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

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>New</u> Hanover

PROJECT DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington

SITE DESCRIPTION Bridge on SR 1409 (Military Cutoff Rd.)

(-L-) over US 17 Business/Market Street (-Y1-) at -L-

Sta. 38 + 94.20

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U–4751	1	17

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 RALEGICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, CEDTECHNICAL ENGINEERING UNIT AT 1919) TOT-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 SUBSURFACE DATA AND MAY NOT INCEESSARILY 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 SOLL MOISTURE CONDITIONS MOICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTIGE 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.

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DRAWN BY _____ D. Racey

CHECKED BY <u>B. Howey</u>, PG, PE

SUBMITTED BY __HDR, Inc.

DATE January 2015



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL DESCRIPTION			GRADATION		HADD DOCK IC NON	ROCK DES	SCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLII BE PENETRATED WITH A CONTINU	DATED, SEMI-CONSOLIDATED, OR WEATHERED EA JOUS FLIGHT POWER AUGER AND YIELD LESS	ARTH MATERIALS THAT CAN THAN 100 BLOWS PER FOOT	WELL GRADED - INDICAT	(ES A GOOD REPRESENTATION OF PARTICL!	E SIZES FROM FINE TO COARSE.	ROCK LINE INDICAT	ES THE LEVEL AT WHICH NON-COA	STAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD F	PENETRATION TEST (AASHTO T 206.ASTM D15	586). SOIL CLASSIFICATION	GAP-GRADED - INDICATE	S A MIXTURE OF UNIFORM PARTICLE SIZE	S OF TWO OR MORE SIZES.	SPT REFUSAL IS P	ENETRATION BY A SPLIT SPOON SA	MPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, M	OISTURE. AASHTO CLASSIFICATION. AND OTHER	CLUDE THE FULLOWING: R PERTINENT FACTORS SUCH			5	REPRESENTED BY A	ZONE OF WEATHERED ROCK.	NSTITUN BETWEEN SUIL HND NOCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPO	OSITION, ANGULARITY, STRUCTURE, PLASTICITY,	ETC. FOR EXAMPLE.	THE ANGULARIT	Y OR ROUNDNESS OF SOIL GRAINS IS DE?	SIGNATED BY THE TERMS:	ROCK MATERIALS A	RE TYPICALLY DIVIDED AS FOLLOW	S:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILLY CLA	AY, MUISI WITH INTERBEDDED FINE SAND LAYERS, H	HIGHLY PLASTIC, A-7-6	ANGULAR, SUBAN	NGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED	NON-COASTAL PLAI	N MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SUIL LEU	END AND AASHIU LLASSIFIL	ATION		MINERALOGICAL COMPOSI	ION	RULK (WR)	IDD BLOWS PER FO	JULI IF LESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CLASS. (≤ 35% PASSIN	G #200) (> 35% PASSING #200)	ORGANIC MATERIALS	MINERAL NA	MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LC, KAOLIN, ETC.	CRYSTALLINE	WOULD YIELD SPT	REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	SURFACE.
GROUP A-1 A-3	A-2 A-4 A-5 A-6 A-7	A-1 A-2 A-4 A-5	ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	RULK (LR)	GNEISS, GABBRO, SC	HIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4	A-2-5 A-2-6 A-2-7 A-7-5	A-3 A-6, A-7		COMPRESSIBILITY		NON-CRYSTALLINE	FINE TO COARSE G	THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
			SLIG	HTLY COMPRESSIBLE	LL < 31	RULK (NLR)	ROCK TYPE INCLUD	ES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
			MODE HIGH	LATELY COMPRESSIBLE	LL = 31 - 50 LL > 50	COASTAL PLAIN SEDIMENTARY ROCK	SPT REFUSAL ROC	DIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD K TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING		GRANIILAR SILT- MUCK		PERCENTAGE OF MATERI		(CP)	SHELL BEDS, ETC.		BY IUTAL LENGTH OF CORE RON AND EXPRESSED AS A PERCENTAGE.
*40 30 MX 50 MX 51 MN		SOILS CLAY PEAT					WEATH	IERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX	35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	50125	ORGANIC MATERIAL	<u>SOILS</u> SOILS	OTHER MATERIAL	FRESH ROCK	FRESH, CRYSTALS BRIGHT, FEW JOINT	S MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL			I TRACE OF ORGANIC M	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10%	HAMM	ER IF CRYSTALLINE.		HORIZONTAL.
LL – – 40 MX	41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN	SOILS WITH	MODERATELY ORGANIC	5 - 10% 12 - 20%	SOME 20 - 35%	VERY SLIGHT ROCK	GENERALLY FRESH, JOINTS STAINED, TALS ON A BROKEN SPECIMEN FACE S	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, SHINE BRIGHTLY ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX	10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN	MODERATE HIGHLY	HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE	OF A	CRYSTALLINE NATURE.		LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø	8 4 MX 8 MX 12 MX 16 MX NO MX	AMOUNTS OF SOULS		GROUND WATER		SLIGHT ROCK	GENERALLY FRESH, JOINTS STAINED	AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE		ORGANIC	∇	WATER LEVEL IN BORE HOLE IMMEDIAT	ELY AFTER DRILLING	(SLI.) 1 INC	H. OPEN JOINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE HINDTHER FARALLEE TO THE FRACTORE.
OF MAJOR GRAVEL, AND SAND GF	RAVEL AND SAND SOILS SOILS	MHIEN		STATIC WATER LEVEL AFTER 24 H	DURS	LRYS	THES ARE DULL AND DISCULURED. CR	TSTALLINE MULKS KING UNDER HAMMER BLUWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLUSELY SPACED PARALLEL PLANES.
MATERIALS SAND						(MOD.) GRAN	ITOID ROCKS MOST FELDSPARS ARE D	ULL AND DISCOLORED SOME SHOW CLAY, ROCK HAS	FLUAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO	GOOD FAIR TO POOR	FAIR TO POOR UNSUITABLE		FERGRED WHIER, SATURATED ZUNE, UR V	WHICH DEHRIND SIKAIA	DULL	SOUND UNDER HAMMER BLOWS AND S	HOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM BUILT OF SEDIMENTS DEPOSITED BY THE STREAM
				SPRING OR SEEP		WITH	FRESH ROCK.		FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
		LL JU	-		S	MODERATELY ALL	ROCK EXCEPT QUARTZ DISCOLORED OF	R STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FIELD.
			<u> </u>	MISCELEHNEOUS STHIDUE		(MOD. SEV.) AND	CAN BE EXCAVATED WITH A GEOLOGIS	T'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPA	CTNESS OR PENETRATION RESISTENCE	COMPRESSIVE STRENGTH	L ROADWAY EMB	ANKMENT (RE) 25/025 DIP & DIP DIRE	CTION	<u>IF 1</u>	ESTED, WOULD YIELD SPT REFUSAL		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
	(N-VALUE)	(TONS/FT ²)	WITH SOIL DE	SCRIPTION OF ROCK STRUCT	TURES	SEVERE ALL	ROCK EXCEPT QUARTZ DISCOLORED OF	STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY	Y LOOSE < 4		SOIL SYMBOL	PT DAT TEST BORI		(SEV.) REDU	DME EXTENT. SOME FRAGMENTS OF S	IN GRANITUID RUCKS ALL FELDSPARS ARE KAULINIZED TRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIU	UM DENSE 10 TO 30	N/A				<u>IF</u> T	ESTED, WOULD YIELD SPT N VALUES >	100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
(NON-COHESIVE)	DENSE 30 TO 50		THAN ROADWA		TEST	VERY ALL	ROCK EXCEPT QUARTZ DISCOLORED OF	R STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VER	Y DENSE > 50					SEVERE BUT	MASS IS EFFECTIVELY REDUCED TO S	OIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
CENERALLY VER	RY SOFT < 2	< 0.25 0.25 TO 0.5	INFERRED SUL	L BOUNDARY CORE BORING		VEST	IGES OF ORIGINAL ROCK FABRIC REMA	AIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	
SILT-CLAY MEDI	UM STIFF 4 TO 8	0.5 TO 1.0	INFERRED ROC	CK LINE MWONITORING WEL		COMPLETE ROCK	REDUCED TO SOIL. ROCK FABRIC NOT	DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUEL THE DESIGNATION (ROD) - A MEASURE OF ROCK ONALITY DESCRIPTION AT LENGTH OF
MATERIAL	STIFF 8 TO 15	1 TO 2			WITH CORE	SCAT	TERED CONCENTRATIONS. QUARTZ MAY	BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(CUHESIVE) VER	HARD > 30	2104	ALLUVIAL SOI		SPT N-VALUE	ALSO	AN EXAMPLE.		RUN AND EXPRESSED AS A PERCENTAGE.
	TEXTURE OR GRAIN SIZE			RECOMMENDATION SYMBC	IS		ROCK H	ARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
					THE UNCLASSIFIED EXCAVATION -	VERY HARD CANN	OT BE SCRATCHED BY KNIFE OR SHAF	RP PICK. BREAKING OF HAND SPECIMENS REQUIRES	RULK.
OPENING (MM)	4 10 40 60 200 4.76 2.00 0.42 0.25 0.075	270 0.053			ACCEPTABLE, BUT NOT TO BE	SEVE CAN	RAL HARD BLOWS OF THE GEOLOGIST	S MUK.	<u>SILL</u> - AN INTRUSIVE BOUY OF IGNEOUS RUCK OF APPRUXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT. THAT HAS BEEN EMPLACED PARALLEL TO
			SHALLOW	UNCLASSIFIED EXCAVATION -	USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKEILL	HARU LAN TO D	BE SCRATCHED BY KNIFE OR PICK ON ETACH HAND SPECIMEN.	LY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE	GRAVEL SAND SAND	SILT CLAY				MODERATELY CAN	BE SCRATCHED BY KNIFE OR PICK. GO	DUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
	(CSE. SD.) (F SD.)		L	ABBREVIATIONS		HARD EXCA	VATED BY HARD BLOW OF A GEOLOGIS	ST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75	2.0 0.25	0.05 0.005	AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST	BY M	ODERATE BLOWS.		STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
512E IN. 12 3			CL CLAY	MILA MICACEUUS MOD MODERATELY	WEA WEATHERED → UNIT WEIGHT	MEDIUM CAN HARD CAN	BE GROUVED OR GOUGED 0.05 INCHES BE EXCAVATED IN SMALL CHIPS TO P	ULLE BY FIRM PRESSURE OF KNIFE OR PICK POINT.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MO	ISTURE - CORRELATION OF T	TERMS	CPT - CONE PENETRATIO	N TEST NP - NON PLASTIC	Ta- DRY UNIT WEIGHT	POIN	OF A GEOLOGIST'S PICK.	Elses . Mor they not size of them being of the	TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE	FIELD MOISTURE GUIDE FOR FIE	IELD MOISTURE DESCRIPTION	CSE COARSE	ORG ORGANIC		SOFT CAN	BE GROVED OR GOUGED READILY BY K	NIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)	DESCRIPTION		DPT - DYNAMIC PENFTRA	TION TEST SAP SAPROLITIC	S - BULK	FROM	CHIPS TO SEVERAL INCHES IN SIZE	BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TUTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	- SATURATED - USUALLY LIQU	UID; VERY WET, USUALLY	e - VOID RATIO	SD SAND, SANDY	SS - SPLIT SPOON		RE CARVED WITH KNIEF CAN BE EVEN		LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
	(SAT.) FROM BELOW	THE GROUND WATER TABLE	F - FINE	SL SILT, SILTY	ST - SHELBY TUBE	SOFT OR M	ORE IN THICKNESS CAN BE BROKEN B	Y FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC			FRAC FRACTURED. FRAC	TURES TCR - TRICONE REFUSAL	RS - RUCK RT - RECOMPACTED TRIAXIAL	FING	RNAIL.		TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE	- WET - (W) ATTAIN OPTIM	MUM MOISTURE	FRAGS FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FRAC	TURE SPACING	BEDDING	BENCH MARK: N/A
(FI) PL L _ PLASTIC LIMIT			HI HIGHLY	V - VERY	RATIO	TERM	SPACING	TERM THICKNESS	
	MOIST - (M) SOLID: AT OR	NEAR OPTIMUM MOISTURE	<u>E0</u>	UIPMENT USED ON SUBJECT	PROJECT	VERY WIDE WIDE	MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 15 - 4 FEET	ELEVATION: N/A FEET
			DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	MODERATELY CL	OSE 1 TO 3 FEET	THINLY BEDDED 0.16 - 1.5 FEET	NOTES,
	BEQUIRES ADD	NITIONAL WATER TO	CME-45C	CLAY BITS		CLOSE	Ø.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES: DODING AND CODIND CUDEACE - ELEVATIONS ODTAINED EDON
	- DRY - (D) ATTAIN OPTIM	NUM MOISTURE		6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	VENT CLUDE	LLJJ MHN 0.10 FEEL	THINLY LAMINATED < 0.008 FEET	NCDOT-PROVIDED DTM FILE
	PLASTICITY			8" HOLLOW AUGERS	П-в П-н		INDUR	ATION	
		000 075-0	X CME-550			FOR SEDIMENTARY	ROCKS, INDURATION IS THE HARDEN	ING OF MATERIAL BY CEMENTING. HEAT. PRESSURE. ETC.	1 FIAD - FILLED IMMEDIATELY AFTER DRILLING
NON PLASTIC	PLASTICITY INDEX (PI) 0-5	VERY LOW			└─J ⁻ N		RUBBING WITH	FINGER FREES NUMEROUS GRAINS:	
SLIGHTLY PLASTIC	6-15	SLIGHT	VANE SHEAR TEST		HAND TOOLS:	⊢ RIABLE	GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC	16-25	MEDIUM			POST HOLE DIGGER	MODEPATE	INDURATED GRAINS CAN BE	SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLT PLASTIC	26 UK MUKE	HIGH	PORTABLE HOIST	X TRICONE 3 1/8 STEEL TEETH	HAND AUGER	HODERHIELT	BREAKS EASILY	WHEN HIT WITH HAMMER.	
	COLOR			TRICONE TUNGCARB.		INDURATED	GRAINS ARE DI	FFICULT TO SEPARATE WITH STEEL PROBE:	
DESCRIPTIONS MAY INCLUDE CO	DLOR OR COLOR COMBINATIONS (TAN. RED. Y	ELLOW-BROWN, BLUE-GRAY)		CORE BIT			DIFFICULT TO	BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGH	HT, DARK, STREAKED, ETC. ARE USED TO DES	SCRIBE APPEARANCE.				EXTREMELY	INDURATED SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE:	
1							SAMPLE BREAKS	D ALKUSS UKAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



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	- 			 I I I	·	<mark> </mark>	- <mark>-</mark>		5		- 						' ! ! !	 	30)	·					
30.					·		Bro	wn,dark	8)	<u>_bro</u> i	win_&_ta	h,loose_to_	very	18	<u></u>	ense,fir	e_to_co	arse SA	ND 3		(Å-3,	. <u>A-2</u> -	-4),			
									0/0.9					22	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1 1 1 1	 	26							
20 _	- +	 	 		·	l	 	-+		0 0 0 0	-+		·				 	 +				+ 				
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0.	- 1								0-	<u>.</u>				36-	0 0				(6	0000 0000 0000		 				· · · · · · · · · · · · · · · · · · ·
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-10	- +	 	 					k DI OWI]		4		(4)			 	/ ₁ +				mqis	it to we	<i>t</i>		
										N	÷			38												
=20			<mark> </mark>		·	Gray-	&-gray-	-brown,-	2		-very-loo	se -to -med	រំប៣	33-	de	nse,fin	e-to-coo	11-se	23)	SAND	+-(A-3	3, A-2-	4);		<u>+</u>
=30	- 1					with w	hite,very	dense,	12-		cemente	d shell lay	vers		(′А-1-b),	wet to		1)	satur	ated				
									5—L B	(四) (丁)			Ø)0/0.5 E	BT_				€0/0.							
-: 40	- +								۶I	4D			·	ні 	AD				(31))		+				· -
																				FIAD						
_ 50	- +		 		·			- -	 	 	- +			+-	·		, 	+ + - - -	- 	 	·	+				
	B) Tan	& ligi	ht gray, i	medium de	ense to v	very den	se,GRAV	ËL/SHL	<u>LL</u> SU	BGRADE	(A-/-b)	·									L_ C		JLINE T	AKEN -	FROM R
66CAU]						y nor			·····	 					38+9	94.20			 	 		INF	BY NC	DEPAR		
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000000000000000000000000000000000000000	150	140	130	120	110	100	90	80 7	7 <mark>0 6</mark>	50	50 4	40 30	20	10	<u>د</u>	-) 1	0 2	zio :	0 4	lo	50	60	70	80	j ¢	90 10(

					PROJ	ECT RE	FERENCI	E NO .	SHEET	<i>NO</i> .
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		FEET								
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XIST ING	GROUND SU	URFACE	, , , , ,				; ; ;			50
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	<u> </u>	⊆ ¦(B)	 	 	 	 	 			40
.A-2-4)									30
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 7-5/6)		-								
moist i	o wet	·	+	·			+			-10
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–L–¦ GR(B	DUNDLIN Y NC D	NE TAKÉ EPARTM	n fro Ent of	m róa Trans	DWAY 1 PORTATI	DESIGN	PLANS TED 9/24	PROVII 4⁄14	DED	
	RED STR		'HY⊨IS PROJEC	drawn Ted Oi	THROUN THE	JGH TH SECTION	E BORIN	IG, WI	H	
60	70	80	90	100	110	120	130	140	150	



WBS	4 0191	.1.2			ТІ	P U-4751	COUNT	Y NEW HAI	NOVER			G	EOLOGIST C. Futral			WBS	40191	.1.2			TI	9 U-4751	COUNTY
SITE	DESCR	IPTION	BRID	DGE O	N -L- (MILITARY CUTOFF	RD.) OVE	R -Y1- (US 17	7/MARK	ET ST.)			GROUND WT	R (ft)	SITE	DESCR	IPTION	BRI	DGE O	N -L- (I	MILITARY CUTOFF	RD.) OVER
BOR	ing no.	EB1-	4		S	FATION 37+50		OFFSET (60 ft LT			A	LIGNMENT -L-	0 HR.	N/A	BOR	NG NO.	EB1-0	С		ST	ATION 38+22	(
COL	LAR EL	EV. 45	5.5 ft		т	OTAL DEPTH 64.9	ť	NORTHING	i 189,4	28		E	ASTING 2,354,620	24 HR.	10.1	COLI	LAR ELE	EV . 44	.9 ft		тс	DTAL DEPTH 64.3 f	it I
DRIL	RIG/HAN	MMER EF	F./DATI	E CAT	-1303 C	ME-550 77.2% 01/09/201	4		DRILL	NETHOD) Mi	ud Ro	tary HAMM	IER TYPE Autom	atic	DRILL	. RIG/HAM	IMER EF	F./DAT	E CAT	1303 CI	VE-550 77.2% 01/09/201	4
DRIL	LER W	/. Miller			S	TART DATE 09/04/	14	COMP. DA	TE 09/	04/14		s	URFACE WATER DEPTH N	/A		DRIL	LER W	. Miller			ST	ART DATE 09/04/	14
ELEV	DRIVE	DEPTH	BLC	w co	UNT	BLOWS	PER FOO	T	SAMP.		L		SOIL AND ROCK DES	CRIPTION		ELEV	DRIVE FL FV	DEPTH	BLC	ow col	JNT	BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	моі	Ğ	ELE	EV. (ft)	DE	PTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50 7
50		Ļ										L				45	44.0-				_		
		ŧ										F						0.0	11	6		· · • • 13· · · · · ·	
45	45.4	‡										- 45.	5 GROUND SURF	ACE	0.0	10	42.1	2.8	2	6	8	· · · · · · · · · · · · · · · · · · ·	
40	45.1		4	12	15	· · · · . 0 27 · · ·					X	44.:	2 ARTIFICIAL FI TAN SAND AND GRAV	LL /EL. MOIST	1.3	40	-	F.					· · · · ·
	42.1	3.4	3	3	5			- -			\bigotimes	- - 41.	5	,	4.0		37.1	7.8	28	35	30	`. 	
40	-	‡			5							Ē	BROWN SAND MOIS	AL PLAIN T TO SAT		35	-	÷	20	55	30	· · · · · · · · · · · · · · · · · · ·	•65
	07.4	‡						· · · · · · · · · · ·					,,,				-	40.0					
25		8.4	7	13	24	↓ · · · · ↓ ↓ 37 ·										20		12.8	9	17	15	· · · · · · · · · · · · · · · · · · ·	
- 35	-	ŧ										-				- 30	-	F					· · · · ·
	32.1	13.4	18	17	21			· · · · · · · · · · ·				- - 31.	5		14.0		27.1	17.8		12	15	: : : : /: : : :	
30	-	ŧ			21						0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Ē	RED BROWN SAN	AL PLAIN D. SAT.		25	-	÷		12		•••••	
	07.4	+						· · · · · · · · · · ·			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	}- }-		, -			-						
25		+ 10.4	11	20	31		51	· · · · · ·			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-				20			4	8	10		
25	-	ŧ				· · · · · · · · ·	· · · ·				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					20	-	+					
	22.1	23.4	7	9	10			 			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0) -					17.1	27.8	7	13	15		
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	17 1	+				::::::		 			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Ļ					-	-					· · · · ·
15	15 1	20.4	4	6	10	 					0 0 0 0 0 0 0 0 0 0 0 0)- 				10		32.0	6	9	12	21	
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	12.1	33.4	7	12	14			· · · · · ·			0 0 0 0 0 0 0 0 0 0 0 0)- }-					7.1	37.8	3	4	7		
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5		ŧ				· · · <i> </i> · · · ·					0000	-				0			3	7	10	17	
	-	ŧ									0000	F					-	F					
	2.1	43.4	3	4	6						0000	-					-2.9	47.8	6	3	2		
0	-	Ŧ									0000	-				-5	-	F				4 5	+ • • • •
9/15	-29	48.4				.					0000	F					-7.9	52.8					
-5		Ŧ	2	3	3						0 0 0 0 0 0 0 0 0 0 0 0	F				-10	-		WOH	2	2	$ \mathbf{\phi}_{4} \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot $	
		Ŧ										<u>-6.</u> 5	5		<u>52.0</u>		-	F					
6	-7.9	53.4	1	1	1							F	DARK GRAY SANDY C	AIN CLAY, WET			-12.9	57.8	2	3	4		
<u>2</u> -10		Ŧ					+ • • •					F				-15	_	F					
G.GP.	-12.9	58.4										F					-17.9	62.8					
00 22 15		Ŧ	WOH	WOH	2	Q 2						F							WOH	2	5	7	
jE0		Ŧ				· · · · · · · · · · · · · · · · · · ·						F					-	F					
51_6	-17.9	63.4	6	9	4							-18			<u>_ 64.0</u>		-	F					
C47	-	Ŧ				13.	1	-				<u> </u>		AN BAT.	04.9		-	F					
UBLE		Ŧ										E	Boring Terminated at Eleva SAND	ation -19.4 ft IN			-	E					
E DC		ŧ										F					-	Ł					
BOR		ŧ										F					-	Ł					
DOI		ŧ										F					-	ł					
ž		L								1													

SHEET 8 OF 17



WBS	40191	.1.2			T	IP	U-4751			С	OUN	ТΥ	NEW	/ HAN	NOVER			GEOLOGI	ST S. Hudso	n		
SITE	DESCR	IPTION	BRI	DGE O	N -L- ((M	IILITARY (CU	TOFF	RD.) OVE	ER - Y	(1- (L	JS 17	/MARKI	ET ST	.)	•			GROUN	ND WTR (ft)
BOR	ing no.	EB1-E	3		S	TA	ATION 38	3+5	50			0	FFSE	ET 4	15 ft RT			ALIGNME	NT -L-		0 HR.	N/A
COL	LAR ELI	EV . 45	.6 ft		Т	от	TAL DEPT	Ή	59.8	ft		N	ORTI	HING	189,5	45		EASTING	2,354,705		24 HR.	8.7
DRILL	RIG/HAN	IMER EF	F./DAT	E CAT	, 1303 C	ME	E-550 77.2%	6 Oʻ	1/09/201	14					DRILL N	IETHO	D Mi	ud Rotary		HAMM	ER TYPE	Automatic
DRIL	LER W	/. Miller			S	ТА	ART DATE		09/04/	14		С	OMP	. DA	FE 09/0	04/14		SURFACE	WATER DEP	TH Ν//	4	
ELEV	DRIVE	DEPTH	BLC	ow co	UNT			E	BLOWS	S PEI	R FOC	т			SAMP.	▼/	L					1
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft		0 2	25		50		75		100	NO.	мо	I G	ELEV. (ft)				DEPTH (ft)
50																						
		Ŧ																F				
		Ŧ																				0.0
45	45.2	0.4	9	11	18	╂		H		-							X°	- 45.0				1.0
	42.3	+ - 33						1			· · ·			•••				<u> 43.6 </u>	UNDIVIDED	D GRAVI	el, mois L plain	<u> </u>
40		Ŧ	5	10	11			21		-		:					0000	-	BROWN SANE	D, MOIST	TO SAT	
-10	-	ŧ															0000					
	37.3	8.3	9	13	15		· · · · ·	Ń	· · · ·	-	· · ·	:					0000	36.8				8.8
35		‡						•	28 \	-		-						+				
		+					· · · ·		· \ 		 	:	•••	· ·				+				
		13.3	10	18	22	11			: :) 40	5		:						1				
30	-	ŧ							<u>/</u>	-								- 28.6				17 0
	27.3	18.3					,	1		-		:		•••			0000					
25		Ł		4	0		_ •10 _			-		-					0000					
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	22.3	23.3	4	8	10		· · · · ·	2		-		-					0000	F				
20	-	Ŧ															0000	F				
	17.3	+ 28.3									· · ·	:					0000					
15		ŧ	4	17	22				39			:					0000	-				
10	-	ŧ							<i>t</i>								0000					
	12.3	33.3	6	8	10	$\left \right $	· · · · /		· · · ·	-	· · ·	-					0000	-				
10	-	‡					018	3		_		-					0000	+				
	73	+ 29.2					· · /· ·		·		 	:	•••	· ·			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	}- }-				
-	1.3	- 30.3	1	4	6	11	10					:					0000	L L				
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	2.3	43.3			14							:					0000	-				
0		ł	7	9	'4		· · · ·)	23		-		•					0000	F				
2		±							 		 	:	•••					<u>-</u> - <u>1.4</u>				<u> </u>
1/19/1	-2.7	<u>48.3</u>	wон	WOH	2					-		:						-	DARK GRAY S	ANDY C	LAY, WE	Г
-5	-	Ŧ					1											-				
0.0	-7.7	53.3			_					-		-						F				
- 		Ŧ	Iмон	1	2		Q 3			-		-										
2		Ŧ					• \ • •											-				
9.9	-12.7	58.3	2	4	14	$\left \right $	· · · · ·		· · · ·	-		-						- 13.7				59.3
	-	ŧ				┢		2		-		-						<u>14.2</u>	COAST GRAY S	F <mark>AL PLA</mark> SAND, SA	IN AT.	<u>59.8</u>
	.	Ŧ																E Boi	ring Terminated	at Eleva	tion -14.2	ft IN
10/4		ŧ																F	3			
с Ц	-	ŧ																F				
OUB		‡																F				
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SHEET 9 OF 17

WBS	4 0191	.1.2			TI	P U-4751	COUNT	Y NEW HA	NOVER			GEOLOGIST	D. Racey		WB	S 4019	1.1.2			TIF	• U-475	1	С	OUNT
SITE	DESCR	IPTION	Bridg	ge on S	SR 140	9 (Military Cutoff Rd.)	over US '	17 Bus./Mark	ket St.					GROUND WTR (ft)	SIT	E DESCR	RIPTION	Bridg	je on S	R 1409	Э (Military	Cutoff R	d.) ove	er US 1
BOR	ing no.	B1-A			ST	TATION 38+57		OFFSET	48 ft LT			ALIGNMENT	-L-	0 HR. N/A	во	ring no	. B1-A			ST	ATION	38+57		
COL	LAR ELI	EV. 47	'.1 ft		т	DTAL DEPTH 80.0	ït	NORTHING	G 189,5	32		EASTING 2,3	354,613	24 HR. FIAD	со	LLAR EL	. EV . 47	.1 ft		тс	TAL DEF	PTH 80.	0 ft	
DRIL	RIG/HAN	MER EF	F./DATI	E F&F	R2175 C	ME-55 76% 02/22/2014		I	DRILL	NETHO	D M	ud Rotary	НАММ	IER TYPE Automatic	DRI	LL RIG/HA	MMER EF	F./DATE	E F&R	2175 CI	ME-55 769	% 02/22/20	14	
DRIL	.LER S	. Davis			S	TART DATE 10/15/	14	COMP. DA	TE 10/	16/14		SURFACE WA	ATER DEPTH N/	/A	DR	LLER S	6. Davis			ST		TE 10/1	5/14	
ELEV	DRIVE	DEPTH	BLC	ow co	UNT	BLOWS	PER FOO	T	SAMP.						ELE		DEPTH	BLO	w cou	JNT	Τ	BLOV	VS PEI	R FOOT
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	мо	I G	SOI ELEV. (ft)	IL AND ROCK DES	SCRIPTION DEPTH (f	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	
															1									
50															-30							N	latch L	∟ine
		Ŧ										-				-31.4	78.5							
		†										47.1	GROUND SURF	ACE 0.	D		†	3	2	3	• 5	· · · · ·	•	
45	45.2	1.9	23	16	23							45.2		1. KMENT2			Ŧ							
	43.6	+ <u>3.5</u> +	13	14	13	27		· · · · · ·				Tan, GR	AVEL/SHELL SUB	GRADE (A-1-b).			‡							
40	-	ŧ										<u>Lignt gra</u>	COASTAL PLA), with trace silt⊇: AIN			‡							
40	38.6	+ 85										– Dark	brown & brown, silt (A-2-4).	ty fine SAND			‡							
		1	20	24	27		5 1	. .		м		-	()				ţ							
35		ŧ										-					ŧ							
	33.6	13.5	27	43	38							-					ŧ							
		Ŧ	2,	-10				81				-					Ŧ							
30	-	F										-					Ŧ							
	28.6 ·	<u>+ 18.5</u> T	35	53	47/0.4					w		-					Ŧ							
25		ŧ							7			- 25.1		22			‡							
	23.6	+ + 23.5				· · · · .							rown, fine to coarse	SAND (A-2-4),			ŧ							
		‡	2	4	5			· · · · · ·		Sat.		-	with trace sit	ι.			‡							
20		1				· · · · · · · · · · · · · · · · · · ·					0 0 0 0	20.1		27.	<u>)</u>		ŧ							
	18.6	28.5	4	9	11	$\left \begin{array}{c} \cdot \cdot$				1.07	0000	Ian, 	tine SAND (A-3), W	lith trace slit.			ţ							
		ł		-		$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $					0000	_					ł							
15	10.0					· · · · · · · · · · · · · · · · · · ·					0000						ł							
		T_33.5_ T	6	12	13	25				w	0000	_					Ŧ							
10		Ŧ				/						- - 10.1		37.			Ŧ							
	8.6	38.5							1			T	an, silty fine SAND	0 (A-2-4).			Ŧ							
		ŧ	3	4	o			· · · · · ·		W		-					Ŧ							
5		ŧ										-					ŧ							
	3.6	+ 43.5 +	1	3	4	.		· · · · · ·		W		-					‡							
0	-	ŧ										-		47			‡							
	-14	+ 48.5										<u> </u>	an & gray, fine SAN	ND (A-3).	<u>,</u>		‡							
9/15		1	5	7	9	••••••••••••••••••••••••••••••••••••••				W	0000	3.2		50.	3		t							
¥5		ŧ										- '	Gray, silty CLAY (A	A-7-5/6).			ŧ							
T.GD	-6.4	53.5	WOH	WOH				.				-					ŧ							
B	.	ł										_					ł							
<u>2</u> -10	· · · · ·	Ŧ					+ • • •					-					Ŧ							
GP.	-11.4 ·	<u>+ 58.5</u> T	wон	WOH	3					м		-					Ŧ							
	-	ŧ										- -14 9		62			ŧ							
	-16.4	- 63.5		-		· · · · · · · · ·							avered dark brown-g	gray, silty fine			ŧ							
10 10		‡	3	6	12					W		_ JANL	$\sum (\pi - 2 - 4) \alpha$ since OLP	-1 (-1 - 3/0).			‡							
-20	-	‡				- /						-19.9		<u>67</u> .	<u></u>		‡							
BLE	-21.4	68.5	2	0	2			.		Sat		_ Gray-br	some clay.	ש (א-∠-4), Witn			‡							
DOD		t										-					t							
<u>ш -25</u>	_26.4	- 73 5				$ \cdot \cdot$						Dark g	ray, fine to coarse S	SAND (A-2-4), 72.			ŧ							
OT B	-20.4	1	5	7	5	• • 12 · · · · ·		.		Sat.		-	with trace clay	y.	1		ŧ							
Ó 30		+															+							

NEW HAN	OVER			GEOLOGIST D. Racey		
7 Bus./Marke	t St.				GROUN	ID WTR (ft)
OFFSET 4	8 ft LT			ALIGNMENT -L-	0 HR.	N/A
NORTHING	189,53	32		EASTING 2,354,613	24 HR.	FIAD
	DRILL M	ETHOD	Muc	Rotary HAMN	IER TYPE	Automatic
COMP. DAT	E 10/1	16/14		SURFACE WATER DEPTH N	Ά	
	SAMP.		L		00071011	
75 100	NO.	мог	G	SUIL AND ROCK DES	CRIPTION	
<u> </u>				Dark gray, fine to coarse s	SAND (A-2-	-4),
		Sat.	¥	-32.9 Boring Termineted at Elevi	ation 22.0	80.0
				SAND (COASTAL	PLAIN)	
				NOTES:		
				1) Water levels not measure	ed due to m	nud
			[rotary drilling techniques a	and boring	-
			F	2) Strata break in split spoo	n at a depti	n of
			F	2.5.3) Driller indicates softer dri	lling at a de	epth
			F	ot 50.3'.		
			Ŀ			
			F			
			F			
			ĹĹ			
			F			
			F			
			F			
			F			
			F			

