	4	50	50/0.3			
			E														E	-						Ŧ						
/15		38.5 -	48.5	22	20	20							· ·				E						-44.2							
<sup>80</sup> 00 01	)		E		25	25			+		●58				Sat	[.	E					-45		<u> </u>	14	14	18		<b>9</b> 32	
GDT		40 -								•••			 				E	-43.5			53			Ŧ						
LOG -45	5	+3.5		60/0.1						•••	بيا.	<u> </u>	0/0.1		Sat		Ŧ	-43.8_/				-50	-49.2	53.5	5	6	8	/	· · · · ·	
vc		_	L						· ·	· ·			 				1		COA	STAL PLA				ŧ						
LGPJ		48.5 -	58.5	8	24	33			· ·	· ·	.    .		 				1		GRAY AND BLA WITH TR	CK, SILTY ACE FINE	CLAY (A-7-6) SAND		-54.2	58 5						
7000	)	_	L		27				+	/	<b>9</b> 57				Sa		ӡ	-				-55	-	÷	8	17	17		<b>9</b> 34	+
BRD(		53 5 -	63.5					· · · ·		/.	 		 				1							ŧ						
표 -55	5		03.5	8	11	18			<b>\$</b> 29	•••					Sat		Ł					-60	-59.2	63.5	5	11	16		<i>[</i>	
GEO		-	Ļ					· · · ·		· · · ·			 				1							ŧ						
5021	!	58.5 -	68.5	10	14	17		· · · ·		•••	 		 		Sat								-64.2	68.5						
≟ <u>-60</u>	)	_	ŧ			"			<u>– 9</u> 31 <i>J</i>		<u></u>						*					65	-	+	4	7	18			<u>+</u>
DUBL	_4	- 	- 73 5					· · · ·	$ \dot{f} \cdot \cdot \dot{f}$	 			 											‡						
й ш -65	5			6	10	15			• <u>25</u> ·	•••					Sat		¥	-65.0			75.	<u>&gt;</u>	-	‡						
T BOF		-	ł														F		Boring Terminate CLAY (C	ed at Eleva OASTAL F	ation -65.0 ft in PLAIN)			‡						
CDO.		-	ŧ														F							‡						
z					1	1									1													I		



WE	<b>S</b> 4	11582	.1.1			Т	IP R-502	21	OUNTY	BRUNS	WICK			GEOLO	GIST C. WAN	G			WBS	4158	2.1.1			ТІ	<b>P</b> R-50	21	COUNT	
SIT	e de	ESCR	IPTION	UD I	AL BR	3RIDGES NO. 24 AND NO. 259 ON NC 211 OVER DUTC								CRE	EK			GROUND	WTR (ft)	SITE	DESCF	RIPTION	DU/	AL BR	IDGES	3 NO. 24	AND NO. 2	259 ON NC
во	RING	g no.	B1-0	)		S	TATION	369+03			OFFSET	16 ft RT			ALIGNN	IENT -L-		0 HR.	N/A	BOR	ing no	. B1-C	)		S	ΓΑΤΙΟΝ	369+03	
со	LLAF	r ele	E <b>V.</b> 1	1.2 ft		Т	OTAL DEI	<b>PTH</b> 89	.4 ft		NORTHIN	<b>G</b> 74,14	15		EASTIN	<b>G</b> 2,291,637	2	24 HR.	FIAD	COL	LAR EL	<b>EV.</b> 11	1.2 ft		т	OTAL DE	<b>EPTH</b> 89.4	ft
DRI	LL RI	G/HAM	MMER E	FF./DA	TE Fa	&R5785	5 CME-55 8	80% 04/23	/2015			DRILL N	NETHC	DD N	lud Rotary		HAMME	R TYPE	Automatic	DRILI	RIG/HA	MMER E	FF./DA	TE F8	R5785	CME-55	80% 04/23/20	)15
DR	ILLE	R S	DAVI	s		S	TART DA	<b>TE</b> 07/1	4/15		COMP. DA	<b>TE</b> 07/	15/15		SURFAC	CE WATER DEP	PTH N/A	١		DRIL	LER S	. DAVI	s		S	FART D/	ATE 07/14/	'15
ELE		RIVE LEV	DEPTH	BLC				BLOV	VS PEI	R FOOT		SAMP.	$\mathbf{\nabla}$			SOIL AND RO	CK DESCF	RIPTION		ELEV	DRIVE ELEV	DEPTH	BLC	SW COL	JNT		BLOWS	PER FOOT
(11)		(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50		/5 100	NO.	Имо	I G	ELEV. (ft)				DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0		50
20			-																	-60		+		+			Mat	ch Line
		-	E																		-62.3	73.5	9	10	12			
15		-	F												-					-65		Ŧ	ľ		12		<b>P</b> <sup>22</sup>	
		-	F												-						67.2	Ŧ					<i>i</i>	
		-													- 11.2	GROUN	ID SURFAC	CE	0.0		-07.5	<u> </u>	5	8	8	9	16	
10	1	10.2		14	6	3							м		9.2	12" ASPHALT A	ND 12" AB	C STONE	2.0	-70	-	Ŧ				<del>  /</del>		
		7.7 -	3.5	5	3	3									-	ROADWAY GRAY AND BROW	' <b>EMBANKI</b> WN, SILTY	MENT FINE SAN	D		-72.3	83.5	5	5	5			
5		-	-	ľ	Ű		<b>9</b> 6								_	(A-2-4) WITH	I TRACE G	RAVEL		-75		Ŧ	ľ		Ŭ			
		27	85												3.2				8.0		773	I as 5						
		2./	- 0.5	4	3	6	- · • • • • • • • • • • • • • • • • • •						w			GRAY AND BROV	<b>TAL PLAIN</b> WN, SILTY	<b>N</b> FINE SAN	D		-77.5	- 00.5	38	100/0.4				
0	_		F												(A	A-2-4) WITH TRAC	CE ORGAN	ICS (ROO	TS)		-	Ŧ						
		-2.3 -	- 13.5	1	1	1							Cat	$\mathbb{N}$	<u>-1.8</u>	GRAY, CLAYEY	FINE SAN	ND (A-2-6)	<u> </u>			Ŧ						
-5		_	Ē				$\mathbf{P}^2$						Sal.	/./.	-						_	Ŧ						
		73	185											///					<u> <u> </u></u>			Ŧ						
		1.5		1	6	6	12						Sat.		-	GRAY, SILTY I	FINE SAND	D (A-2-4)				Ŧ						
-10	•	_																			-	Ŧ						
		12.3 -	- 23.5	  woh	WOH	1							Sat	Z	<u>-11.8</u>	GRAY, SILTY CLAY	Y (A-7-6) V		<u>23.0</u>			Ŧ						
-15		-	L				$\begin{bmatrix} \mathbf{P}^1 \\ \mathbf{I} \\ \mathbf{I} \end{bmatrix}$						Jai.		-	FINE SAND AN FRAG	ND TRACE GMENTS	ESHELL			_	Ŧ						
		17.3 -	- 28 5												-							ŧ						
				1	1	2	<b>↓</b> 3 : :						Sat.		-							ŧ						
-20	<u> </u>		-												-						-	ŧ						
	:	22.3 -	- 33.5	7	8	5		.   .		· · · ·			Sat		 	GRAY, SILTY FIN		RSE SAN	<u>33.0</u>			ŧ						
-25		_	L				·	· · · ·							-	(A-2-4) WITH LITT FRAG	ILE CEMEI GMENTS	NTED SAN	D		_	ŧ						
	-:	- 27.3 -	- 38.5					· · · · ·							-							ŧ						
3/15		-	_	5	10	100/0.2	2   · · <b>!</b>	<u></u>	÷÷+		<u> </u>	•			28.3	COASTAL PLAIN	SEDIMEN	TARY ROC	39.5 <b>K</b> 41.0			ŧ						
-30 	_	-	-						-+	<del></del> -	+ <del></del>	1				CEMEN	NTED SAN	D			-	ŧ						
.GDT	:	32.3 -	- 43.5 -	5	5	5		-   -		· · · ·	· · · ·		Sat.		-	GRAY, SILTY FIN	IE SAND (A	• •-2-4) WITI IS	н			ŧ						
G -35		-	-					· · · ·		· · · ·					-			0			-	ŧ						
NC NC		- 37.3 -	- - 48.5					-   -		· · · · ·	· · · · ·				-							ŧ						
4.GP		-	-	4	6	7	13	3 <sup>.</sup>		· · · ·	· · · ·		Sat.		-							ŧ						
2005		_	-												-						-	ŧ						
BRD	-4	42.3 -	- <u>53.5</u>	7	14	36	: : :	.   .			· · · ·		Sat.		43.3				54.5			ŧ						
표 -45		-	-				· · ·	· · · ·	∠	• • • •					-	GRAY AND BLACH WITH TH	K, SILTY C	CLAY (A-7-6 D	6)		-	ŧ						
GEO		- 47.3 -	- - <u>58.5</u>							 					-							‡						
5021		-	t	7	10	12		• • • •		· · · ·			Sat.		-							‡						
<u>и</u> -50	<u> </u>	_	t				,	<u>;                                    </u>			<u> </u>	11			-						-	‡						
OUBL	-!	52.3 -	- 63.5 -	7	8	9	¦ ∶∶; <b>′</b>	17 · · ·		· · · ·			Sat.		-							‡						
ă ш -55		_	t.				• • • • •	\'							-						-	‡						
T BOI		- 57.3 -	- - 68.5					·\  · · ·		· · · · · · · ·	· · · · ·				-							‡						
CDO		-	È.	10	11	14		. <b>●</b> 25		· · · ·	· · · ·		Sat.		-							‡						
∠00					1		1				1	L								L						·		



WBS	<b>3</b> 41582	2.1.1			Т	IP R-502	21		COUNT	Y BRUNS	WICK			GE	OLOGIST C. WANG	G		WBS	<b>4</b> 1582	2.1.1			ТІІ	<b>P</b> R-5021	С	OUNTY
SITE	DESCR		DUA	AL BR	IDGE	S NO. 24	AND N	IO. 259	ON NO	C 211 OVEF	R DUTCH	IMAN	CRE	EEK			GROUND WTR (ft)	SITE	DESCR		I DUA	L BRI	DGES	5 NO. 24 AI	ND NO. 259	ON NC 2
BOR	ING NO	. B1-B			S	TATION	369+0	6		OFFSET	45 ft RT			AL	IGNMENT -L-		0 HR. N/A	BOR	ING NO.	B1-B			ST	TATION 3	39+06	C
COL	LAR EL	<b>EV.</b> 10	.4 ft		Т	OTAL DE	PTH 8	35.0 ft		NORTHIN	<b>G</b> 74,11	7		EA	<b>STING</b> 2,291,628		<b>24 HR.</b> 3.0	COL	LAR ELI	<b>EV.</b> 10	).4 ft		тс	TAL DEPT	H 85.0 ft	Ν
DRIL	l Rig/ha	MMER E	FF./DA	TE F8	R5785	5 CME-55 8	30% 04/2	23/2015			DRILL I	METHC	DD N	/lud Rot	ary	HAMM	ER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DAT	<b>E</b> F8	R5785	CME-55 80%	6 04/23/2015	
DRIL	LER S	DAVIS	3		S	TART DA	<b>TE</b> 07	7/09/15		COMP. DA	<b>TE</b> 07/	10/15		SU	RFACE WATER DEP	TH N/	Ά	DRIL	LER S	. DAVIS	S		ST	ART DATE	07/09/15	C
ELEV	DRIVE	DEPTH	BLC	W COL	JNT		BL	OWS PE	ER FOOT	Г /	SAMP.	$\mathbf{\nabla}$			SOIL AND ROO	CK DESC	CRIPTION	ELEV	DRIVE ELEV	DEPTH	BLO	w cor	JNT		BLOWS PEF	R FOOT
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	)	/5 100	NO.	Имо	I G	ELEV	/. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft		5 50	
15		ł												-				-65	+		+		i—— +	r	Match L	_ine
		Ŧ												F					-68 1	78.5						
10	10.4	0.0				∐								- 10.4	GROUNE	) SURFA	ACE 0.0	-70		- 10.0	6	8	8	• • •16		
		Ŧ	1	1	2	<b>•</b> 3						M			GRAY, BROWN, AN	EMBANI	KMENT XK, SILTY FINE		-	E						
	6.9	3.5	2	2	1							м			TO COARSE SAND ORGANICS AND S	) (A-2-4) SHELL F	RAGMENTS		-73.1	83.5	5	6	7			
5	-	Ē												3.9			6.5		-				i – †	<u> </u>		
	1.9	8.5													GRAY. BROWN, AN	TAL PLA	JN XK. SILTY FINE		-	Ł						
0		L	2	2	4	<b>6</b>						w		· 	TO COARSE SAND	) (A-2-4) SHELL F	WITH TRACE RAGMENTS		_	E						
		ŧ																	-	Ł						
	-3.1	13.5	WOH	WOH	1					.		Sat							-	ŧ						
-5	-	F									-			-					-	F						
	-8.1	18.5																	-	ł						
-10		ŧ	2	2	4	•6						Sat.							-	Ł						
		ŧ				! : :													-	ŧ						
45	-13.1	23.5	1	2	2	$ \begin{vmatrix} \mathbf{l} & \cdot & \cdot \\ \mathbf{d}_4 & \cdot & \cdot \end{vmatrix} $	· · · ·			.		Sat.		-					-	ŧ						
-15	-	ŧ									-			-					-	ł						
	-18.1	28.5				<u>  :::</u>	· · · ·			.				-					-	ł						
-20		ŧ	2	2	1	•3 · ·						Sat.		-					-	ŧ						
		ŧ												-					-	ł						
25	-23.1	<u> </u>	3	4	6		· · · ·		· · · ·	.   .		Sat.		-					-	+						
-25	-	ŧ									1			-					-	ł						
	-28.1	38.5	00/0.4			. <b> </b> .    . <b> </b>	·   · ·	· · ·	· · · ·					-27.9			38.3		-	ŧ						
-30		ŧ	60/0.1								Ĭ			-		TED SA			-	ŧ						
	00.4	+												-	GRAY AND BLAC	<b>AL PLA</b> K, SILTY	IN FINE SAND		-	ŧ						
<u>9</u> /12	-33.1	<u>43.5</u>	4	4	5		· · · ·		· · · ·	.   .		Sat.		-	(A-2-4) WITH T	HIN CLA	AY SEAMS		-	+						
1 9	1 -	ŧ									11			F					-	ŧ						
DT.GD	-38.1	48.5	7	18	54			::+	· · · · · · · · · · · · · · · · · · ·			0.04			HARD DRILLING N	IOTED F	ROM 51.8' TO		-	Ŧ						
ය <u>-40</u>		Ŧ			•••					•72···· 1		Sal.		-	5	52.2'			-	ŧ						
й Г	-43.1	53.5							::: <i> </i>					- <u>42.6</u>			53.0		-	Ŧ						
19. 75 -45		- 00.0	20	10	57				· · · •	 67		Sat.	///	F	GRAY AND BLACK (A	., CLAYE A-2-6)	Y FINE SAND		-	Ŧ						
DG00		Ŧ							· · · ·		]		///	F.,			50.0			F						
L BRI	-48.1	58.5	10	12	11							Sat		<u>47.6</u>	GRAY AND BLACK	K, SILTY	CLAY (A-7-6) 58.0		-	F						
<u>歯 -50</u> 0		F	-				- <u>-</u>				-	Jai.		F	WITH LITTL	LE FINE	SAND		-	F						
1_GE	-53.1	63.5												E					-	Ł						
-55		+	6	8	10		18					Sat.		Ł						Ł						
BLE I		ŧ					$\left  \cdot \right  =$	:::		.				Ł					-	ŧ						
noa	-58.1	68.5	7	14	20		:  `\_					Sat.		Ł					-	ŧ						
-60 04	-	ŧ									+			<b> </b> _					-	ŧ						
DOT B	-63.1	73.5					:/::			.				ŧ					-	ŧ						
ЦО И -65		t	8	10	12		$\phi_{1}^{1}$					Sat.	N	-					-	ł				<u> </u>		

UNT	<b>r</b> BRU	NS	N	ICK				GEOLOGI	ST	C. WANG	3		
N NC	211 0\	/ER	C	DUTCH	MAN	CRE	E	ĸ				GROUN	DWTR (ft)
	OFFSE	т	45	5 ft RT				ALIGNME	NT	-L-		0 HR.	N/A
	NORTH	HINC	3	74,11	7			EASTING	2,2	291,628		24 HR.	3.0
1			1	DRILL N	IETHO	D N	luc	Rotary			HAMM	ER TYPE	Automatic
	COMP.	DA	T	E 07/	10/15			SURFACE	WA	TER DEP	TH N/	Ą	
:00T				SAMP.	/	L	Γ					יאסידחוחי	
	75	100		NO.	<u>/мо</u> і	G			50			RIPTION	
			Ī										
е													
		•				$\boldsymbol{N}$	F	GF	RAY . VITH	AND BLACK	K, SILTY IE SAND	CLAY (A-7 (continue)	/-6) d)
		•			Sat		Ē	<u>-67.6</u> — GR	AYA	AND BLACK		Y FINE SA	ND
	+				out.	~~~~	F			(A	-2-0)		
		•				/~/~	F						
		•			Sat.	/./.	Ŀ	-74.6	eire :	Torreitado	at Eta at	ion 7404	85.0
							E	Во	ring	SAND (CO)	at Elevat ASTAL P	ion -74.6 f LAIN)	t in
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WBS	<b>3</b> 41582	2.1.1			TI	<b>P</b> R-5	021		CC	OUNT	Y BRUI	١SW	VICK			G	EOLOGIST C. WAN	G			WBS	41582	2.1.1			TI	<b>P</b> R-502′	1	COUNT
SITE	DESCR		DU	AL BR	IDGES	5 NO. 2	4 AN	D NO.	259 C	ON NC	211 0	'ER	DUTCH	IMAN	CRE	EEK			GROUND WT	R (ft)	SITE	DESCR	RIPTION	DU/	AL BR	IDGES	3 NO. 24 A	ND NO.	259 ON NC
BOF	ING NO	. B2-A			S	TATION	36	9+89			OFFSE	<b>T</b> 2	21 ft LT			<b>A</b>	LIGNMENT -L-		0 HR.	N/A	BOR	ING NO	. B2-A			S	TATION 3	69+89	
COL	LAR EL	<b>EV.</b> 6.3	3 ft		Т	OTAL D	EPT	H 89.8	8 ft		NORTH	IING	i 74,14	15		E	<b>ASTING</b> 2,291,730	1	24 HR.	FIAD	COL	LAR EL	<b>EV.</b> 6.	3 ft		ТС	JTAL DEP	<b>TH</b> 89.8	3 ft
DRIL	l Rig/Ha	MMER E	FF./DA	TE F	R5785	CME-55	5 80%	04/23/2	2015				DRILL	METHC	DD N	/lud Ro	otary	HAMM	ER TYPE Auton	natic	DRILI	RIG/HA	MMER E	FF./DA	TE F8	R5785	CME-55 80	% 04/23/2	015
DRI	LER S	. DAVIS	3		S		ATE	07/2	1/15		COMP.	DAT	<b>FE</b> 07/	21/15		S	URFACE WATER DEF	PTH N	/A		DRIL	LER S	5. DAVIS	S		S1		E 07/21	/15
ELEV (ft)	ELEV	DEPTH (ft)	BLC				2	BLOW	S PER	FOOT	75	100	SAMP.		Ō		SOIL AND RO	CK DES	CRIPTION		ELEV (ft)	ELEV	DEPTH (ft)	BLC			0	BLOW:	50 SPER FOOT
	(11)		0.011	0.011	0.011			-			<u> </u>		110.		I G		EV. (ft)		DE	PTH (ft)		(11)		0.011	0.011	0.011		<u> </u>	
15																					65							Ma	atch Line
15		ŧ														F					-05	- — — —	<u>+</u>		+		· · · /	 	
		ŧ														F						-67.2	<u>+ /3.5</u> T	6	6	7	· · · · · ·		· · · · · ·
10		ŧ														F					-70	-	ŧ					+	
		Ŧ														F.						-72.2	78.5	5	5	5			
5	6.3	<u> </u>	WOH	1	1	2	•••		• •	•••		•				- 6.3	COAS	TAL PLA	ACE IN	0.0	-75		Ī			Ŭ			
	28	35										÷				Ē	GRAY AND BROV (A-2-4) WITH TRAC	VN, SILT E ORGA	Y FINE SAND NICS (ROOTS),			-77.2	83.5						
		1	3	3	4	<b>∳</b> 7	· ·	· · ·	· ·	· · ·		•		w			THIN CLAY SEA LITTLE SHELL AN	MS, AND ND CEME	O TRACE TO ENTED SAND				1	32	59	41/0.2			· · · · · ·
0	-	ŧ														-	FRA	GMENTS	8		-80	-	ŧ					+	
	-2.2	- 8.5 -	2	1	1		· · ·	· · ·	· · ·	· · ·		:		w		-						-82.2	<u>- 88.5</u> -	28	32	68/0.3		· · · ·	· · · · · ·
-5		‡				<del>~</del> .	• •		• •			•				Ļ						-	ŧ						
	-7.2	- 13.5	0		10		· · · .	· · · · · ·	: :	· · · · · ·		-											ŧ						
-10		ŧ	0	9	10		. 19	· · · · · ·	· · ·	· · · ·		•		Sat.		-							ŧ						
	12.2	+ + 105				/						-				F						-	Ŧ						
	- 12.2	- 10.5	2	3	2	<b>4</b> 5'								Sat.									Ŧ						
-15	-	Ī										-										-	Ī						
	-17.2	23.5	WOH	1	1		 		· ·			-		Sat									ł						
-20		ŧ.					• •		• •			•											ŧ						
	-22.2	- 28.5					· · ·	· · · · · ·	· ·	· · · · · ·		:											ŧ						
-25		ŧ	4	4	4	●8	· · ·	· · · · · ·	· · ·	· · · · · ·		:		Sat.									ŧ						
-20		+														-						-	ŧ						
	-21.2	- 33.5 -	5	9	100/0.1				· ·-	· · · ·		1				-28		SEDIME		34.5			ŧ						
-30	-	Ī									+					<u>-29</u>		NTED SA	ND	36.0		-	Ŧ						
10	-32.2	38.5	7	6	6							•		Sat			GRAY AND BLAC	CK, SILT	Y FINE SAND				Ī						
31/8/		±				· · ]	· · ·					•					()	A-2-4)					ŧ						
DT 1	-37.2	43.5		_	_	:i	· · ·	· · · · · ·	· ·	· · · · · ·		:				-							ŧ						
01.0		ŧ	4	5	6	∶ ∳ 	11 ·	· · · · · ·	· · ·	· · ·		•		Sat.									ŧ						
2 2 2	-	+						<u></u>				-				-						-	ŧ						
GPJ	-42.2	+ 48.5 +	12	15	19		· · · ·	•34	· · ·	· · · · · ·				Sat.		}							ŧ						
-45		ŧ					•••	- <u>/</u>	· ·	· · ·		•				F						-	ŧ						
BRDG	-47.2	53.5	8	10	17									Sat		-48	2			54.5			Ŧ						
Ha -50		Ŧ	-					$P^{27}$						Joan.		E	GRAY AND BLAC	K, SILTY	CLAY (A-7-6)				Ŧ						
GEO	-52.2	- 58.5					· ·/	· · ·		· · ·		-							0,110				ŧ						
5021		‡	6	8	12		: <b>•</b> 20	· · ·	·   ·	· · ·		:		Sat.									‡						
и́ -55 щ	-	<b>†</b>					<u>.</u> †.		<del>.   .</del>		+					F						-	‡						
OUBL	-57.2	+ 63.5 +	6	7	8		./. •15	 	:   :	· · ·		·		Sat.		ţ							‡						
-60		‡					- <u>\</u>		·   ·	· · ·		·				ţ.						- ·	ŧ						
DT BC	-62.2	68.5	6	11	16		::\	· · · ·	.   .	· · · ·		:		0-1		ŧ							ŧ						
000 -65		Ŧ	Ū					27 · ·		· · ·				Sat.		E							Ŧ						

BRUNSW	ICK			GEOLOGIST C. WANG	3		
211 OVER [	DUTCH	MAN	CREI	EK		GROUN	D WTR (ft)
OFFSET 2	1 ft LT			ALIGNMENT -L-		0 HR.	N/A
NORTHING	74,14	5		EASTING 2,291,730		24 HR.	FIAD
		IETHO	D Mu	ud Rotary	HAMME	R TYPE	Automatic
COMP DAT	<b>F</b> 07/2	21/15				Δ	
	SAMP		L	SOR ACE WATER DEP	III IN//		
75 100	NO.		0	SOIL AND ROC	K DESC	RIPTION	
			6				
				GRAY AND BLACK		CLAY (A-7	<u></u>
		Cat	N	WITH TRACE FIN	E SAND	(continue	d)
		Sal.	N				
				- <u>71.7</u>			
		Sat.	/./.	GRAY AND BLACK,	CLAYE -2-6)	Y FINE SA	ND
			$\sim$	-	_ 0)		
· · · ·				-76.9			83.2
· · · · · · · · · · · · · · · · · · ·			Ħ	CUASTAL PLAIN S	STONE	ITARY RO	
				_			
			+++	00 5			00.0
100/0.8				Boring Terminated a	at Elevat	ion -83.5 f	89.8 t in
				- SEDIMENTARY RO	CK (COA	ASTAL PL/	AIN)
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WBS	<b>3</b> 41582	2.1.1			Т	<b>ip</b> R	-5021			COUN	TY B	RUNSV	VICK			GE	OLOGIST C. WANG	G	-		WBS	41582	.1.1			TI	P R-502	21	COUN	ITY
SITE	DESCR	RIPTION	I DUA	AL BR	IDGE	S NO.	24 A	ND N	O. 25	9 ON N	IC 211	OVER	DUTCH	HMAN	CRE	EK			GROUND WT	R (ft)	SITE	DESCR	IPTION	DUA	L BR	IDGES	5 NO. 24	AND NO. 2	259 ON I	
BOF	ING NO	. B2-C	;		s	TATIO	<b>DN</b> 3	69+73	3		OFF	SET	6 ft RT			ALI	GNMENT -L-		0 HR.	N/A	BOR	NG NO.	B2-C			ST	ATION	369+73		(
COL	LAR EL	<b>EV.</b> 10	).6 ft		Т	OTAL	DEP	<b>FH</b> 8	85.0 ft		NOF	RTHING	<b>3</b> 74,12	27		EA	STING 2,291,705		24 HR.	FIAD	COL	AR ELE	<b>V.</b> 10	.6 ft		т	DTAL DE	<b>PTH</b> 85.0	ft	1
DRIL	L RIG/HA	MMER E	FF./DA	TE F8	R5785	5 CME-	55 80%	% 04/2	23/2015	i			DRILL	METHO	DD N	lud Rota	iry	HAMM	ER TYPE Auton	natic	DRILL	RIG/HAN	IMER E	FF./DAT	<b>E</b> F8	R5785	CME-55 8	30% 04/23/20	)15	
DRI	LER S	. DAVIS	5		S	TART	DATE	E 07	/20/15	5	CO	/IP. DA	<b>TE</b> 07/	21/15	;	SU	RFACE WATER DEP	TH N/	A		DRIL	LER S.	DAVIS	3		ST	ART DA	TE 07/20/	/15	0
ELEV	DRIVE	DEPTH	BLC				,	BLC	DWS P	ER FOC	DT 75	100	SAMP.				SOIL AND RO	CK DESC	CRIPTION		ELEV	DRIVE ELEV	DEPTH	BLO		JNT		BLOWS	S PER FO	)Т 7
(11)	(ft)	(11)	0.5π	0.5ft	0.5π			25		0	15	100	NO.	Имо	I G	ELEV	(ft)		DE	PTH (ft)	(11)	(ft)	(11)	0.5π	0.5ft	0.5π			50	
15		ł														_					-65	·		+						
		ŧ														_						-67.9	78.5	_	~		::i	 	.	•
10	10.6	- 0.0	WOH	1	1			<u> </u>						м		- 10.6 	GROUNI ROADWAY	D SURFA	ACE Kment	0.0	-70	-	-	5	b	· /	· ·•1:	3		•
		<u>+</u>					· · ·	· ·	· · · ·	· · · · · ·	: :	· · · · · ·				-	GRAY AND BROW (A-2-4) WITH TRA	VN, SILT	Y FINE SAND GANICS AND				-						.   .	•
5		- 3.5	1	1	1	• <u>·</u> 2	· · ·	· ·	· · ·	· · · · · ·	· · ·	· · · · · ·		м		-	SHELL F	RAGME	NTS			-72.9	_ 83.5 -	5	5	6	 	· · · · ·	 	•
5	-	ŧ				1.		1.								<u>4.6</u>				<u>6.0</u>			-							
	2.1	8.5	WOH	1	3		· · · · · ·	· ·	· · · ·	· · · · · ·	· · ·	· · · · · ·				-	GRAY AND BROW (A-2-4) WITH TRA	/N, SILT ACE ORC	Y FINE SAND GANICS AND			-	-							
0		ŧ			Ŭ	<b>•</b> <sup>4</sup>	· · ·		•••		·   ·					-	SHELL F	RAGME	NTS			_	-							
	20	+					· · ·		· · · ·	· · · · · ·	: .	· · · · · ·				-						-	-							
-5	-2.9	+ 13.5	1	4	2	1  <b>•</b>	 3		· · · ·	· · · · · ·	· · ·	· · · · · ·		w		-						-	-							
	-	ŧ				1	 									-						-	-							
	-7.9	18.5	6	5	8					· · · ·	· · ·	· · ·		Sat		-						-	-							
-10		ŧ					••13. 	···	· ·		· · ·					-						-	-							
	-12.9	23.5				- j										-						-	-							
-15		Ŧ	4	3	2	<b>│</b>						· · · ·		Sat.		-13.9	COAST	TAL PLA	IN	24.5		-	-							
		Ŧ														-	GRAY, CLAYEY FIN TRACE TO LITTLE	NE SANE	) (A-2-6) WITH FRAGMENTS			-	-							
	-17.9	28.5	1	2	3									Sat.		_						-	-							
-20		Ŧ														_						_	-							
	-22.9	33.5				Ì I										E														
-25		Ł	2	3	4	<u> </u>	7				• •			Sat.		_						-	-							
		ŧ					· · ·	· ·	· · ·	· · ·	: :	· · ·				_						-	-							
	-27.9	38.5	17	100/0.1		:i	<del></del>	-:-:	÷÷		÷+÷	 100/0.1				28.4 29.4	COASTAL PLAIN	SEDIME	NTARY ROCK	39.0 40.0		-	-							
-30	-	ŧ					 									-		TED SA				_	-							
ъ	-32.9	43.5	6	6	5	<b>  </b> :		· ·   · ·	· · · ·	· · · · · ·	· · ·	· · · · · ·				-	GRAY AND BLAC	K, SILTY	FINE SAND			-	-							
-35		ŧ					<b>(</b> 11 ·		• •		· ·			Sat.		-	(*	<b>∼∠-</b> <del>+</del> )				_	-							
, TO	27.0	+				:	:: <b>`</b> .		· · · ·	· · · · · ·	: :	· · · · · ·				-						-	-							
0. LOO -40	-57.9	+ +0.5	6	8	22	11:	· · ·	30		· · · · · ·	· · ·	· · · · · ·		Sat.		-						-	-							
	-	ŧ						· .	×.							-				50.0		-	-							
GPJ	-42.9	53.5	21	20	37		· · ·					· · ·		Sat		- <u>-42.4</u> -	GRAY AND BLACK	K, SILTY	CLAY (A-7-6)	53.0		-	-							
-45		ŧ								57.	·   ·					-	WITH TRAC	CE FINE	SAND			_	-							
SRDG	-47 9	58.5				:			/							-						-	-							
HA -50		Ŧ	7	14	13	] :	· · ·	•27 ·				· · · ·		Sat.		-						-	-							
GEO	.	Ē								<u> </u>						Ē						-								
021	-52.9	63.5	23	48	27	$\left  \right  $	· · ·		•••		75	· · ·		Sat.		L						-								
-55	-	Ŧ						+								F							_							
DUBLE	-57.9	68.5					· · ·		//	· · · ·		· · ·				L							-							
ы Ш -60		ŧ		8	14			22.			• •			Sat.		_						-	-							
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CDO	-62.9	73.5	8	9	13	11:		  22	· · ·	 	:   :	· · · ·		Sat.		F						-	-							
Z -00				I	L			1						1		L														

