3300B

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DESCRIPTION

LABORATORY TEST RESULTS

SITE PHOTOGRAPHS

TITLE SHEET

LEGEND SITE PLAN

PROFILE CROSS SECTIONS BORE LOGS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION BRIDGE NO. 257 ON -Y30- (NC 210) OVER -L1- (HAMPSTEAD BYPASS) BETWEEN US 17 BUS. AND SR 1002 (ISLAND CREEK RD.)

4023 PROIEC

STATE PROJECT REFERENCE NO. STATE SHEETS NO. 14 N.C **R-3300B** 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 ENCINEERING UNIT AT (1991 707-686). THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJERACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

MID-ATLANTIC

GOODNIGHT, D.J.

LANE, R.W.

INVESTIGATED BY ______.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE DECEMBER 2019



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		SOIL D	ESCRIPTION				GRADATION					ROCK DES	CRIPTION	
SOIL IS CONS BE PENETRATE ACCORDING T IS BASED CONSISTENCY,	SIDERED UNCONSOLIDA ED WITH A CONTINUO TO THE STANDARD PE D ON THE AASHTO S ,COLOR,TEXTURE,MO	ATED, SEMI-CON IUS FLIGHT POW ENETRATION TES YSTEM, BASIC D ISTURE, AASHTO	SOLIDATED, OR WEATHERE WER AUGER AND YIELD LI ST (AASHTO T 206, ASTM DESCRIPTIONS GENERALL U CLASSIFICATION, AND O	D EARTH MATERIALS SS THAN 100 BLOW D1586). SOIL CLAS INCLUDE THE FOLL HER PERTINENT FAC	THAT CAN PER FOOT IFICATION DWING: TORS SUCH	WELL GRADED - INDICA UNIFORMLY GRADED - I GAP-GRADED - INDICATE	TES A GOOD REPRESENTATION OF I NDICATES THAT SOIL PARTICLES A ES A MIXTURE OF UNIFORM PARTIC ANGULARITY OF (PARTICLE SIZES FR RE ALL APPROXIMA LE SIZES OF TWO	OM FINE TO COARSE. TELY THE SAME SIZE. OR MORE SIZES.	HARD ROCK ROCK LINE SPT REFUSA BLOWS IN N REPRESENTE	IS NON-COASTAL PLAIN INDICATES THE LEVEL A LIS PENETRATION BY NON-COASTAL PLAIN MA LD BY A ZONE OF WEAT	MATERIAL THAT WO AT WHICH NON-COAS A SPLIT SPOON SAM TERIAL, THE TRAN HERED ROCK,	DULD YIELD SPT REFUSAL IF TAL PLAIN MATERIAL WOULD) MPLER EQUAL TO OR LESS THA ISITION BETWEEN SOIL AND F	ESTED. AN INFERRED IELD SPT REFUSAL. N 0.1 FOOT PER 60 ROCK IS OFTEN
AS MII VERY	INERALOGICAL COMPOS STIFF.GRAY.SILTY CLAY	SITION, ANGULAF , <i>MOIST WITH INTE</i>	RITY, STRUCTURE, PLASTIC ERBEDDED FINE SAND LAYL	ITY, ETC. FOR EXAM RS.HIGHLY PLASTIC.A-	'LE, −6	THE ANGULARI	TY OR ROUNDNESS OF SOIL GRAINS	IS DESIGNATED BY	Y THE TERMS:			IVIDED AS FULLOWS		O ODT NI VALUES N
	SOIL LEG	END AND (AASHTO CLASSI	ICATION		ANGULAR, SUBA	MINERAL OCICAL CON			ROCK (WR)		100 BLOWS PER FOC	OT IF TESTED.	J SPT N VALUES /
GENERAL CLASS.	GRANULAR MATE (≤35% PASSING	RIALS *200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MA	TERIALS	MINERAL NA	MES SUCH AS QUARTZ, FELDSPAR, N	ICA, TALC, KAOLIN, I	ETC.	CRYSTALLIN ROCK (CR)	E	FINE TO COARSE GR WOULD YIELD SPT F GNEISS. GABBRO. SCH	RAIN IGNEOUS AND METAMORPH REFUSAL IF TESTED. ROCK TYP HIST.ETC.	C ROCK THAT 'E INCLUDES GRANITE
GROUP F CLASS. A-1-a	A-1 A-3 A-1-b A-2-4 A	A-2 A-2-5 A-2-6 A-2-	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A A-3 A-6, A	-5		COMPRESSIBIL	ITY		NON-CRYSTA		FINE TO COARSE GR	RAIN METAMORPHIC AND NON-CO	JASTAL PLAIN
SYMBOL 00000						SLIG		LL < 31	50	ROCK (NCR)		ROCK TYPE INCLUDE	ES PHYLLITE, SLATE, SANDSTON	E,ETC.
% PASSING	000000					HIGH	ILY COMPRESSIBLE	LL > 50	50	SEDIMENTAR		SPT REFUSAL. ROCK	TYPE INCLUDES LIMESTONE.	SANDSTONE, CEMENTED
*10 50 MX *40 30 MX	X 50 MX 51 MN			GRANULAR CLA SOILS	MUCK, PEAT		PERCENTAGE OF MA	<u>ATERIAL</u>				WEATH	ERING	
*200 15 MX	X 25 MX 10 MX 35 MX 3	85 MX 35 MX 35 M	1X 36 MN 36 MN 36 MN 36 M	IN SOIL	-	ORGANIC MATERIA			MATERIAL	FRESH	ROCK FRESH, CRYSTALS	BRIGHT, FEW JOINTS	S MAY SHOW SLIGHT STAINING. F	ROCK RINGS UNDER
MATERIAL PASSING 40 LL	40 MX	41 MN 40 MX 41 M	IN 40 MX 41 MN 40 MX 41 M	N SOILS WITH		LITTLE ORGANIC MAT	MATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12% C 5 - 10% 12 - 20%	LITTLE SOME	1 - 10% 10 - 20% 20 - 35%	VERY SLIGHT (V SLI.)	HAMMER IF CRYSTALLI ROCK GENERALLY FRES CRYSTALS ON A BROKE	√E. H, JOINTS STAINED, S N SPECIMEN FACE S⊦	SOME JOINTS MAY SHOW THIN CL HINE BRIGHTLY. ROCK RINGS UND	.AY COATINGS IF OPEN, DER HAMMER BLOWS IF
PI 6	5 MX NP 10 MX 1	Ø MX 11 MN 11 M	N 10 MX 10 MX 11 MN 11 M	MODERATE	HIGHLY ORGANIC		GROUND WATE		35% HND HBUVE		OF A CRYSTALLINE NA	TURE.		
USUAL TYPES STONE	E FRAGS. FINE SIL	TY OR CLAYEY	SILTY CLAYEY	ORGANIC MATTER	SOILS	▽	WATER LEVEL IN BORE HOLE IN	MEDIATELY AFTER	DRILLING	(SLIL)	I INCH. OPEN JOINTS M CRYSTALS ARE DULL A	A, JUINTS STAINED A 1AY CONTAIN CLAY. II IND DISCOLORED, CRY	AND DISCOLORATION EXTENDS IN IN GRANITOID ROCKS SOME OCCA: 'STALLINE ROCKS RING UNDER HA	SIONAL FELDSPAR
MATERIALS SA	SAND SAND GRA	WEL AND SAND	SOILS SOILS				STATIC WATER LEVEL AFTER _	24_ HOURS		MODERATE	SIGNIFICANT PORTIONS	OF ROCK SHOW DISC	COLORATION AND WEATHERING EF	FECTS. IN
GEN. RATING AS SUBGRADE	EXCELLENT TO	GOOD	FAIR TO POOR	FAIR TO POOR POO	UNSUITABLI	<u>₽₩</u> ∩∩∩\	PERCHED WATER, SATURATED ZO	NE, OR WATER BEAR	RING STRATA	(MOD.)	DULL SOUND UNDER HA	MMER BLOWS AND SH	IOWS SIGNIFICANT LOSS OF STRE	ENGTH AS COMPARED
	PI OF A-7-5 SUE	SCROUP IS \leq LL	- 30 ; PI OF A-7-6 SUBGROUP	IS > LL - 30		0.00.				MODERATELY	ALL ROCK EXCEPT QUA	RTZ DISCOLORED OR	STAINED. IN GRANITOID ROCKS,	ALL FELDSPARS DULL
		INFSS OR	RANGE OF STANDARD	RANGE OF	JNCONFINED					(MOD. SEV.)		D WITH A GEOLOGIST	T'S PICK. ROCK GIVES "CLUNK" SC	UND WHEN STRUCK.
GENERALLY	VERY	STENCY LOOSE	VENETRATION RESISTEN (N-VALUE) < 4 4 TO 10	COMPRESSIV	/FT ²)	UADWAY EME	- DIP & D ESCRIPTION DF ROCK - OF TOMT TES	STRUCTURES	SLOPE INDICATOR INSTALLATION	SEVERE (SEV.)	ALL ROCK EXCEPT QUA REDUCED IN STRENGTH TO SOME EXTENT. SOM	RTZ DISCOLORED OR TO STRONG SOIL. IN E FRAGMENTS OF ST	STAINED. ROCK FABRIC CLEAR (N GRANITOID ROCKS ALL FELDSP RONG ROCK USUALLY REMAIN.	ND EVIDENT BUT ARS ARE KAOLINIZED
GRANULAR MATERIAL	MEDIUM	1 DENSE	10 TO 30 30 TO 50	N	A				CONE PENETROMETER	VERY	IF TESTED, WOULD YIEL	<u>D SPT N VALUES ></u>	100 BPF	
	IVE) VERY	DENSE SOFT	> 50 < 2 2 TO 4	< 0 0.25	.25	I I I I I I I I I I I I I I I I I I I			SOUNDING ROD	SEVERE (V SEV.)	BUT MASS IS EFFECTIV REMAINING. SAPROLITE VESTIGES OF ORIGINAL	IS AN EXAMPLE OF	DIL STATUS, WITH ONLY FRAGMEN ROCK WEATHERED TO A DEGREE IN. IF TESTED, WOULD YIELD SP	TS OF STRONG ROCK THAT ONLY MINOR T N VALUES < 100 BPF
SILT-CLAY MATERIAL (COHESIVE)	MEDIU SI VERY	M STIFF TIFF STIFF	4 TO 8 8 TO 15 15 TO 30	0.5 T 1 T 2 T	0 1.0) 2) 4	INFERRED RO			TEST BORING WITH CORE - SPT N-VALUE	COMPLETE	ROCK REDUCED TO SOU SCATTERED CONCENTRA ALSO AN EXAMPLE.	. ROCK FABRIC NOT TIONS. QUARTZ MAY	DISCERNIBLE, OR DISCERNIBLE (BE PRESENT AS DIKES OR STRI	JNLY IN SMALL AND NGERS. SAPROLITE IS
	н			>	4							ROCK HA	RDNESS	
	0175		UR URHIN SIZE						SSIFIED EXCAVATION -	VERY HARD	CANNOT BE SCRATCHED	BY KNIFE OR SHARF	P PICK. BREAKING OF HAND SPEC	IMENS REQUIRES
OPENING (MM)	SIZE	4 10 4.76 2.00	40 60 2 0.42 0.25 0.0	175 0.0 53			UNSUITABLE WASTE	ACCEPT	TABLE, BUT NOT TO BE	HARD	CAN BE SCRATCHED BY	KNIFE OR PICK ONL	S PICK. Y WITH DIFFICULTY. HARD HAMM	IER BLOWS REQUIRED
BOULDER (BLDR.)	COBBLE (GRAVEL	COARSE FI SAND SA	NE SILT ND (SL.)	CLAY (CL.)	SHALLOW UNDERCUT			KMENT OR BACKFILL	MODERATELY	TO DETACH HAND SPEC CAN BE SCRATCHED BY	IMEN. KNIFE OR PICK. GOU	UGES OR GROOVES TO 0.25 INCH	ES DEEP CAN BE
GRAIN MM	305 75	2.0	(LSE. SD.) (F 0.25	0.05 0.	005	AR - AUGER REFUSAL		VST -	VANE SHEAR TEST	HARD	EXCAVATED BY HARD B BY MODERATE BLOWS.	LOW OF A GEOLOGIST	T'S PICK. HAND SPECIMENS CAN	BE DETACHED
SIZE IN.	SOIL MOI	STURE - (CORRELATION OF	TERMS		CL CLAY CPT - CONE PENETRATIC	MOD MODERATELY ON TEST NP - NON PLASTIC	νεн γ - υ γ τ	UNIT WEIGHT DRY UNIT WEIGHT	HARD	CAN BE EXCAVATED IN POINT OF A GEOLOGIST	SMALL CHIPS TO PE	EICES 1 INCH MAXIMUM SIZE BY	HARD BLOWS OF THE
SOIL MOIS (ATTERBE	STURE SCALE ERG LIMITS)	FIELD MC DESCRI	DISTURE GUIDE FO	R FIELD MOISTURE	DESCRIPTION	CSE COARSE DMT - DILATOMETER TES	ORG ORGANIC ST PMT - PRESSUREME	TER TEST SAN	MPLE ABBREVIATIONS	SOF T	CAN BE GROVED OR GO FROM CHIPS TO SEVER	UGED READILY BY KN AL INCHES IN SIZE {	NIFE OR PICK. CAN BE EXCAVATE BY MODERATE BLOWS OF A PICK	D IN FRAGMENTS POINT. SMALL, THIN
		- SATURA (SAT.)	TED - USUALLY FROM BEL	LIQUID;VERY WET,U OW THE GROUND W	SUALLY	e - VOID RATIO F - FINE	SD SAND, SANDY SL SILT, SILTY	SS - 5 SS - 5 ST - 5	SPLIT SPOON SHELBY TUBE	VERY SOF T	CAN BE CARVED WITH	I BY FINGER PRESSU KNIFE. CAN BE EXCA S CAN BE BROKEN BY	JRE. VATED READILY WITH POINT OF Y FINGER PRESSURE. CAN BE SCI	PICK. PIECES 1 INCH RATCHED READILY BY
			SEMISOLI	REQUIRES DRYING	то	FRAC FRACTURED, FRAC	CTURES TCR - TRICONE REF	USAL RT-1	RECOMPACTED TRIAXIAL		FINGERNAIL.			
(PI) PI	PLASTIC IMIT	- WEI -	(W) ATTAIN O	TIMUM MOISTURE		FRAGS FRAGMENTS HI HIGHLY	₩ - MOISTURE CONT V - VERY	ENT CBR -	CALIFORNIA BEARING RATIO	TERM	FRACTURE SPAC		TERM	
			- (M)		MOTOTURE	EG	UIPMENT USED ON SUB	JECT PROJEC	T	VERY WID		HAN 10 FEET	VERY THICKLY BEDDED	4 FEET
	OPTIMUM MOISTURE SHRINKAGE LIMIT		30E10; HT	OR NEHR OF THOM	HOISTONE	DRILL UNITS:	ADVANCING TOOLS:	HAMMER T	TYPE:	MODERAT	ELY CLOSE 1 TO) 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
		- DRY - 1	(D) REQUIRES	ADDITIONAL WATER	то	X CME-45C			OMATIC MANUAL	CLOSE VERY CLO	0.16 OSE LESS TH	TO 1 FOOT AN 0.16 FEET	VERY THINLY BEDDED THICKLY LAMINATED	0.03 - 0.16 FEET 0.008 - 0.03 FEET
			- ATTAIN O	TIMUM MOISTURE		CME-55			E:	L			THINLY LAMINATED	< 0.008 FEET
		PLA	ASTICITY			CME-550X			⊔⁺'	FOR SEDIME	NTARY ROCKS. INDURATI	ON IS THE HARDENT		
NON PLA	ASTIC	PLASTI	0-5	DRY STR VERY	.OW		TUNGCARBIDE INSERTS			FRIAF	BLE	RUBBING WITH F	INGER FREES NUMEROUS GRAIN	1S;
SLIGHTL MODERAT	Y PLASTIC		6-15 16-25	SLIG	IT JM	VANE SHEAR TEST	X CASING W/ ADVANCE					GENTLE BLOW B	BY HAMMER DISINTEGRATES SAN	IPLE.
HIGHLY	PLASTIC	20	6 OR MORE	HIG	1	PORTABLE HOIST	X TRICONE 215/6 " STEEL		D AUGER	MODE	RATELY INDURATED	BREAKS EASILY	WHEN HIT WITH HAMMER.	n SILL PRUBL;
L		(CULOR			X DIEDRICH D-25		ARB. SOUT	NDING ROD	INDUF	RATED	GRAINS ARE DIF	FICULT TO SEPARATE WITH ST BREAK WITH HAMMER.	EEL PROBE:
DESCRIPTIONS MODIFI	S MAY INCLUDE COL IERS SUCH AS LIGH ⁻	OR OR COLOR T, DARK, STREA	COMBINATIONS (TAN, RE KED, ETC. ARE USED TO	D, YELLOW-BROWN, E DESCRIBE APPEARA	LUE-GRAY). NCE.				E SHEAR TEST	EXTR	EMELY INDURATED	SHARP HAMMER I SAMPLE BREAKS	BLOWS REQUIRED TO BREAK SA	AMPLE:

PROJECT REFERENCE NO. R-3300B



TERMS AND DEFINITIONS

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND

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

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

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

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE

 $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE

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

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

<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

 $\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

SURFACE.

HORIZONTAL.

ITS LATERAL EXTENT.

OF AN INTERVENING IMPERVIOUS STRATUM.

RUN AND EXPRESSED AS A PERCENTAGE.

TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

N: 231572 E: 2377851

THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BL-95, -Y30- STA. 39+12, 15' LT

ROCKS OR CUTS MASSIVE ROCK.

2

6 - 1.5 FEET 3 - 0.16 FEET 18 - 0.03 FEET 0.008 FEET	<u>NOTE</u> FIAD	<u>-</u> Filled	IMMEDIATELY	AFTER	DRILLING
AT, PRESSURE, ETC.					

DATE: 8-15-1-

ELEVATION: 42.28 FEET





50 100	PROJECT REFERENCE NO.	SHEET NO.
FEET	R-3300B	4
VE = 5	BRIDGE NO. 257 ON -Y30- (BETWEEN US 17 BUS. AND N	OVER -L1- C 210/SR 1002
		50
· · · · · · · · · · · · · · · · · · ·		
		· · · · · · · · · · · · · · · · · · ·
RAY, TAN, AND BLACK, MOIST TO	SAT.V.LOOSE TO MEDIUM DENSE	
AND (A-S) LUE-GRAY,SAT V.LOOSE TO L 7) (CASTLE HAYNE FORMATIO	OOSE,SILTY AND CLAYEY SAND	
UE-GRAY,SAT,V.SOFT TO SC A-4,A-6,A-7)WITH TRACE OF	FT SANDY SILT AND SANDY AND RGANICS	
GRAY, SAT "MED. DENSE TO V.I STONE FRAGS.	DENSE, SAND (A-3) WITH TRACE TO	0
Y HUCK: WHILE, HARD, SANDY L	IMESIONE	
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ΝΟΤ	ES.	20
GRO	UNDLINE PROFILE TAKEN	=C
DATE	D JUNE, 2018.	
INFE THR	RRED STRATIGRAPHY IS DRAY	WN TH
PRO	JECTED ONTO THE PROFILE.	
BRID	GE SKEW: 111°35'21"	
4	4 + 00	· · · · ·

. 60			(A) UNDIVIDED COAST AL PLAIN: GRAY AN (B) COAST AL PLAIN: GRAY.SAT.V.LOOSE.S (C) COAST AL PLAIN: GRAY AND BLUE-GR. (C) COAST AL PLAIN: WHITE AND CRAY SU	D TAN,WET TO SAT V.LOOSE TO MED.DENSE,SA SILTY SAND (A-2-4) (CASTLE HAYNE FORMATION) AY,SAT V.SOFT TO MED.STIFF,SANDY SILT AND	ND (A-3) SANDY AND SILTY CLAY (A-4,A-6,
	· · · · · · · · · · · · · · · · · · ·	SS-34 SS-74 ST-16	(E) COASTAL PLAIN SEDIMENTARY ROCK	GRAY AND WHITE.HARD.SANDY LIMESTONE	TALE LIMESI UNE FRAGS.
		55-85 55-75 55-76		DAADWAY EUDAWYWENT, CDAY WOIST	SULTY E SAND (A-2-4)
. 45		SI3_EBI-/ 38+94 33' LT	· 		
	A		/18	(A)	
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-20		(18)) END BENT #1 38+50.29	
-25				- - <u>-</u> Y30-	



45			<u>[SS-32</u> SI3_BI-] A ROADW /	AY EMBANKMENT: GRAY, MOIST, SI	ILTY F.SAND (A-2-4)	
— — —					/	×	
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35	<u></u>					<u> </u>	- - (W
30							(
25			WOH)-				Ŵ
20					(C)		(
15							ĆW
10							Ŵ
5	<u> </u>						
0			60				
5	·····	\mathcal{D}	(35)	(D)			
-10	·····		42				
-,5		<u>(E)</u>		(<u>E)</u>)	Ø	(
-20			28—				C
-25		(D)	36	\bigcirc			Ć
- <i>su</i>		<u>E</u>)	00/0.2 BT			Ē	00
-35 (AUNDIVIDE) (BCOASTAL	D COASTAL PLAIN: BLACK,TAN,ANL PLAIN: GRAY,SAT.,V.LOOSE,CLAYEY	D GRAY.WET TO SA SAND (A-2-7)(CA	NT.LOOSE TO MED.DENSE.S STLE HAYNE FORMATION)	5AND (A-3)	BENT #1 39+82.39		
-40 ©COASTAL @COASTAL (Ê)COASTAL	PLAIN: GRAY AND BLUE-GRAY, SAT PLAIN: GRAY AND WHITE, SAT., MEL PLAIN SEDIMENTARY ROCK: WHIT	.V.SOFT TO MED. D.DENSE TO V.DEN E.HARD.SANDY LIME	STIFF, SANDY SILT AND SA ISE, SAND (A-3) WITH TRAC STONE	NDY AND SILTY CLAY (A-4,A-6 E LIMESTONE FRAGS.	. ^{д-7-6)} -Y30-	\bigcirc	(
-45							





GEOTECHNICAL BORING REPORT

BORE LOG



WBS	40237	.1.1			Т	P R-3	300B		COUNT	Y PEN	IDER				GEOLOGIST Lane, R.W			
SITE	DESCR	PTION	BRID	DGE N	0. 257	' ON -Y	′30- (NC	210) C	VER -L1	- (HAM	PSTEA	D BYP/	ASS)		•		GROUN	ID WTR (ft)
BORI	NG NO.	S13_	EB1-A		S		N 38+94	ŀ		OFFS	ET 33	3 ft LT			ALIGNMENT -Y30-		0 HR.	8.4
COLL	AR ELE	V. 41	.8 ft		то	OTAL D	DEPTH	73.0 ft		NORT	HING	231,59	95		EASTING 2,377,840		24 HR.	3.6
DRILL	rig/ham	MER EF	F./DATI	e Mid	3964 CI	ME-45C	83% 09/05	/2017				DRILL M	IETHOD	D M	d Rotary	HAMME	R TYPE	Automatic
DRILL	ER S	FRICKL	AND,	TJ	S		DATE 0	5/08/1	8	СОМ	P. DAT	E 05/0	09/18		SURFACE WATER DEPT	H N/A	4	
ELEV	DRIVE	DEPTH (ft)	BLC			0	BL 25	OWSF.	PER FOO	T 75	100	SAMP.			SOIL AND ROC	K DESC	RIPTION	
()	(ft)	()	0.51	0.51	0.51	0			1	10	100	NO.	<u>/ MOI</u>	G	ELEV. (ft)			DEPTH (fi
25								Mate	hlino									
20-				+							- — — -					TONE		
	-	-													. ST-16 pushed in offs 38+91	et borin	g at Sta	·Y30-
	-	-													- Other Samples:	, 00 E1		
	-	-													ST-16 (13.0 - 15.0))		
	-	-																
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GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

BORE LOG



WBS	40237	.1.1			TI	Ρ	R-33	300E	3		COU	ΝΤΥ	PEN	NDER				GEOLO	OGIST Lane, R.V	V.		
SITE	DESCR	PTION	BRID	DGE N	0. 257	7 ON -Y30- (NC 210) OVER -L1-						-L1- ((HAM	PSTE	AD BYP/	ASS)					GROUN	D WTR (ft)
BOR	NG NO.	S13_I	B1-A		S	ΓA		39)+72				OFFS	ET 3	32 ft LT			ALIGN	MENT -Y30-		0 HR.	10.5
COLI	LAR ELE	V . 42	.2 ft		т	D	TAL D	EPT	H 73	.5 ft			NORT	HING	231,56	68		EASTI	NG 2,377,913		24 HR.	4.2
DRILL	. RIG/HAM	MER EF	F./DATI	E MID	3964 CM	ME	E-45C 8	3% 0	9/05/20	17					DRILL M	IETHO	D Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER S	FRICKL	AND,	TJ	ST	ΓA	ART D	ATE	05/0	9/18	}		сомі	P. DA	TE 05/*	10/18		SURFA	ACE WATER DEP	TH N//	Ą	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT				BLOV	VSP	'ER FC	тос			SAMP.	▼∕			SOIL AND ROO	CK DESC		I
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft		0	2	25	5	0	7	75 I	100	NO.	/моі	G	ELEV. (ft)				DEPTH (ft)
45		-																-				
	-	-																42.2	GROUNI) SURF	ACE	0.0
40	41.2	1.0	3	3	3						• •					w	0000		UNDIVIDED (BLACK, TAN, ANI	COASTA D GRAY	L PLAIN , SAND (A	-3)
	38.9	3.3	3	5	6			•••		• •	•••	• •		•••		▼	0000					
	36.9	5.3	3	3	1						• •	• •		•••		Sat	0000					
35	33.9	8.3					<u>7</u> 4 ·									out.	0000	34.2				<u>8.0</u>
	-	-	wон	WOH	WOH		0· ·	•••			••	•••		•••		Sat.		•	COAST GRAY, CLAYEY S/	r al pla AND (A-2	IN 2-7) (CAS	TLE
30	-	-									••	• •					$\langle \rangle$	30.2			ION)	<u>12.0</u>
	28.9 -	- 13.3 -	wон	woн	woн		· ·	 			· · · ·	· ·	· ·	· ·		Sat.	N		GRAY, SANDY	SILTYC	JLAY (A-7)
	-	-				I	•••	 			••	· ·	· ·	•••								
25	23.9	- - 18.3																_				
	-	-	WOH	WOH	WOH		0· · 	•••			· · · ·	: :	· · ·	::		Sat.		22.2				<u>20.0</u>
20	-	-						 		• •	••	•••		••				_	BLUE-GRAT,	SANDI	SILT (A-4)	
		<u>- 23.3</u> -	wон	woн	wон		· · 0· ·	· ·			••	::	· · · ·	· ·	SS-32	27%						
15	-	-					· · · ·				••	::		::				15.2				27.0
15	13.9 -	- 28.3	WOL		WOU						•••								GRAY AND BLUE-	GRAY, S	SANDY C	
	-	-			VV O H	Í	0	· ·			•••	· ·	· · · ·	: :		Sat.			(A 0)		
10		-									•••			•••				-				
	- 8.9	<u>- 33.3</u> -	wон	woн	wон		0. •	· ·			•••	· · · ·	· · ·			Sat.						
5	-	-						:×.,			••	· · · ·	· · · ·					6.2	WHITE, SAND	(A-3) W	// TRACE	<u> </u>
	3.9	38.3	10	36	24					<u>`</u> ~	,					Sat	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-	LIMESTONE	EFRÁGN	MENTS	
	-	-					•••									Jai.	0000	•				
0	-11	43 3					· ·	 				· ·										
		-	8	9	26				4 3	5 -	• •					Sat.	0000					
-5	-	_									•••											
	-6.1	- 48.3 -	27	22	20	ļ	•••	· · ·		· ·		•••		::		Sat.						
	-	-					· · · ·			† ^{⊤∠}	 	::	: :	::				• ი •				50.0
-10	-11.1 -	- 53.3		07/2						 	⊨ · ·		+					= <u>- 3.0</u>				<u>оск</u> <u>52.0</u>
	-	-	73	27/0.4			••• •••	 		· ·	 	· ·		00/0.9			<u>⊨</u>	_13.8	WHILE, HARD, S	Sandy L		NE 56 0
-15	-	-											+				0000	<u></u>				<u>0.0</u>
	-16.1 -	<u>- 58.3</u> -	5	15	13		· · · ·	· ·	↓ 28· 1		· · · ·	::	· · ·			Sat.			GRAT AND W	пн е, <i>э</i>	AND (A-3)	
20	-	-					· · · ·	 	$\begin{vmatrix} \mathbf{v} \\ \mathbf{v} \end{vmatrix}$	· ·	· · · ·	· ·		· ·								
-20		63.3	10	11	22				- \-				· ·									
	-	-	10	14			· · · ·		- ● 3	6 -	 	::				Sat.	0000					
-25							•••	· ·		•••	•••	•••	· ·	•••			00000	- 				60.2
	-20.1 -	- 00.3 -	18	82/0.3			· · · ·	· ·	· · •	· · ·	 · ·		+ 	 00/0.8				20.1				
-30	-	-					· · · ·					::					臣		WITTE, MARD, S	JAINDTL		v L
		73.3	100/0.2			Ľ								00/0.2	,		F	- 31.3	Boring Terminated	at Flovo	tion - 31 3	73.5 ft IN
		-		1										_				•	CP: SAND	Y LIMES	TONE	ал II м

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

BORE LOG



BORING NO. S13_B1-B **STATION** 39+63 COLLAR ELEV. 42.1 ft TOTAL DEPTH 88.7 ft DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 09/05/2017 DRILLER STRICKLAND, TJ **START DATE 04/26/18** ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft **BLOWS PER FOOT** 0.5ft 0.5ft 0.5ft 50 25 Match Line -35 -357 778 92/0.4 -40 -40.7 + 82.89 9 ... -45 45.7 + 87.8 74/0.4 26

TIP R-3300B

WBS 40237.1.1

GEOTECHNICAL BORING REPORT

BORE LOG

GEOLOGIST Lane, R.W. COUNTY PENDER SITE DESCRIPTION BRIDGE NO. 257 ON -Y30- (NC 210) OVER -L1- (HAMPSTEAD BYPASS) **GROUND WTR (ft)** OFFSET 36 ft RT ALIGNMENT -Y30-0 HR. 11.2 **NORTHING** 231,507 EASTING 2,377,882 24 HR. 3.6 HAMMER TYPE Automatic DRILL METHOD Mud Rotary COMP. DATE 04/27/18 SURFACE WATER DEPTH N/A SAMP. SOIL AND ROCK DESCRIPTION 0 75 100 NO. MOLIG ELEV. (ft) DEPTH (COASTAL PLAIN SEDIMENTARY ROCK WHITE, HARD, SANDY LIMESTONE 100/0.9 (continued) . . -39.9 0000 ___ . . Sat. WHITE, SAND (A-3) . . - -- --- . COASTAL PLAIN SEDIMENTARY ROCK WHITE, HARD, SANDY LIMESTONE 100/0.9 Boring Terminated at Elevation -46.6 ft IN CP: SANDY LIMESTONE

GEOTECHNICAL BORING REPORT ROREIOG

									00			
WBS	40237	7.1.1			T	IP R-3300B	COUNT	Y PENDER			GEOLOGIST Lane, R.W.	
SITE	DESCR		BRI		0 257	7 ON -Y30- (NC 210)		- (HAMPSTE		ASS)		GROUND WTR (ff)
		040								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
BOR	NG NO.	S13_	EB5-9	۱	5	TATION 41+12		OFFSEL	37 ft L I		ALIGNMENT -Y30-	UHR. 8./
COLI	LAR EL	EV. 43	3.6 ft		T(OTAL DEPTH 73.1	ft	NORTHING	231,5	27	EASTING 2,378,047	24 HR. 4.7
DRILL	. RIG/HAM	MER EF	F./DAT	E MID	3964 C	ME-45C 83% 09/05/2017	i			IETHOD M	Id Rotary	IER TYPE Automatic
DRII		TRICKI		ті	s		/18		TE 05/	08/18		/Δ
DIGE												A
ELEV	ELEV	DEPTH					50 PER FUU	75 100	SAIVIE.	V ō	SOIL AND ROCK DES	CRIPTION
(14)	(ft)	(,	0.50	0.51	0.51		50	13 100	NO.	/MOI G	ELEV. (ft)	DEPTH (f
45												
		<u> </u>									43.6 GROUND SURF	ACE 0.
	42.6	1.0	1	2	2					M	- UNDIVIDED COASTA	AL PLAIN
40	40.6	- 3.0				$\left \left \P^4 \cdot \cdot \cdot \right \cdot \cdot \cdot \right $.			111 0000	-	
	38.6	5.0	2	3	4	•7					-	
		İ	4	6	5] :) 11: :::				Sat.	- 36.6	7.1
35	35.6	8.0								-	- COASTAL PLA	<u> </u>
		‡	INOH	INOH	IMOH	•			SS-80	33%	GRAY, SANDY SILT (A- - HAYNE FORMAT	4) (CASTLE [ION]
	·	+										
30	30.6	13.0									- BLUE-GRAT, SILT F G	_AT (A-7-0)
	-	‡	lмон	Тмон	1	1			SS-87	30%	-	
	.	+				$ _{1}^{1}$.				- 27.6	<u>16.0</u>
25	25.6	18.0									- BLUE-GRAY, SILTY SA -	AND (A-2-4)
	-	İ	1	2	3	• 5	· · · · · ·		SS-81	33%		
		ł					.				-	
	20.6	+ 23.0				i	· · · · · ·				-	
20		+	2	3	2		• • • • • •		SS-35	30%	_	
		Ŧ				$ _{I}$, \cdot , \cdot , $ $, \cdot , \cdot , $ $, \cdot					- 17.6	26.0
	15.6	+ 28.0									- GRAY, SANDY CLA	AY (A-6)
15	- 13.0	- 20.0	WOH	WOH	woн	「↓。	• • • • • •	· · · · ·		Sat.	_	
		Ţ									-	
	10.6	1									-	
10	- 10.8	- 33.0	WOH	WOH	woн	┥┟╷╴╸╸┥╺╴╺╸			SS-82	33%	_	
		‡									- - 7.6	36.0
	50	1								0 0 0 0 0 0 0 0 0 0 0 0	WHITE, SAND (A-3) W	W/LITTLE
5		T 38.0	33	16	41	1	9 57			Sat.		
		1								0000	-	
		+					/			0000	-	
0	- 0.6	<u>+ 43.0</u> +	10	15	22					Sat.		
		<u>†</u>					:			0000	-	
		+								0000	-	
-5	-4.4	+ 48.0 +	16	60	26					Sat.	-	
		t					· · · · ·	· · · · ·		0000	-	
		+					.	· • • •		0000	-	
-10	-9.4	<u>+ 53.0</u>	16	49	51/0.4					0000		53.5
		t						100/0.9	2		_ COASTAL PLAIN SEDIME 124 WHITE, HARD, SANDY	
		+				· · · · · · F ⁻	-+	+		0000	COASTAL PLA	<u>NN</u>
-15	-14.4	<u>+ 58.0</u>	24	26	12	┤│ ///	-			Sat	- WHITE AND GRAY, SA	ND (A-3) W/ MESTONF
		t						• • • •		0000	FRAGMENT	S
		Ŧ				/				0000	-	
-20	-19.4	<u>+ 63.0</u>	8	7	9					Sat	-	
		t				$\left \left \begin{array}{c} \cdot \cdot \cdot \mathbf{\Psi}^{16} \right \cdot \cdot \cdot \cdot \right $.			0000	-	
		Ŧ								0000	-	
-25	-24.4	<u>+ 68.0</u>	7	7	7					Sat	-	
		ł	[']	'	`	$\left \left \cdot \cdot \cdot \bigoplus_{i=1}^{i_{14}} \right \cdot \cdot \overline{\cdot} \right $.	• • • •]		Jal. 0000	-	
		Ŧ				i	.			0000	-	
	-29.4	<u>+ 73.0</u>	60/0 1			<u> </u>	·	60/0.1	-	0000	29.4 29.5 // COASTAL PLAIN SEDIME	73.0 NTARY ROCK Л 73.1
		+		1							- WHITE, HARD, SANDY	LIMESTONE
		Ŧ									Boring Terminated WITH	STANDARD
	•	t									Elevation -29.5 ft IN C	P: SANDY

COUNTY PENDER WBS 40237.1.1 **TIP** R-3300B SITE DESCRIPTION BRIDGE NO. 257 ON -Y30- (NC 210) OVER -L1- (HAMPSTEAD BYPASS) **STATION** 41+12 BORING NO. S13_EB2-A COLLAR ELEV. 43.6 ft TOTAL DEPTH 73,1 ft DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 09/05/2017 DRILLER STRICKLAND, TJ **START DATE** 05/07/18 ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft BLOWS PER FOOT (ft) 0.5ft 0.5ft 0.5ft 25 50 0 Match Line _-<u>35</u>_

GEOTECHNICAL BORING REPORT

BORE LOG

100

75

SHEET 11 GEOLOGIST Lane, R.W. GROUND WTR (ft) OFFSET 37 ft LT ALIGNMENT -Y30-0 HR. 8.7 **NORTHING** 231,527 **EASTING** 2,378,047 24 HR. 4.7 DRILL METHOD Mud Rotary HAMMER TYPE Automatic **COMP. DATE** 05/08/18 SURFACE WATER DEPTH N/A SAMP. 0 SOIL AND ROCK DESCRIPTION NO. MOI G ELEV. (ft) DEPTH (ft LIMESTONE

GEOTECHNICAL BORING REPORT BORE LOG

WBS	40237	.1.1			т	P R-3300	3				<u> </u>			GEOLOG	ST Lane. R.V	V.		
SITE	DESCR	PTION	BRID	DGE N	0.257	' ON -Y30-	- (NC 210) (VER -L1-	(HAMP	STE	AD BYP	ASS)			20110,141	••	GROUNE	WTR (ft)
BOR	NG NO.	S13	FB2-B		s	TATION 4	0+67		OFFSE	ET 3	37 ft RT			ALIGNME	NT -Y30-		0 HR.	7.3
COL		V . 41				OTAL DEP	TH 68.6 ft		NORTH	HING	231.47	72		EASTING	2.377.980		24 HR.	4.5
DRILL	. RIG/HAM	MER EF	F./DAT	E MID	3964 C	ME-45C 83%	09/05/2017				DRILL M	IETHOI	D Mu	I Rotary	_,,	НАММЕ	R TYPE	Automatic
DRIL	LER S	FRICKI	AND.	<u></u> тј	s		E 04/27/1	8	COMP	. DA1	FE 05/0	07/18		SURFACE	WATER DEP	TH N/A	4	
ELEV	DRIVE	DEPTH	BLC	w co			BLOWS	PER FOOT	-		SAMP.	V/	1 - 1				•	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	мо	0 G	ELEV. (ft)	SOIL AND ROO	CK DESC	CRIPTION	DEPTH (ft)
45																		
	-	-												-				
	40.0	-						1						- 41.6				0.0
40	40.0 -	- 20	2	4	3	- • 7	+ • • • •		+			м		- — Т	AN AND BLACK		(A-3) WITH	4
		- 2.9	WOH	2	1	\bullet_3								- 				4.5
35		- 4.9	WOH	woн	wон							Sat.			BLACK, SAM	NDY SIL	Г (А-4)	
	33.7 -	- 7.9		6	8	· · · · ·							0000		COAST		<u>N</u> — — — —	<u></u>
	-	-				14						Sat.	0000		FORN	ATION)		=
30	-	-								· ·					GRAY, SAN		(A-4) —	
		- 12.9	WOH	WOH	wон	ϕ_0					SS-83	26%		-				
25	-	-												- <u>25.6</u>			ᇞᅑᅎᅜ	<u> 16.0</u>
		- - 17.9	WOH		WOH							1.000		- G	RAY AND BLUE (A	-GRAY, -7-6)	SILTYCLA	ι¥
	-	-				•0 ⁻ · · · ·					SS-88	42%		-				01.0
20	-	-						+ • • • •							BLUE-GRAY, S		LAY (A-6)	21.0
	- 18.7 -	- <u>22.9</u> -	wон	woн	woн					::	SS-84	40%		-				
15	-	-												-				
10	13.7 -	- - 27.9												-				
	-	-				•2 · · · ·				::		Sat.		-				
10	-	-												<u> </u>	GRAY, SAN		(A-4) — —	<u>31.0</u>
	8.7 -	- <u>32.9</u> -	woн	woн	wон						SS-36	38%		-				
5	-	-								::]		- <u>5.6</u>		<u></u>		<u>36.0</u>
Ŭ	3.7 -	- 37.9							· · ·					-	GRAY, SAN	DY CLA	Y (A-6)	
	-	-				•0					SS-89	27%		-				
0	-	-											0000	<u> </u>	WHITE, SAND	(A-3) W	TRACE	<u> </u>
2	-1.3 -	- 42.9 -	4	8	73							Sat.	0000	-	LIMESTONE	FRAGN	MENTS	
-5	-	-											0000	-				
	-6.3 -	- - 47.9	25	24	66/0.2								0000					48.4
3	-	-	25	34	00/0.2				. 100	D/0.7			FT		Dastal Plain S Vhite, Hard, S	SANDY L	ITARY ROO	CK
-10	-	-						· <u></u>					0000	<u>9.4</u>	COAST		<u>N</u> — — — —	<u>51.0</u>
	-11.4 -	- <u>53.0</u> -	58	34	23							Sat.	0000	-	WHITE, SAND	e (A-3) w E FRAGN	//LILLE //ENTS	
-15	-	-											0000	-				
	-16.4 -	- - 58.0							1				0000	-				
	-	-	10	15	16		3 1					Sat.	0000	-				
	-	-				· · · ·	- 1		· · · ·				0000	-				
		- 63.0 -	10	13	23		• • • • • • • • • • • • • • • • • • •			::		Sat.	0000	-				
_25		-					:]:::			::			0000	-				
		- 68.3					$ \cdot \cdot \cdot$			<u> </u>			0000					68.3
		-	100/0.3						<u> </u>	0/0.3 [●]	1				DASTAL PLAIN S	SANDY I	MESTONF	CK68.6
	-	-												Bo	ring Terminated	at Eleva	tion -27.0 ft	ÎN Î
	-	-												-				
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SOIL TEST DESILTS

SULL LEST RESULTS															
SAMPLE	OFFICER		DEPTH	AASHTO		זת		% BY W	EIGHT		% PAS	SSING (S.	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.		C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-86	36 FT RT	38 + 67	4.8'-6.3'	A-6	29	11	0	54	21	25	100	100	71	32	_
SS-77	36 FT RT	38 + 67	7.8'-9.3'	A-6	39	27	20	25	14	41	100	94	58	33	-
ST-10	36 FT RT	38+70	12.0'–14.0'	A-7-6	70	55	1	12	44	43	100	100	87	42	-
SS-78	36 FT RT	38+67	17.8'–19.3'	A-6	34	17	17	45	19	19	100	89	43	49	-
SS-79	36 FT RT	38 + 67	27.8'-29.3'	A-6	31	16	13	39	31	17	100	90	61	38	-
ST-16	33 FT LT	38+91	13.0'–15.0'	A-6	38	26	15	36	17	31	100	96	49	36	- I
SS-34	33 FT LT	38 + 94	8.0'-9.5'	A-2-4	NP	NP	58	25	7	10	81	68	15	68	-
SS-74	33 FT LT	38 + 94	13.0'–14.5'	A-7-6	46	30	7	11	42	40	100	96	84	37	-
SS-85	33 FT LT	38 + 94	18.0'–19.5'	A-7-6	84	68	31	36	13	20	100	86	38	31	-
SS-75	33 FT LT	38 + 94	23.0'-24.5'	A-4	27	6	2	68	19	11	100	99	48	30	-
SS-76	33 FT LT	38 + 94	33.0'–34.5'	A-6	31	14	31	41	14	14	98	83	36	33	-
SS-33	36 FT RT	39 + 63	12.8'-14.3'	A-7-6	42	13	7	27	35	31	100	99	69	31	-
SS-32	32 FT LT	39+72	23.3'-24.8'	A-4	24	4	5	66	4	25	100	98	38	27	-
SS-83	37 FT RT	40 + 67	12.9'–14.4'	A-4	24	9	22	39	15	24	100	94	56	26	-
SS-88	37 FT RT	40 + 67	17.9'–19.4'	A-7-6	48	37	15	26	13	46	100	98	60	42	-
SS-84	37 FT RT	40 + 67	22.9'-24.4'	A-6	29	15	20	49	17	14	100	90	36	40	<u> </u>
SS-36	37 FT RT	40 + 67	32.9'-34.4'	A-4	21	3	2	26	42	30	100	99	81	38	–
SS-89	37 FT RT	40+67	37.9'–39.4'	A-6	30	17	36	34	11	19	99	87	36	27	-
SS-80	37 FT LT	41+12	8.0'-9.5'	A-4	27	10	1	52	22	25	100	100	76	33	-
SS-87	37 FT LT	41+12	13.0'–14.5'	A-7-6	108	93	8	23	15	64	100	98	72	30	-
SS-81	$3\overline{7} \ FT \ LT$	41+12	18.0'-19.5'	A-2-4	23	NP	20	61	6	13	100	92	20	33	
SS-35	37 FT LT	41+12	23.0'-24.5'	A-2-4	27	8	8	65	1	26	99	96	32	30	-
SS-82	37 FT LT	41+12	33.0'-34.5'	A-6	26	12	26	42	17	15	100	90	40	33	-

PROJECT REFERENCE NO.