١	NBS	40191	1.1.2			T	P U-475	1	COUNT	Y NEW HA	NOVER			GEOLOGIST D. Racey			WBS	3 4019	1.1.2			TI	P U-475	1	COUNTY
;	SITE I	DESCR	RIPTION	l Brid	ge on S	SR 140	9 (Military	Cutoff Rd.) over US	17 Bus./Mark	ket St.				G	ROUND WTR (ft)	SITE	DESCR	RIPTION	Bridg	ge on S	R 140	9 (Military	Cutoff Rd.) over US 1
I	BORI	NG NO.	. B1-C	;		S	TATION	38+89		OFFSET	6 ft LT			ALIGNMENT -L-	0	HR. N/A	BOR	ing no	. B1-C			ST	ATION	38+89	
(COLL	AR EL	EV. 4	7.0 ft		Т	OTAL DEP	PTH 79.5	ft	NORTHING	3 189,5	72		EASTING 2,354,647	24	HR. FIAD	COL	LAR EL	EV . 47	'.0 ft		тс	DTAL DE	PTH 79.5	ft
Ī	ORILL	RIG/HAN	MMER E	F./DAT	E F&F	R2175 (CME-55 76%	% 02/22/2014	Ļ	•	DRILL	IETHO	D Mu	/ud Rotary H	MMER T	TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DAT	E F&R	2175 C	ME-55 769	% 02/22/2014	
I	ORILL	ER S	. Davis			S		TE 10/14/	14	COMP. DA	TE 10/	15/14		SURFACE WATER DEPTH	N/A		DRIL	LER S	6. Davis			ST	ART DA	TE 10/14/	14
E	LEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	T	SAMP.	V /	L		SCRIE		ELEV	DRIVE	DEPTH	BLC	w col	JNT		BLOWS	PER FOOT
_	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	мо	I G	ELEV. (ft)	2001	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
	50		Ļ											_			-30	ļ	∔					Mat	ch Line
			‡															-31.5	+ 78.5 +	16	100/0.5		¦	· · · · ·	· · · · · ·
	45	45 1	+ 10											- 45.1 ASPH/	LT	0.0			‡ +						
		43.5	- 3.5	32	32	28			- • •60			D				$\frac{1.0}{26}$			‡						
			ŧ	6	6	11		17		· · · · · ·		D		Light gray, fine SAND (A-3), with	h trace silt.			‡						
_	40	-	ŧ											COASTAL	PLAIN , silty find	e SAND			‡						
		38.5	+ 8.5 +	18	23	27		: ::``	50	· · · · · ·		М		(A-2-	·).				‡						
	35		ŧ							· · · · · ·				35.0		12.0			ŧ						
		33.5	+ + 13.5										0000	Brown to dark brown, fi	ie SAND	(A-3), with			Ŧ						
		•	ŧ	5	8	10	:::•	18				Sat.	00000		ne ont.				Ŧ						
_	30	-	Ŧ				i	<u> </u>					0000					.	Ŧ						
	ŀ	28.5	<u>† 18.5</u> †	5	10	12						Sat.	0000						Ŧ						
	25		Ŧ				/						0000	25.0		22.0			Ŧ						
		23.5	23.5			6	· · · /·							Dark brown, fine to co	rse SAN	ID (A-2-4).			Ŧ						
			Ŧ		4		1 0					Sat.		F					Ŧ						
_	20	-	Ŧ										0000	Brown to tan & light ar	v. fine S/	AND (A-3).			Ŧ						
	ŀ	18.5	T 28.5 I	4	7	10		17				Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	with trac	e silt.	× //			Ŧ						
	15		Ŧ										0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0					Ŧ						
		13.5	33.5	5	9	11						0.04	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0					Ŧ						
			ŧ					20				Sat.	0000						ŧ						
	10	- 0 E	+				;						0000	°					ŧ						
			1 30.5	3	6	9		5				w	00000						‡						
	5	-	ŧ				`	<u> </u>					0000						ŧ						
	-	3.5	43.5	8	15	21				· · · · · ·			0000						ŧ						
	0		ŧ										0000						‡						
	0	-15	+ 48.5					. /					0000	o o					‡						
19/15			‡	10	15	10	· · · - <u></u> .	•25		· · · · · ·		w	0 0 0 0 0 0 0 0 0 0 0 0	°- 3.4		50.4			‡						
)T 1/	-5	-	‡				I I				-			 Gray to dark brown, si 	ty CLAY	(A-7-5/6).			‡						
DT.GI		-6.5	+ 53.5 +	WOH	2	2		· · · · ·		· · · · · ·		М							‡						
ы С	-10	•	ŧ				i : :			· · · · · ·									‡						
z – G	-10	-11.5	+ 58.5											-				· ·	ŧ						
9.9C			ŧ	2	2	4	6			· · · · · ·		м		<u>}</u>					ŧ						
BRI	-15	-	ŧ				<u>· · ×</u> ,	<u> </u>						- <u>15.0</u>		<u> 62.0</u>		.	‡						
GEO		-16.5	+ 63.5 +	16	19	19				· · · · · ·		l w	0 0 0 0 0 0 0 0 0 0 0 0			-3).			‡						
4751	-20	•	‡					: : : 7					0000						‡						
Э Ц		-21.5	+ 68.5										0000					·	ŧ						
OUB			ŧ	10	13	20		33				W	0000						‡						
RED	-25		ŧ					· /· · ·					0000	-25.0 Dark gray fine to coa		<u></u> <u>72.0</u>		.	‡						
DT BC	F	-26.5	<u>† 73.5</u> †	4	6	8						Sat.		with trace	clay.	- ··· - ·//			Ŧ						
NCDC	-30		Ŧ		1		· · F·''												Ŧ						
	- 1	_		•	-	-	· · · · ·		• • • • •			-													

SHEET 11 OF 17



WBS	40191	.1.2			TI	IP U-4751	COUNT	Y NEW HA	NOVER			GEOLOG	ST D. Racey			WB	S 4019	1.1.2			TIF	P U-475	1	C	OUNT
SITE	DESCR	IPTION	Bridg	je on S	SR 140	9 (Military Cutoff Rd.)	over US 1	17 Bus./Mark	æt St.						GROUND WTR (ft)	SIT	E DESCI	RIPTION	Bridg	ge on S	R 1409	9 (Military	Cutoff R	d.) ov	er US 1
BOR	ing no.	B1-B			S	TATION 39+21		OFFSET	35 ft RT			ALIGNME	NT -L-		0 HR. N/A	BO	ring no) . B1-B			ST	ATION	39+21		
COL	LAR ELI	EV. 46	6.9 ft		т	OTAL DEPTH 85.0 f	t	NORTHING	3 189,6	13		EASTING	2,354,680		24 HR. FIAD	co	LLAR EL	.EV. 46	6.9 ft		тс	TAL DE	PTH 85.	0 ft	
DRILI	. RIG/HAN	IMER EF	F./DATE	E F&R	2175 (CME-55 76% 02/22/2014		1	DRILL	IETHO	D M	ud Rotary		НАММ	MER TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DAT	E F&R2	2175 C	ME-55 76°	% 02/22/20	14	
DRIL	LER S	. Davis			S	TART DATE 10/13/2	4	COMP. DA	TE 10/	14/14		SURFACE	WATER DEP	TH N/	/A	DRI	LLER	S. Davis			ST	ART DA	TE 10/1	3/14	
ELEV	DRIVE	DEPTH	BLO	W CO	UNT	BLOWS	PER FOO	T	SAMP.	▼/						ELE			BLC	DW COL	JNT		BLOV	VS PE	R FOOT
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	Имо	I G	ELEV. (ft)	SOIL AND ROO	CK DES	SCRIPTION DEPTH (ft	(ft)	• ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	
50																-30							Ν	latch I	∟ine
	-	Ŧ										-					-31.6	78.5			1	· · · ·	· <u> </u>		<u> </u>
	-	ŧ	ļ							 		46.9	GROUNE		ACE 0.0			Ŧ	100/0.4	4					<u> </u>
45	45.2	1.7	24	37	25						0	45.2			1.7 IKMENT 2.7	-35	_	‡					· 1 · ·		· · · ·
	43.4	3.5	8	6	8	╽╷╷╷╷╷╷╷╷╷	\$ 62 . - • •					42.8 Tar	, GRAVEL/SHEL	L SUBO	GRADE (A-1-b). 4.1	1	-36.6	+ 83.5	23	14	17		: <u>i</u> : :		· · · ·
10	-	ŧ		-	_			· · · · · ·				\ <u>Lig</u>	ht gray, fine SAN	id (A-3) Tal Pla), with trace silt. /			+	-				<u> </u>	•	<u></u>
40							+					I	Dark brown to bro	own, silt -2-4)	Ity fine SAND			+							
		 	10	12	18	↓ · · · · · ↓ · · · · · · · · · · · · ·				м	0000	Bro	wn to dark browr	n, fine S	8.9 SAND (A-3), with			ŧ							
35	-	Ł					+	+++++++++++++++++++++++++++++++++++++++			0000	-	trace to	some s	silt.			ł							
	33.4	13.5				· · · · ·-···	+				0000	-						Ŧ							
	-	Ŧ	9	14	17	9 31				Sat.	0000	-						Ŧ							
30		ŧ					+ • • • •				0000	-						Ŧ							
	28.4	18.5	12	12	14					l w	0000	-						‡							
05	-	ŧ								"	0000	-						‡							
25		+ 22 5				/					0000	<u>24.9</u> Da	rk brown, fine to	coarse	SAND (A-2-4).			‡							
	4		5	8	9					w		-						†							
20	-	Ł													27.0			Ŧ							
	18.4	28.5		45	10							_ Bro	wn to tan & light with t	gray, fir	ine SAND (A-3),			ł							
	-	Ŧ	9	15	19	34				W	0000	-	with t	1000 011				Ŧ							
15		Ŧ					+				0000	-						Ŧ							
	13.4	† 33.5 	5	7	10			· · · · · ·		l w	0000	-						Ŧ							
10	-	‡				· · / / · · · ·					0000	-						‡							
10	84 -	+ 38.5				- /					0000	-						‡							
		1	2	2	3] ●5		· · · · · ·		w	0000	-						‡							
5		ŧ									0000	-						1							
	3.4	43.5	5	9	9						0000	-						ŧ							
	-	ł		0		16				**	0000	-						ł							
0	-	ł				/	+ • • • •				0000	<u> </u>	aht gray fine to g	coarse S	SAND (A-2-4) 47.0			+							
9/15	-1.6	T_48.5_ T	6	5	4					w		-2.9	g g,,		49.8			Ŧ							
-5	-	Ŧ										Gi	ay to dark brown	i, silty C	CLAY (A-7-5/6).			Ŧ							
GDT	-6.6	- 53.5										-						Ŧ							
DOT	-	ŧ	WOH	1	1			· · · · · ·		W		-						Ŧ							
일 <u>-10</u>		ŧ										-						‡							
GPJ	-11.6	58.5	1	2	2	· · · · · · · · · · · · · · · ·		· · · · · ·				-						‡							
2DG.	-	ŧ	.	-	-	••						-						ŧ							
<u> 15</u> 0	-	<u>+</u>					+ • • • •					<u>-15.1</u>	Light grav. fi	ne SAN	<u>ID (A-3).</u> <u>62.0</u>			Ŧ							
E G E	-16.6	1 63.5 1	13	13	14	●27				w	0000	-	5 5 5,0					Ŧ							
-20	-	f.									0000	-						Ŧ							
	-21.6	68.5]		0000	-						Ŧ							
OUB	-	Ŧ	9	11	12					W	0 0 0 0 0 0 0 0 0 0 0 0	-						Ŧ							
비 -25	-	ŧ				<i>i</i>	+ • • • •				0000	25.1	ork arou fire to		72.0			+							
T BO	-26.6	73.5	4	8	9	· · · <i>I</i> . · · · · ·				Sat		_ D -	ark gray, tine to o with tr	ace cla	эаны (а-2-4), ay.			‡							
CDO	-	‡				$\left \left \begin{array}{ccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot &$						-						‡							
z -30		L				I I				1						ı ——		_							



WB	3 4019	1.1.2			TI	P U-4751	COUNT	Y NEW HA	NOVER			GEOLOGIST D. Racey			WBS	4 0191	1.1.2			TIF	P U-4751	COUNTY
SITE	DESCI	RIPTION	Bridg	ge on S	SR 140	9 (Military Cutoff Rd.)	ry Cutoff Rd.) over US 17 Bus./Market St.							GROUND WTR (ft)	SITE	DESCR	RIPTION	Bridge	e on S	R 1409	9 (Military Cutoff Rd.)	over US 17
BOF	NG NO	. EB2-/	4		SI	ATION 39+49		OFFSET	55 ft LT			ALIGNMENT -L-		0 HR. Dry	BOR	ing no.	. EB2-A	4		ST	ATION 39+49	
COL	LAR EL	. EV . 44	.9 ft		т	DTAL DEPTH 78.5 f	ť	NORTHING	1 89,6 ⁻	18		EASTING 2,354,585		24 HR. FIAD	COL	LAR EL	EV . 44	.9 ft		тс)TAL DEPTH 78.5 ft	t
DRIL	L RIG/HA	MMER EF	F./DATI	E F&F	2175 C	ME-55 76% 02/22/2014		,	DRILL N	IETHO) Muc	d Rotary	HAMM	ER TYPE Automatic	DRIL	RIG/HAN	MMER EF	F./DATE	F&R	2175 C	ME-55 76% 02/22/2014	
DRI	LER	S. Davis			ST	ART DATE 10/20/2	14	COMP. DA	TE 10/2	21/14		SURFACE WATER DEP	TH N/	A	DRIL	.LER S	6. Davis			ST	ART DATE 10/20/1	4
ELEV	, DRIVE	DEPTH	BLC	w co	UNT	BLOWS	PER FOOT	Г	SAMP.	▼∕		SOIL AND ROO		CRIPTION	ELEV	DRIVE FL FV	DEPTH	BLO	w cor	JNT	BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	моі	Ğ	ELEV. (ft)		DEPTH (f	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50 7
45	44.9	+		2	2							44.9 GROUNE	SURF	ACE 0.	0 <u>35</u> _	<u> </u>		+		+	<u>Mato</u>	<u>h Line</u>
	11.0	‡		3	3							Gray-brown, silty fir	ne SANI	$D_{(A-2-4)}$, with \int_{-1}^{1}	1		‡					
40	41.4	3.5	9	14	15					Sat	-	40.5 Some brick fra	AL PLA	<u>k gravel.</u> JN4.	4		‡					
	1	‡				· · · · · · · · · · ·					-	 Gray-brown, silty Dark brown & ora 	fine SA	ND (A-2-4).		-	ŧ					
	36.4	+ 8.5									-	SAND	(A-2-4)).			ŧ					
35	-	Ŧ	19	32	43			75		W	-	-				_	ŧ					
		ŧ															ŧ					
30	31.4	+ 13.5 +	16	18	18		1			w	-						ŧ					
00		Ŧ				· · · · · · · · · · · ·					-	-				-	ŧ					
	26.4	18.5									F						Ŧ					
25	-	Ŧ	7	11	14	0 25				Sat.	-	-				_	Ŧ					
		Ŧ									F						Ŧ					
20	21.4	<u>† 23.5</u> †	6	13	16					Sat.	F						Ŧ					
	1	Ŧ				<u> </u>					F	- 17.9		27.	0	-	Ŧ					
	16.4	28.5		10								Brown, fine SAND	(A-3), v	with trace silt.			Ŧ					
15	-	Ŧ	9	16	20	9 36				W	0000	-				-	Ŧ					
		Ŧ															Ŧ					
10	11_4_	<u>T 33.5</u>	7	12	15	4 27				w	0 0 0 0 0 0 0 0 0 0 0 0	_					Ŧ					
		Ŧ									0 0 0 0 0 0 0 0 0 0 0 0	7.9		37.	D		Ŧ					
	6.4	38.5		12	10						E	Tan to light gray, si	Ity fine S	SAND (A-2-4).			Ŧ					
5	-	ŧ		15	19	4 32	· · · · ·					-				-	ŧ					
		+ 49 5															ŧ					
0	1.4	43.5	7	17	25	••••••••••••••••••••••••••••••••••••••	2			w		_				_	Ŧ					
		ŧ															ŧ					
_	-3.6	48.5	6	5	4							-4.1		49.	D		ŧ					
-5	-	ŧ			-	• • • • • • • • • • • • • • • • • • •					Ň	<u>-4.6</u> Dark gray, clayey Grav. silty C	fine SA	<u>ND (A-2-6).</u> -7-5/6).	5	-	ŧ					
9/15		ŧ									N		,)			ŧ					
÷ -10	10.7	+ 55 6									N	-				_	‡					
T.GD	-10.7	+ 55.0	1	2	4	● 6				м	N						‡					
	-13.6	58.5	2	2	4						N						ŧ					
Z -15	-	ŧ	-	_							N	-				-	‡					
G.G	-18.6	+ 63.5									N						‡					
協 -20		+	WOH	2	3	•5 <u></u>				м	N	-				_	‡					
GEO		‡									N	-22.6		67.	5		‡					
1751	-23.6	+ 68.5	11	18	23						0 0 0 0 0 0 0 0 0 0 0 0	Light gray, fi	ne SANI	D (A-3).			‡					
<u>⇒ -∠э</u> щ	1	‡				41	+					-				-	‡					
OUBI	-28.6	+										Dark gray, silty fi	ne to co	barse SAND	4		‡					
습		+	7	7	6	1 3 	+	· · · · ·		W		(A-2-4), wit	n trace (gravel.		-	‡					
T BO		‡										-32.6		77.	5		‡					
ICDO	-33.6	<u>† 78.5</u> †	60/0.0				-	60/0.0	•		┝╌╴╴	-33.6 COASTAL PLAIN S	EDIME	NTARY ROCK 78. DASTAL PLAIN)	5		‡					
<									-				,	<u> </u>			<u>+</u>					

NEW HAN	OVER			GEOLOGIST D. Racey			
Bus./Market	t St.					GROUN	D WTR (ft)
OFFSET 5	5 ft LT			ALIGNMENT -L-		0 HR.	Drv
NORTHING	189.61	18		EASTING 2 354 585		24 HR	FIAD
			Mue		НАММЕ		Automatic
		21/14	iviuC				
JUNIF. DAI	SAMD	_ 1/ 14 	LT	JUNFACE WATER DEPT	in N/A	٦	
75 100	NO.	моі	O G	SOIL AND ROC	K DESC	RIPTION	
	:		-+	Boring Termina Penetration Test Ref ft in SEDIMENTAR PL	ted with fusal at I Y ROCH AIN)	Standard Elevation (COAST	
			F	NOTES:			
				1) 0.0-0.1' = Surficial 2) Strata break in spl 1.1', 4.4', 49.0' and 3) Driller indicates ha of 67.5' and 77.5'.	Organic it spoon 49.5'. arder dril	c Soils at depths lling at de	of pths
				-			
				-			
				-			
				-			
				-			
			F				

WE	S 40 ⁻	191.1	1.2			TI	P U-4751		COUNT	Y NEW HA	NOVER			GE	OLOGIST D. Racey			WBS	3 4019	91.1.2			TI	P U-4751	COUNTY
SIT	E DES	CRIP	PTION	Bridg	ge on S	SR 140	9 (Military C	Cutoff Rd.)	over US ²	17 Bus./Mark	æt St.					GROUND WTR ((ft)	SITE	DESC	RIPTION	Brid	ge on S	R 140	9 (Military Cutof	f Rd.) over US 1
во	ring N	Ю.	EB2-0)		SI	TATION 39	9+89		OFFSET	CL			AL	GNMENT -L-	0 HR. N	I/A	BOF	RING NC). EB2-(С		ST	FATION 39+89)
со	LLAR	ELE\	V . 45	.0 ft		т	OTAL DEPT	H 75.0 ft	t	NORTHING	3 189,6	71		EA	STING 2,354,628	24 HR. 2	2.7	COL	LAR EL	.EV. 45	5.0 ft		тс	OTAL DEPTH	75.0 ft
DRI	LL RIG/H	IAMN	/IER EF	F./DATE	E F&F	R2175 C	ME-55 76%	02/22/2014		1	DRILL	IETHO	D M	ud Rota	у НАММ	ER TYPE Automatic	;	DRIL	L RIG/HA	MMER EF	F./DAT	E F&R	2175 C	ME-55 76% 02/22	2/2014
DR	ILLER	S. [Davis			ST	TART DATE	10/16/1	4	COMP. DA	TE 10/	17/14		SU	RFACE WATER DEPTH N/	'A		DRI	LER	S. Davis			ST	TART DATE 10	0/16/14
ELE			DEPTH	BLO	w co	UNT		BLOWS	PER FOO	T	SAMP.	V /		[CRIPTION		ELEV		DEPTH	BLC	ow cou	UNT	BL	OWS PER FOOT
(ft)	ELE (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 100	NO.	мо	I G	ELEV	. (ft)	DEPTH DEPTH	H (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50
45														45.0	GROUND SURF.	ACE	0.0	-35							Match Line
	44.	8	0.2 /	5	7	6	• 13-					W	<u> </u>	44.8			0.2 0.5		T	+		T	1		
	41.	5 Ŧ	3.5	_									-	41.3	Tan, GRAVEL & SHEL	LS (A-1-b).	3.7			Ŧ					
40	_	Ŧ		5	6	8	14					Sat.	0000		COASTAL PLA Dark gray to dark brown, s	NN ilty fine SAND				Ŧ					
		‡								· · · · · ·			0000	38.0	(A-2-4), with trace gravel f	from 0.5'-1.7'.	7.0			‡					
25	36.	5 ‡	8.5	13	15	17						l w		⊱ -	Dark brown to orange-bro	pwn, silty fine				‡					
- 35	_	+						7 32 1 · · ·						<u>↓</u>	SAND (A-2-4)).				‡					
	31	<u>ج</u> ‡	13.5					<u>/::::</u>		· · · · · ·										‡					
30		Ť		10	13	13		26				Sat.		-						Ŧ					
		Ŧ																		ł					
	26.	5 +	18.5	14	24	20		· · · ``		.				-						ł					
25	_	Ŧ		14	24	30			●54			Sat.		F						Ŧ					
		Ŧ												Ļ						Ŧ					
20	21.	5 +	23.5	16	45	55/0.4						w		÷						Ŧ					
		‡								100/0.9	•			Ļ						Ŧ					
	16.	5 ‡	28.5											Ļ						‡					
15	_	4		14	27	41				68		w		<u>+</u>						‡					
		‡						/		· · · · · ·				13.0			32.0			‡					
1.0	11.	5 ‡	33.5	7	10	11		//					0000	-	Brown, fine SAND (A-3), v	with trace silt.				ţ					
10	_	+		-			−−−− ¶ 2	21					0000							+					
		. ±	20 5										0000	<u>8.0</u>	Tan to light gray, silty fine	SAND (A-2-4).	<u>37.0</u>			ł					
5	0.:	<u> </u>	38.5	6	9	11	· · · •	0				w								Ŧ					
		Ŧ												1						Ŧ					
	1.5	; Ŧ	43.5	10	10	10		×						F						Ŧ					
0	_	Ŧ		10	10	10		•36				w		F.						Ŧ					
		Ŧ												-2.8		2	47.8			Ŧ					
-5	3.	5 +	48.5	wон	wон	1				· · · · · ·		м		ŧ.	Gray, highly silty CLAY	(A-7-5(33)).				Ŧ					
	1	‡					$ \frac{\mathbf{T}}{\mathbf{I}} \cdot \cdot \cdot \cdot$				11	76%		F						Ŧ					
19/15	-8.	5 ‡	53.5					· · · · ·		· · · · · ·				ŧ.						‡					
-10		+		WOH	1	2	\$ 3					м		ŧ.						‡					
T.GL		‡						· · · ·		· · · · · ·										‡					
	-13	5 +	58.5	11	7	29	i <u></u> -	- · · · · ·						-13.7	Crowbrown ailty fing SA		58.7			ţ					
2 -15	<u>></u>	+						4 36						-	Gray-brown, sitty line SP	AND (A-2-4).				Ŧ					
G.G.	10	± ۲	60 F											Ĺ						ł					
0 2 2 0 2 1 8 -20	18	<u> </u>	03.5	13	15	17		32				Sat.		-						Ŧ					
ЭЕO		Ŧ								• • • • •				-						Ŧ					
51_0	-23	<u>5</u>	68.5		-	_								F						Ŧ					
-25	<u>;</u>	Ŧ		8	<i>'</i>	5	9 12					Sat.	0000	-24.8	Light gray, fine SAN	0 (A-3).	69.8			Ŧ					
JBLE		‡												-27.0	Gray-brown silty fine SA		<u>72.0</u>			‡					
DOL	-28	5 ‡	73.5	1	1	2	/					Sat		-	Gray-Diown, Silly inte SA	ייש (איב- <i>יי</i> ן). -	75 0			‡					
BORE -3C		+					<u> </u>	1	1		4				Boring Terminated at Eleva	ation -30.0 ft in	, 5.0			‡					
OT E		‡												þ	SAND (COASTAL	PLAIN)				‡					
NCF		<u>+</u>												E						<u>†</u>					

NEW HAN	IOVER			GEOLOGIST D. Racey			
Bus./Marke	t St.					GROUN	D WTR (ft)
OFFSET C	L			ALIGNMENT -L-		0 HR.	N/A
NORTHING	189.67	71		EASTING 2.354.628		24 HR.	2.7
		IFTHOD	Mud	Rotary	НАММЕ		Automatic
	F 10/2	17/14	iviac		н N//		/ atomato
CONF. DAT			LI	SURFACE WATER DEFT		<u>،</u>	
75 100	NO.	моі	0 G	SOIL AND ROC	K DESC	RIPTION	I
	L						
			E	NOTES:			
			F	 Boring located in b Strata break in spli 	usiness t spoon	parking I	ot.
			F	. 0.5', 3.7', 58.7' and	69.8'.	ing of a d	onth
			F	of 47.8'.		ing at a u	epui
			Ę	Other Samples:			
			F	ST-1 (50.0 - 52.0)			
			F				
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WBS	4 0191	.1.2			TI	P U-4751	COUNT	Y NEW HAP	NOVER			GEOLOGIST D. Racey			WBS	3 4019	1.1.2			TIP	U-4751	COUNTY
SITE	DESCR	IPTION	Bridg	ge on S	SR 140	9 (Military Cutoff Rd.)	over US 1	17 Bus./Marke	et St.					GROUND WTR (ft)	SITE	DESCR	RIPTION	Bridge	on SR '	1409 (I	Military Cutoff Rd.)	over US 17
BOR	ING NO.	EB2-I	В		S	FATION 40+18		OFFSET 4	14 ft RT			ALIGNMENT -L-		0 HR. N/A	BOR	ING NO	. EB2-E	3		STAT	TION 40+18	
COL	LAR EL	EV. 45	5.1 ft		т	OTAL DEPTH 70.0	ť	NORTHING	189,7	11		EASTING 2,354,662		24 HR. 6.5	COL	LAR EL	EV. 45	.1 ft		TOTA	AL DEPTH 70.0 ft	t
DRIL	RIG/HAN	IMER EF	F./DATI	E F&R	2175 C	CME-55 76% 02/22/2014			DRILL N	IETHOD) Mu	ud Rotary H	AMME	ER TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DATE	F&R217	5 CME	-55 76% 02/22/2014	•
DRI	.LER S	. Davis			S	TART DATE 10/20/	4	COMP. DAT	FE 10/2	20/14		SURFACE WATER DEPTH	N/A	4	DRIL	LER S	6. Davis			STAF	RT DATE 10/20/1	4
ELEV	DRIVE	DEPTH	BLC	ow co	UNT	BLOWS	PER FOO	Г	SAMP.	▼/	L		DESC		ELEV	DRIVE	DEPTH	BLOW	V COUN	Г	BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	моі	G	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft 0.	5ft 0) 25	50
50		+										-			<u>30</u> _	+	+	+		-+-		
45		I										- - - 45.4 GROUND S		ACE aa			Į					
10	44.9	- 0.2	11	8	10	- 18				D	***						ŧ					
	41.6	3.5				/		· · · · · ·				- ^{42.1} - Tan, GRAVEL & S	AL FIL	<u>-S (A-1-b).</u>			‡					
40	-	ŧ	4	3	4	<u> </u>				Sat.		- COASTAL Gray, fine SAND (A	- PLAI -3), wi	IN / ith trace silt.			‡					
		ŧ						· · · · · ·				Dark brown to orang	e-bro	wn, silty fine			‡					
35	36.6	8.5	15	18	16			· · · · · ·		Sat.).				‡					
	-	ŧ										-				· ·	+					
	31.6	- 13.5	_			: : : : / : : : :		· · · · · ·				-					‡					
30	-	ŧ	5	9	12	<u> </u>				Sat.		-					‡					
		ŧ				:::; i ::::		· · · · · ·				-					‡					
25	26.6	+ 18.5 +	10	12	6	 				Sat.		-					‡					
20	-	ŧ				 						-					‡					
	21.6	23.5			- 10	:::i\ ::::		· · · · · ·				-					ŧ					
20	-	ŧ	'	11	13	Q 24		· · · · · ·		Sat.		-				.	ŧ					
		ŧ				\		· · · · · ·				-					ŧ					
15	16.6	+ 28.5 	9	17	16	33				Sat.		-					ŧ					
10	-	ŧ				/						— - 13.1		32.0		·	Ŧ					
	11.6	33.5		7	10	,					0000	Brown, fine SAND (A	4-3), w	vith trace silt.			Ŧ					
10	-	Ŧ			10	6 17				W	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-				.	Ŧ					
		Ŧ										8.1 Tan to light gray, silty	fine S	SAND (A-2-4).			Ŧ					
5	6.6	<u>+ 38.5</u>	5	8	11	• • • • • • • • • • • • • • • • • • •				w		-		· · ·			Ŧ					
		Ŧ				· · · · · · · · · · ·						-					Ŧ					
	1.6	43.5	8	11	15	: : : : \ : : : :						-					Ŧ					
0	-	Ŧ			15	26	+			VV		-					Ŧ					
9/15	24											 	$\overline{AY}(\overline{A})$	<u>7-5/6).</u> <u>47</u> .0			Ŧ					
-5	-3.4	<u>+ 48.5</u>	WOH	WOH	2	• 2				м	\square						Ŧ					
L'GD'		Ī									\square	-					Ŧ					
G	-8.4	53.5	WOH	1	2						\square	-					Ŧ					
9 <u>-10</u>	-	Ŧ			-	• 3				70%		-9.9 Gray, fine to coarse s	andy	55.0 SILT (A-4(0)),		.	Ŧ					
G.GP	10.4									10%		Grav silty fine S	e clay.	(A-2-4)			Ŧ					
00 22 15	-13.4	<u> </u>	1	3	15	● 18				w				(/(2-1))			Ŧ					
3E0		E															Ŧ					
751_0	-18.4	63.5	23	27	32		+:::					-					Ŧ					
±20	-	ŧ		<i>-'</i>			•59					-				.	ŧ					
DUBLE	_23.4	69 5					1					-					Ŧ					
KE DC	-20.4	- 00.0	7	16	15				1	w		-24.9		70.0		.	±					
BOF		ŧ										Boring Terminated at SAND (COAS	Eleva TAL F	ition -24.9 ft in PLAIN)			<u>†</u>					
CDOT		ŧ										-					t					
ž	I	L		I												L						

NEW HANO	/ER		GEOLOGIST D. Racey			
' Bus./Market S	t.				GROUN	DWTR (ft)
OFFSET 44 ft	t RT		ALIGNMENT -L-		0 HR.	N/A
NORTHING 1	89,711		EASTING 2,354,662		24 HR.	6.5
DR		Muo	d Rotary	HAMME	RTYPE	Automatic
COMP. DATE	10/20/14		SURFACE WATER DEPT	H N/A	<u>۱</u>	
SA		L				
75 100 N	NO.	0	SOIL AND ROC	K DESC	RIPTION	l
		Ť				
+-		-+				
		E	1) Boring located in b	usiness	parking I	ot.
		E	2) Strata break in spli	t spoon	at depths	of
		F	Other Samples:			
		F	ST-2 (55.0 - 56.9)			
		F	-			
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North Carolina Department of Transportation Division of Highways Materials and Test Unit Soils Laboratory

 T.I.P. ID NO.:
 U-4751

 DESCRIPTION:
 Bridge on SR 1409 (Military Cutoff Road, -L-) over US 17 Business/Market Street (-Y1-)

REPORT ON SAMPLES OF: SOIL FOR QUALITY

 PROJECT:
 40191.1.2

 DATE SAMPLED:
 10/14

 SAMPLED FROM:
 -L

 SUBMITTED BY:
 W.P. Alton, PE

 COUNTY:
 New H

 RECEIVED:
 11/14

 REPORTED:
 11/14

 BY:
 D. Jer

11/14 D. Jenks D Cert No. 101-02-0603

New Hanover

TEST RESULTS

TEST RESULTS

12

PROJ. SAMPLE NO.	ST-1	ST-2							
BORING NO.	EB2-C	EB2-B							
								1	
Retained #4 Sieve %	0.0	0.0		-					
Passing #10 Sieve %	100.0	100.0		1.00					
Passing #40 Sieve %	99.9	94.6		1				1	
Passing #200 Sieve %	99.6	64.8		1.2					

SOIL MORTAR - 100%										(in 1997)	
Coarse Sand Ret - #60 %	0.2	14.6								î	
Fine Sand Ret - #270 %	0.3	24.9							(internet)		
Silt 0.053 - 0.010 mm %	45.6	43.9						· · · · · · · · · · · · · · · · · · ·			
Clay < 0.010 mm %	53.9	16.6	1			-					
L.L.	70	34	1.0						1 1		
P.L.	48	NP	1	1		2					
P.I.	22	NP				1		1.1			
AASHTO Classification	A-7-5 (33)	A-4 (0)	-								
Station -L-	39+89	40+18	-	 _	-						
Offset	CL	44' Rt.					N				
Depth (ft)	50.0	55.0								1000 E	
to	52.0	56.9								1.0	
Moisture Content (%)	76.1	70.0									
Organic Content (%)	NT	NT									

NP=Not plastic NT=Not tested ND = Not Determined CL = Centerline Sheet 16 of 17

W.P. Alton, PE

Soils Engineer



SITE PHOTOGRAPHS



Photograph No. 1: View looking North across Market Street from End Bent 1 toward End Bent 2



Photograph No. 2: View looking SW along End Bent 1, Market Street to right



Photograph No. 3: View looking NW across Market Street from End Bent 1 toward End Bent 2



Photograph No. 4: View looking SW along End Bent 2, Market Street to left

Sheet 17 of 17

CONTENTS

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4

REFERENCE

HEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-12	BORE LOGS REPORTS
13	SOIL TEST RESULTS
14	SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION BRIDGE NO. 202 ON -L- (PROPOSED SR 1409) OVER -Y2- (OGDEN PARK DRIVE) AT -L-STA. 62 + 99.10

40191 **PROJECT:**

STATE N.C

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, GEOTECHNICL ENGINEERING UNIT AT 1999 707-6860. 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 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 TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATIONS ARE AS RECORDED AT WAT ON A SEVEL A SOULD AND A WOLL WATER 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 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 INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO DEENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

- ES: 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 CLAINS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL M. BAHIRADHAN J. WHITT J. DANIEL S. BUCHANAN S. KITTS A. PAISLEY MID-ATLANTIC DR. INVESTIGATED BY M. BAHIRADHAN DRAWN BY _S. BUCHANAN CHECKED BY _______ M. BAHIRADHAN SUBMITTED BY ______SCHNABEL_ENG. DATE _____ FEBRUARY 2015