1T	BRUNS	NICK			GEOLOGIST C. WANG			
NC	211 OVER		CHMAI	N CREI	EK		GROUN	ID WTR (ft)
	OFFSET	6 ft R	Т		ALIGNMENT -L-		0 HR.	N/A
	NORTHING	<b>G</b> 74	,127		EASTING 2,291,705		24 HR.	FIAD
		DRIL	L METH	OD Mu	Id Rotary HAN	ΛM	ER TYPE	Automatic
	COMP. DA	TE (	07/21/1	5	SURFACE WATER DEPTH	N/	A	
от		SAN	/IP.	15	SOIL AND ROCK DE	sc	RIPTION	
	75 100	NC	D. M	ы G				
	<del></del>			+		TV		
					WITH TRACE FINE SA	ND	(continue	d)
· ·			Sat					
					-			
			Sat		74.4			05.0
<u> </u>		4			- Boring Terminated at Ele	eva	tion -74.4 f	t in
				F	CLAY (COASTA	LP	LAIN)	
				F				
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	WBS	41582	2.1.1			Т	IP	R-502 <sup>2</sup>	1		COUN	ITY	BRUNS	WICK				GEOLOGIST C. WANG	;		WBS	<b>3</b> 4158	32.1.1			ТІ	<b>P</b> R-5021		COUNT
	SITE	DESCR		DU/	AL BR	IDGE	S N	D. 24 A	ND N	0. 25	9 ON N	NC 2	11 OVEF	R DUTCH	IMA	N CR	EEł			GROUND WTR (ft		E DESCI	RIPTIO	DU.	AL BR	IDGES	3 NO. 24 A	ND NO. 2	:59 ON NO
	BOR	ING NO	. B2-B			S	TAT	ION 3	369+6	4		0	FFSET	33 ft RT	•			ALIGNMENT -L-		0 HR. N/A	BOF	RING NC	<b>).</b> B2-E	3		ST	FATION 3	69+64	
	COL	LAR ELI	<b>EV.</b> 10	).3 ft		<u>т</u>	ΟΤΑ	L DEP	TH 9	94.4 ft		N	ORTHIN	<b>G</b> 74,10	06			EASTING 2,291,686		24 HR. FIAD	COL	LAR EL	<b>.EV.</b> 1	0.3 ft		тс	JTAL DEP	<b>ГН</b> 94.4	ft
	DRILL	RIG/HA	MMER E	FF./DA	TE F8	&R5785	5 CM	E-55 80	% 04/2	23/201	5			DRILL	METH	IOD	Mud	Rotary	HAMM	<b>ER TYPE</b> Automatic	DRIL	L RIG/HA	AMMER E	EFF./DA	TE F8	kR5785	CME-55 80°	% 04/23/20	15
	DRIL	LER S	. DAVIS	S		S	TAF	RT DAT	<b>E</b> 07	/15/1	5	C	OMP. DA	<b>TE</b> 07/	/16/1	5		SURFACE WATER DEPT	TH N/	/A	DRI	LER	S. DAVI	S		ST		<b>E</b> 07/15/	15
	ELEV	DRIVE ELEV	DEPTH	BLC					BLO	OWS F	PER FOO	ТС		SAMP.				SOIL AND ROC	K DESC	CRIPTION	ELEV	DRIVE ELEV	DEPTH	BLC				BLOWS	PER FOOT
-	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0		25	5	50 I	75	5 100	NO.	/м	OI G	E	LEV. (ft)		DEPTH (	t) (π)	(ft)	(π)	0.5ft	0.5ft	0.5ft		25	50
-	15		Ļ														┝				-65	+	+		<b>↓</b>		<i>r</i>	Mat	ch Line
		-	ŧ														F					0.00	+				::;;:		
	10	-	ŧ														Ē	0.3 GROUND	SURFA	ACE 0	.0 -70	-68.2	+ 78.5	6	7	7	· · · • 14		
		9.3	1.0	7	43	3	$\left  \right $								м			.3 ASP	HALT		0		Ŧ					· · · ·	· · · ·
		6.8	3.5		2	2		· · · · ·	فبسبه لجر		••••••	:	· · · · ·			L	-	GRAY AND BROWN	N, SILT			-73.2	83.5	5	6	7			
-	5	-	ŧ		3	2		5	· · ·			·		-	M			(7-2-4) ****			-75		‡		0	'	· · • 13:		
			‡					 		•••		:	· · · · ·				+	.3		8	0		‡						+-~_
	0	1.8 -	<u>+ 8.5</u> +	2	2	1	11	 3		•••	· · · ·	:	· · · · ·		w			GRAY AND BLACK		NN Y FINE SAND		-78.2	<u>+ 88.5</u> +	49	54	46/0.5			
	0	-	ŧ				f		1.								-	(A-2-4) WITH TR	RACE O	ORGANICS		-	‡					<u> </u>	
		-3.2	13.5					 		•••		:	· · · · ·									-83.2	93.5		00/0 4				
-	-5	-	‡		1		🛉	<u>2</u> · · ·	· ·	· · ·		·		-	Sat	t.							+	40	60/0.4	┢──┤		1	
		-	ŧ				`	λ:::		•••		:	· · · · ·										‡						
	10	-8.2 -	<u> </u>	5	3	7	$\left\{ \right\}$	· <b>\</b> · <b>\</b> 10 ·	· ·	•••		:	· · · · ·		Sat								‡						
-	-10	-	ŧ					- <u> </u>	+ : :														‡						
		-13.2 ·	23.5					/:::	· ·	•••	· · ·	:	· · · ·				+		ETOC		<u>o</u>		1						
	-15	-	t	WOH	2	2		4 · · ·	· ·	•••		•			Sat		<u>, , , , , , , , , , , , , , , , , , , </u>	(A-2-6) WITH TRACE	SHELL	L FRAGMENTS			1						
		-	ŧ					 		•••			· · · ·			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~ <u>.</u>						t						
		-18.2 -	28.5	WOH	2	3	$\left  \right $	· · ·	· ·	•••	· · ·	·	· · · ·		Sat		~ <u>,</u> ,,,						ł						
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		33.0	135															GRAY, SILTY FINE	SAND	(A-2-4) WITH			Ŧ						
/8/15	-35	-00.2 -	<u></u>	5	4	4	11	••••••••••••••••••••••••••••••••••••••							Sat			I HIN CLA	AY SEA	MS			Ŧ						
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JT.GC		-38.2	48.5	6	15	26						:					F						Ŧ				1		
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й Гс		12 0	F2 F									.											Ŧ				1		
24.GF	-45	-43.2 -	= <u>33.5</u> -	17	13	13	11	· · · · ·	26 ·			:			Sat	t.							Ŧ						
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BRC		-48.2	58.5			11		· · · · /	/ ::	•••			· · · · ·					GRAY AND BLACK.	. SILTY	CLAY (A-7-6) 58	<u>0</u>		‡						
BH	-50	-	‡	0	°			· · · •	19 • •	•••		•		-	Sat			WITH TRAC	EFINE	SAND			‡						
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5021	_55	-53.2 -	+ 63.5 -	8	10	19		 	•29	•••		:	· · · · ·		Sat								‡						
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OUBL		-58.2	68.5	<b>_</b>		<b>.</b>		 	į::	•••		:	· · · · · · · ·										‡						
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ICDO	-65	-63.2 -	+ 73.5 +	7	8	11	$\left  \right $	::: <b>;</b>	· · 19 · ·	•••		:			Sat								‡						
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WBS	41582	2.1.1			Т	IP R-5021		COUNT	Y BRUNS	WICK			GEOL	OGIST Corey F	utral			WBS	<b>4</b> 158	2.1.1			ТІІ	• R-502	21	С	COUNTY
SITE	DESCR		NC	211 F	ROM	WEST OF	SR 1500 (I	MIDWAY	ROAD) TO	EAST C	OF NC	87				GROUNI	OWTR (ft)	SITE	DESCR	RIPTION	I NC	211 FI	ROM V	VEST O	F SR 15	00 (MII	DWAY F
BOR	ING NO	. EB2-	A		S	TATION 3	70+50		OFFSET	27 ft LT			ALIGN	MENT -L-		0 HR.	3.7	BOR	ING NO	. EB2-	A		ST	ATION	370+50	)	
COL	LAR ELI	<b>EV.</b> 5.8	8 ft		Т	OTAL DEP	<b>TH</b> 84.1 f	t	NORTHIN	<b>G</b> 74,12	26		EASTI	NG 2,291,789		24 HR.	2.5	COL	LAR EL	<b>EV.</b> 5.8	8 ft		тс	TAL DE	. <b>PTH</b> 8	4.1 ft	
DRIL	RIG/HA	MMER E	FF./DA	TE C/	AT1303	CME-550 77.	.2% 01/09/20	14	•	DRILL	METHO	D N	Nud Rotary		HAMM	ER TYPE	Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE CA	AT1303 (	CME-550	77.2% 01	09/2014	
DRIL	.LER D	.T. Cha	Imers	, Jr.	S		E 10/09/1	4	COMP. DA	TE 10/	13/14		SURFA	CE WATER DEI	PTH N/	A		DRIL	LER D	).T. Cha	almers	, Jr.	ST	ART DA	<b>TE</b> 10	/09/14	
ELEV	DRIVE	DEPTH	BLC	w co	JNT		BLOWS I	PER FOOT	-	SAMP.						RIPTION		ELEV	DRIVE	DEPTH	BLC	ow cou	UNT		BLC	WS PE	R FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 :	25	50	75 100	NO.	Имо	I G	ELEV. (ft)	00127118710	0.1.0200		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7
10		Ļ											L					-70		₋_		<u> </u>	+	- <u> </u>		Match I	Line
	-	ŧ											Ę						-72 7	+ 785					: .		· · · · · · · ·
5	5.8	0.0					1					0000	5.8	GROUN	ID SURFA	CE	0.0	-75		+	5	6	7	<b> </b> .   <b> </b> 1:	3	· · ·	· · · · · · · ·
	33	+ + - 25	2	1	2	<b>•</b> 3 • • •					<b>₩</b>	0000	<u> </u>	Med. g	ray, f. SA			-75	-	ŧ				· · · ·			
		+	2	1	2						Ŵ		- 1.3	Black, Silty, f. SA	AND w/sor	me organics	s 4.5		-77.7	83.5	31	69/0.1		<u> ::¦:</u>	· · ·	· · ·	 <u></u>
0	0.5	- <u>5.3</u>	1	4	6					SS-13	Sat.	0000		Med. brown	to gray, f	SAND			-	ŧ		1	1				
	-27	+ - 85									1		<u>1.7</u>	Med. grav. Silt		/tr. f. sand	<u> </u>			ŧ							
-5		+	WOH	2	2	<b>1 ●</b> 4				SS-14	Sat.				,					ŧ							
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-10		ŧ					+ • • • •			-			<b>-</b>						-	ŧ							
	-12.7	T 18.5											-							Ŧ							
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	-27.7	T 33.5	30	70/0.1			· · · · ·	+		SS-15	Sat.		-28.3	Med aray Silty f		emented s	34.1			Ŧ							
-30	-	Ŧ											 	ivicu. gruy, onty, i.	frags.		37.0		-	Ŧ							
	-32.7	38.5			6								E	Med. gra	y, Sandy	SILT				Ŧ							
-35		Ł	0	°	0	· · • • 14.	· · · · ·				Sat.		L						_	ŧ							
		+				::k:							-							ŧ							
3/15	-37.7	43.5	4	5	8	 ●13.					Sat.		_							ŧ							
<sup>®</sup> -40	-	ŧ						<u> </u>		-			<u> </u>						-	ŧ							
GDT	-42.7	48.5	9	11	30								_							ŧ							
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и́ -00 щ	-	ŧ						<u> </u>		11			<u> </u>	Dark gra	y, Clayey	SILT	<u> </u>		-	‡							
OUBL	-62.7	68.5	7	10	12	$\left  \left  \begin{array}{c} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{array} \right  \right $					Q-+		ŀ							‡							
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T BO	-67 7 ·	73.5				::/:							<u></u> - <u>06.2</u>	Dark gra	y, Sandy S	SILT — —	<u> </u>			‡							
2007		+	5	6	6	 					Sat.		-							‡							
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T	BRUN	ISN	/10	CK				GEOLOGI	ST Corey Fut	ral		
Y	ROAD)	TO E	Ē	AST O	FNC	87					GROUN	D WTR (ft)
	OFFSE	<b>T</b> 2	27	ft LT				ALIGNME	NT -L-		0 HR.	3.7
	NORTH	ING		74,12	6		1	EASTING	2,291,789		24 HR.	2.5
_	1		D	RILLM	ETHO	D N	lud	Rotary		HAMME	R TYPE	Automatic
	COMP.	DAT	Ē	10/1	3/14			SURFACE	WATER DEPI	TH N//	4	
)T			5	SAMP.	/	L				ע הבפיס		
	75 1	100		NO.	Лог	G				IN DESU		
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SITE DESCRIPTION       DUAL BRIDGES NO. 24 AND NO. 259 ON NC 211 OVER DUTCHMAN CREEK       GROUND WTR (ft)       SITE DESCRIPTION       DUAL BRIDGES NO. 24 AND NO. 259 ON NC 211 OVER DUTCHMAN CREEK         BORING NO. EB2-C       STATION 370+09       OFFSET 5 ft RT       ALIGNMENT -L-       0 HR. N/A         COLLAR ELEV. 10.6 ft       TOTAL DEPTH 80.0 ft       NORTHING 74,113       EASTING 2,291,738       24 HR. FIAD       DRILL RIGHAMMER EFF.JDATE       FRAF785       STATION 370+09       COLLAR ELEV. 10.6 ft       TOTAL DEPTH 80.0 ft         DRILL RIGHAMMER EFF.JDATE       FSR5785       CME-55 80% 04/23/2015       DRILL METHOD Mud Rotary       HAMMER TYPE Automatic       DRILL RIGHAMMER EFF.JDATE       FRAF785       CME-55 80% 04/23/2015         DRILL RS. DAVIS       START DATE       07/22/15       COMP. DATE       07/22/15       SURFACE WATER DEPTH       N/A         LEV       DRIV       DEPTH       BLOW COUNT       BLOWS PER FOOT       SOIL AND ROCK DESCRIPTION       DEPTH(t)       BLOW COUNT       BLOW COU	COUNTY I
BORING NO.         EB2-C         STATION 370+09         OFFSET 5 ft RT         ALIGNMENT -L-         0 HR.         N/A         BORING NO.         EB2-C         STATION 370+09           COLLAR ELEV. 10.6 ft         TOTAL DEPTH 80.0 ft         NORTHING 74,113         EASTING 2,291,738         24 HR.         FIAD         COLLAR ELEV. 10.6 ft         TOTAL DEPTH 80.0           DRILL RIG/HAMMER EFF./DATE         F8R5785 CME-55 80% 04/23/2015         DRILL METHOD         Mud Rotary         HAMMER TYPE         Automatic         DRILL RIG/HAMMER EFF./DATE         F8R5785 CME-55 80% 04/23/2015           DRILL RIG/HAMMER EFF./DATE         START DATE         0/722/15         SURFACE WATER DEPTH N/A         DRILL RIG/HAMMER EFF./DATE         F8R5785 CME-55 80% 04/23/20           DRILL RIG/HAMMER EFF./DATE         BLOW COUNT         BLOW COUNT         BLOWS PER FOOT         SOIL AND ROCK DESCRIPTION         DEPTH (t)         DRILL RIG/HAMMER EFF./DATE         F8R5785 0.65ft 0.5ft 0.5f	59 ON NC 21
COLLAR ELEV.         10.6 ft         TOTAL DEPTH         80.0 ft         NORTHING         74,113         EASTING         2,291,738         24 HR.         FIAD         COLLAR ELEV.         10.6 ft         TOTAL DEPTH         80.0 ft           DRILL RIG/HAMMER EFF./DATE         F&R5785         CME-55         80%         04/23/2015         DRILL METHOD         Mud Rotary         HAMMER TYPE         Automatic         DRILL RIG/HAMMER EFF./DATE         F&R5785         CME-55         80%         04/23/2015           DRILL RIG/HAMMER EFF./DATE         F&R5785         CME-55         80%         04/23/2015         SURFACE WATER DEPTH         N/A         DRILL RIG/HAMMER EFF./DATE         F&R5785         CME-55         80%         04/23/2015           DRILL RIG         DAVIS         START DATE         07/22/15         SURFACE WATER DEPTH         N/A         DRILL RIG/HAMMER EFF./DATE         F&R5785         CME-55         80%         04/23/2015           ELEV         DRIVE         DEPTH         BLOW COUNT         BLOWS PER FOOT         SOIL AND ROCK DESCRIPTION         DEPTH (t)         Diff.         0.5tt         0.25         0.25         0.25         0.25         <	OF
DRILL RIG/HAMMER EFF./DATE       F&R5785       CME-55       80%       04/23/2015       DRILL METHOD       Mud Rotary       HAMMER TYPE       Automatic         DRILLER       S. DAVIS       START DATE       07/22/15       SURFACE WATER DEPTH       N/A         ELEV       DRIVE       DEPTH       BLOW COUNT       BLOWS PER FOOT       SAMP.       L       SOIL AND ROCK DESCRIPTION       DEPTH (ft)       BLOW COUNT       BLOW COUNT       BLOW COUNT       0       25       50       75       100       NO.       MOI       G       ELEV. (ft)       SOIL AND ROCK DESCRIPTION       DEPTH (ft)       BLOW COUNT       BLOW COUNT       BLOW COUNT       BLOW COUNT       BLOW COUNT       0       25         10       10.6       0.0       2       2       4       6       -       -       Mail         7.1       3.5       2       2       1       6       -       -       -       6       -	it NC
DRILLER         S. DAVIS         START DATE         07/22/15         SURFACE WATER DEPTH         N/A         DRILLER         S. DAVIS         START DATE         07/22/16         OT/22/15         SURFACE WATER DEPTH         N/A         DRILLER         S. DAVIS         START DATE         07/22           ELEV         DRIVE         DEPTH         BLOW COUNT         BLOWS PER FOOT         SOIL AND ROCK DESCRIPTION         ELEV. (ft)         DEPTH (ft)         0.5ft	15
ELEV (ft)       DEPTH (ft)       BLOW COUNT       BLOWS PER FOOT       SAMP. NO.       L NO.       SOIL AND ROCK DESCRIPTION G ELEV. (ft)       DEPTH (ft)       BLOW COUNT       BLOW COUNT <th>15 <b>CC</b></th>	15 <b>CC</b>
(ii)       (ii)       (iii)       (ii)       (iii)       (i	PER FOOT
15     -65     -65     -65       10     10.6     0.0     0.65     -67.9     78.5     7     -7     -7       10     10.6     0.0	50 75
15     -65     -65     -67.9     78.5     -7.1     -7.1     -67.9     78.5     -7.1     -7.1     -66     -7.1     -7.1     -67.9     78.5     -7.1     -7.1     -67.9     78.5     -7.1     -7.1     -67.9     78.5     -7.1     -7.1     -67.9     -7.1     -67.9     -7.1     -7.1     -67.9     -7.1     -7.1     -67.9     -7.1	
10     10.6     0.0     2     2     4     6     7     7 <td< td=""><td></td></td<>	
10     10.6     0.0	
7.1     3.5     2     2     1       5     2     2     1       6          7         6        7        7        7        7        7        7        7        7        8        9        1	<u> </u>
$\begin{bmatrix} 7.1 & 3.5 \\ - & - & - \\ - & - & - \\ - & - & - & -$	
-2.9 + 13.5 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	
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-17.9 28.5 WOH 1 3	
-25 $-25$	
-32.9     -32.9     -43.5     5     4     5     1	
Image: Harder Drilling NOTED FROM 52.0'     Image: Harder Drilling NOTED FROM 52.0'       Image: Harder Drilling NOTED FROM 52.0'     Image: Harder Drilling NOTED FROM 52.0'	
$\begin{bmatrix} -42.9 \\ 53.5 \\ 19 \\ 16 \\ 46 \end{bmatrix}$	
$\overline{\mathbb{A}}$ $\underline{\mathbb{A}}$ $\mathbb{$	
$\begin{bmatrix} 5 \\ 9 \\ 5 \end{bmatrix}_{55} \begin{bmatrix} -52.9 \\ + \end{bmatrix} \begin{bmatrix} 63.5 \\ -5 \end{bmatrix} + \begin{bmatrix} 12 \\ 11 \\ 12 \end{bmatrix} \begin{bmatrix} 1 \\ 12 \end{bmatrix} \begin{bmatrix} 1 \\ 12 \end{bmatrix} \begin{bmatrix} 1 \\ 23 \\ -5 \end{bmatrix} + \begin{bmatrix} 1 \\ 23 \\ -5 \end{bmatrix} + \begin{bmatrix} 1 \\ -5 \end{bmatrix} + \begin{bmatrix} 12 \\ -5 \end{bmatrix} + \begin{bmatrix} 1$	
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Ľ	Y BRL	JNS	N	ICK			GEO	OGIS	ST C. WAN	G		
IC	211 0	VER		DUTCH	MAN	CRE	EK				GROUN	D WTR (ft)
1	OFFS	ЕТ	5	ft RT			ALIG	NMEN	IT -L-		0 HR.	N/A
	NORT	HINC	3	74,11	3		EAST	ING	2,291,738		24 HR.	FIAD
				DRILL N	IETHO	D M	ud Rotary			HAMM	ER TYPE	Automatic
	COMP	. DA	Т	E 07/2	22/15		SURF	ACE	WATER DEP	TH N/	A	
т				SAMP.		L	1					
	75	100		NO.	мог	G			SUIL AND RU	CK DESU	RIPTION	
	Τ											
•		· · · ·			0.1		-	GRA	SILT (A-4	) (contin	ued)	
•			Ц		Sat.		69.4	Bor	ing Terminated	at Eleva	ion -69.4 f	80.0 t in
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WBS	<b>3</b> 4158	2.1.1			Т	IP R-5021		COUNT	Y BRUNS	WICK			GEOLOGIST C. WANG			WBS	<b>3</b> 4158	2.1.1			Т	<b>P</b> R-	-5021		COUN	
SITE	DESC	RIPTION	DU	AL BR	IDGE	S NO. 24 A	ND NO. 2	59 ON NO	211 OVEF	R DUTCH	IMAN CF	REE	ΞK	GROU	JND WTR (ft)	SITE	DESCR	RIPTIO	N DU	AL BR	IDGE	S NO.	24 AN	ND NO. :	259 ON I	NC 21
BOF	ING NC	. EB2-	В		S	TATION 3	70+01		OFFSET	35 ft RT			ALIGNMENT -L-	0 HR.	. N/A	BOF	RING NO	. EB2	-В		S	ΓΑΤΙΟ	<b>N</b> 37	/0+01		OF
COL	LAR EL	<b>EV.</b> 10	.2 ft		Т	OTAL DEP	<b>TH</b> 85.0 f	t	NORTHIN	<b>G</b> 74,08	39		EASTING 2,291,719	24 HR.	. FIAD	COL	LAR EL	<b>EV.</b> 1	0.2 ft		Т	OTAL	DEPT	<b>H</b> 85.0	ft	NC
DRIL	l Rig/Ha	MMER E	FF./DA	TE F8	&R5785	CME-55 80	% 04/23/201	5		DRILL	NETHOD	Mu	Id Rotary HA		E Automatic	DRIL	L RIG/HA	MMER E	EFF./DA	TE F	&R5785	CME-	55 80%	6 04/23/20	)15	
DRI	LER S	S. DAVIS	3		S	TART DATI	E 07/16/1	5	COMP. DA	<b>TE</b> 07/	17/15		SURFACE WATER DEPTH	N/A		DRI	LER S	. DAVI	S		S	TART	DATE	07/16	/15	CC
ELEV	DRIVE ELEV	DEPTH	BLC				BLOWS	PER FOOT	Г	SAMP.			SOIL AND ROCK [	ESCRIPTIO	N	ELEV	DRIVE ELEV	DEPTH	H BLC	ow co				BLOWS	BPER FO	ОТ
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI (	G	ELEV. (ft)		DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	2	.5	50	75
15		+										┝	-			-65	+	+	-	┝				Mat	tch Line	
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10		Ŧ										F	10.2 GROUND SU	RFACE	0.0	-70	-00.3	<u>+ /0.5</u> +	6	7	7		<b>•</b> 14			
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	6.7	3.5	2	2	3								GRAY AND BROWN, S (A-2-4	ILTY FINE S	SAND		-73.3	83.5	5	6	7		.   .		.	
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-30		‡	30	100/0.0		<del>.</del> <del>.</del>		+	100/0.0	•			30.3 COASTAL PLAIN SED		ROCK		-	‡								
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£1/2 -35	-33.3	<u>+ 43.5</u> +	5	5	6				.   .		Sat.		GRAT AND BLACK, S (A-2-4		AND			ŧ								
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### SHEET 19 OF 21

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					DRILL N	IETHO	D N	lud	Rota	ry					HAMM	ER TYPE	Automatic
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T.I.P. ID NO.:R-5021DESCRIPTION:Dual Bridges Nos. 24 and 259 on NC 211 over Dutchman Creek

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT:	41582.1.1	COUNTY:	Brunswick
DATE SAMPLED:	7/15	RECEIVED:	8/15
SAMPLED FROM:	<u>-L</u>	REPORTED:	8/15
SUBMITTED BY:	P. Alton, PE	BY:	D. Jenks
			Cert No. 101-02-0603

TEST RESULTS

PROJ. SAMPLE NO.	SS-18	ST-2	ST-2	SS-23	SS-81						
BORING NO.	EB1-A	EB1-A	EB1-A	EB1-B	EB2-B						
Retained #4 Sieve %	0.9	0.0	0.0	0.1	0.0						
Passing #10 Sieve %	99.1	99.7	100.0	99.8	100.0						
Passing #40 Sieve %	95.6	98.7	98.2	88.1	97.9						
Passing #200 Sieve %	74.8	16.2	51.5	31.6	71.0						

<b></b>		1		1							
SOIL MORTAR - 100%											
Coarse Sand Ret - #60 %	5.0	2.7	3.6	29.8	3.2						
Fine Sand Ret - #270 %	33.4	81.6	45.8	40.3	42.3						
Silt 0.053 - 0.010 mm %	26.7	4.5	21.2	9.0	29.9						
Clay < 0.010 mm %	34.9	11.3	29.4	20.9	24.6						
L.L.	57	22	38	24	38						
P.L.	33	NP	19	18	30						
P.I.	24	NP	19	6	8						
AASHTO Classification	A-7-5 (2)	A-2-4 (0)	A-6 (7)	A-2-4 (0)	A-4 (6)						
Station	368+84	368+84	368+84	368+63	370+03						
Offset	37' Lt	37' Lt	37' Lt	40' Rt	47' Rt						
Depth (ft)	53.5	19.5	18.5	23.5	53.5						
to	55.0	20.0	19.0	25.0	55.0						
Moisture Content (%)	34.4	65.8	40.3	40.7	35.5						
Organic Content (%)	NT	NT	NT	NT	NT						

NP=Not plastic NT=Not tested ND = Not Determined CL = Centerline

W.P. Alton, PE

Soils Engineer

T.I.P. ID NO.:R-5021DESCRIPTION:NC 211 from west of SR 1500 (Midway Road) to east of NC 87

### REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT:	41582.1.1	COUNTY:	Brunswick
DATE SAMPLED:	10/13/14	RECEIVED:	Ν/Α
SAMPLED FROM:	<u>-L-</u>	REPORTED:	9/30/15
SUBMITTED BY:	P. Alton, PE	BY:	Catlin

### TEST RESULTS

PROJ. SAMPLE NO.	SS-13	SS-14	SS-15							
BORING NO.	L_37050	L_37050	L_37050							
	(EB2-A)	(EB2-A)	(EB2-A)							
Retained #4 Sieve %	0.0	0.5	0.0							
Passing #10 Sieve %	100.0	99.2	100.0							
Passing #40 Sieve %	67.0	99.0	99.0							
Passing #200 Sieve %	3.0	48.0	39.0							

		-		-		-	-	-			-	-
SOIL MORTAR - 100%												
Coarse Sand Ret - #60 %	68.3	2.1	1.1									
Fine Sand Ret - #270 %	30.0	50.3	74.2									
Silt 0.053 - 0.010 mm %	1.4	19.8	15.4									
Clay < 0.010 mm %	0.3	27.8	9.4									
L.L.	21	35	28									
P.L.	NP	17	NP									
P.I.	NP	18	NP									
AASHTO Classification	A-3 (0)	A-6 (5)	A-4 (0)									
Station -L-	370+50	370+50	370+50									
Offset	27' Lt.	27' Lt.	27' Lt.									
Depth (ft)	5.3	8.5	33.5									
to	6.8	10.0	34.1									
Moisture Content (%)	28.0	58.0	31.0									
Organic Content (%)	NT	NT	1.1									

NP=Not plastic NT=Not tested ND = Not Determined CL = Centerline

### **CONTENTS**

5021

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REFERENCE

SHEET NO.	DESCRIPTIC
I	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-14	BORE LOGS
15-16	SOIL TEST RESULTS

**DESCRIPTION** 

# STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY RD) TO NC 87

SITE DESCRIPTION BRIDGE OVER CP&L CANAL ON NC 211 BETWEEN NC 133 AND NC 87 LEFT LANE AND RIGHT LANE

STATE N.C

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THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6850. 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 BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSDERABLY WITH TWE ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION CHANGE OBCORDING AND AND AND AS WELL AS COULD NOT CLIMATE CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATION AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ON OF OR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

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

PERSONNEL

HUNSBERGER, W. S.

MID-ATLANTIC DRILLING

INVESTIGATED BY \_ HUNSBERGER, W. S

DRAWN BY <u>HUNSBERGER</u>, W. S.

CHECKED BY \_\_\_\_\_\_\_. HAMM, J. R.

SUBMITTED BY \_\_\_\_\_\_

DATE AUGUST 2017



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION			
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AGASTH 7 206 ASTM DISAR). SOIL (I SESTION)	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TEST ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.			
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOTICAL COMPOSITION, ANNU MAITY, STRUCTURE, PLASTICITY, ETC, FOR FXAMPLE.	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:			
VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTERBEDGED FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPI ROCK (WR) 100 BLOWS PER FOOT IF TESTED.			
GENERAL         GRANULAR MATERIALS         SILT-CLAY MATERIALS         ORGANIC MATERIALS           CLASS.         ( ≤ 35% PASSING #200)         ( > 35% PASSING #200)         ORGANIC MATERIALS	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROC WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE IN			
GROUP         A-1         A-3         X-2         A-4         A-5         A-6         A-7         A-1,A-2         A-4,A-5           CLASS.         A-1-b         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A-3         A-3         A-6,A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA			
SYMEOL 00000 0000 0000 0000 0000 0000 0000	SLIGHTLY COMPRESSIBLE         LL < 31           MODERATELY COMPRESSIBLE         LL = 31 - 50           HIGHLY COMPRESSIBLE         LL > 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ET COASTAL PLAIN SEDIMENTARY ROCK STAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS			
*10 50 MX GRANULAR SILT-	PERCENTAGE OF MATERIAL				
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN					
MATERIAL PASSING *40 LL 40 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 18 MX 41 MN 10 MX 41 MN 10 MX 41 MN 10 MX 41 MN	TRACE OF ORGANIC MATTER         2         -3%         3         -5%         TRACE         1         -10%           LITTLE ORGANIC MATTER         3         -5%         5         12%         LITTLE         10         -20%           MODERATELY ORGANIC         5         -10%         12         -20%         SOME         20         -35%           HIGHLY ORGANIC         5         -10%         12         -20%         SOME         20         -35%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C IV SLIJ CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H			
PI         6 MX         NP         18 MX         18 MX         11 MN         11 MN         18 MX         18 MX         18 MX         18 MX         18 MX         10 MX         10 MX         11 MN         11 MN         10 MD         MODERATE         ORGANIC         ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO			
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▼ STATIC WATER LEVEL AFTER 24 HOURS	(SLL) I INCH. DPEN JOINTS MAY CONTAIN CLAY, IN GRANITOL ROCKS SOM OCCASIONA CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER			
MRTERIALS SANU GEN.RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	Yes     Perched water, saturated zone, or water bearing strata	MUDERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCULCURATION AND WEATHERING EFFECT: (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGT			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 :PI OF A-7-6 SUBGROUP IS > LL - 30	- O-M- Spring or seep	WITH FRESH ROCK.			
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L (MOD, SEV.) AND CAN BE EXCAVATED WITH A CEOLOGIST'S PICK. ROCK CIVES "CLUNK" SOUND			
PRIMARY SOIL TYPE         COMPACTNESS OR CONSISTENCY         PANDE US STRACTION RESISTENCE (N-VALUE)         COMPACTNESS (N TABLE)           PRIMARY SOIL TYPE         VERY LOOSE         < 4	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION COLL SWIDDL SOIL SWIDDL SUPPLIES SU	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS (			
GENERALLY         LOOSE         4         TO         10           GRANULAR         MEDIUM_DENSE         10         TO         30         N/A	ARTIFICIAL FILL (AF) OTHER AUCTO DODING CONE PENETROMETER	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF			
(NON-COHESIVE)         UENSE VERY DENSE         30/10/50/ 50           VERY DENSE         > 50           VERY SOFT         < 2	THAN ROADWAY EMBANKMENT THOUGH BURING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OI (V SEV.) REMAINING, SAPPOLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N</u>			
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2           (COHESIVE)         VERY STIFF         15 TO 30         2 TO 4	INFERRED ROCK LINE     MWO     MONITORING WELL     TEST BORING WITH CORE       INFERRED ROCK LINE     MONITORING WELL     INFERRED ROCK LINE     INFERRED ROCK	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGER ALSO AN EXAMPLE.			
		ROCK HARDNESS			
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - EXCAVATION - UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.			
OPENING (MM)         4.76         2.00         0.42         0.25         0.075         0.053           BOULDER         COBBLE         GRAVEL         COARSE         FINE         SUIT         CLAY	SHALLOW UNCLASSIFIED EXCAVATION - UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B TO DETACH HAND SPECIMEN.			
(BLDR.)         (COB.)         (GR.)         SAND         SAND           (BLDR.)         (COB.)         (GR.)         (CSE. SD.)         (F SD.)         (SL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D			
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL - CL AY MODE - MODERATELY 27 - INIT, WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE C			
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.			
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINCER 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           FOOD         CIL - GUIDUTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH			
PLASTIC - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES ICR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS FRACMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FINGERNAIL. FRACTURE SPACING BEDDING			
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM			
OM OPTIMUM MOISTURE ' MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	EQUIPMENT OSED ON SUBJECT PROJECT           DRILL UNITS:         ADVANCING TOOLS:         HAMMER TYPE:           X         CME-45C         X         CLAY BITS         X         AUTOMATIC         MANUAL	WIDE         3 TO 10 FEET         THICKLY BEDDED         1           WIDE         3 TO 10 FEET         THICKLY BEDDED         1           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.           CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.			
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <			
PLASTICITY	] 8° HOLLOW AUGERS   Вн				
PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	CME-550     HARD FACED FINGER BITS       VANE SHEAR TEST     TUNGCARBIDE INSERTS       HAND TOOLS:	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	W/ ADVANCER     POST HOLE DIGGER       PORTABLE HOIST     TRICONE     STEEL TEETH	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.			
COLOR	TRICONE TUNGCARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.			

### PROJECT REFERENCE NO. R-5021



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	IERMS AND DEFINITIONS
D. AN INFERRED SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
13 OF IEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
N VHLUES /	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ICK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLODES ORHINITE,	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN IF TESTED. 2.	$\underline{\text{COLLUVIUM}}$ - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NOT YIELD TONE, 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.
21122 111222	$\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
OATINGS IF OPEN, AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO L FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN Y. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FUNSPARS DUILL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH	FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
E DISCERNIBLE	USUALLY INDICATES FOUR AERATION AND LACK OF GUOD DRAINAGE.
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES. SULL - SULL FORMED IN FLACE BY THE WEATHERING OF AUCK.
S. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR CREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	$\underline{SAPROLITE}$ (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IONEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUGED ROCKS.
EEP CAN BE ETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
R PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS T. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	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 THE TOTAL LENGTH OF STRATA ONE STRATA ONE OF STRATEGY AND A STRATAGY AND A STRATAGY AND A STRATAGY AND A STRATAGY
IED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	RENCH MARK+RM48 -RYI- STA, 369+26 73' RT RR SPIKE IN 17" PINE
THICKNESS	N: 72776 E: 2293529
4 FEET .5 - 4 FEET	ELEVATION: 29.77 FEET
16 - 1.5 FEET	NOTES:
18 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
0.008 FEET	LT LIGHT
AT. PRESSURE, ETC.	DK DARK
	UCP - UNDIVIDED COASTAL PLAIN
EEL PROBE;	
PROBE:	
-,	DATE: 8-15-14





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SILTY AND S ORMATION)	SANDY		-80	
T TO SATUI SAND (WACC)	RATED,V.LOOSE AMAW FORMATIO	TO V.DENSE, N)W/ TRACE	SHELLS	
T TO SATUI AW FORMAT	RATED,V.SOFT 7 ION)W/ TRACE	SHELLS		
CAMAW FORM	IV.DENSE,SILIY IATIONIW/ TRAC	: AND E SHELLS	_100	
NDY SILT (W	ACCAMAW FORMA	ATION)		
AND TAN, LI	MÉSTONE (WACC	AMAW FORMAT	ION)	
39	6+00			
ON ENGINEERING, INC. IRINITY ROAD, SUITE 110	SUBSURFA	CE PROFILE AT CEN	TERLINE	
ALEIGH, NC 27607	BRIDGE ON NO BRUNSWICK	COUNTY, NORTH	JTFALL CANAL CAROLINA	
FAX: 919.871.0803	VVBS.	41302.1.1, HP.: K-5U	<u>, , , , , , , , , , , , , , , , , , , </u>	



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ENGINEERING, INC. TY ROAD, SUITE 110	-L - SUB	SURFACE	CROSS S	ECTION	I (END BEN	IT 1)				
IE: 919.871.0800 : 919.871.0803	BRIDGE ON NC 211 OVER CP&L CANAL BRUNSWICK COUNTY, NC WBS: 41582.1.1, TIP: R-5021 FALCON PROJECT NO. G15019.00									



WBS 41582.1.1 TIP R-5	5021 COUNTY BRUNSW	VICK	GEOLOGIST FUTRAL, C.		<b>WBS</b> 41	582.1.1	<b>TIP</b> R-5021 <b>COUN</b>	ITΥ
SITE DESCRIPTION BRIDGE ON NC 211 OV	VER CP&L CANAL			GROUND WTR (ft)	SITE DES	SCRIPTION BRIDGE ON N	C 211 OVER CP&L CANAL	
BORING NO. EB1-A STATION	N 388+50 OFFSET	40 ft LT	ALIGNMENT -L-	<b>0 HR.</b> 19.1	BORING	NO. EB1-A	<b>STATION</b> 388+50	(
COLLAR ELEV. 29.3 ft TOTAL I	DEPTH 94.5 ft NORTHING	<b>G</b> 73,173	EASTING 2,293,320	24 HR. FIAD	COLLAR	ELEV. 29.3 ft	TOTAL DEPTH 94.5 ft	
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550	0 77.2% 01/09/2014	DRILL METHOD Mud F	Rotary HAMME	ER TYPE Automatic	DRILL RIG/	HAMMER EFF./DATE CAT1303	3 CME-550 77.2% 01/09/2014	
DRILLER Contract Driller START I	DATE 10/13/14 COMP. DA	<b>TE</b> 10/14/14	SURFACE WATER DEPTH N/A	٩	DRILLER	Contract Driller	<b>START DATE</b> 10/13/14	0
ELEV DRIVE DEPTH BLOW COUNT	BLOWS PER FOOT	SAMP.	SOIL AND ROCK DESC	CRIPTION	ELEV DR	IVE DEPTH BLOW COUNT	BLOWS PER FOC	от
(ft) (ft) (ft) 0.5ft 0.5ft 0.5ft 0	25 50 75 100	NO. MOI G E	ELEV. (ft)	DEPTH (ft)	(ft) (f	t) (ft) 0.5ft 0.5ft 0.5	ift 0 25 50	7
30 29.3 0.0			29.3 GROUND SURFA	ACE 0.0	-50		_ Match Line	
	25	D	UNDIVIDED COASTA Light tan to brown, f.	L PLAIN SAND		‡		•
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} \cdot & \cdot & \cdot \\ \cdot & \cdot & \bullet \\ \bullet & \\ \bullet & \bullet \\$	SS-16 10% D	<b>,</b>	-	-55	3.7 <del> </del> 83.0	$\frac{1}{3} \begin{vmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{vmatrix} \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix}$	•
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	· · · · · · · · · · · · · · · · · · ·		Dark gray, Sandy CLAY.	Low plast7.0	-58	3.7 + 88.0		
	· · ·   · · · ·   · · · ·   · · · · ·	SS-17 35%			-60		••••••••••••••••••••••••••••••••••••••	
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15 16.3 <b>†</b> 13.0 7 10 12 1 · ·		Sat			-65	3.7 <del> </del> 93.0	<u>-</u>    . <b>.</b>	•
	· · /·   · · · ·   · · · ·   · · · ·		13.3	16.0				
	· / ·   · · · ·   · · · ·   · · · ·		COASTAL PLAI Med. grav. f. SAN	IN		‡		
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			7.7 Lt. grav. f. SAND w/tr. s	37.0 hell frags.		‡		
	••••••••••••••••••••••••••••••••••••••	Sat.	,			‡		
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-15 -13.7 + 43.0 WOH WOH 1		SS-19 63%				‡		
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0         +                             .           ∑         -38.7         -68.0                                       .	· · ·   · · · ·   · · · ·   · · · · ·		37.7 Dark gray, Clavey, f. SAND w	v/tr. shell frags.		‡		
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Ž         -50         4         8         15         -	••••••••••••••••••••••••••••••••••••••	Sat.				<u>t      </u>		