R-3300B

1	3



-Y30-,LOOKING DOWNSTATION FROM STATION 41+50

LOOKING AT BRIDGE NO.257 BENT I FROM RIGHT OF -Y30- CENTERLINE

PROJECT REFERENCE NO.

R-3300B

SHEET NO.

14

3300B

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REFERENCE

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DESCRIPTIO	V
TITLE SHEET	
LEGEND	
SITE PLAN	
PROFILES	
CROSS SECTIONS	
BORE LOGS	
SITE PHOTOGRAPHS	

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION BRIDGES NO. 258 & 259 ON -LI-(HAMPSTEAD BYPASS) OVER -Y38- (HOLIDAY DR.) BETWEEN US 17 BUS. AND NC 210 /SR 1002 (ISLAND CREEK RD.)

4023 PROIEC

STATE PROJECT REFERENCE NO. STATE NO. N.C **R-3300B** 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 ENCINEERING UNIT AT (1991 707-686). THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJERACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS NCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

SHEETS

11

MID-ATLANTIC

CROCKETT, S.C.

LANE, R.W.

INVESTIGATED BY ______.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE DECEMBER 2019



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD VIELD 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	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	RUCK LINE INDICATES THE LEVEL AT WHICH NUN-CUASIAL PLAIN MATERIAL WUULD YTELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPT IT SPOND SAMPLER FOLIAL TO DR LESS THAN AT FONT PER 60	ADUIFER - A WATER REARING FORMATION OR STRATA
IS BASED ON THE ASHIDDERD FEREIRETION TEST (HESTIGHTED) 200, HSTM DISON, SUIT CLESSIFICATION	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	ADENACEOUS ADDUTED TO DOCKS THAT HAVE DEEN DEDIVED EDOM SAND OD THAT CONTAIN SAND
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENALEUUS - APPLIED IU RUCKS THAT HAVE BEEN DERIVED FRUM SAND OR THAT CUNTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	RUCK MATERIALS ARE TYPICALLY DIVIDED AS FULLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERT STIFF, GRAF, SILT CLAF, MOIST WITH INTERGEDUED FINE SAND LATERS, HIGHLT FLASTIC, A-T-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NUTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SOCH 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		CRYSTALLINE JI JI FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH II IS ENCOUNTERED, BUT WHICH DUES NUT NECESSARILY RISE TO UR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS UUGARIZ, FELDSPAR, MICA, LALL, KAULIN, ETC.	ROCK (CR) THE WOULD YIELD SPI REPUSAL IF LESTED, RUCK TYPE INCLUDES GRANITE,	
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	HRE USED IN DESCRIPTIONS WHEN THEIT HRE CONSIDERED OF SIGNIFICHNCE.	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SUILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBUNATE.
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	COMPRESSIBILITY	NUN-CHYSIALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL BORRESSES	SLIGHTLY COMPRESSIBLE LL < 31	ROCK WEIGHT	OF SLOPE.
	A MUDERATELY CUMPRESSIBLE LL = 31 - 50 H HIGHLY COMPRESSIBLE LL > 50	CUASIAL PLAIN CUASIAL PLAIN SEUMENIS LEMENIED INIU RUCK, BUI MAY NUI YILLU	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
Z PASSING SILT-		(CP) SHELL BOS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX URANULAR MULEA MULEA MULEA		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAI SOUIS SOUS OTHER MATERIAI		ROCKS OR CUTS MASSIVE ROCK.
MATERIA:	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALS BROM, FEW SOLATS HAT SHOW SELENT STRIMMO, NOCK NINGS UNDER	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%	VERY STICHT DOCY CENERALLY ERECH TOINTS STAINED SOME TOINTS MAY SHOW THIN CLAY CONTINGS TO OPEN	HORIZONTAL.
LL - 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	(V SLI) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER	SLIGHT BOCK GENERALLY FRESH, JOINTS STAINED AND DISCOLOBATION EXTENDS INTO BOCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STORE EDACE ORGANIC SUILS		(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 GRAVELAND FINE 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 GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
	∇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 EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		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.
	1 UUU SPRING OR SEEP	WITH FRESH HULK.	
		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FIELD.
CUNSISTENCT OR DENSENESS	MISCELLANEOUS STABOLS	SEVERE AND DISCULURED AND A MAJURITY SHUW KAULINIZATIUN, MUCK SHUWS SEVERE LUSS OF STRENUTH	TOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED
PRIMARY COLL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		IF CENTED EVENTIED SPT REFUSAL	
CONSISTENCY FENERATION RESISTENCE CONFICESIVE STRENGTH	WITH SOIL DESCRIPTION OF ROCK STRUCTURES		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
		(SEV.) REDUCED IN STRENGTH TO STRONG SOLL IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED	
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BUDY OF SULL OF ROLK THAT THINS OUT IN ONE OF MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A		<u>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</u>	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 < 0.25	I INFERRED SOIL BOUNDARY -()- CORE BORING • SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE OMNITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 10 15 1 10 2 (COMESTIE) VERY STIFE 15 10 20 2 10 4		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 SPIN-VALUE	ALSU AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	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		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
DOW DED CODDUE CRAVEL COARSE FINE SUIT SLAV	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BDR) (CDR) (GR) SAND SAND (CL)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE, SD.) (F SD.) (CSE, 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 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	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
SOU MOISTURE - CORRELATION OF TERMS	1 CL CLAY MOD MODERATELY / - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITT H Z INUT UUTSIDE DIAMETER SPLIT SPUUN SAMPLER, SPT MEFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
	$\frac{1}{1} CSE = COARSE OPC = OPCANIC - ORY UNIT WEIGHT = 0 OPCANIC$	FUINT UF A GEULUGIST'S MICK.	10 ON LESS HIMT BUT TOUT TEN OF DEUTS.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SUFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATH CURE RECOVERT (SREL) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM UTINS TO SEVENAL INCHES IN SIZE BY MUDEMATE BLOWS OF A MICK MUINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE	
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON		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	VERT CHIN DE CHIVED WITH KNIFE, CHIN DE EXCHVITED REHULLT WITH FUNNT OF FILK, FILLES I 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 TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL P		
(PD) DI ACTIC LINIT			BENCH MARK: BM-25 - RR SPIKE SET IN POWER POLE ON HOLIDAY DR.
		IERM SPALING IERM IHLENES	BY4 STA. 19+44, 27' RT, N: 232087 E: 2382638
ON OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EUUIPMENI USEU UN SUBJELI PRUJELI	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FFFT	ELEVATION: 34.91 FEET
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTEC
	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NUTES:
- DRY - (D) REQUIRES ADUITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
		IHINLY LAMINATED < 0.008 FEET	
PLASTICITY] 8' HOLLOW AUGERS [_]-В /	INDUKATION	
	CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
		RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 215/6 " STEEL TEETH HIT WAS WAST	MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		CONING ADE DIECTORET TO CEDADATE WITH STEEL PROPE	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT		
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
		SHULLE DUCHYS HURUSS ONHINS.	DAIL: 8-13-14

PROJECT REFERENCE NO. R-3300B



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FEET R-3300B 5 WE = 5 BRIDGE NO.259 ON -LL- (HAMPSTEAD BYPASS) OVER -Y38- (HOLIDAY DR.) TAN. AND BLACK, MOIST. TO SAT, V. LOOSE TO LOOSE. SILTY SAND AND 0(A=2-4, A=3) WITH TRACE ORGANICS SAT, V. SOFT. TO SOFT, SANDY SILT AND SANDY SILTY CLAY (A-4, A-7) TRACE ORGANICS TO SOFT, SANDY AND SILTY CLAY (A-6, A-7-6) WITH LITTLE SAND FORMATION) S.SAT, LOOSE TO V. DENSE, SILTY SAND AND SAND (A-1-b, A-2-4, A-3) FRAGS. OCK: GRAY AND WHITE, HARD, SANDY LIMESTONE	NO.
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GROUNDLINE PROFILE DRAWN ALONG CENTERLINE OF STRUCTURE. GENERATED FROM FILES PROVIDED BY STANTEC DATED JUNE, 2018.	30
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE. END BENT 1 BRIDGE SKEW: 88°46'51" END BENT 2 BRIDGE SKEW: 89°48'43" * ARTESIAN	40

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GEOTECHNICAL BORING REPORT PODEIOC

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SITE	DESCR	IPTION	BR		IO. 258	ON -L1- (I	HAMPSTE	AD BYPAS	S) OVER -Y	38- (HO	LIDAY	DR.)				GROUNE	WTR (ft)
BOR	NG NO.	S14_	EB1-A	LL	S	TATION 6	58+05		OFFSET 4	41 ft LT			ALIGNME	NT -L1-		0 HR.	N/A
COLI	AR EL	EV. 25	5.5 ft		т	OTAL DEP	TH 49.4 f	t	NORTHING	232,9	07		EASTING	2,382,603		24 HR.	FIAD
DRILL	RIG/HAM	IMER EF	F./DAT	E MIC	03964 CI	ME-45C 83%	09/05/2017			DRILL N	ETHO) Mu	d Rotary		НАММ	ER TYPE	Automatic
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=I FV	DRIVE	DEPTH	BLO	ow cc	UNT		BLOWS	PER FOOT	-	SAMP.	▼/	1 L					
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		T 1.0	WO⊦	IWOH	woн	•0					w		G		CK, SAND	OY CLAY (A	-6)
	22.0	3.5	WOF	 I WOH	1						\A/	N	-22.5			ANICS	<u></u>
20	19.5 -	6.0				∏ <mark>₹</mark>					~~	N	-	GRAY, SAND	Y SILTY (CLAY (A-7)	
	47.0	‡	1	2	6	9 8					W		18.5 17.5	GRAY, SIL	TY SAND	(A-2-4)	7.0
45		- 8.5	WOF	woн	woн	√					w						
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	12.0	13.5															
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	-	Ŧ				$\left \begin{array}{c} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{array} \right $							<u>9.5</u> G	RAY, SILTY SA	ND (A-2-	4) W/ SHEL	<u>16</u> .
	7.0	18.5	2	2	2							-		FRA	GMENTS	3	
5	· 	1	2			• 4 · · ·				SS-37	30%		-4.5				21.
		t					<u>+</u>	<u> </u>					<u> </u>	CRAY HARD	SEDIME	NTARY ROO	ск — —
	2.0	23.5	100/0.	2					100/0.2			E		GIVAT, HAND,			
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	-13.0	38.5	22	31	33			· · · ·				-		GRAY, SILT	(SAND (JN A-2-4) W/	
15		1	~~~					• • • • • 64			vv		-	LIMÉSTON	IE FRAG	MENÍS	
		t						/····									
	-18.0	43.5	8	18	14		. . / .				w	Ŀ					
-20	-	+						+ · · · ·	+ • • • • •			-	-				
	-23.0												- <u>-22.0</u> — <u>c</u>		SEDIME		с к — <u>47.</u>
		- 10.0	13	87/0.4	<u> </u>				100/0.9	,		╞╍╧Ӻ	-23.9	GRAY, HARD,		IMESTONE	49.4
	-	Ŧ										I F	- DU	CPSR: SAN	IDY LIME	STONE	IN
		Ŧ											ST	-11 pushed at 9	0.0'-11.0'	in offset bor	ing
		Ŧ											-	located at -L1-	Sta. 658-	+08, 41' LT.	
		ŧ												ARTESIAI ENCOUNT	N CONDI	TIONS ' HEAD	
		‡											04	or Sompless			
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WBS	40237	.1.1			т	IP	R-3300)B		co	UNTY	PEN	DER				GEOLO	GIST Lane, R.	w.		
SITE	DESCR	PTION	BRI	DGE N	10.258	3 ON	I -L1- (HAN	1PSTE	AD B`	YPAS	S) OV	ER -Y	′38- (HO	LIDA`	Y DR	.)			GROUN	ND WTR (ft)
BOR	NG NO.	S14	EB2-A	LL	s	TAT	ION (359+	09			OFFS	ET -	42 ft LT			ALIGNM	ENT -L1-		0 HR.	N/A
COLI	LAR ELE	EV . 25	5 1 ft		Т	ΟΤΑ		тн	58.91	t		NORT	HING	232.9	07		EASTIN	G 2 382 706		24 HR.	FIAD
	RIG/HAN			F MI	13964 0	ME_/	150 830	. 00/0	5/2017	-						א חו	lud Rotary		НАММ		Automatic
						TAC			DE /4 4 /*	10		COM			1 = /10						Automatio
DRIL									10/14/			COW	DA			<u> </u>		E WATER DE		A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0		25	10003	50	-001	75	100	NO.	мо	0 0 G	ELEV. (ft)	SOIL AND RC	CK DES	CRIPTION	l DEPTH (f
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25	-															000	- - - 25.1				0
		- 1.0	1	1	1	1 6	••••	: :	· · ·		· · ·				Sat.	000		BLACK	SAND (A-3)	
	22.0	3.1	WOH	woн	2	┤╏	· · · ·	: :		1		1 : :	· · ·		Sat.	~	BL	ACK, CLAYEY S	AND (A-	2-7) W/ TF	RACE
20	20.0	5.1	2	3	3	łĒ		+		+ :		+ : :	• •		Sat		<u>20.1</u> ~ -		GANICS	<u> </u>	
	170	81						. .							ou.		<u>18.1</u>			<u> </u>	7
15		- 0.1	WOH	Т	WOH	1 ↓ ∕	· · · ·	: :	· · · ·	.	· · ·		•••		Sat.		Ŧ	GRAY, SILTY CI	_AY (A-7	-6) (CAST	LE
	-	F						. .		1.		1					↓		0100/01		
	12.0	13.1	WOH				• • • •		· · ·		· · ·										
10	-	t F			WC WC	h∳∳0	· · ·	· ·		·	· · ·	· ·	•••		Sat.						16
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_	7.0	18.1	3	2	3		5	. .	· · ·		· · ·		· · ·	SS-38	28%			LIMESTON	EFRAG	MENTS	
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	20	23.1								-+-		+				ŏŏč	<u>5 3.1</u> — — 7	COASTAL PLAIN	SEDIME	NTARY	<u>оск</u> — ²²
0	- 2.0	- 20.1	60/0.1					: :		:		1:1	60/0 ⁻ 1				<u> </u>	WHITE, HARD,	SANDY	LIMESTON	NE
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	-8.0	33.1	100/0.3	3				. .					00/0 3			<u>ل</u> ل	-				
-10	-	F]			· · ·	· .									<u>-9.9</u>			<u> </u>	<u> </u>
	-							: j :		:		1::	::			000	- -	WHITE	, SAND (A-3)	
45	-13.0	38.1	14	12	14	11	• • • •		· · · 3 · · ·		· · · · · ·	· ·	· · · ·		Sat.	000	°-				
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	-23.0	48.1	30	15	16			. .				: :	::			000	- -	WHITE	, SAND (A-3)	
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	-33.0	58 1					• • • • •	. .		:						000	-32.9				58.
	-55.0 -	- 50.1	55	45/0.3	<u> </u>	$\downarrow \downarrow$	•••			- – –		<u>+-</u>	00/0.8	• — —		<u> </u>	$\frac{1}{33.8}$	COASTAL PLAIN			
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	-	t.		1													<u> </u>		I CONDI ERED 7	TIONS	
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GEOTECHNICAL BORING REPORT

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GEOTECHNICAL BORING REPORT BORF I OG

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WBS	40237	.1.1			וד	IP R-3300E	3	COUNTY	PENDER				GEOLOGIST Lane, R.W.	
SITE	DESCR	PTION	BRID	DGE N	0. 259) ON -L1- (H	AMPSTEA	D BYPAS	S) OVER -Y	′38- (HO	LIDAY	DR.)	•	GROUND WTR (ft)
		015								44 H DT		,		
JURI	NG NO.	515_		RL	- 3		00+24		UFF3EI 4	44 IL K I				
COLL	AR ELE	V. 28	.1 ft		т	OTAL DEPT	H 68.1 ft		NORTHING	232,8	22		EASTING 2,382,620	24 HR. FIAD
DRILL	RIG/HAM	MER EF	F./DATI	E MID	3964 CI	ME-45C 83% C	9/05/2017			DRILL N	IETHOD) Muo	d Rotary HAM	MER TYPE Automatic
DRILI	LER S	TRICKI	AND.	тJ	S	TART DATE	05/15/18	3	COMP. DA	TE 05/*	18/18		SURFACE WATER DEPTH	N/A
	DRIVE	DEDTU	BIC				BLOWSP			SAMP		1 L T		
.LEV (ft)	ELEV	DEPTH (ft)	0.5ft	0.5#	0.5#		5 5	0	75 100	NO		0	SOIL AND ROCK DE	SCRIPTION
	(π)	()	0.51	0.51	0.51			Ŭ		NO.		G	ELEV. (ft)	DEPTH (ft)
30													_	
	-	-											28.1 GROUND SUF	RFACE 0.0
	27.1	1.0										0000	UNDIVIDED COAS	TAL PLAIN
25	25 1 -	30	4	4	5	· • • 9 · ·					М		GRAY AND TAN, S	SAND (A-3)
			WOH	2	2	4 · · ·					Sat.	<u> </u>	GRAY SANDY SILTY	3.8 CLAY (A-7) W/
ł		5.0	wон	WOH	1						Sat.	N	TRACE ORGA	ANICS
, n	20.1	• • •												-7.0
1		- 0.0	1	1	1					SS-39	43%			
	-	-										-	17.1	11.0
5	-											\square		
ر ا	15.1	<u></u>	wон	1	2	3			+		Sat.	N	CASTLE HAYNE FC	-1-0) W/ SAND DRMATION)
	-	-									40%	N	Υ.	,
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<u>'</u>	10.1	_ 18.0	1	1	1		· · · · ·		+ · · · · · · · · · · · · · · · · · · ·	SS-61	37%		_ GRAY, SANDY CI	_AY (A-6)
	-	-								00-01	07 /0			
	-	-											_6.1	22.0
	5.1	23.0	4	6	4						0-1	****	GRAY, SAND	(A-3)
	-	-			-			· · · ·			Sat.			
	-	-				.							1.1	27.0
<u> </u>	0.1	28.0		40					<u> </u>				COASTAL PLAIN SEDIM	ENTARY ROCK
	-	-	20	43	51				• • • • • 94		Sat.	E-	WHITE, HARD, SAND	Y LIMESTONE
	-	-										╞╧╋	2.0	22.0
;	-4.9	33.0							+			000		AND (A-1-b)
	-	F	21	17	18		- 🗯 35 -				Sat.		_	
	-	[·/···					000-		
)	-99-	38.0					/						GRAY AND WHITE, S	AND (A-3) W/ FRAGMENTS
		-	34	13	10		23				Sat.			
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5	_1/ 0	430												
-	-14.9_	- 43.0	16	22	23	1	· · · ••4!	· · · · · · · · · · · · · · · · · · ·	<u> </u>		Sat.		-	
	-	F					· · · •							
	-						::::							
4	-19.9	<u>48.0</u>	100/0.5					· · · · ·	. 100/0.5			ĒŦ	WHITE, HARD, SAND	LIMESTONE
	-	F										╞╪Ӻ	-22.9	51.0
<u> </u>	-	È							† -				COASTAL PL	
:5	-24.9	53.0	18	9	8	<u> i</u>			+ • • • •		Sat	0000	_ GRAY AND WHITE, S	AND (A-3) W/ FRAGMENTS
	-	[_		-	· · • • • 17 · · · •					Jai.			
	-	L				$: : \cdot $			• • • •					
ון	-29.9	58.0	10	10	12	<i>i</i>			+		S-4		-	
	-	t			'2	· · · ↓ ↓	22 • • • •				Sat.			
	-	F											-33.9	62 0
5	-34.9	63.0	20	5 7	12/0 0							Ë	COASTAL PLAIN SEDIM	
	-	Ł	30	⁵	43/0.2	• • • •			100/0.7			╞╤┲╋	GRAY, HARD, SANDY	LIMESTONE
	-	F										БЦ		
)	-39.9	68.0	00/5					· · · ·	· · · · ·				40.0	68.1
1	-	-	60/0.1						60/0.1			F	Boring Terminated at Ele	vation -40.0 ft IN
	-	t –											UFOR. JANUY LIN	
	-	_								1		-	ST-12 pushed at 13.0'-15.	0' in offset boring 8+27_44' RT
	-	F										F		
	-	È .										[JITIONS 4 2' HEAD
	-	F									1	ΙĒ	LINCOUNT LIKED.	

WBS	WBS 40237.1.1					P R-33	300B		COUNT	COUNTY PENDER GEOLOGIST Lane, R.W.									
SITE	DESCR	PTION	BRID	GE N	0. 259	ON -L1	- (HAN	IPSTE/	AD BYPA	SS) OV	ER -Y3	8- (HO	LIDAY	DR.	.)			GROUM	ND WTR (ft)
BOR	NG NO.	S15	EB1-B	RL	S		658+	+24		OFFS	SET 4	4 ft RT			ALIGN	MENT -L1-		0 HR.	N/A
COL	LAR ELE	V. 28	3.1 ft		т	DTAL D	EPTH	68.1 f	ť	NOR	THING	232,82	22		EAST	NG 2,382,620		24 HR.	FIAD
DRILL	. RIG/HAN	MER EF	F./DATE	E MID	3964 CI	ME-45C 8	3% 09/0	05/2017		1		DRILL M	ETHOD	ОМ	ud Rotary		НАММ	LER TYPE	Automatic
DRIL	LER S	TRICKL	AND,	TJ	s	FART D	ATE	05/15/1	18	сом	P. DAT	E 05/*	18/18		SURFA	ACE WATER DEF	- •ΤΗ Ν//	Ą	
ELEV	DRIVE	DEPTH	BLO	W CO	UNT		E	BLOWS	PER FOO	T		SAMP.	▼/						1
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25		50	75 I	100	NO.	моі	G	ELEV. (ft)	SOIL AND RO	CR DES		DEPTH (ff
<u>50</u> _				L				_ Mate	ch Line										
	-	-													- ! -	<u>Other Samples:</u> ST-12 (13.0 - 15.	0)		
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GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

MIRS 2027/1.1 TP P. R.3300 COUNTY PENDER EECOCIST Long, R.V. BRING NO. S15_EB2-8 PL STATION 686-92 OFFSET 361 RT ALKINNENT_1.1: 0 HR NA BORNG NO. S15_EB2-8 PL STATION 686-92 OFFSET 361 RT ALKINNENT_1.1: 0 HR NA BOLL REV 23.1 TOTAL DEPTH 4.3.8 NORTHING 22.020 EASTING 2.302.680 24 HR FLAM BULL REV 23.1 TOTAL DEPTH 5.3 NORTHING 22.020 EASTING 2.302.680 24 HR FLAM BULL REV 23.1 TOTAL DEPTH 5.3 NORTHING 22.020 EASTING 2.302.680 24 HR FLAM BULL REV BULW REV MARRENT 4.11 CALKADD MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.11 MARRENT 4.1		BORE LOG																	
STE DESCRIPTION BRICK COUND VTR (N) COLLAR ELEV Constraints GROUND VTR (N) COLLAR ELEV GROUND VTR (N) COLLAR ELEV GROUND VTR (N) COLLAR ELEV GROUND VTR (N) COLLAR ELEV Constraints GROUND VTR (N) COLLAR ELEV Constraints GROUND VTR (N) COLLAR ELEV Constraints Constra	WBS	40237	.1.1			Т	P F	R-3300E	3	COUNT	Y PENDE	R				GEOLOGIST Lane, R.V	Ν.		
BORRMON, 315_ERG-RL, STATUCH, 650-92 OFFSET 36 [I NT LUBAMENT 1_1- O FR. NAME DORLAR DELY, S23 /I TOTAL DEPTH 53.11 NORTHON 232.020 EASTING 2.32.0203 24.4 FRAD DORLARDELY, S23 /I TOTAL DEPTH 53.11 COMP. 022.020 EASTING 2.32.0203 24.4 FRAD DORLARDELY, STRUCAND, TJ STATUCH C.52.05.0005007 ORL. METHOD MAMERTYPE, AUKnow. SURFACE WATER DEPTH IN A 20 10 10 10 BURGACE WATER DEPTH IN A SURFACE WATER DEPTH IN A 20 23 10 0 29 0 79 00 SMP 100 0 Lev.m. SURACE WATER DEPTH IN A 20 23 10 0 29 0 79 00 SMP 100 0 Lev.m. SURACE WATER DEPTH IN A 20 23 10 0 29 0 79 00 SMP 100 0 Lev.m. SURACE WATER DEPTH IN A 24 24.0 10 10 10 10 10	SITE	DESCR	PTION	BRII	DGE N	0.259	ON	-L1- (⊦	IAMPSTE/	D BYPA	SS) OVER	-Y38-	(HOI	LIDAY	DR.))		GROUN	ID WTR (ft)
COLLAR ELEV 25.3 rt TOTAL DEPTH 54.3 rt NORTHING 22.82/3 EASTING 2.828/38 24.98 rt FIAD DRULE ROTANDER EFFANTE MUDBAGE	BOR	NG NO.	S15_	EB2-B	RL	S	ΤΑΤ	ON 65	58+92		OFFSET	36 ft	RT			ALIGNMENT -L1-		0 HR.	N/A
DBLL BAUMANNER FF, DATE MUIDEAL CHI-SC SUBJECT DRL BAT Stand Chi-SC SUBJECT DRL BAT Stand Chi-SC SUBJECT MAINTER CPE Automatic DRL LEG STROCLAND, T.J. START DATE 05/10/18 COMP, DATE 05/11/18 SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL LEG STROCLAND, T.J. START DATE 05/10/18 COMP, DATE 05/11/18 SUBPACE WATER DEPTH. N/A DRL LEG STROCLAND, T.J. START DATE 05/10/18 RAWP, MORAN SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. START DATE 05/10/18 RAWP, MORAN SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. START DATE 05/10/18 SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. START DATE 05/10/17 RAWP, WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.J. SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A SUBPACE WATER DEPTH. N/A DRL STROCLAND, T.S. WOT WOT WOT WATER DEPHINE SUBPACE WATER DEPHINE	COLI	LAR ELE	EV. 25	5.3 ft		Т	OTA	L DEPT	H 54.3 ft		NORTHIN	IG 23	32,82	29		EASTING 2,382,689		24 HR.	FIAD
DPRLIES STRACT DATE 05/11/16 COMP. DATE OF/11/16 SURFACE WATER DEPTH NA 26 0	DRILL	. RIG/HAN	IMER EF	F./DAT	e Mic	3964 Cl	ME-4	5C 83% (09/05/2017		1	DR	ILL M	ETHOD) Mu	ld Rotary	HAMM	ER TYPE	Automatic
ILLY Depring ILLOW COUNT ILLOWS PERFOOT SAMP V. SOL AND ROCK DESCRIPTION DEPTH IN NO. SOL AND ROCK DESCRIPTION DEPTH IN DEPTH IN NO. SOL AND ROCK DESCRIPTION DEPTH IN DEPTH I	DRIL	LER S	TRICKL	AND,	ТJ	S	TAR	T DATE	05/10/1	8	COMP. D	ATE	05/1	1/18		SURFACE WATER DEF	ΤΗ Ν/.	A	
(ii) (iii) (iiii) <th< td=""><td>ELEV</td><td>DRIVE</td><td>DEPTH</td><td>BLC</td><td>ow co</td><td>UNT</td><td></td><td></td><td>BLOWS</td><td>PER FOO</td><td>Т</td><td>SA</td><td>AMP.</td><td>▼/</td><td>L</td><td></td><td></td><td></td><td>1</td></th<>	ELEV	DRIVE	DEPTH	BLC	ow co	UNT			BLOWS	PER FOO	Т	SA	AMP.	▼/	L				1
30 20 24 10 WORI WORI 2 24 10 <td>(ft)</td> <td>(ft)</td> <td>(ft)</td> <td>0.5ft</td> <td>0.5ft</td> <td>0.5ft</td> <td>0</td> <td>2</td> <td>25</td> <td>50</td> <td>75 10</td> <td>0 1</td> <td>10.</td> <td>мог</td> <td>G</td> <td>ELEV. (ft)</td> <td>CK DES</td> <td></td> <td>DEPTH (ft</td>	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	25	50	75 10	0 1	10.	мог	G	ELEV. (ft)	CK DES		DEPTH (ft
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-Y38-,LOOKING DOWNSTATION FROM STATION 23+00

LOOKING AT SI5_EB2-B RL FROM RIGHT OF -LI- CENTERLINE



PROJECT REFERENCE NO.

SHEET NO.

3300B

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REFERENCE

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DESCRIPTION
TITLE SHEET
LEGEND
SITE PLAN
PROFILE
CROSS SECTIONS
BORE LOGS
SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION STRUCTURE #16 - BRIDGE ON -Y31- (HOOVER RD) OVER -L- (HAMPSTEAD **BYPASS**) AT -Y31- STA. 30+17.11

4023 PROIEC

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 RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICL ENCINEERING UNIT AT (1991 707-686). THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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- 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

MID-ATLANTIC CROCKETT, S.C.

INVESTIGATED BY ______CROCKETT, S.C.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE DECEMBER 2019



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		SOIL	DESCRIP	TION				GRADATION			ROCK (DESCRIPTION
SOIL IS C	CONSIDERED UN	NCONSOLIDATED, SEMI-C	ONSOLIDATED.	OR WEATHERED	EARTH MATERIALS T	HAT CAN	WELL GRADED - INDICAT	TES A GOOD REPRESENTATION OF PARTIC	CLE SIZES FROM FINE TO COARSE.	HARD ROCK IS ROCK LINE INDI	NON-COASTAL PLAIN MATERIAL THA	AT WOULD YIELD SPT REFUSAL IF TESTE COASTAL PLAIN MATERIAL WOULD YIELD
ACCORDIN	NG TO THE ST	ANDARD PENETRATION	EST (AASHTO	J T 206, ASTM	DI586). SOIL CLASSIF	ICATION	GAP-GRADED - INDICATE	S A MIXTURE OF UNIFORM PARTICLE SI	IZES OF TWO OR MORE SIZES.	SPT REFUSAL I	S PENETRATION BY A SPLIT SPOON	N SAMPLER EQUAL TO OR LESS THAN 0.1
CONSISTEN	NCY, COLOR, TE	XTURE, MOISTURE, AASH	TO CLASSIFIC	ATION, AND OTH	ER PERTINENT FACTO	DRS SUCH		ANGULARITY OF GRAI	NS	REPRESENTED B	Y A ZONE OF WEATHERED ROCK.	
AS V	MINERALOGIC	AL COMPOSITION, ANGUL AND CLAY.MOIST WITH IN	ARITY, STRUC <i>VTERBEDDED </i>	TURE, PLASTICI FINE SAND LAYEF	TY,ETC. FOR EXAMPL	E. S	THE ANGULARIT	Y OR ROUNDNESS OF SOIL GRAINS IS D	ESIGNATED BY THE TERMS:	RUCK MATERIAL		
	SOI	L LEGEND AND	AASHTC	CLASSIF	ICATION		- <u>ANGULAR</u> , <u>SUBAN</u>	IGULAR, SUBROUNDED, OR ROUNDED.	ITION	ROCK (WR)	100 BLOWS PEF	R FOOT IF TESTED.
GENERAL	GRA	ANULAR MATERIALS	SILT-C	LAY MATERIALS	ORGANIC MATE	RIALS	MINERAL NAL	MINERALUGICAL CUMPUS		CRYSTALLINE	FINE TO COARS	E GRAIN IGNEOUS AND METAMORPHIC RO
CPOUR	A-1 A-	-3 A-2	A-4 A	-5 A-6 A-7	0-1 0-2 0-4 0-5		ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIL	DERED OF SIGNIFICANCE.	ROCK (CR)	GNEISS, GABBRO	, SCHIST, ETC.
CLASS. A	i-1-a A-1-b	A-2-4 A-2-5 A-2-6 A	-2-7	A-7-5 A-7-6	A-3 A-6, A-7			COMPRESSIBILITY		NON-CRYSTALLI	NE FINE TO COARS	SE GRAIN METAMORPHIC AND NON-COASTA ROCK THAT WOULD YEILD SPT REFUSAL
SYMBOL 00			8					HTLY COMPRESSIBLE	LL < 31			LUDES PHYLLITE, SLATE, SANDSTONE, ET
% PASSING							HIGHL		LL > 50	SEDIMENTARY R	OCK	ROCK TYPE INCLUDES LIMESTONE, SANDS
*10 50	Ø MX				GRANULAR CLAY	MUCK,		PERCENTAGE OF MATER	RIAL		WEf	ATHERING
*200 15	0 MX 50 MX 51 5 MX 25 MX 10	MX 35 MX 35 MX 35 MX 35	6 MX 36 MN 36	MN 36 MN 36 MN	SOILS	PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH RI	OCK FRESH CRYSTALS BRIGHT FEW J	OINTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL							TRACE OF ORGANIC M	ATTER 2 - 3% 3 - 5%	TRACE 1 - 10%	н	AMMER IF CRYSTALLINE.	
PASSING 40		- 40 MX 41 MN 40 MX 4	MN 40 MX 41	MN 40 MX 41 MN	SOILS WITH		MODERATELY ORGANIC	5 - 10% 12 - 20%	SOME 20 - 35%	VERY SLIGHT R	JCK GENERALLY FRESH, JOINTS STAIN	NED, SOME JOINTS MAY SHOW THIN CLAY C
PI	6 MX N	P 10 MX 10 MX 11 MN 1	MN 10 MX 10	MX 11 MN 11 MN	LITTLE OR MODERATE	HIGHLY	HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE		F A CRYSTALLINE NATURE.	CE SHINE BRIGHTET, NOCK RINGS UNDER H
GROUP INDEX	0 0	0 0 4 MX	8 MX 12	MX 16 MX NO MX	AMOUNTS OF	SOILS		GROUND WATER		SLIGHT R	JCK GENERALLY FRESH, JOINTS STAIN	NED AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES ST	TONE FRAGS. FIN	NE SILTY OR CLAYEY	SILTY	CLAYEY	MATTER		∇	WATER LEVEL IN BORE HOLE IMMEDIA	ATELY AFTER DRILLING	(SLI.) I	RYSTALS ARE DULL AND DISCOLORED	. CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS	SAND SAI	ND GRAVEL AND SAND	SOILS	SOILS			▲	STATIC WATER LEVEL AFTER 24	HOURS	MODERATE SI	IGNIFICANT PORTIONS OF ROCK SHOW	DISCOLORATION AND WEATHERING EFFECT
GEN. RATING	EXC	CELLENT TO GOOD	FA	IR TO POOR	FAIR TO POOR	UNSULTABLE		PERCHED WATER, SATURATED ZONE, OF	R WATER BEARING STRATA	(MOD.) GI	RANITOID ROCKS,MOST FELDSPARS AF	RE DULL AND DISCOLORED,SOME SHOW CLA ND SHOWS SIGNIFICANT LOSS OF STRENGTH
AS SUBGRADE			20. 01.05		POOR			SPRING OR SEEP		Ŵ	ITH FRESH ROCK.	
	PI 0			IFNSENESS	5 > LL - 30		+	MISCELLANEOUS SYMB		MODERATELY A	L ROCK EXCEPT QUARTZ DISCOLORE	D OR STAINED. IN GRANITOID ROCKS, ALL F
			RANGE	OF STANDARD	RANGE OF UN	CONFINED			020	(MOD. SEV.) AI	ND CAN BE EXCAVATED WITH A GEOL	OGIST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SC	DIL TYPE	CONSISTENCY	PENETRAT	ION RESISTENCE	COMPRESSIVE	STRENGTH	L ROADWAY EMB	ANKMENT (RE) 257025 DIP & DIP DIF			TESTED, WOULD YIELD SPT REFUSAL	
		VERY LOOSE		< 4		. ,		SPT		(SEV.) R	EDUCED IN STRENGTH TO STRONG SO	IL. IN GRANITOID ROCKS ALL FELDSPARS A
GENERALI	R	LOOSE		4 TO 10			SUIL SYMBUL		RING VINSTALLATION	TI) SOME EXTENT. SOME FRAGMENTS O	F STRONG ROCK USUALLY REMAIN.
MATERIAL		DENSE	3	0 TO 50	N/A		ARTIFICIAL F	ILL (AF) OTHER AUGER BORING	CONE PENETROMETER	VERY A	LL ROCK EXCEPT QUARTZ DISCOLORE	D OR STAINED. ROCK FABRIC ELEMENTS AF
(NON-CON	ESIVE/	VERY DENSE		> 50				<u> </u>		SEVERE BI	JT MASS IS EFFECTIVELY REDUCED 7	TO SOIL STATUS, WITH ONLY FRAGMENTS OF
GENERAL		VERY SOFT SOFT		< 2 2 TO 4	< 0.2 0.25 TO	5 0.5	INFERRED SOL	L BOUNDARY - CORE BORING	SOUNDING ROD	VI SEV./ VI	ESTIGES OF ORIGINAL ROCK FABRIC /	REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>
SILT-CLA	¥Υ	MEDIUM STIFF		4 TO 8	0.5 TO	1.0	INFERRED ROC	CK LINE MONITORING W	ELL - TEST BORING WITH CORE	COMPLETE R	JCK REDUCED TO SOIL. ROCK FABRIC	NOT DISCERNIBLE, OR DISCERNIBLE ONLY
(COHESIV	E)	VERY STIFF	1	5 TO 30	2 TO	4	ALLUVIAL SOI		SPT N-VALUE	AI	LSO AN EXAMPLE.	MAY BE PRESENT AS DIKES OR STRINGERS
		HARD		> 30	> 4						ROCK	HARDNESS
		TEXTURE	UR GRA	IN SIZE						VERY HARD C	ANNOT BE SCRATCHED BY KNIFE OR	SHARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIE	VE SIZE	4 10 4.76 2.0	40 0 0.42	60 200 0.25 0.07	0 270 5 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	SI	EVERAL HARD BLOWS OF THE GEOLOG	SIST'S PICK.
			COARSE	FIN			SHALLOW	UNCLASSIFIED EXCAVATION -	USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD LI	O DETACH HAND SPECIMEN.	CONLY WITH DIFFICULIY. HARD HAMMER BI
(BLDR.)	(COB	LE GRAVEL	SAND) SAN		(CL.)				MODERATELY C	AN BE SCRATCHED BY KNIFE OR PICK	. GOUGES OR GROOVES TO 0.25 INCHES DE
GRAIN MM	305	75 2	1032.30.	0.25	0.05 0.00	15	AR - AUGER REFUSAL		VST - VANE SHEAR TEST	HARD E	<pre>(CAVATED BY HARD BLOW OF A GEOL Y MODERATE BLOWS.</pre>	OGIST'S PICK, HAND SPECIMENS CAN BE D
SIZE IN.	12	3	5	0.25	0.05 0.00	.5	BT - BORING TERMINATE	D MICA MICACEOUS	WEA WEATHERED	MEDIUM C	AN BE GROOVED OR GOUGED 0.05 INC	HES DEEP BY FIRM PRESSURE OF KNIFE O
	SO	IL MOISTURE -	CORREL	ATION OF	TERMS		- CL CLAY CPT - CONE PENETRATIO	MOD MODERATELY	2 - UNIT WEIGHT 2 DRY UNIT WEIGHT	HARD Ci	AN BE EXCAVATED IN SMALL CHIPS T DINT OF A GEOLOGIST'S PICK.	TO PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL N	MOISTURE SC	ALE FIELD	MOISTURE	GUIDE FOR	FIELD MOISTURE DE	SCRIPTION	CSE COARSE	ORG ORGANIC		SOFT C	AN BE GROVED OR GOUGED READILY	BY KNIFE OR PICK. CAN BE EXCAVATED IN
(ATTE	ERBERG LIMIT	DESC	RIPTION				DMT - DILATOMETER TES DPT - DYNAMIC PENETRA	T PMT - PRESSUREMETER TI	EST <u>SAMPLE ABBREVIATIONS</u> S - BULK	FI	ROM CHIPS TO SEVERAL INCHES IN S	SIZE BY MODERATE BLOWS OF A PICK POIN
		- SATU	RATED -	USUALLY L	IQUID: VERY WET, US	UALLY	e - VOID RATIO	SD SAND, SANDY	SS - SPLIT SPOON	VERY C	AN BE CARVED WITH KNIFE. CAN BE	EXCAVATED READILY WITH POINT OF PICK.
ᄔᆮ		MIT	.,		W THE GROUND WHI	EN THBLE	- FOSS FOSSILIFEROUS	SLI- SLIGHTLY	SI - SHELBY TUBE RS - ROCK	SOFT O	R MORE IN THICKNESS CAN BE BROKE	EN BY FINGER PRESSURE. CAN BE SCRATCH
PLASTIC BANGE <		- WFT	- (W)	SEMISOLID;	REQUIRES DRYING T	0	FRAC FRACTURED, FRAC	TURES TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL			BEDDING
(PI) PL	PLASTIC L			ATTAIN OPT	TIMUM MOISTURE		HI HIGHLY	V - VERY	CBR - CALIFORNIA BEARING RATIO	TERM	SPACING	TERM
		MOIO					EO	UIPMENT USED ON SUBJEC	T PROJECT	VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED
OM _			i - (M)	SULID; AT U	DR NEAR OPTIMUM M	UISTURE	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	WIDE MODERATELY	CLOSE 1 TO 3 FEET	THICKLY BEDDED 1. THINLY BEDDED 0.1
JL _				BEQUIRES (το	CME-45C	CLAY BITS	X AUTOMATIC MANUAL	CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED 0.0
		- DRY	- (D)	ATTAIN OP	IMUM MOISTURE			6 CONTINUOUS FLIGHT AUGER	CORE SIZE:	VENT CLUSE	LESS IMAN 0.10 FEET	THINLY LAMINATED <
	I	PL	ASTICIT	Y				8" HOLLOW AUGERS	□-вн		INC	URATION
		PLAS	TICITY INDE	X (PI)	DRY STREN	IGTH	CME-550X	HARD FACED FINGER BITS		FOR SEDIMENTA	RY ROCKS, INDURATION IS THE HAR	DENING OF MATERIAL BY CEMENTING, HE
NON	PLASTIC		0-5		VERY LO	W		TUNGCARBIDE INSERTS		FRIABLE	RUBBING WI	TH FINGER FREES NUMEROUS GRAINS: OW BY HAMMER DISINTEGRATES SAMPLE
MODE	RATELY PLAS	STIC	16-25		MEDIUM			X CASING W/ ADVANCER		1		N BE SEPARATED FROM SAMPLE WITH ST
HIGH	LY PLASTIC		26 OR MORE	2	HIGH		PORTABLE HOIST	X TRICONE 215/6 " STEEL TEETH		MODERAT	ELY INDURATED BREAKS EA'	SILY WHEN HIT WITH HAMMER.
			COLOR					TRICONE TUNGCARB.	SOUNDING ROD	INDURATE	D GRAINS ARE	DIFFICULT TO SEPARATE WITH STEEL
DESCRIPTI	IONS MAY INC	CLUDE COLOR OR COLO	R COMBINAT	IONS (TAN, RED	, YELLOW-BROWN, BLU	UE-GRAY).		CORE BIT	VANE SHEAR TEST		DIFFICULT	TU BREAK WITH HAMMER.
MOE	MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.								🗍	EXTREME	LY INDURATED SAMPLE BR	MER BLUWS REUUIRED TO BREAK SAMPLE EAKS ACROSS GRAINS.