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL DES	CRIPTION			Τ		GRADATION		1	F	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONS BE PENETRATED WITH A CON ACCORDING TO THE STANDA IS BASED ON THE AASH CONSISTENCY, COLOR, TEXTUR	OLIDATED, SEMI-CONSOLI TINUOUS FLIGHT POWER RD PENETRATION TEST (TO SYSTEM. BASIC DESC E, MOISTURE, AASHTO CL4	IDATED, OR WEATHERED EA AUGER AND YIELD LESS AASHTO T 206, ASTM DI5 RIPTIONS GENERALLY INC ASSIFICATION, AND OTHER	ARTH MATERIALS THAT THAN 100 BLOWS PER 86). SOIL CLASSIFICA CLUDE THE FOLLOWING PERTINENT FACTORS	T CAN FOOT ITION SUCH	WELL GRADED - INDICATI UNIFORMLY GRADED - INI GAP-GRADED - INDICATES	ES A GOOD REPRE DICATES THAT SO? S A MIXTURE OF U ANGULF	SENTATION OF PARTIC IL PARTICLES ARE AL INIFORM PARTICLE SI INTY OF GRAIN	LE SIZES FROM FINE TO COARSE. L APPROXIMATELY THE SAME SIZE. ZES OF TWO OR MORE SIZES. VS	HARD ROCK IS ROCK LINE IND SPT REFUSAL I BLOWS IN NON REPRESENTED E	NON-COASTAL PLAIN MATE ICATES THE LEVEL AT WHI IS PENETRATION BY A SPL -COASTAL PLAIN MATERIA BY A ZONE OF WEATHERED	RIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ICH NON-COASTAL PLAIN MATERIAL WOULD YIELD IT SPOON SAMPLER EQUAL TO OR LESS THAN Ø. AL, THE TRANSITION BETWEEN SOIL AND ROCK PROCK.
AS MINERALOGICAL C VERY STIFF, GRAY, SILT	DMPOSITION, ANGULARITY, CLAY,MOIST WITH INTERBE	, STRUCTURE, PLASTICITY, EDDED FINE SAND LAYERS, H	ETC. FOR EXAMPLE, IGHLY PLASTIC, A-7-6		THE ANGULARITY	Y OR ROUNDNESS (OF SOIL GRAINS IS DE	SIGNATED BY THE TERMS:	ROCK MATERIAL	S ARE TYPICALLY DIVIDED) AS FOLLOWS:
SOIL L	EGEND AND AAS	SHTO CLASSIFIC	ATION		- <u>ANGULAR, SUBAN</u>		<u>u, ur <u>rounded</u>. Gical composi</u>	TION	ROCK (WR)	100 BI	LOWS PER FOOT IF TESTED.
GENERAL GRANULAF CLASS. (≤ 35% PA	SSING #200	SILT-CLAY MATERIALS (> 35% PASSING =200)	ORGANIC MATERIAL	S	MINERAL NAM	1ES SUCH AS QUAF	TZ, FELDSPAR, MICA, T	ALC, KAOLIN, ETC.	CRYSTALLINE	FINE T	TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO J YIELD SPT REFUSAL IF TESTED. ROCK TYPE IN
GROUP A-1 A-3	A-2 4	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5		ARE USED IN	DESCRIPTIONS WE	EN THEY ARE CONSID	ERED OF SIGNIFICANCE.			3. GABBRO, SCHIST, ETC. TO COARSE GRAIN METAMORPHIC AND NON-COASTA
CVMD01 00000000000000000000000000000000000	2-4 A-2-5 A-2-6 A-2-7	A-7-6	A-3 A-6, A-7		SLIGH	ITLY COMPRESSIBL	E	LL < 31	ROCK (NCR)		ENTARY ROCK THAT WOULD YEILD SPT REFUSAL TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ET
					MODEF HIGHL	RATELY COMPRESS	IBLE	LL = 31 - 50 LL > 50	COASTAL PLAIN SEDIMENTARY F	I COAST	AL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS
*10 50 MX		0	GRANULAR SILT- CLAY	MUCK,		PERCENT	AGE OF MATER	IAL	(CP)	SHELL	BEDS, ETC.
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35	MX 35 MX 35 MX 35 MX 36	6 MN 36 MN 36 MN 36 MN	SOILS	PEAT	ORGANIC MATERIAL	GRANULAF SOILS	SILT - CLAY	OTHER MATERIAL	FRESH R	ROCK FRESH, CRYSTALS BRIGH	HT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING *40 LL 40 PJ 6 MX NP 10	I MX 41 MN 40 MX 41 MN 40 MX 10 MX 11 MN 11 MN 10	0 MX 41 MN 40 MX 41 MN 3 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR	HIGHLY	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% ER 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% > 20%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	H VERY SLIGHT R (V SLI.) C	AMMER IF CRYSTALLINE. ROCK GENERALLY FRESH, JOIN RYSTALS ON A BROKEN SPE	NTS STAINED,SOME JOINTS MAY SHOW THIN CLAY C CIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER H
GROUP INDEX 0 0 USUAL TYPES STONE FRACS. OF MAJOR GRAVEL, AND FINE	0 4 MX 8 SILTY OR CLAYEY	SILTY CLAYEY	MODERATE AMOUNTS OF ORGANIC MATTER	organic Soils		GRI WATER LEVEL II	OUND WATER	TELY AFTER DRILLING	SLIGHT R (SLI.) 1 C	IOCK GENERALLY FRESH, JOIN INCH. OPEN JOINTS MAY CO CRYSTALS ARE DULL AND DI	NTS STAINED AND DISCOLORATION EXTENDS INTO RC INTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONA SCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER
MATERIALS SAND SAND GEN. RATING AS SUBGRADE EXCELLEN	T TO GOOD	FAIR TO POOR	Fair to Poor I	UNSUITABLE		STATIC WATER L	_EVEL AFTER <u>24</u> ,SATURATED ZONE,OR	WATER BEARING STRATA	MODERATE S (MOD.) G	IGNIFICANT PORTIONS OF RC RANITOID ROCKS, MOST FELD DULL SOUND UNDER HAMMER	JCK SHOW DISCOLORATION AND WEATHERING EFFECT JSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGT
P1 OF A-7	-5 SUBGROUP IS ≤ LL - 30	; PI OF A-7-6 SUBGROUP IS >	LL - 30			SPRING OR SEEF	2		MODERATELY A	ALL ROCK EXCEPT QUARTZ D	JISCOLORED OR STAINED. IN GRANITOID ROCKS.ALL F
	CONSISTENCY (OR DENSENESS				MISCELL	ANEOUS SYMBO	ILS	SEVERE A (MOD. SEV.) A	IND DISCOLORED AND A MAJ	DRITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L H A GEOLOGIST'S PICK. ROCK GIVES *CLUNK* SOUND
PRIMARY SOIL TYPE	MPACTNESS OR CONSISTENCY PE VERY LOOSE		COMPRESSIVE STI (TONS/FT ²	RENGTH		ANKMENT (RE) 25 SCRIPTION	^{∕025} DIP & DIP DIR → OF ROCK STRU SPT OPT OMT TEST BOP	ECTION CTURES	L SEVERE A (SEV.) R	F TESTED, WOULD YIELD SPI ALL ROCK EXCEPT QUARTZ D REDUCED IN STRENGTH TO S	<u>FREFUSAL</u> ISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E TRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS (
GRANULAR M	LOOSE EDIUM DENSE	4 TO 10 10 TO 30	N/A							TESTED WOULD YIELD SP	JMENTS OF STRUNG RUCK USUALLY REMAIN. <u>T N VALUES > 100 BPF</u>
	DENSE VERY DENSE	30 TO 50 > 50 < 2	< 0.25 0 25 10 0	6	THAN ROADWAY	r EMBANKMENT (L BOUNDARY ⊣	AUGER BORING		VERY A SEVERE B (V SEV.) R	ILL ROCK EXCEPT QUARTZ D SUT MASS IS EFFECTIVELY F REMAINING, SAPROLITE IS AN VESTIGES OF ORIGINAL ROCK	ISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF XEDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OU N EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT (FABRIC REMAIN, IF TESTED, WOULD YIELD SPT N 1
SILT-CLAY M MATERIAL (COHESIVE)	EDIUM STIFF STIFF VERY STIFF	4 TO 8 8 TO 15 15 TO 30	0.5 TO 1.0 1 TO 2 2 TO 4		INFERRED ROCI	K LINE MW	MONITORING WE △ PIEZOMETER INSTALLATION	LL TEST BORING WITH CORE	COMPLETE R S A	NOCK REDUCED TO SOIL. ROC SCATTERED CONCENTRATIONS, ALSO AN EXAMPLE.	K FABRIC NOT DISCERNIBLE OR DISCERNIBLE ONLY . QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
		GRAIN SIZE	> 4			RECOMME	NDATION SYMB				ROCK HARDNESS
U.S. STD. SIEVE SIZE	4 10	40 60 200	270				D EXCAVATION -	UNCLASSIFIED EXCAVATION -	VERY HARD C	CANNOT BE SCRATCHED BY KI	NIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN IE GEOLOGIST'S PICK.
OPENING (MM)	4.76 2.00	0.42 0.25 0.075	0.053		- SHALLOW		WASTE D EXCAVATION -	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD C	AN BE SCRATCHED BY KNIFE	E OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B
BOULDER COBBLE (BLDR.) (COB.)	GRAVEL (GR.) (CS	SAND SAND SE. SD.) (F SD.)	SILT (SL.)	(CLAY				VST - VANE SHEAR TEST	MODERATELY C HARD E B	AN BE SCRATCHED BY KNIFE XCAVATED BY HARD BLOW C Y MODERATE BLOWS.	E OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DA JF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN. 12 SOIL	MOISTURE - COF	RRELATION OF T	ERMS		BT - BORING TERMINATED - CL CLAY CPT - CONE PENETRATION	MICA MOD, N TEST NP	- MICACEOUS - MODERATELY NON PLASTIC	WEA WEATHERED γ - UNIT WEIGHT γ - DRY UNIT WEIGHT	MEDIUM C HARD C P	:AN BE GROOVED OR GOUGED :AN BE EXCAVATED IN SMALI POINT OF A GEOLOGIST'S PIC	0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE (L CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD CK.
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOIST DESCRIPTIO	URE GUIDE FOR FI	ELD MOISTURE DESC	RIPTION	CSE COARSE DMT - DILATOMETER TES DPT - DYNAMIC PENETRA1	ORG. T PMT TION TEST SAP.	- ORGANIC - PRESSUREMETER TE - SAPROLITIC	ST <u>SAMPLE ABBREVIATIONS</u> S - BULK	SOFT C F P	;an be groved or gouged f 'Rom Chips to several inc Pieces can be broken by f	READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN CHES IN SIZE BY MODERATE BLOWS OF A PICK POIN FINGER PRESSURE.
	- SATURATED (SAT.)) - USUALLY LIQU FROM BELOW	IID; VERY WET, USUAL THE GROUND WATER	TABLE	e - VOID RATIO F - FINE - FOSS FOSSILIFEROUS	SD SL SLI.	- SAND, SANDY - SILT, SILTY - SLIGHTLY	SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK	VERY C SOFT O	AN BE CARVED WITH KNIFE. DR MORE IN THICKNESS CAN INGERNAIL.	CAN BE EXCAVATED READILY WITH POINT OF PICK. BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH
RANGE <	- WET - (W)	SEMISOLID; RE ATTAIN OPTIM	QUIRES DRYING TO UM MOISTURE		FRAGS FRAGMENTS	W -	MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	FF	ACTURE SPACING	BEDDING
" PLL PLASTIC LIMIT						V -				SPACING MORE THAN 1	
OM OPTIMUM MOIS SL SHRINKAGE LIN	TURE - MOIST - (M IIT	4) SOLID; AT OR BEQUIRES ADD	NEAR OPTIMUM MOIS	TURE	DRILL UNITS:		S:		WIDE MODERATELY CLOSE	3 TO 10 F (CLOSE 1 TO 3 FE 0.16 TO 1 I	THICKLY BEDDED 1 EET THINLY BEDDED 0. FOOT VERY THINLY BEDDED 0.0 FOOT VERY THINLY BEDDED 0.0
	- DRY - (D)	ATTAIN OPTIM	UM MOISTURE		CME-55		DUS FLIGHT AUGER	CORE SIZE:		LESS INHN U.	THICKLY LAMINATED 6.00
	PLAST	ICITY			1	8" HOLLOW	AUGERS	<u>□</u> -в □-н			
NON PLASTIC SLIGHTLY PLASTIC	<u>PLASTICIT)</u> Ø 6	Y INDEX (PI) 0-5 5-15	DRY STRENGTH VERY LOW SLIGHT	<u>1</u>	VANE SHEAR TEST			-N	FUR SEDIMENTA	INT RUCKS, INDURATION IS RU GE	THE HARDENING OF MATERIAL BY CEMENTING, HE IBBING WITH FINGER FREES NUMEROUS GRAINS; NTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MUDERATELY PLASTIC HIGHLY PLASTIC	16 26 OF	R MORE	MEDIUM HIGH		PORTABLE HOIST		2.94 STEEL TEETH	POST HOLE DIGGER	MODERAT	INDURATED GR	AINS CAN BE SEPARATED FROM SAMPLE WITH ST REAKS EASILY WHEN HIT WITH HAMMER.
				CRAX)	1 X <u>CME 45B</u>		TUNGCARB.		INDURAT	ED GR	AINS ARE DIFFICULT TO SEPARATE WITH STEEL FFICULT TO BREAK WITH HAMMER.
MODIFIERS SUCH AS	LIGHT, DARK, STREAKED,	, ETC. ARE USED TO DES	CRIBE APPEARANCE.	GAHT).					EXTREME	SH INDURATED SH	ARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE

$\begin{array}{c|c} \hline & \text{Project reference no.} & \text{sheet no.} \\ \hline & U-4751 & 2 & OF & 14 \end{array}$

	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 UFTEN	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.
	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CLUDES GRANITE,	SURFACE.
DI AINI	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
F TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
	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	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	\underline{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 AS COMPARED	PARENT MATERIAL.
Southing b	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
DSS OF STRENGTH	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED
THEN STRUCK.	LEDGE - A SHELE-LIVE BIDGE OF PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VIDENT BUT	ITS LATERAL EXTENT.
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	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ALUES < 100 BPF	OF HIM INTERVENING INFERVIOUS STARTOM.
IN SMALL AND	RESIDUEL (RES, SUIL - SUIL FORMED IN FLACE BI THE WEATHERING OF NUCK.
. SAPROLITE IS	RUCK SECHENTS EQUAL TO REGREATER 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.
OWS 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.
EP CAN BE	<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 PODUCE 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 AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BL-7, N 191673.0995, E 2353556.8345
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5 - 4 FEET	ELEVATION: 44.99 FEET
6 - 1.5 FEET	NOTES:
8 - 0.03 FEET	NM = NOT MEASURED
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AT, PRESSURE, ETC.	
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20	COAST AL PLAIN: BROWN AND GRAY AND CLAYEY SANI	, j ©	VERY LO WITH S	OSE TO	MEDIU	M DENS	Е, _б	_SAT	URATED	. SILTY	SAND, S	SAND.			
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-10	COASTAL PLAIN: DARK BROWNISH (TO-MEDIUM-STIFF	GRAY ,WET;	VERY SC	FT Y-=		+ + + 	° =	ST - COAS	3 TAL_PL		– – – – K GRAY		- WET,S	ANDY S	ILT
-20	COASTAL PLAIN:	45			 		 						- 		
-30	GRAY AND TAN, ME	ΞDIŲΜ ⑤— ¦®	DENSE 7	0 VERY	DENSE	· • •	 	SAT	"₩RATED 	, SAND 			 		
-40	COAST AL PLAIN: C	- + GRAY, 47 6	GREEN, A	ND BLAC	K, MEDI	UM	 	DE SA	NSE TO TURATE	DENSE D, SAND	AND	SILTY_S	AND		
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сбр	COAST AL PLAIN: BROWN, TAN, CLAYEY SAND 3	V. VERY LOOSE TO MEDIUM O- DENSE, SATURATED, O-	
CADD. GEOTECH/xsec/U4751.	© © © © ∎\$7-2	©	Image: Solution of the second state
саруакснікез/чесеїлер 	3 COASTAL PLAIN: 3 GRAY AND TAN, 5 MEDIUM DENSE	SILT AND SANDY SILT SILT AND SANDY SILT TO VERY DENSE, SATURATED, SAND	
Bay	COASTAL PLAIN: 2 B B GREEN, C SAND A	(29- (9)-	
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S	ITE C	DESCR	IPTION	Brida	ge No.	202 0	n -L- (Milita	-L- (Military Cutoff Road) over -Y2- (Ogd		den Park	Drive)				GROUND WTR (ft)	SITE	DESCR		Bridg	ge No.	202 or	n -L- (Military Cuto	ff Road) over
в	ORIN	IG NO	. EB1-/	4		S	TATION 62	+82	OFFSET	47 ft LT			ALIG	SNMENT -L-		0 HR. 0.1	BOR	ING NO	. EB1-A	4		ST	ATION 62+82	1
С	OLL	AR ELI	EV. 44	.4 ft		т	OTAL DEPT	H 85.0 ft	NORTHIN	IG 191,6	652		EAS	TING 2,353,485		24 HR. 1.0	COL	LAR EL	EV. 44	.4 ft		тс	TAL DEPTH 85.0) ft 🛛 🛛
D	RILL I	rig/han	MMER E	FF./DA	TE MID	1904 C	ME-45B 80% 1	10/22/2014	•	DRILL	METHO	D M	lud Rotary		HAMM	ER TYPE Automatic	DRIL	L RIG/HAM	/MER EF	F./DA	re mid	1904 CN	ME-45B 80% 10/22/201	14
D	RILL	ER M	. Coog	an		S	TART DATE	10/14/14	COMP. D	ATE 10/	/16/14		SUR	FACE WATER DE	PTH N//	A	DRIL	LER M	. Cooga	an		ST	ART DATE 10/14	/14 /
EL	EV		DEPTH	BLC	OW CO	UNT		BLOWS PER FC	OT	SAMP							ELEV	DRIVE	DEPTH	BLO	W COL	JNT	BLOW	S PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 50	75 10	NO.	Имо	I G	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50 7
4	15	44.4											-44.4	GROUN	D SURF	ACE 0.0	-35	-					Ma	atch Line
		44.4	20	1	3	4							- 40.1					-	-					×
		40.4	10	2	3	3	● 6	· · · · · ·			Sat.		• 42.1		SAND		10	-39.1 -	- - 83.5					
	- 0	38.4	6.0	7	11	9	●20				Sat.		<u>}_</u>	GRATAND DA	NED SAN	ND	-40		-	9	38	20		
		36.4	8.0	19	9	11	· · · ·				Sat.		,_ ,_					-						
3	35		- 0.0	3	4	6	1 0	· · · · · · · · ·			Sat.		<u>}</u>					-						
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		30.9 -	13.5					· · · · · ·										-	-					
2	50	-	ŧ	4	4	5	· • 9 · · ·				Sat.		<u>_</u>					-						
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		20.9	23.5									0000						-						
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		10.9	33.5									00000						-						
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		-	Ł										<u>, 7.7</u>					-						
	5	5.9 -	38.5	WOH	WOH	WOH					Sat		,	GIVIT, GIETT T				-						
		-	Ł													41 7		-						
		0.9	43.5										£ <u>~</u>	GRAY,	SILTY CI			-						
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-	5	-4.1 -	48.5	WOH	1	2	1				W		E.			50.0		-	-					
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/15		-91	53 5															-						
2/20	10	-		1	2	2	4			-11	Sat.							-						
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I.GPJ		-19.1	635									0000						-	-					
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DOUB		-20.4	72 -									0000	<u></u>	GRAY, GREEN A				-						
- KE	30	-29.1 -	- (3.5 -	3	19	12					Sat.	0000	<u>ج</u>	SILT, AND SOME	SHELL	FRAGMENTS		-	F					
DT BC		-	ŧ									0000	F					-						
	35	-34.1 -	78.5	12	17	22						0000	F					-						
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SHEET 7 OF 14

UNT	Y NEW HA	NOVER			GEOLOGIST J. Whitt		
d) ove	er -Y2- (Ogo	len Park	Drive))		GROUND	WTR (ft)
	OFFSET	47 ft LT			ALIGNMENT -L-	0 HR.	0.1
	NORTHIN	G 191,6	52		EASTING 2,353,485	24 HR.	1.0
		DRILL	IETHO	D Mu	d Rotary HAM	MER TYPE A	utomatic
	COMP. DA	TE 10/	16/14		SURFACE WATER DEPTH	N/A	
FOOT	-	SAMP.	/	L			
	75 100	NO.	Имо	O G	SOIL AND ROCK D	SCRIPTION	
ne							
	· · · ·	1	Sat.	0000			ـــــــــــــــــــــــــــــــــــــ
· · ·							<u>01.5</u>
58	<u> </u>		w		40.6 SHELL FRAGE	MENTS	85.0
					Boring Terminated at Ele	evation -40.6 ft	in
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WBS 40191	TIP U-4751 COUNTY NE	NEW HANOVER	NOVER GEOLOGIST J. Whitt		WBS 40191	TIP U-4751 COUNTY		
SITE DESCRIPTION Bridge No. 2	02 on -L- (Military Cutoff Road) over -Y2-	(2- (Ogden Park Drive)	•	GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 20	02 on -L- (Military Cutoff Road) over		
BORING NO. EB1-B	STATION 62+14 OFFS	FSET 58 ft RT	ALIGNMENT -L-	0 HR. 0.5	BORING NO. EB1-B	STATION 62+14		
COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft NOR	DRTHING 191,646	EASTING 2,353,610	24 HR. NM	COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft		
DRILL RIG/HAMMER EFF./DATE MID19	204 CME-45B 80% 10/22/2014	DRILL METHOD Mu	ud Rotary HAMM	IER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MID19	04 CME-45B 80% 10/22/2014		
DRILLER M. Coogan	START DATE 10/13/14 COM	OMP. DATE 10/14/14	SURFACE WATER DEPTH N/	Ά	DRILLER M. Coogan	START DATE 10/13/14		
ELEV DRIVE DEPTH BLOW COUI	NT BLOWS PER FOOT	SAMP.	SOIL AND ROCK DES		ELEV DRIVE DEPTH BLOW COUN	IT BLOWS PER FOOT		
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50 75	100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	(ft) (ft) (ft) 0.5ft 0.5ft 0).5ft 0 25 50 7		
45					-35	Match Line		
43.9 <u>0.0</u> WOH 1	1 2	Sat						
41.9 + 2.0 40 + 2.0 + 2 + 4	7	Sat.	_ DARK BROWN, SILTY FI		-40 -39.6 + 83.5			
	11		LIGHT BROWN, FINE GR	AINED SAND		9		
	6	Sat.	-					
35 - 8.0 - 8 11	13	Sat.	-					
			-					
$30 \ 30.4 \ 13.5$			-					
	11	Sat.	-					
			-					
25 25.4 18.5 6 10	15	Sat Sat	-					
			-					
20 20.4 + 23.5			-					
	7	Sat.	-					
			-					
	3			29.5				
			- GRAY, FINE GRAINED - LITTLE SILT	SAND WITH				
10 10.4 33.5			-					
	3	W	-					
		· 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-					
5 <u>5.4</u> 38.5 - 1 WOH	2	Sat	-					
			- 2.2	41.7				
0 0.4 43.5			GRAY, CLAYEY FINE GR	RAINED SAND				
	VOR	Sat.	-					
			<u>2.8</u>	LAY 46.7				
-5 -4.6 + 48.5 WOH WOH	2		- '					
			-					
N -10 -9.6 53.5			- - -10.1	54.0				
	14	W	LIGHT GRAY, FINE GRA	AINED SAND				
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				, 0, 110				
0 <u>19.6</u> - 63.5	: : : : : :		18.6	O MEDIUM62.5				
	24	Sat.	- GRAINED SAM	ND				
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	14	Sat.	-					
			-					
° -30 -29.6 73.5			- - -30.2	7/ 1				
	20 • • 29	Sat.						
			- GIAINED SAND, WITH LI	TILL GRAVEL				
2 <u>-35</u> <u>-34.6 78.5</u>		• • • • • • • • • • • • • • • • • • •	34.6	- <u> </u>				

SHEET 8 OF 14

NT	Y NEW HA	NOVER			GEOLOGIST J. Whitt			
ove	er -Y2- (Ogd	en Park	Drive)				GROUN	ID WTR (ft)
	OFFSET	58 ft RT			ALIGNMENT -L-		0 HR.	0.5
	NORTHING	3 191,6	46		EASTING 2,353,610		24 HR.	NM
		DRILL N	IETHO	D Mu	d Rotary	AMME	R TYPE	Automatic
	COMP. DA	TE 10/ ⁻	14/14		SURFACE WATER DEPTH	H N/A	١	
тос	·	SAMP.		L				
	75 100	NO.		O G	SOIL AND ROCK	DESC	RIPTION	1
	_ 100/0.8	·†			GREEN AND GRAY,	SANI	D(continu	ed) — — — —
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		-	VV		-41.1 Boring Terminated at	Eleva	tion -41.1	85.0 ft in
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WBS 40191 TIP U-4751 COUNTY NEW	HANOVER GEOLOGIST J. Whitt		WBS 40191	TIP U-4751 COUNTY	Y NEW HANOVER	GEOLOGIST J. Whitt
SITE DESCRIPTION Bridge No. 202 on -L- (Military Cutoff Road) over -Y2- (Ogden Park Drive)	GROUND WTR (ft)	SITE DESCRIPTION Bridge No.	o. 202 on -L- (Military Cutoff Road) ove	er -Y2- (Ogden Park Drive)	GROUND WTR (ft)
BORING NO. EB1-C STATION 62+42 OFFSE	T 5 ft RT ALIGNMENT -L-	0 HR. 0.3	BORING NO. EB1-C	STATION 62+42	OFFSET 5 ft RT	ALIGNMENT -L- 0 HR. 0.3
COLLAR ELEV. 43.8 ft TOTAL DEPTH 85.0 ft NORTH	HING 191,643 EASTING 2,353,550	24 HR. 0.3	COLLAR ELEV. 43.8 ft	TOTAL DEPTH 85.0 ft	NORTHING 191,643	EASTING 2,353,550 24 HR. 0.3
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 80% 10/22/2014	DRILL METHOD Mud Rotary HA	AMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE M	ID1904 CME-45B 80% 10/22/2014	DRILL METHOD MU	HAMMER TYPE Automatic
DRILLER M. Coogan START DATE 10/13/14 COMP.	DATE 10/13/14 SURFACE WATER DEPTH	I N/A	DRILLER M. Coogan	START DATE 10/13/14	COMP. DATE 10/13/14	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW COUNT BLOWS PER FOOT		DESCRIPTION	ELEV DRIVE DEPTH BLOW CO	OUNT BLOWS PER FOOT	SAMP.	
(ft) (ft) (ft) 0.5ft 0.5ft 0.5ft 0 25 50 75	100 NO. MOI G ELEV. (ft)	DEPTH (ft)	(ft) (ft) (ft) 0.5ft 0.5f	ft 0.5ft 0 25 50	75 100 NO. MOI G	
45			-35	Match Line		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	- Sat. COASTAL	PLAIN				COARSE GRAINED SAND, WITH LITTLE
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	- DARK BROWN, SILT	Y FINE GRAINED D				\sim SILLAND LITTLE SHELL FRAGMENTS \sim \odot \sim
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	- Sat. GRAY AND LIGHT TO	O DARK BROWN,		10	w	- DARK BROWN, SILT 41.2 85.0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	- FINE GRAINED SAND,	, WITH LITTLE SILT				Boring Terminated at Elevation -41.2 ft in Very Stiff Silt
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∑ -35 <u>-34.7 78.5</u>						<u> </u>

SHEET 9 OF 14

(1)

WBS 40191	TIP U-4751 COUN	TY NEW HANOVER		GEOLOGIST J. Daniel		WB	S 40191		TIP U-4751 COUNT
SITE DESCRIPTION Bridge No. 2	02 on -L- (Military Cutoff Road) o	Cutoff Road) over -Y2- (Ogden Park Drive)			GROUND WTR (ft)	SITE	E DESCRIPT	ION Bridge No. 2	02 on -L- (Military Cutoff Road) ove
BORING NO. EB2-A	STATION 63+98	OFFSET 63 ft LT		ALIGNMENT -L-	0 HR. 3.5	BOF	Ring No. E	32-A	STATION 63+98
COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft	NORTHING 191,744	4	EASTING 2,353,413	24 HR. 1.2	COL	LAR ELEV.	43.9 ft	TOTAL DEPTH 85.0 ft
DRILL RIG/HAMMER EFF./DATE MID19	204 CME-45B 80% 10/22/2014	DRILL ME	ETHOD Mu	ud Rotary HAMM	MER TYPE Automatic	DRIL	L RIG/HAMME	R EFF./DATE MID19	04 CME-45B 80% 10/22/2014
DRILLER M. Coogan	START DATE 10/16/14	COMP. DATE 10/17	7/14	SURFACE WATER DEPTH N	I/A	DRI	LLER M. Co	ogan	START DATE 10/16/14
ELEV DRIVE DEPTH BLOW COUN	NT BLOWS PER FOO	DT SAMP.				ELE\		TH BLOW COUN	IT BLOWS PER FOOT
(ft) (ft) (ft) 0.5ft 0.5ft (0.5ft 0 25 50	75 100 NO.	MOI G	ELEV. (ft)	DEPTH (ft)	(ft)	(ft)	t) 0.5ft 0.5ft 0	0.5ft 0 25 50
45				_		-35			Match Line
43.9 - 0.0	2		V	43.9 GROUND SURI	FACE 0.0 _AIN		l ±	11 10	11 • 21
42.4 + 1.5 40.9 + 3.0 + 2 + 2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	· · · · · · =	Sat.	- GRAY AND DARK BR GRAINED SAND WITH	OWN, FINE TRACE SILT		<u>+</u>		
40 39.4 4.5 1 2	3	<u> </u>	Sat.			-40	-39.6 83	14 11	10 21
37.9 - 6.0 4 9	$\frac{12}{9}$ p_{21}		Sat.	_			Ŧ		
36.4 T 7.5 35 $34.9 T 9.0 3 7$	8		Sat.	-			Ŧ		
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	3			GRAY, FINE GRAINED	SANDY SILT				
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<u>ප්</u>	32		Sat.	GRAY, FINE GRAIN	IED SAND		 		
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9 -35 -34.6 78.5			000						

NEW HAN	OVER			GEOLOGIST J. Daniel		
r -Y2- (Ogde	n Park	Drive)			GROUN	D WTR (ft)
OFFSET 6	3 ft LT			ALIGNMENT -L-	0 HR.	3.5
NORTHING	191,74	14		EASTING 2,353,413	24 HR.	1.2
	DRILL M	IETHOI	D Muc	I Rotary HAM	MER TYPE	Automatic
COMP. DAT	E 10/1	7/14		SURFACE WATER DEPTH	N/A	
	SAMP.	7	L			
75 100	NO.	<u>/мо</u> і	0 G	SOIL AND ROCK D	ESCRIPTION	
····		Sat.		GRAY AND GREEN, FI	NE TO COAR SOME SILT 4	SE
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+ • • • •		Sat.		-41 1	ontinued)	85.0
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WB	S 4019 ⁻	I			ТІ	P U-4751		COUNT	Y NEW HA	NOVER			GEOL	DGIST J. Daniel			WBS	40191				т	P U-47	51	C	OUNT
SITI	E DESCR	RIPTION	Brid	ge No.	202 o	n -L- (Militar	ry Cutoff F	Road) ov	er -Y2- (Ogo	len Park	Drive	e)				GROUND WTR (ft)	SITE	DESCR		I Bridą	ge No.	202 0	n -L- (M	ilitary C	utoff Ro	oad) ove
BOF	RING NO	. EB2-I	В		S	FATION 63-	+40		OFFSET	42 ft RT			ALIGN	MENT -L-		0 HR. 3.0	BOR	ING NO	. EB2-	В		S	ATION	63+40		
COI	LAR EL	EV. 44	.2 ft		т	OTAL DEPT	H 85.0 ft		NORTHIN	G 191,7	'46		EASTI	NG 2,353,532		24 HR. NM	COL	LAR EL	EV. 44	.2 ft		тс	DTAL D	EPTH 8	5.0 ft	
DRIL	L RIG/HA	MMER E	FF./DA	TE MID	1904 C	ME-45B 80% 1	0/22/2014			DRILL	METHO	DD M	ud Rotary		НАММ	ER TYPE Automatic	DRILL	RIG/HAI	MMER EI	FF./DA	TE MID	1904 CI	ME-45B 8	0% 10/22	/2014	
DRI	LLER M	I. Wiggi	ns		S	TART DATE	10/20/14	1	COMP. DA	TE 10/	20/14		SURFA	CE WATER DEI	PTH N/	A	DRIL	LER M	. Wiggi	ns		S	ART D	ATE 10	/20/14	
ELE\		DEPTH	BLC	w co	JNT		BLOWS P	ER FOO	T	SAMP	. 🔨 /						ELEV	DRIVE	DEPTH	BLC	W CO	JNT		BLC	OWS PE	R FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	55	0	75 100	NO.	мо	DI G	ELEV. (ft)	SOIL AND RO	CK DES	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	
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UNT	Y NEW HA	NOVER			GEOLOGIST J. Daniel	
l) ove	er -Y2- (Ogo	den Park	Drive))		GROUND WTR (ft)
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WBS	5 40191	l			T	I P U-4751	COUNT	Y NEW HA	NOVER			GEOL	.OGIST J. Daniel			WB	S 4019 [.]	1			TI	P U-475	1	COUNT
SITE	DESCR	RIPTIO	N Brido	ge No	202 c	on -L- (Military Cutoff	Road) ov	er -Y2- (Ogo	len Park	Drive)			GROUND	NTR (ft)	SITI	E DESCI	RIPTIO	N Brid	ge No.	202 o	n -L- (Mi	itary Cutoff	Road) ove
BOF	ING NO	. EB2-	С		S	TATION 63+60		OFFSET	2 ft RT			ALIG	NMENT -L-	0 HR.	3.5	BO	RING NC). EB2-	С		S	ΓΑΤΙΟΝ	63+60	
COL	LAR EL	EV. 43	3.7 ft		Т	OTAL DEPTH 104.0	ft	NORTHIN	G 191,7	'44		EAST	ING 2,353,487	24 HR.	1.2	COI	LAR EL	.EV. 43	3.7 ft		т	JTAL DE	PTH 104.0) ft
DRIL	l Rig/Hai	MMER E	FF./DA	te Mid	01904 C	ME-45B 80% 10/22/2014			DRILL N	METHO	D Mu	ud Rotary	HA	MMER TYPE Auto	omatic	DRIL	.L RIG/HA	MMER E	FF./DA	te mid	1904 C	ME-45B 80	% 10/22/2014	ł
DRI	LER N	I. Coog	an		S	TART DATE 10/16/1	4	COMP. DA	TE 10/	17/14		SURF	ACE WATER DEPTH	N/A		DRI	LLER N	I. Coog	an		S	FART DA	TE 10/16/	14
ELEV	DRIVE	DEPTH	BLC	w co	UNT	BLOWS	PER FOO	Г	SAMP	. V	L C		SOIL AND ROCK D	ESCRIPTION		ELE\		DEPTH	BLC	ow cou	JNT		BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	Имо	IĞ	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
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о ш30	-29.8	73.5		<u> </u>							000	- <u></u>	GRAY AND GREEN,	SILTY MEDIUM	72.5			£						
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U-4751

40191

BRIDGE NO. 202 ON -L- (MILITARY CUTOFF ROAD) OVER -Y2- (OGDEN PARK DRIVE)

EB1-C

					SC	DIL '	TEST .	RESU	LTS					
SAMPLE			DEPTH	AASHTO				% BY WEI	GHT		% PA	ASSING (S	IEVES)	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOIST
S-51	5 RT	62+42	48.5 - 50.0	A-7-5	62	19	1	3	33	63	100	99	97	62.