NT	Y BRUNSW	ICK			GEOLOGIST FUTRAL, C	:		
							GROUN	ND WTR (ft)
	OFFSET 4	0 ft LT			ALIGNMENT -L-		0 HR.	19.1
	NORTHING	73,173	3		<b>EASTING</b> 2,293,320		24 HR.	FIAD
		DRILL M	ethod	) Mud	Rotary I	HAMME	R TYPE	Automatic
	COMP. DA	<b>FE</b> 10/1	4/14		SURFACE WATER DEPTH	H N/A	۱	
100	Г 75 100	SAMP. NO.	моі	L O G	SOIL AND ROCK	DESC	RIPTION	1
			Sat. Sat.		Dark gray, SIL <u>56.7</u> Dark gray, CLAY w/	T (cont	inued) — Med. pla	<u>86.0</u>
			Sat.		-65.2			94.5
					Boring Terminated a NOTE: SUBSURFAC ADAPTED FROME OTHERS RECEIVED AUGUS	at Eleva E DAT. 30RING FROM T 2015	ation -65. A FOR E S LOGS I NCDOT	94.5 2 ft B1-A BY GEU,

WB	<b>S</b> 415	82.1.1			Т	IP R-5021		COUNT	BRUNS	WICK			GEO	LOGIST HUNSBE	ERGER,	W. S.		WBS	41582	2.1.1			ТІ	P R-5021	]	COUNT	ГY
SIT	E DESC	RIPTIO	N BR	IDGE (		C 211 OVER	R CP&L CA	ANAL								GROUN	D WTR (ft)	SITE	DESCR	RIPTION	I BRI	DGE (	ON NC	; 211 OVE	R CP&L C	ANAL	
BOF	ring n	<b>O.</b> EB1	B1-B         STATION 388+32           29.2 ft         TOTAL DEPTH 94.2 ft						OFFSET	18 ft RT			ALIG	NMENT -L-		0 HR.	5.5 *	BOR	ing no	. EB1-	·B		S	TATION 3	388+32		
COL	LAR E	<b>LEV</b> . 2	9.2 ft		TOTAL DEPTH         94.2 ft         NC           D3964 CME-45C 83% 08/07/2014				NORTHING	<b>G</b> 73,14	0		EAS	<b>FING</b> 2,293,269		24 HR.	FIAD	COL	LAR EL	<b>EV.</b> 29	9.2 ft		т	JTAL DEP	<b>TH</b> 94.2 f	ít	
DRIL	L RIG/H	AMMER E	EFF./DA	TE M	ID3964	CME-45C 83%	6 08/07/2014			DRILL	<b>NETHC</b>	DD M	lud Rotary		HAMME	R TYPE	Automatic	DRILI	RIG/HA	MMER E	FF./DA	TE MI	ID3964	CME-45C 83	% 08/07/201	4	
DRI	LLER	Contrac	t Drille	r	S	TART DATE	07/21/1	5	COMP. DA	<b>TE</b> 07/	22/15	;	SUR	ACE WATER DEP	TH N/A	٩		DRIL	LER C	Contract	Drille	r	S	FART DAT	E 07/21/1	15	1
ELE\			H BL	ow co	UNT		BLOWS F	PER FOOT		SAMP.	▼⁄			SOIL AND RO	CK DESC	RIPTION		ELEV	DRIVE FLEV	DEPTH	BLC	ow cou	UNT		BLOWS	PER FOO	т
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 5	i0 I	75 100	NO.	Имо	I G	ELEV. (1	t)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7
30		4											-29.2	GROUN	D SURFA	CE	0.0	-50				<u> </u>		┢│─────	Mate	h Line	
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5	6.5	+ 22.7	2	2	1		· · · · ·				Sat.		-							ŧ							
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0	_	‡	2	2	1	<b>•</b> <u>3</u>				SS-2	27%		- 				30.0		-	‡							
		‡												DK. GRAY, SA	ANDY CL	AY (A-6)				ŧ							
-5	-3.5	+ 32.7	1	1	1		· · · · ·	 			l w		4.4				33.6			ŧ							
-0	1	‡											_	COAST DK. GRAY, SILT	<b>TAL PLAI</b> I Y F. TO N	<b>n</b> 1ed. sani	C		-	ŧ							
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-10	_	‡	12	18	21						W		- 	·		,	40.0		-	‡							
		ŧ										N	-	DK. GRAY, SILTY C	LAY (A-7	-6) W/ TR/	ACE			ŧ							
-15	-13.	<u>5 + 42.7</u> +	WOH	WOH	WOH		· · · · ·	· · · · ·		SS-3	56%		-	UNEL	LTTV100.	•				‡							
-15	1	Ŧ											-						-	ŧ							
	-18.5	5 <del>+</del> 47.7											-							ŧ							
-20	_	+	1	1	2	<b>b</b> <u>3</u> · · · ·					w		-						-	‡							
15		ŧ											-							ŧ							
-25	-23.5	<u>; + 52.7</u> +	1	2	2						w		-							‡				1			
- <u>23</u>	1	‡							· · · ·	11			-						-	ŧ				1			
01.6	-28.5	5 + 57.7				] ¦::::		· · · · ·					-							‡				1			
<u>-30</u>	-	+	1	2	2	<b>4</b>		· · · ·	· · · ·		W		-						-	‡				1			
GPJ -		‡											-							ŧ				1			
U.L.NI	-33.5	<u>; + 62.7</u> +	1	2	2						w		-							‡				1			
	1	‡							· · · ·	1			-						-	ŧ				1			
21_GI	-38.5	5 + 67.7											-							‡				1			
1058 -40	_	+	2	4	9				· · · ·		W		39.2	DK.TO LT. GRAY,	CLAYEY	MED. SAN	68.4 ND			‡				1			
JBLE		‡											-	(A-2-6) W	II CSE. SA	and				‡				1			
	-43.5	<u>; + 72.7</u> +	5	28	33	$\left  \left  \begin{array}{c} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{array} \right  \right $	: : : ``	· · · · ·			w		-							‡				1			
SORE -+-2	1	‡							×	1		<u>/</u> ~/~	-						-	‡				1			
DOTE	-48.5	5 + 77.7						· · · ·   · · · ·				/./., /./.,	- 48.5				77.7			‡				1			
ට 2 -50		+	100/0.	2					100/0.2	•			-49.2	COASTAL PLAIN	SEDIMEN	TARY RO	CK 78.4			†							

NT	BRUNSW	/ICK			GEOLOGIST HUNSBER	RGER,	W. S.	
							GROUN	D WTR (ft)
	OFFSET 1	8 ft RT			ALIGNMENT -L-		0 HR.	5.5 *
	NORTHING	73,14	0		EASTING 2,293,269		24 HR.	FIAD
			IETHO	D Mud	d Rotary	HAMME	R TYPE	Automatic
	COMP. DAT	E 07/2	22/15		SURFACE WATER DEPT	H N//	4	
ОТ		SAMP.		L				
	75 100	NO.	моі	G	SOIL AND ROOM	VDL30		
		L						
· ·					LIMESTONE OR CEM (NO REC	ENTED	) SAND LA Y)	YER
			5		COASTA DK. GRAY, SANDY C	LAY (A-	N -6) (contin	ued)
64 	<u> </u>		D					
· ·								
• •			D					
· ·								
· ·								
			IVI		-65.0 Boring Terminated at	t Elevati	ion -65.0 fi	94.2 t IN
				E	CP: SANDY CLA	Y (WAC Ation)	CCAMAW	
				Ŀ	*0-HOUR WATER L	, EVEL M	IAY APPE	AR
				Ŀ	FALSELY HIGH	DUE TO	o fluid Drii i ing	
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W	BS	41582	.1.1			TI	<b>P</b> R-5021	COUNT	Y BRUNSW	ICK			GEOLOGIST HUNSBERGER,	W. S.	WBS 41582	.1.1			TIP	R-5021	COUN	TY BRI
SI	ΓE D	ESCR	IPTION	BRID	DGE O	N NC	211 OVER CP&L CAN	IAL						GROUND WTR (ft)	SITE DESCR	IPTION	BRID	GE ON N	NC 211	OVER CP&L C	ANAL	
BC	RIN	g no.	B1-B			S	<b>TATION</b> 389+40		OFFSET 1	9 ft RT			ALIGNMENT -L-	0 HR. N/A	BORING NO.	B1-B			STAT	<b>ION</b> 389+40		OFFS
CC	OLLA		<b>EV</b> 2	.1 ft		т	OTAL DEPTH 77.9 ft		NORTHING	73,07	0		EASTING 2,293,350	24 HR. FIAD	COLLAR ELI	<b>EV.</b> -2	.1 ft		ΤΟΤΑ	L DEPTH 77.9	9 ft	NORT
DR	ILL R	IG/HAM	IMER EF	F./DATI	e Mid	3964 CI	ME-45C 83% 08/07/2014			DRILL N	/IETHO	D Mu	Id Rotary HAMN	ER TYPE Automatic	DRILL RIG/HAM	IMER EF	F./DATE	MID396	4 CME-4	45C 83% 08/07/201	14	
DF	RILLE	ER C	ontract	Driller		S	TART DATE 07/22/1	5	COMP. DAT	<b>FE</b> 07/2	23/15		SURFACE WATER DEPTH 5.	8ft	DRILLER C	ontract	Driller		STAR	RT DATE 07/22	2/15	СОМ
ELE		DRIVE	DEPTH	BLC	w co	UNT	BLOWS	PER FOO	г	SAMP.		L	SOIL AND ROCK DES	CRIPTION	ELEV DRIVE	DEPTH	BLO	W COUN	Т	BLOW	S PER FOC	TC
(ft	)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	Имо	I G	ELEV. (ft)	DEPTH (ft)	(ft) (ft)	(ft)	0.5ft	0.5ft 0.	5ft 0	25	50	75 I
0			Ļ										_		-80					М	latch Line	
		-	-										-2.1	0.0	-	ŧ						
5		-	ŧ										LT. GRAY, SILTY F. SAM	NN ID (A-2-4) W/	-	ŧ						
0	<u>'</u>		÷										- IRACE SHELL FI	RAGS. MATION)		ŧ						
		-85 -	64										-		-	ŧ						
-1	0	-	-	21	41	17		<b>\$</b> 58			w		-		-	ŧ.						
		-	ŧ.				│									ŧ						
1	_	-13.5 -	11.4	WOH	1	WOH					l w		_ DK. GRAY TO LT. GRAY _ (A-7-6) W/ TRACE SHE	, SILTY CLAY ELL FRAGS.		ł						
-13	5		÷										-		-	ŧ						
		- -185 -	16.4										-		-	ŧ						
-2	0	-	-	1	1	1	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				w		-		-	ŧ.						
		-	ł										-		-	ŧ						
	₋⊢	-23.5 -	21.4	1	1	1				<u>SS-4</u>	75%		-			ŧ						
-2	5		-				$\left \begin{array}{c c} \mathbf{\Psi}^2 & \dots & \dots \\ \hline \mathbf{I} \cdot \cdot \cdot \cdot \cdot & \dots & \dots \end{array}\right $			00 4	1				-	÷						
		-28.5 -	264										-		-	ŧ						
-3	0		-	1	1	2	<b>•</b> 3				w		- 		-	+						
		-	ł				 						-		-	ŧ						
2	_  -	-33.5 -	31.4	1	2	2	· · · ·   · · · · ·     <b> </b> · · · ·   · · · ·				W		-		-	ł						
-3	5	-	+				$\left \begin{array}{c c c c c c c c c c c c c c c c c c c$						-		-	+						
		- -38 5 -	36.4										DK. GRAY, CLAYEY F. T	D MED. SAND 35.0	-	ł						
-4	0	-	-	8	4	4					w	//	- (A-2-6)		-	ŧ.						
		-	ł				:::::					//	-			ł						
1		-43.5 -	41.4	7	8	10				<u>SS-5</u>	35%		-			ŧ						
-4;		-45.5 -	43.4	60/0.0	-			====	<u> </u>		Ŵ			43.4 NTARY ROCK 44.1	-	ŧ						
		- -48.5 -	46.4				<b>I</b> .     <b>I</b> .									ŧ						
-5	0	-	-	12	10	10	<u> </u>		· · · · · ·		w		DK. BROWN, SLI. SAND	TO CLAYEY		ŧ						
15		-	ŧ													ŧ						
12/15	<u> </u>	-53.5 -	51.4	6	7	14					l w		-			ł						
100	5	-	÷										-	55.0		ŧ						
01.0		- -58.5 -	56.4				]   : : : : \ : : : .							LAY (A-6)55.0		÷						
<u>v</u> -6	0	_	-	9	14	13	•••••				D		-			ŧ						
I L d S		-	ŧ										-			ŧ						
INT.0		-63.5 -	61.4	8	14	14							-			ŧ						
	5	-	ŧ				$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$						-			ŧ						
19		- -68.5 -	66.4				::::/						-			ŧ						
-7	0		-	7	10	11					D		-			ŧ						
BLE		-	ŧ				:::/: ::::		.				-72.1	70.0		ŧ						
	₋⊢	-73.5 -	71.4	5	4	4					w	///	DK. GRAY, CLAYEY F. S -	5AND (A-2-6)		ŧ						
and -/:	<u> </u>	-	ŧ										-			ŧ						
DOTE		- -78.5 -	764				] ::X; ::::						-			ŧ						
5- NC	0			5	4	19	●23				W		-79.7	77.6		<u>t</u>						

١	BRUNSWI	CK			GEOLOGIST HUNS	BERGER,	W. S.	
							GROUM	ND WTR (ft)
1	OFFSET 1	9 ft RT			ALIGNMENT _! -		0 HR	N/A
	NORTHING	70 07	<u> </u>			0	24 115	
	NUKIHING	13,070	J		EASTING 2,293,350	U I	24 HR.	FIAD
_		DRILL M	ETHOD	Mu	d Rotary	HAMM	ER TYPE	Automatic
	COMP. DAT	E 07/2	23/15	, .	SURFACE WATER D	<b>DEPTH</b> 5.8	Bft	
T	. –	SAMP.			SOIL AND	ROCK DES		
	75 100	NO.	моі	G	COLE / IND	INCON DEC		•
					-80.0 GRAY, SLI. S	ILTY CSE. S	AND (A-1	l-b) 77.9
					Boring Termina	ated at Eleva	tion -80.0 ACCAMA	ft IN N
					- F	ORMATION	)	
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WBS	41582	2.1.1			ТІ	<b>IP</b> R-5021	COUNT	Y BRUNSV	VICK			GEOLOGIST HUNSBERGER	R, W. S.		WBS	<b>3</b> 4158	2.1.1			TIF	<b>R</b> -5021		COUNTY
SITE	DESCR	RIPTION	BRI	DGE O	NNC	211 OVER CP&L CAI	NAL						GROUND WTR (	ft)	SITE	DESCI	RIPTION	BRID	DGE ON	NC 2	11 OVER O	CP&L CAN	AL
BOR	ing no.	B2-B			S	<b>TATION</b> 389+87		OFFSET	17 ft RT			ALIGNMENT -L-	0 HR. N	/A	BOR	ing no	. B2-B			ST	ATION 38	9+87	
COL	LAR EL	<b>EV.</b> -8	-8.6 ft TOTAL DEPTH 91.3 ft					NORTHING	<b>3</b> 73,04	0		EASTING 2,293,387	24 HR. FIA	D	COL	LAR EL	. <b>EV</b> 8	.6 ft		тс	TAL DEPT	H 91.3 ft	
DRILI	RIG/HAN	MMER EF	F./DAT	e mid	3964 CI	ME-45C 83% 08/07/2014			DRILL	NETHOD	) Mu	d Rotary HAM	MER TYPE Automatic		DRILI	RIG/HA	MMER EF	F./DATI	E MID3	8964 CN	IE-45C 83% C	8/07/2014	
DRIL	LER C	Contract	Driller		S	TART DATE 07/26/	15	COMP. DA	<b>TE</b> 07/	27/15		SURFACE WATER DEPTH 1	12.9ft		DRIL	LER (	Contract	Driller		ST	ART DATE	07/26/1	5
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT	BLOWS	PER FOO	т	SAMP.	- 🔨 /		SOIL AND ROCK DE	SCRIPTION		ELEV	DRIVE	DEPTH	BLC	W COU	JNT		BLOWS F	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	моі	G	ELEV. (ft)	DEPTH	l (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 5	50
-5		Ŧ										-			-85	+	+			+		Matc	h Line
		ŧ															ŧ						
-10		<b>†</b>										COASTAL PL	AIN	0.0	-90	-88.4	<u>+ 79.8</u> +	100/0.3			· · · · ·	· · · · ·	
	-	ŧ									$\mathbb{N}$	DK. GRAY TO LT. GRA CLAY (A-7) W/ TRACE S	AY, SLI. SILTY SHELL FRAGS.				Ŧ						
	-13.4	4.8			1						$\mathbb{N}$	(WACCAMAW FOR	RMATION)			-93.4	+ 84.8	100/0 1					
-15	-	Ŧ			1	<b>•</b> 1 <sup>•••••</sup>				W	$\mathbb{N}$	_			-95	-	Ŧ	100/0.3					
		Ŧ									$\mathbb{N}$						Ŧ						
-20	-18.4	<u>+ 9.8</u> T	woн	1	1					w	$\mathbb{N}$					-98.4	<u>+ 89.8</u> T	40	16	30			 16
_	-	Ŧ									$\square$	-					Ŧ				•	· · · ·	
	-23.4	14.8		1	2						$\square$						Ŧ						
-25		Ŧ	'	'	2	<b>9</b> 3					$\mathbb{N}$	_					Ŧ						
	00.4	Ŧ.						· · · · ·			$\square$						Ŧ						
-30	-28.4	T 19.8	1	2	2	$  _{\phi_4}$				w	$\square$						Ŧ						
		Ŧ							]		$\square$	-					Ŧ						
	-33.4	24.8		2	2						$\square$	24.5		5.0			Ŧ						
-35	-	Ŧ	'								$\mathbb{N}$	- DK. GRAY, CLAYEY MED	. TO CSE. SAND	5.9			Ŧ						
	20.4	I									$\mathbb{Z}$	(A-2-6)					Ŧ						
-40	-30.4	<u> </u>	2	4	6					w	$\mathbb{Z}$						Ŧ						
		Ŧ									$\mathbb{Z}$	-					Ŧ						
	-43.4	34.8	9	6	8						<u>/~/</u>						ł						
-45	-	ŧ			-						$\mathbb{Z}$	-					÷						
	-48.4	+ 39.8									$\langle / \rangle$						ŧ						
-50		‡	5	9	8					w		-					ŧ						
	-50.9	$\frac{1}{42.3}$	100/0.2	2		: : : + + = = = =	+	100/0.2	•					2.3			‡						
	-53.4	44.8	5	11	12					W		CEMENTED SAND (NC	AIN				‡						
-55	-	ŧ				↓ <u>↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ </u>						<u>-55.6</u> DK. GRAY AND BROWN (A-4) W/ CEMENTE	, F. SANDY SILT	7.0			+						
15/15	-58.4	+ 49.8				]  : : : :    : : : :		· · · · · ·				DK. GRAY, SANDY CI					‡						
-60	-	ŧ	5	6	18	24		· · · · ·		W		-					‡						
l.GD		‡				:::: \;:::		-   -									‡						
	-63.4	+ 54.8 +	6	11	22	<b>.</b>		·   · · · · ·		W							‡						
2 -05 Z	-	ŧ										-					‡						
T.GP	-68.4	+ - <u>59.8</u>				/											‡						
UD -70	-	ŧ	6	8	10	<b>1</b> 8				W		-70.6	e	52.0			‡						
GEO		ŧ				: :/: :   : : : :		· · · · · ·				DK. GRAY AND BROWN (A-2-4)	, SILTY F. SAND				‡						
-75	-73.4	+ 64.8 +	3	2	4			· · · · · ·		w							ŧ						
<u>щ</u>	-	ŧ				<del>- \</del>			1			-					‡						
OUBI	-78.4	69.8		L .		: : X:   : : : :		·   · · · · ·									‡						
-80 노	-	‡	4	4	18			-		W		79.5 - GRAY, SLI. SILTY CSE. S	5AND (A-1-a) W/	0.9			‡						
DT BC		ŧ				:::: :``;						CEMENTED LAYERS, FRAGMENTS, TRA	LIMESTONE CE SHELL				Ŧ						
-85	-83.4	<u>+ 74.8</u> 	24	36	32	: : : :   : : : :		68	SS-6	16%		FRAGMENTS AND	FOSSILS				Ŧ						
	-			-	-	· · · · · · · · · · · ·				-					-	-		-					

BRUNSWICK		GEOLOGIST HUNSBER	GER, V	<i>N</i> . S.	
				GROUN	ID WTR (ft)
OFFSET 17 ft RT		ALIGNMENT -L-		0 HR.	N/A
NORTHING 73,040	D	EASTING 2,293,387		24 HR.	FIAD
DRILL M	IETHOD Mud	d Rotary	HAMME	RTYPE	Automatic
COMP. DATE 07/2	27/15	SURFACE WATER DEPT	<b>H</b> 12.	9ft	
75 100 NO.	MOI G	SOIL AND ROC	K DESC	RIPTION	I
<u></u>					
· · · · · · · · · · · · · · · · · · ·		-88.4 COASTAL PLAIN SI - WHITE AND LT. C	e <b>dimen</b> Gray, L	ITARY RO	79.8 DCK NE
· 100/0.3			<b>AL PLAI</b> HITE, CI	N AYEY M	<u>88.0</u> ED.
		-99.9 SAND (A-2-6) W/C Boring Terminated a CP: CLAYEY SAI FORM	EMENT at Elevat ND (WAATION)	ICCAMAV	RS 91.3 ft IN V

WBS	41582	2.1.1			<b>T</b>	IP R-5021 COUNT	Y BRUNSV	/ICK			GEOLOGIST HUNSBER	RGER,	W. S.	WBS	41582	.1.1			ТІ	<b>P</b> R-5021		COUNTY
SITE	DESCR	IPTION	BRI	DGE C	N NC	211 OVER CP&L CANAL							GROUND WTR (ft)	SITE	DESCR	IPTION	BRID	DGE OI	N NC 2	211 OVER (	CP&L CAN	IAL
BOR	NG NO	B3-B			S	<b>TATION</b> 390+57	OFFSET	17 ft RT			ALIGNMENT -L-		0 HR. N/A	BOR	ing no.	B3-B			SI	TATION 39	90+57	
COL	LAR EL	<b>EV.</b> -6	.9 ft		Т (	OTAL DEPTH 89.9 ft	NORTHING	<b>7</b> 3,99	5		EASTING 2,293,440		24 HR. FIAD	COL	LAR ELI	<b>EV</b> 6	9 ft		т	OTAL DEPT	<b>H</b> 89.9 ft	
DRILI	. RIG/HAI	/MER EF	F./DAT	e mic	3964 C	ME-45C 83% 08/07/2014		DRILL N	/IETHO	<b>d</b> M	lud Rotary	HAMM	ER TYPE Automatic	DRILI	. RIG/HAN	IMER EF	F./DATI	e Mida	3964 CN	ME-45C 83% (	08/07/2014	
DRIL	LER C	ontract	Driller		S	TART DATE 07/27/15	COMP. DA	<b>TE</b> 07/2	28/15		SURFACE WATER DEPT	<b>FH</b> 10	.4ft	DRIL	LER C	ontract	Driller		ST	FART DATE	07/27/1	5
ELEV	DRIVE ELEV	DEPTH	BLC	W CO	UNT	BLOWS PER FOO	Т	SAMP.	▼⁄		SOIL AND ROO	K DES	CRIPTION	ELEV	DRIVE ELEV	DEPTH	BLC	W COL	JNT		BLOWS	PER FOOT
(π)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0 25 50	75 100	NO.	Имо	I G	ELEV. (ft)		DEPTH (ft)	(π)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 !	50
-5		+									-			-85	-85.6	78.7					Mato	h Line
		Ŧ									COAST	AL PLA	0.0 <b>JN</b>		-	F	52	15	27			
-10		I									DK. GRAY, F. TO (A-7) W/ TRAC	CSE. S E SHEL	ANDY CLAY L FRAGS.	-90		E						
	-10.6	<u> </u>	woн	WOH	1				w		(WACCAMAV	V FORM	MATION)		-90.6 -	<u>    83.7                                </u>	48	52/0.1				
		Ŧ													-	E						
-15	-15.6	8.7	1	1	1						Ŧ			-95	-95.6 -	88.7	27	45	EE/0 0			
		ŧ	'	'	'	$\left \begin{array}{c c c c c c c c c c c c c c c c c c c$			w							<u> </u>	57	45	55/0.2			
-20		+ 40 7													-	Ł						
	-20.6	- <u>13.7</u> -	1	1	2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $			w						-	ł						
		ŧ													-	ŧ						
-25	-25.6	18.7	2	2	2											ŧ						
		ŧ	-	_	-	$   \mathbf{P}^4 \cdot \cdot \cdot \cdot   \cdot \cdot \cdot \cdot \cdot   \cdot \cdot \cdot \cdot  $	· · · · · ·		<sup>v</sup>						-	ł						
-30	-30.6-	+ 23.7													-	÷						
	00.0	+ <sup>20.7</sup>	1	2	2	$\left  \left  \stackrel{!}{\bullet} \right  \cdot \cdot \cdot \cdot \left  \cdot \cdot \cdot \cdot \cdot \right  \cdot \cdot \cdot \cdot \right  \cdot \cdot \cdot \cdot \right  \cdot \cdot \cdot \cdot$	 		w						-	ł						
25		ŧ				$\left \begin{array}{c c c c c c c c c c c c c c c c c c c$	· · · · · ·				•				-	ł						
-35	-35.6 -	<u>+</u> 28.7	4	5	10				l w		36.3		29.4		-	÷						
		ŧ				$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$	· · · · · ·				DK. GRAY, CLAYE W/ G	y med. Ravel	SAND (A-2-6)		-	ł						
-40	-40.6 -	+ 33.7								///					-	ŧ						
		ŧ	10	10	7		· · · · · ·	SS-7	19%		<del>.</del>				-	ŧ						
-45	-43.8	36.9	18	10	21				l w		-43.8 DK. GRAY, SILT	Y F. SA	36.9 ND (A-2-4)		-	+						
	-45.6	<u>+ 38.7</u> 	6	10	12				w				. ,			F						
		Ŧ											42.0		-	F						
-50	-50.6	43.7	10	10	11						DK. GRAY, SLI.	SANDY	ŚILT (A-4)		-	E						
		Ī		12		↓			w						-	E						
-55		1													-	Ł						
15	-55.6	48.7	5	11	16				w						-	ł						
2/15/		ŧ											52.0		-	ŧ						
60 5	-60.6 -	53.7	13	14	18	<del> </del>					DK. GRAY, SA	NDY C	LAY (A-6)			ŧ						
01.6		ŧ				$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$	 								-	ł						
ပ္ <u>-65</u>	-65.6	- 58 7				/									-	÷						
L L L L L	-00.0	- <u>30.7</u>	6	7	11		· · · · ·		w						-	ł						
U.L.		ŧ					· · · · · ·								-	ł						
0 <u>-70</u>	-70.6	63.7	3	4	5				l w			1 Г. ЗА	(ND (A-2-4)		-	÷						
21_GI		ŧ					· · · · · ·								-	ł						
-75	-75.6	+ 68.7									₽ ₽				-	ŧ						
JBLE		+	6	5	6	] . <b>.</b>	·   · · · · ·		W		₽ ₽					ŧ						
		ŧ					·   · · · · ·			000			CSE SAND 72.0		-	ŧ						
BORE	-80.6	<u>† 73.7</u>	21	34	32	$   \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 \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 \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   \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$			w		(A-1-b) W/ CEMEN	ITED S	AND LAYERS		-	ŧ						
DOT		ŧ					~			000			77 0		-	ŧ						
Öz -85		t				<u>  ···· ···· /···</u>	-			<u></u>	* <u> </u>				-	t						



WB	<b>S</b> 4158	2.1.1			T	<b>P</b> R-5021	COUNT	Y BRUNSV	VICK			GEOL	DGIST HUNSBERGE	R, \	W. S.	WBS	41582	.1.1			TI	P R-5021	1	COUNTY
SIT	E DESCI	RIPTION	BRII	DGE O	N NC	211 OVER C	P&L CANAL								GROUND WTR (ft)	SITE	DESCR	IPTION	BRID	DGE O	N NC 2	211 OVER	CP&L CAN	IAL
BO	ring no	. B4-B			S	TATION 390	)+97	OFFSET	17 ft RT			ALIGN	MENT -L-		0 HR. N/A	BOR	ing no.	B4-B			S	FATION (	390+97	
CO	LLAR EL	<b>EV.</b> 0.	3 ft		TOTAL DEPTH         85.4 ft         NORTHING           D3064_CME_45C_83%_08/07/2014					9		EASTI	<b>NG</b> 2,293,469		24 HR. FIAD	COL	LAR ELI	<b>EV.</b> 0.3	3 ft		т	OTAL DEF	<b>PTH</b> 85.4 f	t
DRI	.L RIG/HA	MMER EF	F./DAT	E MID	3964 C	ME-45C 83% 08	3/07/2014		DRILL N	NETHOD	D Mu	ud Rotary	HAM	MME	ER TYPE Automatic	DRILI	. RIG/HAN	IMER EF	F./DATI	e mid	3964 CN	ME-45C 83%	6 08/07/2014	
DRI	LLER (	Contract	Driller		S	TART DATE	07/28/15	COMP. DA	<b>TE</b> 07/2	29/15		SURFA	CE WATER DEPTH	3.6	Sft	DRIL	LER C	ontract	Driller		ST	FART DAT	E 07/28/1	5
ELE		DEPTH	BLC	ow co	UNT		BLOWS PER FOC	т	SAMP.		L		SOIL AND ROCK D	ESC	CRIPTION	ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT	1	BLOWS	PER FOOT
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0 25	5 50	75 100	NO.	Иог	G	ELEV. (ft)			DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50
																						[]		
5		Ŧ										_				-75				<u> </u>		⊦ <b>├</b> ── <u>~</u> ;	Mate	<u>h Line</u>
		ŧ										-						ŧ						
0		ŧ										- - 0.3			0.0	-80	-78.6	78.9	6	7	53	::::		
		Ŧ									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		UNDIVIDED COAS DK. GRAY, CLAYEY F.	SAN	<b>L PLAIN</b> ND (A-2-6) W/			ŧ						
	-3.6	+ - <u>3.9</u>										-	TRACE SHELL	FR/	AGS.		-83.6	83.9						
-5	_	Ŧ	2	3	4	<b>4</b> 7 <b></b>			-	Sat.		-				-85		<b>-</b>	46	34	62	· · · ·		
		Ŧ									/./	- <u>7.</u> 7			8.0			ŧ				1		
-10	-8.6	<u>† 8.9</u> †	3	9	13					м		-	LT. AND DK. GRAY, SL (A-2-4) W/ TRACE S	I. SI HEL	ILTY F. SAND LL FRAGS.			ŧ				1		
		Ŧ				· · · · ·									12.0		-	F				1		
	-13.6	+ + <u>13.9</u>										-	COASTAL F DK. GRAY, F. SANDY	'CL/	IN AY (A-6) W/			ŧ				1		
-15	_	Ŧ	IMOH	Пмон	1	•1				W		-	TRACE SHELL (WACCAMAW FC	FR/	AGŠ. (ATION)		-	ŧ				1		
		Ŧ										<u>16.7</u>	DK. GRAY, SILTY CLAY	(A-	-7) W/ TRACE 17.0			Ŧ				1		
-20	-18.6	<u>† 18.9</u> †	1	1	1					w		-	SHELL FRA	AGS	δ.			Ŧ				1		
		Ŧ										-					-	F				1		
	-23.6	23.9										-						Ŧ				1		
-25	_	Ŧ		1	2	• <sup>3</sup>				W		-					-	F				1		
		Ŧ																Ŧ				1		
-30	-28.6	<u>7 28.9</u> 7	1	2	2	4				w		-						F				1		
		Ŧ				$\left  \begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \end{array} \right $						-						F				1		
	-33.6	- 33.9										-						F				1		
-35	_	Ŧ	1		2	<b>•</b> 4				w		_					-	F				1		
		<u> </u>										<u>36.7</u>	GRAY, CLAYEY MED.	тō	CSE. SAND 37.0			E				1		
-40	-38.6	<u>T 38.9</u> T	7	10	11	21				w	///		(A-2-6)	)				E				1		
		Ŧ									///	41.7			42.0			Ł				1		
	-43.6	43.9	10	15	10		<u>\.</u>				0000		TO CSE. SAND	.i. C D (A	LAYEY MED. A-1-b)			Ł				1		
-45	_	ŧ		15	15		34				0000				17.0		-	ŧ				1		
5/15	40.0	+									مَمَم	<u>-40.7</u>	DK. GRAY, CLAYE	YS	SILT (A-4)			ł				1		
-50	-48.0	48.9	4	7	14	<b>/</b> _21	· · · · · · · · · · ·		SS-8	42%		_	CEMENTED SAND L	AYE	ER AT 53.9			Ł				1		
.GDT		ŧ					· · · · · · · · · · ·	· · · · · ·				-						ŧ				1		
	-53.6	53.9	15	10	12							-						ŧ				1		
U -55	_	ŧ				22	2			l vv		- 56 7			57.0		-	ŧ				1		
ſ.GP,	59.6	+ 50 0					\   \					<u></u>	DK. GRAY, SANDY C		Y (A-6) W/			ŧ				1		
UD -60	-56.0	- 50.9	11	15	19		34			w		-	CEMENTED SAN	עט	ATERS		-	ŧ				1		
GEO		±						· · · · · ·				61.7		<u></u>	<u> </u>			ŧ				1		
021	-63.6	63.9	16	14	21							-	CEMENTED SAN	D L	AYERS			ł				1		
<del>2 -65</del> щ		‡			-'		<b>₽</b> 35 ✔		11			66 7			67.0		-	ŧ				1		
DUBL	-68 6	+ 68.0		1			/	·   · · · · ·		1			DK. GRAY, SANDY	7 CL	<u>AY (A-6)</u>		-	ŧ				1		
ŭ ₩ -70	-00.0	+ 00.9	8	10	13	2	3	.   -		w		- 					·	ŧ				1		
T BO		‡				• • • /•	· · · ·   · · · ·	·   · · · · ·		1		<u>71.7</u>		SITT	TY F SAND 72.0		·	ŧ				1		
CDO.	-73.6	+ 73.9	4	4	5		· · · ·   · · · ·	·   · · · · ·		1		-	(A-2-4) W/ LIMESTON	EF	RAGMENTS		-	ŧ				1		
z -/3		L	I	1	I	LI9			- I	1 **		L						L			L	<u> </u>		