PROJECT REFERENCE NO. R-3300B



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DATE: 8-15-1-

TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ED. AN INFERRED SPT REFUSAL. 1 FOOT PER 60 IS OFTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. AL PLAIN IF TESTED. MAY NOT YIELD STONE, CEMENTED CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS. $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. $\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE TACHED 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BY53, -BY5- STA. 27+65.67, N: 235623.2 E: 2389187.0 THICKNESS 4 FEET 1.5 - 4 FEET ELEVATION: 47.43 FEET 16 - 1.5 EEET NOTES 3 - 0.16 FEE 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE:



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		(D) COAST AL PLAIN: G	RAY,WET,V.DENS. SEDIMENTARY RO	E,MEDIUM S, CK:GRAY_HAR	AND (A-I-b)V RD.SANDY I IMI	NITH SHELL AN ESTONE (CAST)	D LIMESTONE	FRAGMEN	TS (CASTLE	EHAYNE	FORMATIO	i wi				EB
		COCOAST AL PLAN:L	IGHT AND DARK A-4, A-6, A-7-5, A	GRAY, MOIST -7-6) WITH	TO WET.V.SO SHELL FRAGN	DET TO V.STIE IENTS (CASTLE	F.SANDY SILT HAYNE FORM	AND SANJ ATION)	DY AND SIL	TY CLAY		; ;				EB
		BCOASTAL PLAIN:D	DARK GRAY,WET,V	LOOSE TO I	MED.DENSE.S	SILTY AND CLAY	EY SAND (A-2	-4, A-2-6	, A-2-7) (CA	STLE HAY	NE FORM	AT ION)				PR
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100			<u>ST-2</u> <u>SS-45</u>	39 FT RT 42 FT RT	31+33 $31+33$	28.0 -30.0 28.5'-30.0'	A-4 A-6	39	7 0 14 8	46 53	39 25	15 14	98 100	98 95	53 57	38 38
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			<u>SS-42</u> <u>SS-43</u>	<u>35 FT RT</u> <u>35 FT</u> RT	30+26 30+26	<u>18.5´-20.0´</u> <u>28.5`-3</u> 0.0`	<u>A-2-7</u> <u>A</u> -4	48 .	10 63 3 31	<u>14</u> <u>42</u>	<u>7</u> <u>12</u>	<u>16</u> <u>15</u>	<u>85</u> <u>98</u>	<u>39</u> <u>78</u>	<u>21</u> <u>37</u>	37 36
			<u>SS-41</u>	41 FT RT	29+20	33.5'-35.0'	A-7-6	43 2	23 8	26	32	34	100	94	77	62
			<u>ST-1</u> SS-40	<u>38 FT RT</u> <u>41</u> FT RT	29+20 29+20	<u>20.0´–22.0´</u> <u>23</u> .5`–25.0`	<u>A-7-5</u> <u>A-2-4</u>	23	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u> </u>	28	<u>67</u> 9	100 100	<u>99</u> <u>9</u> 3	96 <u>13</u>	91 31
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INDLINE CROSS SEC	TION ALONG BE A IN ELECTRON	NT LINE DRAWN	
IVED FROM STANTE	C DATED MARCH	1 2018.	
	WITH BOTH		-70
GE SKEW: 76°06'09" A	T BENT #1		
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70							ST-2 SS-45	<u>39 FT RT</u> 42 FT RT	31+33 31+33	28.0'-30.0' 28.5'-30.0'	<u> </u>	$ \begin{array}{c cccccccccccccccccccccccccccccccc$	0 8	<u>46</u> 53	<u>39</u> 25	<u>15</u> 14	98 100	<u>98</u> 95	$\frac{53}{57}$
							SS-46	42 FT RT	31+33	38.5'-40.0'	A-7-6	43 23	13	18	40 :	29 :	100	<u>89</u>	76
.60				A	COAST AL	PLAN:G	RAY,WET,V	DENSE,MEDI	UM SAND (A	-I-b)WITH SHELI	AND LIMEST	ONE FRAG	MENTS (C	ASTLE HA	AYNE FOR	RMATION	<u></u> SS-42]	
				Œ	COAST AL	PLAN S	EDIMENTA	RY ROCK:GRA	Y, HARD, SANL	DY LIMESTONE (C	ASTLE HAYNE	FORMATIC	נאכ				SS-43 SS-44		
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JNDLINE CROSS SEC	TION ALONG BE		
I TOPOGRAPHIC DA IVED FROM STANTE	C DATED MARCH	IC FILES H 2018	
RED STRATIGRAPH	Y IS DRAWN WITH BOTH		-70
ECTED ONTO THE C GE SKEW: 74°54'52'' 4	ROSS SECTION. T END BENT #2		
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GEOTECHNICAL BORING REPORT BORE LOG

WE	3S 40	0237.	1.1			Т	ΊP	R-3300E	3	COUNT	Y PENDER				GEC	DLOGIST Contract G	eologis	st	WBS	40237	7.1.1			TIF	R -330	0B	COUNTY
SIT	E DES	SCRI	PTION	STR	UCTU	RE #1	6 -	BRIDGE	ON -Y31-	(HOOVE	R RD) OVER	R -L- (HA	MPS ⁻	TEAD	BYPAS	S)		GROUND WTR (ft)	SITE	DESCR	IPTION	STRI	JCTUF	RE #16	- BRIDG	E ON -Y31	- (HOOVER
BO	RING	NO.	S16_	EB1-B		s	STA	TION 29	+20		OFFSET	41 ft RT			ALIO	GNMENT -Y31-		0 HR. 2.2	BORI	NG NO.	S16_	B1-B		ST	ATION	30+26	
СО	LLAR	ELE	V. 47	'.6 ft		Т	ΌТ	AL DEPT	H 64.9 f	t	NORTHING	235,8	03		EAS	TING 2,389,148		24 HR. 1.5	COLL	AR ELI	EV . 46	6.9 ft		тс	TAL DE	PTH 64.9	ft
DR	LL RIG	/HAMI	MER EF	F./DATI	e mic) 1904 C	CME-	-45B 78% C	9/06/2017		•	DRILL	NETHC	DD N	lud Rotary	,	HAMM	ER TYPE Automatic	DRILL	RIG/HAN	IMER EF	F./DATE	MID1	1904 CN	E-45B 789	% 09/06/2017	
DR	ILLER	R ME	EIGS, F	२.		s	STA	RT DATE	03/06/1	8	COMP. DA	TE 03/	06/18	;	SUR	FACE WATER DEPT	H N//	A	DRIL	LER M	IEIGS,	R.		ST	ART DA	TE 03/06/	18
ELE			DEPTH	BLC	w co	UNT			BLOWS	PER FOC	T	SAMP.							ELEV	DRIVE	DEPTH	BLO	w cou	JNT		BLOWS	S PER FOOT
(ft)		.⊏v ft)	(ft)	0.5ft	0.5ft	0.5ft) 2	5	50	75 100	NO.	Имс	DI G	ELEV.	(ft)	K DESU	DEPTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
50																			50								
		-	-												F		SUDE	ACE 0.0		-	Ŧ						
	46	3.6	· 1.0					<u> </u>							- 47.0		DASTA			45.0	<u>+</u>						
45		1 I I	35	2	2	2	-	4		+ • • •					44.6		and (A RGAN	-2-4) WITH ICS <u>3.0</u>	45	45.9	+ 1.0	1	3	3	6		
		••• +	. 0.0	2	3	3	11	6			· · · · · ·		w			GRAY, CLAYE	Y SANI	D (A-2-6)		43.4	3.5	5	8	12			
40	41	1.6 +	<u>6.0</u>	7	10	11	$\left \right $				· · · · · ·		l w	<u> </u>	41.6	LIGHT BROWN, S	ILTY S	AND (A-2-4)	40	40.9	6.0			_		₽20 ·	· · · · · ·
40	39	9.1	8.5	WOH	WOH	WOF	┨┝	· /· · ·								WITH TRA	ACE CI	LAY	40	38.4 .	+ 85	°	4	'	9 5		
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35		‡													34.6			13.0	35	-	ŧ					· · · · ·	
	34	^{4.1}	<u>13.5</u>	1	1	1		2	· · · ·	· · · ·	 		w	/./		GRAY CLAYEY SAN		IN 2-6) (CASTLE		33.4	13.5	WOH	1	1	i · · · ·	· · · · ·	
		1	-											<i>.</i> /~/		HAYNE FO	RMAT	ION)		•	ł			'			
30	29	9.1	18.5											~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				19.0	30	-	<u>+</u>				<u> </u>	<u></u>	
		+	-	1	3	2		b 5					W		20.0	GRAY, SILTY	CLAY	(A-7-5)		28.4	18.5 [WOH	WOH	WOH			
25		Ŧ	-												24.6			22.0	25		Ŧ						
	24	4.1	23.5	wон	WOH	WOF	Ī					SS-40	31%			GRAY, SILTY	SAND	(A-2-4) <u>Z3.0</u>		23.4	23.5				1		
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15		‡	-								· · · · · ·]	DARK GRAY, SILTY SAND AND SHE	′ CLAY	(A-7-6) WITH AGMENTS	15	•	ŧ				N		· · · · · ·
15	14	4.1	33.5	WOU	WOU	1	┤┠								-				15	- 13 /	-				<u>i</u>		
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	9	0.1 _	<u>38.5</u>	woн	2	3		► · · · ●5· · ·	· · · ·		· · · · ·		w							8.4	38.5	1	1		<u> </u> <u>i</u> :::	· · · ·	
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5	4	.1	43.5		-	_	┨┝	<u> </u>		<u> </u>						DARK GRAY, SILTY	SAND	(A-2-4) WITH	5	-	+				H	<u></u>	
17/19		Ŧ	-	14	8	7		15					w							3.4	43.5	7	11	89/0.5	<u> </u>		
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S.GP				100/0.5	5						. 100/0.5			Ħ	F	GRAY, SAND	E dimen Y Lime	NTARY ROCK STONE		-6.6	<u>† 53.5</u> 	100/0.2				· · · · ·	· · · · ·
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3300		Ŧ									100/0.9				ţ.	Boring Terminated a CP: SANDY	t Eleva	tion -17.3 ft IN TONE			<u>†</u>		-		1	<u> </u>	
й щ		+	-												F	ST-1 pushed at 20.0'-	-22.0" i	in offset boring		-	‡						
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GEOTECHNICAL BORING REPORT BORE LOG

WBS	40237	.1.1			Т	IΡ	R-3300E	3	COUNT	ΥP	ENDER				GEOLOGIST Contract C	Geologis	st	
SITE	DESCR	IPTION	STR	UCTU	RE #1	6 -	BRIDGE	ON -Y31-	(HOOVE	RR)) OVER	-L- (HAI	MPST	EAD	BYPASS)		GROUND	WTR (ft)
BOR	ing no.	S16_I	EB2-B	3	S	TA	TION 31	+33		OF	FSET 4	42 ft RT			ALIGNMENT -Y31-		0 HR.	4.4
COL	LAR ELI	EV. 47	.7 ft		Т	от	AL DEPT	H 65.0 f	ť	NO	RTHING	235,59	92		EASTING 2,389,127		24 HR.	1.7
DRILL	. RIG/HAN	IMER EF	F./DAT	E MID	1904 C	ME	E-45B 78% 0	9/06/2017		_		DRILL M	IETHO	D Mu	ld Rotary	HAMME	ER TYPE A	utomatic
DRIL	LER M	EIGS, F	२.		S	TA	RT DATE	03/05/1	18	со	MP. DA	TE 03/0)5/18		SURFACE WATER DEPT	TH N//	4	
ELEV	DRIVE ELEV	DEPTH	BLC					BLOWS	PER FOO	т	100	SAMP.	▼∕		SOIL AND ROC	K DESC	CRIPTION	
(11)	(ft)	(11)	0.5π	0.5π	0.51	+	0 2	:5 	50	/5	100	NO.	<u>/ MOI</u>	I G	ELEV. (ft)			DEPTH (ft)
50		F													_			
	46.7					\parallel	1	1							47.7 GROUNE			0.0
45	40.7 -	F1.0	2	3	2	11	• • • • •							-	- BLACK, GRAY, AN	D TAN,	SILTY SAN	D
	44.2	3.5	3	3	4	$\frac{1}{2}$	1						w		- (A-2-4) WITH II		RGANICS	
	41.7	6.0	3	6	8										-			
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	34.2	13.5	1	1	0								w		-			
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30	29.2	18.5							+ • • •						- 			<u>18.0</u>
		-	4	5	7		• • 12 .						w		- LIGHT GRAY, SILT	Y CLAY	(A-7-5) WIT	н
25	-	ŧ								: :					- SAND (CASTLE H	AYNE F	ORMATION)
	24.2	23.5	1	1	0	ł	1								DARK GRAY, SILT	SAND	(A-2-4) WIT	<u>-H</u> <u></u> <u>23.0</u>
	-	ŧ					1			: :					- IRAC	E CLAY		
20	192	28.5							+ • • •						- 			<u>28.0</u>
	- 19.2	- 20.0	WOH	WOH	WOH		0			: :	· · · · · ·	SS-45	38%		- DARK GRAY, S -	andy c	CLAY (A-6)	
15	-	ŧ				ľ	\ <u>.</u>			: :					-			
15	14.2	33.5	WOH	4	5	┨┢	·\			. .					<u>14.7</u>	SAND	(A-2-4) WIT	<u>-H 33.0</u>
	-	ŧ			Ű		· • 9 · ·	· · · · ·	· · · ·	· ·	· · · · · ·				- SHELL FF -	RAGMEI	NTS	
10							<i>i</i> · · ·		· · ·	• •					- 9.7			<u>38.0</u>
	9.2	- 30.5	WOH	WOH	1		1	· · · ·	· · · ·	· ·	· · · · · ·	SS-46	61%	\mathbb{N}	- DARK GRAY, SILT` - TRACE SAND AND	Y CLAY SHELL	(A-7-6) WIT FRAGMENT	Ή ſS
_	-	ŧ					· · · ·	· · · ·		: :	· · · · · ·			\mathbb{N}	-			
	4.2	43.5	4	14	79		╘╧╧╧		+====	:+:	- <u></u> :j.			000		SAND (A	-1-b) WITH	<u> </u>
31// 1/	-	ŧ					· · · · ·			: :	∳ <u>93</u> 			ŏŏŏ	- 2.7 SHELL AND LIMES		RAGMENT	<u>S</u> <u>45.0</u>
1 1 1							· · · ·		+	:+÷	· <u>- · · ·</u>						STONE	<u></u>
01.6	-0.8	+ +0.5	14	11	12	1		23		· ·	· · · ·		w		LIGHT GRAY, SAN		Y (A-6) WIT	Н
	-	ŧ					· · · ·			: :	· · · ·				IRACE SHEL	LFRAG	IVIENTS	
∠ -> Γd	-5.8	53.5	52	47/0 1			····		+====	:+:					5.3 COASTAL PLAIN S		TARY ROC	<u>κ</u> <u>53.0</u>
5.C	-	ŧ		-770.1			· · · · ·		· · · ·	: :	100/0.6	'			- LIGHT GRAY, S/	ANDY LI	MESTONE	
<u> </u>	-	<u>+</u>								• •					-			
din	-10.8	58.5	100/0.:	3			· · · ·			: :	100/0.3			田	-			
KDG	-	ŧ					· · · · ·		· · ·	: :	:::			Ħ	-			
m <u>-15</u>	-15.8	63.5	10	40	EF	┨┝		· · · ·	<u> </u>	<u>-</u>	!			E	-			
0 0		<u> </u>	10	42	55	\parallel				. .		7			17.3 - Boring Terminated	at Eleva	tion -17.3 ft	65.0 N
R330	-	ŧ													- CP: SANDY	LIMES	TONE	
BLE	-	ŧ													- ST-2 pushed at 28.0)'-30.0' i Sta_31+	n offset borii	ng
DOU	-	ŧ													- Sample classified as	a dark	gray, sandy	silt
ORE	-	ŧ													 -	-+).		
01 B		ŧ													-			
NCD	-	ł													-			



-Y31-, LOOKING UPSTATION FROM STATION 29+00

-Y3I-, LOOKING UPSTATION FROM LEFT OF CENTERLINE

PROJECT REFERENCE NO.

R-3300B

SHEET NO.

10

3300B

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REFERENCE

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DESCRIPTION
TITLE SHEET
LEGEND
SITE PLAN
PROFILE
CROSS SECTIONS
BORE LOGS
SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION BRIDGE NO. 262 ON -Y32- OVER -L1 NORTHERN- (HAMPSTEAD BYPASS) BETWEEN SR 1565 (COUNTRY CLUB DR.) AND SR 1675 (LONG LEAF DR.)

4023 PROIEC

STATE N.C



NO.

1

SHEETS 16



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 ENCINEERING UNIT AT (1991 707-686). THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSUFFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJERACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTUFE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS NCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

MID-ATLANTIC

CROCKETT, S.C.

LANE, R.W.

INVESTIGATED BY ______.

DRAWN BY _____CROCKETT, S.C.

CHECKED BY _______. HAMM, J.R.

SUBMITTED BY ______ FALCON ENG.

DATE APRIL 2020


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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

				SOIL D	ESCR	IPTION					GRADATI	ION						ROCK DE	SCRIPTION
SOIL IS BE PENE ACCORE	CONSIDERE TRATED WI DING TO THI BASED ON	ED UNCO TH A CO E STANO THE AA	NSOLIDATED	, SEMI-CONS FLIGHT POW RATION TES	SOLIDATI	ED, OR WEAT ER AND YIEL TTO T 206, A	HERED EAF	TH MATERIALS T HAN 100 BLOWS F S). SOIL CLASSIF	HAT CAN PER FOOT ICATION	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	TES A GOOD REPRESENTATION NDICATES THAT SOIL PARTICLE ES A MIXTURE OF UNIFORM PA	OF PARTICLE ES ARE ALL ARTICLE SIZE	E SIZES FROM APPROXIMATE S OF TWO OF	M FINE TO COARSE. ELY THE SAME SIZE. R MORE SIZES.	HARD ROCK I ROCK LINE I SPT REFUSAL BLOWS IN NO	S NON-CO NDICATES _ IS PEN ON-COAS	OASTAL PLA 5 THE LEVE 1ETRATION E TAL PLAIN	AIN MATERIAL THAT L AT WHICH NON-COA BY A SPLIT SPOON S MATERIAL, THE TRA	WOULD YIELD SPT REFUSAL IF TESTE STAL PLAIN MATERIAL WOULD YIELD AMPLER EQUAL TO OR LESS THAN 0.1 NSITION BETWEEN SOIL AND ROCK
CONSIST	ENCY, COLO	R, TEXTI	JRE, MOISTU	RE, AASHTO	CLASSI	FICATION, AN	ND OTHER F	PERTINENT FACTO	IRS SUCH		ANGULARITY OF	F GRAINS	5		REPRESENTED) BY A Z	ZONE OF WE	ATHERED ROCK.	45.
· ·	VERY STIFF	GRAY, SIL	TY CLAY, MOIS	T WITH INTE	RBEDDE	D FINE SAND	LAYERS, HIG	HLY PLASTIC, A-7-6		THE ANGULARIT	Y OR ROUNDNESS OF SOIL GR	AINS IS DESI	IGNATED BY	THE TERMS:	WEATHERED		SI/159/1	NON-COASTAL PLA	IN MATERIAL THAT WOULD YIELD SPT
		SOIL	LEGEN) and (AASH'	TO CLAS	SSIFICA	TION		- <u> </u>	MINERAL OGICAL				ROCK (WR)			100 BLOWS PER F	DOT IF TESTED.
GENERAL CLASS.		GRANUL ($\leq 35\%$	AR MATERIAL! PASSING #200	5 1)	SILT	T-CLAY MATERI 35% PASSING =	IALS 200)	ORGANIC MATE	RIALS	MINERAL NA	MES SUCH AS QUARTZ, FELDSP	AR, MICA, TAL	.C, KAOLIN, ET	rc.	CRYSTALLINE	, I		FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC RO REFUSAL IF TESTED. ROCK TYPE IN(
GROUP	A-1	A-3	A	-2	A-4	A-5 A-6	A-7 A	1, A-2 A-4, A-5		ARE USED IN	N DESCRIPTIONS WHEN THEY A	RE CONSIDER	RED OF SIGNI	FICANCE.	RULK (LR)		<u>ZCZC</u>	GNEISS, GABBRO, S	CHIST, ETC.
CLASS.	A-1-a A-1-t		A-2-4 A-2-5	A-2-6 A-2-	7		A-7-5 A-7-6	A-3 A-6, A-7			COMPRESSIE	<u> 3ILITY</u>			NON-CRYSTAL ROCK (NCR)	.LINE		SEDIMENTARY ROC	K THAT WOULD YEILD SPT REFUSAL 1
SYMBOL		000000000000000000000000000000000000000			3	171				SLIG MODE	ATLY COMPRESSIBLE		LL < 31 LL = 31 - 5	ø	COASTAL PLA	AIN		COASTAL PLAIN S	EDIMENTS CEMENTED INTO ROCK, BUT
% PASSING								SILT-		HIGHL		MATERI	LL > 50		SEDIMENTARY (CP)	ROCK		SPT REFUSAL. ROU SHELL BEDS, ETC.	CK TYPE INCLUDES LIMESTONE, SANDS
=10 =40	50 MX 30 MX 50 MX	X 51 MN					64	OILS CLAY	PEAT				HL					WEAT	HERING
*200	15 MX 25 M	X 10 MX	35 MX 35 MX	35 MX 35 M	X 36 MN	36 MN 36 MN	1 36 MN	50125	_		<u>SOILS</u>	LS	OTHER N	ATERIAL	FRESH	ROCK FI	RESH, CRYST	ALS BRIGHT, FEW JOIN	TS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING #40								60% 6 WTW		LITTLE ORGANIC MAT	TER 3 - 5% 5 -	12%	LITTLE	10 - 20%	VERY SUIGHT		ENERALLY F	RESH. JOINTS STAINED	SOME JOINTS MAY SHOW THIN CLAY CO
LL PI	- 6 MX	– NP	40 MX 41 MN 10 MX 10 MX	40 MX 41 M	N 40 MX	41 MN 40 MX 10 MX 11 MN	41 MN	LITTLE OR	нісні у	MODERATELY ORGANIC HIGHLY ORGANIC	. 5-10% 12- >10% >2	20% 20%	SOME HIGHLY	20 - 35% 35% AND ABOVE	(V SLI.)	CRYSTA	LS ON A BR	OKEN SPECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX	0 112	0	0	4 MX	8 MX	12 MX 16 MX	NO MX	MODERATE AMOUNTS OF	ORGANIC		GROUND W	ATER			SUIGHT	BULK C	ENERALLY E	NATURE. RESH. JOINTS STAINED	
USUAL TYPES	STONE FRAGS	5. ENE	CIL TX O			TX CL		ORGANIC	SOILS	∇	WATER LEVEL IN BORE HOL	LE IMMEDIATE	ELY AFTER D	RILLING	(SLI.)	1 INCH.	OPEN JOINT	S MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL
OF MAJOR	GRAVEL, AND	SAND	GRAVEL	AND SAND	501		DILS	MATTER		T	STATIC WATER LEVEL AFTE	ER <u>24</u> HOI	URS		MODERATE	SIGNIET	LS ARE DULI	L AND DISCULURED. CH	YSTALLINE RUCKS RING UNDER HAMMEH
GEN. RATING	Shire				-		Ff				PERCHED WATER, SATURATE	D ZONE, OR W	ATER BEARIN	NG STRATA	(MOD.)	GRANIT	JID ROCKS, M	IOST FELDSPARS ARE	DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE		EXCELL	ENT TO GOOD			FAIR TO POOR		POOR	UNSUITABLE		SPRING OR SEEP					WITH F	RESH ROCK.	HAMMER BLOWS AND	SHOWS SIGNIFICANT LOSS OF STRENGTH
		PI OF A	-7-5 SUBGROL	PIS ≤ LL -	30 ; PI (OF A-7-6 SUBG	ROUP IS > L	- 30		000					MODERATELY	ALL RO	СК ЕХСЕРТ	QUARTZ DISCOLORED O	R STAINED. IN GRANITOID ROCKS, ALL F
			LUNS	ISTENU							MISCELLANEOUS	STMBUL	.5		(MOD. SEV.)	AND DIS	SCOLORED AN	ND A MAJORITY SHOW ATED WITH A GEOLOGI	KAOLINIZATION. ROCK SHOWS SEVERE LI ST'S PICK. ROCK GIVES "CLUNK" SOUND \
PRIMARY	SOIL TYPE		OMPACTNE: CONSISTE	SS OR	PENETI	RATION RESI	STENCE	COMPRESSIVE	STRENGTH		SANKMENT (RE) 25/025 DIP	& DIP DIREC	TION			<u>IF TEST</u>	TED, WOULD	<u>YIELD SPT REFUSAL</u>	
				ISE		(N-VALUE)		(1005/6	1-)			NUCK STRUCT		SLOPE INDICATOR	SEVERE (SEV.)	ALL ROU REDUCE	CK EXCEPT (D IN STREN(QUARTZ DISCOLORED O STH TO STRONG SOIL.	R STAINED. ROCK FABRIC CLEAR AND E IN GRANITOID ROCKS ALL FELDSPARS A
GENERA	ALLY		LOOSE			4 TO 10				SOIL SYMBOL	UPT DMT	TEST BORIN	ic 🔿	INSTALLATION		TO SOM	E EXTENT. S	SOME FRAGMENTS OF S	TRONG ROCK USUALLY REMAIN.
MATERI			MEDIUM DI DENSE	ENSE		10 TO 30 30 TO 50		N/A		ARTIFICIAL F		ER BORING		CONE PENETROMETER	VERY	ALL RO	CK EXCEPT	QUARTZ DISCOLORED O	R STAINED. ROCK FABRIC ELEMENTS AR
(1001-00	UNESIVE/	_	VERY DE	NSE		> 50				- 80					SEVERE	BUT MA	SS IS EFFE	CTIVELY REDUCED TO	SOIL STATUS, WITH ONLY FRAGMENTS OF
GENERA	ALLY		VERY SO SOFT	FT		< 2 2 TO 4		< 0.2 0.25 TO	5 Ø.5	INFERRED SUI		- BURING	•	SUUNDING RUD	(V 3LV./	VESTIGE	IS OF ORIGI	NAL ROCK FABRIC REM	AIN. IF TESTED, WOULD YIELD SPT N VI
SILT-C			MEDIUM S	TIFF		4 TO 8 8 TO 15		0.5 TO	1.0	INFERRED ROC	CK LINE MON	ITORING WELL	L 🕂	WITH CORE	COMPLETE	ROCK R	EDUCED TO	SOIL. ROCK FABRIC NO	T DISCERNIBLE, OR DISCERNIBLE ONLY
(COHES	IVE)		VERY ST	IFF		15 TO 30		2 TO	4	ALLUVIAL SOI	IL BOUNDARY A PIEZ	COMETER	Ò-	SPT N-VALUE		ALSO A	N EXAMPLE.	TRATIONS. GORATZ MA	DE FRESENT HS DIKES UN STRINDENS
			TE				7F	> 4					15					ROCK H	ARDNESS
					<u>, 10 / 10</u>	<u>, HIN 51</u>	2	070				10N - 17		IFIED EXCAVATION -	VERY HARD	CANNOT	BE SCRATC	HED BY KNIFE OR SHA	RP PICK. BREAKING OF HAND SPECIMENS
OPENING (M	1M)		4 4.7	6 2.00	40 0.42	2 0.25	200 0.075	270 0.053		EXCAVATION	UNSUITABLE WASTE	L.		BLE, BUT NOT TO BE	HARD	CAN BE	SCRATCHED	BY KNIFE OR PICK O	S FICK. NLY WITH DIFFICULTY. HARD HAMMER BL
BOULD	ER C	OBBLE	GRAV	'EL	COAR	SE	FINE	SILT	CLAY	SHALLOW UNDERCUT	ACCEPTABLE DEGRADABL	.ON - _E ROCK	EMBANKM	ENT OR BACKFILL	_	TO DET	ACH HAND S	PECIMEN.	
(BLDR.		(COB.)	(GR		CSE. S	5D.)	(F SD.)	(SL.)	(CL.)		ABBREVIAT	IONS			MODERATELY HARD	CAN BE EXCAVA	SCRATCHED TED BY HAR	BY KNIFE OR PICK. C D BLOW OF A GEOLOG	OUGES OR GROOVES TO 0.25 INCHES DE ST'S PICK. HAND SPECIMENS CAN BE DE
GRAIN MI	м 305		75	2.0		0.25		0.05 0.00	5	AR - AUGER REFUSAL	MED MEDIUM		VST - V	ANE SHEAR TEST	-	BY MOD	ERATE BLOW	s.	
SIZE IN	. 12		3							BT - BORING TERMINATED CL CLAY	D MICA MICACEC MOD MODERAT	JUS FELY	WEA V グ- UN	VEATHERED IT WEIGHT	MEDIUM HARD	CAN BE CAN BE	GROOVED OF EXCAVATED	R GOUGED 0.05 INCHES IN SMALL CHIPS TO	S DEEP BY FIRM PRESSURE OF KNIFE O PEICES 1 INCH MAXIMUM SIZE BY HARD
	NOIGTUDE	SOIL	MOIST	<u>JRE - C</u>		LATION	OF TE	RMS		CPT - CONE PENETRATIO	N TEST NP - NON PLAS	TIC	$\dot{\gamma}_{ m d}$ - DR	Y UNIT WEIGHT		POINT C	JF A GEOLOC	GIST'S PICK.	
(AT	TERBERG L	IMITS)		DESCRIP	PTION	GUIDE	FOR FIE	D MOISTURE DE	SCRIPTION	DMT - DILATOMETER TES	ST PMT - PRESSUR	REMETER TES?	t <u>Samp</u>	LE ABBREVIATIONS	SOFT	CAN BE FROM C	GROVED OR HIPS TO SE	GOUGED READILY BY VERAL INCHES IN SIZE	KNIFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POIN
				- SATURA	TED -	USUAL		. VERY WET. US	JALLY	DPT - DYNAMIC PENETRA	TION TEST SAP SAPROLIT SD SAND, SAN	LIC NDX	S - BUL SS - SP	K 1 IT SPOON		PIECES	CAN BE BRO	OKEN BY FINGER PRES	SURE.
		דזאדו ח		(SAT.)		FROM	BELOW T	HE GROUND WAT	ER TABLE	F - FINE	SL SILT, SILT	ίΥ	ST - S⊢	ELBY TUBE	VERY SOF T	CAN BE OR MOR	CARVED WI	TH KNIFE. CAN BE EXC WESS CAN BE BROKEN	AVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH
PLASTIC						SEMIS	50L ID: RF0	JIRES DRYING T	n	FRAC FRACTURED, FRAC	TURES TCR - TRICONE	REFUSAL	RS - RC RT - RE	ICK COMPACTED TRIAXIAL		FINGERN	√AIL.		-
RANGE <				- WET - ((W)	ATTA	IN OPTIMU	MOISTURE		FRAGS FRAGMENTS	W - MOISTURE	CONTENT	CBR - C	ALIFORNIA BEARING	F	RACT	URE SP	ACING	BEDDING
FL L										FO	UIPMENT USED ON S	UBJECT	PROJECT		VERY WID	E	MORI	E THAN 10 FEET	VERY THICKLY BEDDED
OM		IUM MO	STURE	- MOIST ·	- (M)	SOLIC	D; AT OR N	EAR OPTIMUM M	OISTURE	DRILL UNITS:	ADVANCING TOOLS:		HAMMER TY	PE:	WIDE MODERATE	LY CLOS	3 5E	TO 10 FEET	THICKLY BEDDED 1. THINLY BEDDED 0.1
51		KAGE L	IMII			REOUT		TONAL WATER 1	.0	CME-45C	CLAY BITS		X AUTOM	IATIC MANUAL	CLOSE	005	0.	16 TO 1 FOOT	VERY THINLY BEDDED 0.0
1				- DRY - (D)	ATTA	IN OPTIMU	MOISTURE	-	CME-55	6" CONTINUOUS FLIGHT	AUGER	CORE SIZE:			30	LESS	INHIN U.IO FEEI	THINLY LAMINATED 4.00
				<u>PL</u> A	STIC	ITY				1	8" HOLLOW AUGERS		в	н				INDU	RATION
				PLASTI	CITY IN	IDEX (PI)		DRY STREN	GTH	CME-550X	HARD FACED FINGER BI	ITS	N		FOR SEDIMEN	ITARY RC	JCKS, INDURA	ATION IS THE HARDEN	NING OF MATERIAL BY CEMENTING, HE
NO	N PLASTIC	ASTIC			Ø-5 6-15			VERY LO	W	VANE SHEAR TEST	TUNGCARBIDE INSERT	s –		<u>.</u>	FRIABL	LE		RUBBING WITH GENTLE BLOW	FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.
MO	DERATELY	PLASTI	2	~	16-25	DE		MEDIUM				ANCER	POST	HOLE DIGGER	MODEP	ATEL V T		GRAINS CAN B	E SEPARATED FROM SAMPLE WITH ST
ніс	MLI PLAS	110		26))		нібн		PORTABLE HOIST	X TRICONE 215/16 " STE	EL TEETH	HAND	AUGER	MODER			BREAKS EASIL	Y WHEN HIT WITH HAMMER.
—				L	ULUH.	N				X <u>CME-45B</u>		VGCARB.	SOUND	ING ROD	INDUR	ATED		GRAINS ARE D DIFFICULT TO	IFFICULT TO SEPARATE WITH STEEL BREAK WITH HAMMER.
DESCRIP	TIONS MAY			OR COLOR	COMBIN	ATIONS (TA	N, RED, YEL	LOW-BROWN, BLU	JE-GRAY).				VANE	SHEAR TEST	EVIDE	MEL 9 71		SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE
•	551 ILN3 3	5561 H	, cronny DF			JUNE OJEL					│ └┘ ────		└		EXIRE	MELT IN	JURHIEU	SAMPLE BREAK	S ACROSS GRAINS.