EB2-A

SAMPLE DEPTH AASHTO % BY WEIGHT	ΗT	% P/	ASSING (SIEVES)	%
NO. OFFSET STATION INTERVAL CLASS. L.L. P.I. C.SAND F.SAND SI	SILT CLAY	10	40 200	MOIST
ST-2 63 LT 63+98 40.0 - 42.0 A-3 NP NP 0 95	2 3	100	100 7	22.

NP- Non Plastic

EB2-B

LD2-D															
	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY WE	IGHT		% PA	ASSING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-92	42 RT	63+40	38.5 - 40.0	A-2-4	NP	NP	1	87	4	8	100	100	16	19.4	-

NP- Non Plastic

EB2-C

					SC	DIL '	TEST .	RESL	LTS						
SAMPLE			DEPTH	AASHTO				% BY WE	GHT		% PA	SSING (SI	EVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-123	2 RT	63+60	88.5 - 90.0	A-4	27	4	1	67	24	9	100	100	54	26.5	-
ST-3	2 RT	63+60	50.0 - 52.0	A-4	24	4	0	68	15	16	100	100	38	19.7	-

SHEET 13 OF 14 U-4751 NEW HANOVER COUNTY

%	%
STURE	ORGANIC
2.3	-
%	%
STURE	ORGANIC

-

SITE PHOTOGRAPHS BRIDGE NO. 202 ON -L- (MILITARY CUTOFF ROAD) OVER -Y2- (OGDEN PARK DRIVE)



View of -Y2- (Ogden Park Drive), looking west.



View of path in woods between boreholes along End Bent 2, looking to the east. -Y2- (Ogden Park Drive) is located to the right of the photograph.

SHEET NO. 14 OF 14 U-4751 NEW HANOVER COUNTY

CONTENTS

<u>SHEET NO.</u>
l I
2
3
4
5-7
8-10
II
12

4751

REFERENCE

DESCRIPTION

TITLE SHEET LEGEND SITE PLAN

SITE PHOTOGRAPHS

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 NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION BRIDGE NO. 203 ON SR 1409 (-L-) **OVER US 17 (-Y8-)** AT -L- STA. 225+92.26

PROJECT:

STATE N.C

1

U-4751

12

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6850. THE SUBSIFFACE 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

W. S. HUNSBERGER

MID-ATLANTIC DRILLING

DRAWN BY <u>WS</u>H

SUBMITTED BY _____FALCON

DATE ______ FEBRUARY 2015



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 DE	SCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EA	RTH MATERIALS THAT CAN	WELL GRADED - INDICATES A	A GOOD REPRESENTATION OF PARTICL	E SIZES FROM FINE TO COARSE.	HARD ROCK IS N ROCK LINF INDIG	ON-COASTAL PLAIN MATERIAL THAT	WOULD YIELD SPT REFUSAL IF TEST
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DISE	B6), SOIL CLASSIFICATION	GAP-GRADED - INDICATES A	MILS THAT SULL PARTICLES ARE ALL MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	SPT REFUSAL IS	PENETRATION BY A SPLIT SPOON S	AMPLER EQUAL TO OR LESS THAN 0.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCL CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER	PERTINENT FACTORS SUCH		ANGULARITY OF GRAIN	S	REPRESENTED B	A ZONE OF WEATHERED ROCK.	INSTITUN BETWEEN SUIL HND ROCK
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, I VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS.HI	ETC. FOR EXAMPLE. GHLY PLASTIC.A-7-6	THE ANGULARITY OR	R ROUNDNESS OF SOIL GRAINS IS DES	SIGNATED BY THE TERMS:	ROCK MATERIALS	ARE TYPICALLY DIVIDED AS FOLLO	
SOIL LEGEND AND AASHTO CLASSIFIC	ATION	ANGULAR, SUBANGULA	AR, SUBROUNDED, OR ROUNDED.		ROCK (WR)	100 BLOWS PER F	IN MATERIAL THAT WOULD YIELD SP DOT IF TESTED.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS	ORGANIC MATERIALS		MINERALUGILAL LUMPUSI		CRYSTALLINE	FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC RO
CD0/JD	.1 0-2 0-4 0-5	ARE USED IN DES	SCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	ROCK (CR)	GNEISS, GABBRO, S	CHIST, ETC.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-5	A-3 A-6, A-7		COMPRESSIBILITY		NON-CRYSTALLIN	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COAST < THAT WOULD YEILD SPT REFUSAL
SYMBOL SOCOCOCOCOCOCOCOCOCOCOCOCOCOCOCOCOCOCOC		SLIGHTLY		LL < 31			DES PHYLLITE, SLATE, SANDSTONE, ET
7 PASSING		HIGHLY CO	OMPRESSIBLE	LL > 50	SEDIMENTARY RC	CK SPT REFUSAL. ROI	CK TYPE INCLUDES LIMESTONE, SAND
#10 50 MX	RANULAR CLAY MUCK,		PERCENTAGE OF MATERI	AL		WEAT	HERING
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	SOILS	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH RO	CK FRESH, CRYSTALS BRIGHT, FEW JOIN	TS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL		TRACE OF ORGANIC MATTER	R 2 - 3% 3 - 5%	TRACE 1 - 10%	HA	MMER IF CRYSTALLINE.	
PASSING #40 LL 40 MX 41 MN	SOILS WITH	MODERATELY ORGANIC	5 - 10% 12 - 20%	SOME 20 - 35%	VERY SLIGHT RO	CK GENERALLY FRESH, JOINTS STAINED	SOME JOINTS MAY SHOW THIN CLAY O
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN	MODERATE HIGHLY	HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE	OF	A CRYSTALLINE NATURE.	
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX N0 MX	AMOUNTS OF SOILS		GROUND WATER		SLIGHT RO	CK GENERALLY FRESH, JOINTS STAINED	AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY	MATTER	\₩4	ATER LEVEL IN BORE HOLE IMMEDIAT	ELY AFTER DRILLING	CR	YSTALS ARE DULL AND DISCOLORED. C	IN GRANITUID RUCKS SUME UCCASIONA
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS		▼ST	TATIC WATER LEVEL AFTER 24 H	DURS	MODERATE SI	SNIFICANT PORTIONS OF ROCK SHOW DI	SCOLORATION AND WEATHERING EFFECT
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR	AIR TO POOR UNSUITABLE	E <u>∑Pw</u> PE	ERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA	(MOD.) GR	ANITOID ROCKS, MOST FELDSPARS ARE	DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH
AS SUBGRADE	POOR	- ────────────────────────────────────	PRING OR SEEP		WI	TH FRESH ROCK.	
PLOF A-7-5 SUBGROUP IS ≤ LL - 30 ;PLOF A-7-6 SUBGROUP IS > CONSISTENCY OR DENSENESS	LL - 30	0		C	MODERATELY AL	L ROCK EXCEPT QUARTZ DISCOLORED O	R STAINED. IN GRANITOID ROCKS, ALL I
	BANGE OF LINCONFINED		MISCELEANEOUS STABO	_5	(MOD. SEV.) AN	D CAN BE EXCAVATED WITH A GEOLOGI	ST'S PICK, ROCK GIVES "CLUNK" SOUND
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE			IENT (RE) 25/025 DIP & DIP DIRE		IF	TESTED, WOULD YIELD SPT REFUSAL	
	(TUNS/FT)		SPT		SEVERE AL (SEV.) RE	L ROCK EXCEPT QUARTZ DISCOLORED O DUCED IN STRENGTH TO STRONG SOIL.	R STAINED, ROCK FABRIC CLEAR AND E IN GRANITOID ROCKS ALL FELDSPARS (
GENERALLY LOOSE 4 TO 10		SOIL SYMBOL	VST PMT TEST BORI		TO	SOME EXTENT. SOME FRAGMENTS OF S	TRONG ROCK USUALLY REMAIN.
MATERIAL MEDIUM DENSE 10 TO 30 DENSE 30 TO 50	N/A	ARTIFICIAL FILL (ALAF) OTHER AUGER BORING			ROCK EXCEPT OUGRTZ DISCOLORED O	<u>> 100 BPF</u> R STAINED ROCK FABRIC FLEMENTS AF
(NON-COHESIVE) VERY DENSE > 50				U TEST	SEVERE BU	T MASS IS EFFECTIVELY REDUCED TO	SOIL STATUS, WITH ONLY FRAGMENTS O
VERY SOFT < 2	< 0.25	- INFERRED SOIL BO	DUNDARY - CORE BORING	SOUNDING ROD	(V SEV.) RE	MAINING. SAPROLITE IS AN EXAMPLE O STIGES OF ORIGINAL ROCK FABRIC REM	F ROCK WEATHERED TO A DEGREE THAT AIN, IF TESTED, WOULD YIELD SPT N I
SILT-CLAY MEDIUM STIFF 4 TO 8	0.5 TO 1.0	INFERRED ROCK LI	INE MW MONITORING WEL		COMPLETE RO	CK REDUCED TO SOIL. ROCK FABRIC NO	T DISCERNIBLE, OR DISCERNIBLE ONLY
MATERIAL STIFF 8 TO 15	1 TO 2				SC	ATTERED CONCENTRATIONS. QUARTZ MA	Y BE PRESENT AS DIKES OR STRINGER
HARD > 30	> 4	TTTTT ALLOVIAL SUIL BU	INSTALLATION	SPT N-VALUE	HL		
TEXTURE OR GRAIN SIZE			RECOMMENDATION SYMBO	ILS			HUNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200	270		UNCLASSIFIED EXCAVATION -	ACCEPTORIE BUT NOT TO RE	SE	VERAL HARD BLOWS OF THE GEOLOGIST	'S PICK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075	0.053		UNCLASSIFIED EXCAVATION -	USED IN THE TOP 3 FEET OF	HARD CA	N BE SCRATCHED BY KNIFE OR PICK OF	NLY WITH DIFFICULTY. HARD HAMMER B
BOULDER COBBLE GRAVEL SAND SAND	SILT CLAY		ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL		N RE SCRAICHED BY KNIEF OR PICK O	OUGES OR GROOVES TO 0.25 INCHES D
(CSE. SD.) (F SD.)	(SL.) (UL.)		ABBREVIATIONS		HARD EX	CAVATED BY HARD BLOW OF A GEOLOG	ST'S PICK. HAND SPECIMENS CAN BE D
GRAIN MM 305 75 2.0 0.25	0.05 0.005	AR - AUGER REFUSAL BT - BORING TERMINATED	MED MEDIUM MICA - MICACEDUS	VST - VANE SHEAR TEST	BY MEDIUM CO	MODERATE BLOWS.	DEED BY EIDM DECCUDE OF KNIEF
		CL CLAY	MOD MODERATELY	γ - UNIT WEIGHT	HARD CA	N BE EXCAVATED IN SMALL CHIPS TO	PEICES 1 INCH MAXIMUM SIZE BY HARD
	ERMS	CPT - CONE PENETRATION TE CSE COARSE	ST NP - NON PLASTIC ORG ORGANIC	$\gamma_{ m d}$ - dry unit weight	PO	INT OF A GEOLOGIST'S PICK.	
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIE	ELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST	PMT - PRESSUREMETER TES	ST SAMPLE ABBREVIATIONS	SUFI CA	N BE GROVED OR GOUGED READILY BY OM CHIPS TO SEVERAL INCHES IN SIZE	KNIFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POIN
- SATURATED - USUALLY LIQU	ID: VERY WET. USUALLY	DPT - DYNAMIC PENETRATION	TEST SAP SAPROLITIC	S - BULK SS - SPLIT SPOON	PI	CES CAN BE BROKEN BY FINGER PRES	SURE.
(SAT.) FROM BELOW 1	THE GROUND WATER TABLE	F - FINE	SL SILT, SILTY	ST - SHELBY TUBE	VERY CA SOFT OR	N BE CARVED WITH KNIFE. CAN BE EXC MORE IN THICKNESS CAN BE BROKEN	AVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE, CAN BE SCRATCH
		 FOSS FOSSILIFEROUS FRAC FRACTURED, FRACTURE 	SLI SLIGHTLY	RS - ROCK RT - ΒΕΓΩΜΡΔΓΤΕΠ ΤΒΙΔΧΙΔΙ	FI	GERNAIL.	
RANGE - WET - (W) ATTAIN OPTIMU	JM MOISTURE	FRAGS FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FR	ACTURE SPACING	BEDDING
		HI HIGHLY	V - VERY	RATIO		SPACING	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR I	NEAR OPTIMUM MOISTURE	EUUIP	MENT USED UN SUBJECT		WIDE	3 TO 10 FEET	THICKLY BEDDED
SL SHRINKAGE LIMIT					MODERATELY CLOSE	CLOSE 1 TO 3 FEET 0.16 TO 1 FOOT	THINLY BEDDED 0.
- DRY - (D) REQUIRES ADD	ITIONAL WATER TO				VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED 0.00
	UN NUISIORE	CME-55				ויטאז	
PLASTICITY							
NON PLASTIC 0-5	DRY STRENGTH			LI-N		RUBBING WITH	FINGER FREES NUMEROUS GRAINS:
SLIGHTLY PLASTIC 6-15	SLIGHT	VANE SHEAR TEST		HAND TOOLS:	+RIABLE	GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OR MORE	MEDIUM		URSING W/ ADVANCER	POST HOLE DIGGER	MODERATE	LY INDURATED GRAINS CAN B	SEPARATED FROM SAMPLE WITH ST
		- U PURTABLE HOIST	THILUNE Z-13/16 STEEL TEETH	HAND AUGER		BREAKS EASIL	T WHEN HIL WITH HAMMER.
		┫╓╴│╞	IRICONE TUNGCARB.	SOUNDING ROD	INDURATE	D GRAINS ARE D DIFFICULT TO	BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YE MODIFIERS SUCH AS LIGHT DADY, STREAMED FTS, ADS 1957, TO 255	LLOW-BROWN, BLUE-GRAY).		CORE BIT	VANE SHEAR TEST		SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPL
MUDIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESC	LRIBE APPEAKANUE.				EXTREMEL	Y INDURATED SAMPLE BREAK	S ACROSS GRAINS.

U-4751

	TERMS AND DEFINITIONS
ED, 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.
N VALUES >	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
CK THAT CLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
AL PLAIN IF TESTED.	<u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
C. MAY NOT YIELD STONE, CEMENTED	OF SLOPE. <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
	BY IUTAL LENGTH OF CURE NON AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF TONEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
RINGS UNDER	ROCKS OR COIS MASSIVE ROCK. <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
OATINGS IF OPEN. AMMER BLOWS IF	HORIZONTAL. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
ICK UP TO	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
L FELDSPAR R BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. 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.
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	LEDCE - 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE 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 S. 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.
S REQUIRES	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.
EEP CAN BE ETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
DR 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 IT. 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.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: U-4751-11: 36" REBAR WITH ALUMINUM TRAVERSE CAP
THICKNESS	N:206409 E:2354287
4 FEET .5 - 4 FFFT	-L- STA 226+02,284 ft RT ELEVATION: 43.41 FEET
16 - 1.5 FEET	NOTES
13 - 0.16 FEET 18 - 0.03 FFFT	FIAD - FILLED IMMEDIATELY AFTER DRILLING
0.008 FEET	
AI, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	
-•	DATE: 8-15-14





			SHEET	4
			50	
			40	
			30) ELEV. (FEET
			20	/D 1988)
RAY,MOIST,MED.I TO WET,SOFT,F. AY AND TAN,MOIS	DENSE,SILTY F.SAND SANDY SILT W/ TRAC ST TO SATURATED,LC	CE TO MODERATE	organics 10	(NAV
N,WET TO SATUR AYNE FORMATION SATURATED,V.SU FORMATION)W/	E.SAND WY TRACE (RATED,V.LOOSE, I) OFT,SANDY CLAY / TRACE ORGANICS	Ingawics	0	
			-10	
DN ENGINEERING, INC. RINITY ROAD, SUITE 110 ALEIGH, NC 27607	SUBSURFAC	BRIDGE NO 202	LT OF -L-	

PHONE: 919.871.0800 FAX: 919.871.0803 ON SR 1409 (-L-) OVER US 17 (-Y8-) NEW HANOVER COUNTY, NORTH CAROLINA WBS.: 40191.1.2, TIP.: U-4751






WB	S 4019	1.1.2			Т	IP U-4751		COUNT	NEW H	ANOVEF	र		GEO	LOGIST Hunsberg	ger, W.	S.		WBS	40191.1.2			ТІ	P U-4751		COUNTY
SIT	e desc	RIPTIO	N Bric	lge No	. 203	on SR 1409	9 (-L-) over	US 17 (-`	Y8-)							GROUND WTR	(ft)	SITE	DESCRIPT	ON B	ridge No	o. 203 d	on SR 1409	(-L-) over	r US 17 (-)
BO	RING NO). EB1	-A		S	TATION 2	24+92		OFFSET	57 ft LT			ALIG	NMENT -L-		0 HR.	3.9	BOR	ING NO. E	31-B		SI	TATION 22	<u>2</u> 4+94	
CO	LLAR EI	.EV. 4	1.6 ft		Т	OTAL DEP	TH 47.2 f	:	NORTHIN	G 206,3	369		EAS	TING 2,353,932		24 HR. FI.	٩D	COL	LAR ELEV.	42.5 ft		т	TAL DEPT	H 49.6 f	t
DRI	LL RIG/H	AMMER E	EFF./DA	TE M	ID1904	CME-45B 87%	% 07/30/2013	3		DRILL	METHO	D N	lud Rotar	/	HAMM	ER TYPE Automat	ic	DRIL	L RIG/HAMME	R EFF./D	DATE M	1ID1904 (CME-45B 87%	07/30/201	3
DR	LLER	Contrac	t Drille	r	S	TART DATE	E 10/23/1	4	COMP. DA	ATE 10/	23/14		SUR	FACE WATER DEPT	TH N/	'A		DRIL	LER Contr	act Dril	ler	ST	ART DATE	10/23/1	4
ELE		DEPTH	BLC	ow co	UNT		BLOWS I	PER FOOT		SAMP.				SOIL AND ROC	K DES	CRIPTION		ELEV	DRIVE ELEV DEF	тн в	LOW CO	UNT		BLOWS	PER FOOT
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WB	5 401	91.1.2			Т	ĪΡ	U-4751		COUNT	Y NEW H	ANOVER	२		G	EOLOGIST Hunsberger, W	'. S.		WBS	4 019 ⁻	1.1.2			Т	P U-475	51	COUNT
SIT	DESC	RIPTIO	N Bri	dge No	o. 203	on	SR 1409	(-L-) over	r US 17 (-	-Y8-)						GROUN	ND WTR (ft)	SITE	DESCR	RIPTION	N Bric	dge No	. 203	on SR 14	J9 (-L-) ov€	er US 17 (-
BOF	RING N). B1-/	٩		s	TAT	TION 22	25+91		OFFSET	63 ft LT			A	LIGNMENT -L-	0 HR.	3.8	BOR	ING NO	. B1-E	3		S	TATION	225+92	
COL	LAR E	.EV . 4	4.7 ft		Т	ОΤ	AL DEPT	H 53.2 f	t	NORTHIN	G 206,4	469		E	ASTING 2,353,945	24 HR.	7.1	COL	LAR EL	EV . 44	4.5 ft		Т	OTAL DE	PTH 54.3	ft
DRIL	L RIG/H	AMMER I	EFF./DA	ATE M	IID1904	CM	E-45B 87%	6 07/30/201	3		DRILL	METHO	OD I	Hud R	otary HAMM	MER TYPE	Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE M	ID1904	CME-45B 8	7% 07/30/201	13
DRI	LLER	Contrac	t Drille	er	S	TAF	RT DATE	10/21/1	4	COMP. DA	ATE 10	/21/14	1	s		I/A		DRIL	LER C	Contract	t Drille	r	S	TART DA	FE 10/21/	14
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(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50	75 100	NO.	И	DI G	ELI	EV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
45		_												44.	7		0.0	45		Ļ						
	43.7	+ 1.0	5	9	11		· · · ·					М	L		ROADWAY EMBAN TAN AND DK. AND LT. G	NKMENT RAY, SILTY	ΥF.		43.7	- 0.8	6	8	9		 17	
10	41.1	3.6		2	2			Ĭ 		· · · · · ·				41.		4) AI PLAIN	<u></u>	10	41.3	3.2	2	4	5			
40	38.9	5.8					P 4				11			-	BLACK, F. SANDY SILT (A	4-4) W/ TR/	ACE	40	38.6	+ - 5.9				9 1		
	00.4	‡	3				3	· · · ·						- <u>36.</u>	7	, 	8.0		26.4	‡	3	4	4	: • ® :	· · · · · ·	
35		+ 8.6	2	5	8	1	· · · · · ·					w			LT. GRAY AND TAN, SII (A-2-4)	LTY F. SAN	ID	35		+ ^{8.4}	5	8	8		 16	· · · ·
		‡					· · · · · ·	· · · ·												ŧ				· · <i>j</i> · · <i>j</i> ·	· · · · · ·	
20	31.1	13.6	3		8		$\cdot \cdot \cdot \cdot$ $\cdot \cdot \cdot \cdot$	· · · ·		· · · · · ·								20	31.1	13.4	2	2	2	'/' '	· · · · · ·	
- 30		‡		 			••12				11			- -				30	-	ŧ				•••		
	00.4	‡					· · [. · · · [. ·	· · · ·											06.1	+ 10.4				: : ``.	. .	
25	26.1	<u>+ 18.6</u>	4	6	9	11	··· • • · ••15					w						25		+ 18.4 +	9	11	14		25	· · · ·
		‡					$\cdot \cdot \cdot \cdot \cdot \cdot$							22.	7		22.0			ŧ						
20	21.1	23.6	1	2	3		:/:::							20.	COASTAL PL <u>6</u> LT. GRAY, F. SANDY	AIN CLAY (A-6)	24.1	20	21.1	23.4	3	2	1		· · · · · ·	
20		‡	'				4 5				11				(CASTLE HAYNE FOI	RMATION)	6)	20	-	ŧ			'	¶3		
	16.1	+				'	$ \cdot $							<u> </u>	DK. GRAY, F. SANDY	CLAY (A-6)	<u>) 27.0</u>		16.1	+					· · · · · ·	
15	10.1	+ 20.0	WOH	woн	WOH	∣∳₀)		· · · ·			w						15		- 20.4	WOH	WOH	WOH	•		· · · ·
		ŧ					· · · · · · · ·	· · · · ·												ŧ					· · · · · ·	
10	11.1	33.6	WOH	I WOH	WOH		· · · · ·			· · · · · ·				1				10	11.1	33.4	WOH	WOH	WOH		· · · · · ·	
10		‡)				11	**		-				10	-	ŧ				•••••		
	61	+ 38.6				ļį	· · · · ·			· · · · · ·			1	<u></u> ≹_'-′ ;	GRAY-GREEN, CLAYEY S	AND (A-2-6	<u>37.0</u> 3) W/		61	+ + - 384					· · · · · ·	
5	0.1	+ 30.0	WOH	1 1	2		 3	· · · ·	· · · ·	· · · · ·		w	/./.	€ <u>4.5</u>	LITTLE SHELL F	RAGS	40.2	5		+	1	11	24	===		
		ŧ					· · · · ·	· · · · ·						ţ.	COASTAL PLAIN SEDIME WHITE GRAY-GREEN AI	Entary RO ND LT. GR/	OCK AY,			ŧ					· · · · · ·	
0	1.1	43.6	44	56/0.3	3		· · · · ·	· · · · ·						ţ.	LIMESTONE	Ξ		0	1.1	43.4	60/0.1	-			· · · · · ·	
		Ŧ									TI			F						ŧ						<u> </u>
3/15	-39	† 48 6					· · · · ·							ŧ					-39	+ 48.4					· · · · · ·	
-5	-5.4	- 50.1	60/0.1	1			· · · · ·			60/0.1	T		±	F				-5	-	+	60/0.1]				
EG.		Ŧ	00	42/0.1						100/0.6	T			ŧ.,	_		50.0			Ŧ						
	-8.5	<u>+ 53.2</u> †	60/0.0	D D			• • • •			60/0.0	┥			<u>8.</u> ;	Boring Terminated wit	h Standard	53.2		-8.9 -9.8	53.4	60/0.1				· · · · ·	
NC		Ŧ												F	Penetration Test Refusal at in CP: LIMESTONE (CAS	Elevation -	8.5 ft NE			Ŧ	60/0.0	Ĩ				
T.GP		Ŧ												F	FORMATION	N)				Ŧ						
ND		Ŧ												F					-	Ŧ						
\$0203		Ŧ												F						Ŧ						
BRDG		Ŧ												F						Ŧ						
		Ŧ												F						Ŧ						
51_0		Ŧ												E						Ŧ						
U47		Ŧ												F					-	Ŧ						
UBLE		Ŧ												E						Ŧ						
E DO		Ŧ												E						Ŧ						
BOR		Ŧ												E						£						
DOC		ł												E						£						
¥		Т												Г						T						



WBS	3 4019 ⁻	1.1.2			Т	I P U-4	751		COUNT	Y NEW HA	ANOVEF	२		GEO	LOGIST Hunsberger,	, W. S	3.	WB	S 4019	1.1.2			TI	P U-47	751		COUNTY
SITE	DESCR	RIPTION	Brio	dge No	o. 203 (on SR	1409	(-L-) ovei	r US 17 (-Y8-)							GROUND WTR (ft) SIT	E DESCI	RIPTIO	N Brid	dge No	. 203 (on SR 1	409 (-L-) over	US 17 (-`
BOR	ING NO	. EB2	-A		S	TATIO	N 22	6+87		OFFSET	65 ft LT			ALIG	NMENT -L-		0 HR. 4.5	BO	RING NO) . EB2	2-B		S	TATION	226+8	37	
COL	LAR EL	EV . 4	1.4 ft		т	OTAL [DEPTH	H 47.9 f	t	NORTHING	G 206,8	565		EAST	ING 2,353,964	2	24 HR. 4.1	COI	LAR EL	.EV. 4	1.2 ft		т	OTAL DI	EPTH ·	47.8 ft	
DRIL	L RIG/HA	MMER E	FF./DA	TE M	ID1904	CME-45	B 87%	07/30/201	3		DRILL	METH	OD	Mud Rotary	H/	AMME	R TYPE Automatic	DRI	L RIG/HA	MMER	EFF./DA	ATE M	ID1904	CME-45B	87% 07/3	30/2013	
DRIL	LER C	Contrac	Drille	r	S	TART [DATE	10/22/1	4	COMP. DA	TE 10/	/22/14	4	SURF	ACE WATER DEPTH	I N/A	N N	DRI	LLER	Contrac	t Drille	er	ST	ART D	ATE 10)/22/14	1
ELEV	DRIVE	DEPTH	BLO	ow co	UNT			BLOWS	PER FOO	Г	SAMP.				SOIL AND ROCK [DESCF	RIPTION	ELE\	, DRIVE	DEPTH	H BLO	ow co	UNT		BL	OWS P	ER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50	75 100	NO.	Им	DI G	ELEV. (f	t)		DEPTH (t) (π)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	0
45																		45									
		ŧ												F						Ŧ							
	41.0					<u> </u>								- 41.4			0	.0	10.0	Ŧ.							
40		ł	1	1	2	• 3					SS-5	30%	6	F	BLACK, F. SAND	DY SIL	PLAIN T (A-4)	40		Ŧ	WOH	1 1	2	• 3			
	38.2	3.2	1	2	4		· ·						'	<u> </u>	BROWN TAN AND GRA	AY, SI	ANIC		38.1	3.1	1	1	1	1 •2			
35	35.9	5.5	4	4	6										(A-2-4	4)		35	35.5	5.7	3	4	6	<u> </u>			
	33.2	8.2	2	3	3		· · ·	· · · ·											32.9	8.3				· • • • •)	· · ·	
30		‡				 ● ^{6.}	· · ·	· · · · ·	· · · · · ·	· · · · · ·								30		‡	2	3	5	. •8 ·		· · ·	
	28.2	+				. \								-					- ·	‡				· <u> </u>			
		+ 10.2	3	5	8		 13.	· · · · ·		· · · · · ·		w							27.9	+ 13.3	6	7	6	· · ·	13 [.] .	· · ·	
25		Ŧ				/-		· · · ·		· · · · · ·				24.4			17	0 25		Ŧ							
	23.2	18.2 [3	1	WOH						SS-6	32%		Ŧ	COASTAL GRAY, SANDY	CLAY	N (A-6)		22.9	18.3	2	1	1				
20		Ī													(CASTLE HAYNE	FORM	1ATION)	20		Ŧ				¶ ²			
	18.2	23.2			WOLL		· ·	· · · ·	· · ·					<u> </u>	DK. GRAY, F. SAN	NDY SI	LT (A-4) 22		17.9	23.3				İ			
45		ŧ	WOH	WOH	WOH	•0	· ·	· · · ·	 		SS-7	33%	6	8_ 9-				1		‡	WOH	I WOH	WOH	•0····		· · ·	
15		+							<u> </u>					14.4			$\overline{CI} \overline{AY} \overline{(A-6)} = 27$	0		‡							
		+ <u>28.2</u> +	WOH	WOH	WOH	↓ ● 0	· ·	· · · · ·	· · · · · ·	. .		w			DR. GIVIT, MED. OR				12.9	<u>+ 28.3</u> +	WOH	и мон	WOH			· · ·	
10		‡					• •	· · · ·	· · ·									10		‡				· · · ·			
	8.2	33.2	WOH	WOH	WOH			· · · · ·		· · · · · ·	55-8	38%							7.9	33.3			1				
5	5.0	+ 364						· · · · · · · ·						5.0			36	4 5	51	+ - - 36 1						· · · ·	
	3.2	38.2	10	54	38		• •			92	1	w		ł	COASTAL PLAIN SED LT. GRAY AND G	DIMENT	TARY ROCK GREEN.		29	38.3	21	13	87/0.4	L			
		Ŧ	20	20	23		•••	· · ·••4	3			W			LIMEST	ONE	- ,		 .0		37	63/0.4					
0		+											Ħ	1-				0		÷							
15	1.8	43.2	32	68/0.4			· ·	· · · ·					H	1					-2.1	43.3	100/0.3	3		· · · ·			
-5		‡					• •		· · ·	• • • • •			Ħ	1				-5		‡				· · ·			
GDT	-6.4	+ 47.8 +	60/0.1						•••	60/0.1		-		6.5	Boring Terminated	d with S	Standard 47	9	-6.6	+ 47.8 +	60/0.0				• •		
DOT		ŧ												F	Penetration Test Refusa in CP: LIMESTONE (al at Ele (CASTI	evation -6.5 ft LE HAYNE			ŧ		-					
NC NC	-	Ŧ												F	FORMAT	ΓΙΟN)				Ŧ							
T.GP		Ŧ												E						Ŧ							
GIN	-	Ŧ												E						Ŧ							
30203		Ŧ												E						Ŧ							
BRD	_	ŧ												F						1							
GEO		ŧ												F						ŧ							
1751		‡												È.						‡							
E U	-	ŧ												F						‡							
OUBL		‡												F						‡							
RE D	-	ŧ												F						‡							
DT BC		Ŧ												F					1	Ŧ							
NCDC		Ŧ												F						Ŧ							

NEW HANOVER		GEOLOGIST	Hunsberger, W	/. S.	
(8-)				GROUN	D WTR (ft)
OFFSET 19 ft LT		ALIGNMENT	-L-	0 HR.	4.2
NORTHING 206,554	4	EASTING 2,3	354,009	24 HR.	4.8
DRILL ME	THOD Mu	ld Rotary	HAM	MER TYPE	Automatic
COMP. DATE 10/22	/14	SURFACE WA		I/A	
SAMP.	L	SO	L AND ROCK DES	SCRIPTION	
NO.	MOI G				
····	D		IDIVIDED COAST	AL PLAIN	0.0 CE
	<u>w_</u>	- <u>38.7</u> - <u>DENOR</u> ,	ORGANICS	S	
	▼	DK. BRO	WN TAN AND LT. TO MED. SAND	GRAY, SIL1 (A-2-4)	YF.
· · · · ·	w 📄	-			
	w				
	W	-			
					<u>17.0</u>
· · · · · · · · · · · · · · · · · · ·	w 💐	22.1 LT	COASTAL PL . GRAY, SANDY C ASTLE HAYNE FO	AIN CLAY (A-6) RMATION)	
· · · · · SS-9 3	18%	- LI.	GRAY, F. SANDY	SILT (A-4)	
	w	-			
· · · · · · · · · · · · · · · · · · ·	i4%	<u>9.2</u>	ILTY F. TO MED. TRACE SHELL F	SAND (A-2-4 RAGS	.) W/ 32.0
	_	-4.6			36.6
. 100/0.9 100/0.9 		COAST. LT	al plain sedimi . Gray and gra Limeston	Entary Ro Y-green, E	СК
		-6.6			47.8
60/0.0		-0.0 Bor Penetrat in CP: PROBI - AND 1 <u>Other Sar</u> ST-2 (2	ing Terminated wit ion Test Refusal at LIMESTONE (CA FORMATIOI SHELBY TUBE 1 DRILLED 5 FEE FOOT DOWNST EB2-B <u>nples:</u> 29.0 - 31.0)	h Standard Elevation -6 STLE HAYN V) AKEN FROI TOWARD - ATION FROI	47.5 6 ft E M -L- M

FALCON ENGINEERING, INC.