JNT	BRUN	ISW	IC	Ж				GEOLOGIS	т	HUNSBER	RGER, V	W. S.	
												GROUN	D WTR (ft)
	OFFSE	<b>T</b> 1	17	ft RT				ALIGNMEN	п	-L-		0 HR.	N/A
	NORTH	IING		72,969	)			EASTING	2,2	293,469		24 HR.	FIAD
			p	RILL M	ethod	) Mi	ud	Rotarv	,		HAMME	R TYPE	Automatic
	COMP	DA	TE	07/2	29/15			SURFACE	WA		<b>FH</b> 36	ft	
00T			1	SAMP.		L					0.0		
	75	100		NO.	мо	O G			SO	IL AND ROC	K DESC	RIPTION	I
			T			Ŭ							
_													
<u> </u>	T		t			_	╞╴	<u>-</u>	Г. А	ND DK. GR	AY, SILT	YF. SAN	1 <u>0</u>
		:					F	(A-	2-4	) W/ LIMES (con	IONE FI <i>tinued</i> )	RAGMEN	IS
60	· · ·	•			W		E						
		:					F						
		•					╞						
		96	3		W		F	-85.1 Bori	na '	Terminated	at Flavat	ion -85 1	85.4
							F	DOI	CP	: SILTY SAN		CAMAW	
							F			FURM	(ATION)		
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WE	<b>S</b> 4	1582	.1.1			Т	IP R-5021	l	COU	NTY	BRUNSV	/ICK			0	GEOLOGIST FUTRAL,	С			WBS	<b>3</b> 415	82.1.1			TIF	• R-5021		COUNTY
SIT	E DE	SCRI	IPTION	BRID	DGE O	N NC	211 OVER	CP&L C/	ANAL									GROUN	D WTR (ft)	SITE	DESC	RIPTION	BRI	DGE OI	N NC 2	11 OVER	CP&L CA	NAL
во	ring	NO.	EB2-/	۹.		S	TATION 3	392+00		0	OFFSET	40 ft LT			/	ALIGNMENT -L-		0 HR.	18.8	BOR	NG NG	<b>0.</b> EB2-	A		ST	ATION 3	92+00	
со	LLAF	R ELE	<b>EV.</b> 27	'.4 ft		Т	OTAL DEP	<b>TH</b> 78.6	6 ft	N	NORTHING	<b>7</b> 2,94	1		E	EASTING 2,293,584		24 HR.	FIAD	COL	LAR E	<b>LEV.</b> 2	7.4 ft		тс	TAL DEP	<b>TH</b> 78.6	ft
DRI	LL RIG	G/HAM	IMER EF	F./DATI	E CAT	1303 C	ME-550 77.2	2% 01/09/20	)14			DRILL	IETHO	D M	lud R	otary	HAMM	ER TYPE	Automatic	DRIL	L RIG/H/	AMMER EI	FF./DAT	E CAT	1303 CN	ИЕ-550 77.2	% 01/09/20	14
DR	ILLEF	<b>R</b> Co	ontract	Driller		S	TART DAT	<b>E</b> 10/14	/14	0	COMP. DA	<b>TE</b> 10/	16/14		5	SURFACE WATER DEP	TH N//	4		DRIL	LER	Contract	Driller		ST	ART DAT	<b>E</b> 10/14/	/14
ELE	V DF EL	rive Lev	DEPTH	BLC	w co	UNT	4	BLOW	S PER FO	ОТ		SAMP.	▼∕			SOIL AND ROO	CK DESC	CRIPTION		ELEV	DRIV		BLC	ow cou	JNT		BLOWS	6 PER FOOT
(π)	(	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	7	5 100	NO.	Имо	I G	EL	LEV. (ft)			DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50
30			-												╞					-50	-50.8	3 78.2		+	+		Ma	tch Line
	2	7.4	- 0.0				ļ .								F 37	GROUNI	D SURF	ACE	0.0			+	100/.4					
25	2	4 0	25	2	9	9	::: <b>\</b>	18					D	0000		Dark brown, Org.	COASTA rich surfi	L PLAIN	al.			Ŧ						
			- 2.0	10	11	11	1	22					м	0000	F	Tan to med.	brown, f	. SAND				Ŧ						
	2	2.2	5.2	10	12	19		31					М	0000	F							Ŧ						
20	1	9.2	8.2											0000	F							Ŧ						
		-	F	13	16	17		. 33.		•••			W	0000	Ē							Ŧ						
15		-	E												Ē							Ŧ						
	1	4.2	<u>13.2</u>	4	5	7	· · / .			•••			Sat.									Ŧ						
		-							· · · ·	· ·					11	<u></u>			<u> </u>			Ŧ						
10		9.2	18.2				<del>  . <i>i</i></del>	<u> </u>							-	Med. gray	, Silty S	AND				+						
		-			4	4	. <b>∳</b> 8		· · · ·	•••	· · · ·		Sat.		ł	Waccama		allon				ŧ						
5															Ł							±						
		4.2	23.2	1	2	1	$\begin{vmatrix} 1 & 1 & 2 \\ 4 & 3 \\ 4 & 3 \\ 5 & 5 \\ 5 $		· · · ·	· ·	· · · · ·		Sat.									ţ						
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0	(	0.8	28.2	5	6		<u>-1</u>   .1								-							+						
		-	-						 		· · · · ·		Sat.									ţ						
-5	╡,		-				• • • •		· · · ·						<u>}</u>							‡						
	;	<u></u>	- 33.2	4	5	8	  ●13.		· · · · · · ·	 	· · · ·		Sat.		]							‡						
-10		-	-				· · · ``				· · · · ·			0000	-9	.1			<u></u>			ŧ						
	′1	10.8	38.2	21	22	26							Sat	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<u>}</u>	Lt. gray	y, t. SAN	D				+						
		-	-						48		· · · · ·				- -1:	<u>3.6</u>						ŧ						
-15	i -1	15.8	43.2					1							-	Med. gr	ray, CLA	Υ.				Ŧ						
			-	WOH	WOH	1	•1. · · · ·		· · · ·	•••			Sat.		F							Ŧ						
-20		-	-												F							Ŧ						
2	2	20.8	48.2	wон	2	2							Sat.		F							Ŧ						
2/15/1		-	-												F							Ŧ						
₩ <u>-25</u>	i 2	25.8	53.2												F							Ŧ						
DT.GI			E	1	1	2	•3						Sat.		E							Ŧ						
ප්30	)		E												E							Ŧ						
L L L	3	30.8	58.2	1	2	2	<mark> </mark>		-   -	•••	· · · ·		Sat.		Ł							Ŧ						
NT.G		-							· · · ·	· ·					Ł							Ŧ						
<u>ວ່-35</u> ວ່	i 3	35.8	63.2		2	2									-							+						
1_GE		-	L		<sup>∠</sup>	3	•5		:   : :	: :	· · · · ·		Sat.		<b>L</b> ,	8.6			66.0			ŧ						
2058 -40			-					]	·   · ·					0000	<u>*</u>	Lt. gray	y, f. SAN		<u>00.0</u>			±						
BLE	-4	+U.8	68.2	20	21	45	1		: 1:	• • •	· · · ·		Sat.									ŧ						
DOU .		-	ŀ				: : : :		-   ;	<u>;</u> :	· · · · ·				ļ							<u>‡</u>						
u -45	-4	15.8	73.2	21	35	24		<u> </u>	:   : /					0000	ļ							+						
OT B		-	t l	<sup>∠1</sup>	33	24			•5	9	· · · · ·		Sat.	0000								‡						
DZ -50		-	-						-	· · ]				0000								<u>_t</u>						

BRUNSWI	СК			GEOLOGIST FUTRAL,	С		
						GROUN	ID WTR (ft)
OFFSET 40	) ft LT			ALIGNMENT -L-		0 HR.	18.8
NORTHING	72,941	1		EASTING 2,293,584		24 HR.	FIAD
	DRILL M	ETHOD	Muc	Rotary	HAMME	R TYPE	Automatic
COMP. DAT	<b>E</b> 10/1	6/14		SURFACE WATER DEPT	H N/A	4	
75 100	SAMP. NO.	моі	L O G	SOIL AND ROC	K DESC	RIPTION	l
100/0 4		_Sat.	0000	-51.2			<u> </u>
		_Sat		-51.2 Boring Terminated NOTE: SUBSURFAC ADAPTED FROM OTHERS RECEIVED AUGUS	at Eleva CE DAT. BORING FROM ST 2015	ation -51. A FOR El 3 LOGS I NCDOT	78.6 2 ft B2-A 3Y GEU,
			-				

WB	<b>S</b> 415	82.1.1			ТІ	TIP R-5021 COUNTY BRUNSWICK GEOLOGIST				GEOLOGIST HUNSBERGER	R, W. S.	<b>WBS</b> 41582.1.1 <b>TIP</b> R-5021				COUNT	٢Y									
SIT	E DESC	RIPTION	BRI	DGE O	N NC	211 OVER 0	R CP&L CANAL				GROUND WTR (ft)			SITE DESCRIPTION BRIDGE ON I				N NC 2	VC 211 OVER CP&L CANAL							
BO	RING N	<b>0.</b> EB2-	В		S	TATION 39	1+88	OFFSET 17 ft RT					ALIGNMENT -L-	0 HR.	5.2 *	BORING NO. EB2-B					ST	ATION 3	91+88			
CO	LLAR E	LEV. 29	9.3 ft	TOTAL DEPTH 94.1 ft NC		Northing 72,906			EASTING 2,293,536	24 HR. FIAD		COLLAR ELEV. 29.3 ft				тс	TOTAL DEPTH 94.1 ft			T						
DRI	L RIG/H	AMMER EI	F./DAT	E MID	3964 CI	ME-45C 83% 0	8/07/2014			DRILL	<b>NETHC</b>	DD M	lud l	Rotary HAMI	MER TYPE	Automatic	DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/07/2014				-					
DRI	LLER	Contract	Driller		S	ART DATE	07/29/15		COMP. DA	TE 07/	30/15	;			I/A		DRILLER Contract Driller START DATE 07/29/15						5			
ELE			BLC	ow co	UNT		BLOWS PER	R FOOT		SAMP.			Γ	SOIL AND ROCK DE	SCRIPTION		ELEV	DRIVE FL FV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	π
(ft)	 (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 50		75 100	NO.	Имс	DI G	6	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	7
30		+												29.3 GROUND SUR	FACE	0.0	-50		┿╌╌╴		┣━━	+		Mato	h Line	
		<b>†</b>											-	UNDIVIDED COAST BROWN AND TAN, SI	<b>'AL PLAIN</b> LTY F. SAND	)			‡							
25	26.7	+ 2.6	9	13	19		<b>4</b> 32				D		F	(A-2-4)			-55	-53.3	<u>+ 82.6</u> T	7	7	10	↓ · · · • • 17	,		:
		Ŧ											F					-	ŧ					<b>\</b>	· · · ·	
	21.7	7.6		16	23		.						F					-58.3	<u>+</u> 87.6	15	15	28				:
20	_	Ŧ		10	25		<b>\$</b> 39				M		F				-60		Ŧ		15	20		<b>4</b>	3	
	40.7	Ť.											Ŧ						Ŧ							•
15	10.7	+ 12.0	10	15	21		●36				м		F					-03.3	+ 92.6 +	9	16	20		<b>4</b> 36		•
		Ŧ					1						E	13.3					Ŧ							
	11.7	17.6		4	6							0000		DK. BROWN, SLI. SILTY N	MED. SAND (A	A-3)			Ŧ							
10	_	Ŧ				<b>1</b> 0			+ • • • •	55-9	20%	00000						-	Ŧ							
	6.7	Ŧ												B.3	SAND (A-2-6	<u>21.0</u>			Ŧ							
5	0.7	+ 22.0	2	1	1	<b>é</b> 2					w	/./.							Ŧ							
		Ŧ				1						/./.						-	Ŧ							
	1.7	27.6	1	2	2							/./.							Ŧ							
0	_	Ŧ	·	-		<b>•</b> 4												-	Ŧ							
	33	I 326											f	COASTAL PL	AIN	<u>31.0</u>			Ŧ							
-5		1 1	1	1	3	<b>•</b> 4 • • •					w		Ł	DK. GRAY, CSE. SANDY TRACE SHELL F	CLAY (A-7) RAGS.	W/		_	Ŧ							
		Ŧ											E	-6.7 (WACCAMAW FOF		36.0			Ŧ							
	-8.3		2	2	2								*	DK. GRAY, CLAYEY F. S TRACE SHELL F	AND (A-2-6) RAGS.	VV/			ŧ							
-10	_	+				•4 [							*	44 7		11.0		-	ŧ							
	-13 3	3 426					.     .					Ś		DK. GRAY, SLI. F. SAN		Y 41.0			ŧ							
-15		+	1	WOH	1	<b>4</b> 1					w		Ł	CLAY (A-7-6) W/ TRACE	SHELL FRAU	<i>3</i> 5.		-	ŧ							
		ţ																	ŧ							
	-18.3	$\frac{3+47.6}{4}$	1	1	2		.     .			SS-10	63%								ŧ							
-20	_	+																-	ŧ							
15/15	-23.3	3 + 52.6						· · · ·					1						‡							
<sup>/21</sup> -25		‡		2	2	<b>•</b> 4 · · ·					w							-	‡							
T.GD		‡						· · · ·					1						‡							
DO	-28.3	3 <u>+ 57.6</u> +	1	1	2						w								‡							
2 -30 Z	-	‡				$  \frac{\mathbf{T}^2}{\mathbf{I}^2 \cdot \cdot \cdot \cdot}$												-	‡							
T.GP	-33.3	3 + 62.6					· · · · · · ·		· · · · ·										‡							
U -35	_	‡	1	1	2	<b>•</b> 3					W							-	‡							
GEO		‡										000	-	- <u>36.7</u>		<u> </u>			‡							
102	-38.3	3 <u>+ 67.6</u> +	14	20	18						w			CSE. SAND (A	-1-b)				‡							
<u>ё</u> -40 щ		‡							· · · ·			000						-	‡							
OUBL	-43.3	3 + 72.6					/···/·					000							‡							
⊔ 	_	‡	19	11	15		<b>9</b> 26				W	000	ţ.					-	‡							
T BO		‡				:::;/						000	<u>;</u>	-46.7 DK. GRAY. F. SANDY	Y SILT (A-4)	<u>76</u> .0			‡							
0000	-48.3	3 <u>+ 77.6</u> +	4	6	10	<u>/</u> 					w		1		( • • •)				‡							
~00				-			<u> </u>					1000000	<b>.</b>						±							

١TN	BRUNSW	ICK			GEOLOGIST	HUNSBER	GER, V	<i>N</i> . S.	
								GROUN	ID WTR (ft)
	OFFSET 1	7 ft RT			ALIGNMENT	-L-		0 HR.	5.2 *
	NORTHING	72,906	6		EASTING 2,2	293,536		24 HR.	FIAD
		DRILL M	ethod	Mud	Rotary		HAMME	R TYPE	Automatic
	COMP. DAT	<b>E</b> 07/3	30/15		SURFACE WA	TER DEPT	<b>H</b> N/A	۸	
OT		SAMP.		L	SOI	L AND ROC	K DESC	RIPTION	
	75 100	NO.	/моі	G					
		+							
						(cont			<u>/<sup>81.0</sup></u>
			w		DI			AT (A-0)	
					- <u>56.7</u>				<u> </u>
: :			п	Ŀ	DK	. GRAY, CL	AYEY S	ILI (A-4)	
	+		D	Ľ					
			D	<u></u>	-64.8	<b>F</b>			94.1
					Boring CP:	CLAYEY SIL FORM	at Elevat _T (WA ATION)	CCAMAN	tt IN /
				Ŀ	*0-HOU	IR WATER L			EAR
					INTR	CODUCED D	URING	DRILLING	<del>3</del> .
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Falcon E	ngineering	, Inc.								1210	Trinity Ro	ad, Suite 11
					LA	BORATO	RY TEST	RESULTS				
					BRIDO	GE ON NC	211 OVER	CP&L CAN	AL			
					BRUNS	SWICK CO	UNTY, NOR	TH CAROL	.INA			
						Project: 4	11582.1.1 (F	<b>-5021)</b>				
					Falcon	Engineeri	ng Project I	No.: G1501	9.00			
SAMPLE DEPTH		AASHTO	ATTERBE	ATTERBERG LIMITS			VEIGHT	% PASSING (SIEVE				
NO.	STATION	OFFSET	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40
SS-1	388+32	18 ft RT	2.7-4.2	A-3	17	NP	25	68	4	3	100	96
SS-2	388+32	18 ft RT	27.7-29.2	A-2-4	26	NP	1	88	0	11	100	100
SS-3	388+32	18 ft RT	42.7-44.2	A-7-6	47	22	1	22	45	32	100	100
SS-4	389+40	19 ft RT	21.4-23.9	A-7-6	68	28	0	4	46	50	100	100
SS-5	389+40	19 ft RT	41.4-43.9	A-2-6	30	15	37	30	9	24	100	78
SS-6	389+87	17 ft RT	74.8-76.3	A-1-a	17	NP	64	15	15	6	41	19
SS-7	390+57	17 ft RT	33.7-35.2	A-2-6	38	16	70	6	9	15	92	35
SS-8	390+97	17 ft RT	48.9-50.4	A-4	39	30	2	43	30	25	100	99
SS-9	391+88	17 ft RT	17.6-19.1	A-3	18	NP	39	57	4	0	100	83
SS-10	391+88	17 ft RT	47.6-49.1	A-7-6	49	27	1	11	54	34	100	100
Signature:	KJ	Still									Ν	CDOT No.:

Signature:

Notes: LL PL PI

Liquid Limit =

Plastic Limit
 Plasticity Index = LL - PL
 \* Classification based only on field classification

### SHEET 15

0, Raleigh, NC 27607							
S)	%						
200	MOISTURE						
8	16.0						
34	27.3						
86	55.8						
98	75.0						
34	34.8						
9	15.6						
22	18.6						
74	41.8						
5	19.9						
94	63.3						

123-01-0509
# LABORATORY SUMMARY SHEET

## **AASHTO Standard Specifications**

(As modified by NCDOT, Material and Tests Unit, 2000.)

						TEST RESULTS
Proj. Sample Number	SS-16	SS-17	SS-18	SS-19	SS-20	
Lab Sample Number	SS-16	SS-17	SS-18	SS-19	SS-20	
Retained #4 Sieve %	0	0	0	0	2.6	
Passing #10 Sieve %	99.9	100	100	99.2	96.8	
Passing #40 Sieve %	92	96	100	99	75	
Passing #200 Sieve %	20	36	26	84	31	
						MINUS NUMBER 10 FRACTION
SOIL MORTAR - 100%						
Coarse Sand Ret#60 %	18.0	17.0	0.6	1.0	63.0	
Fine Sand Ret#270 %	64.8	49.5	87.5	23.3	6.9	
Silt 0.05 - 0.005mm %	9.8	11.0	5.6	42.6	12.2	
Clay <0.005mm %	7.3	22.5	6.3	33.1	17.9	
Liquid Limit (LL)	19	26	25	51	27	
Plasticity Index (PI)	NP	11	NP	28	13	
AASHTO Classification /Group Index	A-2-4(0)	A-6(0)	A-2-4(0)	A-7-6(25)	A-2-6(0)	
Organic Content %	N/A	N/A	N/A	N/A	N/A	
Station	388+50	388+50	388+50	388+50	388+50	
Offset	40ft LT					
Alignment	-L-	-L-	-L-	-L-	-L-	
Boring Identification	EB1-A	EB1-A	EB1-A	EB1-A	EB1-A	
Depth (FT)	2.5	8.0	23.0	43.0	68.0	
to	4.0	9.5	24.5	44.5	69.5	
Field Moisture Content	10	35	35	63	45	
Tested By	M. Mason					
Submitted By	S. Hudson					
Date Submitted	10/15/14	10/15/14	10/15/14	10/15/14	10/15/14	

NP = Non-Plastic

N/A = Not Applicable / Not Analyzed

Laboratory Manager

	CATLI	N Engineers	PROJI	E NO.	SHEET	
	214114 Z20 Old Dairy Wilmington, NC Corporate Licensure No. for Engineer	Road 28405 ng Services C-0585			16	
	Laborator	ry test d	ata pre	pared by Catlin	provid	ed
			0100			
					1	
. Ma	inager		Re	eport Date: <u>1</u> 2	2/11/20	15

Laboratory Report Page 1 of 1

#### **CONTENTS** SHEET NO

- 5 6-7

5021

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REFERENCE

I <u>O.</u>	<b>DESCRIPTION</b>
	TITLE SHEET
	LEGEND (SOIL & ROCK)
	SITE PLAN
	PROFILE
	CROSS SECTIONS
	BORE LOGS
	SOIL TEST RESULTS

## STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION BRIDGE ON -Y14A- (NC 133) **OVER** -L- (NC 211) AT -Y14A- STA. 39+52.37

STATE PROJECT REFERENCE NO. STATE TOTAL SHEETS NO. 8 N.C R-5021 1

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 107-6860. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE ONSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLTADE IN THE SUBSURFACE RELIVESTIGATIONS AND REAS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS NICLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF 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 OPHION OF THE DEPARTMENT AS TO THE TYPE OF MATERNALS AND COCUMPTERED. OR 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 REASON RESULTING FROM THE ACTUAL CONDENSATION.

- 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. 2.

PERSONNEL	
LINDSAY PUGH	
MICHAEL D. MASON	
T. SPENCER	
INVESTIGATED BY <u>J. L. STONE, LG</u>	
DRAWN BY S. V. HUDSON, LG	
CHECKED BY I. STONE, LG	
SUBMITTED BY V. HUDSON, LG	
DATE DECEMBER 2017	
📿 ΑΤΊ ΙΝ	T
Engineers and Scientist	
	3



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION							ROCK DESCRIPTION			
SOIL IS O BE PENETH ACCORDIN IS BA CONSISTEN	CONSIDERED RATED WITH NG TO THE ASED ON TH NCY, COLOR,	UNCONSOLIDATI H A CONTINUOUS STANDARD PENE HE AASHTO SYS TEXTURE, MOIST	D, SEMI-CON FLIGHT POV TRATION TE TEM. BASIC I URE, AASHTC	SOLIDATE VER AUGE ST (AASE DESCRIP1 ) CLASSI	ED, OR WE ER AND Y HTO T 20 FIONS GEI	ATHERED IELD LESS 6. ASTM DINERALLY II	EARTH MA 5 THAN 100 1586). SOII NCLUDE TH R PERTINE	TERIALS TH D BLOWS PE L CLASSIFINE FOLLOWING INT FACTOR	IAT CAN ER FOOT CATION NG: RS SUCH	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	ES A C .DICATE S A MI	GOOD REPRES ES THAT SOIL IXTURE OF UN	ENTATION OF PARTI PARTICLES ARE AU NIFORM PARTICLE SI RITY OF GRAI	CLE SIZES F L APPROXIM IZES OF TWO NS	FROM FINE TO COARSE. MATELY THE SAME SIZE. D OR MORE SIZES.	HARD ROCK I ROCK LINE I SPT REFUSAL BLOWS IN N REPRESENTED BOCK MATER	S NON- NDICATE IS PE JN-COA J BY A	COASTAL PLI S THE LEVE INETRATION & STAL PLAIN ZONE OF WE RE TYPICAL	AIN MATERIAL THAT EL AT WHICH NON-C BY A SPLIT SPOON MATERIAL, THE T EATHERED ROCK. Y DIVIDED AS ECT	WOULD YIELD SPT REFUSAL IF TEST JASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EOUAL TO OR LESS THAN 0. RANSITION BETWEEN SOIL AND ROCK
AS V	ERY STIFF.G	GICAL CUMPUSIT	IUN, ANGULAH NST WITH INT	ERBEDDE	D FINE S	AND LAYERS	HIGHLY PLA	R EXAMPLE, STIC.A-7-6	,	THE ANGULARITY	Y OR R		F SOIL GRAINS IS D	ESIGNATED	BY THE TERMS:	WEATHERED	HL5 HR		NON-COASTAL PL	AIN MATERIAL THAT WOULD YIELD SPI
	S	OIL LEGEN	id and	AASH	TO CL	ASSIFI	CATION	1		- ANGULAR, SUBAN	MI		TCAL COMPOS			ROCK (WR)			100 BLOWS PER	FOOT IF TESTED.
GENERAL CLASS.	(	GRANULAR MATERIA ≤ 35% PASSING ■2	LS 20)	SIL1 (>:	I-CLAY MA 35% PASSIN	(ERIALS NG #200)	OR	GANIC MATERI	IALS	MINERAL NAM	IES SU	ICH AS QUART	Z, FELDSPAR, MICA,	TALC, KAOLIN	N. ETC.	CRYSTALLINE ROCK (CR)			FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC RC T REFUSAL IF TESTED. ROCK TYPE IN
GROUP	A-1	A-3	A-2	A-4	A-5 A	-6 A-7	A-1, A-2	A-4. A-5 A-6 A-7		ARE USED IN	DESCH		RESSIBILITY	JERED OF S.	IGNIFICANCE.	NON-CRYSTAL	LINE		FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTA
SYMBOL OC	00000000000000000000000000000000000000	H-2-4 H-2				A-7-6				SLIGH	ITLY CI	OMPRESSIBLE		LL < 31		ROCK (NCR)			ROCK TYPE INCL	UDES PHYLLITE, SLATE, SANDSTONE, ET
% PASSING			<u></u>	*			· · · · · · · · · · · · · · · · · · ·	SII T-			Y COM			LL = 31 LL > 50	- 50	SEDIMENTARY	' ROCK		SPT REFUSAL. R	DCK TYPE INCLUDES LIMESTONE, SANDS
*10 5i *40 3i	0 MX 0 MX 50 MX	51 MN					GRANULAR SOILS	CLAY	MUCK, PEAT		P		AGE OF MATER			-			WEA	THERING
*200 15	5 MX 25 MX	10 MX 35 MX 35	1X 35 MX 35 M	4X 36 MN	36 MN 36	MN 36 MN		SUILS		ORGANIC MATERIAL		SOILS			ER MATERIAL	FRESH	ROCK	FRESH, CRYST	ALS BRIGHT, FEW JO	NTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING •40 LL PI	_ 6 MX	- 40 MX 41 M	1N 40 MX 41 M MX 11 MN 11 M	1N 40 MX 1N 10 MX	41 MN 40	⊤MX 41 MN MN 11 MN	SOILS	S WITH LE OR	HIGHLY	LITTLE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ER	2 - 3% 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% > 20%	LITTLE SOME HIGHLY	1 - 10% 10 - 20% 20 - 35% 35% AND ABOVE	VERY SLIGHT (V SLI.)	ROCK CRYST	GENERALLY F GENERALLY F ALS ON A BR	LLINE. RESH, JOINTS STAINE OKEN SPECIMEN FACI	D, SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX	Ø TONE FRAGS.	0 0 FINE SILTY	4 MX OR CLAYEY	8 MX	12 MX 16	MX NO MX	Mode Amoui Orc Ma`	ERATE NTS OF HANIC I TER	ORGANIC SOILS		WATE	GRC ER LEVEL IN	BORE HOLE IMMEDI	ATELY AFTE	R DRILLING	SLIGHT (SLI.)	ROCK	GENERALLY F . OPEN JOINT ALS ARE DUL	RESH, JOINTS STAINE 'S MAY CONTAIN CLA L AND DISCOLORED.	D AND DISCOLORATION EXTENDS INTO RO Y. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS	SAND	SAND GRAVE	. AND SAND	SOI	ILS	SOILS					STAT	TIC WATER LE	EVEL AFTER 24	HOURS		MODERATE	SIGNIF	ICANT PORTI	ONS OF ROCK SHOW	DISCOLORATION AND WEATHERING EFFECT
gen. Rating As subgrade		EXCELLENT TO GOO	0		FAIR TO P	OOR	Fair to Poor	POOR	UNSUITABLE	- <u>∽™</u> ⊖-∭∩ <del>-</del>	PERC SPRI	CHED WATER, ING OR SEEP	SATURATED ZONE, OF	₹ WATER BE	ARING STRATA	(MOD.)	GRANII DULL WITH	SOUND UNDER	HOST FELDSPARS ARE HAMMER BLOWS AND	DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH
				- 30 ; PI C		ENESS	>LL - 30					MISCELL	ANFOLIS SYMB			MODERATELY	ALL R	OCK EXCEPT	QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F
			FSS OR	RAN	IGE OF ST	ANDARD	RAN	GE OF UNC	ONFINED			25/	N25	<u></u>		(MOD. SEV.)		AN BE EXCAV	ATED WITH A GEOLO	SIST'S PICK. ROCK GIVES "CLUNK" SOUND
GENERAL		CONSIST	ENCY OOSE	PENET	(N-VALU		COMP	(TONS/FT	2)		SCRIPT		DIP & DIP DIP     OF ROCK STRU     SPT     DPT DMT TEST BO		SLOPE INDICATOR	SEVERE (SEV.)	OR STAINED, ROCK FABRIC CLEAR AND E . IN GRANITOID ROCKS ALL FELDSPARS A			
	iR I	MEDIUM	JENSE		4 TU 1 10 TO	.0 30		N/A			ILL (AF	OTHER (			CONE PENETROMETER		<u>IF TE</u>	STED, WOULD	YIELD SPT N VALUES	> 100 BPF
(NON-COH	HESIVE)	VERY D	E ENSE SOFT		30 TO > 50 < 2	50		< 0.25			r EMBA L BOUN	NKMENT C	CORE BORING	•	SOUNDING ROD	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABR SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONL (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO VESTICE OF ORIGINAL DOOR STATUS FOR A VESTICATION OF A				OR STAINED. ROCK FABRIC ELEMENTS AR SOIL STATUS, WITH ONLY FRAGMENTS OF OF ROCK WEATHERED TO A DEGREE THAT MAIN IF LESTED WOULD VIELD SET N. 1
GENERAL SILT-CLA MATERIAL (COHESIX	LY AY L (F)	SOF MEDIUM STIF	r STIFF F		2 TO 4 TO 8 TO 15 TO	4 8 15 30		0.25 TO 1 0.5 TO 1 1 TO 2 2 TO 4	0.5 .0		K LINE		⊓ ⊃ MONITORING W ∧ PIEZOMETER		TEST BORING WITH CORE	COMPLETE	ROCK SCATT	REDUCED TO ERED CONCEN	SOIL. ROCK FABRIC I ITRATIONS. QUARTZ M	NOT DISCERNIBLE, OR DISCERNIBLE ONLY AY BE PRESENT AS DIKES OR STRINGERS
		HAR	5		> 30			> 4			- 8000		INSTALLATION		J SFT N-VHEUE		HESO		ROCK	HARDNESS
		TE	XTURE	<u>OR GF</u>	RAIN S	SIZE					R		NDATION SYME	JOLS		VERY HARD	CANNO	T BE SCRATC	HED BY KNIFE OR SH	ARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIE OPENING (MM	VE SIZE 1)	4	4 10 .76 2.00	40 0.47	60 2 0.2	i 200 5 0.075	270 0.053					ISUITABLE WA	STE	ACCEP	TABLE, BUT NOT TO BE	HARD	SEVER	AL HARD BLO E SCRATCHED	WS OF THE GEOLOGI BY KNIFE OR PICK	ST'S PICK. ONLY WITH DIFFICULTY. HARD HAMMER B
BOULDER	R CO	BBLE GR	AVEL	COAR! SAN	SE D	F INE SAND		SILT				CEPTABLE DE	EGRADABLE ROCK	EMBAN	KMENT OR BACKFILL	MODERATELY	to de Can B	TACH HAND S	PECIMEN. BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DE
GRAIN MM	305	75	2.0	(CSE. 9	3D.) Ø.2	(F SD.	.) 0.05	0.005	i (CL.)	AR - AUGER REFUSAL		ABB MED.	REVIATIONS	VST	- VANE SHEAR TEST	HARD	EXCAV BY MO	ATED BY HAR	D BLOW OF A GEOLO /S.	GIST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN.	12	3		<u></u>			TEDMO			BT - BORING TERMINATED - CL CLAY	J	MICA. MOD.	- MICACEOUS - MODERATELY	WEA.	- WEATHERED UNIT WEIGHT	MEDIUM HARD	can B Can B	E GROOVED O E EXCAVATED	R GOUGED 0.05 INCH IN SMALL CHIPS TO	ES DEEP BY FIRM PRESSURE OF KNIFE O PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL P	MOISTURE	SCALE	FIELD M							CPT - CONE PENETRATION CSE COARSE	I TEST	NP - ORG	NON PLASTIC - ORGANIC	$\gamma_{d}$ -	DRY UNIT WEIGHT	SOF T	POINT CAN P	OF A GEOLO	GIST'S PICK. GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN
(ATTE	ERBERG LI	MITS)	- SATUR	PTION	US		UID: VERY	WET. USU	ALLY	DMT - DILATOMETER TESI DPT - DYNAMIC PENETRAI e - VOID RATIO	T TION TF	PMT · EST SAP. · SD. ·	<ul> <li>PRESSUREMETER T</li> <li>SAPROLITIC</li> <li>SAND, SANDY</li> </ul>	EST <u>S</u> -	AMPLE ABBREVIATIONS BULK - SPLIT SPOON		FROM PIECE!	CHIPS TO SE S CAN BE BR	VERAL INCHES IN SI OKEN BY FINGER PRE	ZE BY MODERATE BLOWS OF A PICK POIN SSURE.
		LIMIT _	(SAT.)	)	FR	OM BELOW	THE GRO	OUND WATE	R TABLE	F - FINE - FOSS FOSSILIFEROUS	TUDEC	SL SLI	SILT, SILTY SLIGHTLY	ST - RS	- SHELBY TUBE - ROCK	VERY SOFT	CAN BI OR MO FINGE!	E CARVED WI RE IN THICKN RNAIL.	TH KNIFE. CAN BE E NESS CAN BE BROKEN	KCAVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH
RANGE <			- WET -	(W)	SE AT	TAIN OPT!	MUM MOIS	DRYING TO STURE		FRAGS FRAGMENTS	IONES	w - N	MOISTURE CONTENT	CBR	- CALIFORNIA BEARING		RAC	TURE SP	ACING	BEDDING
" PLL _	PLASTI	C LIMIT _									IIPM		ON SUBJEC			VERY WID	E	MOR	<u>SPACING</u> E THAN 10 FEET	VERY THICKLY BEDDED
0M _		M MOISTURE	- MOIST	- (M)	SO	LID; AT OF	R NEAR OF	РТІМ∪М МО	ISTURE	DRILL UNITS:	ADVF	ANCING TOOLS	:	HAMMER	TYPE:	WIDE MODERATE	LY CLC	3 JSE	3 TO 10 FEET 1 TO 3 FEET	THICKLY BEDDED 1 THINLY BEDDED 0.1
56 -			- 084 -		RE	OUIRES AF	DITIONAL	WATER TO	נ	CME-45C		CLAY BITS		X AL	JTOMATIC MANUAL	CLOSE VERY CLO	JSE	Ø LESS	.16 TO 1 FOOT THAN 0.16 FEET	VERY THINLY BEDDED 0.0 THICKLY LAMINATED 0.00
			- 081 -	101	AT	TAIN OPTI		STURE		CME-55		6" CONTINUOL	JS FLIGHT AUGER	CORE S	IZE:				The second se	THINLY LAMINATED <
<u> </u>			PLF	<u>ASTIC</u>	ITY					- CME-550		HARD FACED	FINGER BITS	│ └── ▫ ·	∐""	FOR SEDIMEN			ATION IS THE HARD	UTHIIUN
NON SLIG	PLASTIC	STIC	PLASTI	<u>ICITY IN</u> 0-5 6-15	DEX (PI)		Di	RY STRENG VERY LOW SLIGHT	<u>тн</u> '			TUNGCARBI	DE INSERTS			FRIAB	LE		RUBBING WIT	H FINGER FREES NUMEROUS GRAINS: W BY HAMMER DISINTEGRATES SAMPLE.
MODE HIGH	ERATELY PI	LASTIC C	2	16-25 6 OR M(	DRE			MEDIUM HIGH		PORTABLE HOIST			J W/ ADVANCER 2 <sup>15</sup> /16_•STEEL TEETH		DST HOLE DIGGER AND AUGER	MODEF	ATELY	INDURATED	GRAINS CAN BREAKS EASI	BE SEPARATED FROM SAMPLE WITH ST LY WHEN HIT WITH HAMMER.
			(	COLOR	<u> </u>					X DIEDRICH D-50		TRICONE	' TUNGCARB.	🛄 sr	DUNDING ROD	INDUR	ATED		GRAINS ARE DIFFICULT T	DIFFICULT TO SEPARATE WITH STEEL D 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.						E-GRAY). E.			CORE BIT			ANE SHEAR TEST	EXTRE	MELY I	NDURATED	SHARP HAMM	ER BLOWS REQUIRED TO BREAK SAMPLE			