PROJECT REFERENCE NO. R-3300B



2

TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ED. AN INFERRED SPT REFUSAL. 1 FOOT PER 60 IS OFTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. AL PLAIN IF TESTED. MAY NOT YIELD STONE, CEMENTED CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS. $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. $\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE TACHED 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BM-R3300-29, -Y32- STA. 15+86, 176' LT THICKNESS N: 238208 E: 2399827 4 FEET 1.5 - 4 FEET ELEVATION: 44.38 FEET 16 - 1.5 EEET NOTES: 3 - 0.16 FEE 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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# **GEOTECHNICAL BORING REPORT**

**BORE LOG** 



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BOR	NG NO.	S18_	EB1-A		s	STA	ATION 2	4+44		OFF	SET 1	3 ft L ⁻	Γ		ALIGNMENT -Y32- 0 HF	<b>4</b> .4
COL	LAR ELI	<b>EV.</b> 43	.8 ft		Т	гот	TAL DEP	TH 85.0	ft	NOF	rthing	238,	948		EASTING 2,400,128 24 HF	. FIAD
DRILL	. RIG/HAN	IMER EF	F./DATE	E MID	1904 C	CME	E-45B 90%	03/01/2019				DRILL	METHO	D M	ud Rotary HAMMER TYP	Automatic
DRIL	LER W	IGGAN	IS, M.		S	STA	ART DAT	E 01/24/	19	CON	NP. DAT	<b>E</b> 0'	/25/19		SURFACE WATER DEPTH N/A	
ELEV	DRIVE ELEV	DEPTH	BLO	w co	UNT			BLOWS	PER FOO	Т		SAM	[.] .▼∕		SOIL AND ROCK DESCRIPTION	ON
(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	t	0	25	50	75	100	NO.	Имо	I G	ELEV. (ft)	DEPTH (1
-35			-12 -	- 10-	-10	$\left  + \right $		Mat	ch Line			<u>+</u>	- Sat.			
	-	Ē													WHITE, SILTY SAND (A-2-4) W/ LIMESTONE FRAGMENTS (cont	SOME nued)
-40	-39.7	83.5	10	- 10						.   .						(lucu)
		[	12	18	30	$\square$			<b>4</b> 8.				Sat.		Boring Terminated at Elevation -41	85. 2 ft IN
															CP: SILTY SAND	

## **GEOTECHNICAL BORING REPORT**

### **BORE LOG**

# GEOTECHNICAL BORING REPORT

**BORE LOG** 



SITE DESCRIPTION BRIDGE NO. 262 ON -Y32- OVER -L1_NORTHEF BORING NO. S18_EB1-B **STATION** 24+42 COLLAR ELEV. 44.1 ft TOTAL DEPTH 80.0 ft DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 90% 03/01/2019 DRILLER WIGGANS, M. **START DATE** 01/25/19 ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft **BLOWS PER FOOT** 0.5ft 0.5ft 0.5ft 50 25 _ <u>Match Line</u> _ _-<u>35</u>_ -37 + 71 - - 9

**WBS** 40237.1.1

## GEOTECHNICAL BORING REPORT

# 

**TIP** R-3300B

### **BORE LOG**

PENDER				GEOLOGIST Lane, R.W			
RN- (HAMPS	TEAD E		S)			GROU	ND WTR (ft)
OFFSET 5	3 ft RT			ALIGNMENT -Y32-		0 HR.	4.2
NORTHING	238.93	31		EASTING 2,400.191		24 HR.	FIAD
	DRILL M	ETHOD	) Mi	ud Rotary	HAMME	RTYPE	Automatic
COMP. DAT	E 01/2	25/19			'H N/4	<u></u>	
	SAMP.		L				
5 100	NO.		0 G	SOIL AND ROC	K DESC	RIPTION	
1							
<u></u>		Sat.		-35.9 Design Terreinsted a			80.0
				CP: SIL	TY SAN	D	IL IIN
				ST-14 pushed in of	fset bori	ng locate	d at
				Y32- Sta. 2	4+39, 5	3' RT	
				<ul> <li><u>Other Samples:</u></li> <li>ST-14 (30.5 - 32.5)</li> </ul>	)		
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## GEOTECHNICAL BORING REPORT BORE LOG

WBS	40237	'.1.1			ТІ	P R-3300	3	COUNT	Y PEN	DER				GEOLOGIST Lane, R.V	۷.		
SITE	DESCR	IPTION	BRI	DGE N	O. 262	2 ON -Y32-	OVER -L1	_NORTH	ERN- (H	IAMP	STEAD E	BYPAS	SS)			GROUN	ND WTR (ft)
BOR	ING NO.	S18_	B1-A		S	TATION 2	5+35		OFFS	ET ·	14 ft LT			ALIGNMENT -Y32-		0 HR.	4.4
COL	LAR ELI	<b>EV.</b> 43	.4 ft		т	OTAL DEPT	<b>H</b> 74.51	ft	NORT	HING	239,03	37		EASTING 2,400,153		24 HR.	FIAD
DRILL	. RIG/HAN	IMER EF	F./DAT	E MID	1904 CI	ME-45B 78%	09/06/2017		1		DRILL M	IETHO	D Mu	ud Rotary	HAMME	R TYPE	Automatic
DRIL	LER W	/IGGAN	IS, M.		S		01/22/*	19	СОМІ	P. DA	TE 01/2	22/19		SURFACE WATER DEP	TH N/A	4	
ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	T		SAMP.	<b>V</b>	L				
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	o :	25	50	75	100	NO.	мо	G	SOIL AND ROO ELEV. (ft)	JK DESC	RIPTION	I DEPTH (ft
									•			ĺ					, ,
45																	
		ŧ													) SURFA	CE	0.0
	42.4	<u> </u>	2	3	2					•••				- UNDIVIDED ( TAN BLACK AND	CASTAL BROWN	L <b>PLAIN</b> . SAND (/	A-3)
40	39.9	3.5				<b>7</b> °							0000	-		,	,
	374		2	2		<b>4</b> 3 · · · ·	· · · ·		·   · ·	· · ·		$\vdash^{\vee}$	0000	-			
		1 0.0	3	7	7	14			:   : :	::		Sat.	0000	-			
35	34.9 -	8.5	4	3	3			<u> </u>				Sat	0 0 0 0 0 0 0 0 0 0 0 0	-			
		ł				<b>∫</b> °							0 0 0 0 0 0 0 0 0 0 0 0	-			
30	20.0	T 135											~	<u>- 31.4</u> COAST		<u>_</u>	<u>12.0</u>
	. 29.9 -	- 13.5	2	2	4	•6 · · ·						Sat.	$\langle / \rangle$	- GRAY, CLAYEY S/ HAYNE F	AND (A-2 ORMATI	2-7) (CAS ON)	TLE
		‡				::``.`.								- - 26.4		- /	17.0
25	24.9	18.5					<u> </u>						0000	GRAY, S	SAND (A-	-3)	
		t	14	22	28			50		· · ·		Sat.	0000	-			
		ł						N: : :		· ·			0 0 0 0 0 0 0 0 0 0 0 0	-			
20	19.9 _	23.5	15	26	31			+				Sat	0 0 0 0 0 0 0 0 0 0 0 0	_			
		Ŧ						•57 •				Jai.	0 0 0 0 0 0 0 0 0 0 0 0	-			
15	110	†				r	+	+-::						<u>- 16.4</u> 	Y (A-6) V		<u>27.0</u> SAND
10	14.9 -	<u>- 28.5</u> -	1	1	1							Sat.		LA	YÈRS		
		ŧ							·   · ·					-			
10	9.9 -	33.5						· · ·						-			
		ł	WOH	WOH	1	•1····				•••		Sat.		-			
	.	ł							-					-			
5	4.9 -	38.5	  WOH	WOH	3			+ • • •				Cat		_			
		Ŧ				$\begin{bmatrix} \bullet_3 \cdot \cdot \cdot \\ \bullet_1 \cdot \cdot \cdot \end{bmatrix}$						Sal.		-			
0		‡												-			40.5
	-0.1 -	<u>- 43.5</u> -	40	60/0.1	-	│	<u> </u>	+	· · 1	00/0.6				COASTAL PLAIN S	EDIMEN	ITARY RO	43.5 CK
10/2/		ŧ				:::	+ <u>-</u> - <u>-</u>			÷÷			0000	- <u>- 2.7</u> GRAY AND WH , LIME	ITE, HAR	RD, SAND	0Y <u>46.0</u>
<del>,</del> -5	-5.2 -	48.5											0 0 0 0 0 0 0 0 0 0 0 0				 = 1 1
		ł	7	7	7	•14				•••		Sat.		- FRAC	3) W/ TR 3MENTS		LL
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z -10	-10.2 _	53.5	13	22	25			+ • • •				0-1	0000	-			
0.01		ŧ					· · · · ·					Sat.	0 0 0 0 0 0 0 0 0 0 0 0	-			
5 0 1 15		‡						! :::		::				-			
z -15	-15.2 -	<u> </u>	15	19	27			46 * * *				Sat.	0 0 0 0 0 0 0 0 0 0 0 0	-			
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-20	-20.2	635					· · · ł						0 0 0 0 0 0 0 0 0 0 0 0	-			
2 		-	12	20	23	• • • •		13	.	• • ]		Sat.	0000	-			
	.	Ŧ					. /							- - <u>-23.7</u>			<u> </u>
2 -25	-25.2 -	68.5	1/	10	<u>م</u>		/····	+ • • •	-					GRAY AND WHITE	E, SILTY	Sand (a Ragmen	-2-4) ITS
		‡	'4		9	· · · <b>•</b> 1     · · · <b>●</b> 1	9 			•••		Sat.		-			-
		‡							-	: :				-			
ц <u>-30</u>	-30.2 _	- 73.5	15	81	19/0.0		<u> </u>	· <b>-</b>	<u> </u>								74.0
		<u>+</u>				]				UO/0.5				GRAY, HARD, S	ANDY LI	MESTON	
	.	ł												Boring Terminated	at Elevat	ion -31.2	ft IN

#### **GEOTECHNICAL BORING REPORT** RORE I OG

Image         Aug         Image         County         Decudate         Decudate <thdecudate< th=""><th></th><th>40007</th><th></th><th></th><th></th><th>-</th><th></th><th>D 0000D</th><th></th><th></th><th></th><th>00</th><th></th><th></th><th></th><th></th><th>,</th><th></th><th></th></thdecudate<>		40007				-		D 0000D				00					,		
SHE DECRIPTION       BRIDE NO. 22: 20 A. Y22 - 20 A. TL, NORTHERK, (HAMPSTED BY/NSS)       GROUND WTR (M)         DORNE NO. 21: 88 I-8       TOTAL DEPTH 95:0.0       NORTHING 200:0.0       EASTING 24:02:0.0       24 RR. 4.0         DELLER WIGGANS, M.       START DATE 35: 80:00:07       DELLER WIGGANS, M.       START DATE 01:21:10       SURFACE WATER DEPTH NA         ELV (MC)       0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.01 (0.	WBS	40237	.1.1				P	R-3300B		COUNTY	PENDER				GEOLOGIST	_ane, R.W			
DORM NO.         St.E [81 #]         STATON         DefEnd         OFFSET         46 INT         ALIAMMENT ~1220         0 FR.         5.0           COLLAR ELEV.         COMPAGE MAY ASA         TOTAL DEPTH 80.0         NORTHING 230/10         EASTING 240/2018         JAMMERT YFE AUXING:         JAMMERT YFE AUXING:         AUXING AUX	SITE	DESCR	PTION	BRID	DGE NO	0.262	2 0	DN -Y32- O	VER -L1	NORTHE	RN- (HAMP:	STEAD B	YPAS	S)	1			GROUND \	NTR (ft)
COLLAR LEW.         4.35.8.         TOTAL DEPTH 85.0.1         NORTHING 230:016         DATING 2400.200         24.48.2         4.00           DBLIL BRUMMERE PRIATE MOTE CARGE MY MOUNT         BRUL REVEALES MOUNT CARGE MY MOUNT         BRUL REVEALES MOUNT         SURFACE WATER DEPTH N/A           DBLIL BRUMMERE PRIATE MOTE MOUNT         BLORS PERFORT         BLORS PERFORT         SURFACE WATER DEPTH N/A           ELEV DIPTH         BLORS PERFORT         BLORS PERFORT         SURFACE WATER DEPTH N/A           40         ORT 0.3.8         0.01         20         00         76         00         NO         SURFACE WATER DEPTH N/A           41         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01	BOR	ng no.	S18_	B1-B		S	TA	<b>TION</b> 25	+33		OFFSET 4	46 ft RT			ALIGNMENT -	Y32-		0 HR.	5.0
DBLL Reviewer         Marker TYPE         Marker TYPE         Aubmet PYPE	COLI	LAR ELE	<b>EV.</b> 43	8.6 ft		<b>т</b> е	от	AL DEPTI	H 85.0 ft		NORTHING	239,01	6		EASTING 2,40	0,208		24 HR.	4.0
DBLLER, WIGGANS, M.         START DATE 0/22/1/0         COMP. DATE 0/22/1/0         SURFACE WATER DEPTH NA           Lis, DRMS         BIOW COMP.         BIOW COMP.         BIOW COMP.         BIOW COMP.         SURFACE WATER DEPTH NA           Lis, DRMS         BIOW COMP.         BIOW COMP.         BIOW COMP.         BIOW COMP.         BIOW COMP.           45	DRILL	. RIG/HAM	MER EF	F./DATI	e Mid [.]	1904 C	ME	E-45B 78% 09	9/06/2017			DRILL M	ethod	Muc	d Rotary		HAMME	<b>R TYPE</b> Au	tomatic
LLD:         DRVE         DEPTY         BLOW COUNT         BLOW SPERFOOT         SAMP         LLD         SOL AND NOCK DESCRIPTION         SUPPLY         SOL AND NOCK DESCRIPTION	DRIL	LER W	GGAN	IS, M.		S	ТА	ART DATE	01/21/19	9	COMP. DA	TE 01/2	1/19		SURFACE WAT	ER DEPT	H N/A		
IF:       IE:       IC:       I	ELEV	DRIVE	DEPTH	BLC	w col	UNT			BLOWSF	PER FOOT		SAMP.	▼∕	L	1			DIDTION	
46       42       10       3       2       2       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <td>(ft)</td> <td>ELEV (ft)</td> <td>(ft)</td> <td>0.5ft</td> <td>0.5ft</td> <td>0.5ft</td> <td>11</td> <td>0 25</td> <td>5 5</td> <td>50</td> <td>75 100</td> <td>NO.</td> <td>моі</td> <td>G</td> <td>ELEV. (ft)</td> <td>AND RUCI</td> <td>K DESC</td> <td>RIPTION</td> <td>DEPTH (ft)</td>	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	11	0 25	5 5	50	75 100	NO.	моі	G	ELEV. (ft)	AND RUCI	K DESC	RIPTION	DEPTH (ft)
42							Π				•	Ĩ			, <i>1</i>				
30       42.6       1.0       5       7       7       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0<	45																		
42a       10       3       2       2       10       10       10       10       13       2       2       10       10       10       13       10       13       2       3       10       13       10       13       10       13       2       3       10       13       2       3       10       13       2       3       4       4       3       10       13       2       3       4       4       3       10       13       2       3       4       4       3       10       10       13       2       3       4       4       3       10       10       13       2       3       4       4       3       10       10       10       13       2       3       4       4       3       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10	45	_	[												- 43.6	GROUND	SURFA	CE	0.0
40       401       35       5       2       3       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td></td> <td>42.6 -</td> <td>- 1.0</td> <td>3</td> <td>2</td> <td>2</td> <td>Ħ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>0 0 0 0 0 0 0 0 0 0 0 0</td> <td>UN</td> <td></td> <td></td> <td></td> <td></td>		42.6 -	- 1.0	3	2	2	Ħ						-	0 0 0 0 0 0 0 0 0 0 0 0	UN				
37.6       6.0       5       2       3         36       6.1       6.5       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       7       <	40	40.1	35			2		<b>4</b>							1AI	N AND GRA	41, <b>SAN</b>	D ( <del>A-</del> 3)	
326         4.0         4         5         6           36         301         4.5         4         3         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7			- 0.0	5	2	3	11	<b>4</b> 5				-	•		-				
38       35.1       8.6       4       3       7		37.6 -	- 6.0 -	4	5	6	$\left  \right $		· · · · ·				Sat	• • • • • - • • • • • -					
30       30.1       13.5       2       3       4       4       3       9	35	35.1	8.5					· 7'.' -					out.	• • • • • • • • • •	_				
30       201       13.5       2       3       4		-	-	4	4	3		<b>•</b> 7 • •					Sat.	• • • • • •	22.6				11.0
30       30.1       13.5       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1		-	-												_ <u>32.0</u>	COASTA		<u></u>	<u> </u>
28       25.1       118.5       4       9       13         20       20.1       22.5       17       30       35         15       15.1       28.5       WORI WORH       1       1         10       10.1       33.5       WORI WORH       1       1       1         15       15.1       28.5       WORI WORH       1       1       1       1         10       10.1       33.5       WORI WORH       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td>30</td> <td>30.1</td> <td>13.5</td> <td>2</td> <td>2</td> <td>4</td> <td>┨┟</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>/./</td> <td>- GRAY, C</td> <td>LAYEY SA</td> <td>ND (A-2- DRMATIO</td> <td>-7) (CASTLE DN)</td> <td></td>	30	30.1	13.5	2	2	4	┨┟							/./	- GRAY, C	LAYEY SA	ND (A-2- DRMATIO	-7) (CASTLE DN)	
25       25.1       18.5       4       9       13		-	_			-		•7 · · ·	· · · ·				Sat.	///				,	
25       25.1       16.5       4       9       13		-	_												_ <u>26.6</u>				<u> </u>
20       20       17       30       35         15       15.1       28.5       WOH WOH       1	25	25.1	18.5	4	9	13	┨┝				+		Sat		-		III L, 3A	ND (A-3)	
20       201       23.5       17       30       35         15       15.1       28.6       WOH WOH       1		-	-					· · · • • • •	×				oat.	• • • • • - • • • • • -					
20       20.1       23.5       17       30       35         15       15.1       28.5       WOH       WOH       1       1         10       10.1       33.5       WOH       WOH       1       1         5       5.1       38.5       1       2       3       5         0       0.1       43.5       6       12       46       5         5       4.0       48.5       6       12       46       5         -10       9.0       53.5       -       -       5       -       -         -10       9.0       53.5       -       -       -       -       -       -         -10       9.0       53.5       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -																			
15       15.1       28.5       WOH       WOH       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <t< td=""><td></td><td></td><td>_ 23.5</td><td>17</td><td>30</td><td>35</td><td>11</td><td></td><td></td><td> 65</td><td>+ · · · · ·</td><td></td><td>Sat.</td><td>****</td><td>-</td><td></td><td></td><td></td><td></td></t<>			_ 23.5	17	30	35	11			65	+ · · · · ·		Sat.	****	-				
15       15.1       28.5       WOH       WOH       1         10       10.1       33.5       WOH       WOH       1         5       5.1       38.5       1       2       3         0       0.1       43.5       6       12       46         -5       4.0       48.5       8       7		-	-							·								<u></u>	<u> </u>
0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	15	15 1	28.5												e	INAT, SILT	T ULAT	(A-7)	
10       10.1       33.5       WOH       WOH       1         5       5.1       38.5       1       2       3         0       0.1       43.5       6       12       46         -5       -4.9       48.5       8       7			_ 20.0	WOH	WOH	1	1	1					Sat.		-				
10       10.1       33.5       WOH WOH 1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1		-	-					· · · ·     · · · ·	· · · · · · · ·	· · · ·				N					
s       5       5.1       38.5       1       2       3         0       0.1       43.5       6       12       46         -5       4.9       48.5       -       -       -         -5       4.9       48.5       -       -       -       -         -10       -9.9       53.5       -       -       -       -       -       -         -10       -9.9       53.5       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -	10	10.1	33.5				ļį	i · · · ·						N	_				
5       5.1       38.5       1       2       3       5		-	-	IMOH	WOH	1		1					Sat.						
5       5.1       38.5		-	-				Ľ	$\left  \left							_6.6				<u> </u>
0       0.1       43.5       6       12       46         -5       -4.9       48.5       8       8       7         -6       -5       -4.9       48.5       8       7         -10       -9.9       53.5       13       21       24         -10       -9.9       53.5       13       21       24         -10       -9.9       53.5       13       21       24         -110       -9.9       53.5       13       21       24         -15       -14.9       58.5       14       18       28         -20       -19.9       63.5       -14       18       -46         -20       -19.9       63.5       -14       18       -46         -20       -19.9       63.5       -14       -46       -15         -20       -19.9       63.5       -14       -46       -16       -16         -21       -24.9       68.5       -28       18       11       -23.4       -23.4       -23.4         -23.4       -23.4       -23.4       -23.4       -23.4       -23.4       -23.4         -29.9       73.5       -29	5	5.1	38.5	1	2	3	┥┟	$\frac{1}{1}$					0-1		- Gi	RAY, SANE	DY CLAY	(A-6)	
0       0.1       43.5       6       12       46         -5       4.9       48.5       8       8       7         -10       -9.9       53.5       13       21       24         -10       -9.9       53.5       13       21       24         -10       -9.9       53.5       13       21       24         -10       -9.9       53.5       13       21       24         -15       -14.9       58.5       14       18       28         -20       -19.9       63.5       12       17       18         -25       -24.9       68.5       28       18       11         -26       -24.9       68.5       28       18       11         -28       -29.9       73.5       28       72.0       73.5         -30       -29.9       73.5       28       72.0       73.5         -31       -29.9       73.5       28       72.0       73.5         -34       -29.9       73.5       28       72.0       73.5         -30       -29.9       73.5       28       72.0       73.5         -30		-	-	'		0		•5					Sat.						
0       0.1       43.5       6       12       46         -5       -4.9       48.5       8       7       -5       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34       -34		-	_					$\cdot \cdot \cdot \cdot \cdot$											<u>42.0</u>
-5       -4.9       48.5	0	0.1	43.5	6	12	46	┨┝	· · · · ·			+ • • • •		Sat		-	SHELL FR	AGMEN	TS	-
-5       -4.9       48.5       8       8       7       -10       -9.9       53.5       -10       -10       -9.9       53.5       -10       -10       -10       -9.9       53.5       -11       21       24       -15       -14.9       58.5       14       18       28       -15       -14.9       58.5       14       18       28       -15       -16       -17       -17       -18       -16       -17       -17       18       -16       -17       -17       18       -16       -17       -18       -16       -17       -17       -18       -16       -17       -17       -18       -16       -17       -17       -18       -16       -17       -16       -17       -17       -18       -16       -17       -17       -18       -16       -17       -16       -17       -17       -17       -17       -17       -17       -17       -18       -17       -17       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18       -18<	NZ NZ	-	-										0	~/~/					
-3       4.9       40.5       8       8       7	4/10	-	-											····	- <u>-3.4</u>	SAND (A-3)	) W/ TR/	ACE SHELL	- <u>47.0</u>
-10       -9.9       53.5       13       21       24         -15       -14.9       58.5       -14       18       28         -15       -14.9       58.5       -14       18       28         -20       -19.9       63.5       -11       18       28         -25       -24.9       68.5       -11       -11       -11         -25       -24.9       68.5       -11       -11       -11         -30       -29.9       73.5       -11       -11       -11       -11         -30       -29.9       73.5       -11       -11       -11       -11       -11         -35       -34.9       78.5       -11       -11       -11       -11       -11         -35       -34.9       78.5       -11       -11       -11       -11       -11         -35       -34.9       78.5       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       <		-4.9	<u>40.5</u>	8	8	7	11	· · @15	· · · · ·		· · · ·		Sat.		-	FRAGÍ	MENTS		
-10       -9.9       53.5       13       21       24         -15       -14.9       58.5       14       18       28         -20       -19.9       63.5       -11       -11       -11         -20       -19.9       63.5       -11       18       -11       -11         -20       -19.9       63.5       -11       18       -11       -11       -11         -20       -19.9       63.5       -11       17       18       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11		-	L																
-15       -14.9       58.5       14       18       28         -20       -19.9       63.5       -11       -11       -11       -11         -20       -19.9       63.5       -11       18       -11       -11       -11         -20       -19.9       63.5       -11       18       -11       -11       -11       -11         -20       -19.9       63.5       -11       18       -11       -11       -11       -11       -11         -20       -19.9       63.5       -11       18       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11       -11		9.9 -	53.5						$\mathbf{X}$					****					
-15       -14.9       58.5       14       18       28         -20       -19.9       63.5	2		-	13	21	24	11		• • • <b>•</b> 4	 5			Sat.		-				
-15       -14.9       58.5       14       18       28         -20       -19.9       63.5	2	1	-					· · · · ·	· · ·	· · · ·									
-20       -19.9       63.5       12       17       18         -20       -19.9       63.5       12       17       18         -20       -24.9       68.5       -24.9       68.5       -23.4       -23.4         -25       -24.9       68.5       -28       18       11       -29.9       -73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       73.5       -29.9       -23.4       -29.9       -23.4       -29.9       -23.4       -29.9       -23.4       -29.9       -23.4       -29.9       -23.4	<u>-15</u>	-14.9	_ 58.5						<u> </u>						_				
-20       -19.9       63.5       -12       17       18         -25       -24.9       68.5		-	F	14	18	28			🏓	6			Sat.	0000					
-20       -19.9       63.5	2	-	I .											00000					
-25       -24.9       68.5       -28       18       11	ਸ <u>਼ੂ -20</u>	-19.9	63.5	12		18	┨┞		· · /· ·				<b>.</b>		_				
-25       -24.9       68.5       -28       18       11           GREEN-GRAY AND WHITE, SILTY FINE       67.0         -30       -29.9       73.5       -28       18       11		-	F	' <i>∠</i>	''	10			• • 35				Sat.	***					
23       -24.9       68.5       -24.9       68.5       -24.9       GREEN-GRAT AND WITE, SLTY FINE         -30       -29.9       73.5       -29.9       73.5       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9<		-	Ł						:/:::		• • • •				- <u>-23.4</u>				<u> </u>
LIMESTONE FRAGMENTS	2 -25	_24.9	68.5	28	18	11	┨┝				+ • • • • •		Sat		- TO COA	ARSE SAND	D (A-2-4)	W/LITTLE	-
-30       -29.9       73.5       -29.9       73.5       -29.9       73.5         -30       -29.9       73.5       -29.9       73.5       -29.9       73.5         -35       -34.9       78.5       -33.4       -33.4       -33.4       -33.4	2FE	-	F					· · · · ·	●29 · · ·  · · · ·				Jai.		LI	VESTONE	FRAGM	ENTS	
-30       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -29.9       -73.5         -30       -29.9       -29.9       -29.9       -29.9       COASTAL PLAIN SEDIMENTARY ROCK         -30       -35       -34.9       78.5       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4       -33.4 <td></td> <td></td> <td>-</td> <td></td> <td>   </td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>20.0</td> <td></td> <td></td> <td></td> <td>70 5</td>			-						<u> </u>						20.0				70 5
0     -35     -34.9     78.5     WHITE, HARD, SANDY LIMESTONE	<u>-30</u>	-29.9		28	72/0.3				<u> </u>		• 100/0 8				COASTA	L PLAIN SE	EDIMEN	TARY ROCK	/3.5
		-	-					••••	• • • •					F	-33.4	, HARD, SA	ANDY LI	MESTONE	77.0
	-35	-34 9	78.5						<u></u>	- <u>.</u> +	- -:÷÷÷				_ <u></u>				<u>//</u> .0

#### COUNTY PENDER GEOLOGIST Lane, R.W. **WBS** 40237.1.1 **TIP** R-3300B SITE DESCRIPTION BRIDGE NO. 262 ON -Y32- OVER -L1_NORTHERN- (HAMPSTEAD BYPASS) GROUND WTR (ft) OFFSET 46 ft RT ALIGNMENT -Y32-**STATION** 25+33 0 HR. BORING NO. S18_B1-B 5.0 COLLAR ELEV. 43.6 ft TOTAL DEPTH 85.0 ft **NORTHING** 239,016 **EASTING** 2,400,208 24 HR. 4.0 DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 78% 09/06/2017 DRILL METHOD Mud Rotary HAMMER TYPE Automatic COMP. DATE 01/21/19 DRILLER WIGGANS, M. **START DATE** 01/21/19 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft SAMP. BLOWS PER FOOT 0 SOIL AND ROCK DESCRIPTION 0.5ft 0.5ft 0.5ft 50 75 25 100 NO. MOI G ELEV. (ft) DEPTH (fl Match Line -35 COASTAL PLAIN WHITE, SAND (A-3) W/ LITTLE LIMESTONE FRAGMENTS (continued) WHITE, SILTY SAND (A-2-4) W/ TRACE LIMESTONE FRAGMENTS -20 16 12 Sat. **▲**28. . . . . . . . . . . · · · · · . . . . . . . . -38.4 82.0 . . . . . . . . -40 <u>-39.9 <u></u>83.5</u> 10 17 27 Sat. -41.4 644 85.0 Boring Terminated at Elevation -41.4 ft IN CP: SILTY SAND

# **GEOTECHNICAL BORING REPORT**

## **BORE LOG**

#### GEOTECHNICAL BORING REPORT

							B	<u>ORE L</u>	UG							
WBS	40237.	.1.1			TI	P R-3300B	COUNT	Y PENDER				GEOLOG	ST Lane, R.	W.		
SITE	DESCR	PTION	BRI	DGE NO	D. 262	2 ON -Y32- OVER -L1		ERN- (HAMP	STEAD B	BYPAS	SS)				GROUN	ID WTR (ft)
BOR	NG NO.	S18	EB2-A	1	S	TATION 26+21		OFFSET	16 ft LT			ALIGNME	NT -Y32-		0 HR.	4.5
COLI	AR ELE	<b>V.</b> 43	3 <u>.</u> 2 ft		т	OTAL DEPTH 95.0	ft	NORTHING	239,1	19		EASTING	2,400,182		24 HR.	2.7
DRILL	RIG/HAM	MER EF	F./DAT	E MID1	1904 Cl	ME-45B 90% 03/01/2019		•	DRILL N	IETHOD	) Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER W	IGGAN	IS, M.		S	TART DATE 01/23/	19	COMP. DA	TE 01/2	23/19		SURFACE	WATER DEI	PTH N/.	<b>д</b>	
ELEV	DRIVE	DEPTH	BLC	ow cor	JNT	BLOWS	PER FOO	r	SAMP.	▼/	L					
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	мо	G	ELEV. (ft)	SUIL AND RU	JCK DES	SKIPTION	DEPTH (ft
45																
40		-										-	GROUN		ACE	0.0
	42.2	1.0									0000	-10.2	UNDIVIDED	COASTA		0.0
40	20.7	- 25	3	3	3	•6					0000	_	TAN AND G	iRAY, SAI	ND (A-3)	
		- <u>3.5</u> -	3	5	5					Sat.	0 0 0 0 0 0 0 0 0 0 0 0	-				
	37.2	6.0	4	5	6	.				0-4	0 0 0 0 0 0 0 0 0 0 0 0					
35	34.7 -	- - 8.5				<b>1</b> • <b>9</b> ¹¹ • • • • • • • • • • • • • • • • • •				Sal.	0 0 0 0 0 0 0 0 0 0	-				
	-	-	3	3	4	]   ;∳7 : :   : : : :				Sat.	0000					
	-	-									0 0 0 0 0 0 0 0 0 0 0 0	31.2				12.0
30		- - 13.5									$\sim$	- GR		SAND (A-	IN 2-6) (CAS	
		-	1		2					Sat.			HAYNE	FORMAT	ION)	
		-														<u>17.0</u>
25		- 18.5	5	5	7					Cat		_	TAN AND G	RAY, SA	ND (A-3)	
	Ŧ	-								Sat.	0 0 0 0 0 0 0 0 0 0 0 0					
20	1	-									0000					
20		- 23.5 -	11	16	20					Sat	0 0 0 0 0 0 0 0 0 0 0 0 0 0	<u> </u>				
	-	-								out.	0000					
15		- 00 5				││ <b></b> →→→ <b>-</b> │→→						<u>16.2</u>	GRAY, SA		Y (A-6)	27.0
	14./	- 28.5 -	WOH	woн	2	$\mathbf{b}_2$ · · · · · · ·			SS-72	36%		-			. ,	
		-				$\left  \begin{array}{c}    \mathbf{T} \cdot \cdot \cdot \cdot \cdot \\   \cdot \cdot \cdot \cdot \cdot \\   \cdot \cdot \cdot \cdot \cdot \\   \cdot \cdot \cdot \cdot$										
10	97 -	- 33 5										- -				
		-	WOH	ТМОН	1					Sat.						
	ļ	-										6.2				37.0
5	4.7 -	- - 38.5			-						$\sim$	Gi	REEN-GRAY, O	CLAYEY	SAND (A-2	2-6)
	+	-	IMOH		2					Sat.						
	4	-									$\sim$	1.2				42.0
0	-0.3 -	- 43.5	6	10	0						-	_ GF	EEN-GRAY, S LITTLE SHE	SILTY SAN ELL FRAG	ND (A-2-4)	) W/
		-			3	19 · · · · · · · · · · · · · · · · · · ·				Sat.	-					
F		-				:::: ::::						-3.8			<u></u>	47.0
-0	-5.3 -	- 48.5 -	5	25	24					Sat	0000	-	GRAT,		,	
	+	-				: : : :   : :	49				0000					
-10		-														
	10.3	<u>- 53.5</u> -	9	10	15					Sat.		<b>_</b>				
		-				:::://::::					0000					
-15	-15 3 -	- 58 5				• • • • /  • • • •					0000	_				
		-	8	7	14	· · · • • • • • • • • • • • • • • • •		]		Sat.						
		-				::::\\::::										
-20		- - 63.5						· · · · · ·				<b>-</b>				
		_	12	14	16	: : : :  ) 30 : :				Sat.	0000					
	+	Ľ				::::/····					0000	-23.8				67.0
-25	-25.3 -	- 68.5			0	,/-				Ι.		-	WHITE, SIL	TY SAND	) (A-2-4)	
		-	6	0	ö	: : <b>∳</b> 14:   : : : :				Sat.						
		-				· · ŀ ·   · · · ·										
-30	-30.3 -	- 73.5	60/0 1									<u>- 30.3</u> — —		SEDIME		<u>73.5</u>
		-									FFF		WHITE AND G	RAY, HAI	RD, SAND	Y
<u>_</u>		ļ					$ \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$						<u>LIM</u>			<u>77.0</u>
-35			1	1			1	I	1	1	L					

									<u> </u>	ONL								
WBS	40237	.1.1			TI	I <b>P</b> F	R-3300	3	COUNTY	PEND	ER				GEOLOGIST Lane, R.W.			
SITE	DESCR	<b>PTION</b>	BRID	DGE N	O. 262	2 ON	-Y32- (	OVER -L1	NORTHE	RN- (HAI	MPS	STEAD E	BYPAS	SS)			GROUN	D WTR (ft)
BOR	NG NO.	S18	EB2-A		s	TAT	<b>ON</b> 20			OFFSET	「 1	6 ft L T			ALIGNMENT -Y32-		0 HR.	4.5
		V 12	2 ft					- <u>-</u> . TH 050#				230.44	10		FASTING 2 400 192		24 HD	 7 7
		-•. 43						95.01		NUKIH		239,1	19				24 FIR.	Z.1
DRILL	RIG/HAM	MER EF	F./DATI	e Mid	1904 C	ME-4	5B 90% (	03/01/2019				DRILL M	ETHOD	) Mu	d Rotary	IAMME	ER TYPE	Automatic
DRIL	LER W	IGGAN	IS, M.		S	TAR	T DATE	E 01/23/1	9	COMP. I	DAT	E 01/2	23/19		SURFACE WATER DEPTH	<b>I</b> N/A	4	
ELEV		DEPTH	BLC	ow co	UNT			BLOWS	PER FOOT			SAMP.	▼∕				RIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	:	25 :	50	75 1	00	NO.	Лиог	G	ELEV. (ft)	DLOC		DEPTH (ft
_35								Mate	hline									
_ 00 _	35.3	78.5	<u> </u>	8	8	t	. 16		<u> </u>	T			 Sat.		COASTA		N	
	-	-				:				1	:				WHITE, SILTY SANL	) (A-2-	4) (continu	ed)
-40	40.0					.			<u> </u>		-			-				
	-40.3 -	- 83.5 -	45	40	41	1 🗔				×81 ·			Sat.		-			
	-	_				:	· · · ·				:							
-45	45.2	- 00 5				.			- · · · ·		-			-				
	-45.5 -	- <u>00.0</u> -	11	11	12	1 🗔		23			•		Sat.	F	-			
	-	-				:	· · · ·	1			:							
-50	-50.3	- 03 5				Ŀ		1			•			Ŀ	_			
	-30.3 -	- 93.5	13	14	16	1 🗔		<b>b</b> 30 · ·			•		Sat.		-51.8			95.0
	-	-													Boring Terminated at	Eleva	tion -51.8 f	t IN
	_	_													-	1 0/11	D	
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# GEOTECHNICAL BORING REPORT

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## GEOTECHNICAL BORING REPORT

SHEET 13

									B	ORE L	OG			_			
WBS	40237	'.1.1			TI	P	R-3300B	5		Y PENDER				GEOLOGIST Lane, R.V	۷.		
SITE	DESCR	IPTION	BRID	DGE N	10.262	0N	N -Y32- C	OVER -L1	NORTHE	ERN- (HAMP	STEAD E	BYPA	SS)				VTR (ft)
BOR	NG NO.	S18_	EB2-B		S	ΓΑΤ	<b>TION</b> 26	+39		OFFSET	59 ft RT			ALIGNMENT -Y32-		0 HR.	2.8
COL	LAR ELI	<b>EV.</b> 43	3.2 ft		Т	DTA	AL DEPT	<b>H</b> 84.1 f	t	NORTHING	239,10	03		EASTING 2,400,257		24 HR.	1.9
DRILL	. RIG/HAN	IMER EF	F./DATI	e Mic	01904 CI	VE-4	45B 90% 0	3/01/2019			DRILL M	IETHO	D Mi	ud Rotary	HAMM	ER TYPE Aut	omatic
DRIL	LER W	/IGGAN	IS, M.		S	ΓAR	RT DATE	01/23/1	9	COMP. DA	<b>TE</b> 01/2	24/19		SURFACE WATER DEP	TH N/.	A	
ELEV	DRIVE ELEV	DEPTH	BLC		UNT			BLOWS	PER FOOT	r	SAMP.	$\mathbf{V}$		SOIL AND ROO	CK DES	CRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	) 2	5	50	75 100	NO.	/мо	I G	ELEV. (ft)			DEPTH (ft)
45		Ļ												_			
	42.2						1		· · · · · ·				0000	43.2 GROUNI			0.0
40	42.2	+ 1.0 +	3	3	3		• • 6	· · · · ·					00000	TAN AND BRO	JWN, S/	AND (A-3)	
40	<u> </u>	- 3.5	3	4	4		· <b>1</b> · · · ·					Sat.	0 0 0 0 0 0 0 0 0 0 0 0	-			
	37.2	6.0	3	5	6		· ¶° · · ·	· · · · ·					0 0 0 0 0 0 0 0 0 0 0 0	-			
35	34.7 -	- 8.5					· • 11 ·					Sat.	0000	-			
		-	3	5	3		: <b>4</b> 8 : :	· · · ·				Sat.	0000	-			
		ł					$\cdot$ $\begin{pmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $	· · · ·					0000	<u>31.2</u>			12.0
30	29.7 -	- 13.5	2	7	8		· · • • • •			<u> </u>		Sat	0000	TAN AND GRAY,	AL PLA SAND (/	A-3) (CASTLE	
		Ł					$1 \cdot 15$					Jai.	0000	L HAYNE F	ORMAT	ION)	
25	. 247 -	185					· · · \						0000	-			
	- 24.7		6	9	14		<b>.</b>	23				Sat.	0000	-			
		Ŧ					· · · ·						0000	-			
20	19.7 -	23.5	13	13	12				+			0.1	0000	-			
	-	Ŧ			12			25				Sat.	0000	-			
15	- -	<b>†</b>														Y (A-6)	27.0
10		<u>+ 28.5</u> +	wон	wон	woн	•	· · · · ·					Sat.		-			
		ŧ					· · · · ·	· · · · ·						-			
10	9.7 -	33.5												-			
	-	ŧ				• • 1	1				SS-73	42%		-			
5		ŧ				ľ		· · · · ·									<u> </u>
5	4.7 -	- <u>38.5</u>	woн	2	4		<b>b</b> 6					Sat.	$\langle / /$	TRACE LIMEST	ONE FF	RAGMENTS	,
	-	ŧ					<u>.</u>						///	- - 12			42 0
0	-0.3 -	43.5			_		<u>``\``</u>			· · · · · ·				GREEN-GRAY, SI		ND (A-2-4) W/	
	-	ŧ	10	9	7		16	· · · · ·				Sat.			LINAG		
F	-	ŧ												-			
-0	-5.3 -	<u>+ 48.5</u>	20	17	20				+			Sat		-			
	-	ŧ					· · · ·							-			
10	- <u>10.3</u> -	- 53.5						· · · · · ·	• • • •	· · · · · ·			0000	<u>-9.8</u>		<u></u>	<u> 53.0</u>
		+	10	19	28		· · · ·		47			Sat.	0 0 0 0 0 0 0 0 0 0 0 0		עויהע (P	· 0)	
15	-	ŧ					· · · · ·	/ .  /					0000	-			
-15	-15.3 -	- 58.5	9	12	16				 			Sat	0 0 0 0 0 0 0 0 0 0 0 0	- -			
		ŧ.					· · · ·	<b>T</b>						-			
20	-20.3 -	63.5						····		· · · · ·			0000	-			64.0
		+	16	15	85/0.3			'	+	100/0.8					EDIME		04.0
<u>-</u>	-	ŧ					· · · ·		 					GRAY, HARD, S			<u> 67.0</u>
25	-25.3 -	68.5	8	9	9		· · · · · · · · · · · · · · · · · · ·					S-t		L COAST WHITE, SILT	Y SANE	<b>IN</b> D (A-2-4)	
		Ł		⁻			· · · • • • • • • • • • • • • • • • • •					Jodi.					
-30	20.2	72 5					· · · · -		·							NTARY ROCK	<u> 72.0</u>
_	-30.3 -		60/0.1	1						60/0.1	2		F	GRAY, HARD, S	ANDY L	IMESTONE	
		F					$\frac{1}{2}$		+	+				<u>- ^{32.8} COAS</u>		in	<u> 76.0</u>
-35		L												WHITE, SILT	Y SANE	D (A-2-4)	