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

STRUCTURE #3 - BRIDGE NO. 203 ON SR 1409 (-L-) OVER US 17 (-Y8-)

WBS NO.: 40191.1.2, TIP NO.: U-4751

-

BOR	RING	SAMPLE	T	DTAL SAMP	LE				01 0110101	Attorba	a Limit Toot	Beaulto	Natural	Organic
AAS	6HTO Classifica	ition	PEF	CENT PASS	SING	COARSE SAND	FINE SAND	SILT	CLAY	Atterbei		Results	Content	Content
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	(%)	(%)	(%)	(%)	LL	PL	Ы	%	%
EB	1-A	SS-1												
224.02	A-6	28.2.20.8	100	98	90	3	24	45	28	36	19	17	43.4	-
224+92 FB	<u> 57 ⊑⊺</u> 1-B	20.3-29.0 SS-2												
	-	002	-	-	-	-	-	-	-	-	-	-	25.3	6.9
224+94	26' LT	0.3-1.8												
EB	1-B	SS-3												
	A-4	-	100	99	76	1	68	19	12	23	0	NP	35.4	-
224+94	26' LT	23.5-25.0												
EB	1-B	SS-4					• •							
004.04	A-2-4		100	83	27	45	31	14	10	19	0	NP	33.7	-
224+94	26° L I	33.5-35.0												
ED.	2-A _	33-5	_			_	_	_	_	_	_	_	29.6	13.2
226+87	65' I T	0.4-1.9	_	_	_	_	-	_	_	-	_	_	25.0	13.2
EB	2-A	SS-6												
	A-6		100	99	52	5	44	11	40	39	14	25	31.9	-
226+87	65' LT	18.2-19.7												
EB	2-A	SS-7												
	A-4		100	100	66	1	69	21	9	23	NP	NP	32.6	-
226+87	65' LT	23.2-24.7												
EB	2-A	SS-8	400				07	40	40	00	45	44	20.2	
000.07	A-6	00.0.04.7	100	82	31	41	21	16	16	20	15	11	38.3	-
220+07 FB	05 L1	55.2-54.7 SS-9												
			100	99	69	1	60	29	10	25	NP	NP	37.5	-
226+87	19' LT	23.3-24.8							-					
EB	2-B	SS-10												
	A-2-4		98	79	23	49	30	4	12	20	NP	NP	34.1	-
226+87	19' LT	33.3-34.8												
EB	1-B													
	A-6		100	98	91	3	14	52	30	36	19	17	40.0	-
224+92	57'LI	28.0-30.0												
EB.	2-D A-A	L	99	80	44	44	14	25	17	24	14	10	30.0	_
226+87	7-4 19' I T	29.0-31.0	39		-++	-+4	14	20		24	14	10	30.0	-
220701	10 11	23.0-51.0		I	1									1

127 Still SIGNATURE

Notes:

LL

Liquid LimitPlastic Limit PL PI

= Plasticity Index = LL - PL

NEW HANOVER COUNTY, NORTH CAROLINA

105-03-0803









FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607

SITE PHOTOGRAPHS

BRIDGE NO. 203 ON SR 1409 (–L–) OVER US 17 (–Y8–) NEW HANOVER COUNTY, NORTH CAROLINA WBS NO.: 40191.1.2, TIP NO.: U–4751

<u>SHEET NO.</u>
I.
2
3
4
5-7
8-10
II
12

4751

REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN PROFILE CROSS SECTIONS BORE LOGS

SOIL TEST RESULTS

SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUT-OFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION BRIDGE NO. 204 ON -Y8RPDB-**OVER** -Y8- (US 17) AT -Y8RPDB- STA. 35+12.05



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, GEOTECHNICL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE 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 NECESSARLY 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 UNVESTIGATIONS 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 CONTACT DEFORMATION AND AND AND AND AND AND AND AND THE SUBSURFACE UNVESTIGATIONS 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 CONTACT ON AND AND AND AS WELL AS CONTROLORING TO CLIMATE CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALIFONED 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 SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO DEENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- ES: 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 REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAVES 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

J. MUESSEN, EI

MID-ATLANTIC

M. COOGAN

M. SMALL

S. COOMBS

INVESTIGATED BY _____. BROWN, PE

DRAWN BY ______ D. BROWN, PE

CHECKED BY _____. MUESSEN, EI

SUBMITTED BY ______ D. BROWN, PE

DATE _____ FEBRUARY 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL (DESCRI	PTIO	١						GRADATION					ROCK	DESCRIPTION	
SOIL IS BE PENET ACCORDI IS B	CONSIDERED TRATED WITH ING TO THE BASED ON TH	UNCONSOLIDA H A CONTINUOU STANDARD PE HE AASHTO SY	TED. SEMI-COM IS FLIGHT PO NETRATION TE STEM. BASIC	NSOLIDATE WER AUGE ST (AASH) DESCRIPTI	D.OR WE R AND Y TO T 20 IONS GEI	ATHERED	EARTH MAT THAN 100 586). SOIL NCLUDE TH	ERIALS THA BLOWS PE CLASSIFIC E FOLLOWIN	AT CAN R FOOT ATION IG:	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	ES A GOOD REPR DICATES THAT SI S A MIXTURE OF	ESENTATION OF PARTI DIL PARTICLES ARE A UNIFORM PARTICLE S	ICLE SIZES FR	ROM FINE TO COARSE. NTELY THE SAME SIZE. OR MORE SIZES.	HARD ROCK IS ROCK LINE IND SPT REFUSAL BLOWS IN NON REPRESENTED	NON-COASTAL ICATES THE IS PENETRAT -COASTAL PL BY A ZONE (L PLAIN MATERIAL TH LEVEL AT WHICH NOU ION BY A SPLIT SPOU LAIN MATERIAL, THE DE WEATHERED ROCK.	HAT WOULD YIELD SPT RI N-COASTAL PLAIN MATERI DN SAMPLER EQUAL TO O TRANSITION BETWEEN	FUSAL IF TESTE AL WOULD YIELD R LESS THAN 0.1 SOIL AND ROCK
CUNSISTE	S MINERALO	GICAL COMPOS	TION, ANGULA	RITY, STRU	UCTURE,	PLASTICIT	.ETC. FOF	EXAMPLE.	5 5000	THE ANGULARIT	Y OR ROUNDNESS	OF SOIL GRAINS IS D	DESIGNATED B	Y THE TERMS:	ROCK MATERIAL	.S ARE TYPIC	CALLY DIVIDED AS FO	DLLOWS:	
, ·	VERY STIFF.G	NI LEGE	ND AND	ΔΔSHT	OFINE S	AND LAYERS	ΓΔΤΙΩΝ	STIC.A-7-6		ANGULAR, SUBAN	GULAR, SUBROUND	ED, OR ROUNDED.			WEATHERED ROCK (WR)		NON-COASTAL	PLAIN MATERIAL THAT N	WOULD YIELD SPT
GENERAL		GRANULAR MATER	IALS	SILT	-CLAY MA	TERIALS			N S	·	MINERAL	OGICAL COMPOS	ITION				FINE TO COA	RSE GRAIN IGNEOUS AND	METAMORPHIC RO
CLASS.	(≤ 35% PASSING	200)	(> 3	5% PASSIN	G = 200)				MINERAL NAM	ES SUCH AS QUA DESCRIPTIONS V	RTZ,FELDSPAR,MICA, WHEN THEY ARE CONSI	TALC, KAOLIN, IDERED OF SIC	ETC. SNIFICANCE.	ROCK (CR)		GNEISS, GABBI	SPT REFUSAL IF TESTEN RO, SCHIST, ETC.). ROCK TYPE IN
CLASS.	A-1-a A-1-b	A-2-4 A	2-5 A-2-6 A-2	-7	н-р н	A-7-5.	A-1, A-2 A-3	A-4, A-5 A-6, A-7			<u> </u>	MPRESSIBILITY			NON-CRYSTALL	NE	FINE TO COA	RSE GRAIN METAMORPHIC ROCK THAT WOULD YEIL	AND NON-COASTA D SPT REFUSAL
SYMBOL				3	17.4					SLIGH MODE!	TLY COMPRESSIB	LE SIBLE	LL < 31 LL = 31 -	50	COASTAL PLAIN		COASTAL PLA	NCLUDES PHYLLITE, SLATE IN SEDIMENTS CEMENTED	INTO ROCK, BUT
% PASSING					· · · · ·			SILT-		HIGHL	Y COMPRESSIBLE		LL > 50		SEDIMENTARY F (CP)	юск	SPT REFUSAL	. ROCK TYPE INCLUDES L ETC.	IMESTONE, SANDS
*10 5 *40 3	50 MX 30 MX 50 MX	51 MN					GRANULAR SOILS	CLAY	MUCK, PEAT			IAGE OF MAIEI					WE	ATHERING	
*200 1	15 MX 25 MX	10 MX 35 MX 35	MX 35 MX 35	MX 36 MN :	36 MN 36	MN 36 MN		30123		ORGANIC MATERIAL	ATTER 2 - 3	<u>SOILS</u>	<u>OTHER</u> TRACE	MATERIAL	FRESH P	OCK FRESH, C	CRYSTALS BRIGHT, FEW	JOINTS MAY SHOW SLIGHT	STAINING, ROCK
PASSING 40							soti s	WITH		LITTLE ORGANIC MATT	ER 3 - 5%	5 - 12%	LITTLE	10 - 20%	VERY SLIGHT F	OCK GENERAL	LY FRESH, JOINTS STA	INED, SOME JOINTS MAY S	HOW THIN CLAY CO
LL PI	_ 6 МХ	- 40 MX 4 NP 10 MX 10	MN 40 MX 41 MX 11 MN 11 I	410 MX 410 10 MX :	41 MN 40 10 MX 11	MX 41 MN MN 11 MN	LITTL	E OR	HIGHLY	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE	(V SLI.) C	.RYSTALS ON JF A CRYSTAL	A BROKEN SPECIMEN F	ACE SHINE BRIGHTLY. ROC	K RINGS UNDER H
GROUP INDEX	0	0 0	4 MX	8 MX	12 MX 16	MX NO MX	AMOUN	ITS OF	ORGANIC SOTUS		GF	ROUND WATER			SLIGHT F	OCK GENERAL	LY FRESH, JOINTS STA	INED AND DISCOLORATION	EXTENDS INTO RO
USUAL TYPES S	STONE FRAGS.	FINE SIL1	Y OR CLAYEY	SILT	ry I	CLAYEY	ORG/ MAT	ANIC Ter		∇	WATER LEVEL	IN BORE HOLE IMMEDI	ATELY AFTER	DRILLING	(SLI.) 1	INCH. OPEN . RYSTALS ARE	JOINTS MAY CONTAIN (E DULL AND DISCOLORE	CLAY. IN GRANITOID ROCKS D. CRYSTALLINE ROCKS RI	SOME OCCASIONAL
MATERIALS	SAND	SAND GRAV	el and sand	SOIL	.S	SOILS					STATIC WATER	LEVEL AFTER 24	HOURS		MODERATE S	IGNIFICANT P	PORTIONS OF ROCK SHO	W DISCOLORATION AND WE	ATHERING EFFECTS
GEN. RATING		EXCELLENT TO G	00D	F	AIR TO P	DOR	FAIR TO	POOR	UNSUITABLE		PERCHED WATE	R, SATURATED ZONE, O	R WATER BEAF	RING STRATA	(MUD.) [JULL SOUND L	JNDER HAMMER BLOWS	ARE DULL AND DISCULURED AND SHOWS SIGNIFICANT L	USS OF STRENGTH
HJ JUDUNHDL		PIOF A-7-5 SUB	GROUP IS ≤ LL	- 30 ; PI OF	F A-7-6 S	UBGROUP IS	> LL - 30				SPRING OR SEE	P			MODERATELY	ITH FRESH R	ROCK.		
		100	ISISTENC	Y OR	DENS	ENESS	_				MISCEL	LANEOUS SYMB	OLS		SEVERE 4	ND DISCOLOR	ED AND A MAJORITY S	HOW KAOLINIZATION. ROCK	SHOWS SEVERE LI
PRIMARY S	SOIL TYPE	COMPACT	NESS OR	RANG PENETR	E OF ST	ANDARD ESISTENCE	RANG COMPI	E OF UNCO RESSIVE S	DNFINED		ANKMENT (RE)	25/025 DIP & DIP DI	RECTION		(MUD. SEV.) A	NU CAN BE E <u>F TESTED, WC</u>	DULD YIELD SPT REFUS	AL	S "LLUNK" SUUND
		CUNSI			(N-VALL	E)		(TONS/FT	2)		SCRIPTION		UCTURES		SEVERE A	ILL ROCK EXC	CEPT QUARTZ DISCOLOR	ED OR STAINED. ROCK FAE	RIC CLEAR AND E
GENERAL GRANULA	LLY AR	LO	DSE		4 TO 3	Ø				SOIL SYMBOL		UPT DMT TEST BO	JRING	INSTALLATION	Т	O SOME EXTE	ENT. SOME FRAGMENTS	OF STRONG ROCK USUALLY	REMAIN.
MATERIA		MEDIUM	DENSE ISE		10 TO 30 TO	30 50		N/A		ARTIFICIAL FI	LL (AF) OTHER (EMBANKMENT		3 🛆	CONE PENETROMETER	VERY #	LL ROCK EXC	CEPT QUARTZ DISCOLOF	ED OR STAINED. ROCK FAE	BRIC ELEMENTS AR
	HESIVE/	VERY	DENSE		> 50								•		SEVERE E	UT MASS IS	EFFECTIVELY REDUCED	TO SOIL STATUS, WITH ON	ILY FRAGMENTS OF
GENERAL	LLY	SC	SUF I FT		2 TO	4		¢ 0.25 0.25 TO 0	1.5		- BUUNDHRT		•	TEST BORING	v octo	ESTIGES OF	ORIGINAL ROCK FABRIC	REMAIN. IF TESTED, WOUL	<u>.D YIELD SPT N V</u>
SILT-CL MATERIA	AY AL	MEDIUM	STIFF		4 TO 8 TO 3	8 5		0.5 TO 1. 1 TO 2	Ø	INFERRED ROC	K LINE	MONITORING W	(ELL 🕂	WITH CORE	COMPLETE F	OCK REDUCED) TO SOIL. ROCK FABR DNCENTRATIONS. QUART	IC NOT DISCERNIBLE,OR DI Z MAY BE PRESENT AS DIM	SCERNIBLE ONLY
(COHESI)	VE)	VERY	STIFF RD		15 TO > 30	30		2 TO 4		ALLUVIAL SOIL	- BOUNDARY	△ PIEZOMETER INSTALLATION	$^{\prime}$ $^{\prime}$	- SPT N-VALUE	f	LSO AN EXAM	MPLE.		
		T	EXTURE	OR GR	AIN	SIZE					RECOMM	ENDATION SYME	BOLS				ROC	< HARDNESS	
U.S. STD. SIE	EVE SIZE		4 10	40	60	200	270					ED EXCAVATION -		SSIFIED EXCAVATION -	VERY HARD C	ANNOT BE SC SEVERAL HARD	CRATCHED BY KNIFE OF D BLOWS OF THE GEOL	GIST'S PICK. BREAKING D	F HAND SPECIMENS
OPENING (MN	M)		4.76 2.00	0.42	0.2	5 0.075	0.053					ED EXCAVATION -	USED	IN THE TOP 3 FEET OF	HARD C	AN BE SCRAT	TCHED BY KNIFE OR PI	CK ONLY WITH DIFFICULTY	. HARD HAMMER BI
BOULDER (BLDR.)	R CO	BBLE G	(GR.)	SAND		SAND	9	SILT SL.)	CLAY (CL.)			DEGRADABLE ROCK		KMENT ON BHCKFILL	MODERATELY (AN BE SCRAT	TCHED BY KNIFE OR PI	CK. GOUGES OR GROOVES T	0 0.25 INCHES DE
	205	75		(CSE.S	<u>D.)</u>	(FSD) 0.0E				AL		VST .	VANE SHEAR TEST	HARD E	XCAVATED BY	Y HARD BLOW OF A GE BLOWS.	DLOGIST'S PICK. HAND SPE	CIMENS CAN BE DE
SIZE IN.	12	3	2.0		0.2	5	0.05	0.005		BT - BORING TERMINATED	MIC	CA MICACEOUS	WEA	WEATHERED	MEDIUM (AN BE GROOV	VED OR GOUGED 0.05 1	NCHES DEEP BY FIRM PRES	SURE OF KNIFE O
	S	OIL MOIS	TURE -	CORRE	LATIO	ON OF	TERMS			CL CLAY	NOL NTEST NP	D MODERATELY - NON PLASTIC	7-1	JNIT WEIGHT DRY UNIT WEIGHT	HARD C	'OINT OF A G	VATED IN SMALL CHIPS EOLOGIST'S PICK.	TO PEICES 1 INCH MAXIMU	JM SIZE BY HARD
SOIL (ATT	MOISTURE	SCALE MITS)	FIELD M DESCR	OISTURE IPTION	GU	IDE FOR F	TELD MOIS	STURE DES	CRIPTION	CSE COARSE DMT - DILATOMETER TES DPT - DYNAMIC PENETRA	ORC T PM TION TEST SAI	G ORGANIC T - PRESSUREMETER T P SAPROLITIC	rest <u>SAI</u> S - B	MPLE ABBREVIATIONS ULK	SOFT C F	AN BE GROVE ROM CHIPS T PIECES CAN B	ED OR GOUGED READILY TO SEVERAL INCHES IN E BROKEN BY FINGER	BY KNIFE OR PICK. CAN SIZE BY MODERATE BLOWS PRESSURE.	BE EXCAVATED IN 3 OF A PICK POIN
			- SATUR (SAT	ATED - .)	FR	OM BELOW	THE GRO	WEL, USUA UND WATEF	TABLE	e - VOID RATIO F - FINE	SD. SL.	- SAND, SANDY - SILT, SILTY	SS - 1 ST -	SPLIT SPOON SHELBY TUBE	VERY C	AN BE CARVE	ED WITH KNIFE. CAN BE	EXCAVATED READILY WITH	H POINT OF PICK.
PLASTIC		LIMIT								 FOSS FOSSILIFEROUS FRAC FRACTURED, FRACT 	SLI TURES TC	SLIGHTLY R - TRICONE REFUSAL	RS - RT -	ROCK RECOMPACTED TRIAXIA	F	INGERNAIL.	HICKNESS CHN DE BRU	KEN DI FINDER FRESSURE.	CHN DE SUNHTUN
RANGE <			- WET -	(W)	AT	TAIN OPT	MUM MOIS	TURE		FRAGS FRAGMENTS	w	- MOISTURE CONTENT	CBR -	CALIFORNIA BEARING	FF	ACTURE	SPACING		BEDDING
PL L	+ PLASTI	C LIMIT									ITPMENT US	FD ON SUBJEC		T	VERY WIDE		SPACING MORE THAN 10 FEET	VERY THICKLY	BEDDED
OM		M MOISTURE	- MOIST	- (M)	SO	LID;AT O	R NEAR OP	TIMUM MOI	STURE	DRILL UNITS:	ADVANCING TOO	LS:	HAMMER	TYPE:	WIDE MODERATEL	(CLOSE	3 TO 10 FEET 1 TO 3 FEET	THICKLY BEDD THINLY BEDDE	ED 1.
SL		AGE LIMII			RF			WATER TO		X CME-45	CLAY BIT	5	X AUT	OMATIC MANUAL	CLOSE		0.16 TO 1 FOOT		BEDDED 0.0
			- DRY -	(D)	AT	TAIN OPT	MUM MOIS	TURE		СМЕ-55		UOUS FLIGHT AUGER	CORE SIZ	E:	VENT CEUSE		LESS THAN D.10 FEE	THINLY LAMIN	ATED <
			PL	ASTICI	TΥ					1	8" HOLLOW	AUGERS	🗆 - в _	🗌 -н			IN		
NOV			PLAST	ICITY INE	DEX (PI)		DF	YERY LOW	<u>гн</u>	CME-550		ED FINGER BITS	□ ⁻ N _		FOR SEDIMENTA	HRY RUCKS, IN	NUURATION IS THE H	WITH FINGER FREES NUM	T CEMENTING, HE
SL10	GHTLY PLAS	STIC		6-15				SLIGHT		VANE SHEAR TEST			HAND TOC	DLS:	FRIABLE		GENTLE B	LOW BY HAMMER DISINTE	GRATES SAMPLE.
MOD HIGH	ERATELY P HLY PLASTI	LASTIC C	2	16-25 26 OR MOI	RE			MEDIUM HIGH				2 15/2 STEFI TEETH		T HOLE DIGGER	MODERA	ELY INDURA	TED GRAINS C	AN BE SEPARATED FROM	SAMPLE WITH ST
				COLOR								TUNGCARB.		ID AUGER	INDUDAT	50	GRAINS A	RE DIFFICULT TO SEPARA	ATE WITH STEEL
DESCRIPT	TIONS MAY	INCLUDE COLO	OR OR COLOR	COMBINA	TIONS	TAN, RED.	YELLOW-B	ROWN, BLUE	-GRAY).					E SHEAR TEST	INDURAT	10	DIFFICUL	TO BREAK WITH HAMME	з.
MO	DIFIERS SU	ICH AS LIGHT	DARK, STRE	KED, ETC.	ARE U	SED TO DE	SCRIBE A	PPEARANCE	•		ı 🗖		. [] _		EXTREM	LY INDURATE	ED SHARP HA SAMPLE E	MMER BLOWS REQUIRED T REAKS ACROSS GRAINS.	O BREAK SAMPLE

PROJECT REFERENCE NO.

40191.1.2(U-4751)

	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 NUTABLE PROPORTION OF CLAT IN THEIR COMPOSITION, SUCH AS SMALE, SLATE, ETC.
СК ТНАТ	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLUDES GRANITE,	SURFACE.
L PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SUIL DEPOSITED BY GRAVITY ON SLOPE OR AT BUTTOM 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.
S. IN Y. ROCK HAS	\underline{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.
	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VIDENT BUT RE KAOLINIZED	ITS LATERAL EXTENT.
	LENS - A BUDY OF SUIL OF RUCK THAT THINS OUT IN ONE OF MORE DIRECTIONS.
	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES.) SUIL - SUIL FURMED IN PLACE BY THE WEATHERING OF ROLK.
. SAPROLITE IS	ROCK SECRETTS COULD TO OR ORGENER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
5 REQUIRES	$\underline{SAPROLITE}$ - 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 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	H 140 LD. THEMMENT FALLING 30 INCHES REQUIRED TO PRODUCE A PENEINATION OF 1FOOT INTO SOLL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1FOOT 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.
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
PIECES 1 INCH ED READILY BY	LENDIN OF NOLK SLOMENIS WITHIN A STANION LOUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	UF SURFACE SURFACE SULS USUALLI CUNTAINING URGANIC MATTER.
THICKNESS	BENCH MARK: NCGS MONUMENT "MURRAY".
4 FEET	
.5 - 4 FEET .6 - 1.5 FEET	
3 - 0.16 FEET	NUTES:
0.008 FEET	
AT, PRESSURE, ETC.	
FFI PROBE	
PROBE;	
;	
	DATE: 8-15-14





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		PROJECT REFERENCE NO.	SHEET NO.
		ROADWAY DESIGN	HYDRAULICS
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JND SURFACE			
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TAL PLAIN:			
OOSE TO MEDIUM D	ENSE, GRAY AND		
MOIST TO SATURAT	ED, CLAYEY SAN	JD	30
WITH INTERMITTED	SHELLS		
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DENSE TO VERY DE	NSE, GRAY, WET,	GRAVELLY	
(A-2-4) AND CLAYEY	COARSE SAND	(A-2-6)	0
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PLAIN SEDIMENTAR	Y ROCK:		-5
ILLY HARD TO HAR	DLIMESTONE		
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NOTE: THE EXISTING GR	OUND SURFACE PROFIL	LE OF -Y8RPDB- TAKEN GEU, DATED 5/6/14 INFE	FROM -20 RRED
STRATIGRAPHY IS DRAWN	THROUGH THE BORING	S WITH BOTH PROJECTE	D ONTO
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37+00	37+50	38+00	38+50



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NCDOT GEOTECHNICAL ENGINEERING UNIT

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WBS SITE	5 4019					P U-4/5				(NEW HA		א רא בחו	τΔ 3	GE	EOLOGIST J MUE	SSEN	GROUN		WBS SITE	5 4019	1.1.2				P U-47	51 8000		
BOF		. EB1	-A		s. 5.		33+99		-10- (C	OFFSET	19 ft LT	D- 01	17. 5		JIGNMENT -Y8RP	DB-		N/A	BOR		. EB1	-B		s		33+93	3	(
COL	LAR EL	EV. 4 ²	1.3 ft		T	OTAL DE	PTH 52	5 ft		NORTHIN	G 206,2	227		EA	ASTING 2,354,769		24 HR.	1.3	COL	LAR EL	EV. 4	 1.2 ft		т	DTAL DE	EPTH	- 49.4 ft	
DRIL	L RIG/HA	MMER E	FF./DA	TE M	D1904	CME-45B 8	7% 07/30/2	2013	I		DRILL	METHO	OD	I Mud Ro	tary	HAN		Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE M	ID1904	CME-45B	87% 07/3	30/2013	I
DRII	LER N	1. COO	GAN		S	TART DA	TE 10/0	9/14		COMP. DA	TE 10/	09/14	1	SL	JRFACE WATER D	EPTH	N/A		DRIL	LER N	И. COO	GAN		S		TE 10	0/09/14	4
ELEV	DRIVE	DEPTH	BLC	ow co	JNT		BLOV	/S PEF	R FOOT		SAMP.	▼⁄		Γ.	SOIL AND F	SOCK DE	SCRIPTION		ELEV	DRIVE	DEPTH	BLO	ow co	UNT		BL	OWS P	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50		75 100	NO.	Имс	ы G	ELE	V. (ft)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	0
45		Ŧ												F					45		\downarrow							
		ŧ												F	0.50						ŧ							
40		 				· · · ·						┟┳	~~~	- 41.3 ∳	GROU COA	STAL PI	RFACE L AIN	0.0	40		<u> </u>				· · · ·		•••	
	37.8	I 35									1	_	/~/~; 	÷.	GRAY,	CLAYEY	SAND			377	I 35							
		Ī	4	7	11		18				SS-1	19%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	چ چ							<u> </u>	5	7	6		3.		
35		ŧ				<i>i</i>				<u> </u>			<u> </u> 	*					35		ŧ							
	32.8	- 8.5 -	6	7	6		. .		 		SS-2	18%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	چار پار						32.7	<u>- 8.5</u> -	6	6	7		 3 [.] .	· · ·	· · · ·
30		ŧ				T .``	 	• •				1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>,</u>					30		‡				· · · · · · · · · ·	· ·	· · ·	
	27.8	13.5					· · · · ·		 	· · · · ·			~~~~							27.7	+ - 13.5				:::	· · ·	· · · · · ·	· · · · ·
25		ŧ	4	4	6		· · · · ·	• •	· · · · ·			Sat.	·/~/~	<i>نا</i> من م					25		ŧ	3	4	5	. 9 .9	· · ·	· · · · · ·	
		+				1.								<u>24.3</u>		, SANDY		<u> </u>			ŧ.,_				1.			
	22.0	+ 10.5 +	1	1	1							Sat.		1							<u>+ 18.5</u> +	2	1	1				
20		Ŧ												F					20		Ŧ				<u> </u>		· · ·	
	17.8	23.5	WOH	WOH	WOH							Sat		Ĩ						17.7	23.5	WOH	I WOH	WOH				
15		ŧ				•••••		• •											15		Ŧ		_		· · ·	• •		
	12.8	28.5					· · · · ·													12.7	- - 28.5				· · ·	· ·	· · ·	· · · ·
10		ŧ	WOH	1	1	•2 · · ·	· · · · ·	• •	· · · · ·	· · · · ·		Sat.							10		‡	WOH	I WOH	WOH	•0:::	· · ·	· · · · · ·	
10		‡				 								+					10		ŧ				<u></u>			
	7.8	<u>+ 33.5</u> +	1	2	2		· · · · ·		· · · · ·			Sat.								7.7	+ 33.5 +	1	2	2	\downarrow	· · ·	· · · · · ·	
5		ŧ					· · · · ·	· · ·		· · · ·				4.3				37.0	5		ŧ				· · · ·	· ·	· · ·	
	2.8	38.5	19	18	11							Set			GRAY, (GRAVELL	Y SAND			2.7	38.5	11	18	12				
0		Ŧ					. ¶29					Jai.		Ë.				10.0	0		Ŧ					• • • • • • • • • • • • • • • • • • •	0	
	-2.2	43.5					.	-+-						<u>-0.7</u>	COASTAL PLA			42.0 CK		-23	43.5					. !-	 -	
2/15		ŧ	60/0.1				 		 		T I			1	L	IVIES I OF					+	100/0.4	4		· · ·	· · ·	· · ·	
01/2		+												1-					-5		ŧ							
GDT	-7.2	<u>+ 48.5</u> +	60/0.0	7			· · · · ·		· · · · ·	60/0.0				1						-7.3	+ 48.5	60/0.1	ī			· ·	· · · ·	
-10		ŧ				· · ·	· · · · ·	· · ·		· · · ·				-11 2	b			52.5		-	ŧ							
N NC		Ī					<u></u>			<u> </u>	•			E	Boring Terminat	ed with T	ricone Refusa Limestone	l at			I							
BH.GF	_	ŧ												F	2.0101.011		2			-	ł							
204 E		ŧ												F							ŧ							
200 0		ŧ												F							‡							
EO BF	-	ŧ												F						-	+							
751 GI		ŧ												F							ŧ							
U-47	-	ŧ												F						-	ŧ							
UBLE		Ŧ												F							Ŧ							
О́ Щ		Ŧ												E							Ŧ							
BOR	-	Ŧ												E						-	Ŧ							
CDOI		ŧ												F							ŧ							
ž												1																

NEW HAN	NOVER			GEOLOGIS	ST J MUESS	SEN		
JS 17-) AT -`	Y8RPBI	D- ST/	A. 35∙	+12.05			GROUN	D WTR (ft)
OFFSET 1	2 ft RT			ALIGNMEN	IT -Y8RPDB	-	0 HR.	N/A
NORTHING	206,2	23		EASTING	2,354,802		24 HR.	0.7
	DRILL N	IETHO	D Mu	ld Rotary		HAMME	ER TYPE	Automatic
COMP. DAT	E 10/0)9/14		SURFACE	WATER DEP	TH N/	Ą	
75 100	SAMP. NO.	мон	L O G		SOIL AND ROC	K DESC	RIPTION	
		/ 101	Ŭ					
<u> </u>			- - -	- 41.2 -	GROUND COAST GRAY, S) SURFA AL PLAI ILTY SA	.CE ND	0.0
	SS-3	Sat.		35.2				6.0
	SS-4	16%	, - , - , - , - , - , - , - , - , - , -	-	GRAY, CL	AYEY S	AND	
		Sat. Sat.			GRAY, S	ILTY SA		<u>17.0</u>
		Sat.		-				
		Sat.		<u>_9.2</u> G	RAY, SANDY C		TH SHELL	<u>32.0</u>
		Sat.			GRAY, GRA		SAND -	<u>36</u> .0
· · · · · · · · · · · · · · · · · · ·		Sat.		- <u>-0.8</u>	ASTAL PLAIN S			42.0
· 100/0.4				-	LIME	STONE		
<u> </u> 60/0.1 <u></u> ♥				<u>-8.2</u> Bori -	ng Terminated v Elevation -8.2	vith Trico ft in Lim	one Refusa nestone	49.4 al at
				- 	<u>Samples:</u> -1 (25.5 - 27.5)			

						<u> </u>						_		_												T -
W	/BS	40191	1.1.2			T	IP U-4751	1	COUNTY	Y NEW HA	NOVER	२		GE	OLOGIST J MUES	SEN	1	WBS	3 4019	1.1.2			TI	P U-4751		COUNTY
S	ITE I	DESCR	RIPTION	BR	IDGE	NO. 2	04 ON -Y8F	RPDB- OV	ER -Y8- (l	JS 17-) AT	-Y8RPE	BD- ST	ΓA. 3	5+12.0	95		GROUND WTR (ft)	SITE	DESC	RIPTIO	N BR	DGE	10.20	4 ON -Y8F	₹PDB- OV	ER -Y8- (l
В	ORII	NG NO	. B1-A	۱		s	STATION 3	35+12		OFFSET	20 ft LT			AL	IGNMENT -Y8RPDE	3-	0 HR. N/A	BOF	RING NO). B1-E	3		S	ATION 3	5+12	
С	OLL	AR ELI	EV. 44	1.2 ft		T	OTAL DEP	TH 55.0 f	t	NORTHING	G 206,3	337		EA	STING 2,354,757		24 HR. 3.5	COL	LAR EL	. EV . 4	4.0 ft		Т	DTAL DEP	FH 54.8 f	it
D	RILL	RIG/HA	MMER E	FF./DA	TE M	ID1904	CME-45B 87	% 07/30/201	3		DRILL	METHO	DD N	/lud Rota	ary	HAMM	IER TYPE Automatic	DRIL	L RIG/HA	MMER E	EFF./DA	TE M	D1904 (CME-45B 87	% 07/30/201	3
D	RILL	ER N	1. COO	GAN		S	TART DAT	E 10/08/1	4	COMP. DA	TE 10	/08/14		SU	RFACE WATER DEP	TH N	/A	DRI	LER N	И. СОО	GAN		ST	ART DAT	E 10/07/	14
EL	EV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOOT		SAMP	· ▼ /			SOIL AND ROO	CK DES	CRIPTION	ELEV	DRIVE	DEPTH	H BLC		JNT		BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо) G	ELEV	′. (ft)		DEPTH (ft)	(π)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
4	5		Ļ															45		\downarrow						
			<u> </u>				1						Ľ,	44.2	ROADWAY	EMBAN	KMENT			<u> </u>				<u> </u>	T	<u> </u>
		40.7	3.5										L.~.	-	BLACK, C	LAYEY	SAND		40.5	1						
4	0	40.7	<u> </u>	1	2	4		+ • • • •	+ • • • •	+	SS-5	55%	^,^,	39.2			5.0	40	40.5	<u> </u>	2	1	7		+	+
			Ŧ											-	COAST GRAY, CL	LAYEY S	NN SAND			Ŧ						
	15	35.7	8.5				_ · · · \ ·							- -	,			35	35.5	+ 8.5				: : X :		
		-	ŧ	10	11	12		23			SS-6	24%								‡	8	9	9	•1	8	<u> </u>
			‡				$ \cdot \cdot \cdot \cdot $													‡					· · · · ·	
3	80	30.7	- 13.5	5	8	6						Sat	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>_</u>				30	30.5	13.5	8	8	8	· · · · į ·		
			ŧ				1 1 1 1 1 1 1 1 1 1						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							Ŧ			Ŭ			
			10 5											-						Ŧ				· · [. ·		
2	25		+ 10.5 +	4	5	3			+ • • • •			Sat.		F				25		<u>+ 18.5</u> +	7	6	6	• 12	+	+
		-	ŧ											-						Ŧ						
	0	20.7 ·	23.5				<i>i</i>							-				20	20.5	+ 23.5				<u>/</u> :::		
	0	-	‡	3	1	1	¢2					Sat.		-						+	3	2	1	• 3	<u> </u>	<u> </u>
			ŧ											17.2			27.0			ŧ				į		
1	5	15.7 ·	28.5	 WOH	WOH	WOH	<u> </u>					Cot.			GRAY, S	andy C	LAY	15	15.5	28.5			WOH			
		-	Ŧ				•					Sat.		F						Ŧ			WUN	•0		
			Ŧ											-						Ŧ						
1	0	10.7	+ 33.5 +	WOH	WOH	WOH				· · · ·		Sat.						10	10.5	+ 33.5 +	WOH	WOH	WOH		_ · · · ·	+ • • • •
		•	ŧ											- 72			37.0			‡						
	-	5.7 ·	- 38.5												GRAY, CLAYEY C	OARSE	SAND WITH		55	+ 38.5]:::::	
	5	-	ŧ	23	28	29		+ · · · · ·	1 57	<u> </u>		Sat.		-	SF	IELLS		5	- 0.0	+	11	36	20		<u> </u>	•56
		-	ŧ										~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							Ŧ						
	0	0.7	43.5	100/0	1								·~~	<u> </u>	COASTAL PLAIN	SEDIME	43.0 NTARY ROCK	0	0.5	43.5	00/0 4	_				
		-	Ŧ		1					100/0.4-				F	LIME	STONE] .	Ŧ	00/0.4					
5			ŧ										-	-2.8	COAST		47.0			ŧ					· · · · ·	
122/1	5	-4.3 -	+ 48.5 +	25	24	26			50			Sat.		Ļ	WHITE, CLAYE	Y COA	RSE SAND	-5	-4.5	+ 48.5	17	23	11			· · · ·
T 01			‡														52.0			‡					• • 34	
T.GD		-93	53.5						►	· +			÷	- <u>-</u> 7.8	COASTAL PLAIN	SEDIME	NTARY ROCK		0.5	+ 52 5					· · · · ·	
8	10	-10.8	55.0	60/0.0)				· · · · ·	60/0.0				-10.8	LIME	STONE	55.0	-10	-10.8	54.8	60/0.3				<u>+</u>	+
N N			ł	60/0.0						60/0.0				E	Boring Termina Penetration Test Ref	ated with fusal at E	n Standard Elevation -10.8 ft			ł	60/0.0					
H.GP.			Ŧ											F	in Lir	mestone	•			Ŧ						
4 B		-	ŧ											F					-	‡						
3 020			‡											F						‡						
3RD(£											F						Ŧ						
EOE			Ŧ											F						Ŧ						
51 G			Ŧ											F						Ŧ						
U-47		-	‡											F					-	‡						
BLE			‡		1									F						‡						
nod		•	t		1									F						t						
ORE I		-	ł											ŀ					-	f						
DT BC			Ŧ		1									F						Ŧ						
lCDO		•	‡											F						‡						
7																										