#### PROJECT REFERENCE NO. R-5021



	TERMS AND DEFINITIONS
D. AN INFERRED SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60 IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
N VALUES >	<u>INTULENEEUUS</u> - APPLIEU ID ALL HOLKS ON SUBSIANLES LUMPUSED UN LEAT MINEMALS, DR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALES LAITE, ETC. <u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT CLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
IF TESTED.	<u>CALLAREOUS (CALC.)</u> - SULS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBUNATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM DE SLOPE
MAY NOT YIELD TONE, 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.
	$\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
NATINGS IF OPEN	$\overline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO L FELDSPAR BLOWS	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
S. IN Y. ROCK HAS	FIGULE - H FROMERITOR SELITING HEAVE CLUSELT SPHEED FRANCEL FLAMES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM,) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT RE KAOLINIZED	LEDUE - H SHELF-LIKE RIDUE ON PROJECTION OF ROLK WHOUSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - & RONY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS
	MOTILED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF IN SMALL AND 5. SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS FOLD ID OR REFETER THAN A INFRES DIVIDED BY THE TOTAL LENGTH OF CORE
	RUN AND EXPRESSED AS A PERCENTAGE.
5 REQUIRES	ROCK. <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
LOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EP CAN BE ETACHED	<u>SLIVENSIUE</u> - POLISHED HNU SIMIHIED SUMPHLE IMHI RESULIS PNUM PNULIUM HLUNG H PHULI OR SLIP PLANE. STANDARD PENTIRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF RIOVS (N OR REF.)DE
R PICK POINT. 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 TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS T. SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH ED READILY BY	SIRAIA MULK UUALIIY DESIGNATION (SROD) - A MEASURE OF ROCK OUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO ON GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
THICKNESS 4 FEET	BENCH MARK: BORING ELEVATIONS OBTAINED WITH RTK SURVEY GRADE GLOBAL POSITIONING SYSTEM.
5 - 4 FEET	ELEVATION: FEET
3 - 0.16 FEET	
0.008 FEET 0.008 FEET	HAU = HILLEU IMMEDIATELY AFTER URILLING UCP = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PRUBE;	
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	GEOTECHNICAL BORING REPORT BORE LOG																										
WBS: 41582.1.1 TIP: R-5021 COUNTY: BRUNSWICK GEOLOGIST: L.PUGH										WBS: 41582.1.1 TIP: R-5021 COUNTY:							INTY:										
SITE	DESCR		I BRI	DGE (	-Y1	14A- (NC <sup>-</sup>	133) OVER	-L- (NC 2	211) AT -Y1	4A- STA	. 39+	52	I			GROUND	WTR (ft)	SITE	DESCR	RIPTION	BRI	DGE (	DN -Y1	14A- (NC	133) OVE	ER -L- (N	IC 21
BORI	NG NO.	.: EB1	-A		ST	TATION:	38+89		OFFSET:	34 ft LT	-		ALIGN	MENT: -Y14A-		0 HR.	5.8	BOR	ING NO	.: EB1	I-B		S	STATION: 38+55			C
COLL	AR ELE	<b>EV</b> .: 3	4.5 ft		тс	DTAL DEP	<b>TH:</b> 48.2	ft	NORTHIN	<b>G:</b> 75,1	72		EASTI	NG: 2,287,962		24 HR.	FIAD	COL	LAR EL	<b>EV.</b> : 3	4.6 ft		т	TOTAL DEPTH: 48.1 ft			1
DRILL	RIG/HAI	MMER E	FF./DA	<b>TE</b> : C	AT0071	DIEDRICH	D-50 89.0% 0	7/19/2017		DRILL I	METHO	DD:	Mud Rotary		HAMM	IER TYPE: A	UTOMATIC	DRILI	L RIG/HA	MMER E	FF./DA	TE: C	AT0071	DIEDRICH	1 D-50 89.0%	% 07/19/20	)17
DRIL	<b>_ER</b> : 1	Thomas	Spen	cer	ST		<b>E:</b> 11/16/ <sup>-</sup>	17	COMP. DA	<b>TE:</b> 11	/16/17	7	SURF	ACE WATER DEI	PTH: N	I/A		DRIL	LER:	Thomas	s Spen	cer	S	FART DA	<b>TE:</b> 11/1	4/17	C
ELEV	DRIVE ELEV	DEPTH	BLC		JNT		BLOWS I	PER FOOT						SOIL AND RC	OCK DES	CRIPTION		ELEV	DRIVE ELEV	DEPTH	BLC		JNT		BLOW	S PER FO	)OT
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5		27.5	4	2	2	4 · · ·					Sat.		5.8				28.7	5		+	3	2	2	<b>4</b>		· · · · · · ·	•••
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-	2.0	32.5	1	1	2					88.02			\$	(WACCAMA	AVV FORM	/IATION)			2.4	<u>† 32.2</u> †	1	1	2		· · · · ·	· · · ·	•••
0	-	ŧ				<b>Q</b> 3 · · ·				A-7-5(33	) Sal.							0	-	ŧ				<b>4</b> 0		· · · ·	
	-3.0	37.5											Ŧ						-2.6	37.2		2	2				
-5	-	L.	2	1	3	<b>•</b> 4 · · ·					Sat.							-5		ŧ	'	2	5	•5			
12/0	-	+				<u>\</u> :::							- <u>6.5</u>		SE. TO F		<u> </u>		-76	+				.\   . \ .	·   · · · ·	:   : :	· ·
10 10	-8.0	42.5	3	3	4	.\ ∳7				SS-04	Sat.			LITTLE S	ILT AND	CLAY		10	- 1.0	+	5	5	7		· · · · ·	· · · · · · ·	· · ·
	-	ŧ					7.7.7.			<u>A-2-4(0)</u>	1		<u></u>			STONE	<u> </u>	10	-	ŧ				<u>`</u>			
	-13.0	47.5	23	60/0.1						SS-05	Sat.	H	-13.6				48.1		-12.6 -13.4	+ 47.2 + 48.0	11	100/0.2			<u>\</u>	· · ·	· · <u></u>
NCD	-	+	60/0.1						60/0.1 60/0.1	A-3(0)	$\int$		<u>13.7</u>	BORING TERMINA PENETRATION	ATED WIT I TEST R	TH STANDAR EFUSAL AT	RD \_48.2/		-	ŧ	60/0.1						
GPJ	-	E											E	ELEVATION -13.7 f (WACCAMA)	t in Sani W Forn	DY LIMESTOI /IATION)	NE			Ŧ							
OVRL	-	L											E							Ŧ							
Y14A(	-	ł											Ł							ŧ							
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											CATLIN Engineers	PROJECT REFERENCE NO.	SHEET
								TO	אר		214114.04 214114.04 Wilmington, NC 28405 Corporate Licensure No. for Engineering Services C-0585	R-5021	8
							UKA		K Y				
					SI	І КЛ КЛ	ΔRY	'SH	FFT				
					AASI (As mo	HTO Sta dified by NC	<b>andard</b> DOT, Materia	Specifi al and Tests	Cations	6			
						Т	EST RESI	JLTS					
Proj. Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09	SS-10			
Lab Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09	SS-10			
Retained #4 Sieve %	0	0	0	0	0	0.3	0	0.2	0	0			
Passing #10 Sieve %	99.5	100	100	99.3	99.4	99.6	99.9	99.8	100	100			
Passing #40 Sieve %	54	100	99	83	68	86	79	99	99	94			
Passing #200 Sieve %	9	23	97	15	5	5	10	8	95	9			
						MINUS	NUMBER 10	FRACTION					
SOIL MORTAR - 100%													
Coarse Sand Ret#60 %	74.6	0.7	1.5	37.3	68.2	55.6	60.1	1.6	2.6	29.3			
Fine Sand Ret#270 %	17.2	89.9	1.8	48.5	27.7	39.8	31.0	92.4	2.2	62.7			
Silt 0.05 - 0.005mm %	5.2	5.4	54.9	6.1	2.1	1.7	4.1	1.0	38.3	1.0			
Clay <0.005mm %	3.0	4.0	41.8	8.2	2.0	3.0	4.8	5.0	56.9	7.0			
Liquid Limit (LL)	10	16	60	20	7	11	16	13	63	10			
Plasticity Index (PI)	NP	NP	27	NP	NP	NP	NP	NP	31	NP			
AASHTO Classification /Group Index	A-3(0)	A-2-4(0)	A-7-5(33)	A-2-4(0)	A-3(0)	A-3(0)	A-3(0)	A-3(0)	A-7-5(36)	A-3(0)			
Organic Content %	2.2	N/A	N/A	N/A	N/A	1.8	N/A	N/A	N/A	N/A			
Station	38+89	38+89	38+89	38+89	38+89	39+98	39+98	39+98	39+98	39+98			
Offset	34ft LT	34ft LT	34ft LT	34ft LT	34ft LT	32ft LT	32ft LT	32ft LT	32ft LT	32ft LT			
Alignment	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-	-Y14A-			
Boring Identification	EB1-A	EB1-A	EB1-A	EB1-A	EB1-A	EB2-A	EB2-A	EB2-A	EB2-A	EB2-A			
Depth (FT)	7.5	22.5	32.5	42.5	47.5	1.6	4.4	17.4	32.4	37.4			
to	9.0	24.0	34.0	44.0	48.1	2.5	5.9	18.9	33.9	38.9			
Field Moist. Content %													
Tested By	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON	MDMASON			
Submitted By	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH	L. PUGH			
Date Submitted	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17	11/17/17			
NP = Non-Plastic										,	/	Report Date: 12/4/20	

N/A = Not Applicable / Not Analyzed

Laboratory Manager

Laboratory Report Page 1 of 1

5-6

7-10

SHEET NO. 3 - 4

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REFERENCE

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

#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION BRIDGE ON -YREV- (SR 1500) **OVER** -L- (NC 211) AT -YREV- STA. 31+30

STATE N.C

NO.

1

TOTAL SHEETS 10



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 (919) 707-6850. 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 UN-FLACE)TEST DATA CAN BE RELIED ON ONLY TO THE DECREE 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 OF CONTRACTOR IS CALIFORED THAT DE THALE AS OF OWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN NEOTON THE MUSSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN NEOTON THE SUBSURFACE FLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOS NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS 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 SATISFY IMISELF 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 ACUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

PERSONNEL

C.J. CORNETTE S.N. ZIMARINO

R.E. SMITH

J.M. EDMONDSON

INVESTIGATED BY \_\_\_\_\_. BOTTOMS DRAWN BY \_T.C. BOTTOMS CHECKED BY \_\_\_\_\_\_. D.N. ARGENBRIGHT SUBMITTED BY \_\_\_\_\_\_. ARGENBRIGHT DATE \_\_\_\_\_SEPTEMBER 2017



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		SOIL DES	CRIPTION			GRADATION		ROCK DESCRIPTION				
SOIL IS O	CONSIDERED UNCONSOLIDA	TED, SEMI-CONSOL I	DATED, OR WEATHERED	EARTH MATERIALS THAT CAN	WELL GRADED - INDICA	TES A GOOD REPRESENTATION OF PARTIC	E SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED.				
ACCORDIN	NG TO THE STANDARD PE	VETRATION TEST (A	AASHTO T 206, ASTM [	1586). SOIL CLASSIFICATION	GAP-GRADED - INDICATE	NDICATES THAT SULL PARTICLES ARE ALL ES A MIXTURE OF UNIFORM PARTICLE SIZ	ES OF TWO OR MORE SIZE.	SPT REFUSAL I	S PENETRATION BY A SPLIT	SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FO		
IS B	ASED ON THE AASHTO SY NCY, COLOR, TEXTURE, MOI	STEM. BASIC DESCR	RIPTIONS GENERALLY I ASSIFICATION, AND OTH	NCLUDE THE FOLLOWING: FR PERTINENT FACTORS SUCH				- BLOWS IN NON- REPRESENTED F	COASTAL PLAIN MATERIAL.	OCK.		
AS	MINERALOGICAL COMPOS	TION, ANGULARITY,	STRUCTURE, PLASTICIT	Y, ETC. FOR EXAMPLE,	THE ANGULARI	Y OR ROUNDNESS OF SOIL GRAINS IS DE	SIGNATED BY THE TERMS:	- ROCK MATERIAL	S ARE TYPICALLY DIVIDED	AS FOLLOWS:		
V	ERT STIFF.GRAT.SILLY CLAY.		DUED FINE SAND LAYER.	S.HIGHLY PLASTIC.A-7-6	ANGULAR, SUBA	NGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED	NON-COA	STAL PLAIN MATERIAL THAT WOULD YIELD SPT N		
GENERAL			SILT-CLAY MATERIALS	CHITON		MINERALOGICAL COMPOSI	TION		EINE TO	COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK		
CLASS.	$(\leq 35\%$ Passing	200)	( > 35% PASSING *200)	ORGANIC MATERIALS	MINERAL NA	MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)	WOULD Y	TELD SPT REFUSAL IF TESTED. ROCK TYPE INCLU		
GROUP	A-1 A-3	A-2 A	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5	ARE USED I	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.			COARSE GRAIN METAMORPHIC AND NON-COASTAL F		
ULASS. A	A-1-a A-1-b A-2-4 A	2-5 A-2-6 A-2-7	A-7-6	A-3 A-6, A-7	SU IG		11 < 31	- ROCK (NCR)		TARY ROCK THAT WOULD YEILD SPT REFUSAL IF PE INCLUDES PHYLLITE.SLATE.SANDSTONE.ETC.		
SYMBOL	00000000				MODE	RATELY COMPRESSIBLE	LL = 31 - 50	COASTAL PLAIN	COASTAL	PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MA		
% PASSING				SILT-	HIGH	LY COMPRESSIBLE	LL > 50	SEDIMENTARY R (CP)	OCK	USAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTON EDS.ETC.		
10 5 40 3	0 MX 0 MX 50 MX 51 MN			GRANULAR CLAY MUC SOILS PEA	τ	PERCENTAGE OF MATER	IAL			WEATHERING		
<b>*200</b> 1	5 MX 25 MX 10 MX 35 MX 35	MX 35 MX 35 MX 36	5 MN 36 MN 36 MN 36 MN	SULS	ORGANIC MATERIAL	<u>SOILS</u>	OTHER MATERIAL	FRESH R	OCK FRESH, CRYSTALS BRIGHT,	FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RIN		
MATERIAL					TRACE OF ORGANIC N	1ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10%	н	AMMER IF CRYSTALLINE.			
LL	40 MX 4	MN 40 MX 41 MN 40	1 MX 41 MN 40 MX 41 MN	SOILS WITH	MODERATELY ORGANIC	5 - 10% 12 - 20%	SOME 20 - 35%	VERY SLIGHT R	JCK GENERALLY FRESH, JOINTS RYSTALS ON A BROKEN SPECT	S STAINED, SOME JOINTS MAY SHOW THIN CLAY COAT MEN FACE SHINE BRIGHTLY, ROCK RINGS LINDER HAMM		
PI	6 MX NP 10 MX 10	MX 11 MN 11 MN 10	MX 10 MX 11 MN 11 MN	MODERATE	Y HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE	- 0	F A CRYSTALLINE NATURE.			
GROUP INDEX	0 0 0	4 MX 8	MX 12 MX 16 MX NO MX	AMOUNTS OF SOI	S	GROUND WATER		SLIGHT R	OCK GENERALLY FRESH, JOINTS	S STAINED AND DISCOLORATION EXTENDS INTO ROCK		
USUAL TYPES S	TONE FRAGS. FINE SILT	Y OR CLAYEY	SILTY CLAYEY	MATTER	$\nabla$	WATER LEVEL IN BORE HOLE IMMEDIA	ELY AFTER DRILLING	(SLI.) I C	RYSTALS ARE DULL AND DISC	AIN CLAY. IN GRANITUID RUCKS SUME OCCASIONAL F DLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BL		
MATERIALS	SAND SAND GRAY	el and sand	SOILS SOILS		▼	STATIC WATER LEVEL AFTER 24 H	OURS	MODERATE S	IGNIFICANT PORTIONS OF ROCI	SHOW DISCOLORATION AND WEATHERING EFFECTS. I		
GEN. RATING				FAIR TO POOD UNCULT		PERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA	(MOD.) G	RANITOID ROCKS, MOST FELDSP	PARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. F		
AS SUBGRADE	EXCELLENT TO G	100	FHIR TO FOOR	POOR POUR ONSOL		SPRING OR SEEP		W	WITH FRESH ROCK.			
	PI OF A-7-5 SUB	ROUP IS ≤ LL - 30 :	PI OF A-7-6 SUBGROUP IS	> LL - 30	0.00			MODERATELY A	LL ROCK EXCEPT QUARTZ DIS	COLORED OR STAINED. IN GRANITOID ROCKS, ALL FELD		
	CO	ISISTENCY C	<u>DR DENSENESS</u>			MISCELLANEOUS SYMBO	LS		ND DISCOLORED AND A MAJOR	ITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS		
PRIMARY S	OIL TYPE COMPACT	NESS OR PE	RANGE OF STANDARD	RANGE OF UNCONFINE COMPRESSIVE STRENG		ANKMENT (RE) 25/025 DIP & DIP DIRE	CTION	1100.3EV./ H	F TESTED, WOULD YIELD SPT I	REFUSAL		
	LUNSI	TENLY	(N-VALUE)	(TONS/FT <sup>2</sup> )	WITH SOIL D	ESCRIPTION P OF ROCK STRUC	TURES	SEVERE A	LL ROCK EXCEPT QUARTZ DIS	COLORED OR STAINED. ROCK FABRIC CLEAR AND EVID		
GENERAL	LY VERY	LOOSE	< 4		SOIL SYMBOL			(SEV.) R	EDUCED IN STRENGTH TO STRU O SOME EXTENT. SOME FRAGM	DNG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE ENTS OF STRONG ROCK USUALLY REMAIN.		
GRANULA	R MEDIUM	DENSE	10 TO 30	N/A				<u>lí</u>	TESTED, WOULD YIELD SPT I	VALUES > 100 BPF		
(NON-COF	HESIVE) DEI	ISE	30 TO 50		THAN ROADWA		TEST	VERY A	LL ROCK EXCEPT QUARTZ DISC	COLORED OR STAINED. ROCK FABRIC ELEMENTS ARE D		
	VERI		/ 3	( 0.25				(V SEV.) P	EMAINING. SAPROLITE IS AN E	XAMPLE OF ROCK WEATHERED TO A DEGREE THAT ON		
GENERAL		FT	2 TO 4	0.25 TO 0.5		MW C		v	ESTIGES OF ORIGINAL ROCK F	ABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALU</u>		
SILT-CLA MATERIA	AY MEDIUM	STIFF	4 TO 8 8 TO 15	0.5 TO 1.0	INFERRED RO	CK LINE () MONITORING WE		COMPLETE R	OCK REDUCED TO SOIL. ROCK	FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN		
(COHESIV	E) VERY	STIFF	15 TO 30	2 TO 4	TTTTT ALLUVIAL SO		SPT N-VALUE	A	LSO AN EXAMPLE.	UNITZ PHT DE TRESERT AS DIRES OR STRINGERS, SI		
				> 4					F	ROCK HARDNESS		
		EXTURE UN	ORHIN SIZE					VERY HARD C	ANNOT BE SCRATCHED BY KNIF	FE OR SHARP PICK. BREAKING OF HAND SPECIMENS R		
U.S. STD. SIE	VE SIZE	4 10 4.76 2.00	40 60 200 0.42 0.25 0.07	270 5 0.053		UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	S	EVERAL HARD BLOWS OF THE	GEOLOGIST'S PICK.		
			OARSE FINE		SHALLOW	UNCLASSIFIED EXCAVATION -	USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD LI	O DETACH HAND SPECIMEN.	DR PICK UNLY WITH DIFFICULIT. HARD HAMMER BLOW		
BOULDER (BLDR.)	COBBLE G	RAVEL (GR.)	SAND SAN	) SILT CLAY (SL.) (CL.)				MODERATELY C	AN BE SCRATCHED BY KNIFE	DR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP		
		(CS	SE. SD.) (F SE			ABBREVIATIONS		HARD E	XCAVATED BY HARD BLOW OF	A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETA		
GRAIN MM SIZE IN.	305 /5 12 3	2.0	0.25	0.05 0.005	BT - BORING TERMINATE	D MICA MICACEOUS	WEA WEATHERED	MEDIUM C	AN BE GROOVED OR GOUGED @	.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR P		
				TEDMC	CL CLAY	MOD MODERATELY	2 - UNIT WEIGHT	HARD C	AN BE EXCAVATED IN SMALL	CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLO		
SOTI				TERMO	CPT - CONE PENETRATIC	IN TEST NP - NON PLASTIC ORG ORGANIC	7d- DRY UNIT WEIGHT	P	JINT OF A GEOLOGIST'S PICK.			
(ATTE	ERBERG LIMITS)	DESCRIPTIO	IN GUIDE FOR	FIELD MOISTURE DESCRIPT	DMT - DILATOMETER TES	ST PMT - PRESSUREMETER TE	ST SAMPLE ABBREVIATIONS	SUFT L	ROM CHIPS TO SEVERAL INCH	ADILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRA		
		- SATURATED	- USUALLY LI	QUID: VERY WET. USUALLY	DPT - DYNAMIC PENETRA	TION TEST SAP SAPROLITIC	S - BULK SS - SPLIT SPOON	P	IECES CAN BE BROKEN BY FIN	IGER PRESSURE.		
		(SAT.)	FROM BELO	W THE GROUND WATER TABL	E F - FINE	SL SILT, SILTY	ST - SHELBY TUBE	VERY C	AN BE CARVED WITH KNIFE. C	AN BE EXCAVATED READILY WITH POINT OF PICK. PIE		
					FOSS FOSSILIFEROUS	SLI SLIGHTLY	RS - ROCK	F	INGERNAIL.	BROKEN DI TINDEN TRESSORE, CAN DE SCHATCHED		
RANGE <		- WET - (W)	SEMISULID; ATTAIN OPT	REQUIRES DRYING TO	FRAGS FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FF	ACTURE SPACING	BEDDING		
(P1) PL L .	PLASTIC LIMIT				HI HIGHLY	V - VERY	RATIO	TERM	SPACING	<u>TERM</u> <u>THI</u>		
		- MOIST - (M	SOLID; AT O	R NEAR OPTIMUM MOISTURE	EC	UIPMENT USED ON SUBJECT	PROJECT	VERY WIDE	MORE THAN 10 3 TO 10 FEE	FEET VERY THICKLY BEDDED 4		
UM . SL .	SHRINKAGE LIMIT				DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	MODERATELY	CLOSE 1 TO 3 FEE	T THINLY BEDDED 0.16 -		
			REQUIRES A	DDITIONAL WATER TO	CME-45C			VERY CLOSE	0.16 TU 1 FU LESS THAN 0.16	FEET THICKLY LAMINATED 0.008 -		
		- UK f - (U)	ATTAIN OPT	IMUM MOISTURE	CME-55	6 CONTINUOUS FLIGHT AUGER	CORE SIZE:			THINLY LAMINATED < 0.0		
	•	PLAST	ICITY			8' HOLLOW AUGERS	🗌 -в П-н			INDURATION		
		PLASTICITY	Y INDEX (PI)	DRY STRENGTH	X CME-550	HARD FACED FINGER BITS	-N	FOR SEDIMENTA	RY ROCKS, INDURATION IS TH	HE HARDENING OF MATERIAL BY CEMENTING, HEAT,		
NON	PLASTIC	0	-5	VERY LOW		TUNGCARBIDE INSERTS		- FRIABLE	RUBB	ING WITH FINGER FREES NUMEROUS GRAINS:		
SL IG MODE	ERATELY PLASTIC	6- 16-	-15	MEDIUM	VHINE SHEAR IEST	X CASING W/ ADVANCER			CDAL	NO CAN BE SEDADATED EDOM CAMPLE WITH OTEN		
HIGHLY PLASTIC 26 OR MORE HIGH				HIGH	PORTABLE HOIST	X TRICONE 2 15/16 STEEL TEETH		MODERAT	ELY INDURATED BREA	KS EASILY WHEN HIT WITH HAMMER.		
COLOR						TRICONE			ED GRAI	NS ARE DIFFICULT TO SEPARATE WITH STEEL PRO		
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YELLOW-BROWN, RELIF-GRAY).				YELLOW-BROWN BLUE-CRAY				INDURATE	DIFF	ICULT TO BREAK WITH HAMMER.		
MOL	DIFIERS SUCH AS LIGHT	, DARK, STREAKED,	ETC. ARE USED TO D	ESCRIBE APPEARANCE.				EXTREME	LY INDURATED SHAR	P HAMMER BLOWS REQUIRED TO BREAK SAMPLE;		
								1	SAMP	LL DULHNO HUNDOO UNHINO.		





	TERMS AND DEFINITIONS
ED. AN INFERRED ) SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
1 FOOT PER 60	ADUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
T N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
OCK THAT	WHICH IT IS ENCLUNTERED, BUT WHICH DUES NUT NECESSARILY RISE TO UR ABOVE THE GROUND SURFACE.
CLODES ORHNITE,	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN	COLLIVIUM - ROCK FRAGMENTS MIXED WITH SOUL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
C.	OF SLOPE.
MAY NOT YIELD STONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
	HORIZONTAL.
COATINGS IF OPEN. AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
DCK UP TO N FELDSPAR	$\underline{FAULT}$ - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIG1NAL POSITION AND DISLODGED FROM
AY. ROCK HAS	PARENT MATERIAL.
T HS COM HILD	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH	TOINT - EPACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED
WHEN STRUCK.	LEDGE - A SUELE-LIVE BIDGE OF BROTECTION OF BOCK WUGGE THICKNESS IS SMALL COMPARED TO
EVIDENT BUT	ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
RE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
IF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VALUES < 100 BPF	RESTULAL (RES ) SOTU - SOTU FORMED IN PLACE BY THE WEATHERING OF ROCK
IN SMALL AND	
S. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
IS REQUIRES	ROCK.
	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
LOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRIDED ROCKS.
	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
DETACHED	OR SLIP PLANE.
	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
BLUWS OF THE	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
NT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
HECES I INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	RENCH MARK, RM92
THICKNESS	N=81586,9044 E=2264662,2379
4 FEET	ELEVATION: 52.85 FEET
1.5 - 4 FEEI 16 - 1.5 FEET	
03 - 0.16 FEET	NUIES:
08 - 0.03 FEET	FIAD: FILLED IMMEDIATELY AFTER DRILLING

EAT, PRESSURE, ETC.

TEEL PROBE:

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SITE	DESCR	IPTION	BRI	DGE O	N -YR	REV- (SR 1500) OVER -L- (NC 2	211) AT -YRE	V- STA. 3	31+30				GROUND WTR (ft)	SITE	DESC	RIPTION	BRID	DGE OI	N -YRE	EV- (SR 150	00) OVER	-L- (NC 21
BOR	ING NO.	EB1-	4		S	<b>TATION</b> 30+78	OFFSET 4	43 ft LT		ALIGNME	NT -YREV-		0 HR. N/A	BOR	RING NC	<b>).</b> EB1-	A		ST	ATION 30	)+78	
COL	LAR EL	<b>EV.</b> 43	8.5 ft		т	OTAL DEPTH 94.4 ft	NORTHING	82,021		EASTING	2,263,801		<b>24 HR.</b> 0.9	COL	LAR EL	<b>.EV.</b> 43	3.5 ft		тс	TAL DEPT	<b>H</b> 94.4 ft	t
DRIL	L RIG/HAN	IMER EF	F./DAT	E GFO	00057 (	CME-550X 76% 06/13/2017	•	DRILL MI	ethod N	lud Rotary		HAMME	R TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DATE	GFO	0057 CI	ME-550X 76%	% 06/13/201	7
DRI	LER S	mith, R	. E.		S	TART DATE 08/16/17	COMP. DA	TE 08/1	6/17	SURFACE	WATER DEPT	TH N/A	4	DRIL	LER	Smith, R	. E.		ST	ART DATE	08/16/1	7
ELEV		DEPTH	BLC	ow co	UNT	BLOWS PER FOO	Т	SAMP.		1				ELEV		DEPTH	BLO	w cou	JNT		BLOWS	PER FOOT
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#### SHEET 7 OF 10

BRUNSWI	CK			GEC	DLOGIST	ZIMARINO	D, S.N.		
1) AT -YREV	- STA. :	31+30						GROUN	ID WTR (ft)
OFFSET 4	3 ft LT			ALI	GNMENT	-YREV-		0 HR.	N/A
NORTHING	82,02	1		EAS	TING 2	,263,801		24 HR.	0.9
		FTHOD	Mu	d Rotan	-	,,		RTYPE	Automatic
	F 08/1	6/17	1110					<u></u>	7101011010
	SAMP.		L				111 IN/ <i>F</i>	<u> </u>	
75 100	NO.		0		S	DIL AND ROC	K DESC	RIPTION	
						COAST		N	
				-37.5	GRA FRAG	Y AND TAN S MENTS, SAT	SAND W URATE	ITH SHE	LL 81.0 Jed)
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					Boring	Dens	at Elevai	ion -50.9	πin
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WB	<b>S</b> 4158	2.1.1			ТІ	P R-5021 COUN	ry Brunsv	VICK		GEOLOGIST ZIMARINO, S.N		<b>WBS</b> 41582.1.1					TI	<b>P</b> R-502	
SITI	E DESC	RIPTION	BRI	DGE O	N -YR	EV- (SR 1500) OVER -L- (NC	211) AT -YRE	V- STA. 31+3	30		GROUND WTR (ft)	SITE	DESCR	IPTION	BRID	DGE O	N -YRE	EV- (SR 1	500) OVER -L- (NC 21
BOF	ring no	<b>).</b> EB1-	В		S	<b>TATION</b> 30+37	OFFSET	5 ft RT		ALIGNMENT -YREV-	0 HR. N/A	BOR	ing no.	EB1-E	3		ST	ATION	30+37
COL	LAR E	<b>.EV.</b> 43	3.6 ft		Т	OTAL DEPTH 94.4 ft	NORTHING	82,068		EASTING 2,263,759	<b>24 HR.</b> 0.8	COL	LAR EL	<b>EV.</b> 43	8.6 ft		тс	TAL DEF	<b>7TH</b> 94.4 ft
DRIL	.L RIG/HA	MMER EF	F./DAT	E GFC	0057 C	ME-550X 76% 06/13/2017		DRILL METH	OD M	d Rotary HAMN	MER TYPE Automatic	DRILI	RIG/HAN	/MER EF	F./DATI	E GFC	00057 CI	ME-550X 7	6% 06/13/2017
DRI	LLER	Smith, R	. E.		S	TART DATE 08/17/17	COMP. DA	TE 08/17/17	7	SURFACE WATER DEPTH N	/A	DRIL	.LER S	mith, R.	E.		ST	ART DAT	f <b>E</b> 08/17/17
ELE\	/ DRIVE		BLC	ow co	JNT	BLOWS PER FOO	DΤ	SAMP.		SOIL AND ROCK DES	SCRIPTION	ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS PER FOOT
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0 25 50	75 100	NO. MO	DI G	ELEV. (ft)	DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25 50
45		+										-35	+		-18 -	100/05	+		Match Line
	43.6	+ 0.0	1	1	3		• • • • • •	┥		- 43.6 GROUND SURF	-ACE 0.0			Ŧ					· · · · · · · · · · · · · · · ·
40		Ŧ.,								BROWN SAND, MOIST T(	D SATURATED <u>_ 3.0</u>	-40	-39.4	82.9	25	21	20		
	- 39.7	<u>+ 3.9</u> +	2	1	2	$\mathbf{\phi}_3 \cdot \cdot$				- ALLUVIAL GRAY SILTY CLA	Y, WET			Ŧ	25	21	25		
	05.7	Ŧ_,												Ŧ "Ţ "					
35	35.7	<u>+ 7.9</u>	WOH	WOH	1					BROWN SAND, SAT	URATED	-45	-44.4	- 87.9 -	8	16	21		<b>9</b> 37
		Ŧ								- <u>32.6</u>	<u>11.0</u>			Ŧ					
30	30.7	<u> </u>		1	1					- GRAY SILT, WET (WA	ACCAMAW	-50	-49.4	92.9	5	q	20		
	1	Ŧ	'								N)			<del>-</del>		, s	20		<b>Q</b> 29
	25.7	I 170									AIN			Ŧ					
25		1	1	0	1					- GRAT SILTI CLA	T, VVE1		-	ŧ					
		ł				`					<u>21.0</u>			ŧ					
20	20.7	- 22.9	2	2	3					- GRAY SAND WITH SHELL	FRAGMENTS,			ŧ					
		1					· · · · · ·			- -	D			ŧ					
	15 7	+ 27.9								-				ŧ					
15	-	+	7	15	16	31				-			-	ŧ					
		‡					· · · · · ·							ŧ					
10	10.7	<u>+ 32.9</u>	3	6	25					-			-	ŧ					
		‡					· · · · · ·			- 7.6	36.0			ŧ					
_	5.7	+ 37.9					· · · · · ·			COASTAL PL/ GRAY SANDY CLAY W	<b>ain</b> Vith Shell			‡					
5	-	+	4	4	3	φ <sup>7</sup>				FRAGMENTS,	WET		-	‡					
		‡					· · · · · ·			- <u>2.6</u>	AIN41.0			ŧ					
0	0.6	+ 42.9	3	5	3				Ŧ	- SOFT GRAY LIME	STONE		-	ŧ					
117		‡				• ¶~ • •   • • • •   • • • •    • ŀ • •   • • • •   • • •	· · · · · ·							‡					
6/11	-4.4	+ 47.9			_	· <b> </b> · ·   · · · ·   · · ·			T.					ŧ					
GDT	1	+	5	· ·	5				Т.	-			-	ŧ					
DOT		‡					· · · · · ·							ŧ					
<u>2</u> -10	-9.4	<u>+ 52.9</u> +	13	14	18	<b>1</b> 32				-			-	Ŧ					
L'GP,		Ŧ								- - <u>-12.5</u>	<u>56.0</u>			Ŧ					
P -15	-14.4	57.9		1	1					GRAY SAND WITH SHELL	AIN FRAGMENTS,			Ŧ					
YREV		Ŧ	-	'	-	••••••••••••••••••••••••••••••••••••••				- SATURATE				Ŧ					
g	10.4	Ŧ								17.5	61.0			Ŧ					
뚭 <u>-20</u>	- 19.4	<u>+ 62.9</u>	7	10	13	23			000	20.2	63.7		-	Ŧ					
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-25	-24.4	+ 67.9	4	5	5					-				Ŧ					
3LE 1		ŧ	<sup>′</sup>		Ť					- 27 5	71 0			ŧ					
DOUL	-20 /	+ 72 0									AIN STONE			ŧ					
<u>н</u> -30	- 23.4	+ 2.3	60/0.1						Ħ				-	ŧ					
OT B		ŧ							Ħ	- -				‡					
07 -35	-34.4	- 77.9								-				t					

#### SHEET 8 OF 10

BRUNSWICK		GEOLOGIST ZIMARINC	), S.N.		
1) AT -YREV- STA.	31+30			GROUN	D WTR (ft)
OFFSET 5 ft RT		ALIGNMENT -YREV-		0 HR.	N/A
NORTHING 82,068	3	EASTING 2,263,759		24 HR.	0.8
DRILL M	ETHOD Mud	Rotary	HAMME	RTYPE	Automatic
COMP. DATE 08/	17/17	SURFACE WATER DEPT	H N/A	۸	
75 100 NO.	L O MOI G	SOIL AND ROC	K DESC	RIPTION	
. 100/0.5		-37.5 HARD GRAY LIME	STONE	(continue	ed) <u>81</u> .0
· · · · · · · · · · · · · · · · · · ·		TAN SAND WI FRAGMENTS	<b>AL PLAI</b> TH LIME , SATUI	N – – – – ESTONE RATED	
+		-50.9 Poring Torminated a	at Elovat	ion 50.0	94.4 ft in
		Boring Terminated a Medium D	at Elevat lense Sa	ion -50.9 and	ft in

WBS	<b>3</b> 4158	2.1.1			Т	IP R-502	1	COU	NTY	BRUNSV	VICK				GEOLOGIST ZIMARIN	O, S.N.		<b>WBS</b> 41582.1.1					TI	P R-502	:1	COUNTY
SITE	DESCR	IPTION	BRII	DGE O	N -YR	EV- (SR 1	500) OVE	R -L- (NC	211)	AT -YRE	V- STA.	31+3	0				GROUND WTR (ft)	t) SITE DESCRIPTION BRIDG				DGE C	DN -YRI	EV- (SR 1	500) OVER	: -L- (NC 21
BOF	NO NO	EB2-	A		S	TATION	31+87		0	FFSET	44 ft LT				ALIGNMENT -YREV-		0 HR. N/A	BOR	ing no.	EB2-A	4		S	ATION	31+87	
COL	LAR EL	<b>EV</b> . 46	6.4 ft		Т	OTAL DEI	<b>PTH</b> 89.5	5 ft	N	ORTHING	<b>3</b> 81,91	0			EASTING 2,263,782		24 HR. FIAD	COL	LAR EL	<b>EV.</b> 46	6.4 ft		т	)TAL DE	<b>PTH</b> 89.5	ft
DRIL	l Rig/Hai	MMER EF	F./DAT	E GFC	00057 (	ME-550X 7	6% 06/13/2	017			DRILL	NETHO	DD M	lud F	Rotary	HAMME	ER TYPE Automatic	DRILI	L RIG/HAI	MMER EF	F./DAT	E GF	O0057 C	ME-550X	76% 06/13/20	17
DRI	LER S	mith, R	. E.		S	TART DA	<b>FE</b> 08/22	/17	C	omp. Da	<b>TE</b> 08/	31/17			SURFACE WATER DEP	TH N/A	A	DRIL	LER S	mith, R.	E.		ST	ART DA	TE 08/22/	17
ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOW	S PER FC	ОТ		SAMP	. 🔨			SOIL AND ROO	CK DESC	CRIPTION	ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FOOT
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	Имо	DI G	E	ELEV. (ft)		DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	50
50		ł												F				30	+	+		+			Mat	ch Line
		Ŧ												F.					-31.6	<u>† 78.0</u> †	22	100/0.4	4		·	
45	45.8	0.6	6	7	5	<u>  · · ·</u> ·		• • • •	• •	• • • •				- 4	6.4 GROUNL 5.8 PAV	EMENT	ACE 0.0	-35		Ŧ						
	] .	Ŧ		·										F	ROADWAY I BROWN SAND, MO	EMBANK DIST TO	KMENT SATURATED		-36.6	83.0	40	10	00/0.4			
	42.3	<u><u>    4.1    </u></u>	3	2	2				•••					F.	<b>.</b>					Ŧ	42	18	60/0.1			
40		Ŧ								· · · · ·								-40		Ŧ						
	38.4	<u>T 8.0</u> T	woн	1	1									Ē	BROWN AND TAN	N SAND, S	SATURATED		-41.6	<u>T 88.0</u> T	6	11	8		19	
35		Ŧ												E						Ŧ						
	33.4	13.0			2	1								ł						Ŧ						
		ŧ				<b>    †</b> <sup>4</sup> · · ·									0.4		16.0			ŧ						
30		+												F					-	ŧ						
	28.4	18.0 1	wон	WOH	2			· · · ·						Ł	FORM	MATION)	)			ŧ						
25		ŧ				<u>  `, : :</u>								<u></u> 2	<u>5.4</u>		<u> </u>		-	ŧ						
	23.4	23.0	3	2	7		·   · · · ·   · · ·	 	· ·	· · · ·					GRAY SAND WITH	SHELL I	FRAGMENTS,			ŧ						
20		ŧ		_		. <b>¶</b> <sup>9</sup> .	:   : : :	: :							SAT		,			ŧ						
	18.4	+ 28.0				- · · · · · · · · · · · · · · · · · ·													-	ŧ						
	10.4	+	4	7	14	1	21	· · · ·		· · · · · · · ·										ŧ						
15		ŧ						· · · ·											-	ŧ						
	13.4	<u>+</u> 33.0	7	19	40		·   · · · ·			· · · ·										ŧ						
10		ŧ					·   · · ·	,						1						ŧ						
10	8.4	+ + 38.0																	-	ŧ						
		Ŧ	6	8	6	<b> </b>				· · · · ·				Ļ						ŧ						
5		ŧ												1					-	ŧ						
/12	3.4	<u>† 43.0</u> †	4	4	3				•••	· · · ·										ŧ						
0/11		ŧ																		ŧ						
L'GD'	-1.6	48.0									1			E					-	Ŧ						
DO		Ŧ	6	6	6									E	4.6					Ŧ						
2 -5 7	- ·	£												Ē			IN 51.0		-	Ŧ						
KL.GP	-6.6	53.0	6	11	14		.\25							E	SOFT GRA	IT LIMES	ONE			£						
4 0 -10		Ŧ					/							Ē	<u>9.6</u>		<u>56.0</u>			Ŧ						
YRE	-11.6	58.0				/.									GRAY SAND	D, SATUF	IN RATED			Ŧ						
SDG		Ŧ	4	4	4															Ŧ						
<u>歯 -15</u> 0		+				-+-								ŀ						ŧ						
1_GE	-16.6	+ 03.0	3	7	7	::•			::					ł						ŧ						
-20	╡.	ŧ				`		-						<u>+</u> -	19.6		<u> </u>		.	ŧ						
BLE	-21.6	<u>+ 68.0</u>	6	26	17			·   · · ·	$\left  \begin{array}{c} \cdot \cdot \end{array} \right $	· · · · ·				F	GRAY	SILT, WE	ËT			ŧ						
DOD 27		‡			''		.   <b>)</b> .	43						F						‡						
<u>н -25</u>	26.6	+ 72 0												F						‡						
OT B	-20.0	+ '3.0	5	7	5	1	.	·   · · ·						F						‡						
-30		†				$   \cdot \cdot \rangle$	.	-						<u>L</u> -4	29.6	·	<u> </u>			<u>†</u>				L		