						D		UG							
WBS	40237.1.1			Т	<b>P</b> R-3300B	COUNT	Y PENDER				GEOLOG	ST Lane, R.\	N.		
SITE	DESCRIPTIO	N BRI	DGE N	0.262	ON - Y32- OVER - L1	NORTHE	ERN- (HAMP	STEAD I	BYPASS	5)	·			GROUN	D WTR (ff
BOR	NG NO. 518	FR2-F	3	s	TATION 26+39		OFFSET #	59 ft RT		,		NT -Y32-		0 HR	29
		32ft		т		ft	NORTHING	230.1	03		FASTING	2 400 257		24 HR	1 (
				1004 C						Mue	Boton	2,400,201			Automatia
				1904 Ci		10				wide					Automatic
DRIL		NS, M		5		19			24/19	1	SURFACE	WATER DEP	IH N/A	<b>\</b>	
ELEV (ft)	ELEV (ft)	H BLC 0.5ft	0.5ft	UNI 0.5ft	0 25	50 50	75 100	NO.	MOI	O G	ELEV. (ft)	SOIL AND RO	CK DESC	RIPTION	DEPTH
-35					Mat	ch Line									
	-35.3 78.5		8	10	· · · • 18 · · · ·	· · · ·		t	Sat.	-				N 1) (continu	
	‡				· · · I·   · · · ·					-	VVI	TIL, SILTT SA	IND (A-2-4	+) (continu	eu)
-40	-40.3 + 83.5				   <del><b> </b></del>		· · · · ·			_	40.3				83
-40		69	31/0.1				100/0.6					GRAY, HARD, S ing Terminated CPSR: SAN	SEDIMEN SANDY LI I at Elevat DY LIMES	TARY RO MESTONE ion -40.9 ft STONE	

# GEOTECHNICAL BORING REPORT

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## GEOTECHNICAL BORING REPORT BORE LOG

WBS	<b>4</b> 0237	<b>'</b> .1.1			Т	IP R-33	800B		COL	JNTY	PENDEF	R			C	GEOL	OGIST	GOOD	NIGHT, D	).J.		WBS	40237	7.1.1			TI	P R-330	0B	COUNT
SITE	DESCR	IPTION	BRID	GE N	O. 262	2 ON - Y3	32- OV	/ER -L1	NOR	RTHER	RN- (HAMF	STEAD	BYPA	ASS)						GROUND WTR	(ft)	SITE	DESCR		BRI	DGE N	0. 262	ON - Y32	- OVER -	L1_NORTHE
BOR	ing no.	MSE1	-LT		S	TATION	24+	·58		(	OFFSET	56 ft LT			4	ALIGN	IMENT	-Y32-		0 HR.	4.2	BOR	ing no.	MSE	1-RT		ST	ATION	24+53	
COL	LAR EL	<b>EV.</b> 42	.7 ft		Т	OTAL D	EPTH	40.0	ft	- I	NORTHIN	<b>G</b> 238,9	972		E	EASTI	<b>NG</b> 2,4	100,089		24 HR.	3.5	COL	LAR EL	<b>EV.</b> 43	3.8 ft		т	DTAL DE	<b>PTH</b> 40	.0 ft
DRILI	RIG/HAN	IMER EF	F./DATE	MIC	1904 C	ME-45B 9	0% 03	/01/2019				DRILL	METHO	DD M	lud Ro	Rotary			HAMM	IER TYPE Automati	с	DRILL	. RIG/HAN	/MER EF	F./DAT	E MID	1904 CN	/IE-45B 90	% 03/01/20	19
DRIL	LER W	/IGGIN	5, M.		S	TART D	ATE	02/06/2	20	•	COMP. DA	<b>TE</b> 02/	/06/20	)	5	SURFA	ACE WA	TER DE	PTH N	Ά		DRIL	LER V	VIGGIN	S, M.		ST	ART DA	<b>TE</b> 02/0	6/20
ELEV	DRIVE FL FV	DEPTH	BLO	w co	UNT			BLOWS	PER F	TOOT		SAMP					SOI		OCK DES	CRIPTION		ELEV	DRIVE FLFV	DEPTH	BLC	ow co	UNT		BLOV	VS PER FOO
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25		50	7	5 100	NO.	/mc	DI G	EL	LEV. (ft)				DEPT	"H (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
ELEV (fft) 40 35 30 25 20 15 10 15 10 15 10 15	DRIVE ELEV (ft) 39.2 36.7 34.2 29.2 24.2 19.2 14.2 9.2 4.2	DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5 23.5 33.5 33.5 33.5 33.5	ВLО 0.5ft 1 2 12 12 13 WOH WOH	W CO 0.5ft 1 1 6 3 2 15 16 WOH WOH 1	UNT 0.5ft 1 1 1 6 4 2 19 16 WOH WOH 3			■LOWS	PER F 50 	7 7 7		SAMP NO.	MC Sat Sat Sat Sat Sat Sat			<u>LEV. (ft)</u> <u>2.7</u> <u>9.7</u> <u>7.2</u> <u>5.7</u> <u>.7</u> <u>.7</u> <u>.7</u> <u>.7</u>		GROU NDIVIDEI TAN, I AND BR( -4) WITH TAN, I TAN, I TAN, I TAN, I TAN, I CANDER -4) WITH TAN, I CANE FO CANE FO CANE FO CANE FO CLAYEY C	ND SURF COAST/ SAND ( DVN, SIL TRACE ( CLAYEY (A-2-4) STAL PLZ A-3) (CA: TMATION SSE. TO F IELLS AN TRAGS. I AT Eleval YEY SAN	CRIPTION DEPT ACE AL PLAIN A-3) TY F. SAND DRGANICS A-3) SILTY F. SAND SILTY F. SAND CLAY (A-6) CLAY (A-6) CLAY (A-6) D LIMESTONE ion 2.7 ft IN CP: D	<u>0.0</u> <u>3.0</u> <u>5.5</u> <u>12.0</u> <u>17.0</u> <u>37.0</u> <u>40.0</u>	ELEV (ft) 45 40 35 30 25 20 15 10 5	DRIVE ELEV (ft) 42.8 40.3 37.8 35.3 30.3 25.3 20.3 15.3 10.3 5.3	DEPTH (ft) 1.0 3.5 6.0 8.5 13.5 18.5 28.5 33.5 33.5 33.5 33.5	I     BLC       0.5ft       1       2       1       3       2       5       12       1       1       WOH       1	DW CO 0.5ft 1 1 3 4 2 7 19 1 WOH 1	UNT 0.5ft 1 2 4 4 5 12 31 2 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 1	BLOV 25	VS PER FOO 50 
NCDOT BORE DOUBLE R3300																							-							



## GEOTECHNICAL BORING REPORT BORE LOG

STE DESCRIPTION         BRIDGE NO. 282 ON-Y32-OVER-L1_NORTHERN- (HAMPSTEAD BYPASS)         GROUND WTR (ft) DRING NO. MSE2LT         GROUND WTR (ft) STE DESCRIPTION.         GROUND WTR (ft) DRING NO. MSE2 2 HR         GROUND WTR (ft) DRING NO. MSE2 2 HR         STE DESCRIPTION.           COLLAR ELEV. 42.0 ft         TOTAL DEPTH 45.0 ft         NORTH MOS 201:00         DRILL RETHOD. Mud Relary         HAMMER TYPE Automatic         DRILL RETHOD. Mud Relary         HAMMER TYPE Automatic           DRILLER. WIGGINS, M.         START DATE 0207/20         COMP. DATE 0207/20         SURFACE WATER DEPTH N/A         DRILL RETHOD. Mud Relary         HAMMER TYPE Automatic           LEV         DIFUE         DIFUE         BLOWS PER FOT (ft)         DIFUE         SURFACE WATER DEPTH N/A         DEPTH, BLOW OVER WATER DEPTH N/A         DEPTH, BLOW OVER WATER DEPTH N/A           45         BLOWS PER FOT (ft)         DIFUE			, =	GEOLOGIST GOODINIG		FLIDER	COONT	- K-3300B				1.1	40237.	WBS	1
BORING NO.         MESCALT         TATION 26:403         OFFSET 52:ft.IT         ALLONMENT -/32:         0 HR         2.5         BORING NO.         MSE           COLLAR ELEV.         42 HR         ft.TGAL DEPTH         45.0 ft         NORTHING 239,120         EASTING 24:01,133         24 HR         Ft.DGAL HAMMER TP/DAE         COLLAR ELEV.         42         HR         6.0 ft         AUMMER TP/DAE         AU	ON BRIDGE NO	SITE DES	GROUND WTR (ft)		EAD BYPASS)	ERN- (HAMP	/ER -L1_NORTHE	ON -Y32- O	). 262	RIDGE N	BRI	PTION	DESCRI	SITE	:
COLLAR ELEV.         42.0 ft         TOTAL DEPTH         45.0 ft         NORTHING         239,120         EASTING         2,400,133         24 HR         FIAD           DRULER WORGINS, M.         START DATE         MD190 (DE-458 90% 030/02/019         DORULER V.         MARRENTPE Automatic         DRULENC WATER DEPTH         NA           DRULER WORGINS, M.         START DATE         0.0007 PDATE         0.0007 PDATE         COMP.PATE         0.0007 PDATE         SUBFACE WATER DEPTH         NA           LEV         ERV         (ft)         0.010 0.011         ELV         DRULER WORGINS, M.         TOTAL DEPTH         DEPTH         NA           45	SE2-RT	BORING	0 HR. 2.5	ALIGNMENT -Y32-	ft LT	OFFSET (	03	ATION 26+	ST		2-LT	MSE2	NG NO.	BORI	I
DRILLER         MIDISAL CMA-438 90% 03012019         DRILL METHOD         Multiple Rest         HAMMER TYPE         Automatic           DRILLER         MICGINS, M.         START DATE         220/720         COMP. DATE         220/720         SURFACE WATER CEPTH         N/A           LEV         DRILLER         MICGINS, M.         START DATE         220/720         SURFACE WATER CEPTH         N/A           LEV         DRILLER         MICGINS, M.         START DATE         220/720         SURFACE WATER CEPTH         N/A           LEV         DRIVE         DRIVE SPERFEDOT         BLOWS PERFEOT         SOIL AND ROCK DESCRIPTION         DEFINE, MIC         DEF	42.7 ft	COLLAR	24 HR. FIAD	EASTING 2,400,133	239,120	NORTHING	45.0 ft	TAL DEPTH	тс		.0 ft	<b>V.</b> 42.	AR ELE	COLL	-
DRULER         WIGGINS M.         START DATE         02/07/20         SURFACE WATER DEPTH         NA           ELEV         DERULER         WIGGINS M.         START DATE         02/07/20         SURFACE WATER DEPTH         NA           ELEV         DERULER         WIGGINS M.         START DATE         02/07/20         SURFACE WATER DEPTH         NA           H         0         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51         0.51 <td>REFF./DATE MID19</td> <td>DRILL RIG</td> <td>HAMMER TYPE Automatic</td> <td>id Rotary</td> <td>RILL METHOD Mud</td> <td></td> <td>01/2019</td> <td>1E-45B 90% 03</td> <td>1904 CN</td> <td>ATE MID</td> <td>F./DAT</td> <td>MER EFF</td> <td>rig/hami</td> <td>DRILL</td> <td></td>	REFF./DATE MID19	DRILL RIG	HAMMER TYPE Automatic	id Rotary	RILL METHOD Mud		01/2019	1E-45B 90% 03	1904 CN	ATE MID	F./DAT	MER EFF	rig/hami	DRILL	
ELEV         DETTY         BLOWS COUNT         BLOWS PER FOOT         SAMP         NO.         Count         Sold AND ROCK DESCRIPTION         DEFTH(R)           45         0         25         50         75         100         0         ELEV         (R)         0         DEFTH(R)         ELEV         (R)         DEFTH(R)         ELEV         DEFTH(R)         <	GINS, M.	DRILLER	I N/A	SURFACE WATER DEPT	02/07/20	COMP. DA	02/07/20	ART DATE	ST		S, M.	IGGINS	ER W	DRILI	I
(f)       (f)       (f)       0.51       0.51       0       25       50       75       100       NO.       MOI G       ELEV. (f)       DEPTH(f)       (f)	TH BLOW COU	ELEV DR	DESCRIPTION		SAMP.	Г	BLOWS PER FOOT		JNT	LOW CO	BLC	DEPTH	DRIVE	ELEV	E
45       40       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       2       3       410       10       1       40       325       3.5       1       1       5       3       6       6       417       10       40       392       3.5       3.6       6       6       417       10       40       392       3.5       3.6       6       6       417       10       40       392       3.5       3.6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6       6	^{t)} 0.5ft 0.5ft	(ft) (f	DEPTH (ft)	ELEV. (ft)	NO. MOI G	75 100	50	0 25	0.5ft	ift 0.5ft	0.5ft	(ft)	(ft)	(ft)	L
Sat.     (A-2-5) UMESTARGS.     450       Image: Start St	BLOW COULT         0.5ft       0.5ft       0.5ft         0       2       3         2       3       1         2       3       1         5       2       3         0       2       4         5       2       3         1       2       3         4.5       1       2         4.5       1       2         4.5       1       1         4.5       1       1         4.5       1       1         4.5       1       1         4.5       1       1         4.5       1       1         4.5       1       1         4.5       WOH       WOH	ELEV DEL (ft) EL (ft)	SURFACE       0.0         ASTAL PLAN       0.0         SLIGHTLY SILTY F.	SOIL AND ROC ELEV. (ft) 42.0 GROUND 42.0 UNDIVIDED C TAN AND BROWN, SAND (A-3) WITH 30.0 COAST. GRAY-TAN, CLA (CASTLE HAYN 25.0 GRAY, SLIGHTLY 25.0 GRAY, SLIGHTLY 15.0 TAN-GRAY, CLAY 10.0 GRAY, SILTY F. S 5.0 GRAY, CLAYEY SIL 5.0 GRAY, CLAYEY SIL 5.0 GRAY, CLAYEY SIL 3.0 LIMESTON Boring Terminated CP: SIL	SAMP. VI O NO. MOI G W W Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.		BLOWS PER FOOT		JNT 0.5ft 3 5 10 6 4 6 25 0 WOH 1 6	LOW COI ift 0.5ft 2 1 8 5 3 8 0 10 10 1 0H WOH 7 7 7	BLC 0.5ft 1 1 5 3 3 2 2 3 3 10 10 1 1 WOH 4	DEPTH (ft) - 1.0 - 3.5 	DRIVE ELEV (ft) 41.0 38.5 36.0 33.5 28.5 23.5 18.5 13.5 3.5 -1.5	ELEV (ft) 40 35 30 25 20 15 10 5 0	BLE R3300_GEO_FALCON_CULVERT AND WALLS_GINT_LOGS.GPJ_NC_DOT.GDT 4/16/20





-Y32-,LOOKING UPSTATION FROM -Y32- STATION 24+00

LOOKING AT BRIDGE NO.262 BENT I FROM RIGHT OF -Y32- CENTERLINE

PROJECT REFERENCE NO.

R-3300B

SHEET NO.

16

3300B

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REFERENCE

# **CONTENTS** SHEET NO. 2

- 5 6-23 **DESCRIPTION** 

LEGEND (SOIL & ROCK)

LABORATORY SOIL TEST RESULTS

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION CULVERT ON -Y30RPD-(HAMPSTEAD BYPASS RAMP) STATION 19+49 OVER WINDING BRANCH

4023 PROJEC

$\mathbb{N}.\mathbb{C}.  \mathbb{R}-3300\mathbb{B}    \mathbb{I}$	23

#### CAUTION NOTICE

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

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

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

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

PERSONNEL

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INVESTIGATED B	Y CATLIN
DRAWN BY CL	ROCKETT, S.C.
	HAMM I R
CHECKED BY	
SUBMITTED BY .	FALCON
DATE	2020



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION				
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0,I BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK				
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL, COMPOSITION, ANGLU ARITY, STRUCTURE, PLASTICITY, ETC., FOR, EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:				
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT				
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO				
CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC				
CHOUP         H-1         H-3         H-2         H-4         H-3         H-6         H-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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA				
SYMBOL BOOOD STATE STA	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT				
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS				
■10 50 MX GRANULAR CLAY MUCK, ■40 30 MX 50 MX 51 MN SOLLS COLO PEAT		WEATHERING				
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK				
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY, ORGANIC 5 - 10% 12 - 20% SIME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO				
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN UNCEDATE HIGHLY	HIGHLY ORGANIC > 10% 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.				
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 ROOM				
USUAL TYPES STONE FRAGS. DE MAIDE CRAVEL AND 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER				
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS				
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH				
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	O-M- Spring or seep					
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO				
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOU, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. RUCK GIVES "CLUNK" SOUND Y				
(TONS/FT ² )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E				
GENERALLY VERY LOUSE < 4 GRANNIAR LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.				
MATERIAL         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         10 TO 30         10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANYMENT AUGER BORING (A) CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR				
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF				
VERY SUFI         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>				
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS				
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.				
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS					
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.				
0PENING (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 BL				
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE				
CEAIN MM 305 75 2.0 0.25 0.05 0.05		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.				
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 O				
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.				
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 FINGER PRESSURE.				
- SAIUKAIED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.				
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.				
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING				
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED				
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1				
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.Ø				
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED				
PLASTICITY	В НОLLOW AUGERS   □-В					
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH		FUR SEDIMENTARY RUCKS, INDUKATION IS THE HARDENING OF MATERIAL BY CEMENTING, HER RUBBING WITH FINGER FREES NUMEROUS GRAINS:				
SLIGHTLY PLASTIC 6-15 SLIGHT		GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.				
MUDERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.				
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL				
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED. YELLOW-BROWN, BLUE-GRAY).		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; SAMPLE BREAKS ACROSS GRAINS.				

#### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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inn	SAMPLE		DEPTH AASHTO		WEIGHT % P	ASSING (SIEVES) % %	
	NO. 0.	FFSET STATION	INTERVAL CLASS.	L.L. P.I. C. SAND F. SAND	D SILT CLAY 10	40 200 MOISTURE ORGANIC	2
90	<u>SS-41</u> 71 <u>SS-42</u> 71	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8.5'-10.0' A-7-6 13.5'-15.0' A-6	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	<u>SS-39</u> 85 <u>ST-6</u> 85	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8.3'-9.8' A-7-6 10.0'-12.0' A-7-6	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
BO	<u>SS-40 85</u>	<u>FT LT 19+63</u>	<u>13.3'-14.8'</u> <u>A-7-6</u>				
.70	(A) UNDVIDED BUNDVIDED	<b>COAST AL PLAIN:</b> DARK G COAST AL PLAIN: GRAY.WE	RAY.MOIST TO SATURATE TT TO SATURATED.LOOSE	ED.SOFT.SILT (A-4)WITH LITT E TO MED.DENSE.CLAYEY SAN	LE ORGANICS AND TRACE D AND FINE TO COARSE	WOOD AND ROOT FRAGMENTS (NO RE SAND (A-2-6, A-3) WITH SHELL FRAGM	COVERY) IENTS
		COASTAL PLAIN: GRAY.WE	T TO SAT V. SOFT TO S	SOFT, SANDY AND SILTY CLAY (	A-6, A-7-6) WITH TRACE	SHELL FRAGMENTS	
. 60	E COASTAL PL	AIN SEDIMENTARY ROCK	LIGHT GRAY, SOFT TO L	HARD, SANDY LIMESTONE (CAST	LE HAYNE FORMATION)	(CASTLE HAINE FORMATION)	
.50	<u>SS-39</u> ST-6				PROP	OSED FILL	
	<u>[SS-40]</u> Y30RPD-1949-LT					SS-41 SS-42	
.40	19+63 851 LT			Ľ		19+22 71' RT	
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-20						BT	
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- <i>-30</i>						GROUNDLIN GROUNDLIN	
				19+48.60		RECEIVED F	FROM STANTEC DATED NOVEMBER 2019.
-40	·····					INFERRED S THROUGH T	STRATIGRAPHY IS DRAWN THE BORINGS WITH BOTH
				-Y30RPD-	-	CULVERTS	KEW: 112°
						*ARTESIAN	WELL CONDITIONS ENCOUNTERED.

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## GEOTECHNICAL BORING REPORT BORE LOG

WBS	<b>4</b> 0237	'.1.1			Т	IP R-330	0B	COUNT	Y PENDEF	2			GEC	DLOGIST FUTRAL, C.		WBS	<b>3</b> 40237.1	1.1			TIF	• R-3300E	3	COUNTY
SITE	DESCR	IPTION	CUL	VERT	ON -Y	/30RPD- (I	HAMPSTEA	D BYPAS	S RAMP) ST	TATION ²	19+49	OVE	R WIND	DING BRANCH	GROUND WTR (ft)	SITE	DESCRIF	PTION	CUL	VERT	ON -Y3	80RPD- (HA	MPSTEA	D BYPASS
BOR	ing no.	Y30F	PD-19	49-LT	s	TATION	19+63		OFFSET	85 ft LT			ALIC	GNMENT -Y30RPD-	0 HR. N/A	BOR	ING NO.	Y30R	RPD-19	49-RT	ST	ATION 19	)+22	
COL	LAR ELI	<b>EV.</b> 2	5.6 ft		Т	OTAL DEP	<b>PTH</b> 39.7	ft	NORTHING	<b>G</b> 231,7	68		EAS	TING 2,378,642	24 HR. N/A	COL		<b>V.</b> 24	4.1 ft		тс	TAL DEPT	<b>H</b> 40.0 f	ť
DRILI	RIG/HAN	IMER EF	F./DAT	E CA	r1314 C	CME-45B 949	% 09/26/2018			DRILL	NETHO	D Mu	ud Rotary	HAMME	ER TYPE Automatic	DRIL	L RIG/HAMN	IER EF	F./DATE	E CAT	1314 CN	/IE-45B 94% (	9/26/2018	I
DRIL	LER C	halmer	s, D. T.		s	TART DA	TE 07/03/	19	COMP. DA	TE 07/	03/19		SUR	FACE WATER DEPTH N//	4	DRIL	LER Ch	almers	s, D. T.		ST	ART DATE	07/02/1	19
ELEV	DRIVE	DEPTH	BLC	w co	UNT		BLOWS	PER FOO	Г	SAMP.		L				ELEV		DEPTH	BLO	W COL	JNT		BLOWS	PER FOOT
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	73	+				:\:	.   .					0000		GRAY, FINE SAND	(A-3)		‡						· · · · ·	
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	-7.7	+ - 33.3											<u>6.4</u>	COASTAL PLAIN SEDIMEN			‡						$\begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \end{vmatrix}$	
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DT.GI		ŧ											_	CPSR: SANDY LIME	STONE		‡							
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PENDER				GEC	DLOGIST	FUTRAL, (	C.		
RAMP) STA	ATION 1	9+49 (	OVEF		ING BRAN	ICH		GROUN	ID WTR (ft)
OFFSET 7	71 ft RT			ALIC	GNMENT	-Y30RPD-		0 HR.	2.6
NORTHING	231,8	58		EAS	<b>TING</b> 2,3	78,508		24 HR.	1.9
	DRILL M	ETHOD	) Mu	ld Rotary	1		HAMME	R TYPE	Automatic
COMP. DAT	<b>FE</b> 07/0	)2/19		SUR	FACE WA	TER DEPT	<b>H</b> N/A	۱	
75 100	SAMP. NO.		L O G		SOI	AND ROC	K DESC	RIPTION	1
				24.1	UN	GROUND	SURFA	CE	0.0
				-	DARK	GRAY, SIL	T (A-4)	W/ LITTL	.E
		Sat.		-	one	FRAG	MENTS	V)	,
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			$\square$	-	GRAY, SHELL I		Y (A-7-6 S, HIGH	) W/ TRA ILY PLAS	STIC
	SS-41	49%	$\square$	-					
				12.1					<u>CE</u> <u>12.0</u>
	SS-42	33%		-	01011,	SHELL FF	RAGMEN	ITS	
				8.1					<u> 16.0</u>
				-	GRAI	N/ SHELL F		ENTS	0)
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		Sat.		-	(CA	STLE HAYN	IE FOR	MATION)	
				-7.9					
		0-4		-	LIGHT	GRAY, SIL1	<b>AL PLAI</b> IY SANI	<b>N</b> D (A-2-4)	W/
		Sat.		-	L	MESTONE	FRAGM	IENTS	
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REFERENCE

# **CONTENTS** SHEET NO. 2

- 5 6-23 **DESCRIPTION** 

LEGEND (SOIL & ROCK)

LABORATORY SOIL TEST RESULTS

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION CULVERT ON -Y30RPD-(HAMPSTEAD BYPASS RAMP) STATION 19+49 OVER WINDING BRANCH

4023 PROJEC

$\mathbb{N}.\mathbb{C}.  \mathbb{R}-3300\mathbb{B}    \mathbb{I}$	23

#### CAUTION NOTICE

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

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

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

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

PERSONNEL

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INVESTIGATED BY	CATLIN
DRAWN BY	ROCKETT, S.C.
CHECKED BY	IAMM, J. R.
	FALCON
	2020
DATE APRIL	2020



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION							
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0,I BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK							
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL, COMPOSITION, ANGLU ARITY, STRUCTURE, PLASTICITY, ETC., FOR, EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:							
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT							
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO							
CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC							
CHOUP         H-1         H-3         H-2         H-4         H-3         H-6         H-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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA							
SYMBOL BOOOD STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STA	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT							
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS							
■10 50 MX GRANULAR CLAY MUCK, ■40 30 MX 50 MX 51 MN SOLLS COLO PEAT		WEATHERING							
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK							
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY, ORGANIC 5 - 10% 12 - 20% SIME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO							
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN UNCEDATE HIGHLY	HIGHLY ORGANIC > 10% 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.							
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 ROOM							
USUAL TYPES STONE FRAGS. DE MAIDE CRAVEL AND 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER							
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS							
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH							
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	O-M- Spring or seep								
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO							
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOU, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. RUCK GIVES "CLUNK" SOUND Y							
(TONS/FT ² )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E							
GENERALLY VERY LOUSE < 4 GRANNIAR LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.							
MATERIAL         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         10 TO 30         10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANYMENT AUGER BORING (A) CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR							
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF							
VERY SUFI         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>							
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS							
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.							
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS								
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.							
0PENING (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 BL							
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE							
CEAIN MM 305 75 2.0 0.25 0.05 0.05		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.							
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 O							
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.							
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 FINGER PRESSURE.							
- SAIUKAIED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.							
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.							
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING							
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED							
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1							
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.Ø							
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED							
PLASTICITY	В НОLLOW AUGERS   □-В								
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH		FUR SEDIMENTARY RUCKS, INDUKATION IS THE HARDENING OF MATERIAL BY CEMENTING, HER RUBBING WITH FINGER FREES NUMEROUS GRAINS:							
SLIGHTLY PLASTIC 6-15 SLIGHT		GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.							
MUDERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.							
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED. YELLOW-BROWN, BLUE-GRAY).		DIFFICULT TO BREAK WITH HAMMER.							
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REOUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.							

#### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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											SOI	<u> </u>		T R						
							SAMPLE	OFFICER	GTATION	DEPTH	AASHTO			1 10	% BY W	EIGHT		% PASSI	NG (SIEVI	ES)
100							NO.	OFFSET	612±13	INTERVAL	CLASS.	<i>L.L.</i>	P.1.	C. SAND	F. SAND	SILT	CLAY	10	40 2	200 M
							ST-5	86 FT RT	612 + 13 612 + 13	10.5'-12.5'	A-7-0 A-6	34	16 J	9	48	47 18	34 24	98	98 94	<u>91</u> 49
			1 1 1	1			SS-31 SS-26	86 FT RT 95 FT LT	612+13 612+33	13.8'-15.3' 0 0'-1 5'	A-2-4 A_4	23	4	39 13	37 56	<u>9</u> 17	15 14	<u>99</u> 100	<u>88</u> . 96	<u>29</u> 39
							SS-20 SS-27	95 FT LT	612+33	3.9'-5.4'	A-7-6	87	69	6	27	27	40	100	98	71
						:	<u>SS-28</u> SS-29	95 FT LT 95 FT LT	612 + 33 612 + 33	7.9'-9.4' 12.9'-14.4'	A-7-6 A-2-4	28	54 7	18 39	24 38	<u>44</u> 7	14 16	100 100	88	<u>66</u> 30
80							(A) UNDIVID (B) UNDIVID	ED COASTAL ED COASTAL	PLAIN: DAR	K GRAY.WET.V.S K GRAY AND BR	OFT.HIGHLY OF	RGANIC E.FINE	MUCK SAN	WITH R D (A-3) V	OOTS WITH LITT	LE ORG	ANICS			
.70							©UNDIVID	ED COASTAL	PLAN: GRA	Y,SAT.V.SOFT T	O SOFT.SILTY	CLAY (	A-7-6	5), HIGHLY	PLASTIC.	WITH TH	RACE SHE	LL FRAGS		0.0.4
							E COAST A	L PLAIN: LIGH	T GRAY,SA	T.MED.DENSE.SI	ILTY SAND (A-2	2-4) Wi	TH T	RACE SH	IELL FRAG	GS.AND I	LIMESTON	E FRAGS.	A-2-4,A-	-2-0,A
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## GEOTECHNICAL BORING REPORT BORE LOG

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;	SITE	DESCR	IPTION	CUL	VERT	ON -L	1- (HA	AMPSTI	EAD BYP	ASS) STA	TION 612+1	3 OVEF	R WIN	IDING	G BRA	ANCH	GRO	UND WTR (ft)	SITE	DESCR	IPTION	CUL	ON -L	N -L1- (HAMPSTEAD BYPASS) STA				
I	BORII	NG NO.	L1-6′	1213-L	Т	S	TATIC	<b>DN</b> 612	2+33		OFFSET	95 ft LT			A	LIGNMENT -L1-	0 HF	<b>r.</b> 0.0	BOR	ing no.	L1-61	1213-R	Т	S	<b>STATION</b> 612+13			
	COLL	AR ELE	<b>EV</b> . 27	7.9 ft		т	OTAL	DEPTH	H 24.4 ft		NORTHING	<b>i</b> 232,1	17		E	<b>ASTING</b> 2,378,290	24 HF	<b>r.</b> 0.0	COLLAR ELEV.23.4 ftTOTAL DEPTH25.3 ft									
I	DRILL	rig/ham	IMER EF	F./DAT	E CAT	1303 C	ME-55	50 77% Oʻ	1/27/2015			DRILL N	NETHO	DD M	lud Ro	tary HA	MMER TYP	E Automatic	DRILI	RIG/HAN	/MER EF	F./DATE	1314 C	14 CME-45B 94% 09/26/2018				
I	DRILL	ER C	halmer	s, D. T.		S	TART	DATE	06/19/19	9	COMP. DA	<b>TE</b> 06/	19/19	)	S	URFACE WATER DEPTH	N/A		DRIL	LER C	halmers	s, D. T.		S	START DATE 07/02/19			
E	LEV	DRIVE ELEV	DEPTH	BLC	ow co	JNT			BLOWS F	PER FOOT	-	SAMP.	▼∕			SOIL AND ROCK D	ESCRIPTIO	ON	ELEV	DRIVE	DEPTH	BLO	w col	UNT		BLOWS	PER FOO	
	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5 5	50	75 100	NO.	Имс	) G	ELE	EV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	
	30		Ļ												L				25		Ļ							
		27.9	0.0			WOLL				1				,	27.	9 GROUND SL	IRFACE	0.0		23.4	+ 0.0	  WOH	WOH	WOH	<b>1</b>	<u> </u>		
	25	-	ł	WOH	WOH	WOH	•0- -	· · ·	· · · ·	· · · · ·		SS-26	38%		- 25.	UNDIVIDED COA 4 DARK GRAY TO GRA	STAL PLAII AY, SANDY	N ´SILT _{2.5}	20		ŧ				$   \left[ \begin{array}{cccccccccccccccccccccccccccccccccccc$			
	25	24.0	3.9			WOLL									╞┈	GRAY. SILTY CLAY	ORGANICS	s HLY	20	19.3	4.1	2	2	3	<u>\</u>	+	1	
		-	ł	INOH	WOH	WOH	<b>•</b> 0-		· · · ·			SS-27	62%	° N		PLAST	ic ,				ŧ			Ŭ	●5 			
	20	20.0	7.9												Ł				15	146-					<u>i</u>			
		-	L	IMOH	WOH	1	<b>●</b> 1·			· · · ·		SS-28	61%							14.0	1 0.0	WOH	1	2	<b>•</b> 3			
		-	L												<u>16.</u>		ND (A-2-4)	) <u>11.0</u>			ŧ							
_	15	15.0	12.9	WOH	WOH	1						SS-29	37%		F			,	10	9.6 -	13.8	1	1	1	1	+		
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	10	10.0	[ 17 9				:							0000		GRAY, FINE TO COA	RSE SAND	(A-3)	5		Ŧ							
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REFERENCE

# **CONTENTS** SHEET NO. 2 -3 - 5 6-19

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

LABORATORY SOIL TEST RESULTS

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION CULVERT ON -Y30RPA-(HAMPSTEAD BYPASS RAMP) STATION 16+22 OVER WINDING BRANCH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3300B	1	19

#### CAUTION NOTICE

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

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

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

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

PERSONNEL

CATLIN
INVECTION TED BY CATLIN
INVESTIGATED BY
DRAWN BY CROCKETT, S.C.
CHECKED BY HAMM, J. R.
SUDWITTED BY FALCON
DATE APRIL 2020



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION							
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0,I BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK							
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL, COMPOSITION, ANGLU ARITY, STRUCTURE, PLASTICITY, ETC., FOR, EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:							
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT							
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO							
CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC							
CHOUP         H-1         H-3         H-2         H-4         H-3         H-6         H-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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA							
SYMBOL BOOOD STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STA	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT							
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS							
■10 50 MX GRANULAR CLAY MUCK, ■40 30 MX 50 MX 51 MN SOLLS COLO PEAT		WEATHERING							
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK							
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY, ORGANIC 5 - 10% 12 - 20% SIME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO							
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN UNCEDATE HIGHLY	HIGHLY ORGANIC > 10% 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.							
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 ROOM							
USUAL TYPES STONE FRAGS. DE MAIDE CRAVEL AND 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER							
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS							
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH							
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	O-M- Spring or seep								
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO							
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOU, SEV.) AND LAN BE EXCAVATED WITH A GEOLOGIST'S PICK. RUCK GIVES "CLUNK" SOUND Y							
(TONS/FT ² )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E							
GENERALLY VERY LOUSE < 4 GRANNIAR LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.							
MATERIAL         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         10 TO 30         10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANYMENT AUGER BORING (A) CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR							
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF							
VERY SUFI         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>							
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS							
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.							
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS								
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.							
0PENING (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 BL							
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE							
CEAIN MM 305 75 2.0 0.25 0.05 0.05		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.							
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 O							
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.							
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 FINGER PRESSURE.							
- SAIUKAIED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.							
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.							
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING							
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED							
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1							
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.Ø							
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED							
PLASTICITY	В НОLLOW AUGERS   □-В								
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH		FUR SEDIMENTARY RUCKS, INDUKATION IS THE HARDENING OF MATERIAL BY CEMENTING, HER RUBBING WITH FINGER FREES NUMEROUS GRAINS:							
SLIGHTLY PLASTIC 6-15 SLIGHT		GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.							
MUDERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.							
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED. YELLOW-BROWN, BLUE-GRAY).		DIFFICULT TO BREAK WITH HAMMER.							
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REOUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.							

#### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-





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## GEOTECHNICAL BORING REPORT BORE LOG

<b>WBS</b> 40237.1.1					Т	TIP R-3300B COUNTY PENDER 0								GEOLOGIST HOLLAND, J.				40237	7.1.1		TIF	<b>TIP</b> R-3300B				
SIT	E DESC	RIPTION	CUL	VERT	ON -Y	30RPA- (H	AMPSTEA	D BYPAS	S RAMP) ST	TATION 1	6+22	OVE	RWI	NDING BRANCH	GROUND WTR (	ft)	SITE	DESCR	IPTION	CUL	VERT	ON -Y3	N -Y30RPA- (HAMPSTEAD			
BO	ring NC	. Y30R	PA-16	22-LT	S	TATION 1	5+60		OFFSET	65 ft LT			A	LIGNMENT -Y30RPA-	<b>0 HR.</b> 0	.8	BOR	ing no.	Y30R	PA-16	22-RT	ST	ATION 17	'+36		
со	LLAR EI	. <b>EV</b> . 22	2.2 ft		Т	OTAL DEP	<b>TH</b> 35.3 f	t	NORTHING	<b>3</b> 232,2	81		E	<b>ASTING</b> 2,378,061	<b>24 HR.</b> 0	).2	COL	LAR ELE	<b>EV.</b> 21	l.1 ft		то	TOTAL DEPTH 35.3 ft			
DRI	LL RIG/HA	MMER EF	F./DAT	E CAT	- 1314 C	ME-45B 94%	09/26/2018		1	DRILL	IETHO	D Mu	lud Rot	tary HAMM	ER TYPE Automatic		DRILL	RIG/HAN	IMER EF	F./DAT	E CAT	1314 CN	14 CME-45B 94% 09/26/2018			
DRI	ILLER	Chalmers	s, D. T.		S	TART DATI	E 05/28/1	9	COMP. DA	TE 05/3	30/19		S	URFACE WATER DEPTH N//	A		DRIL	LER C	halmers	s, D. T.		ST	START DATE 05/29/19			
ELE		DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	Γ	SAMP.	▼/						ELEV	DRIVE	DEPTH	BLC	ow col	UNT		BLOWS	PER FOOT	
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		±											i E					17.3	3.8			WOLL				
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	13.4	8.8				[					]		$\frac{14.2}{14.2}$	COASTAL PLA	IN	8.0		-	Ŧ							
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-5	6 6	+ 28.8											<u>+</u>				-5	-	‡					· · · ·		
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PENDER		GEOLOGIST HOLLAND	, J.		
RAMP) STATION 1	6+22 OVER	WINDING BRANCH		GROUNE	OWTR (ft)
OFFSET 128 ft R	Г	ALIGNMENT -Y30RPA-		0 HR.	N/A
NORTHING 232,4	34	<b>EASTING</b> 2,377,843		24 HR.	N/A
DRILL	IETHOD Mud	d Rotary	HAMME	R TYPE	Automatic
COMP. DATE 05/	31/19	SURFACE WATER DEPT	Η N/A	···· <b>_</b> ,	
SAMP.				-	
75 100 NO.	MOIG	SOIL AND ROC	K DESC	RIPTION	
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		- Boring Terminated a CP: SIL ARTESIAN WELL, 2' - <u>Other Samples:</u> ST-15 (5.4 - 7.7) -	at Elevati TY SANI HEAD EI 1.7'	ion -14.2 ft	33.3 IN I =

3300B

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REFERENCE

### **CONTENTS** SHEET NO. 2 -3 - 5 6-18

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

LABORATORY SOIL TEST RESULTS

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION CULVERT NO. 263 ON -Y38-(HOLIDAY DRIVE) STATION 19+80 OVER

HARRISONS CREEK

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3300B	1	18

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS. THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE NUCLED STRATA SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

PERSONNEL

CATLIN
FUTRAL, C.
INVESTIGATED BYCATLIN
DRAWN BYCROCKETT, S.C.
CHECKED BY
SUBMITTED BY <i>FALCON</i>
DATE FEBRUARY 2020



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION							
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM 01586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPON SAMPLER EQUAL TO OR LESS THAN 0.1 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK							
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:							
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							
CENERAL CRANU AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	RUCK (WR) 100 BLOWS PER FOUT IF TESTED.							
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 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA							
	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD TELED SPT REFUSAL I							
2 PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS							
■ 10 50 MX GRANULAR SILT- CLAY MUCK, CLAY MUCK,	PERCENTAGE OF MATERIAL								
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 50 MN S0 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS OTHER MATERIAL</u>	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK							
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 50ILS WITH LL 40 MX 11 MN 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	TRACE OF ORGANIC MATTER         2         - 3%         3         - 5%         TRACE         1         - 10%           LITTLE ORGANIC MATTER         3         - 5%         5         12%         LITTLE         10         - 20%           MODERATELY ORGANIC         5         - 10%         12         - 20%         SOME         20         - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HA							
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROL							
USUAL TYPES STONE FRAGS. 0F MAJOR CRAVEL, AND SAND SAND SAND SAND CRAVEL AND SAND	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER 24 HOURS	(SLI) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER SIGNIFICANT PORTINGS OF PORCY SHOW DISCOLORATION AND WEATHERING FEFERTS							
GEN. RATING FUEL FUEL TO COOD FAIR TO DOOD FAIR TO DOOD UNDUITABLE	✓ 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 GOUD FAIR TO FOUR POOR POUR UNSUITABLE	SPRING OR SEEP	WITH FRESH ROCK.							
PI OF A-7-5 SUBGROUP IS < LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FI							
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND W							
PRIMARY SOIL TYPE         CONSISTENCY         PENETRATION RESISTENCE (N-VALUE)         COMPRESSIVE STRENGTH (N-VALUE)         COMPRESSIVE STRENGTH (TONS/FT ² )           GENERALLY         VERY LODSE         < 4	ROADWAY EMBANKMENT (RE) CONCEPTION → OF ROCK STRUCTURES → OF ROCK STRUCTURES → SOIL SYMBOL → SOIL SYMBOL → INSTALLATION	SEVERE ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EV (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS AL TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.							
GRANULAR         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         N/A           (NDN-COHESIVE)         VERY DENSE         > 50         >	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF 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							
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MDDUM STIFF         4 TO 8         0.5 TO 1.0	INFERRED SOIL BOUNDARY     O     CORE BORING     SOUNDING ROD      INFERRED ROCK LINE     MO     MONITORING WELL     O     TEST BORING     VIII CORE     VIII CORE	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N V</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY I							
MATERIAL         STIFF         8 T0 15         1 T0 2           (COHESIVE)         VERY STIFF         15 T0 30         2 T0 4           HARD         > 30         > 4		SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. ALSO AN EXAMPLE.							
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS							
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.							
OPENING (MMM)         4.76         2.00         0.42         0.25         0.075         0.005           BOULDER         COBBLE         GRAVEL         COARSE         FINE         SILT         CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFF OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BL TO DETACH HAND SPECIMEN.							
(BLDR.)         (COB.)         (GR.)         (GR.)         (F SD.)         (F SD.)         (SL.)         (CL.)           GRAIN         MM         305         75         2.0         0.25         0.05         0.005	ABBREVIATIONS	HARD EXCAVETED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.							
	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 2 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OF HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD							
SOIL MOISTURE SCALE FIELD MOISTURE CONCEPTION OF FERMIS	CPT - CUNE PENETRATION TEST NP - NON PLASTIC Z _d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT							
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	br - Dimension Penel Hericity 1231         Served Served         S = BOLT           e - VOID RATIO         SS = SPLIT         SPOON           F - FINE         SL - SILT, SILTY         SI - SHELBY TUBE	VERY CAN BE GRUKEN BY FINGER PRESSURE. 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 SCRATCHI							
PLASTIC	FUSS FUSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS FRAGMENTS W- MOISTURE CONTENT CRB - CALIFORNIA BEARING								
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM							
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	EQUIPMENT USED ON SUBJECT PROJECT           DRILL UNITS:         ADVANCING TOOLS:           HAMMER TYPE:         CLAX RITS	VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED           WIDE         3 TO 10 FEET         THICKLY BEDDED         1.           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.1           CLOSE         0.0 FEET         THINLY BEDDED         0.1							
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CME-55	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED 4.00							
PLASTICITY	1 — I — 8° HOLLOW AUGERS — — — — — — — — — — — — — — — — — — —	INDURATION							
PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEA RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.							
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	Image: Portable hoist     Image: Xi casing image	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.							
	X CME-45B	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL I DIFFICULT TO BREAK WITH HAMMER.							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT         VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.							

#### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 ROCK. REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS IT. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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<i>100</i> ;							· · NO.	OFFSEI	STATION	INTERVAL	CLASS.	<i>L.L. P</i> .	1. C. SA	AND F. SAN	D SILT	CLAY	10	40	200	MOIST
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							(A) ART IF	ICIAL FILL:GR	AY AND TAN.	DRY,V.LOOSE,FIN	IE SAND (A	3)							-	
<b>0</b>							BUNDIV	IDED COASTA	L PLAN: DARI	K GRAY AND BLA	CK, MOIST, ME	D.STIFF,S	LT (A-	4)WITH LIT	TLE ORG	AWICS				
							(C) UNDN	IDED COASTA	L PLAN: GRAY	WET TO SAT.V	LOOSE TO M	AED.DENSE	SILTY	AND CLAYE	Y SAND A	WD FINE	SAND (	4-2-4, A-	-2-6,A-3	B) WITH
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## GEOTECHNICAL BORING REPORT BORE LOG

14/	DC	40007	11					2000	,	COUN							GEOL					MIDO	40007	. 1 1						COLINI	
sr	TED	HUZ3/		CUI	VERT	NO. 2	63 ON -	-Y38-	, (HOLID4		STATIO	ON 19+							TINAL, U.	GROUND	WTR (ft)	SITE	SITE DESCRIPTION CUI VERT NO				NO. 26	<u>ר איז איז איז איז איז איז איז איז איז איז</u>			
BORING NO. CULY38-1980-LT STATION 19+78				OF	OFFSET 21 ft LT				ALIGN	ALIGNMENT -Y38- 0 HR. N/A			BORING NO. CUI Y38-1980-RT					s	<b>STATION</b> 19+83			T									
С	DLLA	AR ELE	<b>EV.</b> 27	.6 ft		Т		DEPT	H 24.6 f	t	NO	NORTHING 233,032			EASTING 2,382,709 24 HR. FIAD		COL	LAR ELE	<b>EV.</b> 25	.7 ft		т	OTAL DEP	<b>тн</b> 20.3	ft	$\dagger$					
DR	ILL R	RIG/HAM	IMER EF	F./DATE	E CAT	1314 C	ME-45B	94% (	9/26/2018				DRILL	NETHO	D	Mud	Rotary		HAMM	IER TYPE A	Automatic	DRILL	. RIG/HAN	IMER EF	F./DATE	CAT	1314 C	ME-45B 94%	6 09/26/2018		
DF	RILLI	ER CI	halmers	, D. T.		S		DATE	07/09/	9	со	MP. DA	TE 07/	10/19	)		SURFA	ACE WATE		Ά		DRIL	LER C	halmers	s, D. T.		ST	ART DAT	<b>E</b> 07/10/ ⁻	19	T
ELI			DEPTH	BLO	ow co	JNT			BLOWS	PER FO	т		SAMP.			; T		SOIL AI				ELEV		DEPTH	BLO	w cou	JNT		BLOWS	PER FOC	л
(f	:)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50	75	100	NO.	Имс	DI G	;	ELEV. (ft)	SOIL AI			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50 I	7
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L)	<b>/</b> PE	ENI	DER	1					GEO	LOG	IST	FUT	RAL,	C.			
STATION 19+80 OVER HARRISON						NS	S CREEK						GROUND WTR (ft)				
OFFSET 21 ft RT						4	ALIG	NME	NT	-Y38	3-		0 HR.		2.3		
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REFERENCE

## **CONTENTS**

HEET NO.	<b>DESCRIPTION</b>
I.	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS
7-24	LABORATORY SOIL TEST RESULTS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION CULVERT NO. 264 ON -L1-(HAMPSTEAD BYPASS) STATION 660+85 OVER HARRISONS CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3300B	1	24

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS. THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE NUCLED STRATA SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

PERSONNEL

CATLIN
FUTRAL, C.
INVESTIGATED BYCATLIN
DRAWN BYCROCKETT, S.C.
CHECKED BY
SUBMITTED BY FALCON
DATE FEBRUARY 2020


SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AGASHTO I 206, ASTM 01586). SOIL CLASSIFICATION IS BASED ON THE AGSHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE 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 0.1 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZUNE OF WEATHERED ROLK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPENALIC MATERIALS	MINERALOGICAL COMPOSITION	CRYCTALLINE FILE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS. (≤ 35% PASSING #200) (> 35% PASSING #200) 000HILC HH (CHINES	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE IN GNEISS, GABBRO, SCHIST, ETC.
CHOUP         H*1         H*3         H*2         H*4         H*5         H*6         H*7         A-1, A-2         A-4, A-5           CLASS.         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A*7, A         A*3         A+6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
SYMBOL	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN
Z PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS
*10 50 MX *40 30 MX 50 MX 51 MN SOILS SOILS SOILS SOILS		WEATHERING
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK HAMMER IF CRYSTALLINE.
HARLENDEL PACSING *40 PESSING *40 PI 6 MX 10 MX 10 MX 11 MN 16 MX 11 MN 16 MX 11 MN 16 MX 11 MN LITTLE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN LITTLE OR HIGHLY	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLL) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A DEVICAL LINE NATURE
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOLLS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	(SLL) I INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLOREDINA MAN WEATHERING FEFET
GEN. RATING EVELUENT TO COOD EATE TO DOOD FAIR TO DOOD INSULTABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE POOR FOUND POOR FOUND ON POOR FOUND ON ONSOLINGED	SPRING OR SEEP	WITH FRESH ROCK.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LT
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND "
PRIMART SULL TIPE         CONSISTENCY         PENELIKATION RESISTENCE         COMPRESSIVE STRENGTH           GENERALLY         VERY LOOSE         < 4	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES SOIL SYMBOL SYMBOL SIDE SIDE SIDE SIDE SIDE SIDE SIDE SIDE	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 A TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR MEDIUM DENSE 10 TO 30 N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NON-COHESIVE)         DENSE         30 10 50           VERY DENSE         > 50           VERY SOFT         < 2	THAN ROADWAY EMBANKMENT THOUGH BURING TEST	VERY ALL ROCK EXCEPT OUARTZ 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 DEGREE THAT VESTICES OF ORIGINAL ROCK EARDIC FEMAL IN <i>LETESTED WOULD YIELD SET N</i> W
GENERALLY         SOFT         2 T0 4         0.25 T0 0.5           SILT-CLAY         MEDIUM STIFF         4 T0 8         0.5 T0 1.0           MATERIAL         STIFF         8 T0 15         1 T0 2           (COLEVENUE)         VERV STIEF         15 T0 2.0         2 T0 4		COMPLETE ROCK REDUCED TO SOLL. ROCK FABRIC NOT DISCERNIBLE. OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
HARD > 30 > 4		
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 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
GBLDR.)         GCOB.         GR.)         SAND (CCB.S.)         SAND (CSE.SD.)         SAND (F SD.)         CEL           GRAIN         MM         305         75         2.0         0.25         0.05         0.005	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D 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 1 INCH MAXIMUM SIZE BY HARD
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
(ATTERBERG LIMITS) FIELD MUISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION CATTERBERG LIMITS) CONTRACTOR CONTRACTOR	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
ILL LIQUID LIMIT FROM BELOW THE GROUND WATER TABLE	B         YULD HATTO         SUL - SHALLS SHALL         SS         SFLIT SPOUN           F         FINE         SL         SLIT, SILTY         ST         SHELBY TUBE           F05SL         F0SSLIFEROUS         SLI-         SLITY         ST         SHELBY TUBE           F05SL         F0SSLIFEROUS         SLI-         SLITY         ST         SHELBY TUBE           F05SL         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 FINGERNALL.
RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRACS FRACTORED, FRACTORES TOR - TRICORE REPOSEL RT - RECOMPACTED TRIATAL FRACS FRACMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
		TERM SPACING TERM
OM OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	WIDE         3 TO 10         FEET         THICKLY BEDDED         1.           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.1           CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.0
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY		INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY         PLASTIC         16-25         MEDIUM           HIGHLY         PLASTIC         26 OR         MORE         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, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS,

### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS IT. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



											D PROJ. REFERENCE NO R-3300B	). SHE
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IIO				<u>.</u>	SOIL TES	T RESULT	S	; ;			V	
			SAMPLE OFFSET	DEPTH	AASHTO	% BY WEIG	HT % PASSING	(SIEVES) %	%			· · · · · · · · · · · · · · · · · · ·
100			NO. OFFSEI STAT	INTERVAL           74         8 7'-10 2'	CLASS. L.L. P.I.	C. SAND F. SAND S	ILT         CLAY         10         40           51         37         100         100	200 MOISTURE	C ORGANIC			· · · · · · · · · · · · ·
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			SS-35         123         F1         R1         601+           SS-36         123         FT         RT         661+	84         15.7 - 15.2           84         18.7'-20.2'	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c cccc} 7 & 23 \\ \hline 73 & 10 \\ \hline \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	15 25	-			:
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			A UNDIVIDED COAST AL PLAIN	DARK GRAY AND BI	ACK.DRY TO MOIST.V.SOFT	TO SOFT SILT (A-4)		RGANIC WITH TRACE	ROOTS			
70			BUNDIVIDED COASTAL PLAIN	GRAY AND TAN, WET	TO SAT V.LOOSE TO LOO	SE, SILTY SAND AND	FINE SAND (A-2-4, A-3) W17	H SHELL FRAGS.				
			(C) UNDIVIDED COASTAL PLAIN: (D) COASTAL PLAIN: LIGHT GRAV	GRAY,WET.V.SOFT 7 AND GRAY,SAT.MEL	TO SOFT,MOD.TO HIGHLY F D.DENSE TO V.DENSE,SILI	_ASTIC.SILTY CLAY (A- Y SAND AND SAND (/	-7–6)WITH TRACE SHELL F A–2–4,A–3)WITH SHELL FR	RAGS. AGS.(CASTLE HAYNE	FORMATION)			
60			E COAST AL PLAIN SEDIMENT	NRY ROCK:GRAY, HARD	SANDY LIMESTONE WITH	SHELL FRAGS.(CASTLE	HAYNE FORMATION)	DPODOSED EIII		· · · · · · · · · · · · · · · · · · ·		
50								FROFOSED FILL	<b>[CC Z4</b> ]			
.90		<u>[SS-</u>	-32						ST-8 SS-35			:
40		CULI-66	<u>-33</u> 5085-LT	LI-660	000			cu	<u>SS-36</u> LI-66085-RT			
		659 I30'	'LT	659+ CL	90	Ê	PROPOSED CULVERT		123' RT			:
.30	EXISTING GROUND		07/19		<b>.</b>	/- /			07/19			
-\/												
.20									<u></u>			
		© ®	$\bigcirc$	@ <b></b>	C		©	~	ST-8 ©			:
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					220	81 10		GROI FROM	JNDLINE PROFILE	ALONG CULVER	RT DRAWN ONIC FILES	
-50					- UOO	04.47		RÈCE	EIVED FROM STAN	ITEC DATED NO	VEMBER 2019.	
				1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1	—	/-			KRED STRATIGRA	CONTRACTOR OF THE CONTRACT.		
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### GEOTECHNICAL BORING REPORT BORE LOG

WBS	40237	.1.1			TI	<b>P</b> R-3300	В	COUNT	Y PE	NDER				GEOLOGIS	<b>ST</b> FUTRAL, C	).	
SITE	DESCR	IPTION	I CU	LVER	ΓΝΟ. 2	264 ON -L'	I- (HAMPS	TEAD B	PASS	S) STA	TION 6	60+85	5 OVE	ER HARRISO	NS CREEK	GROUN	ND WTR (ft)
BOR	NG NO.	CUL	1-6608	35-LT	S	TATION 6	59+74		OFFS	SET 1	130 ft LT	Г		ALIGNMEN	<b>IT</b> -L1-	0 HR.	N/A
COLI		<b>IV.</b> 25	5.2 ft		т	OTAL DEP	<b>FH</b> 45.2 ft		NOR	THING	232,9	95		EASTING	2,382,769	24 HR.	FIAD
DRILL	. RIG/HAI	MMER E	FF./DA	TE C	AT1314	CME-45B 94	% 09/26/2018	3			DRILL N	ИЕТНО	D M	ud Rotary	H	AMMER TYPE	Automatic
DRIL	LER C	halmer	s, D. 1	г.	S		E 07/10/1	9	сом	P. DA	<b>FE</b> 07/	11/19		SURFACE	WATER DEPTH	I N/A	
ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS F	PER FOOT			SAMP.	▼/	L				
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 5	50 I	75	100	NO.	Имо	G	ELEV. (ft)		DESCRIPTION	DEPTH (ft)
30														_			
	-	-												•			
	-	-												-			
25	25.2	0.0	WOH	WOH	1	1						D			UNDIVIDED CO	ASTAL PLAIN	0.0
	-	-												DAF	RK GRAY TO BLA ORGANIC S	CK, MODERATI SILT (A-4)	ELY
20	21.2	4.0	3	1	1							Sat	0 0 0 0 0 0 0 0 0 0 0 0	<b>_</b> _	GRAY, FINE	SAND (A-3)	
	-	-				T			· ·				0 0 0 0 0 0 0 0 0 0 0 0	 18.2			7.0
	- 16.5	- - 8.7											N	G	RAY, SILTY CLAY PLAS	' (A-7-6), HIGHL TIC	Y
15	_	-	WOH	WOH	WOH	•0 <u> </u>	••••		<u> </u>		SS-32	52%	N	-			
	-	-											N	- -			
10	11.5 -	- <u>13.7</u> -	WOH	WOH	WOH						SS-33	42%	N	- -			
	-	-						<u> </u>				1					<u>16.5</u>
	65 -	- 18 7							· ·	::				- <b>CO/</b> - GR	<b>ASTAL PLAIN SEI</b> RAY, HARD, SAND	DIMENTARY RO	DCK W/
5	-	-	2	100/0.4	1				1 1	00/0.4		Sat.		- SH —	ELL FRAGMENTS FORMA	S (CASTLE HAY TION)	NE
	-	-					· · · · ·	· · · ·	· ·	· · ·				- -		,	
	1.5 -	- 23.7	100/0.2	2			· · · · ·	· · · ·		00/0.2		Sat.					
0	-	-							+				F-1	-			
	- 25 -							 	· ·				F7	-			
-5		 	100/0.2	2					• 1	00/0.2		Sat.	Ħ				
	-	_							· ·	::			<b>F</b>	7.3			32.5
	-8.5	33.7	26	20	17				<u> </u>							<b>PLAIN</b>	
-10	_	_	20	20			•37		+			Sat.		-	LIMESTONE F	RAGMENTS	•••
	10 5 -								· ·								
-15	-13.5	38.7 	13	18	20		· · • •					Sat.					
	-	-					· · • • •							•			
	-18.5 -	- 43.7	20	20	16		· · · · · ·							•			
-20		<u> </u>	20				•	16	1.	-		Sat.		-20.0 _ Bori	ing Terminated at	Elevation -20.0 f	45.2 ft IN
	_													-	CP: SILT	Y SAND	
	-	Ł												. ARTE	ESIAN WELL, HEA	AD ELEVATION	32.2'
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WBS	40237	<b>'</b> .1.1			Т	IP	R-330	0B		CC	UNT	1 P	ENDEF	र			GEOLOGIST ALEXANDER, C.
SITE	DESCR	IPTION	I CU	LVER	T NO.	264	ON -L	.1- (l	HAMP	STE/	AD BY	′PAS	SS) ST/	ATION 6	60+85	5 OV	ER HARRISONS CREEK GROUND WTR (ft)
BOR	NG NO.	L1-6	6000		s	TAT		659-	+90			OFF	SET	CL			ALIGNMENT -L1- 0 HR. N/A
COL	LAR ELE	<b>EV.</b> 25	5.5 ft		Т	ΟΤΑ	AL DEF	РΤΗ	45.1	ft		NOF	RTHING	<b>3</b> 232,8	366		<b>EASTING</b> 2,382,787 <b>24 HR.</b> FIAD
DRILL	RIG/HAI	MMER E	FF./DA	TE C	AT1314	CM	E-45B 94	4% 0	9/26/20	18				DRILL	ИЕТНО	DD N	Iud Rotary HAMMER TYPE Automatic
DRIL	<b>LER</b> C	halmer	s, D <b>.</b> ⁻	г.	S	TAF	rt dat	ΓE	09/10/	18		CO	MP. DA	<b>TE</b> 09/	11/18		SURFACE WATER DEPTH N/A
ELEV (ft)	DRIVE ELEV	DEPTH (ft)	BLC					E 25	BLOWS	PER	FOOT	75	100	SAMP.		L	SOIL AND ROCK DESCRIPTION
	(π)	( )	0.51	0.51	0.51	$\parallel$						<u> </u>		NO.		I G	ELEV. (ft) DEPTH (ft)
30																	
	-																-
25	- 25.5	0.0				Ш.											- 25.5 GROUND SURFACE 0.0
	-	F	1	2	2		4					1.			М		- UNDIVIDED COASTAL PLAIN - GRAY, SILTY SAND (A-2-4)
	21.5 -	4.0					<u>\</u>	:   :			· · ·	:	· · · · · ·				-
20		+	2	2	6		<u>.</u> 8	·   ·				·			Sat.		
	-	+					/ /	:   :			· · · ·	:	· · · · · ·				GRAY, SILTY CLAY (A-7) W/ SHELL
15		<u>    8.6    </u>	1	1	1		 2	.   .	· · · ·		· · · · · ·		· · · · · ·		w		_ FRAGMENTS
15	-	F				ΙŤ				-		+:					
	11.9	13.6						:   :		:		1:	· · ·				-
10	-	Ł	WOH	1	2	Í	3 · · ·	·   ·		•					W		-
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	6.9	18.6	2	3	3	$\left\{ \right\}$		.   .				·			Sat		FRAGMENTS
5	_	F				ΙĽ		-+-		+-		+-			oat.		<u>5.1</u> COASTAL PLAIN SEDIMENTARY ROCK <u>20.4</u>
	10	23.6						.   .				.					GRAY, HARD, SANDY LIMESTONE W/
0	- 1.9	- 20.0	80	20/0.1			· · · ·	.   .			· · ·	.	 100/0.6		Sat.	Ħ	(CASTLE HAYNE FORMATION)
	-	F						.   .									-
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	-8.1 -	33.6	47	17	26	$\left  \right $	 	:   :	· · · j·	13 .	· · ·	:	· · ·		Sat.		- GRAY, SILTY SAND (A-2-4) W/
-10	-	F						+	<b>`</b>			+:					
Q	-13.1 -	38.6						.   .	!		· · ·	:	· · ·				-
-15	-	-	55	27	21			.   .		<b>●</b> 48 ⁻		.			Sat.		-
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DOT	-18.1	43.6	7	17	38		· · · ·	.   .		N.	· · ·				0-1		-
2 V		<u>+</u>	·			┼┴		•		•	55 · ·	·			Sal.		19.6 45.1 
GPJ	-	ŧ															CP: SILTY SAND
DGS.	-	+															ARTESIAN WELL, HEAD ELEVATION 30.2'
	-	+															
	-	ŧ															-
/ERT	-	Ł															-
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## GEOTECHNICAL BORING REPORT

## BORE LOG

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## GEOTECHNICAL BORING REPORT BORE LOG

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SITE	40237					264 ON 14						20105					
BOB								TEAD B	OFESET	100		-					
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DDIL		<b>. 2</b> 0	5.4 π				H 45.2 T	ι ο	NORTH		232,74	49	D 14	EASTING 2,382,987			FIAD
DRILL	RIG/HAI		FF./DA	- C/	411314	CME-45B 94%	6 09/26/2018	8					DIVIL			TTPE	Automatic
DRIL		naimer I	S, D. I		5		DI OMO						1.1	SURFACE WATER DEPT	H N/A		
ELEV (ft)	ELEV	DEPTH (ft)	BLC				BLOWS I	PER FOOT 50	75 1(	0	NO		0	SOIL AND ROCK	K DESCRI	PTION	
. ,	(π)	. ,	0.51	0.51	0.511		i				110.		G	ELEV. (ft)			DEPTH (ft)
30		-											-			_	
		<u>    0.0    </u>	WOH	1	1	$\frac{1}{2}$ · · ·						М	F	UNDIVIDED CO	DASTAL F	LAIN	0.0
25	-	-												DARK GRAY AND B	LACK, SIL S, TRACE	T (A-4) ROOTS	W/ 3 <u>3.0</u>
		4.0	2	1	2	1						Sat	• • • • • • • • • • • • • • • • • • •		SAND (A-	3) — —	
	-					$\begin{bmatrix} \Psi^3 & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{bmatrix}$	· · · ·			.     .		oat.		21.4	JUVERT)		7.0
20	- 197 —	87				<u>  · · · ·</u>							Ň	GRAY, SILTY CLA	Y (A-7-6),		0
	-		WOH	WOH	WOH						SS-34	42%		FRAG	W/ TRAC MENTS	E SHELI	-
	-	F										43%	N				
15	14.7 -	13.7	WOH	WOH	1			+ • • • •					N	- -			
	-	F			'						SS-35	37%	N				
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REFERENCE

## **CONTENTS** SHEET NO. 2

- 5

6-20

TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE BORE LOGS LABORATORY SOIL TEST RESULTS

**DESCRIPTION** 

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION CULVERT NO. 265 ON -L1-(HAMPSTEAD BYPASS) STATION 712+62 OVER TRIBUTARY TO GODFREY CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
$\mathbb{N}.\mathbb{C}.$	R-3300B	1	20

#### CAUTION NOTICE

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

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

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

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

PERSONNEL

CATLIN	
INVESTIGATED BY <u>CATLIN</u>	
DRAWN BYCROCKETT, S.C.	
CHECKED BY HAMM. I. R.	
SUBMITTED BY FALCON	
DATE APRIL 2020	



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0,I BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL, COMPOSITION, ANGLU ARITY, STRUCTURE, PLASTICITY, ETC., FOR, EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC
CHOUP         H-1         H-3         H-2         H-4         H-3         H-6         H-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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
SYMBOL BOOOD STATE AND STA	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS
■10 50 MX GRANULAR CLAY MUCK, ■40 30 MX 50 MX 51 MN SOLLS COLO PEAT		WEATHERING
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY, ORGANIC 5 - 10% 12 - 20% SIME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN UNCEDATE HIGHLY	HIGHLY ORGANIC > 10% 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.
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 ROOM
USUAL TYPES STONE FRAGS. DE MAIDE CRAVEL AND 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	O-M- Spring or seep	
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOU, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. RUCK GIVES "CLUNK" SOUND Y
(TONS/FT ² )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E
GENERALLY VERY LOUSE < 4 GRANNIAR LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
MATERIAL         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         10 TO 30         10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANYMENT AUGER BORING (A) CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF
VERY SUFI         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
0PENING (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 BL
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE
CEAIN MM 305 75 2.0 0.25 0.05 0.05		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.
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 O
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 FINGER PRESSURE.
- SAIUKAIED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.00
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED
PLASTICITY	В НОLLOW AUGERS   □-В	
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH		RUBBING WITH FINGER FREES NUMEROUS GRAINS:
SLIGHTLY PLASTIC 6-15 SLIGHT		GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MUDERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED. YELLOW-BROWN, BLUE-GRAY).		DIFFICULT TO BREAK WITH HAMMER.
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REOUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.

### PROJECT REFERENCE NO. R-3300B



2

TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



150 140 130	120 110 100	90 80	70 (	50 50 40	) 30	20	<u>10</u> 0	10	20	30	40	50 60
				· · · · · · · · · · · · · · · · · · ·								
100					SOIL	TES	ST RESU	JLTS				
		SAMPLE		DEPTH	AASHTO		% B	WEIGHT		% PAS	SING (SIEVE	S) %
		NO.	OFFSET STATIC	ON INTERVAL	CLASS.	L.L. P.I.	C. SAND F. SAI	ID SILT	CLAY	10	40 2	00 MOISTUI
	•••••	SS-064 90 SS-065 90	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{25}{25}$ $0.0^{\circ}-1.5^{\circ}$ $25$ $4.0^{\circ}-5.5^{\circ}$	A-4 A-2-4	NP NP NP NP	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	31	4 12	94 100	$\frac{85}{100}$ 2	<u>37 –</u> 25 –
		SS-066 90	FT LT = 712 + 2	25 13.7'-15.2	A-2-4	NP NP	11 70	15	4	100	96 3	32 -
		·· SS-067 90	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	25 16.0 - 18.0 25 23.7'-25.2'	A-4 A-7-6		1 48 5 29	<u> </u>	14	100	100 $3$ $96$ $8$	<u>52 38</u> 30 -
		SS-068 90	P FT LT 712 + 2	25 33.7'-35.2'	A-6	30 11	23 31	19	26	100	84 8	52 -
90		SS-069 59 SS-070 59	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{25}{25}$ $\frac{4.0-5.5}{13.8'-15.3'}$	A-2-4 A-2-4	NP NP NP NP	$16 71 \\ 22 62$	4 11	5	99	$\frac{98}{90}$ 2	23   32
	· · · · · · · · · · · · · · · · · · ·	SS-071 59	0 FT RT 713+2	25 23.8'-25.3'	A-7-6	45 24	9 33	40	18	100	93	75 65
			ONIDED COASTAL	PLAIN: DARK GRAY.	BROWN, AND BLAC	CK, MOIST	TO WET.V.SOFT	TO SOFT	.MOD.ORGA	WIC SILT	AND MUCK	(A-4) W/ TR
		BUNL	ONIDED COASTAL	PLAN: WHITE AND	GRAY, SAT V.LOO	SE.T.O.ME	D.DENSE.SILTY	F.TO CSE	-SAND (A	-2-4)		ואס <i>ו</i> דא <b>א</b> כ
		0000 0000	ISTAL PLAIN: DARI	E.WET.STIFF.CALCE	ROUS.SANDY CL	AY [:] (A-6)	ANU SANUI SILI	I CLAI IA	-4, 4-7-67	CAST LE	HANNE FUR	TMATION
		Ē04	STAL PLAIN: WHIT	E,SAT.MED.DENSE,	CLAYEY SILTY S	AND (A-2	-4) W/ LIMESTO	NE FRAGM	ENT'S			
		Ē CO4	STAL PLAIN SED	IMENTARY ROCK: LIG	HT GRAY AND W	HITE, SOFT	TO HARD,SAN	DY LIMEST	ONE			
<b>co</b>	\$S-06 \$\$-01	64										
<b>60</b>	SS-OF	66 38										
	SS-06 SS-06	67 68		· · · · · · · · · · · · · · · · · · ·						PROPOSE	D FILL	
	LI_7I26	52-LT		· · · · · · · · · · · · · · · · · · ·			φ.				<u></u>	
	712+1 901	25 LT		PROPOSED	O CULVERT							
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EXISTING G	OUND	······································		· · · · · · · · · · · · · · · · · · ·								
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## GEOTECHNICAL BORING REPORT BORE LOG

WBS	<b>3</b> 40237	.1.1			Т	P R-3300	)B	COUNT	Y PENDER	<u>२</u>			G	EOLOGIST PUGH, L			WB	<b>S</b> 4023	7.1.1			TIF	<b>P</b> R-3300	)B	COUNTY
SITE	DESCR	IPTION	CUL	VERT	NO. 20	65 ON -L1-	(HAMPST	EAD BYP	ASS) STATI	ON 712+	62 O\	VER ⁻	TRIBL	JTARY TO GODFREY C	REEK	GROUND WTR (ft)	SIT	E DESCR	RIPTION	CUL	VERT	NO. 26	5 ON -L1	- (Hamps ⁻	TEAD BYPA
BOR	ing no.	L1_7 [,]	1262-L	.Т	S	TATION 7	712+25		OFFSET	90 ft LT			A	LIGNMENT -L1-		0 HR. N/A	BOF	ring no	. L1_7	1262-F	RT	ST	ATION	713+25	
COL	LAR ELI	<b>EV.</b> 35	.5 ft		т	OTAL DEP	<b>TH</b> 45.2 f	t	NORTHIN	<b>G</b> 235,0	96		E	<b>ASTING</b> 2,387,394		<b>24 HR.</b> 0.5	COI	LAR EL	<b>EV.</b> 36	6.7 ft		то	TAL DEF	<b>TH</b> 39.9	ft
DRIL	L RIG/HAN	IMER EF	F./DATI	E CAT	-1314 C	ME-45B 94%	6 09/26/2018			DRILL N	NETHO	DD M	/lud Ro	tary	HAMME	ER TYPE Automatic	DRIL	L RIG/HA	MMER EF	F./DATI	E CAT	1314 CN	/IE-45B 94%	6 09/26/2018	}
DRIL	LER C	halmers	, D. T.		S	TART DAT	<b>E</b> 10/12/1	8	COMP. DA	<b>ATE</b> 10/	18/18		s	URFACE WATER DEPT	TH N/A	4	DRI	LLER	Chalmers	s, D. T.	•	ST	TART DATE 10/18/18		
ELEV	DRIVE	DEPTH	BLC	w co	UNT		BLOWS	PER FOO	Т	SAMP.				SOIL AND ROC	K DESC	CRIPTION	ELE	/ DRIVE	DEPTH	BLC	w col	JNT		BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	) G	ELE	EV. (ft)		DEPTH (f	j) (π)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
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35	35.5	- 0.0											- 35.	5 GROUND	SURFA	ACE 0.	35	36.7	<u>+ 0.0</u> +	woн	1	1	2		
- 55		+	WOH	WOH	1	1				SS-064		<u>}</u>		UNDIVIDED C DARK BROWN, SIL	<b>OASTAI</b> T, HIGH	<b>L PLAIN</b> ILY ORGANIC			‡				1		
	31.5	4.0				]  \. : : :			·   · · · · ·			~~~~	<u>y-</u> 32.		UĆK)			32.7	<u>+ 4.0</u> +	4	4	4			·   · · · · ·
30		+	3	5	6	<b>1</b> 1				SS-065	5 Sat.		<u> </u>	COARSE S	SAND (A	A-2-4)	30		‡				1		·   · · · ·
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		+				::::			·   · · · · ·		38%			DARK GRAY, SIL	AL PLAI LT (A-4)			17.9	+ 18.8		WOU	WOU			·   · · · · ·
15	16.8	<u>+ 18.7</u>	woн	wон	woн						w		-	HATNE FC	JRIVIATI	ION)	15		‡		WUN	WUN	•0		·   · · · · ·
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<u>G</u> G	-	ŧ								1		H	Ŧ	HARD, SAND	Y LIME	STONE			ŧ						
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REFERENCE

## **CONTENTS** SHEET NO.

-5

<i>NO</i> .	<b>DESCRIPTION</b>
	TITLE SHEET
	LEGEND (SOIL & ROCK)
	SITE PLAN
	PROFILE
	BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION CULVERT ON -Y32- (US 17) STATION 18+00 OVER UNNAMED TRIBUTARY TO OLD TOPSAIL CREEK

# 4023 PROJEC

N.C. <b>R-3300B</b> 1 5	STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
	N.C.	R-3300B	1	5

#### CAUTION NOTICE

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

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

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

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

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MID-ATLANTIC
D.J. GOODNIGHT
INVESTIGATED BYFALCON
DRAWN BYCROCKETT, S.C.
CHECKED BYHAMM, J. R.
SUBMITTED BYFALCON
DATE APRIL 2020



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION					
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0,I BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK					
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO, CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL, COMPOSITION, ANGLU ARITY, STRUCTURE, PLASTICITY, ETC., FOR, EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:					
VERY STIFF.GRAY.SULTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT					
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO					
CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC					
CHOUP         H-1         H-3         H-2         H-4         H-3         H-6         H-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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA					
SYMBOL BOOOD STATE STA	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK.BUT					
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDS					
■10 50 MX GRANULAR CLAY MUCK, ■40 30 MX 50 MX 51 MN SOLLS COLO PEAT		WEATHERING					
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK					
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY, ORGANIC 5 - 10% 12 - 20% SIME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO					
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN UNCEDATE HIGHLY	HIGHLY ORGANIC > 10% 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A CRYSTALLINE NATURE.					
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 ROOM					
USUAL TYPES STONE FRAGS. DE MAIDE CRAVEL AND 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER					
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS					
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH					
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	O-M- Spring or seep						
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO					
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOU, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. RUCK GIVES "CLUNK" SOUND Y					
(TONS/FT ² )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E					
GENERALLY VERY LOUSE < 4 GRANNIAR LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.					
MATERIAL         MEDIUM DENSE         10 TO 30         N/A           MATERIAL         DENSE         30 TO 50         10 TO 30         10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANYMENT AUGER BORING (A) CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AR					
VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF					
VERY SUFI         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>					
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS					
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.					
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS						
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.					
0PENING (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 BL					
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE					
CEAIN MM 305 75 2.0 0.25 0.05 0.05		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE BY MODERATE BLOWS.					
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 O					
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.					
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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 FINGER PRESSURE.					
- SAIUKAIED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK.					
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.					
RANGE C - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING					
		TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED					
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1. MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.1					
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 VERY CLOSE 1.55 THAN 0.16 FEFT THINLY BEDDED 0.03					
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED					
PLASTICITY	В НОLLOW AUGERS   □-В						
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH		FUR SEDIMENTARY RUCKS, INDUKATION IS THE HARDENING OF MATERIAL BY CEMENTING, HER RUBBING WITH FINGER FREES NUMEROUS GRAINS:					
SLIGHTLY PLASTIC 6-15 SLIGHT		GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
MUDERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STI BREAKS EASILY WHEN HIT WITH HAMMER.					
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED. YELLOW-BROWN, BLUE-GRAY).		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 SAMPLE BREAKS ACROSS GRAINS.					