Y NEW HAN	NOVER			GEOLOGIS	T J MUESS	SEN		
JS 17-) AT -ነ	/8RPBI	D- STA	A. 35	+12.05			GROUN	D WTR (ft)
OFFSET 1	5 ft RT			ALIGNMEN	F -Y8RPDB	-	0 HR.	N/A
NORTHING	206,3	43		EASTING	2,354,791		24 HR.	4.0
	DRILL N	IETHOI	D M	ud Rotary		HAMM	ER TYPE	Automatic
COMP. DAT	E 10/0)7/14		SURFACE V	VATER DEP	TH N/	Ą	
75 100	SAMP. NO.	моі	L O G	S	SOIL AND ROC	K DESC	RIPTION	
	SS-7	-16%-		-44.0 	GROUND ROADWAY E BLACK, CL WOOD FRAG APPROXIMATE) SURFA EMBANK AYEY S GMENTS ELY 6 TO	CE MENT AND FROM 07 FEET	0.0
	SS-8	26% Sat. Sat.	<u>, </u>	- - - - - - -	GRAY, CL	AL PLAI AYEY S/	N AND	
		Sat.			GRAY, SA		ĀY — — —	<u>22.0</u> 27.0
	SS-9	Sat. Sat.			GRAY, S	ILTY SA	ND	
· · · · · · · · · · · · · · · · · · ·		Sat.		GRA	Y, GRAVELLY	SAND V	VITH SHE	LS <u>37.0</u> 42.0
		Sat.			STAL PLAIN S LIME: COAST, GRAY, GRA	EDIMEN STONE AL PLAI	ITARY RO N Sand	47.0 52.0
60/0.3 60/0.0				-10.8	STAL PLAIN S LIME	EDIMEN STONE ted with	Standard	54.8
				Penetr	ation Test Refu in Lin	usal at E	evation -1	υ.8 π

W	BS 4	40191	.1.2			TI	P U-47	51		COUNT	Y NEW H	ANOVER	ર			GEOLOGIST J MUES	SSEN			WBS	4019	1.1.2			TI	P U-4751		COUNTY
SI	TE DE	ESCR	IPTION	BRI	DGE N	10.20	04 ON -Y	8RPI	DB- OVE	R -Y8- (I	US 17-) AT	-Y8RPE	BD- S	TA. 3	35+1:	2.05		GROUND WTR	(ft)	SITE	DESCR		BRI	DGE N	10.20	4 ON -Y8F	PDB- OV	ER -Y8- (l
BC	RING	g NO.	EB2-	A		S	TATION	36+2	23		OFFSET	18 ft LT				ALIGNMENT -Y8RPE)B-	0 HR. 1	N/A	BOR	ing no	. EB2-	·B		ST	ATION 3	6+09	
cc	OLLA	RELE	EV. 41	.5 ft		Т	OTAL DE	PTH	53.5 ft		NORTHIN	G 206,4	444			EASTING 2,354,735		24 HR.	4.0	COL		EV. 41	.2 ft		т	DTAL DEP	H 48.7	ft
DR	ILL RI	IG/HAN	MMER E	FF./DA	TE MI	D1904	CME-45B	87% 0	7/30/2013			DRILL	METH	OD	Mud F	Rotary	HAM	MER TYPE Automa	tic	DRILL	RIG/HA	MMER E	FF./DA1	re mic	D1904 (CME-45B 879	6 07/30/201	3
DF	RILLE	RM	. COO	GAN		S		TE	10/07/14	1	COMP. DA	TE 10/	/07/1	4	! :	SURFACE WATER DE	PTH N	I/A		DRIL	LER N	1. COO	GAN		ST		10/08/	14
ELE		DRIVE ELEV	DEPTH	BLC				E 25	BLOWS P	ER FOOT	75 100	SAMP.				SOIL AND R	OCK DES	SCRIPTION		ELEV	DRIVE ELEV	DEPTH	BLO				BLOWS	PER FOOT
(.,	(ft)	(11)	0.5π	0.5ft	0.5π		25		0	15 100	NO.	/м	DI G	EI	LEV. (ft)		DEP1	⁻ H (ft)	(14)	(ft)	(11)	0.5π	0.511	0.5π			50
4	5		-												F					45		ł						
		-	-												L 41	1.5 GROU	ND SURF	ACE	0.0			ŧ						
40)	-	-					•						<i>~~~</i> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	÷	COA: GRAY		AIN SAND		40		<u> </u>						
	3	38.0	3.5				: : :														37.7	- 3.5						· · · · ·
21	-	-	-	2	2	4	• • • • • • • • • • • • • • • • • • •	•	 	· · · ·		SS-10	⁻ 18%	6						25		ŧ	7	8	8	16	 	
3;			-									1		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	, 							ŧ						
		33.0 -	- 8.5	9	10	10		20	 	· · · · ·		SS-11	18%	6 6	÷ †						32.7	+ 8.5 +	5	7	6	· · · · · ·	· · · · ·	
30)	-	-					/·	· · · ·	· · · ·	· · · ·	-		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						30	_	ŧ				· · · · · ·		
	2	28.0	13.5	5	7	5	::/			· · · · ·				/~/~							27.7	- 13.5	_	-				
25	5	-	-			Ŭ	: /1:	2.	· · · · ·	· · · · ·			Sat	· ~ ~ ~						25		ŧ	5	6	5	11		
		23.0	-				1.									<u>4.5</u> GRAY,	SANDY		<u>17.0</u>		-	+						
			-	2	1	1	•2 · ·						Sat									- 18.5 T	WOH	WOH	3	• 3 · · ·		
20)	_	-						· · · · ·			-								20	_	Ŧ						
	-	18.0	23.5	WOH	WOH	WOH							Sat		Ŧ						17.7	23.5	WOH	WOH	WOH			
15	5	_	E												£					15		Ŧ		Wolf		• ⁰ · · · ·		
		13.0	28.5					•							F						127	285						
		-	-	WOH	WOH	1							Sat										WOH	WOH	WOH		 	
10)	-	-					-			<u> </u>	-								10		ŧ				<u> </u>		<u> </u>
		8.0	_ <u>33.5</u> -	1	1	2			 	· · · · ·			Sat								7.7	- 33.5	1	1	1		 	· · · · ·
5	_		-												4.	5			37.0	5		ŧ				, · · · ·		
		3.0	38.5	21	24	14			· · · · ·	· · · · ·							EY GRAV	ELLY SAND			2.7	- 38.5		- 10			· · · · ·	
0		-	-	21	24	14			· · • 38.	· · · · ·			Sat							0		ŧ	19	12	12		24	· · · · ·
		20 -	-						.			1			<u>:0</u>	COASTAL PLAIN		ENTARY ROCK	42.0		-	ŧ						
15	—	-2.0		60/0.1					· · · ·	· · · · ·	60/0.1	•		F	Ŧ	LIN	IESTON	Ξ			-2.3	+ 43.5 	60/0.1					
11/22/	5	-	F							· · · ·		<u> </u>			-					-5		Ŧ						
SDT (-	-7.0	48.5	60/0.1							60/0.1	•			Ŧ						-7.3		160/0 1					
5. Lo	0	-	E					•	· · · ·	· · · · ·					E							±	60/0.0					
NC		-12.0	53.5					-							-1	2.0			53.5			ŧ						
GPJ			_	60/0.0							60/0.0				F	Boring Termi Penetration Test R	nated wit efusal at	h Standard Elevation -12.0 ft				ŧ						
4 BH.		_	-												F	in l	imeston	e			-	ŧ						
9 020		_	-												F							ŧ						
BRDC		_	-												F							ŧ						
GEO		-	-												F							ŧ						
4751		-	-												Ę							ŧ						
Ь́ щ		-	-												F						-	‡						
OUBL		-	-												Ę						·	‡						
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IT BO		-	-												F							‡						
NCDO		-	-												F							ŧ						



SOIL TEST RESU

M&T 503E

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: U-4751

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT:	40191.1.2	COUNTY	NEW	HANOVER		Owner:	NCDOT		
DATE SAMPLED:	10-7-2014 TO 10-9-2014 DA	TE RECEI	VED:	10-7-2014 To	O 10-9-2014	DATE REI	PORTED:	11-4-2014	
SAMPLED FROM:	SOIL TEST BORINGS		SAMPL	ED BY:	STEWART,	INC			
SUBMITTED BY:	JAKE MUESSEN					STAN	DARD SPEC	CIFICATION	
LABORATORY:	STEWART (LAB CERT, #128-1	010)							

TEST RESULTS

Project Sample No.	ST-1	ST-2	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Lab Sample No. A-								
HiCAMS Sample #								
Retained #4 Sieve %	0	0			0			
Passing #10 Sieve %	100	100			100			
Passing #40 Sieve %	99	99			96			
Passing #200 Sieve %	35	67			19			

MINUS #10 FRACTION

Soil Mortar - 100%						
Coarse Sand -Ret. #60	3.9	1.7		12.8		
Fine Sand - Ret. #270	68	41.3		71.2		
Silt 0.05-0.005 mm %	17.8	35.94		6.9		
Clay < 0.005 mm %	10.3	21.09		9.1		
Passing # 40 Sieve %	98.9	99.4		96		
Passing # 200 Sieve %	34.9	67		19		

Liquid Limit	26	30			21			
Plastic Index	3	13			NP			
AASHTO Classification	A-2-4	A-6			A-2-4			
MOISTURE CONTENT			18.6	18.4		15.9	55.4	24.3
Texture								
Station	33+93	36+09	33+99	33+99	33+93	33+93	35+12	35+12
Hole No.	EB1-B	EB2-B	EB1-A	EB1-A	EB1-B	EB1-B	B1-A	B1-A
Depth (ft) From:	25.5	25.5	3.5	8.5	3.5	8.5	3.5	8.5
To:	27.5	27.5	5	10	5	10	5	10

Remarks:

CC:	

SOILS ENGINEER: WILLIAM MUESSEN (CERT. NO. 128-02-1010)

wom

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8-18-2000

T.I.P. ID #:	U-4751				
REPORT ON SAM	IPLES OF:	SOIL FOR C	QUALIT	Υ	
PROJECT:	40191.1.2			COUNTY:	I
DATE CAMPLED			D I		5

							PROJ	ECT REFERENCE NO.	SHEET NO.
							40	191.1.2 (U-4751)	
LTS									
								M&T 502F	
								M&I SOSE	
	NODTH		DEDADT				NT		
	NORTHC	AKULINA	DEPART	MENI OF	TRANSPO	RIAHO	IN		
	DIVISION	N OF HIGH	IWAYS-M	ATERIAL	S AND TES	STS UNIT			
	SO	DILS TEST	REPORT-	SOILS LA	BORATOR	RY			
TIDID#	1764								
1.1.P. ID #:	1/51								
REPORT ON SAMP	LES OF: SOIL	FOR QUALITY							
[
PROJECT:	40191.1.2	C	OUNTY: NE	W HANOVER	Ov	ner: NCD	т		
DATE SAMPLED:	10-7-2014 TO 10-9	9-2014 DATE	RECEIVED	: 10-7-2014 TO	10-9-2014 DAT	E REPOR	ΓED: 11-4-2	014	
SAMPLED FROM:	SOIL TEST BORIN	NGS	SAM	PLED BY:	STEWART, INC				
SUBMITTED BY:	JAKE MUESSEN					STANDAI	RD SPECIFIC	CATION	
LABORATORY:	STEWART (LAB C	ERT. #128-1010)							
			TECT D	FOLD TO					
			IESIK	ESULIS		1			
Project Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12	SS-13		
Lab Sample No. A-									
HICAMS Sample #		-							
Retained #4 Sieve %			0						
Passing #10 Sieve %			100						
Passing #40 Sieve %			98						
Passing #200 Sieve %			31						
		Μ	IINUS #10	FRACTIO	N				
Soil Mortar - 100%									
Coarse Sand -Ret. #60			5.9						
Fine Sand - Ret. #270	1	1	73.1				1	1 1	
Silt 0.05-0.005 mm %	1	1	17.1		1				
Clay < 0.005 mm %	1		3.9	-	1				
Passing # 40 Siove %	+	1	08.2				+	+	
Passing # 200 Sieve %		1	30.6		1		-		
1 assing # 200 Sieve %	1		30.0						
	_								

							PR0.	JECT REFERENCE NO.	SHEET NO.
							4	0191.1.2 (11-4751)	
ZES									
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								M&T 503E	
	NORTH C	AROLIN	A DEPAR	TMENT O	F TRANSI	PORTATIO	N		
	DIVISIO	N OF HI	THWAVS	MATEDIA	IS AND T	FSTS UNIT	Г		
	DIVISIO		JIIWAI 5-			CDV	1		
	50	DILS TES	ST REPOR	T-SOILS L	ABORAT	ORY			
Г.I.Р. ID #:	J-4751								
· · · ·									
REPORT ON SAM	PLES OF: SO	L FOR QUALIT	Y						
PROJECT:	40191.1.2		COUNTY:	NEW HANOVER		Owner: NCE	от		
DATE SAMPLED	10-7-2014 TO 10	-9-2014 DA	FERECEIV	ED· 10-7-2014	TO 10-9-2014	DATE REPOR	TED. 11-4-	-2014	
SAMPLED FROM	SOIL TEST BOR	INGS		MPI FD BV	STEWART IN	C REFOR			
SUBMITTED BV:		1100	Dr	In LED DI.	01207001,10	STANDA	DD SDECIEI	CATION	
ABODATODV.		OEDT #129 10	10			STANDA	KD SI LUITI	CATION	
LADUKATUKI:	STEWART (LAB	CERT. #120-10	10,						
			TEST	RESULTS					
Project Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12	SS-13		
Lab Sample No. A	-								
HiCAMS Sample #									
Retained #4 Sieve %			0						
Passing #10 Sieve %			100						
Passing #40 Sieve %			98						
Passing #200 Sieve %			31						
			MINUS #	10 FRACTI	ON				
Soil Mortar - 100%						1			
Coarse Sand -Ret. #60			5.9						
Fine Sand - Ret. #270			73.1						
Silt 0.05-0.005 mm %		+	17.1						
"lav < 0.005 mm %			3.9						
Passing # 40 Sieve %		+	98.2						
Passing # 200 Sieve %		+	30.6						
	I		00.0						

							PROJI	ECT REFERENCE NO.	SHEET NO.
							40	191.1.2 (U-4751)	
LTS									
								M&T 502F	
								M&I SOSE	
	NODTH		DEDADT				NT		
	NORTHC	AKULINA	DEPART	MENI OF	TRANSPO	RIAHO	IN		
	DIVISION	N OF HIGH	IWAYS-M	ATERIAL	S AND TES	STS UNIT			
	SO	DILS TEST	REPORT-	SOILS LA	BORATOR	RY			
TIDID#	1764								
1.1.P. ID #:	1/51								
REPORT ON SAMP	LES OF: SOIL	FOR QUALITY							
[
PROJECT:	40191.1.2	C	OUNTY: NE	W HANOVER	Ov	ner: NCD	т		
DATE SAMPLED:	10-7-2014 TO 10-9	9-2014 DATE	RECEIVED	: 10-7-2014 TO	10-9-2014 DAT	E REPOR	ΓED: 11-4-2	014	
SAMPLED FROM:	SOIL TEST BORIN	NGS	SAM	PLED BY:	STEWART, INC				
SUBMITTED BY:	JAKE MUESSEN					STANDAI	RD SPECIFIC	CATION	
LABORATORY:	STEWART (LAB C	ERT. #128-1010)							
			TECT D						
			IESIK	ESULIS		1			
Project Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12	SS-13		
Lab Sample No. A-									
							_		
HICAMS Sample #									
Retained #4 Sieve %			0						
Passing #10 Sieve %			100						
Passing #40 Sieve %			98						
Passing #200 Sieve %			31						
		Μ	IINUS #10	FRACTIO	N				
Soil Mortar - 100%									
Coarse Sand -Ret. #60			5.9						
Fine Sand - Ret. #270	1	1	73.1				1	1 1	
Silt 0.05-0.005 mm %	1	1	17.1		1				
Clay < 0.005 mm %			3.9						
Passing # 40 Siove %	+	1	08.2				+	+	
Passing # 200 Sieve %		1	30.6		1		+		
1 assing # 200 Sieve %	1		30.0						
	_								

Liquid Limit			21					
Plastic Index			NP					
AASHTO Classification			A-2-4					
MOISTURE CONTENT	15.8	25.5		17.7	17.7	17.7	17.4	
Texture								
Station	35+12	35+12	35+12	36+23	36+23	36+23	36+09	
Hole No.	B1-B	B1-B	B1-B	EB2-A	EB2-A	EB2-B	EB2-B	
Depth (ft) From:	3.5	8.5	28.5	3.5	8.5	3.5	8.5	
To:	5	10	30	5	10	5	10	

Remarks:

CC:

SOILS ENGINEER: WILLIAM MUESSEN (CERT. NO. 128-02-1010)

wom

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8-18-2000

SITE PHOTOGRAPHS



PHOTOGRAPH I: VIEW LOOKING UPSTATION (NORTH) ALONG PROPOSED -Y8RPDB- FROM END BENT NO.I.

PROJECT REFERENCE NO.	SHEET NO.
40191.1.2 (U-4751)	12



PHOTOGRAPH 2: VIEW LOOKING UPSTATION (EAST) ALONG PROPOSED -Y8- FROM BENT NO. I.

SHEET NO. 2 3

751

4

REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION <u>RETAINING</u> WALL 1 AT -L- STA. 34+00, **RIGHT**

40191 Ĥ PROJEC

STATE N.C



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SHEETS

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOCS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLI 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 UNPLACE) 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 INCLATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTIGE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- 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 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

C.M. WRIKE

CAITLIN

MID ATLANTIC

INVESTIGATED BY _ J.L. STONE

DRAWN BY _C.P. TURNER

CHECKED BY _____. M. ARGENBRIGHT

SUBMITTED BY ______.

DATE MARCH 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERE BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LI ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO I 206, ASTM IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OI) EARTH MATERIALS THAT CAN SS THAN 100 BLOWS PER FOOT D1586). SOIL CLASSIFICATION INCLUDE THE FOLLOWING: HER PERTINENT FACTORS SUCH TY FIG FOR FUNDING	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. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTI ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EOUAL TO OR LESS THAN 0. BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK. BOCK MATERIALS ADE TYPICALLY DIVIDED AS FOLLOWS.
AS MINERALUGICAL COMPOSITION, ANGULARITT, STRUCTORE, PLASTIC VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYE	RS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED
SOIL LEGEND AND AASHTO CLASSI	ICATION		ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	HOUR GOVE THE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
CLASS A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7	A-3 A-6, A-7		ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL
SYMBUL 000000000		MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS
*10 50 MX	GRANULAR SILT- MUCK,	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 M	SOILS SOILS PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH BOCK FRESH CRYSTALS BRIGHT FEW JOINTS MAY SHOW SLIGHT STAINING BOCK
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MX 41 MN 40 MX 41	SOILS WITH LITTLE OR	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% 2 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% 2 - 20% HIGHLY 35% AND ABOVE	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H
	MODERATE ORGANIC	GROUND WATER	
USUAL TYPE STONE FRACE. USUAL TYPE STONE FRACE. GRAVEL, AND SAND GRAVEL AND SAND	ORGANIC SOILS MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▼ STATIC WATER LEVEL AFTER 24 HOURS	SLIDH HOLK DEREALT FREAK, SOUND STANDER HAW DISCUSSION AND EXCLASSION (SLI) INC. OPEN JOINTS MAY CONTRIBUTION CAY, IN GRANITOID ROCKS SOME OCCASIONA CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER
	FAIR TO	∇ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR	POOR POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP	S > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F
	RANGE OF UNCONFINED		(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND
PRIMARY SOIL TYPE COMPACINESS OR CONSISTENCY PENETRATION RESISTENT (N-VALUE)	E COMPRESSIVE STRENGTH (TONS/FT ²)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL SOIL SYMB	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 (
GRANULAR LOOSE 4 TO 10 MATCHAN MEDIUM DENSE 10 TO 30	N/A		ID SOME EXTENT. SOME FRAGMENTS OF STRONG ROLK OSDALLT REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</u>
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50 VERY SOFT < 2	< 0.25	THAN ROADWAY EMBANKMENT \bigcirc AUGER BORING \bigcirc 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 O (V SEV.) REMAINING, SAPPOLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DECREE THAT
GENERALLY SOFT 2 TO 4 SILT-CLAY MEDIUM STIFF 4 TO 8 MATERIAL STIFF 8 TO 15 (COMFESIVE) VERV STIFF 15 TO 30	0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4		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
HARD > 30	> 4		BOCK HARDNESS
TEXTURE OR GRAIN SIZE		RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIEVE SIZE 4 10 40 60 20 OPENING (MM) 4.76 2.00 0.42 0.25 0.0	0 270 75 0.053	EXCAVATION UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
BOULDER COBBLE GRAVEL COARSE FIL		SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEEL OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
(BLDR.) (COB.) (GR.) SAND SA (BLDR.) (COB.) (GR.) (GR.) (GR.) (GR.) GRAIN MM 305 75 2.0 0.25	0.05 0.005	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DI HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D BY MODERATE BLOWS.
SIZE IN. 12 3		BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 27 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE O HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES LINCH MAXIMUM SIZE BY HARD
SOIL MOISTURE - CORRELATION OF	TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_{d}^{-} DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR		DMT - DILATOMETER TEST PMT - PRESSURAMETER 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.
ILL - LIQUID LIMIT - SHIDNHEL - OSOHLET (SAT.) FROM BEL	DW THE GROUND WATER TABLE	e - VUID HATIO SUL - SHAUL SHAUT SS - SPLI SHOUN F - FINE SL - SLIT, SLITY ST - SHELBY TUBE F0SSL - F0SSLIFEROUS SLI - SLITY 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 FINGERMAIL.
RANGE - WET - (W) SEMISOLIC ATTAIN OF	REQUIRES DRYING TO TIMUM MOISTURE	FRAC FRACTORED, FRACTORES TER - TRICUNE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
			TERM SPACING TERM
OM OPTIMUM MOISTURE - MOIST - (M) SOLID;AT SL SHRINKAGE LIMIT	OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1 MODERATELY CLOSE 1 TO 3 FEET THICKLY BEDDED 1 MODERATELY CLOSE 1 TO 3 FEET THICKLY BEDDED 0. CLOSE 0 TO 10 FEET THICKLY BEDDED 0.
- DRY - (D) REQUIRES ATTAIN OF	ADDITIONAL WATER TO TIMUM MOISTURE	CME-55	VERY CLOSE LESS THAN Ø.16 FEET THICKLY LAMINATED Ø.00 THINLY LAMINATED <
PLASTICITY			INDUKATION
NON PLASTIC PLASTICITY INDEX (PI) NON PLASTIC 0-5 SLIGHTLY PLASTIC 6-15	DRY STRENGTH VERY LOW SLIGHT	VANE SHEAR TEST	FRIABLE RUBBING BUT FILE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OR MORE	MEDIUM HIGH	PORTABLE HOIST	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
			INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RE MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO),YELLOW-BROWN,BLUE-GRAY). DESCRIBE APPEARANCE.	□ CORE BIT □ VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.

PROJECT REFERENCE NO.

SHEET NO.

2



TERMS AND DEFINITIONS ED. AN INFERRED) SPT REFUSAL. 1 FOOT PER 60 IS OFTEN ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFER - 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 CK THAT 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. $\underline{\text{DIKE}}$ - 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. NATINGS 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 ІСК 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. S. IN AY. 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. ELDSPARS 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 STRONG ROCK T ONLY MINOR VALUES < 100 BPF OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK OUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS EQUAL TO OR CREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE IN SMALL AND SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT S REQUIRES 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 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 R 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. $\underline{STRATA CORE RECOVERY (SREC.)}$ - 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 (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. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: THICKNESS 4 FEET FEET ELEVATION: .5 - 4 FEET 16 - 1.5 FEET NOTES: 3 - Ø.16 FEET 08 - 0.03 FEET 0.008 FEET AT, PRESSURE, ETC. TEEL PROBE: PROBE;





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REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION <u>RETAINING WALL 2 LEFT</u> OF -L-*STA*. 30 + 00

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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 RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOCS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLI 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 UNPLACE) 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 INCLATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTIGE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- 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 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

C.M. WRIKE

CATLIN PERSONNEL

MID ATLANTIC PER.

INVESTIGATED BY _ J.L. STONE

DRAWN BY _____. STONE

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY ______.

DATE MARCH 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DE	SCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSO BE PENETRATED WITH A CONTINUOUS FLIGHT POWE ACCORDING TO THE STANDARD PENETRATION TEST IS BASED ON THE AASHTO SYSTEM. BASIC DE CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO	LIDATED, OR WEATHERED EARTH MATERIALS THAT CAN R AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION SCRIPTIONS CENERALLY INCLUDE THE FOLLOWING; LASSIFICATION, AND OTHER PERTINENT FACTORS SUCH WEATHER AND AND AND THE FOR TOWNED.	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. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	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. BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK. POCK MATERIALS ARE TYPICALLY DIVIDED AS EQUILONS.
VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTER	BEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED
SOIL LEGEND AND A	ASHTO CLASSIFICATION		ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
GENERAL GRANULAR MATERIALS CLASS. (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE
GROUP A-1 A-3 A-2	A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-COXSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7	A-3 A-6, A-7		ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL
SYMBUL 00000000		MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT
"10 50 MX	GRANULAR SILT- MUCK,	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	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH BOCK FRESH CRYSTALS BRIGHT FEW JOINTS MAY SHOW SLIGHT STAINING BOCK
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN	40 MX 41 MN 40 MX 41 MN SOILS WITH	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% 2 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% 12 - 20% HIGHLY 35% AND ABOVE	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H
	8 MX 12 MX 16 MX ND MX AMOUNTS OF ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE.
USUAL TYPES STONE FRACS. OF MAJOR GRAVEL, AND MATCHINE, CANES MATCHINE, CANES, SAND GRAVEL, AND SAND GRAVEL, AND SAND	SILTY CLAYEY MATTER SOILS SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▼ STATIC WATER LEVEL AFTER 24 HOURS	SELIDIT TODA CONCELET TREAT OWNERS OWNERS AND DISOLOGIMATOR AT AND A TO A STATE OF A STA
GEN. RATING	FAIR TO	∇Pw Perched water, saturated zone, or water bearing strata	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOOD	FAIR TO POOR POOR UNSULTAB	E — 〇川仆— SPRING OR SEEP	DULL SUUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGT WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS ≤ LL - 3	0 PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F
	RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND
PRIMARY SOIL TYPE CONSISTENCY GENERALLY VERY LOOSE	PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) SUBJECTION WITH SOIL DESCRIPTION WITH SOIL SYMBOL SPT SPT	IF TESTED, WOULD TIELD SPT HERDSAL 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 (TO SOME EXTENT SOME FRANKING OF STRONG ROCK HERDINI V REMAIN
GRANULAR LOOSE MATERIAL MEDIUM DENSE	4 TO 10 10 TO 30 N/A		ID SUME EXTENT. SUME PRHOMENTS OF STRUNG ROLK USUALLT REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NON-COHESIVE) DENSE VERY DENSE VERY SOFT	30 TO 50 > 50 < 2 < 0.25	THAN ROADWAY EMBANKMENT + AUGER BORING + TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DECREE THAT
GENERALLY SOFT SILT-CLAY MEDIUM STIFF MATERIAL STIFF (CDHFSIVE) VERY STIFF	2 TO 4 0.25 TO 0.5 4 TO 8 0.5 TO 1.0 8 TO 15 1 TO 2 15 TO 30 2 TO 4		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
HARD	> 30 > 4	INSTALLATION O' SI'L HELE	ROCK HARDNESS
TEXTURE O	R GRAIN SIZE		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIEVE SIZE 4 10 OPENING (MM) 4.76 2.00	40 60 200 270 0.42 0.25 0.075 0.053	Excavation UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
	COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
(BLDR.) (COB.) (GR.) GRAIN MM 305 75 2.0	SAND SAND (CL.) (CSE. SD.) (F SD.) (SL.) (CL.) 0.25 0.05 0.005	ABBRE VIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DI HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D BY MODERATE BLOWS.
SIZE IN. 12 3		BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY γ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE O HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD
	DRRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
(ATTERBERG LIMITS) DESCRIPT	ION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST DMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DMT - DINAMUC PENETRATION TEST SAP, - SAPROLITIC S - BULK OVER DATIO DATIO DATIO	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 FINGER PRESSURE.
	FROM BELOW THE GROUND WATER TABLE	6 YOLD NATIO 33 351 351 351 7 FINS L SIL	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READLY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH FINGERMAIL.
RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTORED, FRACTORES TCR - TRICURE REPOSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
		HI HIGHLY V - VERY RATIO	TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY REDDED
OM OPTIMUM MOISTURE MOIST - SL SHRINKAGE LIMIT	(M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	WIDE 3 TO
- DRY - (D	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	X CME-55	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLAS	TICITY		INDURATION
NON PLASTIC	TY INDEX (PI) DRY STRENGTH 0-5 VERY LOW 6-15 SLICHT	CME-550 HARD FACED FINGER BITS	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 HIGHLY PLASTIC 26	16-25 MEDIUM OR MORE HIGH	Image: Document of the second seco	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
CC)LOR		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR C MODIFIERS SUCH AS LIGHT, DARK, STREAKE	OMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). ID, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

PROJECT REFERENCE NO.

SHEET NO.

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TERMS AND DEFINITIONS ED. AN INFERRED) SPT REFUSAL. 1 FOOT PER 60 IS OFTEN ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFER - 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 CK THAT 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. $\underline{\text{DIKE}}$ - 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. NATINGS 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 ІСК 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. S. IN AY. 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. ELDSPARS 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 STRONG ROCK T ONLY MINOR VALUES < 100 BPF OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK OUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS EQUAL TO OR CREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE IN SMALL AND SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT S REQUIRES 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 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 R 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. $\underline{STRATA CORE RECOVERY (SREC.)}$ - 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 (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. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: THICKNESS 4 FEET FEET ELEVATION: .5 - 4 FEET 16 - 1.5 FEET NOTES: 3 - Ø.16 FEET 08 - 0.03 FEET 0.008 FEET AT, PRESSURE, ETC. TEEL PROBE: PROBE;





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SHEET NO. 2 3

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION <u>RETAINING WALL 3 LEFT OF</u> -Yl - STA. 43 + 50

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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 RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOCS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLI 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 UNPLACE) 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 INCLATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTIGE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- 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 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

C.M. WRIKE

CAITLIN

MID ATLANTIC

INVESTIGATED BY ______. CRENSHAW

DRAWN BY _C.P. TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY ______.

DATE ______ FEBRUARY 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	NUCK MATERIALS ARE THILALLT DIVIDED AS FULLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARIZ, FELUSPAR, MICA, TALC, KAULIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCARENUS (CALC) - SOUS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE
UROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMB0	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE SANDSTONE, ETC.	OF SLOPE.
	HIGHLY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
*10 50 MX GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
■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 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOUS SOUS OTHER MATERIAL		ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING #40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 11 MN 10 MX 11 MN 11 MN 11 MN 11 MN 11 MN	HIGHLY ORGANIC $ ightarrow$ 10%, $ ightarrow$ 20%, HIGHLY 35%, AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
UF MAJUR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING FAIR TO DOOD FAIR TO DOOD INCLUTION OF	✓ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EACELLENT TO DOUD PHIN TO FOUN POOR FOUN UNSUTHBLE	- 	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
	MISCELLANEOUS STMBULS	MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/F1*)		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOLL. IN GRANITOLD ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL DENSE 10 TO 30 N/A		IF IESTED, WUULD YIELD SPI N VALUES > 100 BPF	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD VIELD SPT IN VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SUF1 2 10 4 0.25 10 0.5 SILT-CLAY MEDIUM STIFF 4 T0 8 0.5 T0 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SUIL - SUIL FURMED IN PLACE BY THE WEATHERING UF RUCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	INSTALLATION		RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS		SAPRULITE (SAP.) - RESIDUAL SUIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK COURSES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (CDB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	Standard Penetration test (Penetration Resistance) (SPT) - Number of Blows (N or BPF) of a 140 LB Hammer Falling 30 Inches Required to Produce a Penetration of 1 Foot into Solu
	CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_{d} - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	IU UK LESS IHAN 0.1 FUUI PER 60 BLUWS.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	UPI - UYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FUSS FUSSILIFERUUS SLI SLIGHTLY RS - RUCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
		INDURATION	
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST	GENILE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
		DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	DATE: 0-15-14

PROJECT REFERENCE NO.

SHEET NO.

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SHEET NO. 2 3

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION <u>RETAINING WALL 4 RIGHT</u> OF -L-STA.74+00

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CAUTION NOTICE

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PERSONNEL

C.M. WRIKE

CAITLIN

MID ATLANTIC

INVESTIGATED BY ______. CRENSHAW

DRAWN BY __C.P. TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY ______.