#### SHEET 9 OF 10



<b>WBS</b> 41582.1.1	TIP R-5021 COUN	TY BRUNSWICK	GEOLOGIST ZIMARINO, S.N	I.	WBS 41582.1.1		TIP R-5021 COUNTY
SITE DESCRIPTION BRIDGE ON	-YREV- (SR 1500) OVER -L- (NC	211) AT -YREV- STA. 31+30		GROUND WTR (ft)	SITE DESCRIPTION	BRIDGE ON -Y	'REV- (SR 1500) OVER -L- (NC 21
BORING NO. EB2-B	STATION 31+89	OFFSET 1 ft RT	ALIGNMENT -YREV-	0 HR. N/A	BORING NO. EB2-E	3	STATION 31+89
COLLAR ELEV. 46.3 ft	TOTAL DEPTH 99.5 ft	NORTHING 81,917	EASTING 2,263,741	24 HR. 1.1	COLLAR ELEV. 46	.3 ft	TOTAL DEPTH 99.5 ft
DRILL RIG/HAMMER EFF./DATE GF000	057 CME-550X 76% 06/13/2017	DRILL METHOD Mu	d Rotary HAMM	MER TYPE Automatic	DRILL RIG/HAMMER EF	F./DATE GFO0057	7 CME-550X 76% 06/13/2017
DRILLER Smith, R. E.	START DATE 08/22/17	COMP. DATE 08/22/17	SURFACE WATER DEPTH	I/A	DRILLER Smith, R.	E.	START DATE 08/22/17
ELEV DRIVE DEPTH BLOW COUN	IT BLOWS PER FOO		SOIL AND ROCK DES	SCRIPTION	ELEV DRIVE DEPTH	BLOW COUNT	BLOWS PER FOOT
(ft) (ft) (ft) 0.5ft 0.5ft 0	0.5ft 0 25 50	75 100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	(ft) (ft) (ft)	0.5ft 0.5ft 0.5	ft 0 25 50
50			_		30		Match Line
					-31.7 78.0	18 100/0.5	
45 45.6 0.7 2 4	<u></u>	· · · · · · · · · · · · · · · · · · ·	- 46.3 GROUND SURI	FACE 0.0 T0.7	-35		
	$\left[\begin{array}{c ccccccccccccccccccccccccccccccccccc$		ROADWAY EMBAN BROWN SILT, MOIS	T TO WET	-36.7 83.0		
42.2 4.1 2 1	$ \begin{array}{c c} \hline 2 \\ \hline 3 \\ \hline 3 \\ \hline \end{array} $		-			60/0.1	
				<u> </u>	-40 +		
38.3 8.0 WOH 1	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		GRAY SANDY CLA	AY, WEI 8.8	<u>-41.7 T 88.0</u> I	11 10 10	
35			BROWN AND TAN SAND	, SATURATED	-45		
33.3 13.0					-46.7 93.0	12 7 7	_   / .
	<sup>2</sup>   •6		-	10.0			• • • • • • • • • • • • • • • • • • •
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		FRAGMENTS, WET (V	VACCAMAW	-51.7 98.0	6 5 9	
25			- FORMATIO	N)			
23.3 <b>2</b> 3.0 WOH WOH							
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		- 20.3	26.0			
	·	· · · · · ·	GRAY SAND WITH SHELL	AIN LERAGMENTS			
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		SATURATE	D			
15	· · · · · · · · · · · · · · · · · · ·		-				
	$\frac{1}{20} \begin{vmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{vmatrix} \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix}$						
			- -				
8.3 38.0			-				
	7		•				
5			- 5.3 	41.0			
	3				II I I		
				<u> </u>			
			SOFT GRAY LIME	AIN STONE			
			- 47	<b>E4</b> 0			
				AIN 51.0			
	$1 \begin{vmatrix} \ell & \dots & \dots & \dots & \dots \\ \bullet_3 & \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots$		<u>-7.2</u> I AIN SAIND, SATU COASTAL PL	AIN 53.5			
				STONE <u>56.0</u>			
<u>-11.7 58.0</u> 5 11	$\frac{1}{2} \begin{vmatrix} \cdot, \cdot, \cdot \\ \cdot, \cdot \\ \cdot, \cdot \end{vmatrix} \begin{vmatrix} \cdot, \cdot, \cdot \\ \cdot, \cdot \\ \cdot, \cdot \end{vmatrix} \begin{vmatrix} \cdot, \cdot, \cdot \\ \cdot, \cdot \end{vmatrix} \begin{vmatrix} \cdot, \cdot, \cdot \\ \cdot, \cdot \end{vmatrix}$		BROWN SAND, SAT	TURATED 58.5			
	-    · · · · · · · · · · · · · · · · · ·		- COASTAL PL 14.7 SOFT GRAY LIME	AIN STONE 61.0			
				AIN =N SAND	‡		
	11   · · · · · ·   · · · ·   · · · ·		SATURATE	D			
				AIN66.0			
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			- -				
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	5		- -		‡		
<u><u>v</u>]</u>	· · · · · · · · · · · · · · · · ·	·   · · · ·	-				

BRUNSWI	CK			GEOLOGIST ZIMARI	NO, S.N.		
1) AT -YREV	- STA. 3	31+30				GROUN	ID WTR (ft)
OFFSET 1	ft RT			ALIGNMENT -YREV-		0 HR.	N/A
NORTHING	81,917	7		EASTING 2,263,741		24 HR.	1.1
	DRILL M	ETHOD	) Muc	d Rotary	НАММЕ	R TYPE	Automatic
COMP. DAT	E 08/2	2/17		SURFACE WATER DE	PTH N/A	4	
75 100	SAMP. NO.		L O	SOIL AND R	OCK DESC	RIPTION	
1		/ 10101	0				
· · · · ·			st.				
100/0.5				<u>-32.2</u>	STAL PLA	N	78.5
				HARD GR	AY LIMES	TONE	
· · · · · · · · · · · · · · · · · · ·							
				-39.7			86.0
			00000	TAN SAND	STAL PLAI	N STONE	
			0000 0000 0000	FRAGMEN	TS, SATU	RATED	
			0 0 0 0 0 0 0 0 0 0 0 0 0	-			
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			0 0 0 0 0 0 0 0 0 0 0 0	-53.2			99.5
				Boring Terminate Medium	ed at Eleva n Dense S	tion -53.2 and	ft in
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SHEET NO. 5021 Ŕ

REFERENCE

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILES WITH SOIL TEST RESULTS

#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION WALL 1 LEFT OF -L- STA. 233+00 AND WALL 2 LEFT OF -L- STA. 237+00

STATE PROJECT REFERENCE NO. STATE NO. SHEETS N.C R-5021 1 4

#### **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 SOLT TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE ONSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLTAED IN THE SUBSURFACE RELIVESTIGATIONS AND REAS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS NICLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION 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 INVESTIGATION AS HE DEEMS NECESSARY TO SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENTIONS OF CONTANT THE SIDE 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.

PERSONNEI	L
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL C	ESCRI	PTION	í ———						GF	RADATION						ROCK C	ESCRIPTION
SOIL IS O BE PENETH ACCORDIN IS B4 CONSISTEN	CONSIDERED RATED WITH NG TO THE ASED ON TH NCY, COLOR,	UNCONSOLIDATI A CONTINUOUS STANDARD PENE HE AASHTO SYS TEXTURE, MOIST	ED, SEMI-CON FLIGHT POV TRATION TE TEM. BASIC I	SOLIDATE /ER AUGE ST (AASH' DESCRIPTI CLASSIF	D, OR WEA R AND YI TO T 206 IONS GENI ICATION,	ATHERED E ELD LESS , ASTM DI ERALLY IN AND OTHE	ARTH MAT THAN 100 586), SOIL CLUDE THE R PERTINE	ERIALS TH BLOWS PE CLASSIFIC E FOLLOWIN NT FACTOR	AT CAN R FOOT CATION NG: IS SUCH	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE:	ES A C DICATE S A MI	SOOD REPRESE S THAT SOIL XTURE OF UN	NTATION OF PARTIC PARTICLES ARE AL IFORM PARTICLE SI NITY OF GRAI	LE SIZES F L APPROXIM ZES OF TWO NS	ROM FINE TO COARSE. ATELY THE SAME SIZE. OR MORE SIZES.	HARD ROCK I ROCK LINE IN SPT REFUSAL BLOWS IN NO REPRESENTED ROCK MATERI	DICATE DICATE IS PE N-COA BY A	COASTAL PLI S THE LEVE INETRATION & STAL PLAIN ZONE OF WE RE TYPICAL	AIN MATERIAL THA EL AT WHICH NON-C BY A SPLIT SPOON MATERIAL, THE I EATHERED ROCK.	F WOULD YIELD SPT REFUSAL IF TEST OASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EQUAL TO OR LESS THAN 0. RANSITION BETWEEN SOIL AND ROCK OWS:
AS V	S MINERALOU ERY STIFF.G	GICAL COMPOSIT RAY,SILTY CLAY,MO	ION, ANGULAF <i>WST WITH INT</i>	ERBEDDED	JCTURE, P FINE SA	ND LAYERS,	,ETC. FOR <i>HIGHLY PLA</i>	R EXAMPLE, STIC.A-7-6		THE ANGULARIT	Y OR R	ROUNDNESS OF	SOIL GRAINS IS D	SIGNATED E	BY THE TERMS:	WEATHERED	1L5 HR			AIN MATERIAL THAT WOULD YIELD SPI
	SI	OIL LEGEN	id and	AASHT	O CLA	<u>issifi</u>	CATION			- ANGULAR, SUBAN	MI	NERAL OG	ICAL COMPOS			ROCK (WR)			100 BLOWS PER	FOOT IF TESTED.
GENERAL CLASS.	(	GRANULAR MATERIA ≤ 35% PASSING ■2	LS 00)	SILT- ( > 35	CLAY MATE 5% PASSINC	.RIALS ; #200)	ORC	GANIC MATERI	ALS	MINERAL NAM	1ES SU	CH AS QUART	Z, FELDSPAR, MICA, T	ALC, KAOLIN	.ETC.	CRYSTALLINE			FINE TO COARS	E GRAIN IGNEOUS AND METAMORPHIC RC PT REFUSAL IF TESTED. ROCK TYPE IN
GROUP	A-1	A-3	A-2	A-4	A-5 A-(	3 A-7	A-1, A-2	A-4, A-5		ARE USED IN	DESCF	COMP	N THEY ARE CONSID	ERED OF SI	GNIFICANCE.				GNEISS, GABBRO,	SCHIST,ETC. E GRAIN METAMORPHIC AND NON-COASTA
SYMBOI OC	A-1-a A-1-b	A-2-4 A-2	5 A-2-6 A-2-		<u>_</u>	A-7-6	H-3	H-0, H-7		SLIGF		OMPRESSIBLE	RESSIBILITI	LL < 31		ROCK (NCR)			SEDIMENTARY R ROCK TYPE INCI	DCK THAT WOULD YEILD SPT REFUSAL UDES PHYLLITE, SLATE, SANDSTONE, ET(
% PASSING	000000000000000000000000000000000000000				<u>^</u>					MODEF HIGHL	RATELY	COMPRESSIB	LE	LL = 31 LL > 50	- 50	COASTAL PLA SEDIMENTARY	íN ROCK		SPT REFUSAL. F	SEDIMENTS CEMENTED INTO ROCK.BUT ROCK TYPE INCLUDES LIMESTONE,SANDS
*10 5i	Ø MX	E1 MAI					GRANULAR	SIL 1- CLAY	MUCK,		F	PERCENTA	GE OF MATEF	IAL					WEA	THERING
*200 15	5 MX 25 MX	10 MX 35 MX 35 I	MX 35 MX 35 №	1X 36 MN :	36 MN 36 I	MN 36 MN	30123	SOILS		ORGANIC MATERIAL		GRANULAR SOILS	SILT - CLAY SOILS	OTHE	R MATERIAL	FRESH	ROCK	FRESH, CRYST	ALS BRIGHT, FEW JO	INTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING 40 LL PI	_ 6 MX	- 40 MX 41 M NP 10 MX 10 M	1N 40 MX 41 M MX 11 MN 11 M	N 40 MX N 10 MX	41 MN 40 10 MX 11 M	MX 41 MN 4N 11 MN	SOILS LITTL	WITH .E OR	HIGHLY	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ITTER ER	2 - 3% 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% > 20%	TRACE LITTLE SOME HIGHLY	1 - 10% 10 - 20% 20 - 35% 35% AND ABOVE	VERY SLIGHT (V SLI.)	ROCK I CRYST	R IF CRYSTA GENERALLY F ALS ON A BR CRYSTALLINE	LLINE. RESH, JOINTS STAIN OKEN SPECIMEN FAC NATURE.	ED, SOME JOINTS MAY SHOW THIN CLAY C E SHINE BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX USUAL TYPES ST OF MAJOR C	Ø TONE FRAGS. GRAVEL, AND	Ø Ø	4 MX OR CLAYEY	8 MX SILT	12 MX 16 M	1X NO MX	Mode Amoun Org4 Mat	RATE ITS OF ANIC TER	ORGANIC SOILS		WATE	GRO	UND WATER	TELY AFTEF	R DRILLING	SLIGHT (SLI.)	ROCK ( 1 INCH CRYST	GENERALLY F . OPEN JOINT ALS ARE DUL	RESH. JOINTS STAIN S MAY CONTAIN CLA L AND DISCOLORED.	ED AND DISCOLORATION EXTENDS INTO RO Y. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS GEN. RATING AS SUBGRADE	Sand	EXCELLENT TO GOO	. ANU SANU  )D	F	AIR TO PO	OR	Fair to Poor	POOR	UNSUITABLE	STATIC WATER LEVEL AFTER <u>24</u> HOURS $\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA O 000 SOUND OD SEED						MODERATE (MOD.)	SIGNIF GRANI1 DULL WITH	ICANT PORTION TOID ROCKS, N SOUND UNDER	ONS OF ROCK SHOW MOST FELDSPARS AR HAMMER BLOWS AN	DISCOLORATION AND WEATHERING EFFECT E DULL AND DISCOLORED, SOME SHOW CLA D SHOWS SIGNIFICANT LOSS OF STRENGTH
	I	PI OF A-7-5 SUBGR	UUP IS ≤ LL	- 30 ; PI OF	A-7-6 SU	BGROUP IS :	> LL - 30				5PRI	NG UR SEEP				MODERATELY	ALL R	OCK EXCEPT	QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F
			<u>SISTENC</u>	Y UR RANG	DENSE		RANG			<u> </u>		MISCELLA	NEOUS SYMBO	ILS		SEVERE (MOD. SEV.)	and di and c	ISCOLORED AN	ND A MAJORITY SHO ATED WITH A GEOLC	W KAOLINIZATION. ROCK SHOWS SEVERE L GIST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SO	OIL TYPE	COMPACTN CONSIST VERY L	ISS OR ENCY 00SE	PENETR	ATION RES (N-VALUE < 4	SISTENCE	COMP	RESSIVE S (TONS/FT	TRENGTH		ANKMEN SCRIPT	IT (RE) 25/0	DIP & DIP DIF DIP & DIP DIF OF ROCK STRU		SLOPE INDICATOR	SEVERE (SEV.)	IF TES	STED, WOULD OCK EXCEPT ED IN STREN	<u>YIELD SPT REFUSAL</u> OUARTZ DISCOLORED GTH TO STRONG SOI	OR STAINED. ROCK FABRIC CLEAR AND E . IN GRANITOID ROCKS ALL FELDSPARS A
GRANULA	R	LOOS MEDIUM	E DENSE		4 TO 10 10 TO 3	1 iØ		N/A					VST PMT		INSTALLATION		ID SUI	ME EXTENT. : STED, WOULD	YIELD SPT N VALUE	STRUNG RUCK USUALLY REMAIN.
(NON-COH	HESIVE)	VERY D	E ENSE OF T		30 TO 5 > 50 < 2 2 TO 4	ø 		< 0.25	25		CEMBA		- CORE BORING	•	TEST SOUNDING ROD	VERY SEVERE (V SEV.)	ALL RO BUT M REMAII	OCK EXCEPT IASS IS EFFE NING. SAPROL GES OF ORIGI	QUARTZ DISCOLORED CTIVELY REDUCED T ITE IS AN EXAMPLE NAL ROCK FABRIC R	OR STAINED. ROCK FABRIC ELEMENTS AF D SOLL STATUS, WITH ONLY FRAGMENTS OL OF ROCK WEATHERED TO A DEGREE THAT HMIN. JF IFSTFD, WOULD YIELD SPT N V
SILT-CLA MATERIAL (COHESIV	4Y L (E)	MEDIUM STIF VERY S	STIFF F TIFF		4 TO 8 8 TO 15 15 TO 3	5 10		0.5 TO 1 1 TO 2 2 TO 4	.0	INFERRED ROC	K LINE L BOUN		) MONITORING WI	ш <b>Ф</b>	- TEST BORING WITH CORE - SPT N-VALUE	COMPLETE	ROCK F SCATT ALSO	REDUCED TO ERED CONCEN AN EXAMPLE.	SOIL. ROCK FABRIC ITRATIONS. QUARTZ I	NOT DISCERNIBLE, OR DISCERNIBLE ONLY MAY BE PRESENT AS DIKES OR STRINGERS
		HAR TE				IZE		> 4		<u> </u>	F		DATION SYMB						ROCK	HARDNESS
U.S. STD. SIE	VE SIZE		4 10	40	60	200	270				 7] UN	CLASSIFIED E	XCAVATION -	<u>ज्ञ</u> ्य UNCLAS	SSIFIED EXCAVATION -	VERY HARD	CANNO SEVER	T BE SCRATC	HED BY KNIFE OR S	HARP PICK. BREAKING OF HAND SPECIMEN ST'S PICK.
OPENING (MM BOULDER		4 BBLE GR	76 2.00 AVEL	Ø.42 COARS	0.25 E	0.075 FINE	0.053	SIL T	CLAY		∠ UN ∠ UN AC	SUITABLE WAS CLASSIFIED E CEPTABLE DE	STE É XCAVATION - GRADABLE ROCK	ACCEPT است USED I EMBANI	TABLE, BUT NOT TO BE N THE TOP 3 FEET OF KMENT OR BACKFILL	HARD	can Br To de	E SCRATCHED	BY KNIFE OR PICK PECIMEN.	ONLY WITH DIFFICULTY. HARD HAMMER B
(BLDR.) GRAIN MM	(C 305	75	R.) 2.0	(CSE. SI	<u>).)</u> Ø.25	(F SD.)	0.05	SL.) 0.005	(CL.)	AR - AUGER REFUSAL		ABBI MED	REVIATIONS MEDIUM	VST	- VANE SHEAR TEST	MODERATELY HARD	CAN BE EXCAVI BY MO	E SCRATCHED ATED BY HAR IDERATE BLOV	I BY KNIFE OR PICK. D BLOW OF A GEOLI /S.	GOUGES OR GROOVES TO 0.25 INCHES DE DGIST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN.	12 S	3 OIL MOIST	TURE -	CORRE	LATIO	N OF	TERMS			BT - BORING TERMINATED CL CLAY CPT - CONE PENETRATION	' N TEST	MICA. MOD NP - N	- MICACEOUS MODERATELY NON PLASTIC	WEA. グー グー	- WEATHERED UNIT WEIGHT DRY UNIT WEIGHT	MEDIUM HARD	Can Be Can Be Point	E GROOVED O E EXCAVATED OF A GEOLO	R GOUGED 0.05 INCH IN SMALL CHIPS T GIST'S PICK.	HES DEEP BY FIRM PRESSURE OF KNIFE O D PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL M (ATTE	MOISTURE : ERBERG LIM	SCALE MITS)	FIELD MO DESCRI	DISTURE PTION	GUII	DE FOR F	IELD MOIS	STURE DES	SCRIPTION	CSE COARSE DMT - DILATOMETER TES DPT - DYNAMIC PENETRAI	t Tion ti	ORG PMT - EST SAP	ORGANIC PRESSUREMETER TI SAPROLITIC	:ST <u>S4</u> S - J	AMPLE ABBREVIATIONS BULK	SOFT	CAN BE FROM PIECES	e groved or Chips to se S can be br	GOUGED READILY B VERAL INCHES IN SI OKEN BY FINGER PRI	Y KNIFE OR PICK. CAN BE EXCAVATED IN ZE BY MODERATE BLOWS OF A PICK POIN ESSURE.
		LIMIT _	- SATURA (SAT.)	IED -	FR0	M BELOW	THE GRO	WET.USUA	ALLY R TABLE	e - VOID RATIO F - FINE FOSS FOSSILIFEROUS		SD S SL S SL1	SAND, SANDY SILT, SILTY SLIGHTLY	SS - ST - RS -	SPLIT SPOON SHELBY TUBE ROCK	VERY SOFT	CAN BE OR MO FINGE	E CARVED WI WRE IN THICKM	TH KNIFE. CAN BE E NESS CAN BE BROKE	XCAVATED READILY WITH POINT OF PICK. N BY FINGER PRESSURE. CAN BE SCRATCH
RANGE <			- WET -	(W)	SEM ATT	ISOLID: R	EQUIRES D MUM MOIS	DRYING TO		FRAC FRACTURED, FRAC FRAGS FRAGMENTS	TURES	и - м	DISTURE CONTENT	RT - CBR	- CALIFORNIA BEARING	F	RAC	TURE SP	ACING	BEDDING
PLL.	PLASTI	C LIMIT _								HI HIGHLY	ITDM	V - VE			RATIO		:	MOR	SPACING F THAN 10 FFFT	
OM _ SL _	OPTIMU	M MOISTURE AGE LIMIT	- MOIST	- (M)	SOL		NEAR OP			DRILL UNITS:		NCING TOOLS: CLAY BITS	UN SUBJEC		TYPE: TOMATIC MANUAL	WIDE MODERATE CLOSE	_Y CLC	)SE Ø	3 TO 10 FEET 1 TO 3 FEET .16 TO 1 FOOT	THICKLY BEDDED 1 THINLY BEDDED 0. VERY THINLY BEDDED 0.0
			- DRY -	(D)	ATT	AIN OPTI	MUM MOIS	TURE	,	CME-55		6" CONTINUOU	S FLIGHT AUGER	CORE SI	ZE:		λĽ.	LESS	HAN 0.16 FEET	THINLY LAMINATED 0.00
			PLf	STICI	ΤY					1 - '		8 HOLLOW AU	JGERS	□-в _	🗌 -н				IND	URATION
NON SU TO	PLASTIC	STIC	PLASTJ	0-5 6-15	EX (PI)		DR	VERY LOW	<u>TH</u>	CME-550		HARD FACED	FINGER BITS DE INSERTS		 0  S:	FOR SEDIMEN	∴ary r .e	IOCKS, INDUR	ATION IS THE HARD RUBBING WI GENTLE BLO	DENING OF MATERIAL BY CEMENTING.HE TH FINGER FREES NUMEROUS GRAINS: W BY HAMMER DISINTEGRATES SAMPLE.
MODE	ERATELY PL	LASTIC C	2	16-25 6 OR MO	RE			MEDIUM HIGH		PORTABLE HOIST		CASING	w/ ADVANCER 2 7/8 STEEL TEETH		ST HOLE DIGGER	MODER	<b></b> ↓TELΥ	INDURATED	GRAINS CAN BREAKS EAS	BE SEPARATED FROM SAMPLE WITH ST ILY WHEN HIT WITH HAMMER.
			(	JULUR						DIEDRICH D-50		TRICONE	' TUNGCARB.	50 <sup>1</sup>	UNDING ROD	INDURA	TED		GRAINS ARE	DIFFICULT TO SEPARATE WITH STEEL O BREAK WITH HAMMER.
DESCRIPTI MOD	IONS MAY I DIFIERS SU	INCLUDE COLOF ICH AS LIGHT,I	OR COLOR JARK, STREA	COMBINA KED, ETC.	TIONS (T . ARE US	AN, RED, Y ED TO DE	YELLOW-BA	ROWN, BLUE PPEARANCE	ROWN, BLUE-GRAY).						EXTRE	1ELY I	NDURATED	SHARP HAMM SAMPLE BRE	ER BLOWS REQUIRED TO BREAK SAMPLE AKS ACROSS GRAINS.	

#### PROJECT REFERENCE NO. R-5021



2

TERMS AND DEFINITIONS TO AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. 1 FOOT PER 60 IS OFTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. AL PLAIN IF TESTED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. MAY NOT YIELD STONE, 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN Y. ROCK HAS AS COMPARED FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. FELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO VIDENT BUT ITS LATERAL EXTENT. ARE KAOLINIZED LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. RE DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE S. SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT POCK S REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE ETACHED 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 B PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE 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. FRAGMENTS IT. SMALL, THIN 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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: LOCATIONS OBTAINED WITH REAL TIME KINEMATICS (RTK) THICKNESS SURVEY GRADE GLOBAL POSTIONING SYSTEM (GPS) 4 FEET FEET ELEVATION: .5 - 4 FEET 6 - 1.5 EEET NOTES: - 0.16 FEE 98 - Ø.Ø3 FEET U.C.P. = UNDIVIDED COASTAL PLAIN 0.008 FEET AT. PRESSURE. ETC. TEEL PROBE: PROBE: DATE: 8-15-1-





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;						ROADWAY	7-5021 DESIGN		4 HYDRAULICS	
						ENGIN	IEER	ן '	ENGINEER	
	_					IN	COMPLE	TE I	PLANS	
<u>.</u>	% MOIST		 			DO	NOT USE FOR	ίν γ	CQUISITION	
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N FRO	M WALL EN	VELOPE	DR/	AWINGS DAT	ED 08/17/17	AND 08/15/17	7, RESPECTI	VELY		
RED S BOTH	STRATIGRA PROJECTE	PHY IS I D ONTC	RAV	VN THROUG	H THE BORIN	IGS			-	
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REFERENCE

<b>DESCRIPTION</b>	r
TITLE SHEET	
LEGEND (SOIL &	ROCK)
SITE PLAN	
WALL 3 PROFILE	
WALL 4 PROFILE	
WALL 5 PROFILE	
WALL 6 PROFILE	

#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION **RETAINING WALLS 3, 4, 5 AND 6** 

STATE PROJECT REFERENCE NO. STATE SHEETS NO. N.CR-5021 7 1

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (99) 707-6850. 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 UN-FLACE)TEST DATA CAN BE RELIED ON ONLY TO THE DECREE 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 CAUTONED 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 DOS NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTROST TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMINSELF 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 ACUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

PERSONNEL

C.J. CORNETTE S.N. ZIMARINO

R.E. SMITH

J.M. EDMONDSON

INVESTIGATED BY \_\_\_\_\_. BOTTOMS DRAWN BY \_T.C. BOTTOMS CHECKED BY \_\_\_\_\_\_. D.N. ARGENBRIGHT SUBMITTED BY \_\_\_\_\_\_. ARGENBRIGHT DATE OCTOBER 2017



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL	DESCRIPTION				GRADATION			ROCK DE	ESCRIPTION
	SOIL IS CO	INSIDERED UN	CONSOLIDATED, SEMI-C	ONSOLIDATED, OR WEATHERED	EARTH MATERIALS	HAT CAN	WELL GRADED - INDICA	TES A GOOD REPRESENTATION OF PARTICL	E SIZES FROM FINE TO COARSE.	HARD ROCK IS N ROCK LINE INDIC	ON-COASTAL PLAIN MATERIAL THAT	WOULD YIELD SPT REFUSAL IF TESTED. AN INFEF ASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSA
	ACCORDING	TO THE ST	ANDARD PENETRATION	TEST (AASHTO T 206, ASTM	DI586). SOIL CLASSI	ICATION	GAP-GRADED - INDICATE	ES A MIXTURE OF UNIFORM PARTICLE SIZ	ES OF TWO OR MORE SIZES.	SPT REFUSAL IS	PENETRATION BY A SPLIT SPOON S	SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER (
	CONSISTENC	SED ON THE CY, COLOR, TE	AASHTU SYSTEM, BASIL XTURE, MOISTURE, AASH	TO CLASSIFICATION, AND OTH	INCLUDE THE FULLOW	DRS SUCH		ANGULARITY OF GRAIN	S	REPRESENTED BY	A ZONE OF WEATHERED ROCK.	HINSTITUN BETWEEN SOIL HIND ROCK IS OFTEN
	AS I	MINERALOGIC	AL COMPOSITION, ANGUL	ARITY, STRUCTURE, PLASTICI	TY, ETC. FOR EXAMPL	E.	THE ANGULARI	TY OR ROUNDNESS OF SOIL GRAINS IS DE	SIGNATED BY THE TERMS:	ROCK MATERIALS	ARE TYPICALLY DIVIDED AS FOLLO	JWS:
F	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	SOI	L LEGEND AND	AASHTO CLASSIF	ICATION	,	ANGULAR, SUBA	NGULAR, SUBROUNDED, OR ROUNDED.	τιον	WEATHERED ROCK (WR)	NON-COASTAL PLA	AIN MATERIAL THAT WOULD YIELD SPT N VALUES FOOT IF TESTED.
G	NERAL	GRA ( < 3	NULAR MATERIALS	SILT-CLAY MATERIALS	ORGANIC MATE	RIALS	MINERAL NA	MES SUCH AS QUARTZ FEI DSPAR MICA. TA		CRYSTALLINE	WOULD YIELD SP	GRAIN IGNEOUS AND METAMORPHIC ROCK THAT T REFUSAL IE TESTED, ROCK TYPE INCLUDES GRAI
	RUIP	A-1 A-	3 A-2	A-4 A-5 A-6 A-7	A-1. A-2 A-4. A-F		ARE USED I	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	ROCK (CR)	GNEISS, GABBRO, S	SCHIST, ETC.
(	LASS. A-1	l-a A-1-b	A-2-4 A-2-5 A-2-6 A	-2-7 A-7-5, A-7-6	A-3 A-6, A-7			COMPRESSIBILITY		NON-CRYSTALLINE		CK THAT WOULD YEILD SPT REFUSAL IF TESTED.
s	YMBOL 000							HTLY COMPRESSIBLE	LL < 31			JDES PHYLLITE, SLATE, SANDSTONE, ETC.
×	PASSING	000000					HIGH	LY COMPRESSIBLE	LL > 50	SEDIMENTARY RO	CK SPT REFUSAL. RC	OCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMEN
	•10 50	мх			GRANULAR SILT-	MUCK,		PERCENTAGE OF MATER	IAL	(CP)	SHELL BEDS, ETC. WEAT	
	*40 30 *200 15	MX 50 MX 51 MX 25 MX 10	4N MX 35 MX 35 MX 35 MX 35	5 MX 36 MN 36 MN 36 MN 36 MN	SOILS SOILS	PEAT	ORGANIC MATERIA	GRANULAR SILT - CLAY	OTHER MATERIA			NTE MAY SHOW SUICHT STAINING BOCK BINGS UNDER
Mé	TERIAL						TRACE OF ORGANIC N	ATTER 2 - 3% 3 - 5%	TRACE 1 - 10%	HAI	MMER IF CRYSTALLINE.	NIS MHI SHUW SLIGHT STHINING, NUCK NINGS UNDER
PAS	SING #40				SOILS WITH		LITTLE ORGANIC MAT	TER 3 - 5% 5 - 12%	LITTLE 10 - 20%	VERY SLIGHT ROO	CK GENERALLY FRESH, JOINTS STAINED	D, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF C
	PI		• 40 MX 41 MN 40 MX 4 • 10 MX 10 MX 11 MN 1	1 MN 40 MX 41 MN 40 MX 41 MN 1 MN 10 MX 10 MX 11 MN 11 MN	LITTLE OR	HIGHLY	HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE	(V SLI.) CR	(STALS ON A BROKEN SPECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS
GRO	JP INDEX	0 0	0 4 MX	8 MX 12 MX 16 MX ND MX	AMOUNTS OF	ORGANIC		GROUND WATER				AND DISCOLOBATION EXTENDS INTO BOCK UP TO
USU	L TYPES STO	INE FRAGS			ORGANIC	SOILS	$\nabla$	WATER LEVEL IN BORE HOLE IMMEDIA	ELY AFTER DRILLING	(SLI.) 1 It	NCH. OPEN JOINTS MAY CONTAIN CLAY	. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR
OF	MAJOR GR	AVEL, AND SAM	IE SILTY OR CLAYEY ND GRAVEL AND SAND	SILTY CLAYEY SOILS SOILS	MATTER			STATIC WATER LEVEL AFTER 24 H		CR	/STALS ARE DULL AND DISCOLORED, C	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MA	TERIALS	SAND								MODERATE SIC (MOD.) GR	INIFICANT PORTIONS OF ROCK SHOW D ANITOID ROCKS, MOST FELDSPARS ARE	DISCOLORATION AND WEATHERING EFFECTS. IN DUIL AND DISCOLORED SOME SHOW CLAY, ROCK HAS
GEN	. RATING SUBGRADE	EXC	ELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR	UNSUITABLE		FERCHED WHIER, SHIGHTED ZONE, OR	WHIER BEHRING STRATH	DUI	LL SOUND UNDER HAMMER BLOWS AND	SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARE
		PIO	F A-7-5 SUBGROUP IS < 1	I - 301 : PT OF A-7-6 SUBGROUP 15	5>11 - 30			SPRING OR SEEP		WI	H FRESH ROCK.	
			CONSISTEN	CY OR DENSENESS				MISCELLANEOUS SYMBO	LS	SEVERE AND	D DISCOLORED AND A MAJORITY SHOW	KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRE
				RANGE OF STANDARD	RANGE OF UN	CONFINED		2E /02E		(MOD. SEV.) ANI	J CAN BE EXCAVATED WITH A GEOLOG	IST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK
P	RIMARY SOI	IL TYPE	CONSISTENCY	PENETRATION RESISTENCE (N-VALUE)	COMPRESSIVE	STRENGTH	L ROADWAY EME	SANKMENT (RE) 23/025 DIP & DIP DIRE	CTION TURES		TESTED, WOULD TIELD SPI REFUSAL	
			VERY LOOSE	< 4				SPT		(SEV.) REI	DUCED IN STRENGTH TO STRONG SOIL.	. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZ
	GENERALL	Y	LOOSE	4 TO 10			SUIL SYMBUL		NG VINSTALLATION	TO	SOME EXTENT. SOME FRAGMENTS OF	STRONG ROCK USUALLY REMAIN.
	MATERIAL		MEDIUM DENSE DENSE	10 TO 30 30 TO 50	N/F		ARTIFICIAL F				I BOCK EXCEPT OLIABLE DISCOLORED	OR STAINED ROCK FARRIC FLEMENTS ARE DISCERNIR
	(NON-COHE	SIVE)	VERY DENSE	> 50						SEVERE BU	T MASS IS EFFECTIVELY REDUCED TO	SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG RO
			VERY SOFT	< 2	< 0.2	5	- INFERRED SO	IL BOUNDARY - CORE BORING	SOUNDING ROD	(V SEV.) REI	AAINING, SAPROLITE IS AN EXAMPLE O STICES OF ORIGINAL ROCK FARRIC RE	OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR MAIN IE TESTED WOULD YIELD SPT N VALUES < 100
	SILT-CLAY	Ý	SUFI MEDIUM STIFF	2 TU 4 4 TO 8	0.25 TC 0.5 TO	0.5 1.0	INFERRED RO			COMPLETE ROO	CK REDUCED TO SOIL, BOCK FABRIC N	In the second seco
	MATERIAL		STIFF	8 TO 15	1 TO	2			WITH CORE	SC	ATTERED CONCENTRATIONS. QUARTZ MA	AY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE
	CUHESIVE	,	HARD	> 30	2 10	4	ALLUVIAL SO		SPT N-VALUE	ALS	30 AN EXAMPLE.	
		1	TEXTURE	OR GRAIN SIZE				RECOMMENDATION SYMBO	)LS			HARDNESS
		E SIZE	4 16	40 60 200	270			UNCLASSIFIED EXCAVATION -	.저 UNCLASSIFIED EXCAVATION -	VERY HARD CAI	NOT BE SCRATCHED BY KNIFE OR SHA	ARP PICK. BREAKING OF HAND SPECIMENS REQUIRES
OPE	NING (MM)	- 5122	4.76 2.0	0 0.42 0.25 0.07	5 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	HARD CAI	N BE SCRATCHED BY KNIFE OR PICK (	DNLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIR
	BOULDER	COBBL	E GRAVEL	COARSE FINE	SILT	CLAY		ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	то	DETACH HAND SPECIMEN.	
	(BLDR.)	(COB	.) (GR.)	SAND SAN (CSE, SD.) (F SI	D (SL.)	(CL.)		ABBREVIATIONS		MODERATELY CAN	N BE SCRATCHED BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE
GR	IN MM	305	75 2	0 0.25	0.05 0.00	15	AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST	BY	MODERATE BLOWS.	SISTS FICK. HHND SPECIMENS CHN DE DETHCHED
SIZ	E IN.	12	3			-	BT - BORING TERMINATE	D MICA MICACEOUS	WEA WEATHERED	MEDIUM CAN	N BE GROOVED OR GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE OR PICK POIN
		SOI	L MOISTURE -	CORRELATION OF	TERMS		<ul> <li>CL CLAY</li> <li>CPT - CONE PENETRATIC</li> </ul>	MOD MODERATELY	2 - UNIT WEIGHT	HARD CAN POI	I BE EXCAVATED IN SMALL CHIPS TO INT OF A GEOLOGIST'S PICK.	PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF TH
	SOIL M	DISTURE SCA	ALE FIELD			SCRIPTION	CSE COARSE	ORG ORGANIC	7 <u>d</u> 5m 6m 4216m	SOFT CA	N BE GROVED OR GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS
	(ATTER	RBERG LIMIT	S) DESC	RIPTION	TILLED HOISTONE D		DMT - DILATOMETER TES	ST PMT - PRESSUREMETER TE	ST <u>SAMPLE ABBREVIATIONS</u>	FRO	JM CHIPS TO SEVERAL INCHES IN SIZE	E BY MODERATE BLOWS OF A PICK POINT. SMALL, TH
			- SATU	RATED - USUALLY L	IQUID; VERY WET, US	UALLY	e - VOID RATIO	SD SAND, SANDY	SS - SPLIT SPOON		LES LAN BE BRUKEN BT FINGER PRES	SOURE.
			(SA MIT	T.) FROM BELO	W THE GROUND WAT	ER TABLE	F - FINE	SL SILT, SILTY	ST - SHELBY TUBE	SOFT OR	MORE IN THICKNESS CAN BE BROKEN	BY FINGER PRESSURE. CAN BE SCRATCHED READILY
PL	STIC			SEMISOLID:	REQUIRES DRYING 1	0	FRAC FRACTURED, FRAC	CTURES TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL	FIN	IGERNAIL.	
R	ANGE <		- WET	- (W) ATTAIN OPT	IMUM MOISTURE	-	FRAGS FRAGMENTS	W - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FRA	ACTURE SPACING	BEDDING
		_ PLASTIC L	.IMIT								SPACING MORE THAN 10 FEET	VERY THICKLY BEDDED 4 FEET
	ом _	_ OPTIMUM I	MOISTURE - MOIS	T - (M) SOLID; AT (	OR NEAR OPTIMUM N	IOISTURE		ADVANCING TOOLS		WIDE	3 TO 10 FEET	THICKLY BEDDED 1.5 - 4 FEET
	SL _	_ SHRINKAGE	LIMIT							MODERATELY	CLOSE 1 TO 3 FEET	THINLY BEDDED 0.16 - 1.5 FEE VERY THINLY BEDDED 0.03 - 0.16 FEE
			- DRY	- (D) REQUIRES 4	ADDITIONAL WATER	го				VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED 0.008 - 0.03 FE
				ATTAIN OPT	IIMUM MUISTURE		CME-55		CORE SIZE:			THINLY LAMINATED < 0.008 FEET
			PL	ASTICITY					└─── └───			
			PLAS	STICITY INDEX (PI)	DRY STREE	IGTH	X CME-550			FUR SEDIMENTAR	T RUCKS, INDUKATION IS THE HARDE	INING OF MATERIAL BY LEMENTING, HEAT, PRESSUR
	NON P SLIGH	LASTIC TLY PLASTIC	2	ช-๖ 6-15	VERY LO SLIGHI	W	VANE SHEAR TEST	TUNGCARBIDE INSERTS	HAND TOOLS:	FRIABLE	GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.
	MODER	ATELY PLAS	STIC	16-25	MEDIUN	I		CASING W/ ADVANCER	POST HOLE DIGGER	MODEDATE	GRAINS CAN E	BE SEPARATED FROM SAMPLE WITH STEEL PROBE:
	HIGHLY	T PLASTIC		26 UK MURE	HIGH		PORTABLE HOIST	X TRICONE 2 15/16 STEEL TEETH	HAND AUGER	MUDERATE	BREAKS EASIL	Y WHEN HIT WITH HAMMER.
				CULOR			4 🗂	TRICONE TUNGCARB.	SOUNDING ROD	INDURATED	GRAINS ARE D	DIFFICULT TO SEPARATE WITH STEEL PROBE;
	DESCRIPTIO	INS MAY INC	LUDE COLOR OR COLO	R COMBINATIONS (TAN, RED	, YELLOW-BROWN, BL	UE-GRAY).		CORE BIT	VANE SHEAR TEST		DIFFICULT TO	D DREMN WITH HAMMER.
	MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.							EXTREMEL	Y INDURATED SAMPLE BREA	R BLUWS REQUIRED ID BREAK SAMPLE; KS ACROSS GRAINS.		
-												