DATE ______ FEBRUARY 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	NUCK MATERIALS ARE THILALLT DIVIDED AS FULLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARIZ, FELUSPAR, MICA, TALC, KAULIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCARENUS (CALC) - SOUS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE
UROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMB0	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE SANDSTONE, ETC.	OF SLOPE.
	HIGHLY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
*10 50 MX GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
■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 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOUS SOUS OTHER MATERIAL		ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING #40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 11 MN 10 MX 11 MN 11 MN 11 MN 11 MN 11 MN	HIGHLY ORGANIC $ ightarrow$ 10%, $ ightarrow$ 20%, HIGHLY 35%, AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
UF MAJUR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING FAIR TO DOOD FAIR TO DOOD INCLUTION OF	✓ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EACELLENT TO DOUD PHIN TO FOUN POOR FOUN UNSUTHBLE	- 	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
	MISCELLANEOUS STMBULS	MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/F1*)		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOLL. IN GRANITOLD ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL DENSE 10 TO 30 N/A		IF IESTED, WUULD YIELD SPI N VALUES > 100 BPF	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD VIELD SPT IN VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SUF1 2 10 4 0.25 10 0.5 SILT-CLAY MEDIUM STIFF 4 T0 8 0.5 T0 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SUIL - SUIL FURMED IN PLACE BY THE WEATHERING UF RUCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	INSTALLATION		RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS		SAPRULITE (SAP.) - RESIDUAL SUIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK COURSES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (CDB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	Standard Penetration test (Penetration Resistance) (SPT) - Number of Blows (N or BPF) of A 140 LB HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENEtration of 1 FOOT INTO SOU
	CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_{d} - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	IU UK LESS IHAN 0.1 FUUI PER 60 BLUWS.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	UPI - UYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FUSS FUSSILIFERUUS SLI SLIGHTLY RS - RUCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
		INDURATION	
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST	GENILE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
		DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	DATE: 0-15-14

PROJECT REFERENCE NO.

SHEET NO.

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REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>NEW</u> HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION RETAINING WALL NO. 5 AT -L-STA. 84 + 50, 71' LT

40191 Ĥ PROJEC

STATE N.C



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PERSONNEL

J.R. SWARTLEY

D.G. PINTER

- J.R. MATULA
- INVESTIGATED BY _ J.L. STONE
- DRAWN BY _C.P. TURNER
- CHECKED BY ______. D.N. ARGENBRIGHT
- SUBMITTED BY ______.
- DATE ______ FEBRUARY 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			-
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
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VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7	THE ANGULARITY OR ROUNDNESS OF SUIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		ROCK (WR)	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPPONIC MAT	MINERALUGILAL LUMPUSITIUN	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFALE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-8 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-		ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL BOOOD STORE S	SLIGHTLY COMPRESSIBLE LL < 31	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO BOCK BUT MAY NOT YIELD	
	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX GRANULAR SILT-	MUCK, PERCENTAGE OF MATERIAL		
*40 30 MX 50 MX 51 MN SOILS SOILS	PEAT GRANULAR SILT - CLAY	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
■200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 30 MN 36 MN 30 MN 36 MN 36 MN 30 MN 36 MN 36 MN 36 MN 30 MN 36 MN 36 MN 30 MN	ORGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL	IRACE OF ORGANIC MATTER 2 - 37, 3 - 57, IRACE 1 - 107, LITTLE ORGANIC MATTER 3 - 57, 5 - 127, LITTLE 10 - 207,	HAMMER IF CRYSTALLINE.	HORIZONTAL.
	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX	HIGHLY HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	JRGANIC GROUND WATER		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SHITE SILTY OR CLAYEY SILTY CLAYEY MATTER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING FAIR TO COOP FAIR TO DOOD FAIR TO DOOD FAIR TO	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD PAIR TO FOUR POOR FOUR		WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30			FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OF RANGE OF STANDARD RANGE OF U	INED ET CONTRACT	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE	ANGTH ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SLOPE INDICATOR	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.	- INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPRULITE IS AN EXAMPLE OF RUCK WEATHERED TO A DEGREE THAT ONLY MINUR VESTICES OF OPICINAL PORY FARPIC PEMAIN IF TESTER WOULD VIELD SET A VALUES & LOB OPEC	UF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 T			RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO	WITH CORE	SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DISCENTISES, ON DISCENTISES AS TRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO	TTREAT ALLUVIAL SOIL BOUNDARY A PIEZOMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > ·		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOLL THAT RETAINS THE RELIC STRUCTURE OR EARRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIEF OR SHARP PICK BREAKING OF HAND SPECIMENS BEDUIDES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LXXI EXCAVATION LZZI UNSUITABLE WASTE LXXI ACCEPTABLE, BUT NOT TO BE	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
DOULDER CORPLE CRAVEL COARSE FINE SUIT	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) SAND SAND (SL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE. SD.) (F SD.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.0	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MUDERATE BLUWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BI - BUKING TERMINATED MILA MILALEUUS WEA WEATHERED CI - CLAY MOD - MODERATELY γ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED Ø.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC χ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE	IPTION CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION CODE FOR FIELD HOISTORE	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID: VERY WET. U	Y e - VOID RATIO SD, - SAND, SANDY SS - SPIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WA	ABLE F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL		
	HI HIGHLY V - VERY RATIO		BENCH MARK:
		VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM		WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL SHRINKAGE LIMIT		MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL WATER		VERY CLOSE USS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
- UKY - (U) ATTAIN OPTIMUM MOISTURE	G' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
ρι Δετισιτή		INDURATION	1
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT PRESSURE FTC.]
PLASTICITY INDEX (PI) DRY STRE		RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
SLIGHTLY PLASTIC 6-15 SLIGH	VANE SHEAR TEST	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIU		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MUDERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PRORF:	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BU		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
MUDIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARAT		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
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PROJECT REFERENCE NO.







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CONTENTS

SHEET NO. 2 3

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION <u>RETAINING WALL AT</u> -L- STA. 129 + 00, LEFT

75 4 REFERENCE

STATE N.C



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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 RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOCS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLI 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 UNPLACE) 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 INCLATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTIGE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO DE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

- 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 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

C.M. WRIKE

CATLIN

MID ATLANTIC

- INVESTIGATED BY _ J.L. STONE
- DRAWN BY __C.P. TURNER
- CHECKED BY ______. D.N. ARGENBRIGHT
- SUBMITTED BY ______.
- DATE ______ FEBRUARY 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION		ROCK DES	SCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	CAN WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICL	E SIZES FROM FINE TO COARSE. HARD ROCK	K IS NON-COASTAL PLAIN MATERIAL THAT W F INDICATES THE LEVEL AT WHICH NON-COAS	WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASS	TION UNIFORMLY GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES ARE ALL	APPROXIMATELY THE SAME SIZE. SPT REFU	SAL IS PENETRATION BY A SPLIT SPOON SA	AMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLL		BLOWS IN	I NON-COASTAL PLAIN MATERIAL, THE TRAN	NSITION BETWEEN SOIL AND ROCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAM	ANGULARITY UF GRAIN	S ROCK MAT	ERIALS ARE TYPICALLY DIVIDED AS FOLLOW	/S:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF.GRAY.SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-	THE ANGULARITY OR ROUNDESS OF SOIL GRAINS IS DE	SIGNATED BY THE TERMS: WEATHERE		IN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		ROCK (WR)	100 BLOWS PER FO	DOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPECANIC MA	s MINERALUGILAL LUMPUSI		INE TO COARSE G	GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LC, KAOLIN, ETC. ROCK (CR)	WOULD YIELD SPT	REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFALE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, 4	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	FINE TO COARSE G	GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7.6 A-3 A-6.4	COMPRESSIBILITY	ROCK (NCF	R) SEDIMENTARY ROCK	<pre>< THAT WOULD YEILD SPT REFUSAL IF TESTED.</pre>	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL DOGOGOGOGOGOGOGOGOGOGOGOGOGOGOGOGOGOGOG		LL < 31		DIMENTS CEMENTED INTO ROCK BUT MAY NOT YIELD	UF SLUPE.
	HIGHLY COMPRESSIBLE	LL > 50 SEDIMENTA	ARY ROCK	CK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX GRANULAR SILT	MUCK, PERCENTAGE OF MATER	AL (CP)	SHELL BEDS, ETC.	FRINC	
*40 30 MX 50 MX 51 MN SOILS SOILS	PEAT GRANULAR SILT - CLAY		WEATE	HERING	ROCKS OR CUTS MASSIVE ROCK.
•200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS	OTHER MATERIAL FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINT	TS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL	ITALE OF ORGANIC MATTER 2 - 3% 3 - 5%	IRACE I - 10%	HAMMER IF CRYSTALLINE.		HORIZONTAL.
	MODERATELY ORGANIC 5 - 10% 12 - 20%	SOME 20 - 35%	HT ROCK GENERALLY FRESH, JOINTS STAINED,	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX	HIGHLY HIGHLY ORGANIC > 10% > 20%	HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	SHINE BRIGHTET. RUCK RINGS UNDER HAMMER BLUWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	ORGANIC GROUND WATER	SLIGHT	BOCK GENERALLY ERESH. JOINTS STAINED	AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE EPACS		SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SHITY OR CLAYEY SILTY CLAYEY MATTER			CRYSTALS ARE DULL AND DISCOLORED. CR	RYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	STATIC WATER LEVEL AFTER <u>24</u> H	DURS MODERATE	SIGNIFICANT PORTIONS OF ROCK SHOW DIS	SCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING FAIR TO COOP FAIR TO DOOD FAIR TO DOOD FAIR TO DOOD	NCULTARIE VERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA (MOD.)	GRANITOID ROCKS, MOST FELDSPARS ARE D	DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD PHIN TO FOUR POOR FOU			WITH FRESH ROCK.	SHOWS STONIFICHNI LUSS OF STRENGTH HS COMPHRED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATEL		R STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DUIL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBO	LS SEVERE	AND DISCOLORED AND A MAJORITY SHOW K	KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OF RANGE OF STANDARD RANGE OF	IF INED DIS 1995	(MOD. SEV.)	AND CAN BE EXCAVATED WITH A GEOLOGIS	ST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIV	RENGTH L ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRE	CTION	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS		SEVERE	ALL ROCK EXCEPT QUARTZ DISCOLORED OR	R STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL		TO SOME EXTENT. SOME FRAGMENTS OF ST	TRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N			IF TESTED, WOULD YIELD SPT N VALUES >	> 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50		TEST VERY	ALL ROCK EXCEPT QUARTZ DISCOLORED OR	R STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		SEVERE	BUT MASS IS EFFECTIVELY REDUCED TO S	SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 4	- INFERRED SOIL BOUNDARY - CORE BORING	 SOUNDING ROD (V SEV.) 	REMAINING. SAPROLITE IS AN EXAMPLE OF	ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	UF AN INTERVENING IMPERVIUUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 SILT-CLAY MEDIUM STIFE 4 TO 8 0.5 T		TEST BORING		T DISCEDUIDIE OD DISCEDUIDIE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 T			SCATTERED CONCENTRATIONS, QUARTZ MAY	BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 T	TTTTT	- SPT N-VALUE	ALSO AN EXAMPLE.		RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 >			ROCK HA	ARDNESS	SAPROLITE (SAP) - RESIDUAL SOTI THAT RETAINS THE RELIC STRUCTURE OR FARRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBO	JLS VERY HAR	CANNOT BE SCRATCHED BY KNIEF OR SHAR	RP PICK BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION -	UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'	'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	EXCAVATION	ACCEPTABLE, BUT NOT TO BE	CAN BE SCRATCHED BY KNIFE OR PICK ON	NLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
POUL DEP COPPLE CRAVEL COARSE FINE STLT		EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.		THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR,) (COB.) (GR,) SAND SAND (SL,)		MODERATEL	LY CAN BE SCRATCHED BY KNIFE OR PICK. GO	OUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE. SD.) (F SD.)	ABBREVIATIONS	HARD	EXCAVATED BY HARD BLOW OF A GEOLOGIS	ST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.	AR - AUGER REFUSAL MED MEDIUM	VST - VANE SHEAR TEST	BY MUDERATE BLOWS.		STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3		\mathcal{N} - UNIT WEIGHT HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES	DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC	2 - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	EICES I INCH PHAIPION SIZE BI NHAD BEOWS OF THE	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE	RIPTION CSE COARSE ORG ORGANIC	SOFT	CAN BE GROVED OR GOUGED READILY BY K	KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TES	ST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE	BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID: VERY WET.	LY e - VOID RATIO SD SAND. SANDY	S - BULK SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESS	URE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND W	TABLE F - FINE SL SILT, SILTY	ST - SHELBY TUBE	CAN BE CARVED WITH KNIFE. CAN BE EXCA	AVATED READILY WITH POINT OF PICK. PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY	RS - ROCK	FINGERNAIL.	SI FINDER FRESSURE. CHN DE SCRHICHED REHUILT DI	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL			REDDING	
(PI) PLASTIC LIMIT	HI HIGHLY V - VERY	RATIO TED			BENCH MARK:
			WIDE MORE THAN 10 FEET	VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM		WIDE WIDE	3 TO 10 FEET	THICKLY BEDDED 1.5 - 4 FEET	
SL SHRINKAGE LIMIT			ATELY CLOSE 1 TO 3 FEET	THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL WATER		X AUTUMATIC MANUAL CLUSE	LOSE LESS THAN 0.16 FEET	THICKLY LAMINATED 0.008 - 0.03 FEET	
- UKY - (U) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	CORE SIZE:		THINLY LAMINATED < 0.008 FEET	
ΡΙΔΟΤΙΓΙΤΥ	8" HOLLOW AUGERS	П-в П-н	INDUR	ATION	1
			MENTARY ROCKS. INDURATION IS THE HARDEN	NING OF MATERIAL BY CEMENTING HEAT PRESSURE FTC.	1
PLASTICITY INDEX (PI) DRY STR				FINGER FREES NUMEROUS GRAINS:	
SLIGHTLY PLASTIC 6-15 SLIG		FRI HAND TOOLS:	IABLE GENTLE BLOW E	BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDI			GRAINS CAN BE	SEPARATED FROM SAMPLE WITH STEEL PROBE	
HIGHLY PLASTIC 26 OR MORE HIG	PORTABLE HOIST X TRICONE 2 15/6 STEEL TEETH		DERATELY INDURATED BREAKS EASILY	Y WHEN HIT WITH HAMMER.	
COLOR			GRAINS ARE DIE	FFICULT TO SEPARATE WITH STEEL PROBE:	
			DURATED DIFFICULT TO E	BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, &		VANE SHEAR TEST	SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPI F:	
MUDIFIERS SUCH AS LIGHT, DAKK, STREAKED, ETC. ARE USED TO DESCRIBE APPEAR		Ex1	IREMELY INDURATED SAMPLE BREAKS	S ACROSS GRAINS.	DATE: 8-15-14
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PROJECT REFERENCE NO.







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FERENCE: U-4751	CONTENTS SHEET NO. 1 2 3 4	DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT STRUCTURE SUBSURFACE INVESTIGATION COUNTY NEW HANOVER PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF RD. EXTENSION) FROM SR 1409 (MILITARY CUTOFF RD.) TO US 17 IN WILMINGTON SITE DESCRIPTION RETAINING WALL 7 AT -YI- STA. 68+50, RIGHT
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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 REVEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOL AND ROCK STRATA DESCRIPTION AND INDICATE BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARLY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN STIL UN-PLACETEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INTERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOSTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOSTURE CONDITIONS MAY VARY CONSUBERALY WITH INE 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 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 NECESSART 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 ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PERSONNEL JARED CRENSHAW

RICKY SMITH

INVESTIGATED BY ______.

DRAWN BY <u>C.P.</u> TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

- SUBMITTED BY ______.
- DATE APRIL 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION			GRADATION			ROCK D	ESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATER BE PERETRATED WITH A CONTINUOUS FLICHT POWER AUGER AND YIELD LESS THAN 100 E ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586), SOIL (IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINEN DE MUREDA DICLAL COMPARITION ADITY OFTUTUEE PLACENTIATION THE FRANCH	ALS THAT CAN OWS PER FOOT ASSIFICATION DLLOWING: FACTORS SUCH	WELL GRADED - INDICATES A UNIFORMLY GRADED - INDICATE GAP-GRADED - INDICATES A M	GOOD REPRESENTATION OF PARTICLE ES THAT SOIL PARTICLES ARE ALL IIXTURE OF UNIFORM PARTICLE SIZE ANGULARITY OF GRAIN	E SIZES FROM FINE TO COARSE. APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES. S	HARD ROCK IS N ROCK LINE INDIA SPT REFUSAL IS BLOWS IN NON- REPRESENTED B ROCK MATERIAL	NON-COASTAL PLAIN MATERIAL THAT CATES THE LEVEL AT WHICH NON-CC S PENETRATION BY A SPLIT SPOON COASTAL PLAIN MATERIAL, THE T' YY A ZONE OF WEATHERED ROCK. S ARE TYPICALLY DIVIDED AS FOLL	WOULD YIELD SPT REFUSAL IF TEST DASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EQUAL TO OR LESS THAN 0. RANSITION BETWEEN SOIL AND ROCK DWS:
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLAST	A-7-6	THE ANGULARITY OR F ANGULAR, SUBANGULAR	ROUNDNESS OF SOIL GRAINS IS DES 3. SUBROUNDED, OR ROUNDED.	SIGNATED BY THE TERMS:	WEATHERED	NON-COASTAL PL	AIN MATERIAL THAT WOULD YIELD SP
SOIL LEGEND AND AASHTO CLASSIFICATION		- <u>MODERI, SOBHIODERI</u>	INFRALOGICAL COMPOSIT	TION	ROCK (WR)	100 BLOWS PER	FOOT IF TESTED.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGAN CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) (> 35% PASSING *200) ORGAN	MATERIALS	MINERAL NAMES SU	JCH AS QUARTZ, FELDSPAR, MICA, TAL	LC, KAOLIN, ETC.	CRYSTALLINE	I I WOULD YIELD SF	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	4, A-5	ARE USED IN DESC	RIPTIONS WHEN THEY ARE CONSIDER	RED OF SIGNIFICANCE.		GNEISS, GABBRO,	SCHIST, ETC. GRAIN METAMORPHIC AND NON-COASTA
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-76 A-3	•6, A-7	SLIGHTLY (LL < 31	ROCK (NCR)	SEDIMENTARY RO	ICK THAT WOULD YEILD SPT REFUSAL UDES PHYLLITE, SLATE, SANDSTONE, ETI
SYMBUL 000000000		MODERATELY HIGHLY COM	Y COMPRESSIBLE MPRESSIBLE	LL = 31 - 50 LL > 50	COASTAL PLAIN SEDIMENTARY R	OCK	SEDIMENTS CEMENTED INTO ROCK, BUT OCK TYPE INCLUDES LIMESTONE, SANDS
7, PASSING •10 50 MX GRANULAR	SILT- MUCK,		PERCENTAGE OF MATERI	AL	(CP)	SHELL BEDS, ETC	
■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	SOILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	ERESH RI		INTS MAY SHOW SUIGHT STAINING BOCK
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 11 MN 10 MX 11	H .	TRACE OF ORGANIC MATTER LITTLE ORGANIC MATTER MODERATELY ORGANIC HIGHLY ORGANIC	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HA VERY SLIGHT R((V SLI.) CF	AMMER IF CRYSTALLINE. DCK GENERALLY FRESH, JOINTS STAINE RYSTALS ON A BROKEN SPECIMEN FACI	D,SOME JOINTS MAY SHOW THIN CLAY C E SHINE BRIGHTLY. ROCK RINGS UNDER H
	ORGANIC		GROUND WATER			A CRYSTALLINE NATURE.	D AND DISCOLOBATION EXTENDS INTO BO
USUAL TYPES STONE FRAGS. 0F MAJOR 0F MAJOR	" SOILS	V WAT ▼ STA	ER LEVEL IN BORE HOLE IMMEDIATE	ELY AFTER DRILLING DURS	(SLI.) 1 J CF	INCH. OPEN JOINTS MAY CONTAIN CLAY RYSTALS ARE DULL AND DISCOLORED.	Y. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALLINE ROCKS RING UNDER HAMMEI
GEN. RATING FAIR TO			CHED WATER, SATURATED ZONE, OR V	WATER BEARING STRATA	(MOD.) GF	RANITOID ROCKS, MOST FELDSPARS ARE	DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR	POOR UNSUITABL	E O-MA SPR	ING OR SEEP			JLL SOUND UNDER HAMMER BLOWS AND ITH FRESH ROCK.	SHOWS SIGNIFICANT LOSS OF STRENGTH
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30			MISCELLANEOUS SYMBOL	c	MODERATELY AL	LL ROCK EXCEPT QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F
CONDICTNESS OF RANGE OF STANDARD RANGE	F UNCONFINED			_5	(MOD, SEV.) AN	ND CAN BE EXCAVATED WITH A GEOLOG	GIST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRE GENERALI Y VERY LOOSE < 4	SIVE STRENGTH DNS/FT ²)	L ROADWAY EMBANKMEI WITH SOIL DESCRIPT	NT (RE) 250 025 DIP & DIP DIREC TION → OF ROCK STRUCT	CTION TURES NG SLOPE INDICATOR	SEVERE AL (SEV.) RE	LL ROCK EXCEPT QUARTZ DISCOLORED EDUCED IN STRENGTH TO STRONG SOIL	OR STAINED, ROCK FABRIC CLEAR AND E . IN GRANITOID ROCKS ALL FELDSPARS (
GRANULAR LOOSE 4 TO 10 MATERIA MEDIUM DENSE 10 TO 30	N/A				LE LE	TESTED, WOULD YIELD SPT N VALUES	S > 100 BPF
INFLCTURE DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50 > 50 VERY SOFT < 2	< 0.25	THAN ROADWAY EMB	ANKMENT CORE BORING	SOUNDING ROD	VERY AL SEVERE BU (V SEV.) RE	LL ROCK EXCEPT QUARTZ DISCOLORED UT MASS IS EFFECTIVELY REDUCED TO EMAINING. SAPROLITE IS AN EXAMPLE	OR STAINED. ROCK FABRIC ELEMENTS AF O SOIL STATUS, WITH ONLY FRAGMENTS O OF ROCK WEATHERED TO A DEGREE THAT
GENERALLY SOFT 2 TO 4 Ø SILT-CLAY MEDIUM STIFF 4 TO 8 0 MATERIAL STIFF 8 TO 15 0 (CONFESIVE) VERY STIFE 15 TO 30 0	5 TO 0.5 5 TO 1.0 1 TO 2 2 TO 4				COMPLETE RC SC	JCK REDUCED TO SOIL ROCK FABRIC & CATTERED CONCENTRATIONS. QUARTZ M LSO AN EXAMPLE	NOT DISCERNIBLE, OR DISCERNIBLE ONLY NOT DISCERNIBLE OR DISCERNIBLE ONLY NAY BE PRESENT AS DIKES OR STRINGER
HARD > 30	> 4			JI IN THE DE		BOCK	HARDNESS
TEXTURE OR GRAIN SIZE			RECOMMENDATION SYMBO		VERY HARD CF	ANNOT BE SCRATCHED BY KNIFE OR SH	HARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	HARD C	EVERAL HARD BLOWS OF THE GEOLOGIS	ST'S PICK.
BOULDER COBBLE GRAVEL COARSE FINE STU	CLAY	SHALLOW UNDERCUT	JNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	T(O DETACH HAND SPECIMEN.	UNET WITH DIFFICUETT. HAND HARMEN D
GRAIN MM 305 75 2.0 0.25 0.05 0.05	(CL.) 0.005	AR - AUGER REFUSAL	ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	MODERATELY CA HARD E> B	AN BE SCRATCHED BY KNIFE OR PICK. XCAVATED BY HARD BLOW OF A GEOLO Y MODERATE BLOWS.	GOUGES OR GROOVES TO 0.25 INCHES DI GIST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN. 12 3		BT - BORING TERMINATED CL CLAY	MICA MICACEOUS MOD MODERATELY	WEA WEATHERED γ - UNIT WEIGHT	MEDIUM CA	AN BE GROOVED OR GOUGED 0.05 INCH	es deep by firm pressure of Knife () prices 1 inch maximum size by Hard
SOIL MOISTURE - CORRELATION OF TERMS		CPT - CONE PENETRATION TEST	T NP - NON PLASTIC	$\gamma_{\rm d}$ - DRY UNIT WEIGHT	PC	DINT OF A GEOLOGIST'S PICK.	
(ATTERBERG LIMITS) FIELD MOIST GUIDE FOR FIELD MOIST DESCRIPTION GUIDE FOR FIELD MOIST		DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION T	PMT - PRESSUREMETER TES IEST SAP SAPROLITIC	ST <u>SAMPLE ABBREVIATIONS</u> S - BULK	SOFT CA FF PI	AN BE GROVED OR GOUGED READILY BY ROM CHIPS TO SEVERAL INCHES IN SI IECES CAN BE BROKEN BY FINGER PRE	Y KNIFE OR PICK. CAN BE EXCAVATED IN ZE BY MODERATE BLOWS OF A PICK POIN SSURE.
- SHOWNED - OSSALL CLOUDEREN ((SAT.) FROM BELOW THE GROUN	WATER TABLE	F - FINE FOSS FOSSILIFEROUS	SL SHND, SHNDY SL SILT, SILTY SLI SLIGHTLY	SS - SPEIT SPUUN ST - SHELBY TUBE RS - ROCK	VERY CA SOFT OF F?	AN BE CARVED WITH KNIFE. CAN BE E) R MORE IN THICKNESS CAN BE BROKEN INGERNAIL.	XCAVATED READILY WITH POINT OF PICK. N BY FINGER PRESSURE. CAN BE SCRATCH
RANGE < - WET - (W) SEMISOLID; REOUIRES DR ATTAIN OPTIMUM MOISTU	ING TO E	FRACE - FRACTORED, FRACTORES	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FR	ACTURE SPACING	BEDDING
		HI HIGHLY		RATIO		SPACING	
OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPT: SL - SHRINKAGE LIMIT	UM MOISTURE		ANCING 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.
- DRY - (D) REQUIRES ADDITIONAL W ATTAIN OPTIMUM MOIST	TER TO E	CME-55	6 CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY			8" HULLOW AUGERS	│ └── [−] ₿──── └── [−] Ħ ────			
PLASTICITY_INDEX_(PI) DRY NON_PLASTIC 0-5 VI SLIGHTLY_PLASTIC 6-15 VI	STRENGTH RY LOW LIGHT			HAND TOOLS:	FRIABLE	RUBBING WIT GENTLE BLOI	H FINGER FREES NUMEROUS GRAINS; W BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OM MORE	EDIUM HIGH		CASING W/ ADVANCER	POST HOLE DIGGER	MODERATE	ELY INDURATED GRAINS CAN BREAKS EASI	BE SEPARATED FROM SAMPLE WITH ST LY WHEN HIT WITH HAMMER.
CULUR		┫┌┐__ │□□	TRICONE TUNGCARB.	SOUNDING ROD	INDURATE	D GRAINS ARE	DIFFICULT TO SEPARATE WITH STEEL O BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BRO MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APP	N, BLUE-GRAY). ARANCE.		CORE BIT	XANE SHEAR TEST	EXTREMEI	LY INDURATED SHARP HAMM	ER BLOWS REQUIRED TO BREAK SAMPLE AKS ACROSS GRAINS.

PROJECT REFERENCE NO.





ED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
I 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 A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
IN VALUES 7	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CK THAT CLUDES GRANITE,	WHICH IT IS ENCLOUNTERED, BUT WHICH DUES NOT NECESSARIET RISE TO UR ABOVE THE GROUND SURFACE.
AL PLAIN	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.
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.
ATTUCS 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 AY. 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.
	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
ARE KAOLINIZED	ITS LHIENHE EXTENT.
RE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE 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 5. SAPROLITE IS	ROCK DUALITY DESIGNATION (ROD) - A MEASURE OF ROCK DUALITY 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.
	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	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
DR 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 IT. 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.
	<u>STRATA ROCK QUALITY DESIGNATION (SROD)</u> - 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.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK:
THICKNESS	
4 FEET .5 - 4 FFFT	ELEVATION: FEET
16 - 1.5 FEET	NOTES:
03 - 0.16 FEET 08 - 0.03 FEET	
0.008 FEET	
	UNDIVIDED C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE:	
PROBE;	





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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT - PENETROMETER LOG

PROJECT	ΓNO.	40191.1.2	ID.	U-4751	COU	NTY	NE	EW HA	NOVE	२		GEC	DLOG	IST		C	RENS	SHAW		
SITE DES	SCRIPT	TION SR 1409 (MILIT	ARY	CUTOFF ROAD)) το ι	JS 17 IN \	WILMING	STON -	RWAL	.7										
BORING I	NO.	BR-1 STATION		68 + 62		OFFSET		6	9' RT			ALIC	GNME	NT			-Y′	1-		
COLLAR	ELEV.		STA	RT DATE	4/	17/2015		DRILL	METH	OD			CC	DNTI	NUOL	JS DI	RIVE			
TOTAL D	EPTH	10.0'	CON	IPLETION DATE		4/17/201	5	NOTE												
/							E	BLOW					BLO	WS	per l	FOC	DT			7
ELEV.		SOIL DES	CRI	PTION		DEPIF			l Total		10 2	20	30 4	10 \$	50 (60	70	80 9	90	100
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT - PENETROMETER LOG

PROJECT	NO.	4019	91.1.2	ID.	U-4751	COU	NTY
SITE DES	CRIPTIO	N SR 1	409 (MILIT	ARY CU	JTOFF ROA	D) ΤΟ L	JS 17
BORING N	NO.	BR-2	STATION		69 + 42		OFFS
COLLAR I	ELEV.			START	DATE	4/	17/20
TOTAL DE	EPTH	10).0'	COMPI	LETION DAT	ΓE	4/17/
ELEV.		s	OIL DES	CRIPT			DEF
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	BROW	'N SA	ND, MOI	ST (A-	3)		
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CONTENTS SHEET NO. - 3 4

5-12

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4751

REFERENCE

TITLE SHEET LEGEND SITE PLAN PROFILE BORE LOG REPORTS SITE PHOTOGRAPHS

DESCRIPTION

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>New</u> Hanover

PROJECT DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington

SITE DESCRIPTION Noise Wall 1A at -L- Sta. 12+00 Right

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U–4751	1	13

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 RALEGIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING LUNT 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 SUBSURFACE DATA AND MAY NOT INGEESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN STIL UN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS MOICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTIGE 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

D. Racey

S. Davis

M. Renza

INVESTIGATED BY ______.

DRAWN BY _____ D. Racey

CHECKED BY _____. B. Howey, PG, PE

SUBMITTED BY __HDR, Inc.