	TERMS AND DEFINITIONS								
D. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.								
FOOT PER 60	ADUIFER - A WATER BEARING FORMATION OR STRATA.								
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.								
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.								
N VALUES /	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT								
CK THAT CLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.								
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.								
IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.								
MAY NOT YIELD TONE, 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.								
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.								
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.								
DATINGS IF OPEN. AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.								
CK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.								
BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.								
5. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM								
Y. ROCK HAS	PARENT MATERIAL.								
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.								
	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE								
ELUSPARS DULL DSS OF STRENGTH	FIELD.								
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.								
	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO								
VIDENT BUT	ITS LATERAL EXTENT.								
RE KAULINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.								
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS								
E DISCERNIBLE STRONG ROCK	PERCHED WATER - WATER MAINTAINE ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE								
ALUES < 100 BPF	UF HIN INTERVENTING IMPERATIONS STATION.								
IN SMALL AND	RESIDUEL (RES.) SUL - SUL FORMED IN FERCE OF DOCK OUN VER DECODIDED OF ROCK.								
. SAPROLITE IS	ROCK BEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.								
S REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.								
	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND								
OWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.								
EP CAN BE ETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.								
	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF								
R PICK POINT. 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 TO DE LESS THAN ALFOIT PER AB LIONS								
	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.								
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL								
PIECES 1 INCH ED READILY BY	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.								
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.								
	BENCH MARK: BM92								
THICKNESS	N=8I586.9044 E=2264662.2379								
4 FEET	ELEVATION: 52.85 FEET								
6 - 1.5 FEET									
3 - 0.16 FEET									
8 - 0.03 FEET	FIAD: FILLED IMMEDIATELY AFTER DRILLING								
0.000 FEEI									
AT DOCOUNTS									
AT, PRESSURE, ETC.									



		PROF	ILE	THR	OU	GH	BOI	RING	SP	ROJ	ECTE	D	ALO	NG	W	ALL	3 RI	GHT	OF	–YREV
	SAMPLE	OFFSET STA	ATION	DEPTH INTERVAL	SOI AASHTO CLASS		[ RES( % B 	JLTS WEIGHT ID- SULT- CL	% j AY 10	PASSING (SIEV	(ES) % 200 – MOISTU/R	% PE _ ORGANIC								
80	<u>55-2</u> <u>SS-4</u> <u>SS-5</u>	40' LT 50 40' LT 30 40' LT 30	)+37  2 )+37  2 )+37  2	5.9'-5.4 2.9'-14.4' 7.9'-19.4'	A-6(9) A-2-4(0) A-4(5)	32 18 - NP 28 8	6.9 52. 15.9 63.0 6.1 20.1	7 30.2 30 5 10.4 10 2 57.8 116	<u></u>	2 98 2 92 2 98 	<u>84 -</u> 33 - 83 -		+ + + +	1 1 1 1 1 1 1					· · · · · · · · · · · · · · · · · · ·	
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REFERENCE

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE AND SOIL TEST RESULTS

#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY ROAD) TO NC 87

SITE DESCRIPTION WALL 7: -YREV- STATION 38+00

STATE PROJECT REFERENCE NO. STATE NO. SHEETS N.C R-5021 1 4

#### 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 SOLT TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE ONSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLTAED IN THE SUBSURFACE RELIVESTIGATIONS AND REAS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS NICLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION 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 INVESTIGATION AS HE DEEMS NECESSARY TO SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENTIONS OF CONTANT THE SIDE 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. 2.

PERSO	NNEL
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	CHRIS ALEXANDER
	COREY FUTRAL
	D.T. CHALMERS
_	T. SPENCER
_	M. D. MASON
_	S V HUDSON

- INVESTIGATED BY S. V. HUDSON
- DRAWN BY <u>S. V. HUDSON</u>
- CHECKED BY \_J.L. STONE
- SUBMITTED BY <u>S. V. HUDSON</u>

DATE \_\_\_\_\_ DECEMBER 2017





SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION								GRADATION					ROCK DESCRIPTION									
SOIL IS CO	NSIDERED		D, SEMI-CON		D, OR WE	ATHERED	ARTH MATERI	ALS THAT CA	N	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.				HARD ROCK I ROCK LINE I	S NON-	COASTAL PL	LAIN MAT	ERIAL THAT I	VOULD YIELD SPT REFUSAL IF TEST			
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586), SOIL CLASSIFICATION								GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.				SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1										
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH						н	ANGULARITY OF GRAINS				REPRESENTED BY A ZONE OF WEATHERED ROCK.											
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:						SE TIFICHEL		-COASTAL PLA						
	SC	DIL LEGEN	DAND	AASH1	0 CL	ASSIFI	CATION			ANGULAR, SUBAN						ROCK (WR)			100	BLOWS PER FO	JOT IF TESTED.	
GENERAL CLASS	( (	cranular materia < 35% passing #20	_S 10)	SILT	-CLAY MAT 5% PASSIN	ERIALS	ORGANIC	MATERIALS		MINERAL NAM	MES SU	CH AS QUARTZ. FELI	DSPAR, MICA, TA	LC. KAOLIN. E	ETC.	CRYSTALLINE			/ FINE	TO COARSE (	RAIN IGNEOUS AND METAMORPHIC RC	
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	1 DESCF	RIPTIONS WHEN THE	Y ARE CONSIDE	RED OF SIG	NIFICANCE.	ROCK (CR)			GNEI	SS, GABBRO, SC	HIST, ETC.	
CLASS. A-1	1-а А-1-ь	A-2-4 A-2	5 A-2-6 A-2-	7		A-7-5 A-7-6	A-3 A	6, A-7				COMPRESS	SIBILITY			NON-CRYSTAL ROCK (NCR)	LINE		SEDI	MENTARY ROCH	<pre>&lt; THAT WOULD YEILD SPT REFUSAL</pre>	
SYMBOL 000				3	17.1					SLIGH MODE	ATLY CO RATELY	OMPRESSIBLE COMPRESSIBLE		LL < 31 LL = 31 -	50	COASTAL PL	IN		COAS	STAL PLAIN SI	DIMENTS CEMENTED INTO ROCK, BUT	
% PASSING							CD418 4D	SILT-		HIGHL	Y COMP	PRESSIBLE		LL > 50		SEDIMENTARY (CP)	ROCK		- SPT - SHEL	REFUSAL. ROC _L BEDS, ETC.	K TYPE INCLUDES LIMESTONE, SANDS	
*10 50 *40 30	MX MX 50 MX	51 MN					SOILS	CLAY PE	LK, AT		P		UF MAIERI T - CLAY	IAL						WEAT	HERING	
*200 15	MX 25 MX 1	10 MX 35 MX 35 M	IX 35 MX 35 M	IX 36 MN	36 MN 36	MN 36 MN				ORGANIC MATERIAL	ATTER	SOILS	<u>SOILS</u>	OTHER TRACE	MATERIAL	FRESH	ROCK F	FRESH, CRYST	TALS BRI	.GHT, FEW JOIN	IS MAY SHOW SLIGHT STAINING. ROCK	
PASSING 40								.		LITTLE ORGANIC MATT	FER	3 - 5% 5	5 - 12%	LITTLE	10 - 20%	VERY SLIGHT	ROCK	GENERALLY /	FRESH, JO	DINTS STAINED	. Some joints may show thin clay c	
LL PI	- 6 MX	- 40 MX 41 M	N 40 MX 41 M X 11 MN 11 M	N 40 MX	41 MN 40 10 MX 11	MX 41 MN MN 11 MN	LITTLE OF	ніс	нгγ	HIGHLY ORGANIC		5 - 10% 12 > 10%	2 - 20% > 20%	SUME HIGHLY	20 - 35% 35% AND ABOVE	(V SLI.)	CRYST	ALS ON A BE	ROKEN SF	ECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER H	
GROUP INDEX	0	0 0	4 MX	8 MX	12 MX 16	MX NO MX	Moderate Amounts (	F ORG	ANIC			GROUND	WATER			SLIGHT	ROCK	GENERALLY /	FRESH. J	• DINTS STAINED	AND DISCOLORATION EXTENDS INTO RO	
USUAL TYPES STO	DNE FRAGS.			SI	TY		ORGANIC	50	ILS	$\nabla$	WATE	ER LEVEL IN BORE	HOLE IMMEDIAT	ELY AFTER	DRILLING	(SLI.)	1 INCH.	. OPEN JOIN	ITS MAY (	CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONA	
OF MAJOR GR	SAND	SAND GRAVEL	AND SAND	SOI	s	SOILS	- HALLEN			▼	STAT	TIC WATER LEVEL A	AFTER <u>24</u> HO	DURS		MODERATE	SIGNIF	ICANT PORT	IONS OF	ROCK SHOW DI	SCOLORATION AND WEATHERING EFFECT	
GEN. RATING			n			200	FAIR TO			<b>∑</b> P₩	PERC	CHED WATER, SATURA	ATED ZONE,OR	WATER BEAR	NING STRATA	(MOD.)	GRANIT	OID ROCKS,	MOST FE	LDSPARS ARE I	JULL AND DISCOLORED, SOME SHOW CLA	
AS SUBGRADE	C	INCELLENT TO GOU	J		FAIR TO PL	JUK	POOR		THOLE		SPRI	NG OR SEEP					WITH FRESH ROCK.			1 BLUWS HIND 3	JWS HIND SHOWS STONIFICHINI LUSS OF STRENGTH	
	P	I OF A-7-5 SUBGRI	UP IS ≤ LL	· 30 ; PI 0	F A-7-6 SI	JBGROUP IS	> LL - 30				;					MODERATELY	ALL RO	OCK EXCEPT		DISCOLORED O	R STAINED. IN GRANITOID ROCKS, ALL F	
				T UN RAN	E OF ST	ANDARD	RANGE C	F UNCONFIN	-D		'	MISCELLHNEU		L3		(MOD, SEV.)	AND C	AN BE EXCA	VATED W	ITH A GEOLOGI	ST'S PICK. ROCK GIVES "CLUNK" SOUND	
PRIMARY SOI	IL TYPE	CONSIST	ENCY	PENETR	ATION RE	SISTENCE	COMPRES (TI	SIVE STRENG	тн	ROADWAY EMB	ANKMEN	NT (RE) 25/025 C	DIP & DIP DIRE	CTION		CEVERE	IF TES	STED, WOULD	<u>YIELD S</u>	PT REFUSAL		
CENERALLY	~	VERY L	OSE		< 4										SLOPE INDICATOR	(SEV.)	REDUCI	ED IN STREM	NGTH TO	STRONG SOIL.	IN GRANITOID ROCKS ALL FELDSPARS	
GRANULAR			E		4 TO 1	0		N/A				VST	PMT		INSTALLATION		TO SON	ME EXTENT. STED, WOULD	SOME FR	AGMENTS OF S	TRONG ROCK USUALLY REMAIN.	
MATERIAL (NON-COHE	SIVE)	DENS	E		30 TO 5	50				ARTIFICIAL FI	Y EMBA		AUGER BORING	٨	CONE PENETROMETER TEST	VERY	ALL R	OCK EXCEPT	QUARTZ	DISCOLORED O	R STAINED. ROCK FABRIC ELEMENTS AF	
			NSE		> 50			( 0.25					CORE BORING	•		SEVERE (V SEV.)	BUT M	ASS IS EFFE NING. SAPRO	ECTIVELY	REDUCED TO S	SOIL STATUS, WITH ONLY FRAGMENTS OF ROCK WEATHERED TO A DEGREE THAT	
GENERALL	Y	SOF			2 TO 4	4	0.2	5 TO Ø.5			2 000.1	MW C	CONE DOMINO	Å	TEST BORING		VESTIC	JES OF ORIG	JINAL ROC	CK FABRIC REM	AIN. <u>IF TESTED, WOULD YIELD SPT N V</u>	
SILT-CLAY MATERIAL	(	MEDIUM STIF	STIFF		4 TO 8 8 TO 1	3 5	0.	5 TO 1.0 1 TO 2		INFERRED ROC	K LINE		MONITORING WEL	- 🎔	WITH CORE	COMPLETE	ROCK F	REDUCED TO ERED CONCE	SOIL. RO	JCK FABRIC NO	T DISCERNIBLE, OR DISCERNIBLE ONLY ( BE PRESENT AS DIKES OR STRINGERS)	
(COHESIVE)	)	VERY S			15 TO 3	80		2 TO 4		ALLUVIAL SOI	L BOUN	IDARY $\triangle$ I	PIEZOMETER INSTALLATION	$\bigcirc$	- SPT N-VALUE		ALSO (	AN EXAMPLE.	•			
		TE	XTURE	OR GF	AIN S	SIZE				RECOMMENDATION SYMBOLS			<b>└</b> ───				ROCK H	ARDNESS				
U.S. STD. SIEVE	E SIZE		4 10	40	60	200	270			UNCLASSIFIED EXCAVATION - TT UNCLASSIFIED EXCAVATION -				VERY HARD	CANNO SEVER	T BE SCRAT( AL HARD BLI	CHED BY .OWS OF 7	KNIFE OR SHAL THE GEOLOGIST	<pre>RP PICK. BREAKING OF HAND SPECIMEN 'S PICK.</pre>			
OPENING (MM)	DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053				UNSUITABLE WASTE LINCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF			HARD	CAN B	E SCRATCHE	.D BY KNI	IFE OR PICK ON	WITH DIFFICULTY. HARD HAMMER B									
BOULDER	COE	BLE GR4	VEL	COARS SAND	SE	F INE SAND	SILT	CLA	Y			CEPTABLE DEGRADA	BLE ROCK	EMBANKN	MENT OR BACKFILL		TO DET	TACH HAND S	SPECIMEN			
(BLDR.)		JB.) (G	R.)	(CSE.S	D.)	(F SD.	) (SL.		)			ABBREVI	IATIONS			HARD	EXCAV	ATED BY HAP	RD BLOW	OF A GEOLOGI	ST'S PICK, HAND SPECIMENS CAN BE D	
GRAIN MM	305	75 3	2.0		0.25	5	0.05	0.005		AR - AUGER REFUSAL	n	MED MEDIU MICA - MICA		VST - WFA -	VANE SHEAR TEST	MEDIUM	BY MOI	DERATE BLO	WS.			
SIZE IN.	 C						TEDMC			CL CLAY	· 	MOD MODE	RATELY	χ-υ	INIT WEIGHT	HARD	CAN B	E EXCAVATE	D IN SMA	ALL CHIPS TO F	PEICES 1 INCH MAXIMUM SIZE BY HARD	
SOIL MO	OISTURE S	CALE	FIELD MO	ISTURE					1011	CPT - CONE PENETRATION CSE COARSE	N TEST	NP - NON PL ORG ORGAI	LASTIC NIC	. <sup>1</sup> - D	DRY UNIT WEIGHT	SOFT	POINT	OF A GEOLO	JGIST'S P	TCK.	KNIEF OR PICK CAN BE EXCAVATED IN	
(ATTER	RBERG LIM	ITS)	DESCRI	PTION	60.	UE FUR F	IELD MUISTU	E DESCRIPT	IUN	DMT - DILATOMETER TES	TION T	PMT - PRES	SUREMETER TES	5T <u>SAM</u>	APLE ABBREVIATIONS	5011	FROM	CHIPS TO SE	EVERAL I	NCHES IN SIZE	BY MODERATE BLOWS OF A PICK POIN	
			- SATURA	TED -	USI	JALLY LIC	UID: VERY WE	T. USUALLY		e - VOID RATIO		SD SAND.	SANDY	SS - S	SPLIT SPOON	VERY	CAN B	S CAN BE BR	ITH KNIF	FINGER PRESS	URE.	
ᄔᆮᅳ		LIMIT _	(SAL)		FRU	IM BELOW	THE GROUND	WATER TAB	LE	F - FINE FOSS FOSSILIFEROUS		SL SILT, S SLI SLIGH	SILTY HTLY	ST - 9 RS - F	SHELBY TUBE ROCK	SOFT	OR MO	RE IN THICK	(NESS CA	N BE BROKEN F	3Y FINGER PRESSURE. CAN BE SCRATCH	
PLASTIC RANGE <			- WET -	(W)	SE	ISOLID; R	EQUIRES DRY	NG TO		FRAC FRACTURED, FRAC	TURES	TCR - TRICC	ONE REFUSAL	RT - F				TIDE CE				
(PI) PL	_ PLASTIC	LIMIT _			AT	TAIN OPTI	MUM MOISTUR	E		HI HIGHLY		V - VERY	INE CUNTENT	UBR -	RATIO	TERM	THU	TURE SF	SPAC!	ING	TERM	
			- MOIST	- (M)	SOI		NEAR OPTIM		F	EQI	<u>UIPM</u> F	ENT USED ON	I SUBJECT	PROJEC	T	VERY WID	Ξ	MOF	RE THAN	10 FEET	VERY THICKLY BEDDED	
OM SL	_ OPTIMUN _ SHRINKA	4 MOISTURE AGE LIMIT								DRILL UNITS:		ANCING TOOLS:		HAMMER T	YPE:	MODERATE	LY CLO	JSE	1 TO 3	FEET	THINLY BEDDED 0.1	
			- DRY -	rD)	REC	DUIRES AD	DITIONAL WA	TER TO		X CME-45B		CLAY BITS			DMATIC MANUAL	VERY CLC	SE	e LES	0.16 TO 1 S THAN	0.16 FEET	THICKLY LAMINATED 0.0	
			5		AT.	TAIN OPTI	MUM MOISTUR	E		CME-55		6" CUNTINUUUS FLIC	UHI AUGER	CORE SIZE						TAIDUI		
			PLA	STICI	ΤY					X CME-550	-	HARD FACED FINE	R RITS	∐-" —	∐-+							
NON P	LASTIC		PLASTI	CITY IN Ø-5	DEX (PI)		DRY S	TRENGTH Y LOW					FRIS	└ <u></u> -ヽ_		FOR SEDIMEN		JUCKS, INDUH	F	RUBBING WITH	FINGER FREES NUMEROUS GRAINS;	
SL1GH	TLY PLAS	TIC		6-15			SI	IGHT		VANE SHEAR TEST				HAND TOO	LS:		.E		C	SENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY	MILLY PL Y PLASTIC	.4511C 2	2	16-25 5 OR MC	RE		M	IIGH			💾		STEEL TEETH		T HOLE DIGGER	MODEF	ATELY	INDURATED	C	BRAINS CAN BE	SEPARATED FROM SAMPLE WITH ST	
				OLOR									TUNGCARB.		D AUGER				ſ	GRAINS ARE D	IFFICULT TO SEPARATE WITH STFFI	
DESCRIPTIO				COMPTN					0	∣ L] ′		CORE BIT			NUING KUU F SHEAR TEST	INDUR	ŧιΕD		ſ	JIFFICULT TO	BREAK WITH HAMMER.	
MODI	FIERS SU	CH AS LIGHT, [	ARK, STREA	KED, ETC	. ARE US	ED TO DE	SCRIBE APPE	RANCE.	<i>.</i>			2 7/8" DRAG F	BIT		- SALERY (EST	EXTRE	MELY I	NDURATED	5	SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE	
-										· · · · · · · · · · · · · · · · · · ·	1 1 1 1 1									JUNILL DUCHE		

## PROJECT REFERENCE NO.



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	TERMS AND DEFINITIONS
ED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
「 N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT CLUDES GRANITE.	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED.	$\underline{\text{COLLUVIUM}}$ - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NOT YIELD STONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
NINUS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ick up to L Feldspar	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN NY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
I AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
OSS OF STRENGTH WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VIDENT BUT	ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
RE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABUVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
S. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	$\underline{SAPROLITE\ (SAP.)}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS 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 THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EEP CAN BE ETACHED	$\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO DE LESS THAN AT FOOT PER AG HOWS
FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
PIECES 1 INCH	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
ED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. <u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	RENCH MARK, LOCATIONS AND ELEVATIONS ORTAINED WITH DTV SUBVEY
THICKNESS	GRADE GLOBAL POSITIONING SYSTEM (GPS)
4 FEET	ELEVATION: FEET
16 - 1.5 FEET	
3 - 0.16 FEET	NUTES:
0.008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE:	
PROBE:	
<b>:</b> ;	DATE: 8-15-14





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TELY	IL)		INFE	RRED STRA	TIGRAPHY I	S DRAWN TH	ROUGH TH	BORING	GS .	
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SHEET NO. 5021

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REFERENCE

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

#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY RD.) TO NC 87

SITE DESCRIPTION WALL 8 RIGHT OF -Y14A- STA. 40+50 WALL 9 LEFT OF -Y14A- STA. 40+50 WALL 10 LEFT OF -Y14A- STA. 34+50 WALL 11 RIGHT OF -Y14A- STA. 32+50 EBI- ABUTMENT WALL EB2- ABUTMENT WALL

# 41582 **PROJECT:**

STATE PROJECT REFERENCE NO. STATE N.C R-5021

NO.

1

TOTAL SHEETS 11

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLT TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE ONSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLTAED IN THE SUBSURFACE RELIVESTIGATIONS AND REAS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS NICLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE VIDUCT TACTORS. THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR 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 SALTSY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE NOT ON FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTULAL COMPENSATION.

- 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. 2.

	PEF	SONNEL
	CATLIN	PERSONNEL
	_	
INVESTIGATED	BY <u>JL ST</u>	TONE, PG
DRAWN BY _J	L, STONE	PG
CHECKED BY _	STEVEN	HUDSON, PG
SUBMITTED BY	JL STO	NE, PG
DATE JUNE	2018	
DATE		



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL	DESCRIPTION				GRADATION		ROCK DESCRIPTION			
SOIL IS CONSI BE PENETRATED ACCORDING TO IS BASED CONSISTENCY, C	DERED UNCONSOLIDATED, SEMI-CC D WITH A CONTINUOUS FLIGHT PI D THE STANDARD PENETRATION T ON THE AASHTO SYSTEM, BASIC COLOR, TEXTURE, MOISTURE, AASHT	NSOLIDATED, OR WEATHERED OWER AUGER AND YIELD LES EST (AASHTO T 206, ASTM I DESCRIPTIONS GENERALLY IO CLASSIFICATION, AND OTH	EARTH MATERIALS T SS THAN 100 BLOWS F D1586), SOIL CLASSIF INCLUDE THE FOLLOW HER PERTINENT FACTO	HAT CAN ER FOOT CATION ING: RS SUCH	WELL GRADED - INDICA UNIFORMLY GRADED - I GAP-GRADED - INDICATE	TES A GOOD REPRESENTATION OF PARTIC NDICATES THAT SOIL PARTICLES ARE ALL A MIXTURE OF UNIFORM PARTICLE SIZ ANGULARITY OF GRAIN	LE SIZES FROM FINE TO COARSE. L APPROXIMATELY THE SAME SIZE. ZES OF TWO OR MORE SIZES. NS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERME 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 BLOWS IN NON-COASTAL PLAIN WATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.			
AS MINE VERY S	ERALOGICAL COMPOSITION, ANGUL STIFF.GRAY.SILTY CLAY.MOIST WITH IN	ARITY, STRUCTURE, PLASTICI ITERBEDDED FINE SAND LAYER	TY,ETC. FOR EXAMPLE RS. <i>HIGHLY PLASTIC.A-</i> 7-6	•	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:				ARE TYPICALLY DIVIDED AS FULLOW	N MATERIAL THAT WOULD VIELD OR N. VALUES N	
	SOIL LEGEND AND	AASHTO CLASSIF	ICATION		ANGULAR, SUBA	NGULAR, SUBROUNDED, OR ROUNDED.	TION	ROCK (WR)	100 BLOWS PER FO	N MATERIAL THAT WOULD TIELD SPT N VALUES >	
GENERAL CLASS.	GENERAL         GRANULAR MATERIALS         SILT-CLAY MATERIALS         ORGANIC MATERIALS           CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         ORGANIC MATERIALS			MINERAL NA	MINERALUGICAL CUMPUSI MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LIUN ALC, KAOLIN, ETC. ERED OF SIGNIFICANCE	CRYSTALLINE ROCK (CR)	FINE TO COARSE O WOULD YIELD SPT	RAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE CHIST. FTC.		
GROUP A-1 CLASS. A-1-a	1 A-3 A-2 A-1-b A-2-4 A-2-5 A-2-6 A-	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5 A-3 A-6, A-7		HILE USED I	COMPRESSIBILITY		NON-CRYSTALLINE		RAIN METAMORPHIC AND NON-COASTAL PLAIN	
SYMBOL 00000					SLIG		LL < 31	ROCK (NCR)		DES PHYLLITE, SLATE, SANDSTONE, ETC.	
% PASSING	00000				HIGH	LY COMPRESSIBLE	LL > 50	SEDIMENTARY ROC	K SPT REFUSAL, ROC	K TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	
*10 50 MX *40 30 MX 5	50 MX 51 MN		GRANULAR CLAY	MUCK, PEAT		PERCENTAGE OF MATER	IAL		WEATH	HERING	
*200 15 MX 2	25 MX 10 MX 35 MX 35 MX 35 MX 35	MX 36 MN 36 MN 36 MN 36 MN	SUILS		ORGANIC MATERIAL	<u>SOILS</u> SOILS	OTHER MATERIAL	FRESH ROCI	K FRESH, CRYSTALS BRIGHT, FEW JOIN	TS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	
MATERIAL PASSING #40			COLIC HITH		LITTLE ORGANIC MAT	TER 3 - 5% 5 - 12%	LITTLE 10 - 20%	VERY SLIGHT ROCI	MER IF CRYSTALLINE. K GENERALLY FRESH.JOINTS STAINED.	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN	
LL – PI 6 M	- – 40 MX 41 MN 40 MX 41 4X NP 10 MX 10 MX 11 MN 11	MN 40 MX 41 MN 40 MX 41 MN MN 10 MX 10 MX 11 MN 11 MN	LITTLE OR	HIGHLY	MODERATELY ORGANIC HIGHLY ORGANIC	5 - 10% 12 - 20% > 10% > 20%	SOME 20 - 35% HIGHLY 35% AND ABOVE	(V SLI.) CRY	STALS ON A BROKEN SPECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	
GROUP INDEX Ø	0 0 4 MX	8 MX 12 MX 16 MX NO MX	MODERATE AMOUNTS OF	ORGANIC		GROUND WATER		SLIGHT ROCI	K GENERALLY FRESH, JOINTS STAINED	AND DISCOLORATION EXTENDS INTO ROCK UP TO	
USUAL TYPES STONE F	FRAGS. FINE SILTY OR CLAYEY	SILTY CLAYEY	ORGANIC	SUILS	$\nabla$	WATER LEVEL IN BORE HOLE IMMEDIA	TELY AFTER DRILLING	(SLI.) 1 IN	CH. OPEN JOINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	
OF MAJOR GRAVEL MATERIALS SAN	ND SAND GRAVEL AND SAND	SOILS SOILS			<b>▼</b>	STATIC WATER LEVEL AFTER 24 H	HOURS	MODERATE SIGN	IFICANT PORTIONS OF ROCK SHOW DI	SCOLORATION AND WEATHERING EFFECTS. IN	
GEN, RATING	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR	UNSULTABLE		PERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA	(MOD.) GRAI	NITOID ROCKS, MOST FELDSPARS ARE [ L SOUND UNDER HAMMER BLOWS AND S	DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	
AS SUBURADE	PLOF A-7-5 SUBGROUP IS < 11	- 301 ± PT OF A-7-6 SUBGROUP 19	5 > 11 - 30		- 0-00 <b>-</b> -	SPRING OR SEEP		WITH	WITH FRESH ROCK.		
	CONSISTEN	CY OR DENSENESS	<u>S</u>			MISCELLANEOUS SYMBO	)LS	SEVERE AND	DISCOLORED AND A MAJORITY SHOW	R STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGT	
PRIMARY SOLL T	COMPACTNESS OR	RANGE OF STANDARD		CONFINED		34NKMENT (BE) 25/025 DIP & DIP DIR	FCTION	(MOD. SEV.) AND	CAN BE EXCAVATED WITH A GEOLOGIS TESTED, WOULD YIELD SPT REFUSAL	ST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	
	VERY LOOSE	(N-VALUE) < 4	(TONS/F	T <sup>2</sup> )		ESCRIPTION OF ROCK STRUC		SEVERE ALL (SEV.) RED	ROCK EXCEPT QUARTZ DISCOLORED O UCED IN STRENGTH TO STRONG SOIL.	R STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	
GRANULAR	LOOSE MEDIUM DENSE	4 TO 10	NZA					TO IF	SOME EXTENT. SOME FRAGMENTS OF S TESTED, WOULD YIELD SPT N VALUES 2	TRONG ROCK USUALLY REMAIN.	
MATERIAL (NON-COHESIVE	E) DENSE	30 TO 50			ARTIFICIAL F	ILL (AF) OTHER AUGER BORING	CONE PENETROMETER TEST	VERY ALL	ROCK EXCEPT QUARTZ DISCOLORED O	R STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	
	VERY SOFT	< 2	< 0.25	5	INFERRED SO		SOUNDING ROD	(V SEV.) REM	MASS IS EFFECTIVELY REDUCED TO S AINING. SAPROLITE IS AN EXAMPLE OF	ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	
GENERALLY STLT-CLAY	SOFT MEDIUM STIFE	2 TO 4 4 TO 8	0.25 TO	0.5 1 0					TIGES OF ORIGINAL ROCK FABRIC REM	AIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BP</u>	
MATERIAL (COHESIVE)	STIFF VERY STIFF	8 TO 15 15 TO 30	1 TO 2	4				SCA ALSI	TTERED CONCENTRATIONS. QUARTZ MAN	BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	
	HARD	> 30	> 4							ARDNESS	
	TEXTURE	UR GRAIN SIZE							NOT BE SCRATCHED BY KNIFE OR SHA	RP PICK. BREAKING OF HAND SPECIMENS REQUIRES	
U.S. STD. SIEVE SI OPENING (MM)	IZE 4 10 4.76 2.0	40 60 200 0 0.42 0.25 0.07	0 270 75 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	HARD CAN	ERAL HARD BLOWS OF THE GEOLOGIST BE SCRATCHED BY KNIEE OR PICK ON	'S PICK. Il Y WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	
BOULDER	COBBLE GRAVEL	COARSE FINE	E SILT	CLAY	SHALLOW UNDERCUT	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	TO	DETACH HAND SPECIMEN.		
(BLDR.)	(COB.) (GR.)	SAND SAN (CSE. SD.) (F SI	D.) (SL.)	(CL.)		ABBREVIATIONS		MODERATELY CAN HARD EXC	BE SCRATCHED BY KNIFE OR PICK. G AVATED BY HARD BLOW OF A GEOLOGI	OUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE ST'S PICK, HAND SPECIMENS CAN BE DETACHED	
GRAIN MM 30	Ø5 75 2.0	0.25	0.05 0.00	5	AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST	BY	MODERATE BLOWS.		
SIZE IN. 1			TEDMO		CL CLAY	MOD MODERATELY	$\gamma$ - UNIT WEIGHT	Medium can Hard can	BE GROOVED OR GOUGED 0.05 INCHES BE EXCAVATED IN SMALL CHIPS TO F	DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	
SOIL MOIST	TURE SCALE FIELD N		TERMS		CPT - CONE PENETRATIC CSE COARSE	N TEST NP - NON PLASTIC ORG ORGANIC	$\gamma_{ m d}$ - DRY UNIT WEIGHT	POIN	IT OF A GEOLOGIST'S PICK.		
(ATTERBER	RG LIMITS) DESCR	GUIDE FOR	FIELD MOISTURE DE	SCRIPTION	DMT - DILATOMETER TES	T PMT - PRESSUREMETER TE	ST <u>SAMPLE ABBREVIATIONS</u>	FRO	M CHIPS TO SEVERAL INCHES IN SIZE	BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	
	- SATU	RATED - USUALLY LI	IQUID: VERY WET, USL	ALLY	e - VOID RATIO	SAL SAND, SANDY	SS - SPLIT SPOON	VERY CAN	ES CAN BE BRUKEN BY FINGER PRESS BE CARVED WITH KNIFE. CAN BE EXC	AVATED READILY WITH POINT OF PICK. PIECES 1 INCH	
		I. PROM BELO	W THE GROUND WATE	RIHBLE	F - FINE FOSS FOSSILIFEROUS	SL SLI, SLIY SLI SLIGHTLY	ST - SHELBY TUBE RS - ROCK	SOFT OR	MORE IN THICKNESS CAN BE BROKEN E	BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	
PLASTIC RANGE <	- WET	- (W) SEMISOLID:	REQUIRES DRYING TO	נ	FRAC FRACTURED, FRAC FRAGS FRAGMENTS	TURES TCR - TRICONE REFUSAL W - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL	FRA		BEDDING	
	LASTIC LIMIT		THOM HOISTORE		HI HIGHLY	V - VERY	RATIO	TERM	SPACING	TERM THICKNESS	
	PTIMUM MOISTURE - MOIST	T - (M) SOLID; AT C	DR NEAR OPTIMUM M	DISTURE	EC	UIPMENT USED ON SUBJECT	PROJECT	VERY WIDE WIDE	MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET	
	HRINKAGE LIMIT					ADVANCING TOULS:		MODERATELY C CLOSE	LOSE 1 TO 3 FEET Ø.16 TO 1 FOOT	THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	
	- DRY -	- (D) REQUIRES A ATTAIN OPT	ADDITIONAL WATER T TIMUM MOISTURE	0		6 CONTINUOUS FLIGHT AUGER		VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED 0.008 - 0.03 FEET	
I	PI	ASTICITY			CME-55	8" HOLLOW AUGERS	вн		INDUF	RATION	
				X CME-550	HARD FACED FINGER BITS	<u> </u>	FOR SEDIMENTARY	ROCKS, INDURATION IS THE HARDEN	ING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, E		
NON PLAS		Ø-5 6-15	VERY LO	v	VANE SHEAR TEST	TUNGCARBIDE INSERTS		FRIABLE	RUBBING WITH GENTLE BLOW	FINGER FREES NUMEROUS GRAINS: BY HAMMER DISINTEGRATES SAMPLE.	
MODERATE		16-25	MEDIUM			X CASING W/ ADVANCER	POST HOLE DIGGER	MODERATE	Y INDURATED GRAINS CAN BE	SEPARATED FROM SAMPLE WITH STEEL PROBE:	
	LHƏTİL		нібн		PORTABLE HOIST	X TRICONE 2 7/8 STEEL TEETH	HAND AUGER	HODERHIEL	BREAKS EASILY	WHEN HIT WITH HAMMER.	
l					X CME-45B	TRICONE' TUNGCARB.		INDURATED	GRAINS ARE DI DIFFICULT TO	FFICULI TO SEPARATE WITH STEEL PROBE; BREAK WITH HAMMER.	
DESCRIPTIONS MODIFIER	MAY INCLUDE COLOR OR COLO RS SUCH AS LIGHT, DARK, STRE	R COMBINATIONS (TAN, RED AKED, ETC. ARE USED TO D	), YELLOW-BROWN, BLL DESCRIBE APPEARANC	E-GRAY). E.			VANE SHEAR TEST	EXTREMELY	INDURATED SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE;	
									SAMPLE BREAK	3 HURUSS UKAINS.	

## R-5021



	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VALUES >	A NUTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
THAT JDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
NE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
IGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
INGS IF OPEN, MER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
up to Eldspar	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
LOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
IN ROCK HAS	<u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
S OF STRENGTH	FIELD.
EN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
ENT BUT KAOLINIZED	LEUDE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
	LENS - A BUDY OF SUIL OF ROLK THAT THINS OUT IN ONE OF MURE DIRECTIONS.
	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
NLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM,
SMALL AND	ROCK QUALITY DESIGNATION (BOD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
IS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
CAN BE ACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
PICK POINT. OWS OF THE	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.
AGMENTS SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
ECES 1 INCH READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: ELEVATION DATA COLLECTED USING RTK
FEET	SURVEY GRADE GPS SYSTEM
- 4 FEET - 15 FEET	
0.16 FEET	NOTES:
- 0.03 FEET 008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PRESSURE, ETC.	
L PROBE;	


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#### **CONTENTS**

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REFERENCE

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

#### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY RD.) TO NC 87

SITE DESCRIPTION WALL 12 LEFT OF -Y14A-*STA*. 48+50

# 41582 PROJEC

STATE PROJECT REFERENCE NO. STATE SHEETS NO. N.CR-5021 1 4

#### **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 (919) 707-6850. 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 UN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE 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 CAUTONED 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 DOS NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTROST TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMINSELF 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 ACUAL CONDITIONS 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.

PERSONNEL

S.N. ZIMARINO

R.E. SMITH

C.E. RAWLINS

INVESTIGATED BY \_\_\_\_\_. BOTTOMS DRAWN BY \_T.C. BOTTOMS CHECKED BY \_\_\_\_. ARGENBRIGHT SUBMITTED BY \_\_\_\_\_\_. ARGENBRIGHT DATE JUNE 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL DESCRIPTION						GRADATION					ROCK DESCRIPTION							
SOIL IS BE PENET ACCORDI IS B CONSISTE	CONSIDERED RATED WITH NG TO THE BASED ON TH ENCY, COLOR,	UNCONSOLID H A CONTINUO STANDARD PI HE AASHTO S TEXTURE, MO	ATED, SEMI-CON DUS FLIGHT POV ENETRATION TE YSTEM. BASIC ( ISTURE, AASHTO	SOLIDATED, OF VER AUGER AN ST (AASHTO 1 DESCRIPTIONS CLASSIFICAT	R WEATHERED   ND YIELD LESS 206, ASTM DI GENERALLY IN TON, AND OTHE	EARTH MAT THAN 100 586), SOIL ICLUDE TH R PERTINE	ERIALS TH BLOWS PE CLASSIFI E FOLLOWI NT FACTOF	IAT CAN ER FOOT CATION NG: RS SUCH	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	ies a o Ndicate Is a mi	GOOD REPRES	ENTATION OF PARTIC PARTICLES ARE AL IFORM PARTICLE SI RITY OF GRAI	LE SIZES FI L APPROXIMA ZES OF TWO	ROM FINE TO COARSE. MTELY THE SAME SIZE. OR MORE SIZES.	HARD ROCK I ROCK LINE II SPT REFUSAL BLOWS IN NO REPRESENTED	S NON-CO NDICATES IS PENE NN-COAST BY A Z	JASTAL PLA THE LEVEL ETRATION B (AL PLAIN CONE OF WE	NIN MATERIAL THAT W L AT WHICH NON-COA Y A SPLIT SPOON SA MATERIAL, THE TRA ATHERED ROCK.	OULD YIELD SPT REFUSAL IF TEST STAL PLAIN MATERIAL WOULD YIELD MPLER EQUAL TO OR LESS THAN Ø. NSITION BETWEEN SOIL AND ROCK
AS V	S MINERALO VERY STIFF.G	GICAL COMPO RAY, SILTY CLAY	SITION, ANGULAR , <i>MOIST WITH INT</i>	RITY, STRUCTU ERBEDDED FIN	RE, PLASTICITY E SAND LAYERS	',ETC.FOF <i>HIGHLY PL</i> A	REXAMPLE. STIC.A-7-6	•	THE ANGULARIT	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:				Y THE TERMS:		HLS HRE	SUTE SUTE	NON-COASTAL PLAT	S: N MATERIAL THAT WOULD YIELD SP
	S	OIL LEG	end and	AASHTO	CLASSIFI	CATION			ANGULAR, SUBAN					ROCK (WR)			100 BLOWS PER FO	OT IF TESTED.	
GENERAL CLASS.	(	GRANULAR MATE ≤ 35% PASSING	RIALS =200)	SILT-CLA	MATERIALS	OR	GANIC MATER	IALS	MINERAL NAI	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.			CRYSTALLINE			FINE TO COARSE C WOULD YIELD SPT	RAIN IGNEOUS AND METAMORPHIC RC REFUSAL IF TESTED. ROCK TYPE IN		
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	V DESCR	RIPTIONS WHE	N THEY ARE CONSID	ERED OF SIG	GNIFICANCE.	NOLK (LR)		<u> ZC.ZC.</u>	GNEISS, GABBRO, SC FINE TO COARSE C	HIST, ETC. RAIN METAMORPHIC AND NON-COAST4
CLASS.	A-1-a A-1-b	A-2-4	A-2-5 A-2-6 A-2-	7	A-7-5 A-7-6	A-3	A-6, A-7		SI IG			RESSIBILITY	11 < 31		ROCK (NCR)			SEDIMENTARY ROCK ROCK TYPE INCLUE	THAT WOULD YEILD SPT REFUSAL
SYMBOL				<b>X</b>					MODE	RATELY	COMPRESSIE	LE	LL = 31 ·	50	COASTAL PLA		$\neg \neg$	COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT
7. PASSING 10 E	50 MX					GRANULAR	SILT-	MUCK,		F	PERCENTA	GE OF MATER	IAL		(CP)			SHELL BEDS, ETC.	
■40 3 ■200 1	30 MX 50 MX 15 MX 25 MX	51 MN 10 MX 35 MX 3	35 MX 35 MX 35 M	1X 36 MN 36 MI	N 36 MN 36 MN	SOILS	SOILS	PEAT	ORGANIC MATERIAL		GRANULAR SOILS	SILT - CLAY SOILS	OTHEF	MATERIAL	FRESH	BUCK EB			IS MAY SHOW SLIGHT STAINING BOCK
MATERIAL PASSING *40 LL	_ _	- 40 MX	41 MN 40 MX 41 M	N 40 MX 41 M	1 40 MX 41 MN	SOILS	WITH .E OR		TRACE OF ORGANIC M LITTLE ORGANIC MAT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER TER	2 - 3% 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% 20%	TRACE LITTLE SOME HIGHLY	1 - 10% 10 - 20% 20 - 35% 35% AND ABOVE	VERY SLIGHT (V SLI.)	HAMMER ROCK GE CRYSTAL	IF CRYSTAL NERALLY FF S ON A BR(	LINE. RESH, JOINTS STAINED, DKEN SPECIMEN FACE S	SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY. ROCK RINGS UNDER H
PI GROUP INDEX	вмх	A A	4 MX	8 MX 12 M			RATE	ORGANIC			GRO	UND WATER				OF A CR	YSTALLINE	NATURE.	
USUAL TYPES S OF MAJOR	GRAVEL, AND	FINE SIL SAND GR4	TY OR CLAYEY	SILTY SOILS	CLAYEY	ORG	ANIC TER	SOILS	✓	WATE STA	ER LEVEL IN TIC WATER LE	BORE HOLE IMMEDIA	TELY AFTER	DRILLING	(SLI.)	1 INCH. ( CRYSTAL	DPEN JOINTS	AND DISCOLORED. CR	IN GRANITOID ROCKS SOME OCCASIONA YSTALLINE ROCKS RING UNDER HAMMER
GEN. RATING	SANU					FAIR TO			- 	PER(	CHED WATER,	SATURATED ZONE, OF	WATER BEA	RING STRATA	(MOD.)	GRANITO	ID ROCKS, M	OST FELDSPARS ARE D	ULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE		EXCELLENT TO	GOOD	FAIR	to Poor	POOR	POOR	UNSUITABLE		SPRJ	ING OR SEEP					DULL SO WITH FR	UND UNDER	HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH	
		PIOF A-7-5 SU	BGROUP IS ≤ LL	- 30; PI OF A-7	-6 SUBGROUP IS	> LL - 30					MISCELLA		וו כ		MODERATELY	ALL ROC	K EXCEPT C	DUARTZ DISCOLORED OF	STAINED. IN GRANITOID ROCKS, ALL F
		COMPAC		RANGE OF	STANDARD	RANC	E OF UNC	ONFINED			25/				(MOD. SEV.)	AND CAN	BE EXCAVE	ATED WITH A GEOLOGIS	T'S PICK. ROCK GIVES "CLUNK" SOUND
GENERAL	SOIL TYPE	CONSI		PENETRATIO	N RESISTENCE (ALUE)	COMP	RESSIVE S (TONS/F1	TRENGTH	L ROADWAY EMB	SCRIPT		→ OF ROCK STRU		SLOPE INDICATOR	SEVERE (SEV.)	ALL ROC REDUCED	CK EXCEPT ( ) IN STRENG	DUARTZ DISCOLORED OF TH TO STRONG SOIL.	R STAINED, ROCK FABRIC CLEAR AND E IN GRANITOID ROCKS ALL FELDSPARS (
GRANULA	AR N	MEDIU	DOSE M DENSE	4 10	FO 10/ TO 30/		N/A					VST PMT		INSTALLATION		IF TEST	EXTENT. 5	IELD SPT N VALUES	100 BPF
(NON-CO	HESIVE)	VERY	ENSE DENSE ( SOFT	30	TO 50 50		< 0.25	i	THAN ROADWA	Y EMBA		- CORE BORING	•	TEST SOUNDING ROD	VERY SEVERE (V SEV.)	ALL ROC BUT MAS REMAININ	K EXCEPT G SS IS EFFEC NG. SAPROLI	DUARTZ DISCOLORED OF TIVELY REDUCED TO S TE IS AN EXAMPLE OF	R STAINED. ROCK FABRIC ELEMENTS AF OIL STATUS, WITH ONLY FRAGMENTS O ROCK WEATHERED TO A DEGREE THAT
GENERAL SILT-CL MATERIA	LLY AY NL	S MEDIU S	OFT M STIFF TIFF	2 4 8	TO 4 TO 8 TO 15		0.25 TO 0.5 TO 1 1 TO 2	0.5 1.0		CK LINE	E <sup>MW</sup> (	<pre>     MONITORING ₩     PIEZOMETER </pre>	ill 🔶	TEST BORING WITH CORE	COMPLETE	ROCK RE	S OF ORIGIN	NAL RUCK FABRIC REM SOIL. ROCK FABRIC NO IRATIONS. QUARTZ MAY	AIN. <u>IF TESTED, WOOLD YIELD SPILAL</u> T DISCERNIBLE, OR DISCERNIBLE ONLY BE PRESENT AS DIKES OR STRINGERS
CORESIN	VE)	H	ARD		30		> 4	•	ALLUVIAL SUI	L BUUN		INSTALLATION	<u> </u>	- SPI N-VALUE		ALSU AN	I EXAMPLE.	BUCK H	
			TEXTURE	OR GRAI	N SIZE				<u> </u>	F	RECOMMEN	DATION SYMB	OLS		VERY HARD	CANNOT	BE SCRATCH	ED BY KNIFE OR SHAF	RP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIE OPENING (MM	EVE SIZE M)		4 10 4.76 2.00	40 0.42	60 200 0.25 0.075	270 0.053			UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE						SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B TO DETACH HAND SPECIMEN.				
	R CO	BBLE	GRAVEL	COARSE	FINE		SUIT	CL AY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF					LI WIIN DIFFICULIT, NHAD ANAMER B					
(BLDR.) GRAIN MM	305	(OB.) 75	(GR.) 2.0	SAND (CSE. SD.)	SAND (F SD. 0.25	0.05	SL.) 0.005	(CL.)	AR - AUGER REFUSAL		ABB MED	REVIATIONS	VST ·	· VANE SHEAR TEST	MODERATELY HARD	CAN BE EXCAVAT BY MODE	SCRATCHED IED BY HARE ERATE BLOW	BY KNIFE OR PICK. G BLOW OF A GEOLOGI S.	DUGES OR GROOVES TO 0.25 INCHES DO ST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN.	12	3							BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED					MEDIUM HARD	CAN BE	GROOVED OP	R GOUGED 0.05 INCHES	DEEP BY FIRM PRESSURE OF KNIFE ( FICES 1 INCH MAXIMUM SIZE BY HARD	
	S	SOIL MOI	STURE - I	CORRELA	TION OF	TERMS			CPT - CONE PENETRATIO	N TEST	NP -	NON PLASTIC	$\gamma_{d}$ -	DRY UNIT WEIGHT		POINT O	F A GEOLOG	IST'S PICK.	
(ATT	ERBERG LI	MITS)	DESCRI		GUIDE FOR F	IELD MOI	STURE DES	SCRIPTION	DMT - DILATOMETER TES DPT - DYNAMIC PENETRA	TION T	PMT - EST SAP	PRESSUREMETER TI	ST <u>SA</u> S-E	MPLE ABBREVIATIONS	SOFT	CAN BE FROM CH PIECES	GROVED OR HIPS TO SEV CAN BE BRO	GOUGED READILY BY P REAL INCHES IN SIZE KEN BY FINGER PRESS	NIFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POIN URE.
		LIMIT	(SAT.		FROM BELOW	THE GRO	UND WATE	R TABLE	F - FINE FOSS FOSSILIFEROUS		SL SL SLI	SHID, SHIDT SILT, SILTY SLIGHTLY	SS - ST - RS -	SHELBY TUBE ROCK	VERY SOFT	CAN BE OR MORE FINGERN	CARVED WIT E IN THICKN	H KNIFE. CAN BE EXC ESS CAN BE BROKEN E	AVATED READILY WITH POINT OF PICK. IY FINGER PRESSURE. CAN BE SCRATCH
RANGE <			- WET -	(W)	SEMISOLID; R ATTAIN OPTI	EQUIRES I MUM MOIS	DRYING TO TURE	)	FRAGS FRAGMENTS	IURES	<i>w</i> - N	INICONE REFUSAL	RI- CBR·	· CALIFORNIA BEARING	F	RACTI	URE SPF	AC ING	BEDDING
(PI) PL L	+ PLASTI	C LIMIT							HI HIGHLY					RATIO		-	MORE	SPACING	
OM SL		M MOISTURE AGE LIMIT	- MOIST	- (M)	SOLID; AT OF	NEAR OF	TIMUM MC	ISTURE			ANCING TOOLS:	J UN SUBJECT			WIDE MODERATE CLOSE	- LY CLOSI	3 E 1	TO 10 FEET TO 3 FEET 16 TO 1 FOOT	THICKLY BEDDED 1 THINLY BEDDED 0. VERY THINLY BEDDED 0.0
			- DRY -	(D)	REQUIRES AD ATTAIN OPTI	DITIONAL MUM MOIS	WATER TO TURE	כ			6" CONTINUOL	IS FLIGHT AUGER	CORE SIZ	E:	VERY CLO	SE	LESS	THAN 0.16 FEET	THICKLY LAMINATED 0.00 THINLY LAMINATED <
	1		PLA	STICITY							8 HOLLOW A	UGERS	□-в_	П-н				INDUF	ATION
			PLAST	CITY INDEX	(PI)	DF	Y STRENG	тн	CME-550		HARD FACED	FINGER BITS	<u> </u> -м _		FOR SEDIMEN	TARY RO	CKS, INDURA	TION IS THE HARDEN	ING OF MATERIAL BY CEMENTING, HE
NON SLIC	PLASTIC CHTLY PLAS	STIC		Ø-5 6-15			VERY LOW SLIGHT	I	VANE SHEAR TEST			DE INSERTS	HAND TO	DLS:	FRIABL	.Ε		GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.
MOD HIGH	ERATELY P HLY PLASTI	C	2	16-25 6 OR MORE			MEDIUM HIGH		PORTABLE HOIST			2 15/16 STEEL TEETH		IT HOLE DIGGER	MODER	ATELY IN	<b>IDURATED</b>	GRAINS CAN BE BREAKS EASILY	SEPARATED FROM SAMPLE WITH ST WHEN HIT WITH HAMMER.
			l	JULUK								* TUNGCARB.	Sou	INDING ROD	INDUR	ATED		GRAINS ARE DI DIFFICULT TO	FFICULT TO SEPARATE WITH STEEL BREAK WITH HAMMER.
DESCRIPT MO	IONS MAY DIFIERS SL	INCLUDE COL JCH AS LIGH	OR OR COLOR T, DARK, STREA	COMBINATIO	NS (TAN, RED, E USED TO DE	YELLOW-B	ROWN, BLUE PPEARANCE	E-GRAY). E.			CURE BIT			E SHEAR TEST	EXTRE	MELY INC	JURATED	SHARP HAMMER SAMPLE BREAK	BLOWS REQUIRED TO BREAK SAMPLE S ACROSS GRAINS.





	TERMS AND DEFINITIONS
SPT REFUSAL	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS UFIEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLUDES GRANITE.	SURFACE.
L PLAIN	CALLAREOUS (CALL) - SULS THAT CONTAIN APPRECIABLE AMOUNTS OF CALLION CARBONATE.
IF TESTED.	ULLUVIUM - RUCK FRHUMENTS MIXED WITH SUL DEPOSITED BY URAVITY ON SLOPE OR AT BUTTOM OF SLOPE.
TONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
OATINGS IF OPEN. AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO L FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
5. IN Y. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
RE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
E DISCERNIBLE F STRONG ROCK	DEVELT INDICATES POUR ARMATION AND LACK OF GOUD DRAINAGE. <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF RUCK.
S. SAPROLITE IS	HOCK UDALITY DESIGNATION (HUD) - A MEASURE OF HOCK UDALITY DESCRIBED BY IUTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EP CAN BE	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
R PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPI) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF I FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN &1 FOOT PER 60 BLOWS.
FRAGMENTS T. SMALL.THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: ELEVATIONS OBTAINED FROM R5021_LS_TNL.TIN
THICKNESS 4 FFFT	
.5 - 4 FEET	ELEVATION: FEET
16 - 1.5 FEET 3 - 0.16 FEET	NOTES:
08 - 0.03 FEET	
0.008 FEET	
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE;	





#### **CONTENTS**

SHEET NO. 2

3

5021

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REFERENCE

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

#### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK

PROJECT DESCRIPTION NC 211 FROM SR 1500 (MIDWAY RD.) TO NC 87

SITE DESCRIPTION WALL 13 RIGHT OF -YREV-*STA*. 47+00

STATE PROJECT REFERENCE NO. STATE SHEETS NO. N.CR-5021 1 4

#### **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 (919) 707-6850. 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 DECREE 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 CAUTONED 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 DOS NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTROST TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMINSELF 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 ACUAL CONDITIONS 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.

PERSONNEL

S.N. ZIMARINO

R.E. SMITH

C.E. RAWLINS

INVESTIGATED BY \_\_\_\_\_. BOTTOMS DRAWN BY \_T.C. BOTTOMS CHECKED BY \_\_\_\_\_\_. D.N. ARGENBRIGHT SUBMITTED BY \_\_\_\_\_\_. ARGENBRIGHT DATE JUNE 2018



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL DESCRIPTIO	N			GRADATION		ROCK DESCRIPTION			
SOIL IS CONSIDERED UNCONSO BE PENETRATED WITH A CONT ACCORDING TO THE STANDAR IS BASED ON THE AGSHT CONSISTENCY, COLOR, TEXTURE	LIDATED, SEMI-CONSOLIDATED, OR W NUOUS FLIGHT POWER AUGER AND ) PENETRATION TEST (AASHTO T 24 ) SYSTEM, BASIC DESCRIPTIONS GE MOISTURE, AASHTO CLASSIFICATION	EATHERED EARTH MATERI YIELD LESS THAN 100 BL 36, ASTM D1586). SOIL CL NERALLY INCLUDE THE F I, AND OTHER PERTINENT	ALS THAT CAN OWS PER FOOT ASSIFICATION OLLOWING: FACTORS SUCH	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	ES A GOOD REPRESENTATION OF PARTICL IDICATES THAT SOIL PARTICLES ARE ALL S A MIXTURE OF UNIFORM PARTICLE SIZ ANGULARITY OF GRAIN	LE SIZES FROM FINE TO COARSE. . APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES. IS	HARD ROCK IS I ROCK LINE INDI SPT REFUSAL I BLOWS IN NON- REPRESENTED BOCK MATERIA	NON-COASTAL PLAIN MATERIAL THAT ICATES THE LEVEL AT WHICH NON-C IS PENETRATION BY A SPLIT SPOON -COASTAL PLAIN MATERIAL, THE T BY A ZONE OF WEATHERED ROCK. S APE TYPICALLY DIVIDED AS EQUI-	WOULD YIELD SPT REFUSAL IF TEST DASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EQUAL TO OR LESS THAN 0. RANSITION BETWEEN SOIL AND ROCK	
VERY STIFF.GRAY.SILTY	CLAY,MOIST WITH INTERBEDDED FINE S	AND LAYERS, HIGHLY PLASTIC	(AMPLE, ,A-7-6	THE ANGULARIT	Y OR ROUNDNESS OF SOIL GRAINS IS DE	SIGNATED BY THE TERMS:	WEATHERED	NON-COASTAL PI	AIN MATERIAL THAT WOULD YIELD SP	
SOIL L	GEND AND AASHTO CL	ASSIFICATION		- <u>HNOULHR</u> , <u>SUBHN</u>	MINERAL OGICAL COMPOSI	TION	ROCK (WR)	100 BLOWS PER	FOOT IF TESTED.	
GENERAL GRANULAR CLASS. (≤ 35% PAS	ATERIALS SILT-CLAY MA SING #200) (> 35% PASSI	TERIALS NG =200) ORGANI	C MATERIALS	MINERAL NAM	MES SUCH AS QUARTZ, FELDSPAR, MICA, TF	ALC, KAOLIN, ETC.	CRYSTALLINE	WOULD YIELD SF	E GRAIN IGNEOUS AND METAMORPHIC RO PT REFUSAL IF TESTED. ROCK TYPE IN	
GROUP A-1 A-3	A-2 A-4 A-5 4	A-6 A-7 A-1, A-2 A	-4, A-5	ARE USED IN	DESCRIPTIONS WHEN THEY ARE CONSIDE	ERED OF SIGNIFICANCE.		INF FINE TO COARSE	SCHIST,ETC. GRAIN METAMORPHIC AND NON-COAST4	
CLASS. A-1-a A-1-b A-2	4 A-2-5 A-2-6 A-2-7	A-7-6 A-3 A	-6, A-7	SLIG	LUMPRESSIBILITY	LL < 31	ROCK (NCR)	ROCK TYPE INCI	OCK THAT WOULD YEILD SPT REFUSAL .UDES PHYLLITE, SLATE, SANDSTONE, ETI	
SYMBOL 00000000000				MODE HIGH	RATELY COMPRESSIBLE	LL = 31 - 50 LL > 50	COASTAL PLAIN SEDIMENTARY R	COASTAL PLAIN	SEDIMENTS CEMENTED INTO ROCK, BUT	
7 PASSING 10 50 MX		GRANULAR	SILT- MUCK,		PERCENTAGE OF MATER	IAL	(CP)	SHELL BEDS, ET		
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35	1X 35 MX 35 MX 35 MX 36 MN 36 MN 36	SOILS	SOILS	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH R		INTS MAY SHOW SUIGHT STAINING, ROCK	
MATERIAL PASSING *40 LL 40	1X 41 MN 40 MX 41 MN 40 MX 41 MN 40	OMX 41 MN SOILS WIT	H R Utour X	TRACE OF ORGANIC MU LITTLE ORGANIC MAT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12% 5 - 10% 12 - 20% > 10% > 20%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	VERY SLIGHT RI (V SLI.) C	AMMER IF CRYSTALLINE. NOCK GENERALLY FRESH, JOINTS STAINE RYSTALS ON A BROKEN SPECIMEN FAC	ED,SOME JOINTS MAY SHOW THIN CLAY C E SHINE BRIGHTLY. ROCK RINGS UNDER H	
CROUP INDEX 0 0	1X 10 MX 11 MN 11 MN 10 MX 10 MX 11 0 4 MX 8 MX 12 MX 16		ORGANIC		GROUND WATER			F A CRYSTALLINE NATURE.		
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND SAND	SILTY OR CLAYEY GRAVEL AND SAND SOILS	CLAYEY MATTER SOILS	SOILS		WATER LEVEL IN BORE HOLE IMMEDIAT	TELY AFTER DRILLING	(SLI.) 1	INCH. OPEN JOINTS MAY CONTAIN CLA RYSTALS ARE DULL AND DISCOLORED.	Y. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALLINE ROCKS RING UNDER HAMMER	
MATERIALS SANU		FAIR TO		 	PERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA	(MOD.) G	RANITOID ROCKS, MOST FELDSPARS ARI	E DULL AND DISCOLORED, SOME SHOW CLA	
AS SUBGRADE	TO GOOD FAIR TO F	POOR POOR	POOR UNSUITABLE		SPRING OR SEEP			ULL SOUND UNDER HAMMER BLOWS AND VITH FRESH ROCK.	) SHOWS SIGNIFICANT LOSS OF STRENGTH	
PI OF A-7-5	SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 S	SUBGROUP IS > LL - 30					MODERATELY A	LL ROCK EXCEPT QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F	
	RANGE OF S	TANDARD RANGE	OF UNCONFINED			L3	(MOD. SEV.) A	ND CAN BE EXCAVATED WITH A GEOLO	GIST'S PICK. ROCK GIVES "CLUNK" SOUND	
COM OF NERALLY	INSISTENCY PENETRATION R (N-VAL)	ESISTENCE COMPRES	SIVE STRENGTH ONS/FT <sup>2</sup> )		ANKMENT (RE) 25/025 DIP & DIP DIRE SCRIPTION OF ROCK STRUC	ECTION TURES ING SLOPE INDICATOR	SEVERE AI (SEV.) RI	LL ROCK EXCEPT QUARTZ DISCOLORED REDUCED IN STRENGTH TO STRONG SOIL	OR STAINED. ROCK FABRIC CLEAR AND E . IN GRANITOID ROCKS ALL FELDSPARS (	
GRANULAR ME	LOOSE 4 TO DIUM DENSE 10 TO	10 30	N/A				<u>I</u>	F TESTED, WOULD YIELD SPT N VALUE	STRUNG RULK USUALLY REMAIN.	
(NON-COHESIVE) V	DENSE         30 TO           IRY DENSE         > 50           ERY SOFT         < 2	50	< 0.25		IL BOUNDARY		VERY AL SEVERE BI (V SEV.) RI	LL ROCK EXCEPT QUARTZ DISCOLORED UT MASS IS EFFECTIVELY REDUCED TO TEMAINING, SAPROLITE IS AN EXAMPLE	OR STAINED. ROCK FABRIC ELEMENTS AF D SOIL STATUS, WITH ONLY FRAGMENTS O OF ROCK WEATHERED TO A DEGREE THAT	
GENERALLY SILT-CLAY ME MATERIAL (COHESIVE) V	SOFT         2 TO           DIUM STIFF         4 TO           STIFF         8 TO           FBY STIFF         15 TO	4 0.2 8 0. 15 30	25 TO 0.5 5 TO 1.0 1 TO 2 2 TO 4				COMPLETE RI	SCATTERED CONCENTRATIONS. QUARTZ N	NOT DISCERNIBLE, OR DISCERNIBLE ONLY MAY BE PRESENT AS DIKES OR STRINGER	
	HARD > 30		> 4				"	ROCK	HARDNESS	
	TEXTURE OR GRAIN	SIZE			RECOMMENDATION SYMBO		VERY HARD C	ANNOT BE SCRATCHED BY KNIFE OR S	HARP PICK. BREAKING OF HAND SPECIMEN	
U.S. STD. SIEVE SIZE OPENING (MM)	4 10 40 60 4.76 2.00 0.42 0.2	0 200 270 25 0.075 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE		EVERAL HARD BLOWS OF THE GEOLOGI	ST'S PICK. ONLY WITH DIFFICULTY HARD HAMMER B	
BOULDER COBBLE	GRAVEL COARSE	FINE	CLAY	SHALLOW UNDERCUT	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	T	O DETACH HAND SPECIMEN.		
(BLDR.) (COB.) GRAIN MM 305 75	(GR.) SANU (CSE. SD.) 2.0 0.2	(F SD.) (SL. (SS.) (SL.) (SS.)	) (CL.) 0.005	AR - AUGER REFUSAL	ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	HARD E	AN BE SCRATCHED BY KNIFE OR PICK. XCAVATED BY HARD BLOW OF A GEOLO Y MODERATE BLOWS.	GOUGES OR GROOVES TO 0.25 INCHES DE DGIST'S PICK. HAND SPECIMENS CAN BE D	
SIZE IN. 12 3				BT - BORING TERMINATED — CL CLAY	) MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT	MEDIUM CA HARD CA	AN BE GROOVED OR GOUGED 0.05 INCH	IES DEEP BY FIRM PRESSURE OF KNIFE O D PEICES 1 INCH MAXIMUM SIZE BY HARD	
		DN OF TERMS		_ CPT - CONE PENETRATION	N TEST NP - NON PLASTIC	$\dot{\gamma}_{d}$ - DRY UNIT WEIGHT	Pr	OINT OF A GEOLOGIST'S PICK.		
(ATTERBERG LIMITS)	- SATURATED -		RE DESCRIPTION	DMT - DILATOMETER TES DPT - DYNAMIC PENETRA	T PMT - PRESSUREMETER TES	ST <u>SAMPLE ABBREVIATIONS</u> S - BULK	SUFT CA	AN BE GROVED OR GOUGED READLLY B ROM CHIPS TO SEVERAL INCHES IN SI PIECES CAN BE BROKEN BY FINGER PRE	Y KNIFE OR PICK. CAN BE EXCAVATED IN ZE BY MODERATE BLOWS OF A PICK POIN SSSURE.	
	(SAT.) FF	ROM BELOW THE GROUND	WATER TABLE	F - FINE - FOSS FOSSILIFEROUS	SL SILT, SILTY SLI SLIGHTLY SLI SLIGHTLY	ST - SHELBY TUBE RS - ROCK	VERY CA SOFT OI F	AN BE CARVED WITH KNIFE. CAN BE E JR MORE IN THICKNESS CAN BE BROKET INGERNAIL.	XCAVATED READILY WITH POINT OF PICK. N BY FINGER PRESSURE. CAN BE SCRATCH	
RANGE <	- WET - (W) SE	MISOLID; REQUIRES DRY TAIN OPTIMUM MOISTUR	ING TO RE	FRAGS FRAGMENTS	w - MOSTURE CONTENT	CBR - CALIFORNIA BEARING	FR	ACTURE SPACING	BEDDING	
"" PLL PLASTIC LIMIT							VERY WIDE	<u>SPACING</u> MORE THAN 10 FEET	TERM VERY THICKLY BEDDED	
OM _ OPTIMUM MOIST SL _ SHRINKAGE LIMI	JRE - MOIST - (M) SC T	DLID; AT OR NEAR OPTIN	NUM MOISTURE	DRILL UNITS:	ADVANCING TOOLS:		WIDE MODERATELY CLOSE	3 TO 10 FEET ( CLOSE 1 TO 3 FEET 0.16 TO 1 FOOT	THICKLY BEDDED 1 THINLY BEDDED 0. VERY THINLY BEDDED 0.0	
	- DRY - (D) RE	OUIRES ADDITIONAL WA	TER TO RE	CME-55	6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED 0.00 THINLY LAMINATED <	
	PLASTICITY			1	8' HOLLOW AUGERS	🗌 -в С-н		INDI	JRATION	
NON PLASTIC	PLASTICITY INDEX (PI) 0-5 6-15	DRY VEI	<u>STRENGTH</u> RY LOW	CME-550	HARD FACED FINGER BITS		FOR SEDIMENTA	RY ROCKS, INDURATION IS THE HARD RUBBING WIT GENTLE BLO	VENING OF MATERIAL BY CEMENTING.HE TH FINGER FREES NUMEROUS GRAINS; W BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC HIGHLY PLASTIC	16-25 26 OR MORE	м 			X CASING V/ ADVANCER X TRICONE <u>2 <sup>15</sup>/16</u> *STEEL TEETH		MODERAT	IELY INDURATED GRAINS CAN BREAKS EAS	BE SEPARATED FROM SAMPLE WITH ST ILY WHEN HIT WITH HAMMER.	
	COLOR			4 🗂	TRICONE TUNGCARB.		INDURATE	ED GRAINS ARE	DIFFICULT TO SEPARATE WITH STEEL	
DESCRIPTIONS MAY INCLUDE MODIFIERS SUCH AS L	COLOR OR COLOR COMBINATIONS GHT, DARK, STREAKED, ETC. ARE U	(TAN, RED, YELLOW-BROW SED TO DESCRIBE APPE	N, BLUE-GRAY). ARANCE.		CORE BIT	VANE SHEAR TEST	EXTREME	ELY INDURATED SHARP HAMM SAMPLE BRE	ER BLOWS REQUIRED TO BREAK SAMPLE AKS ACROSS GRAINS.	





	TERMS AND DEFINITIONS
D. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT CLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
L PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
F TESTED.	$\underline{\text{COLLUVIUM}}$ - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NUT YIELD TONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DATINGS IF OPEN. AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN Y. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
DSS OF STRENGTH WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VIDENT BUT	ITS LATERAL EXTENT.
INE KHOLINIZED	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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR	UF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RESJ SUIL - SUIL FORMED IN PLACE BY THE WEATHERING OF ROLK.
. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
05011050	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT BOCK.
5 REQUIRES	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT 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
BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS T. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	RENCH MARKE FLEVATIONS OBTAINED FROM R502LLS TNL TIN
THICKNESS	
4 FEET 5 - 4 FEET	ELEVATION: FEET
6 - 1.5 FEET	NOTES.
3 - 0.16 FEET	
0.008 FEET	
AT, PRESSURE, ETC.	
EEL PROBE;	