DATE March 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586), SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,		ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	RULK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6 A-7	COMPRESSIBILITY	NON-CRYSTALLINE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL SCOOL SCOOL STATES	SLIGHTLY COMPRESSIBLE LL < 31	ROCK INCH - ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
"10 50 MX GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
■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			ROCKS OR CUTS MASSIVE ROCK.
	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING #40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	NURIZUNTHE.
LL – – – 400 MX 41 MN 400 MX 41 MN 400 MX 41 MN 400 MX 41 MN LITTLE OR PI 6 MX NP 100 MX 100 MX 11 MN 11 MN 100 MX 100 MX 11 MN 11 MN	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER	SLIGHT ROCK GENERALLY FRESH JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. ENT. ON THE ON THE OWNER OF THE OWNER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU		(MOD,) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	V FW FERCIED WHIER, SHIURHIED ZUNE, UN WHIER BEARING STRATH	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 :PI OF A-7-6 SUBGROUP IS > LL - 30	- Out Spring or seep	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED	III 25 (025	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25025 DIP & DIP DIRECTION	IT IESTED, WUULD TIELD SPI KEFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
		(SEV.) REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A RODY OF SOLL OR ROCK THAT THINS OUT IN ONE OF MORE DIRECTIONS
GENERALLY LOOSE 4 TO 10 GRANULAR UTDUIN STUDE		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULARI Y MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL DENSE 10 TO 30 N/A		VERY ALL ROCK EXCEPT OLIGRIZ DISCOLORED OR STAINED ROCK EARRIC ELEMENTS ARE DISCERNIRLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SUF1 2 TU 4 0.25 TU 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0		COMPLETE BOCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SULL - SULL FORMED IN PLACE BY THE WEATHERING OF RUCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	RUCK UDALITY DESIGNATION (RUD) - A MEASURE OF RUCK UDALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(LUHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	RUCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - TACA UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	CALCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F. SD.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANF.
GRAIN MM 305 75 2.0 0.25 0.05 0.05	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	- CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK	WITH A 2 INCH DUISIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CUIDE FOR FIELD MOISTURE DECODIDATION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION BOIDE FOR FILED MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIELES LAN BE BRUKEN BY FINGER PRESSURE.	<u>STRATA ROCK QUALITY DESIGNATION (SROD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: N/A
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EUUIPMENT USED UN SUBJELT PRUJELT	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: N/A FEET
SL _ SHRINKAGE LIMIT		MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
- DBY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM
ATTAIN OPTIMUM MOISTURE	CME-55	THINLY LAMINATED < 0.008 FEET	NCDOT-PROVIDED DTM FILE
PLASTICITY	∐ 8' HOLLOW AUGERS ∐ -B □-H	INDURATION	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM		CRAINS CAN BE SEPARATER FORM SAME WITH STEP PROPE	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
		DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
		SHITLE DIEHKS AURUSS URAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



U-4751





WBS 40191.1.2	TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST D. Racey		WBS 40191.1.2		TIP U-4751 COUNT
SITE DESCRIPTION SR 14	409 (Military Cutoff Rd.) to US 17	in Wilmington - Noise Wall 1A at -L- St	a. 12+00 Right	GROUND WTR (ft)	SITE DESCRIPTION	SR 1409 (Milita	ary Cutoff Rd.) to US 17 in Wilmin
BORING NO. NW1A-1	STATION 11+37	OFFSET 66 ft RT	ALIGNMENT -L-	0 HR. N/A	BORING NO. NW1A	-2	STATION 10+18
COLLAR ELEV. 31.0 ft	TOTAL DEPTH 28.5 f	t NORTHING 186,826	EASTING 2,354,702	24 HR. 8.2	COLLAR ELEV. 32.	.3 ft	TOTAL DEPTH 2.3 ft
DRILL RIG/HAMMER EFF./DATE	E F&R2175 CME-55 76% 02/22/2014	DRILL METHOD	H.S. Augers HAM	MER TYPE Automatic	DRILL RIG/HAMMER EFF	/DATE F&R2175	5 CME-55 76% 02/22/2014
DRILLER S. Davis	START DATE 12/08/1	COMP. DATE 12/08/14	SURFACE WATER DEPTH	/A	DRILLER S. Davis		START DATE 12/08/14
ELEV DRIVE DEPTH BLO	W COUNT BLOWS	PER FOOT SAMP.	L SOIL AND ROCK DES	SCRIPTION	ELEV DRIVE DEPTH	BLOW COUNT	BLOWS PER FOO
(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 0.5	ift 0 25 50
35			_		35		
			-				
30 30.5 0.5			GROUND SURI	FACE 0.0	31.8 ± 0.5	8 7 9	• • • • • • • • • • • • • • • • • • •
	6 5 <u>11</u>	M					
27.5 + 3.5 2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M	Black, silty fine SAND & GRA	2-4), with trace			
25			gravel.				
22.5 8.5							
	2 2 4 4 1 1 1 1 1 1 1 1 1 1	Sat.	COASTAL PL	9.5 AIN			
		· · · · · · · · · · · · · · · · · · ·	Gray-brown to light gray, (A-2-4), with som	silty fine SAND e clay.			
17.5 + 13.5 + WOH	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Sat.					
15				17.0			
12.5 + 18.5			Light gray, fine sandy sili	y CLAY (A-6).	 		
		Sat.					
		· · · · · · · · · · · · · · · · · · ·	9.0 Grav-tan, fine SAN	D (A-3).			
7.5 + 23.5 + 4	8 10	· · · · · · · · w		(- /			
5			0 0 0 0 0 0 0 0 0				
			2.5	28.5			
			SAND (COASTAL	PLAIN)			
			-				
			NOTES:				
			1) Boring located on aspha	t walkway.			
			2) Drilled to 28.5', unable to to hole caving in, terminat	o obtain SPT due ed boring.			
			 3) 0-hr water level not mean drilling water introduction. 	sured due to			
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S	TE	DESCR	IPTION	SR [·]	1409 (I	Military	Cuto	ff Rd.)	to US	17 in	Wilmin	gton - N	oise V	Vall 1A a	at -L-	Sta. ⁻	12+	+00 Right			GROU	ND WTR (ft)	SITE	DESCR	IPTION	SR 1	1409 (N	Ailitary	Cutoff Ro	J.) to L	JS 17 in	Wilming
В	ORIN	ig no.	NW1	A-2A		S	ΤΑΤΙΟ	DN 10	0+18			OFFS	ET 1	8 ft LT				ALIGNME	NT -NW1A-		0 HR.	N/A	BOR	ing no.	NW1	A-3		ST	ATION	10+65	5	
С	OLL	AR ELE	EV. 3 ⁻	1.7 ft		Т	OTAL	DEPT	TH 25	5.0 ft		NORT	HING	186,8	71			EASTING	2,354,671		24 HR.	FIAD	COL	LAR EL	EV. 31	.8 ft		тс	DTAL DE	РТН	25.0 ft	
D	RILL I	rig/han	IMER EI	F./DAT	E F&F	2175 (CME-58	5 76%	02/22/2	014				DRILL M	IETHC	DD N	/lud	Rotary		HAMM	IER TYPE	Automatic	DRIL	RIG/HAN	/MER EF	F./DAT	E F&R	2175 C	ME-55 76	% 02/2	.2/2014	
D	RILL	ER S.	Davis			S	TART	DATE	E 12/1	11/14		COMF	P. DAT	FE 12/	11/14			SURFACE	WATER DEP	TH N/	Ά		DRIL	LER S	. Davis			ST	ART DA	TE 1	2/10/14	
EL	EV	DRIVE ELEV	DEPTH	I BLC					BLO\	WS PI	ER FOC	т		SAMP.					SOIL AND RO	CK DES	CRIPTION	1	ELEV	DRIVE ELEV	DEPTH	BLC		UNT		BL	_OWS P	ER FOOT
(0	(ft)	(11)	0.5ft	0.5ft	0.5ft	0		25	50)	/5	100	NO.	/мс	DI G	+	ELEV. (ft)				DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0			0
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3	0	30.7	1.0	16	18	13	•			•••	• • •		• •			ро		30.7	AS	PHALT	MENT	1.0	30	30.8	1.0	16	18	14				
		28.2	3.5						•31	• •							-	28.7 T	an, silty fine SAN	ND (A-1-	b), with so	me $-\frac{3.0}{1}$		28.3	3.5			_			3 2	
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2	25	-	Ł					<u>/</u>	<u> </u>			<u> </u>					F	(<u> </u>	Black, silty fir		0 (A-2-4).		25	-	<u>+</u>				$\left \frac{1}{1} \right $	<u> </u>		
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:	SITE	DESCR	IPTION	SR ²	1409 (N	Ailitary	Cutoff Rd) to US 17	7 in Wili	Imingtor	n - Noise \	Vall 1A a	at -L- S	Sta. ^	12+00	Right	GROUNE	OWTR (ft)	SITE	DESCR	IPTION	SR 1	1409 (N	Ailitary	Cutoff Rd.)	to US 17 ii	n Wilmingt
	BORI	NG NO.	NW1	A-4		S	TATION	11+14		С	OFFSET	20 ft LT			A	LIGNMENT -NW1A-	0 HR.	N/A	BOR	ing no.	NW1	A-5		ST	ATION 1	1+68	
	COLL	AR ELI	EV. 32	2.0 ft		Т	OTAL DEP	TH 25.0	ft	N	ORTHING	186,9	68		E	ASTING 2,354,669	24 HR.	FIAD	COL	LAR ELE	EV. 32	2.1 ft		тс	TAL DEP	H 25.0 ft	
	ORILL	RIG/HAN	IMER EF	F./DAT	E F&F	2175 (CME-55 76%	02/22/201	4			DRILL	IETHO	D N	/ud Ro	ary HAMM		Automatic	DRILI	_ RIG/HAN	IMER EF	F./DATI	E F&R	2175 CI	ME-55 76%	02/22/2014	I
	DRILI	LER S	. Davis			S	TART DAT	E 12/10	/14	C	COMP. DA	TE 12/	10/14		s		/A		DRIL	LER S.	. Davis			ST		12/10/14	4
F	I FV	DRIVE	DEPTH	BLC	ow co	UNT		BLOW	S PER F	FOOT		SAMP.	V /	1 L					FI FV	DRIVE	DEPTH	BLC	w co			BLOWS	PER FOOT
-	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	5 100	NO.	мо	I G	ELE	SOIL AND ROCK DES	SCRIPTION	DEPTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 5	50 ·
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		28.5	3.5	5	5	4										Tan, silty fine SAND (A-1	-b), with som	$\int \frac{1}{2.0}$		28.6	3.5	5	3				
		-	Ŧ	5	5	4	! • 9" !						M	Ľ	F 26.0	Gray-tan, fine SAND (A-3)	, with trace s	silt. 6.0		-	Ŧ				7		
_	25	-	Ŧ												-	Black & gray-tan, silty fine	SAND (A-2-	4), 1	25	-	Ŧ						
			<u>+ 8.5</u> +	2	2	2					· · · · ·		Sat.		.	COASTAL PL				23.6 -	+ 8.5 +	2	1	1			
	20		ŧ				 		: : :						-	SAND (A-2-4), with tra	ce clay from	ne	20	-	‡				<u>↓</u>		
	20	18.5	+				<u> i</u>								-	23.5'-25.0'.			20	18.6 -	+ 13.5						· · · ·
			10.0	1	1	2] ∳ 3 : : :		: : :		· · · · ·		Sat.							-	1	3	3	3	●6	· · · ·	
	15	-	t				<u> </u>								L				15	-	t				<i>i</i>	· · · ·	
		13.5	18.5	4	3	2	[: : :		· · ·		· · · ·		Cot							13.6	18.5	2	1	0	$1 \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot$	· · · ·	· · · ·
		•	ŧ	.	Ű	-	₽ ⁵		: : :	: : :			Sai.		Ł					-	ł						
-	10		+				<i>i</i>	+ • • •							<u> </u>				10	-	+				<u> </u>		
		8.5	<u>= 23.5</u> 	WOH	WOH	wон							Sat.		F 7.0			25.0		- 0.6	<u>- 23.5</u>	1	0	1	↓ · · · · ·		
ORE DOUBLE U4751_GEO_SWAL1A_BORELOGS.GPJ NC_DOT.GDT 3/5/15																NOTES: 1) Boring located in roadwa 2) O-hr water level not measured in the intervence of the interve	y. sured due to ues.										
DOT BORE DOU		- - - -	+ + + + +																		+ + + + + +						

SHEET 7 OF 13

IT)	NEW HA	NOVER			GEOLOGIST D. Racey	-	
ng	ton - Noise \	Vall 1A a	t -L- S	ta. 12	+00 Right	GROU	ND WTR (ft)
	OFFSET	20 ft LT			ALIGNMENT -NW1A-	0 HR.	N/A
	NORTHING	1 87,02	22		EASTING 2,354,670	24 HR.	FIAD
		DRILL M	ETHOD	Mu	d Rotary		Automatic
	COMP. DA	TE 12/*	0/14		SURFACE WATER DEPTH	/A	
OT		SAMP.		L			
	75 100	NO.	мо	0 G	SOIL AND ROCK DES	SCRIPTION	
					-		
				-	32.1 GROUND SURI	ACE	0.0
					30.8 ASPHALT		1.3
			IVI		$-\frac{29.1}{29.1}$ Tan, silty fine SAND (A-1	-b), with so	ome <u>- 3.0</u>
			М		Grav-tan, fine SAND (A-3)	, with trace	silt.
					Black & gray-tan, silty fine	SAND (A-	<u>2-4)</u> <u></u>
			Sat		COASTAL PL Dark brown to gray-brown,	AIN silty fine S	AND
			Sal.	E	(A-2-4).		
	+ • • • •			F	-		
			Sat.	-			
					-		
			Sat.		12.9 Grav. silty CLAY (A-7-6).	with trace	19.2 fine
				N	10.1 sand.		22.0
				-	Gray, silty fine SAN	D (A-2-4).	
	• • • •		Sat.		7.1		25.0
					_ Boring Terminated at Ele SAND (COASTAL	PLAIN)	π in
				Ŀ			
				-	NOTES:		
				F	- 1) Design lagested in reachur		
					2) 0-hr water level not mea	y. sured due t	o
					mud rotary drilling techniq	ues.	
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NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS 40191.1.2	TIP U-4751 COUNT	Y NEW HANOVER	GEOLOGIST D. Racey		WBS 40191.1.2		TIP U-4751 COU	INTY
SITE DESCRIPTION SR 1409 (M	lilitary Cutoff Rd.) to US 17 in Wilmin	gton - Noise Wall 1A at -L- Sta. 12	2+00 Right	GROUND WTR (ft)	SITE DESCRIPTION	SR 1409 (Milita	ry Cutoff Rd.) to US 17 in Wiln	ningto
BORING NO. NW1A-6	STATION 12+10	OFFSET 3 ft LT	ALIGNMENT -NW1A-	0 HR. N/A	BORING NO. NW1	A-7	STATION 12+61	
COLLAR ELEV. 32.9 ft	TOTAL DEPTH 25.0 ft	NORTHING 187,064	EASTING 2,354,689	24 HR. 8.0	COLLAR ELEV. 3	1.6 ft	TOTAL DEPTH 5.0 ft	
DRILL RIG/HAMMER EFF./DATE F&R2	2175 CME-55 76% 02/22/2014	DRILL METHOD Mu	Id Rotary	MER TYPE Automatic	DRILL RIG/HAMMER EI		5 CME-55 76% 02/22/2014	
DRILLER S. Davis	START DATE 12/08/14	COMP. DATE 12/09/14		N/A	DRILLER S. Davis		START DATE 12/09/14	
FLEV DRIVE DEPTH BLOW COU	INT BLOWS PER FOC	T SAMP.				BLOW COUNT	BLOWS PER FO	
(ft) ELEV (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DE	SCRIPTION DEPTH (ft)	(ft) ELEV (ft) (ft)	0.5ft 0.5ft 0.5	ft 0 25 50	7
35					35			
			- 32.9 GROUND SUR	REACE 0.0				
	4	- M – M	ROADWAY EMBA		31.6 - 0.0			
30 294 35			Black, silty fine SAND (A - 29.4 gravel & roc	-2-4), with trace ots. 3.5	30	1 2 5		
	8	: : : : : М	COASTAL PL		28.1 3.5	5 7 5	$- \left \begin{array}{c} \cdot \mathbf{k} \cdot \cdot \cdot \\ \cdot \mathbf{k} \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{array} \right \cdot \cdot \cdot \cdot \cdot \left \cdot \cdot \cdot \cdot \right \cdot \cdot \cdot \cdot \left \cdot \cdot \cdot \right \cdot \cdot \cdot \cdot \left \cdot \cdot \cdot \cdot \right \cdot \cdot \cdot \cdot \left \cdot \cdot \cdot \cdot \right \cdot \cdot \cdot \cdot \cdot \left \cdot \cdot \cdot \cdot \cdot \right \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot$	· ·
			26.9 with trace orga	anics. $\underline{-6.0}$	11 - +		<u> </u>	<u>···</u>
24.4 8.5			Dark red-brown, fine SA trace silt.	AND (A-3), with				
	[′] № ¹⁵		-					
20 10 1 10 5	<u> · · · · · · · · · · · · · · · · · · ·</u>		Brown, silty fine SAI	ND (A-2-4) <u>12.0</u>				
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Sat.	-	. ,				
			- 15.9	17.0				
			Gray-tan, fine SAND (A-3	3), with trace silt.	11 ±			
	/ . •11 .	Sat. Sat.	-					
				<u>22.0</u>	41 Ŧ			
9.4 <u>23.5</u> WOH WOH	WOH	· · · · · · Sat.	sand.	25.0				
	¥°		Boring Terminated at El	evation 7.9 ft in	11 ‡			
			-					
			- NOTES: -					
			 1) 0.0-0.2' = Surficial organ 2) 0-hr water level not mea 	nic soils asured due to				
			mud rotary drilling technic	ques.				
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3/2/11			-					
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SHEET 8 OF 13

T١	N N	ΕW	/ Н	AN	OVER			GEOLOGIST D. Racey	,		
ng	ton -	No	oise	W	/all 1A a	t -L- S	ta. 12	2+00 Right		GROUN	D WTR (ft)
	OF	FSI	ET	С	L			ALIGNMENT -NW1A-		0 HR.	N/A
1	NO	RT	HIN	G	187,11	15		EASTING 2,354,697		24 HR.	FIAD
					DRILL M	ETHOD	H.S	S. Augers	HAMME	R TYPE	Automatic
	со	MP	. D	AT	E 12/0)9/14		SURFACE WATER DEF	TH N/A	4	
т					SAMP.		L			RIPTION	I
	75		10	0	NO.	моі	Ğ				
					NO.	M		SOIL AND RO	D SURFA EMBANK he SAND TAL PLAI silty fine S d at Eleva ASTAL P al organic derground offset to I	CE MENT (A-2-4). N AND (A-2 AND	3.5 2-4)5.0 ft in

WB	S 4019	1.1.2			TI	P U-4751		COUNT	Y NEW HA	NOVER			GE	DLOGIST D. Racey			WBS	3 40191.1.2				TIP U-	4751		COUNT
SITI	E DESC	RIPTION	SR ²	1409 (N	/lilitary	Cutoff Rd.)	to US 17 i	n Wilming	gton - Noise	Wall 1A	at -L- :	Sta. 1	12+00 F	light		GROUND WTR (ft)	SITE	DESCRIPTI	ON S	SR 140	9 (Milita	ary Cutof	i Rd.) to	US 17 i	n Wilmin
BOF	Ring NC	. NW1	A-7A		S	TATION 12	2+61		OFFSET	7 ft LT			ALI	GNMENT -NW1A-		0 HR. N/A	BOR	ING NO. N	N1A-8	8		STATIO	N 13+(08	
COL	LAR EI	. EV. 33	3.0 ft		т	DTAL DEPT	H 25.0 f	t	NORTHING	3 187,1	115		EAS	STING 2,354,690		24 HR. 8.4	COL	LAR ELEV.	32.8	ft		TOTAL	DEPTH	25.0 ft	
DRIL	L RIG/HA	MMER EF	F./DAT	E F&R	2175 C	ME-55 76%	02/22/2014			DRILL	METHO	DD M	lud Rotar	/	HAMM	ER TYPE Automatic	DRIL	L RIG/HAMME	R EFF./D	DATE	F&R217	5 CME-55	76% 02/	/22/2014	
DRI	LER	S. Davis			S		12/09/1	4	COMP. DA	TE 12/	/09/14		SUF	FACE WATER DEP	TH N/	A	DRIL	LER S. Da	vis			START	DATE	12/09/1	4
ELE\ (ft)		DEPTH			JNT		BLOWS	PER FOO	T 100	SAMP	. V			SOIL AND ROO	CK DES	CRIPTION	ELEV			BLOW	COUNT	-	95	BLOWS	PER FOO
(11)	(ft)	(,	0.51	0.51	0.511		1	50	15 100	NO.		DI G	ELEV	(ft)		DEPTH (ft)	()	(ff) (*	·/ 0.	J.SIL U.	.511 0.5				1
35																	35								
		Ŧ											33.0	GROUNI	D SURF.	ACE 0.0		+							
	32.5	<u>+ 0.5</u> T	10	8	11	· · · [9				м		- 32.5		PHALT Embani			32.3 0	5	8	9 6		●15		
30	29.5	3.5		5	4								29.5	Tan, silty SAND	& GRA	/EL (A-1-b)3.5	30	29.3 3	5	_					
		Ŧ		5	4	· • • • •					W		20.4		nD (A-2			l I		9	6 4		10		
25	24.5	±				<u>.</u>						0000	<u>26</u> .0	Tan & brown, silt	T AL PLA Sy fine SA	AND (A-2-4).	25						••		
	24.5	- 0.5	2	2	2	4	· · · ·				Sat.	0000		Black, silty fine SA	ND (A-2 ragment	2-4), with trace 1		24.3 8	5	4	5 5	- :	10	· · · ·	· · · ·
		1										0000	<u></u> 21.0	Dark red-brown, f	ine SAN	ID (A-3), with <u>12.0</u>		<u>+</u>							
20	19.5	+ 13.5	3	4	4						Sat		<u> </u>	Brown, silty fi	ne SANE	¯ (Ā-2-4).	20	19.3 + 13	5	4	5 4				
		‡				.¶ ⁸		 	 							17.0		‡			0		9	· · · ·	· · · ·
15	14.5	+ 18.5				· · · ·						0000	<u> </u>	Gray-tan, fine SAN	D (A-3),	with trace silt.	15	$\frac{1}{143}$ $\frac{1}{11}$	5						· · ·
		Ŧ	6	8	7	15 15	· · · · ·		· · · · · ·		Sat.		<u>}</u>							3	1 0	 ∦:::		· · · ·	
10		ŧ											<u>11.0</u>	Grav silty CLAY (A-7-6) V	with trace fine 22.0	10								
	9.5	<u>+ 23.5</u> T	woн	WOH	WOH	• •					Sat.		8.0	Sincy OLATI (and.	25.0		9.3 23	8.5 W	лон w	он wc	н			
		Ŧ											E	Boring Terminate CLAY (CO	d at Elev ASTAL F	vation 8.0 ft in PLAIN)		Ī				<u> </u>	· · ·		
		Ŧ											E			,		l Ŧ							
		Ŧ											E	NOTES:				l I							
		1											F	1) Boring located on	asphalt	walkway									
		‡											F	offset due to utility 2) 0-br water level n	conflicts	ured due to		L ±							
		‡											Ę	mud rotary drilling	techniqu	ies.		1							
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BITE EDECENTION 59:4402, MURICING 2014, 01:11:11:11:11:11:11:11:11:11:11:11:11:1	WBS	4 0191	1.1.2			ТІ	I P U-4	4751		COUNT	Y NEW HA	NOVER			GE	OLOGIST D. Racey			WBS	40191	.1.2			TI	P U-4751		COUNT
LODENS DD. NUCL-2 ETATION 15-58 OPFREE 31:17 ALXAMMENT - AVIA. B48. TO BORRE ND. NUCL-20 ETATION 14-177 DBLLER SD.MARKEEFFACE VEX.000-05741-001 DBLLER SD.MARKEEFFACE VEX.000-05741-001 DBLLER SD.MARKEEFFACE TOTAL DEFTH 3011 DBLLER SD.MARKEEFFACE NUCL-2010 <	SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in							in Wilming	gton - Noise	Wall 1A a	at -L-	Sta. ⁻	12+00	Right		GROUND WTR (ft)	SITE	DESCR	IPTION	SR 1	1409 (N	Vilitary	Cutoff Rd.)	to US 17 i	n Wilming		
COLLAR ELICY. 32.8 TOTAL DEFTH. 32.61 NORTHING 167.12 BaTWO 204.70 MARMENT Another Landowski DOLLAR ELICY. 32.81 TOTAL DEFTH. 32.61 DBR.LOWANGER FANDT. 50:00:00:00 START DATE: 1700-14 COMP DATE: 1700-14 Burley Access that the same that th	BOR	ing no.	NW1	A-9		S	TATIO	N 13 [.]	+58		OFFSET	3 ft LT			AL	IGNMENT -NW1A-		0 HR. N/A	BOR	ing no.	NW1	A-10		ST	ATION 14	+07	
DBLLER SUBMERTERONE DBLL APPLIE DBLL APPLIE </td <td>COL</td> <td>LAR EL</td> <td>EV. 32</td> <td>2.8 ft</td> <td></td> <td>т</td> <td>OTAL I</td> <td>DEPTI</td> <td>H 25.0 f</td> <td>t</td> <td>NORTHING</td> <td>3 187,2</td> <td>12</td> <td></td> <td>EA</td> <td>STING 2,354,703</td> <td></td> <td>24 HR. 7.7</td> <td>COL</td> <td>LAR EL</td> <td>EV. 33</td> <td>8.1 ft</td> <td></td> <td>тс</td> <td>DTAL DEPT</td> <td>H 25.0 ft</td> <td>t</td>	COL	LAR EL	EV. 32	2.8 ft		т	OTAL I	DEPTI	H 25.0 f	t	NORTHING	3 187,2	12		EA	STING 2,354,703		24 HR. 7.7	COL	LAR EL	EV. 33	8.1 ft		тс	DTAL DEPT	H 25.0 ft	t
DBULLES 3 Date START DATE 12/02/4 COMPANE	DRIL	RIG/HAN	/MER EF	F./DAT	E F&F	2175 0	CME-55	76% 0)2/22/2014			DRILL	VETHO	DD N	lud Rota	ry	HAMM	IER TYPE Automatic	DRILI	_ RIG/HAN	IMER EF	F./DAT	E F&F	R2175 C	ME-55 76% (2/22/2014	
CLCV REACCONT READ CONT READ SUBJECT READ SUBJECT </td <td>DRIL</td> <td>.LER S</td> <td>. Davis</td> <td></td> <td></td> <td>S</td> <td>TART I</td> <td>DATE</td> <td>12/09/1</td> <td>4</td> <td>COMP. DA</td> <td>TE 12/</td> <td>09/14</td> <td></td> <td>SU</td> <td>RFACE WATER DEP</td> <td>TH N/</td> <td>/Α</td> <td>DRIL</td> <td>.LER S</td> <td>. Davis</td> <td></td> <td></td> <td>ST</td> <td>ART DATE</td> <td>12/09/1</td> <td>4</td>	DRIL	.LER S	. Davis			S	TART I	DATE	12/09/1	4	COMP. DA	TE 12/	09/14		SU	RFACE WATER DEP	TH N/	/Α	DRIL	.LER S	. Davis			ST	ART DATE	12/09/1	4
10 m 10 0.00 0.	ELEV	DRIVE	DEPTH	BLC	ow co	UNT			BLOWS	PER FOO	Г	SAMP.				SOIL AND RO	CK DES	CRIPTION	ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO
35 34 3 4 1<	(π)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	2	5	50	75 100	NO.	/мс) G	ELE	′. (ft)		DEPTH (ft)	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0 2	5	50
30 30 3 4 1																											
30 31 34 34 35 4 4 30 33 35 4	35		ł												-				35		ł						
10 10 <td< td=""><td></td><td>32.8</td><td><u> </u></td><td>1</td><td>3</td><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>32.8</td><td></td><td>D SURF</td><td>ACE 0.0</td><td></td><td>33.1</td><td>0.0</td><td>2</td><td>3</td><td>3</td><td>1</td><td></td><td></td></td<>		32.8	<u> </u>	1	3	4									32.8		D SURF	ACE 0.0		33.1	0.0	2	3	3	1		
10 14.2 14.4 1<	30		Ŧ	`	ľ	-	 								÷	Black & gray, silty f	ine SAN	ID (A-2-4), with	30		ŧ.						
20 21 2 6 1		29.3	* 3.5	8	4	4							М		28.1	trace grave	el trom U.	.U-1.5. 4.7		- 29.6 -	- 3.5 -	8	6	3	· • • •		
25 113 11			Ŧ					, 					Ŵ		- 25 0	COAS Black fine sandy	TAL PLA	AIN -4) with trace 7.0			ŧ						
20 103 104 104 104 104 105 103	25	24.3	+ 8.5				-+							000	<u>;</u> 2 <u>3.0</u>		ganics.		25	24.6 -	8.5				<u> </u>		
20 9.3 11.3 2 2 4 1 </td <td></td> <td></td> <td>Ŧ</td> <td>5</td> <td>6</td> <td>5</td> <td> :•</td> <td>11</td> <td></td> <td></td> <td></td> <td></td> <td>W</td> <td>0 0 0 0 0 0 0 0 0</td> <td></td> <td>tra</td> <td>ice silt.</td> <td>ND (A-3), With</td> <td></td> <td></td> <td>ŧ</td> <td>5</td> <td>6</td> <td>6</td> <td>· · · · · · · · · · · · · · · · · · ·</td> <td>· · · · ·</td> <td></td>			Ŧ	5	6	5	:•	11					W	0 0 0 0 0 0 0 0 0		tra	ice silt.	ND (A-3), With			ŧ	5	6	6	· · · · · · · · · · · · · · · · · · ·	· · · · ·	
10 10 <td< td=""><td>20</td><td></td><td>ŧ</td><td></td><td></td><td></td><td> :<i>ț</i>.</td><td></td><td>· · · · ·</td><td></td><td>· · · · · ·</td><td></td><td></td><td>000</td><td>20.8</td><td></td><td></td><td><u> </u></td><td>20</td><td></td><td>ŧ</td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	20		ŧ				: <i>ț</i> .		· · · · ·		· · · · · ·			000	20.8			<u> </u>	20		ŧ						
15 14.1 11.6 1 0<	20	19.3	<u>+</u> 13.5	2	2	4							Sat			Brown, slity fi	ne SANL	D (A-2-4).	20	19.6 -	+ 13.5 +	4	5	7	· · ·		
13 13.1 <			ŧ						· · · · · · · ·												‡				· · · · ·	· · · · ·	
10 10 0 10 <t< td=""><td>15</td><td>14.3</td><td>+</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td><u>15.8</u></td><td>Gray, silty CLAY (</td><td>(A-7-6), v</td><td>with trace fine</td><td>15</td><td>14.6 -</td><td>+ - 18.5_</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	15	14.3	+												<u>15.8</u>	Gray, silty CLAY ((A-7-6), v	with trace fine	15	14.6 -	+ - 18.5_						
10 9.3 22.5 1 0 1 <t< td=""><td></td><td></td><td>+</td><td>1</td><td>0</td><td>0</td><td> 0]</td><td>•••</td><td>· · · · · · · ·</td><td></td><td>· · · · · ·</td><td></td><td>Sat.</td><td></td><td></td><td>S</td><td>sand.</td><td></td><td></td><td></td><td>‡</td><td>6</td><td>9</td><td>9</td><td>●18</td><td>· · · · ·</td><td></td></t<>			+	1	0	0	 0]	•••	· · · · · · · ·		· · · · · ·		Sat.			S	sand.				‡	6	9	9	● 18	· · · · ·	
0.3 23.5 1 0 1	10		ŧ					::	· · · · ·						10.8			22.0	10		ŧ					· · · · ·	
Image: Section 2.5 File 200 Image: Section 2.5 File	10	9.3	23.5	1	0	1							Sat			Gray-brown, silty fi	ine SANI ce clay.	D (A-2-4), with	10	9.6 -	+ 23.5 +	WOH	WOH	WOH			
AND (CORSTAL PLAN)			+		-		<u>¶</u> 1		• • • •		.	Ч	Joan.		<u>- 7.8</u> -	Boring Terminate	d at Elev	vation 7.8 ft in			+				4 °		
		-	ŧ												È.	SAND (CO	ASTALI	PLAIN)		-	ŧ						
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			‡												ţ.	mud rotary drilling	techniqu	Jes.			ŧ						
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WBS	4 019	1.1.2			TI	P U-4751		COUNT	Y NEW HA	NOVER			GE	OLOGIST D. Race	y		WBS	3 4019	1.1.2			Т	P U-4751		COUNT
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noi								gton - Noise	Wall 1A	at -L- S	Sta. 1	12+00	Right		GROUND WTR (ft)	SITE	DESCR	RIPTION	SR 2	1409 (N	Vilitary	Cutoff Rd.)	to US 17 i	in Wilmin	
BOR	BORING NO. NW1A-11 STATION 16+21								OFFSET	66 ft RT			AL	IGNMENT -L-		0 HR. N/A	BOF	no No	. NW1	A-12		S	TATION 16	3+68	
COL	DLLAR ELEV.32.9 ftTOTAL DEPTH25.0 ft								NORTHING	G 187,3	810		EA	STING 2,354,710		24 HR. 7.5	COL	LAR EL	. EV. 33	3.3 ft		т	OTAL DEPT	H 25.0 f	t
DRIL	LL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/22/2014								•	DRILL	METHO	DD M	lud Rota	ıry	HAMM	ER TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DAT	E F&R	R2175 C	ME-55 76%	02/22/2014	
DRIL	LER S	5. Davis			ST	ART DATE	12/11/1	4	COMP. DA	TE 12/	11/14		SU	RFACE WATER DE	PTH N/	Ά	DRI	LER S	S. Davis			S	FART DATE	12/11/1	4
ELEV	DRIVE	DEPTH	BLC	w co	JNT		BLOWS	PER FOOT	T	SAMP					OCK DES	CRIPTION	ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 !	50	75 100	NO.	Имо) G	ELE	/. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50
35		1											L				35		+						
	32.9	<u> </u>					1						32.9	GROUN	D SURF	ACE 0.0		33.3	+ 0.0	1	5	3	· · · · · ·		
20		‡		3	3	• ⁶ · · ·	 		· · · · · ·		M		1	Black & tan, silty	fine SAN	КМЕНТ D (A-2-4), with	20		‡				. 9 ⁸		
- 50	29.4	3.5	10	5	5	-				1	M		29.1		ce gravel.	3.8	- 50	29.8 .	+ 3.5 +	3	2	2		<u> </u>	
		‡							· · · · · ·		Sat.		<u> </u>	Black, silty fine S	AND (A-2	2-4), with trace			‡				$\left \begin{array}{c} \mathbf{\tilde{t}} \cdot \cdot \cdot \\ \mathbf{\tilde{t}} \cdot \cdot \cdot \end{array} \right $		
25	24.4	+ 85				~	\					0000	<u>_ 25.9</u>	Red-brown, fine SA	ND (A-3)), with trace silt.	25	24.8	8.5				<u>'</u> ,	· · · ·	· · ·
		-	15	19	18	· · · · ·	37		· · · · · ·		Sat.	0000							‡	4	5	5		· · · · ·	
20		‡					/		· · · · · ·				20.9			12.0	20		‡						
20	19.4	+ 13.5	5	7	9	· · · /:				1			<u>}</u>	Gray-tan to gray,	silty fine \$	SAND (A-2-4).	20	19.8	+ 13.5 +	3	4	4		<u> </u>	
		‡				P ¹⁶	 		· · · · · ·										‡				· T. · · ·		
15	144	+ 185											1				15	14.8	18.5		_			· · · ·	
		-	5	8	9	! . ∳ 17	 		· · · · · ·		w								‡	4	5	6	. •11 . •11	· · · · ·	· · · ·
10		‡				· · · ·] ·			· · · · · ·				10.9			22.0	10		‡				· · · · ·		
10	9.4	23.5	 woн	WOH	WOH	<u>.</u>				1	Sat		-	Gray, silty CLAY	(A-7-6), v sand.	with trace fine	10	9.8	+ 23.5 +	woн	woн	WOH	0	<u> </u>	
		+				• <u>0</u>					Jai.		- 7.9	Boring Terminat	ed at Elev	vation 7.9 ft in			‡				4 0	1	
		‡											F	CLAY (CC	DASTAL I	PLAIN)			‡						
		‡											Ę						ŧ						
		‡											Ę	NOTES:					‡						
	-	+											-	1) 0.0-0.2' = Surfici 2) 0-br water level	al organio	c soils ured due to			‡						
		‡											Ł	mud rotary drilling	techniqu	Jes.			ŧ						
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WBS	40191	.1.2			Т	IΡU	J-4751			COL	JNTY	NE	W HA	NOVER			GEOLOGIST D. Racey	
SITE	DESCR	IPTION	SR 1	1409 (I	Vilitary	Cuto	off Rd.)) to U	S 17 i	n Wilr	ningto	on - N	Voise V	Nall 1A a	at -L- S	Sta. 1	2+00 Right GROUND	WTR (ft)
BOR	NG NO.	NW1	A-13		S	ΤΑΤΙ	ON 1	7+00				OFF	SET	91 ft RT			ALIGNMENT -L- 0 HR.	N/A
COL	LAR ELI	EV. 30).8 ft		Т	ΟΤΑΙ	DEP	TH 2	25.0 ft			NOR	THING	i 187,3	88		EASTING 2,354,737 24 HR.	4.7
DRILL	RIG/HAN	IMER EF	F./DAT	E F&F	R2175 (CME-5	5 76%	02/22	/2014					DRILL N	NETHO	D M	ud Rotary HAMMER TYPE Au	tomatic
DRIL	LER S	. Davis			S	TAR		E 12	2/11/1	4		сом	IP. DA	TE 12/	11/14		SURFACE WATER DEPTH N/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	OW CO	UNT 0.5ft	0		BL(25	OWS I	PER F	00T 7	75 	100	SAMP. NO.	моі	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft
35	30.8	-														1 10 *	- - - 30.8 GROUND SURFACE	0.0
30	-	‡	2	3	4		7								M		ROADWAY EMBANKMENT 28.8 Black & tan, silty fine SAND (A-2-4), with	1 <u>2.0</u>
25	27.3	3.5	5	5	16			021	· · · ·	 	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · ·		W		trace gravel. COASTAL PLAIN Red-brown, fine SAND (A-3), with trace si	_ / It.
20		- 8.5 - - -	2	2	4				· · · · · ·	· · ·	· · ·	· · ·	· · ·		Sat.		21.8 Gray-tan to gray, silty fine SAND (A-2-4) with trace to some clay.	, 9.0
15		13.5	2	4	5		· · · ●9 		· · · ·	 	· · ·	· · · · · · · · · · · · · · · · · · ·	· · ·		Sat.			
10		18.5	5	3	2	 	5		· · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·		· · · ·		Sat.			
	7.3	23.5	woн	WOH	WOH	/ . / . . .	· · · · · · ·		· · · ·	 	· · · · ·	 	· · ·		Sat.		- 5.8 Boring Terminated at Elevation 5.8 ft in	25.0
																	SAND (COASTAL PLAIN) NOTES: 1) 0.0-0.2' = Surficial organic soils 2) 0-hr water level not measured due to mud rotary drilling techniques.	

SHEET 12 OF 13



SITE PHOTOGRAPHS



Photograph No. 1: View looking South along Military Cutoff Rd from Paradise Way



Photograph No. 3: View looking North along Military Cutoff Road near beginning of NW1A



Photograph No. 2: View looking North along Military Cutoff Road

Sheet 13 of 13