### PROJECT REFERENCE NO. R-3300B



2

TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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<i>100</i>				· · · · · · · · · · · · · · · · · · ·					SS-57 SS-55 SS-56	268 FT 38 FT 38 FT	T RT T LT T LT	17+31 18+14 18+14	38.5'-40 18.5'-20 39.5'-40	.0' .0'	A-2-4 A-7-6 A-2-4	18 50 19	$\begin{array}{c}1\\30\\3\end{array}$	57 18 25	31 34 55	2 15 3	10 33 17	98 100 98	63 93 91	<u>13</u> 51 21
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## GEOTECHNICAL BORING REPORT BORE LOG

WBS	40237	.1.1			Т	IP R	-3300	В	COUNT	Y PENDER	2			G	GEOLOGIST GOODNIGHT, D	).J.	WBS	<b>3</b> 40237	7.1.1			TI	<b>P</b> R-3300	3	COUNTY
SITE	DESCR	IPTION	CUL	VERT	0N -۱	/32- (l	JS 17)	) STA. 18-	00 OVER		TRIBUT	ARY TO OLD TOPSAIL CREEK     GROUND WTR (ft)       ALIGNMENT     -Y32-       0 HR.     3.7       369     EASTING       24 HP     10					SITE	DESCR		CUL	VERT	ON -Y	32- (US 17)	STA. 18-	-00 OVER I
BOR	ing no.	Y32_	1800-L	.T	s	TATIO	<b>DN</b> 18	8+14		OFFSET	38 ft LT			A	ALIGNMENT -Y32-	<b>0 HR.</b> 3.7	BOF	ring no.	Y32_	1800-1	RT	ST	TATION 1	7+31	
COL	LAR ELI	<b>EV.</b> 39	.1 ft		Т	OTAL	DEPT	<b>FH</b> 50.0	ť	NORTHIN	<b>G</b> 238,3	68		E	EASTING 2,399,992	<b>24 HR.</b> 1.0	COL	LAR EL	<b>EV.</b> 35	5.4 ft		тс	TAL DEP	<b>FH</b> 50.0	ft
DRILI	RIG/HAN	IMER EF	F./DATI	e Mid	1904 C	ME-45	B 90% (	03/01/2019		1	DRILL	NETHC	DD M	/lud Ro	otary HAMM	ER TYPE Automatic	DRIL	L RIG/HAM	MMER EF	FF./DAT	E MID	1904 CN	NE-45B 90%	03/01/2019	
DRIL	LER W	/IGGIN	S, M.		S	TART	DATE	E 02/06/	20	COMP. DA	ATE 02/	06/20		s	SURFACE WATER DEPTH N/	Ά	DRI	LER W	VIGGIN	S, M.		ST	ART DAT	02/05/	20
ELEV	DRIVE	DEPTH	BLC	W CO	JNT			BLOWS	PER FOO	T	SAMP	· <b>  V</b> /			SOIL AND ROCK DES	CRIPTION	ELEV	DRIVE	DEPTH					BLOWS	PER FOOT
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PENDER				GEOLOGIST GOODNIGHT, D	.J.
JNNAMED T	RIBUTA			TOPSAIL CREEK	GROUND WTR (ft)
OFFSET 2	68 ft RT	-		ALIGNMENT -Y32-	0 HR. 1.8
NORTHING	238.14	17		EASTING 2.400.289	<b>24 HR.</b> 0.5
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CONF. DAT		)5/20 7	LI	SURFACE WATER DEPTH N/	A
75 100	SAIVIP.		ō	SOIL AND ROCK DES	CRIPTION
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		М		BROWN & GRAY, SLIGHT	LY SILTY FINE
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		0-1		<b>COASTAL PLA</b> GRAY, SLIGHTLY SILTY FI	<b>IN</b> NE SAND (A-3)
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	<u>88-57</u>	25%		- <u>1.6</u>	(A-2-4) <u>37.0</u>
+	00-07	20/0	-		
		Sat.		- <u>6.6</u>	(A-3) <u>42.0</u>
				-12.6	48.0
		w		TAN, SILTY SAND	(A-2-4)
<u></u>				<u>14.6</u> Boring Terminated at Eleva CP: SILTY SAN	-RAGMENTS 50.0 tion -14.6 ft IN ID

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REFERENCE

### **CONTENTS** SHEET NO.

<u>ET NO.</u>	<b>DESCRIPTION</b>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5	BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD

SITE DESCRIPTION CULVERT ON -L- (US-17) STATION 320+01 OVER UNNAMED TRIBUTARY TO NIXON CREEK

# て $\mathbf{m}$ 402 PROJEC

STATE STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C. <b>R–3300B</b>	1	5

#### CAUTION NOTICE

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

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

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

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

PERSONNEL

<i>M.A.D</i> .	
GOODNIGHT,	<b>D.J</b> .
INVESTIGATED BYGOODNIG	HT, D.J.
DRAWN BY CROCKETT, S.C.	
CHECKED BY	
SUBMITTED BY FALCON	
DATE AUGUST 2021	



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

				SOIL DI	ESCR	IPTION						GRADATION						ROCK DE	SCRIPTION				
SOIL IS O BE PENETE ACCORDIN IS BA	CONSIDERED RATED WITH NG TO THE ASED ON TH	UNCONSI A CONT STANDAR IE AASHT	OLIDATED, INUOUS F D PENETF O SYSTEM	SEMI-CONS _IGHT POWI ATION TES 1. BASIC D	SOLIDATE ER AUGE T (AASH ESCRIPT	ED, OR WEAT ER AND YIEL ITO T 206, A IONS GENER	HERED EART LD LESS THI ASTM D1586 RALLY INCLU	H MATERIALS T AN 100 BLOWS F . SOIL CLASSIF DE THE FOLLOW	HAT CAN PER FOOT ICATION VING:	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	TES A GOOD REPR NDICATES THAT S S A MIXTURE OF	RESENTATION OF PART OIL PARTICLES ARE ( UNIFORM PARTICLE	ICLE SIZES FF ALL APPROXIMA SIZES OF TWO	ROM FINE TO COARSE. ITELY THE SAME SIZE. OR MORE SIZES.	HARD ROCK I ROCK LINE I SPT REFUSAL BLOWS IN N	S NON-COAS NDICATES T IS PENET ON-COASTAL	STAL PLA THE LEVEL IRATION B	IN MATERIAL THAT W _ AT WHICH NON-COA Y A SPLIT SPOON SF MATERIAL, THE TRF	VOULD YIELD SPT REFUSAL IF TESTE STAL PLAIN MATERIAL WOULD YIELD AMPLER EQUAL TO OR LESS THAN 0.1 INSITION BETWEEN SOIL AND ROCK				
CONSISTER AS	NCY, COLOR, MINERALO	TEXTURE	, MOISTUR	E. AASHTO	CLASSIF	FICATION, AN	ND OTHER PE ASTICITY.ET	RTINENT FACTO	DRS SUCH	L	ANGUL	ARITY OF GRA	INS		REPRESENTED ROCK MATER	∣ BY A ZON ÍALS ARE T	VE OF WEALLY	ATHERED ROCK. DIVIDED AS FOLLOW	/S:				
V	ERY STIFF.G	RAY, SILTY	CLAY, MOIST	WITH INTE	RBEDDEL	D FINE SAND	) LAYERS, HIGH	LY PLASTIC, A-7-6	;	- ANGULAR, SUBA	Y OR ROUNDNESS	DED, OR ROUNDED.	DESIGNATED B	Y THE TERMS:	WEATHERED	Í.	TST .	NON-COASTAL PLA	IN MATERIAL THAT WOULD YIELD SPT				
CENEDAL	SI			AND A	ASHT	O CLAS	<u>SSIFICA</u>	ION			MINERAL	OGICAL COMPO	SITION		ROCK (WR)			100 BLOWS PER FO	JOT IF TESTED.				
CLASS.	(	$\leq 35\%$ PAS	SING #200		(>?	5% PASSING	1HL 5 #200)	ORGANIC MATE	RIALS	MINERAL NA	MES SUCH AS QU	ARTZ, FELDSPAR, MICA,	, TALC, KAOLIN,	ETC.	CRYSTALLINE ROCK (CR)	K		WOULD YIELD SPT	REFUSAL IF TESTED. ROCK TYPE IN				
GROUP	A-1	A-3	A-	2	A-4	A-5 A-6	A-7 A-1	A-2 A-4. A-5		ARE USED IN	1 DESCRIPTIONS 1	WHEN THEY ARE CONS	IDERED OF SIG	INIFICANCE.			<u>ایت کے بنا ا</u>	FINE TO COARSE (	CHIST, ETC. GRAIN METAMORPHIC AND NON-COASTA				
ULASS. A	4-1-а А-1-ь	A-2	2-4 A-2-5	A-2-6 A-2-7	/ •		A-7-6 A	-3 A-6, A-7		SLIG'	HTLY COMPRESSIE	MPRESSIBILIT	LL < 31		ROCK (NCR)			SEDIMENTARY ROCK ROCK TYPE INCLU	THAT WOULD YEILD SPT REFUSAL I     DES PHYLLITE, SLATE, SANDSTONE, ETC				
SYMBOL						<u>A.7</u> A				MODE	RATELY COMPRES	SIBLE	LL = 31 -	50	COASTAL PLA		$\overline{-}$	COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT				
% PASSING #10 5	амх						GRA	ULAR SILT-	миск.		PFRCEN	TAGE OF MATE			(CP)			SHELL BEDS, ETC.	R THE INCLUDES EINESTONE, SHINDS				
*40 3i	0 MX 50 MX	51 MN				20 10 20 10	SC	ILS SOILS	PEAT		GRANUL	AR SILT - CLAY						WEATH	HERING				
MATERIA	J MA 2J MA	ID MA 30	MA 30 MA	30 PA 30 PA		30 111 30 111	) 30 PIN			TRACE OF ORGANIC M	ATTER 2 - 3	% <u>501L5</u> % 3 - 5%	TRACE	1 - 10%	FRESH	ROCK FRES	SH, CRYSTA F CRYSTAL	LS BRIGHT, FEW JOIN	IS MAY SHOW SLIGHT STAINING. ROCK				
PASSING 40								SOILS WITH		LITTLE ORGANIC MAT	TER 3 - 5	× 5 - 12%		10 - 20%	VERY SLIGHT	ROCK GENE	ERALLY FF	RESH, JOINTS STAINED,	SOME JOINTS MAY SHOW THIN CLAY CO				
LL PI	- 6 MX	- 40 NP 10	MX 41 MN MX 10 MX	40 MX 41 MN 11 MN 11 MN	1 40 MX 1 10 MX	41 MN 40 MX 10 MX 11 MN	. 41 MN 11 MN	LITTLE OR	HIGHL Y	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE	(V SLI.)	OF A CRYS	ON A BRO	JKEN SPECIMEN FACE ' NATURE.	SHINE BRIGHTLY. ROCK RINGS UNDER HA				
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX 16 MX	ND MX	AMOUNTS OF	ORGANIC		G	ROUND WATER			SLIGHT	ROCK GENE	ERALLY FF	RESH, JOINTS STAINED	AND DISCOLORATION EXTENDS INTO ROP				
USUAL TYPES S	TONE FRAGS.	FINE	SILTY OR	CLAYEY	SIL		AYEY	ORGANIC	30123	$\nabla$	WATER LEVEL	IN BORE HOLE IMMED	JIATELY AFTER	DRILLING	(SLI.)	1 INCH. OP	'EN JOINTS	3 MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL				
OF MAJOR C MATERIALS	SRAVEL, AND SAND	SAND	GRAVEL A	ND SAND	SOI	LS SO	JILS			<b>▼</b>	STATIC WATEP	LEVEL AFTER 24	HOURS		MODERATE	SIGNIFICAN	NT PORTIO	INS OF ROCK SHOW DI	SCOLORATION AND WEATHERING EFFECTS				
GEN. RATING					-		, FAI	R TO POOP			PERCHED WATE	R, SATURATED ZONE,	OR WATER BEA	RING STRATA	(MOD.)	GRANITOID	) ROCKS, M	UST FELDSPARS ARE	JULL AND DISCOLORED, SOME SHOW CLA				
AS SUBGRADE		EAUELLENI	10 0000			FAIR TO FOOR	· P(	IOR POUR	UNSULTHELE		SPRING OR SE	EP				WITH FRES	SH ROCK.	HHMMER BLOWS HND 3	HOWS SIGNIFICHNE LUSS OF STRENGTH				
	PIOF A-7-5 SUBGROUP IS ≤ LL - 30 ; PIOF A-7-6 SUBGROUP IS > LL - 30										MISCEL				MODERATELY	ALL ROCK	EXCEPT C	JUARTZ DISCOLORED OF	R STAINED. IN GRANITOID ROCKS, ALL F				
										<u> </u>	MISCEL	LHNEUUS STME	JUL 3		(MOD. SEV.)	AND DISCU	BE EXCAVE	ATED WITH A GEOLOGI	ST'S PICK. ROCK GIVES "CLUNK" SOUND A				
PRIMARY SO	MARY SOIL TYPE COMPACTNESS OR COMPAC								STRENGTH		ANKMENT (RE)		IRECTION		05.1505	<u>IF TESTED</u>	<u>D. WOULD Y</u>	<u>'IELD SPT REFUSAL</u>	<u>D SPT REFUSAL</u>				
	VERY LOOSE 4											SPT TEAT		SLOPE INDICATOR	(SEV.)	REDUCED J	IN STRENG	TH TO STRONG SOIL.	IN GRANITOID ROCKS ALL FELDSPARS A				
GENERAL	LY R		LOOSE			4 TO 10		N/A						INSTALLATION		TO SOME E	EXTENT. S	OME FRAGMENTS OF S	TRONG ROCK USUALLY REMAIN.				
MATERIAL		ME	DENSE	15E		30 TO 50	r	NZ A		ARTIFICIAL F	ILL (AF) OTHER		IG 🛆	CONE PENETROMETER TEST	VERY	ALL ROCK	EXCEPT (	JUARTZ DISCOLORED O	R STAINED. ROCK FABRIC ELEMENTS AR				
	1231427	V	ERY DEN	jЕ -		> 50									SEVERE	BUT MASS	IS EFFEC	TIVELY REDUCED TO S	SOLL STATUS, WITH ONLY FRAGMENTS OF				
GENERAL	LY	'	VERY SOF SOFT	T		< 2 2 TO 4		< 0.2 0.25 TO	5 Ø.5	INFERRED SUL	L BUUNDART		, •	SUUNDING RUD	(1 SE 1./	VESTIGES	OF ORIGIN	AL ROCK FABRIC REM	AIN. IF TESTED, WOULD YIELD SPT N V				
SILT-CLA MATERIA	4Y I	ME	EDIUM ST	IFF		4 TO 8 8 TO 15		0.5 TO	1.0	INFERRED ROC	CK LINE		WELL 🕂	WITH CORE	COMPLETE	ROCK REDU	UCED TO S	OIL. ROCK FABRIC NO	T DISCERNIBLE, OR DISCERNIBLE ONLY				
(COHESIV	E)	v	ERY STI	F		15 TO 30		2 TO	4	ALLUVIAL SOI	L BOUNDARY		in Ö-		ALSO AN E	EXAMPLE.	NATIONS. GOANTZ MAT	BE TRESERT HS DIKES ON STRINGENS					
			TEY					> 4		<u> </u>	BECOMM	ENDATION SYN					ROCK H	ARDNESS					
				10112 0	40		22	270						VERY HARD	RP PICK. BREAKING OF HAND SPECIMENS								
OPENING (MM	VE 512E  )		4.76	2.00	40 0.42	2 0.25	200 0.075 C	270 .053				WASTE	ACCEPT	ABLE, BUT NOT TO BE	HARD	S FICK. WITH DIFFICULTY. HARD HAMMER BL							
BOULDER	coi	BLE	GRAVE	EL I	COARS	5E	FINE	SILT	CLAY	SHALLOW UNDERCUT	ACCEPTABLE	D EXCAVATION - DEGRADABLE ROCK	EMBANK	MENT OR BACKFILL	_	TO DETACH	H HAND SP	'ECIMEN.					
(BLDR.)	(C	0B.)	(GR.		CSE. S	5.0	(F SD.)	(SL.)	(CL.)		A	BBREVIATIONS			MODERATELY HARD	CAN BE SC EXCAVATE	CRATCHED	BY KNIFE OR PICK. G BLOW OF A GEOLOGI	DUGES OR GROOVES TO 0.25 INCHES DE ST'S PICK. HAND SPECIMENS CAN BE DI				
GRAIN MM	305	75	i .	2.0		0.25	t	0.05 0.00	15	AR - AUGER REFUSAL	ME	D MEDIUM	VST -	VANE SHEAR TEST		BY MODER	ATE BLOWS	5.					
SIZE IN.	12	3								BT - BORING TERMINATED	) MI( MC	CA MICACEOUS D MODERATELY	WEA ツ	· WEATHERED JNIT WEIGHT	MEDIUM HARD	CAN BE GR	ROOVED OR XCAVATED	I GOUGED 0.05 INCHES	DEEP BY FIRM PRESSURE OF KNIFE O PEICES 1 INCH MAXIMUM SIZE BY HARD				
	<u>S</u>	<u>OIL №</u>	<u>1015TL</u>	<u>RE - C</u>	ORRE	LATION	OF TE	RMS		CPT - CONE PENETRATIO	N TEST NP	- NON PLASTIC	γ _d - 1	DRY UNIT WEIGHT		POINT OF	A GEOLOG	IST'S PICK.					
(ATTE	ERBERG LIN	ALE		DESCRIP	YTION	GUIDE	E FOR FIELD	MOISTURE DE	SCRIPTION	DMT - DILATOMETER TES	ST PM	IT - PRESSUREMETER	TEST <u>SA</u>	MPLE ABBREVIATIONS	SOFT	CAN BE GR FROM CHIF	ROVED OR PS TO SEV	GOUGED READILY BY F RAL INCHES IN SIZE	<pre>(NIFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POIN</pre>				
				- SATURA	TED -	USUAI		VERY WET. US	UALLY	DPT - DYNAMIC PENETRA	TION TEST SA	P SAPROLITIC	S - B	ULK SPLIT SPOON		PIECES CA	AN BE BRO	KEN BY FINGER PRESS	JURE.				
		. 1.417		(SAT.)		FROM	BELOW TH	E GROUND WAT	ER TABLE	F - FINE	SL	SILT, SILTY	ST -	SHELBY TUBE	VERY SOFT	CAN BE CA	ARVED WIT	H KNIFE. CAN BE EXC ESS CAN BE BROKEN F	AVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH				
PLASTIC		LIMIT				SEMI		RES DRYING T	n	<ul> <li>FOSS FOSSILIFEROUS</li> <li>FRAC FRACTURED, FRAC</li> </ul>	SL TURES TC	I SLIGHTLY R - TRICONE REFUSA	RS- L RT-	ROCK RECOMPACTED TRIAXIAL		FINGERNAII	íL.						
RANGE <				- WET - (1	.W)	ATTA	IN OPTIMUM	MOISTURE	0	FRAGS FRAGMENTS	w	- MOISTURE CONTENT	CBR -	CALIFORNIA BEARING		RACTUR	RE SPA	1CING	BEDDING				
PL L -		: LIMIT		-										T	VERY WID	E	MORE	SPACING THAN 10 FEET	VERY THICKLY BEDDED				
ОМ _	OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOIS							AR OPTIMUM M	OISTURE	DRILL UNITS:	ADVANCING TO	JLS:	HAMMER	TYPE:	WIDE		3	TO 10 FEET	THICKLY BEDDED 1.				
SL _															CLOSE 0.16 TO 1 FOOT								
	- DRY - (D) ATTAIN OPTIMUM MOISTURE						0		6. CONTIN	UOUS FLIGHT AUGER	CORE SIZ	E:	VERY CLC	SE	LESS	THAN 0.16 FEET	THICKLY LAMINATED 0.00 THINLY LAMINATED <						
	1			PLA	STIC	TY					8º HOLLON	AUGERS	в	□-н				INDUF	ATION				
				PLASTI		DEX (PI)		DRY STREN	GTH	CME-550	HARD FAC	CED FINGER BITS	−		FOR SEDIMEN	ITARY ROCK	<s, indura<="" td=""><td>TION IS THE HARDEN</td><td>ING OF MATERIAL BY CEMENTING, HE</td></s,>	TION IS THE HARDEN	ING OF MATERIAL BY CEMENTING, HE				
NON		тіс			0-5			VERY LO	W		TUNGCA	RBIDE INSERTS			FRIAB	LE		RUBBING WITH GENTLE BLOW	FINGER FREES NUMEROUS GRAINS: BY HAMMER DISINTEGRATES SAMPIF.				
MODE	RATELY PLAS	ASTIC			16-25			MEDIUM			X CASING	W/ ADVANCER		T HOLE DIGGER				GRAINS CAN B	E SEPARATED FROM SAMPLE WITH ST				
HIGH	HIGHLY PLASTIC 26 OR MORE HIGH							HIGH		PORTABLE HOIST	X TRICONE	2 15/16 STEEL TEET		D AUGER	MUDER	HIELY INDU	URATED	BREAKS EASIL	/ WHEN HIT WITH HAMMER.				
	COLOR									X CME-45B		TUNGCARB.	SOU	NDING ROD	INDUR	ATED		GRAINS ARE DI	FFICULT TO SEPARATE WITH STEEL I BREAK WITH HAMMER				
DESCRIPTI	IONS MAY		COLOR C	R COLOR (		ATIONS (TA	N, RED, YELI	OW-BROWN, BLU	JE-GRAY).					E SHEAR TEST				SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPI F				
MOL	DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.								.t.		∐		_   🛛 _		EXTRE	MELY INDUF	RATED	SAMPLE BREAK	S ACROSS GRAINS.				

### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ED. AN INFERRED SPT REFUSAL. 1 FOOT PER 60 IS OFTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. AL PLAIN IF TESTED. MAY NOT YIELD STONE, CEMENTED CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE TACHED 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: 3 - 0.16 FEE 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-



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## GEOTECHNICAL BORING REPORT BORE LOG

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COL	LAR ELI	<b>EV.</b> 40	).0 ft		т	OTAL DEF	<b>7TH</b> 40.0	ft	NORTHING	<b>G</b> 243,9	38		EASTIN	<b>G</b> 2,405,867		<b>24 HR.</b> 3.0	cc	LLAR EL	<b>.EV</b> . 4	0.1 ft		т	DTAL DEF	<b>TH</b> 40.0	ft
DRIL	L RIG/HA	MMER E	FF./DA	TE M	D1904	CME-45B 90	0% 03/01/20	19	1	DRILL N	NETHO	D N	lud Rotary		HAMME	<b>R TYPE</b> Automatic	DR	LL RIG/H/	AMMER	EFF./DA	TE M	ID1904 (	CME-45B 90	0% 03/01/201	19
DRIL	LER W	VIGGIN	S, M.		S		E 02/04/	20	COMP. DA	TE 02/	04/20		SURFAC	E WATER DE	PTH N/A	4	DR		WIGGI	IS, M.		ST		E 02/04/	20
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REFERENCE

## **CONTENTS** SHEET NO. 2

5-11

LEGEND (SOIL SITE PLAN	&	ROCK)
BORE LOGS		

**DESCRIPTION** 

TITLE SHEET

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM SOUTH OF NC 210 TO US-17 NORTH OF HAMPSTEAD SITE DESCRIPTION RETAINING WALL NO. 1, -WL1-, FROM -Y40- STATION 249+62.70, 13.60' RT TO -Y40-

STATION 256+19.51, 11.50' RT

# 4023 PROJEC

STATE STATE PROJECT REFERENCE NO.	NO.	SHEETS
N.C. <b>R–3300B</b>	1	11

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS. THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE NUCLED STRATA SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

GOODNIGHT, D.J.
MID-ATLANTIC
INVESTIGATED BYFALCON
DRAWN BYCROCKETT, S.C.
CHECKED BY <b>HAMM, J. R.</b>
SUBMITTED BY FALCON
DATE MAY 2020



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL	DESC	RIPTION				1	GI	RADATION						ROCK DES	CRIPTION
SOIL IS BE PENE ACCORD	CONSIDERED TRATED WITH ING TO THE	D UNCONSOL H A CONTIN STANDARD	DATED, SEMI-C OUS FLIGHT F PENETRATION	ONSOLIDA OWER AU 'EST (AA!	TED, OR WEA IGER AND YII SHTO T 206	ATHERED E ELD LESS , ASTM D15	ARTH MATERIALS 1 THAN 100 BLOWS 1 586). SOIL CLASSIF	HAT CAN PER FOOT TICATION	WELL GRADED - INDICA UNIFORMLY GRADED - II GAP-GRADED - INDICATE	TES A GOOD REPRESE NDICATES THAT SOIL	ENTATION OF PARTI PARTICLES ARE AL	ICLE SIZES FROM LL APPROXIMATEL IZES OF TWO OR I	FINE TO COARSE. ( THE SAME SIZE. MORE SIZES.	HARD ROCK ROCK LINE SPT REFUSA	IS NON-COAST INDICATES TH	TAL PLAIN MAT HE LEVEL AT W ATION BY A SP	ERIAL THAT WO HICH NON-COAS	ULD YIELD SPT REFUSAL IF TESTE TAL PLAIN MATERIAL WOULD YIELD IPLER EQUAL TO OR LESS THAN 0.1
IS CONSIST	BASED ON TI ENCY, COLOR,	HE AASHTO	SYSTEM. BASIC DISTURE, AASH	DESCRIF	<pre>&gt;TIONS GENE SIFICATION,</pre>	ERALLY ING AND OTHER	CLUDE THE FOLLOW PERTINENT FACTO	/ING: DRS SUCH		ANGULAF	RITY OF GRAI	INS		REPRESENTE	D BY A ZONE	OF WEATHERE	D ROCK.	STITUN BETWEEN SUIL AND RUCK
A	S MINERALO	DGICAL COMF GRAY.SILTY CL	DSITION, ANGUL W. <i>MOIST WITH I</i>	ARITY,S' <i>VTERBEDD</i>	IRUCTURE, PI	LASTICITY, ID LAYERS.	ETC. FOR EXAMPL	E.	THE ANGULARI	TY OR ROUNDNESS OF	SOIL GRAINS IS D	DESIGNATED BY TH	E TERMS:	ROCK MATER	IALS ARE TY	PICALLY DIVID	ED AS FOLLOWS	
	S	OIL LE	END AND	AASH	TO CLA	SSIFIC	ATION		- <u>ANGULAR, SUBAN</u>	MULAR, SUBROUNDED,	OR ROUNDED.	ITION		ROCK (WR)		100 NUN	BLOWS PER FOO	T IF TESTED.
GENERAL	,		ERIALS	SI	LT-CLAY MATE	RIALS	ORGANIC MATE	RIALS			ILAL LUMPUS			CRYSTALLIN	E	FINE	TO COARSE GR	AIN IGNEOUS AND METAMORPHIC RO
GROUP	A-1	A-3	A-2	A-4	A-5 A-f	-2007	Q-1 Q-2 Q-4 Q-5	1	- ARE USED I	N DESCRIPTIONS WHE	IN THEY ARE CONSI	DERED OF SIGNIFI	CANCE.	ROCK (CR)		GNEI	SS, GABBRO, SCH	IST, ETC.
CLASS.	A-1-a A-1-b	A-2-4	A-2-5 A-2-6 A	2-7		A-7-5 A-7-6	A-3 A-6, A-7			COMP	RESSIBILITY			NON-CRYSTA		FINE SEDI	TO COARSE GRI MENTARY ROCK	AIN METAMORPHIC AND NON-COASTA THAT WOULD YEILD SPT REFUSAL
SYMBOL		**************************************		8						HTLY COMPRESSIBLE ERATELY COMPRESSIB	3LE	LL < 31 LL = 31 - 50		COASTAL PL	AIN	ROCK	TYPE INCLUDE	S PHYLLITE, SLATE, SANDSTONE, ETC IMENTS CEMENTED INTO ROCK, BUT
% Passing		<u> </u>					SILT-		HIGH	LY COMPRESSIBLE		LL > 50		SEDIMENTAR	Y ROCK	SPT SHEL	REFUSAL, ROCK	TYPE INCLUDES LIMESTONE, SANDS
*10 *40	50 MX 30 MX 50 MX	51 MN					GRANULAR CLAY	MUCK, PEAT		PERCENTA	IGE OF MATER	RIAL			I	0/122	WEATH	ERING
*200	15 MX 25 MX	10 MX 35 MX	35 MX 35 MX 3	6 МХ 36 М	N 36 MN 36 M	4N 36 MN	SULS		ORGANIC MATERIAL	- SOILS		OTHER MA	TERIAL	FRESH	ROCK FRESH	I. CRYSTALS BRI	GHT, FEW JOINTS	MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING *40									LITTLE ORGANIC MAT	TER 3 - 5%	3 - 5% 5 - 12%	LITTLE	1 - 10%		HAMMER IF	CRYSIALLINE.	NINTS STAINED S	חאר זחואדה אמע האחש דאוא רומע ר
LL	-	- 40 MX	41 MN 40 MX 4	MN 40 M	X 41 MN 40 M	1X 41 MN	SOILS WITH LITTLE OR		MODERATELY ORGANIC HIGHLY ORGANIC	5 - 10% > 10%	12 - 20% > 20%	SOME HIGHL Y	20 - 35% 35% AND ABOVE	(V SLI.)	CRYSTALS C	IN A BROKEN SP	ECIMEN FACE SH	INE BRIGHTLY. ROCK RINGS UNDER H
FI GROUP INDEX	6 MX Ø	NP 10 MA		. MIN 18 M	X 12 MX 16 F		MODERATE	ORGANIC		GRO	UND WATER				OF A CRYST	ALLINE NATURE	-	
USUAL TYPES	STONE FRAGS.						ORGANIC	SOILS	$\bigtriangledown$	WATER LEVEL IN	BORE HOLE IMMEDI	ATELY AFTER DRI	LING	(SLI.)	1 INCH. OPEN	N JOINTS MAY	CONTAIN CLAY. IN	N GRANITOID ROCKS SOME OCCASIONA
OF MAJOR	GRAVEL, AND	SAND 0	RAVEL AND SAND	s	SOILS	SOILS	MATTER			STATIC WATER LE	EVEL AFTER 24	HOURS		MODERATE	CRYSTALS A	ARE DULL AND E	ISCOLORED. CRYS	STALLINE ROCKS RING UNDER HAMMER
GEN, RATING	JHNU			_			FAIR TO	-		PERCHED WATER,	SATURATED ZONE, OF	R WATER BEARING	STRATA	(MOD.)	GRANITOID F	ROCKS, MOST FE	LDSPARS ARE DU	LL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE		EXCELLENT T	GOOD		FAIR TO POO	DR	POOR	UNSULTABLE		SPRING OR SEEP					DULL SOUND WITH FRESH	) UNDER HAMMEN I ROCK.	RLOWS AND SHO	JWS SIGNIFICANT LOSS OF STRENGTH
		PI OF A-7-5	JBGROUP IS ≤ L	L - 30 ; P	I OF A-7-6 SUF	BGROUP IS >	LL - 30		0.00.			<u></u>		MODERATELY	ALL ROCK E	XCEPT QUARTZ	DISCOLORED OR	STAINED. IN GRANITOID ROCKS, ALL F
		<u>U</u>	JNSISTEN			NESS				MISCELLA	INEUUS SYMBI	ULS		SEVERE (MOD. SEV.)	AND DISCOLO AND CAN BE	ORED AND A MA E EXCAVATED WI	JORITY SHOW KA TH A GEOLOGIST	OLINIZATION. ROCK SHOWS SEVERE LI 'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY	SOIL TYPE	COMP4 CON	CTNESS OR SISTENCY	PENE	TRATION RES	SISTENCE	COMPRESSIVE	STRENGTH		SANKMENT (RE)	325 DIP & DIP DIF	RECTION			IF TESTED,	WOULD YIELD S		
		VEF			(N-VALUE)	,	(TUNS/F	.1-)		SCRIPTION	SPT			SEVERE (SEV.)	ALL ROCK E REDUCED IN	STRENGTH TO	DISCOLORED OR STRONG SOIL. IN	STAINED. ROCK FABRIC CLEAR AND E I GRANITOID ROCKS ALL FELDSPARS #
GENERA GRANUL	LLY AR		OOSE		4 TO 10	1			SOIL SYMBOL	Ū	VST PMT		NSTALLATION		TO SOME EX	TENT. SOME FR	AGMENTS OF STP	NONG ROCK USUALLY REMAIN.
MATERI		MEDI	IM DENSE		30 TO 5	0	N/A		ARTIFICIAL F			5 🛆 f	ONE PENETROMETER	VERY	ALL ROCK E	EXCEPT QUARTZ	DISCOLORED OR	STAINED. ROCK FABRIC ELEMENTS AF
	HESIVE/	VEF	Y DENSE		> 50					بر الم				SEVERE	BUT MASS I	S EFFECTIVELY	REDUCED TO SO	IL STATUS, WITH ONLY FRAGMENTS OF
GENERA	LLY	VE	SOFT		< 2 2 TO 4		0.25 TO	9.5 0.5	INFERRED SUI		T CORE BURING		CONDING ROD		VESTIGES O	F ORIGINAL ROO	K FABRIC REMAI	N. <u>IF TESTED, WOULD YIELD SPT N V</u>
SILT-CL MATERI	_AY ΔI	MED	JM STIFF		4 TO 8 8 TO 15		0.5 TO	1.0	INFERRED ROOM	CK LINE	) MONITORING W	/ELL 🕂 🔶 🎖	ITH CORE	COMPLETE	ROCK REDUC	CONCENTRATION	JCK FABRIC NOT	DISCERNIBLE, OR DISCERNIBLE ONLY
(COHESI	VE)	VEF	Y STIFF		15 TO 30	2	2 TO	4	ALLUVIAL SO	IL BOUNDARY Z	△ PIEZOMETER INSTALLATION	, <u>Ò</u> - s	PT N-VALUE		ALSO AN EX	AMPLE.	o. doniniz nan i	SE TRESERT HS BIKES ON STRINGERS
					BAIN S	IZF	74			RECOMMEN	JOATION SYME	301 5					ROCK HA	RDNESS
	EVE CIZE		4 10		a ca	200	270				EXCAVATION -		D EXCAVATION -	VERY HARD	CANNOT BE	SCRATCHED BY	KNIFE OR SHARP	PICK. BREAKING OF HAND SPECIMEN
OPENING (M	M)		4.76 2.0	0 0.	42 0.25	0.075	0.053			UNSUITABLE WA	STE [	ACCEPTABLE	BUT NOT TO BE	HARD	CAN BE SCF	RATCHED BY KNI	FE OR PICK ONL	Y WITH DIFFICULTY. HARD HAMMER B
BOULDE	R CO	DBBLE	GRAVEL	COA	RSE	FINE	SILT	CLAY		ACCEPTABLE DE	GRADABLE ROCK	EMBANKMEN	OR BACKFILL		TO DETACH	HAND SPECIMEN	ie -	
(BLDR.	) ((	COB.)	(GR.)	(CSE.	. SD.)	(F SD.)	(SL.)	(CL.)		ABB	REVIATIONS			HARD	EXCAVATED	RATCHED BY KNI BY HARD BLOW	OF A GEOLOGIST	GES OR GROOVES TO 0.25 INCHES DE
GRAIN MN	4 305	75	2.	0	0.25		0.05 0.00	15	AR - AUGER REFUSAL	MED	MEDIUM	VST - VAN	E SHEAR TEST		BY MODERAT	TE BLOWS.		
SIZE IN	. 12	3							- CL CLAY	MOD	- MILALEOUS	$\gamma$ - unit	WEIGHT	HARD	CAN BE GRU	JUVED OR GOUGE CAVATED IN SMA	LL CHIPS TO PE	JEEP BY FIRM PRESSURE OF KNIFE O ICES 1 INCH MAXIMUM SIZE BY HARD
501			ISTURE -				IERMS		CPT - CONE PENETRATIO	N TEST NP - 1 ORG -	NON PLASTIC	$\gamma_{ m d}$ - Dry	UNIT WEIGHT		POINT OF A	GEOLOGIST'S P	ICK.	
(AT	TERBERG LI	IMITS)	DESC	RIPTION	- GUIE	DE FOR FI	ELD MOISTURE DE	SCRIPTION	DMT - DILATOMETER TES	ST PMT -	· PRESSUREMETER T	EST <u>SAMPLE</u>	ABBREVIATIONS	SOFT	FROM CHIPS	DVED OR GOUGEL S TO SEVERAL I	, readily by KN NCHES IN SIZE F	IFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POIN
			- SATU	RATED -	USU	ALLY LIQU	JID; VERY WET, US	UALLY	e - VOID RATIO	TION TEST SAP SD	SAPROLITIC SAND, SANDY	S - BULK SS - SPLI	T SPOON	VEDV	PIECES CAN	BE BROKEN BY	FINGER PRESSUR	RE.
LL			(SA	τ.)	FRO	M BELOW	THE GROUND WAT	ER TABLE	F - FINE	SL 1	SILT, SILTY	ST - SHEL	BY TUBE	SOFT	OR MORE IN	I THICKNESS CA	N BE BROKEN BY	FINGER PRESSURE. CAN BE SCRATCH
PLASTIC	Т				SEM	ISOLID: RE	QUIRES DRYING T	0	FRAC FRACTURED, FRAC	TURES TCR -	TRICONE REFUSAL	RT - RECO	MPACTED TRIAXIAL		FINGERNAIL.			
(PI)	PLASTI		- WEI	- (W)	ATT	AIN OPTIM	1UM MOISTURE		FRAGS FRAGMENTS HL HIGHLY	w - M V - V	10ISTURE CONTENT ERY	CBR - CAL RA	IFORNIA BEARING	терм	FRACTURE	E SPACINO		BEDDING
	T								EO	UIPMENT USE	ON SUBJEC	T PROJECT		VERY WI	JE	MORE THAN	10 FEET	VERY THICKLY BEDDED
OM		JM MOISTUR		I - (M)	SUL	ID; AT UR	NEAR UPTIMUM M	UISTURE	DRILL UNITS:	ADVANCING TOOLS:		HAMMER TYPE		WIDE MODERAT	ELY CLOSE	3 TO 10 1 TO 3	FEET	THICKLY BEDDED 1. THINLY BEDDED 0.1
JL					REQ	UIRES ADD	DITIONAL WATER	то	CME-45C	CLAY BITS		X AUTOMAT	IC MANUAL		NSF	0.16 TO 1	FOOT	VERY THINLY BEDDED 0.0
			- DRY	- (U)	ATT	AIN OPTIM	1UM MOISTURE		CME-55		JS FLIGHT AUGER	CORE SIZE:				2200 MAN		THINLY LAMINATED <
			PL	.ASTIC	CITY				1	8" HOLLOW AI	UGERS	П-в	. 🗌 - ዞ				INDURA	ITION
			PLAS	TICITY	INDEX (PI)		DRY STREM	IGTH	CME-550		FINGER BITS	<u> </u> -N	-	FOR SEDIME	NTARY ROCKS.	, INDURATION I	S THE HARDENIN	IG OF MATERIAL BY CEMENTING, HE
NON SL1	I PLASTIC GHTLY PLAS	STIC		Ø-5 6-15	5		VERY LC SLIGHT	W	VANE SHEAR TEST		JE INSERTS	HAND TOOLS:		FRIA	3LE	F	SENTLE BLOW B	HAMMER DISINTEGRATES SAMPLE.
MOE	ERATELY P			16-2	5 MORE		MEDIUM	1			J W/ ADVANCER	POST HO	LE DIGGER	MODE	RATELY INDU	RATED	RAINS CAN BE	SEPARATED FROM SAMPLE WITH ST
					IR		1100		PORTABLE HOIST		2 '% STEEL TEETH	HAND AL	GER			E	REAKS EASILY	WHEN HIT WITH HAMMER.
				COLO					X <u>CME-45B</u>		IUNGCARB.		G ROD	INDUF	RATED	C C	JIFFICULT TO B	REAK WITH HAMMER.
DESCRIP	TIONS MAY DDIFIERS SL	INCLUDE C	LOR OR COLC HT, DARK. STR	R COMBI	NATIONS (T TC. ARE USF	AN, RED, Y	ELLOW-BROWN, BL	UE-GRAY). CE.				VANE SH	LAR TEST	FXTR			HARP HAMMER [	3LOWS REQUIRED TO BREAK SAMPLE
•																	AMPLE BREAKS	ACROSS GRAINS.

### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-





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## GEOTECHNICAL BORING REPORT BORE LOG

WE	<b>3S</b> 40	237.1.1				TIP	R-3300	В		COUN	TY P	PENDEF	R			(	GEOLOG	<b>IST</b> GC	ODNIGH	IT, D.J.			WBS	<b>3</b> 4023	37.1.1			Т	IP R-33	300B		COUNT	Y PENDE	R			GE	EOLOGIS	GOC	DNIGHT,	D.J.	
SIT	E DE	SCRIPTI	<b>on</b> Re	ETAIN	ING W	ALL N	io. 1 Ff	rom -'	Y40- S	5TA. 24	9+62	.70, 13.	60' RT 1	TO -Y	′40- S	STA. 2	56+19.51	, 11.50' /	RT	G	ROUND	WTR (ft)	SITE	DESC	riptio	N RET	ΓΑΙΝΙΝ	IG WAL	_L NO. 1	1 FRO	M -Y40-	STA. 24	9+62.70, 13	3.60' RT ⁻	TO -Y4	40- ST	TA. 256	6+19.51, <i>*</i>	11.50' R	Г	GROU	ND WTR (ft
во	RING	NO. RV	V1-01			STAT	<b>ION</b> 1	0+04			OF	FSET	9 ft LT			/	ALIGNME	INT -W	L1-		0 HR.	2.5	BOF	RING NO	<b>)</b> . RW	1-02		S	TATION	l 10+	31		OFFSET	16 ft L ⁻	-		AL	IGNMEN	IT -WL	1-	0 HR.	2.2
со	LLAR	ELEV.	43.6 ft			τοτμ	L DEP	тн 3	0.0 ft		NO	ORTHIN	<b>3</b> 238,	949		E	EASTING	2,400,	878	24	4 HR.	4.1	COL	LAR E	L <b>EV.</b> 4	3.5 ft		Т	OTAL DI	EPTH	30.0 ft		NORTHI	NG 238,	966		EA	STING	2,400,89	99	24 HR.	3.8
DRI	LL RIG	HAMMER	EFF./DA	ATE	MID1904	CME-4	45B 90%	03/01/2	2019				DRILL	METH	IOD	Mud R	otary		ŀ	IAMMER	TYPE A	utomatic	DRIL	l Rig/HA	MMERE	FF./DA1	re mi	D1904 C	ME-45B 9	90% 03/	01/2019			DRILL	METH	OD N	/lud Rota	ary		HAN	MER TYPE	Automatic
DR	ILLEF	WIGG	INS, M	l.		STAF	RT DAT	E 02/	/03/20		CC	OMP. DA	<b>TE</b> 02	2/03/2	20	{	SURFACE	E WATE	R DEPTH	N/A			DRI	LER	WIGGI	NS, M.		S	TART D	ATE	02/04/2	0	COMP. D	DATE 02	2/04/2	0	SU	JRFACE	WATER	DEPTH	N/A	
ELE		EV DEF		LOW				BLC	DWS PE	ER FOC	DT 75	400	SAM	P.  ▼		5		SOIL AI	ND ROCK	DESCR	IPTION		ELEV	DRIVE						25	BLOWS F	PER FOO	T	SAM	P.			5	SOIL AND	ROCK DE	SCRIPTION	N
(11)	/ (	t) ("	0.5	π 0.	5π 0.51	nt   U		25	50	)	/5	100	NO.	· / M	101 0	<u> </u>	LEV. (ft)					DEPTH (ft)	(11)	(ft)	(11)	0.5π	0.5π	ι 0.5π		25			75 10	NO.	<u>/M</u>	OI G						
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20	20	).1 <u></u> 23	.5	3 8	3 4	$\neg$	<u> </u>	+ • •					-	Sa	at oo								20	20.0	23.5	3	2	1				· · · ·			4 309	%	-		GRAY,	SILTYSAN	ID (A-2-4)	
		Ŧ					· /· · ·								0.0	<u>:[</u> 17	<u>7.6</u>					<u> 26.0</u>			Ŧ				$\left  \begin{array}{c} \bullet \\ \bullet \\ \bullet \end{array} \right $							/*	L 165					27
15	1	5.1 <u> </u>	5				<i>.</i>										Gr	SAT, FINE	SANDT	SILTTO	LAT (A-7-	-0)	15	15.0	28.5													GRA	Y, FINE S	SANDY SIL	TY CLAY (A	<u>-7-6)</u>
		-	WC	он w	ON NO	<u>н 💑</u>							SS-6	3 42	%	- 13	3.6 Br	oring Terr	ninated at	Flevatio	n 136 ft I	30.0			+	WOF		1 1	<b>\$</b> 1					. SS-6	5 399	%	- 13.5	Bori	na Termii	nated at Fle	vation 13.5	30 ft IN
		ŧ														Ę		UCP	SANDY	SILTY CI	LAY				ŧ												F	2011	UCP: S	SANDY SIL	TY CLAY	
Q		+														F									‡												F					
5/13/		‡														Ę									‡												F					
GDT		‡														F									‡												F					
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## GEOTECHNICAL BORING REPORT BORE LOG

١	NBS	40237	.1.1			Т	IP R-3300	)B	COUNT	Y PENDER					GEOLOGIST GOODNIGH	T, D.	J.	WB	<b>3</b> 4023	7.1.1			TIF	<b>P</b> R-3300E	3	COUNTY
;	SITE	DESCR	IPTION	RET	AINING	g wai	LL NO. 1 F	ROM -Y40	STA. 24	9+62.70, 13.6	60' RT T	) -Y40	D- ST	ΓΑ. 2	256+19.51, 11.50' RT		GROUND WTR (ft)	SITI	E DESCR	RIPTION	RET	AINING	S WAL	L NO. 1 FR	OM -Y40-	STA. 249
I	BORI	ng no.	RW1	-03		S	TATION	10+75		OFFSET	25 ft LT				ALIGNMENT -WL1-		<b>0 HR.</b> 3.3	BOF	Ring No	. RW1	-04		ST	ATION 1	1+46	
•	COLL	AR ELE	<b>EV.</b> 43	.9 ft		Т	OTAL DEF	<b>TH</b> 25.0	t	NORTHING	3 238,9	94			EASTING 2,400,934		<b>24 HR.</b> 4.0	COL	LAR EL	. <b>EV</b> . 4	5.4 ft		тс	TAL DEPT	<b>H</b> 25.0 ft	
I	DRILL	rig/han	IMER EF	F./DATI	e Mid	1904 C	ME-45B 90%	6 03/01/2019			DRILL N	IETHO	DM	/lud F	Rotary HA	AMME	ER TYPE Automatic	DRIL	l Rig/Ha	MMER EI	F./DAT	E MID	1904 CN	1E-45B 90% (	3/01/2019	
l	DRILL	.ER W	/IGGIN	S, M.		S	TART DAT	E 02/04/2	20	COMP. DA	<b>TE</b> 02/	04/20			SURFACE WATER DEPTH	N/A	۹	DRI	LER V	VIGGIN	S, M.		ST	ART DATE	01/30/2	0
E	LEV	DRIVE ELEV	DEPTH	BLC	W CO	JNT		BLOWS	PER FOO	T	SAMP.				SOIL AND ROCK [	DESC	CRIPTION	ELE\	, DRIVE	DEPTH	BLC	DW COL	JNT		BLOWS	PER FOOT
_	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	I G	E	ELEV. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0 .	25 :	
_	45		F												43.9 GROUND SU	URFA	ACE 0.0	50		+						
	-	42.9	1.0	3	2	4								-						Ŧ						
	40	40.4	3.5		2	-				· · · · · ·					SLIGHTLY SILTY FIN	IE SA	ND (A-3) W/	45		ŧ						
			F	2	4	5	9						0000	3	<u>38.4</u>	GAN	<u>5.5</u>		44.3	+ 1.1	9	10	12	· · · ·		
		- 57.9 -	- 0.0	2	1	3						Sat.			DARK BROWN, SILTY W/LITTLE OF	FINE RGAN	E SAND (A-2-4) NICS 8 0		41.9	3.5		4	5			
_	35	35.4	8.5	15	16	17		<b>1</b> 33				Sat.	0000		TAN, FINE SA	AND (	(Ā-3)	40	39.4	+ _{6.0}		-	Ű	<b>P</b> 9		
		-	t t							· · · · · ·									26.0	‡	2	3	5			
	30	- 30.4	13.5							·   · · · · ·				-				35	30.9	+ 8.5	8	18	31		```×	49
	00	-	F	1	1	2	<b>9</b> ³					Sat.							1.	ŧ						
		-	÷							· · · · · ·									31.9	13.5		6	8			
_	25	25.4	18.5	2	1	2						Sat.		-				30		ŧ				• • • • • • 14		
		-	t t							· · · · · ·					21.0		22.0		26.0	+						
	20	20.4	23.5				]   [ : : : : :							<u>*</u> *	GRAY, SANDY	CLAY	Y (A-6)	25	20.9	+ 10.5	4	5	4	· • • •		
			-	1	1	1	•2 · · ·				SS-66	36%			18.9 Boring Terminated at F	Flova	25.0			Ŧ				<u>.</u> [		
		-	F											F	UCP: SANDY S	SILTY	CLAY		21.9	23.5	2	3	3			
		-												E						+				Ψo		1
			E											E						Ŧ						
_		-	E											F						Ŧ						
/13/20		-	E											E						Ŧ						
DT 5.		-	E											E						Ŧ						
DT.GI		-	E											F						Ŧ						
о С		-	F											F						Ŧ						
Ъ		-	F											F						Ŧ						
GS.G		-	F											F						Ŧ						
Lo		-	F											F						Ŧ						
GIN		-	F											F						Ŧ						
ALLS_		-	F											F						Ŧ						
⊿W D		-	F											F						Ŧ						
TAN		-	F											F						Ŧ						
-VER		-	ŧ											F						Ŧ						
		-	F											F						Ŧ						
CON		-	F											F						Ŧ						
EAI		-	F											F						Ŧ						
GEO		-	ŧ											F						Ŧ						
3300		-	ŧ											F						ŧ						
щ		-	ŧ											F						ŧ						
OUBI		-	ŧ											F						‡						
RED		-	ŧ											F						‡						
T BO		-	ŧ											F						‡						
NCDO		-	ŧ											F						ŧ						

PENDER		GEO	LOGIST GOODNIC	SHT, D.	J.	
62.70, 13.60' RT TO	) -Y40- S	A. 256+′	19.51, 11.50' RT		GROUN	ID WTR (ft)
OFFSET 4 ft LT		ALIC	SNMENT -WL1-		0 HR.	5.3
NORTHING 239,0	07	EAS	<b>TING</b> 2,401,007		24 HR.	FIAD
DRILL	IETHOD N	ud Rotary		HAMME	RTYPE	Automatic
COMP. DATE 01/	30/20	SUR	FACE WATER DEPT	TH N/A	٨	
75 100 NO.	MOI G		SOIL AND ROC	K DESC	RIPTION	I
SAMP.       75     100       NO.	MOI G MOI G MI Sat. Sat. Sat. Sat.	- 45.4 - 44.3 	GROUND ROADWAY E BITUMINOU: UNDIVIDED C TAN, F. SAND ORGANICS AND IN CLAY I Boring Terminated UCP:	SURFA MBANK S CONC OASTAL (A-3) W ITERMI LENSES	CE MENT RETE PLAIN / TRACE TTENT T	0.0 1.1 HIN £5.0

## GEOTECHNICAL BORING REPORT BORE LOG

	WBS	40237	'.1.1			Т	IP R-3300	В	COUN	TY PENDE	R			G	GEOLOGIST GOODNIGHT,	D.J.		WBS	<b>3</b> 40237	'.1.1			TI	<b>P</b> R-330(	)B	COUN	ITY
	SITE	DESCR	IPTION	RET	AININ	G WAL	L NO. 1 F	ROM -Y40	- STA. 24	9+62.70, 13	.60' RT T	0 -Y40	)- ST	TA. 25	56+19.51, 11.50' RT	GROUNE	OWTR (ft)	SITE	DESCR	IPTION	RET	AINING	G WAL	.L NO. 1 F	ROM -Y40-	· STA. 24	49+
	BORI	NG NO.	RW1	-05		S	TATION	1+94		OFFSET	CL			A	ALIGNMENT -WL1-	0 HR.	5.4	BOR	ing no.	RW1	-06		ST		12+43		'
	COLL	AR EL	<b>EV.</b> 45	5.8 ft		Т	OTAL DEP	<b>TH</b> 25.0	ft	NORTHIN	<b>IG</b> 239,0	)25		E	EASTING 2,401,052	24 HR.	FIAD	COL	LAR ELE	<b>EV.</b> 46	6.0 ft		т	JTAL DEP	<b>TH</b> 20.0 f	t	!
	DRILL	RIG/HAN	IMER EF	F./DATI	e Mid	1904 CI	ME-45B 90%	03/01/2019			DRILL	METHO	DM	Mud Ro	otary HAM	MER TYPE	Automatic	DRILI	L RIG/HAN	IMER EF	F./DATE	E MID	1904 CN	ИЕ-45В 90%	,03/01/2019		
	DRILI	LER V	/IGGIN	S, M.		S	TART DAT	E 01/30/	20	COMP. D	<b>ATE</b> 01	/30/20		s	SURFACE WATER DEPTH	N/A		DRIL	LER W	/IGGIN	S, M.		ST	ART DAT	E 01/31/2	20	
		DRIVE ELEV	DEPTH	BLC				BLOWS	PER FOO	DT	SAMP	. 🗸			SOIL AND ROCK DE	SCRIPTION		ELEV	DRIVE ELEV	DEPTH	BLO	W COU			BLOWS	PER FO	от -
+	(11)	(ft)	(14)	0.5π	0.5π	0.5π		25	50	75 10	NO.	/мо	I G	EL	_EV. (ft)		DEPTH (ft)	(11)	(ft)	(14)	0.5π	0.5π	0.5π		25	50	
DOUBLE R3300_GEO_FALCON_CULVERT AND WALLS_GINT_LOGS.GPJ_NC_DDT.GDT_5/13/20	ELEV (ft) 45 40 35 30 25	LEV (ft) 44.5 - 42.3 39.8 - 37.3 - 32.3 - - - - - - - - - - - - - - - - - - -	DEPT- (ft) 1.3 3.5 6.0 8.5 13.5 18.5 23.5 23.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5	BLC 0.5ft 6 3 1 WOH 5 3 5	0.5ft 0.5ft 7 3 1 6 6 4	0.5ft 5 3 0 4 8 7 5 5 1 1 1 1 1 1 1 1		BLOWS	PER FOC 50 		9 NO.	M M Sat. Sat. Sat. Sat.			SOIL AND ROCK DE EV. (ft) 3.8 GROUND SUR 5 ROADWAY EMBA BIT UMINOUS CO 2.9 UNDIVIDED COAST TAN, AND GRAY, F. TAN, SILTY F. SAND (A- ORGANIC 3.8 TAN, F. SAND 9.8 Boring Terminated at Ele UCP: SAN	RFACE NKMENT NCRETE TAL PLAIN SAND (A-3) 2-4) W/ TRA( S (A-3)	0.0 1.3 	ELEV (ff) 45 40 35 30	A2.5 - 42.5 - 40.0 - 32.5 - 32.5 - - - - - - - - - - - - - - - - - - -	DEPT- (ft) - 3.5 - 6.0 - 8.5 - 13.5 - 18.5 - 18.5 	BLO           0.5ft           3           2           WOH           9           5	0.5ft 4 2 13 5	0.5ft 		BLOWS	PER FOI	
ICDOT BORE		-	+ + + +																	+ + + +							

TY PENDER	GEOLOGIST GOODNIGHT, D.	J.
9+62.70, 13.60' RT TO -Y40- STA	256+19.51, 11.50' RT	GROUND WTR (ft)
OFFSET 5 ft LT	ALIGNMENT -WL1-	0 HR. 3.9
NORTHING 239,053	EASTING 2,401,092	24 HR. FIAD
DRILL METHOD Muc	Rotary HAMM	ER TYPE Automatic
COMP. DATE 01/31/20	SURFACE WATER DEPTH N//	4
DT SAMP.		
75 100 NO. MOI G	SOIL AND ROOK DESU	
75 100 NO. MOI G	SOIL AND ROCK DESC	ACE 0.0 CMENT 1.3 CRETE / L PLAN ND (A-3) W/ ICS 20.0 tion 26.0 ft IN

## GEOTECHNICAL BORING REPORT BORE LOG

WB	<b>S</b> 402	37.1.1			Т	IP R-3300	В	COUNT	Y PENDER	२			GE	OLOGIST GOODNI	GHT, D.	J.		WBS	40237	.1.1			ТІ	P R-330(	)B	COUNTY
SIT	E DESC	RIPTION	I RET	AININ	G WAI	LL NO. 1 FF	ROM -Y40-	STA. 249	9+62.70, 13.	60' RT T	0 -Y40	)- ST	A. 256	+19.51, 11.50' RT		GROUND WT	R (ft)	SITE	DESCR	IPTION	RET	AINING	G WAL	L NO. 1 F	ROM -Y40-	STA. 249+
BO	ring n	<b>).</b> RW1	-07		s	TATION 1	2+96		OFFSET	12 ft LT			ALI	GNMENT -WL1-		0 HR.	2.7	BOR	ing no.	RW1	-08		SI	ATION	13+44	
CO	LAR E	<b>LEV</b> . 4	6.2 ft		Т	OTAL DEP	<b>TH</b> 20.0 f	t	NORTHIN	<b>G</b> 239,0	85		EA	<b>STING</b> 2,401,135		24 HR.	FIAD	COL	LAR ELE	<b>EV.</b> 45	5.7 ft		т	TAL DEF	<b>'TH</b> 20.0 f	t   I
DRIL	L RIG/H	AMMER E	FF./DAT	E MID	01904 C	ME-45B 90%	03/01/2019		1	DRILL	METHO	DM	lud Rotar	У	HAMME	R TYPE Autom	atic	DRILL	. RIG/HAN	IMER EF	F./DATI	e Mid	1904 CN	/IE-45B 90%	03/01/2019	
DRI	LLER	WIGGIN	IS, M.		S	TART DATI	E 01/31/2	0	COMP. DA	ATE 01/	31/20		SU	RFACE WATER DEP	TH N/A	4		DRIL	LER W	IGGIN	S, M.		ST	ART DAT	E 01/31/2	20
ELE							BLOWS	PER FOO	T 100	SAMP	· 🔨			SOIL AND ROO	CK DESC	RIPTION		ELEV	DRIVE	DEPTH			JNT		BLOWS	PER FOOT
(11)	(ft)	(14)	0.5π	0.511	0.51		25	50	15 100	NO.	/мо	I G	ELEV	. (ft)		DE	PTH (ft)	(11)	(ft)	(14)	0.5π	0.511	0.5π			50 7
50		+											F					50		ŀ						
		Ŧ											F						-	ŧ						
45	44.0	+ 12				<u>   · · · ·</u>		· · · ·	<u></u>				46.2	GROUNE ROADWAY	D SURFA	ACE (MENT	0.0	45	-					<u> </u>		
	44.9	+ 1.3	8	7	5	12		· · · ·		11		0000	- 44.5 •		IS CONC		1.5	10	- 44.7 -	<u>- 1.0</u>	4	10	9	· · · •	J19 · · · ·	
	42.7	+ 3.5	3	4	3						м			TAN AND BRON	WN, F. S	AND (A-3)			42.2	3.5	3	5	7			
40	40.2	+ 6.0	WOH	WOH	WOH						32%	000	<u>•</u> <u>40.</u> /	TAN-BROWN, SILT	LY F. SA	ND (A-2-4) W/	5.5	40	39.7 -	6.0	5	2	- 1			
	37.7	8.5								00-07	- 52 /0		38.2		WN F S	$\overline{CS}$	<u>   8.0     8.0                         </u>		37.2	85	5	2	1	<b>9</b> 3 • • •		
35		ŧ			3	4					Sat.	0000						35	-	- 0.0	WOH	1	1	• · · · ·		
	1	<b>†</b>				- <u>\</u>				11		0000							-	ŧ				1		
	32.7	+ 13.5	7	9	9		8				Sat.	0000							32.2	13.5	3	4	4	1.7°. 1.7°.		
30	_	‡						+ • • •				0000	-					30	-	÷				. 98		
	27.7	18.5										0000							27.2	18.5				l : ÿ: ·		
		+	0	/	9	<u> </u>		•••			Sat.	0000	26.2	Boring Terminated	at Eleva	tion 26.2 ft IN	20.0				4	5	10	· · · · ·	5	
		Ŧ											F	UCP	: SAND				-	F						
		Ŧ											F						-	÷						
		Ŧ											F						-	F						
		Ŧ											F						-	ŧ						
		Ŧ											F						-	+						
20		‡											F							ŧ						
5/13/		ŧ											F						-	ŧ						
GDT		Ŧ											F						-	ŧ						
DOT.		‡											F						-	t t						
S ^I		ŧ											F						-	t t						
GPJ		+											F							F						
OGS.		‡											F						-	ł						
Ъ F		‡											È.						-	+						
S GI		‡											F						-	÷						
VALL		‡											F						-	+						
N DN		‡											F							F						
RTA		‡											Ę						-	ł						
ULVE		‡											Ę						-	÷.						
N N		‡											Ę						-	ł						
ALCC		ţ											Ę						-	ł						
0 1		+											F							+						
0_6		ţ											F						-	ł						
R330		+											F						-	ŧ						
BLE		<u>‡</u>											þ						-	ŧ						
DOU		ŧ											F						-	ŧ						
ORE		+											F						-	ŧ						
OT B		ŧ											F						-	ŧ						
NCD		ł											F						-	ł						

9+6	62.70,	13.6	0'	RT TO		OT					
	OFESI			-	-140-	· 51/	A. 256+19.51	, 11.50' RT		GROUN	ID WTR (ft)
		ET :	3 f	ft RT			ALIGNME	NT -WL1-		0 HR.	3.3
· · ·	NORT	HING	ì	239,09	)7		EASTING	2,401,183		24 HR.	FIAD
			[	ORILL M	ethod	Mu	id Rotary		HAMME	R TYPE	Automatic
1	СОМР	. DA	TE	<b>E</b> 01/3	1/20		SURFACI	E WATER DEPT	TH N/A	١	
DT				SAMP.		L		SOIL AND ROC	K DESC	RIPTION	
7	5	100	_	NO.	/моі	Ğ					
	5			NO. SS-68	MOI W Sat. 32% Sat.		- 45.7 - 44.7 - 39.2 - 39.2 - 33.7 	GROUNE ROADWAY E BITUMINOU UNDIVIDED C TAN, F. S BROWN, SILTN 	SURFA SONC SAND (A T. SAN SAND (A at Eleva SAND (A at Eleva	CE MENT RETE PLAIN -3) D (A-2-4) -3) tion 25.7	

## GEOTECHNICAL BORING REPORT BORE LOG

١	NBS	40237	.1.1			Т	IP R-3300	)B	COUNT	Y PENDER	R			G	EOLOGIST GOODN	GHT, D	.J.		WBS	40237	<b>'</b> .1.1			ТІ	P R-33	00B	C	OUNTY
;	SITE D	DESCR	IPTION	RET	AINING	G WAL	L NO. 1 F	ROM -Y40	- STA. 249	9+62.70, 13.	60' RT T	O -Y40	)- ST.	A. 256	6+19.51, 11.50' RT		GROUND	WTR (ft)	SITE	DESCR	IPTION	RET	AINING	G WAL	.L NO. 1	FROM -Y	40- ST	A. 249+6
I	BORIN	ig no.	RW1-	-09		S	TATION	13+97		OFFSET	9 ft LT			A	LIGNMENT -WL1-		0 HR.	4.0	BOR	NG NO.	RW1	-10		SI	ATION	14+49		
•	COLL	AR ELE	<b>EV.</b> 45	.9 ft		Т	OTAL DEF	<b>TH</b> 20.0	ft	NORTHING	<b>3</b> 239,1	35		E	ASTING 2,401,222		24 HR.	FIAD	COL	LAR ELE	<b>EV.</b> 46	5.3 ft		т	JTAL DE	<b>:PTH</b> 20	.0 ft	1
I	ORILL F	RIG/HAM	IMER EF	F./DATE	E MID	1904 CI	ME-45B 90%	03/01/2019			DRILL	NETHO	<b>D</b> M	ud Rot	ary	HAMM	ER TYPE A	utomatic	DRILL	RIG/HAN	IMER EF	F./DATE	E MID	1904 CN	/E-45B 90	)% 03/01/20	19	
I	DRILL	ER W	/IGGIN	S, M.		S	TART DAT	E 01/31/	20	COMP. DA	<b>TE</b> 01/	31/20		ุ่รเ	JRFACE WATER DEF	PTH N/	A		DRIL	LER W	/IGGIN	S, M.		S	ART D	<b>ATE</b> 02/0	)3/20	
E	LEV	ELEV	DEPTH	BLO		JNT		BLOWS	PER FOO	T 100	SAMP		0		SOIL AND RO	CK DES	CRIPTION		ELEV	ELEV	DEPTH	BLO		UNT		BLO\ 25	VS PER	₹FOOT
_	(11)	(ft)	(19	0.5π	0.51	0.51		25	50	75 100	NO.	/мо	I G	ELE	V. (ft)			DEPTH (ft)	(11)	(ft)	(11)	0.5π	0.511	0.5π				
_	50		E											F					50		Ł							
		-	L											F						-	ŧ							
	45	44.8 -	1.1											45.9 44.8	GROUN	EMBAN	ACE Kment	0.0	45	45.3	1.0	1	1	1	<u> </u>			
		424 -	- 35	5	6	7	: : <b>•</b> 13					M	0000	, , ,	BITUMINO UNDIVIDED	US CONO COASTA	CRETE			- 42.8 -	- 3.5		1	ľ	•2 · ·	: : :		
	40		0.0	4	6	10	:: <b>,</b>	6		· · · · · ·			0000	-	TAN AND BROW SAI	N, SLIGH ND (A-3)	ITLY SILTY F	F.	40	40.3		WOH	1	1	<b>₹</b> ::	· · · ·	· ·   ·	· · · ·
	40	39.9 _	6.0	6	4	4						Sat.	0000			( )			40	-+0.5	+ 0.0	2	4	5	. 🗩 9 .			
	-	37.4	8.5	wон	2	4				·   · · · · ·		Sat.	0 0 0 0 0 0 0 0 0 0 0 0	,_ ,_						37.8 -	<u>- 8.5</u>	2	1	1	<b>∮</b> 2 · ·	· · · ·	· ·   ·	· · · ·
_	35	-	÷				\				-		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	, , ,					35	-	ŧ				<u>  · · ·</u>			
		- 32.4	13.5		_	_				· · · · · ·			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	, , ,						- 32.8 -	13.5	7	7	8		· · · ·	.	· • • •
	30	-	F	6		1	14					Sat.	0000	) 					30	-	ŧ		,			15		
			Ē										0000								185				· ./.			
		27.4	18.5	6	7	10	: : <b>.</b>	7				Sat.	0000	25.9	)			20.0				2	4	6	<u>• • 10</u>		<u> </u>	
		-	F											F	Boring Terminate	d at Eleva P: SAND	ation 25.9 ft II	N		-	ŧ							
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5/13		-	Ľ											E						-	Ŧ							
.GDT		-	F											F						-	ŧ							
DO I		-	Ļ											Ł						-	ŧ							
NC NC		-	+											F						-	ŧ							
S.GP		-	ł											F						-	ŧ							
LOG		-	+											ŧ						-	ŧ							
GINT		-	+											F						-	ŧ							
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T١	F	PEN	DE	R					G	EOLOG	IST (	GOODNIC	GHT, D.	J.	
49 [.]	+62	.70,	13	8.60	)'	RT TC	) -Y40-	STA	۸. 25	6+19.51	, 11.50	)' RT		GROUN	ID WTR (ft)
	OF	FS	ЕΤ	6	f	t LT			A	LIGNME	NT -\	NL1-		0 HR.	2.8
	NC	RT	HIN	IG	2	239,16	62		E/	ASTING	2,40	1,267		24 HR.	6.0
					D	RILL M	ethod	Мι	id Rot	ary			HAMME	R TYPE	Automatic
	СС	MP	. D	AT	Έ	02/0	3/20		S	JRFACE	E WAT	ER DEP	TH N/A	A	
от					5	SAMP.		L			SOIL	AND ROC	K DESC	RIPTION	
	75		10	0		NO.	/моі	G							
							M Sat. Sat. Sat. Sat.			3 BC	UNE TAN, F	GROUNE IVIDED C INE SANI GR	at Eleva SAND	tion 26.3	0.0 E
									-						

## GEOTECHNICAL BORING REPORT BORE LOG

v	/BS	40237	.1.1			ТІ	P R-3300	В	COUNT	Y PENDER	2			GE	OLOGIST GOODNIC	GHT, D.	J.	WBS	<b>4</b> 0237	7.1.1			Т	P R-330	0B	COUNTY
s	ITE C	DESCR	IPTION	RET	AINING	G WAL	L NO. 1 FF	ROM -Y40-	STA. 249	9+62.70, 13.6	60' RT T	) -Y40	)- ST	A. 256	+19.51, 11.50' RT		GROUND WTR (ft)	SITE	DESCR	IPTION	RET	AINING	G WAL	L NO. 1 F	ROM -Y40-	STA. 249+
В	ORIN	ig no.	RW1	·11		S	TATION 1	4+92		OFFSET	12 ft LT			AL	IGNMENT -WL1-		<b>0 HR.</b> 4.1	BOF	ing no.	RW1	-12		SI	ATION	15+34	
С	OLL	AR ELE	<b>EV.</b> 46	.4 ft		т	OTAL DEP	<b>TH</b> 20.0 f	t	NORTHING	<b>3</b> 239,1	91		EA	<b>STING</b> 2,401,299		<b>24 HR.</b> 6.0	COL	LAR ELI	<b>EV.</b> 45	5.9 ft		т	DTAL DE	<b>PTH</b> 20.0 f	t
D	RILL F	RIG/HAM	IMER EF	F./DATE	E MID	1904 CI	ME-45B 90%	03/01/2019			DRILL	<b>IETHO</b>	D M	lud Rota	ry	HAMME	R TYPE Automatic	DRIL	L RIG/HAN	/MER EF	F./DATE	E MID	1904 CN	/IE-45B 909	6 03/01/2019	
D	RILL	ER W	/IGGIN	S, M.		S	TART DAT	E 02/03/2	0	COMP. DA	<b>TE</b> 02/	03/20		SU	RFACE WATER DEP	TH N/A	A	DRI	LER W	VIGGIN	S, M.		ST	ART DA	<b>FE</b> 02/03/2	20
E	EV	DRIVE ELEV	DEPTH	BLO	W CO	JNT		BLOWS	PER FOO	Т	SAMP.				SOIL AND ROO	K DESC	RIPTION	ELEV	DRIVE	DEPTH	BLO	W COL	JNT		BLOWS	PER FOOT
_		(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	/5 100	NO.	Имо	I G	ELEV	/. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50 /
	50		+											<b> </b> -				50		ł						
		-	ŧ											F			05			Ŧ						
	15	45.4	1.0				1		· · · ·					- 46.4	ROUNL ROADWAY E	SURFA	ICE 0.0 IMENT	45	110					<u> </u>		
		42.0	35	2	1	1	•2					M			TAN, FINE SAND (A ASPHAL	4-3) W/ ( .T DEBR	GRAVEL AND			+	2	2	2			
		42.9 -	- 3.5	WOH	2	2	4					Sat.		40.9			5.5		42.4	<u>† 3.5</u> †	woн	wон	2			
-	+0 -	40.4	6.0	2	4	5			+			Sat.	0000					40	39.9	6.0	3	4	6			
	_	37.9	8.5	2	2	2	. <b>p</b>					Sat	0000		TRACE (		CS		37.4	8.5				· • 10		
	35	-	ŧ	_	-	-	¶4:::					Joal.	0000					35		Ŧ	2	2	1	<b>6</b> 3		
		32.0	135				· \						0000							Ŧ						
		- 52.9	- 13.3	7	8	10	· · · •	8				Sat.	0000						32.4	<u>† 13.5</u> †	6	7	7		  4	
;	30	-	F					+	+				0000					30		Ŧ						+ • • • •
	_	27.9	18.5	5	7	11						Sat	0000						27.4	18.5		5	11			
	_	-	<u> </u>				<b>↓ ↓</b>	8					0000	20.4	Boring Terminated	at Elevat	tion 26.4 ft IN			<u>+</u>	4	5		<u> </u>	6	
		-	Ł											F	UCP	: SAND				ŧ						
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N NC		-	÷											F					-	ŧ						
S.GP		-	ł											Ę						ŧ						
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INT	PENE	DER					GEOLOGI	ST GOODNIC	GHT, D.	J.	
249	+62.70,	13.6	0' RT TC	) -Y40-	STA	۹. 2	256+19.51,	11.50' RT		GROUN	D WTR (ft)
	OFFSE	T ·	18 ft LT				ALIGNME	<b>NT</b> -WL1-		0 HR.	4.7
	NORTH	IING	239,22	20			EASTING	2,401,329		24 HR.	5.7
			DRILL M	ETHOD	Mu	ıd F	Rotary		HAMME	R TYPE	Automatic
	COMP.	DA	TE 02/0	03/20			SURFACE	WATER DEPT	TH N/A	A	
001			SAMP.		LO			SOIL AND ROC	K DESC	RIPTION	1
	75	100	NO.	моі	G						
						-					
	_					4	45.9	GROUND	SURFA	CE	0.0
	<u> </u>			м		-	ТА	N, GRAY, AND E	BROWN	, FINE SA	AND
•••	· · ·					-		(A-3) W/ TR	ACE GF	RAVEL	
• •						_4	40.4				
•••	· · ·			Sat.	0000	-	TAI	N AND BROWN,	FINE S	AND (A-3	5) W/
: :				Sat.	0000	-				00	
	<u> </u>				0000	-					
· ·		-		Sat	0000	-					
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•••					0 0 0 0 0 0 0 0 0 0 0 0	-					
• •				Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2	25.9				20.0
						-	Во	ring Terminated UCP:	at Eleva : SAND	tion 25.9	ft IN
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## GEOTECHNICAL BORING REPORT BORE LOG

W	<b>BS</b> 4	0237.1.1				TIF	R-3	300B		C	COUN	TY I	PEND	R				GE	OLO	GIST	GOOE	DNIGH	IT, D.J.				WBS	<b>S</b> 40	0237.1	.1			Т	TIP R	R-3300E	3	C		ry pe	ENDEF	2				GEOLOGIS	T GOC	DNIGH	Г, D.J.		
SI	re de	SCRIPTI	ION F	RETAI	NING	Wali	NO.	1 FRO	DM -Y	′40- S	TA. 24	19+62	2.70, 1	3.60'	RT TC	) -Y40	)- ST.	A. 256	6+19.5	1, 11.5	0' RT		C	GROUN	D WTR	(ft)	SITE	E DES	SCRIP	TION	RETA	AININ	G WAL	LL NC	). 1 FR	OM -Y	40- S	TA. 24	9+62.7	70, 13.	60' RT	·- TO	Y40-	STA	. 256+19.51,	11.50' R	Т	GR	OUND V	VTR (ft)
BC	RING	NO. R	W1-13			ST		<b>1</b> 15	+95			0	FFSET	22	ft LT			AL	.IGNM	ENT ·	-WL1-			0 HR.		2.7	BOR	RING	NO.	RW1-	14		S	TATI	<b>ON</b> 16	6+42			OFF	SET	10 ft R	ιT			ALIGNMEN	T -WL	1-	01	HR.	2.0
СС	OLLAF	ELEV.	46.5	ft		то	TAL I	DEPTI	<b>H</b> 15	.0 ft		N	ORTHI	NG	239,2	59		EA	STIN	<b>G</b> 2,40	01,375	5	2	4 HR.		5.5	COL	LAR	RELEV	. 45	0 ft		Т	OTAL	L DEP1	<b>H</b> 15	.0 ft		NOF	RTHIN	<b>3</b> 239	,263			EASTING	2,401,43	32	24	HR.	4.4
DR	ILL RIG	/HAMMER	R EFF./D	DATE	MID19	904 CM	E-45B	90% 03	3/01/20	)19				D	RILL M	IETHO	D M	ud Rota	ary			H	AMMER	TYPE	Automati	<b>c</b>	DRILL	L RIG	) HAMM	ER EFF	./DATE	E MID	01904 C	CME-45	5B 90% (	03/01/20	19				DRILI	LMET	HOD	Muc	d Rotary		H	MMER TY	<b>'PE</b> Aut	omatic
DF	RILLEF	WIGC	GINS, I	M.		ST	ART I	DATE	02/0	03/20		C	OMP. I	DATE	02/0	)3/20		SU	IRFAC	EWA	TER D	EPTH	N/A				DRIL	LER	<b>x</b> wid	GINS	, М.		S	TART	T DATE	02/0	3/20		CO	MP. DA	TE 0	2/03/	/20		SURFACE	WATER	DEPTH	N/A		
ELE			РТН	BLOW	COU	ΝT			BLO\	WS PE	R FO	тс		5	SAMP.	▼⁄				SOIL		ROCK	DESCR				ELEV	/ DR		EPTH	BLO	W CO	UNT			BLOV	VS PE	R FOC	)T		SAM	iP.	$\square$					ESCRIP		
(ft	) (	ft) (1	ft) 0.	.5ft (	.5ft (	0.5ft	0	2	5	50		75	1	00	NO.	Имо	I Ğ	ELE	V. (ft)	00.2	.,				DEPT	H (ft)	(ft)	(1	ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25	50		75	100	NO	<u>. /</u>	MOI	Ğ				2001		
50	)																	L									45			10				$\parallel$		1					Ц	$\perp$			45.0	GR				0.0
		‡																F						_				44	4.0 +	1.0	2	2	2	<b>┤</b> │₩	4			· · ·	: :	· · · · · ·		ŗ	м	-	,	TAN, FIN	IE SILTY	SAND (A	-2-4)	
45	3 4	5.5 + 1	.0				1	• •		••		•		•				- 46.5 -		R	GRO OADW	UND S	URFAC	E IENT		0.0	40	41	1.5 +	3.5	2	3	6	$\left  \right $			•••	· · · · · ·		· · · · · ·			▼							
	<u> </u>	, <b>†</b> ,	5	2	1	2	•3					-		-		М		  -		TAN,	FINE S	SAND () GRAV	(A-3) W. /EL	/ LITTLE			-10	39	9.0 +	6.0	5	6	4		<b>▼</b> [×] · · ·						11			-	-					
	4.	<u>, , , , , , , , , , , , , , , , , , , </u>	. <u>.</u> w	он	1	1	<b>∮</b> 2 .	•••	· · · ·		· · · · · ·	•	· · ·	-												5 5		36	6.5	8.5	Ű			· /	<b>9</b> 10 ·	· · ·		· · ·	: :	· · ·		`	al.							
40	) 4	). <u>5 + 6</u> +	.0	2	4	6				•••		•		·		w		F- <u></u>							- <u>—</u> ——		35	-	- ‡		1	WOH	1		· · ·		•••		·   ·	· · ·	SS-7	/0 30	0%	-	-					
	3	3.0 ‡ 8	.5	2	1 V	VOH	1.	•••	•••		· · ·		· · ·	:  _	<u> </u>	240/		F		(A-2	2-4) W/	TRAC	EORG	ANICS					ŧ					``,				· · ·		· · ·				-						
35	5	ŧ		-			1					-		:     ;	55-69	24%		F									30	31	1.5 +	13.5	3	3	6		<b>\</b>				:   :			5	Sat.		. 30.0					15.0
	2	20 <b>+</b> 13	2.5				• •											-											-+						•••						1	+		-	. Bori	ng Termir	nated at	Elevation 3	30.0 ft IN	
		<u>, , , , , , , , , , , , , , , , , , , </u>		6	7	8		<b>•</b> 15	• •	· · · ·	· · ·	•		:		Sat.		- 31.5								15.0			ŧ															F			001.0/			
		Ŧ																F	E	Boring I	ermina	ated at JCP: S/	Elevatio AND	on 31.5 f	t IN				Ŧ															F	-					
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GDT		Ŧ																<b>-</b>											-															F	-					
DOT.		Ŧ																F											Ŧ															F						
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GPJ		Ŧ																F											Ŧ															F	-					
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NO		Ŧ																F											Ŧ															F						
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REFERENCE

## **CONTENTS**

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HEET NO.	<b>DESCRIPTION</b>
I	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-9	BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY PENDER

PROJECT DESCRIPTION HAMPSTEAD BYPASS FROM
SOUTH OF NC 210 TO US-17 NORTH OF
HAMPSTEAD
SITE DESCRIPTION NOISE WALL 22 FROM -Y44-
STATION 11+88.66, 25.5' LT TO -Y19- STATION
50+88.57, 22.0' RT
RETAINING WALL NO. 2 FROM -Y19- STATION
47+85.00, 26.67' RT TO -Y19- STATION 50+20.00,
26.67°RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3300B	1	9

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS. THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE NUCLED STRATA SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION OF THE DEPARTMENT AS TO THE TYPE OF MATERNALS AND COCUMPTERED. OR THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR ANY REXTENSION OF TIME FORM ANY CASON RESULTING FROM THE ACTUAL CONDENSATION. OR FOR AN 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. 2.

PERSONNEL
GOODNIGHT, D.I.

MID-ATLANTIC

INVESTIGATED BY _____

DRAWN BY _ CROCKETT, S.C.

CHECKED BY ______. HAMM, J. R.

SUBMITTED BY _____

DATE <u>MAY</u> 2020



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AGASHTO I 206, ASTM 01586). SOIL CLASSIFICATION IS BASED ON THE AGSHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	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.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE 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 0.1 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZUNE OF WEATHERED ROLK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPENALIC MATERIALS	MINERALOGICAL COMPOSITION	CRYCTALLINE FILE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RO
CLASS. (≤ 35% PASSING #200) (> 35% PASSING #200) 000HILC HH (CHINES	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE IN GNEISS, GABBRO, SCHIST, ETC.
CHOUP         H*1         H*3         H*2         H*4         H*5         H*6         H*7         A-1, A-2         A-4, A-5           CLASS.         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A*7, A         A*3         A+6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA
SYMBOL	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN
Z PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS
*10 50 MX *40 30 MX 50 MX 51 MN SOILS SOILS SOILS SOILS		WEATHERING
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK HAMMER IF CRYSTALLINE.
HARLENDEL PACSING *40 PESSING *40 PI 6 MX 10 MX 10 MX 11 MN 16 MX 11 MN 16 MX 11 MN 16 MX 11 MN LITTLE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN LITTLE OR HIGHLY	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLL) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H OF A DEVICAL UNE NATURE
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOLLS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	(SLL) I INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLOREDINA MAN WEATHERING FEFET
GEN. RATING EVELUENT TO COOD EATE TO POOP FAIR TO POOP INSULTABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE POOR FOUND POOR FOUND ON POOR FOUND ON ONSOLINGED	SPRING OR SEEP	WITH FRESH ROCK.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LT
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND "
PRIMART SULL TIPE         CONSISTENCY         PENELIKATION RESISTENCE         COMPRESSIVE STRENGTH           GENERALLY         VERY LOOSE         < 4	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES SOIL SYMBOL SYMBOL SIDE SIDE SIDE SIDE SIDE SIDE SIDE SIDE	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 A TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR MEDIUM DENSE 10 TO 30 N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NON-COHESIVE)         DENSE         30 10 50           VERY DENSE         > 50           VERY SOFT         < 2	THAN ROADWAY EMBANKMENT THOUGH BURING TEST	VERY ALL ROCK EXCEPT OUARTZ 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 DEGREE THAT VESTICES OF ORIGINAL ROCK EARDIC FEMAL IN <i>LE TESTED WOULD YIELD SET N</i> IN
GENERALLY         SOFT         2 T0 4         0.25 T0 0.5           SILT-CLAY         MEDIUM STIFF         4 T0 8         0.5 T0 1.0           MATERIAL         STIFF         8 T0 15         1 T0 2           (COLEVENUE)         VERV STIEF         15 T0 2.0         2 T0 4		COMPLETE ROCK REDUCED TO SOLL. ROCK FABRIC NOT DISCERNIBLE. OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
HARD > 30 > 4		
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 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
GBLDR.)         GCOB.         GR.)         SAND (CCB.S.)         SAND (CSE.SD.)         SAND (F SD.)         CEL           GRAIN         MM         305         75         2.0         0.25         0.05         0.005	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D 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 1 INCH MAXIMUM SIZE BY HARD
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
(ATTERBERG LIMITS) FIELD MUISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION CATTERBERG LIMITS) CONTRACTOR CONTRACTOR	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
ILL _ LIQUID LIMIT FROM BELOW THE GROUND WATER TABLE	B         YULD HATTO         SUL - SHALLS SHALL         SS         SFLIT SPOUN           F         FINE         SL         SLIT, SILTY         ST         SHELBY TUBE           F05SL         F0SSLIFEROUS         SLI-         SLITY         ST         SHELBY TUBE           F05SL         F0SSLIFEROUS         SLI-         SLITY         ST         SHELBY TUBE           F05SL         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 FINGERNALL.
RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRACS FRACTORED, FRACTORES TOR - TRICORE REPOSEL RT - RECOMPACTED TRIATAL FRACS FRACMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
		TERM SPACING TERM
OM OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	WIDE         3 TO 10         FEET         THICKLY BEDDED         1.           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.1           CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.0
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY		INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY         PLASTIC         16-25         MEDIUM           HIGHLY         PLASTIC         26 OR         MORE         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, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS,

### PROJECT REFERENCE NO. R-3300B



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TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SPT REFUSAL. FOOT PER 60 SPTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND СК ТНАТ SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. _ PLAIN F TESTED. MAY NOT YIELD CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN 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. 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 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 POCK REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EP CAN BE TACHED 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 PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM R3300B_LS_TNL_190919.TIN THICKNESS DATED 09/19 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: - 0.16 FEET 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET AT. PRESSURE. ETC. EEL PROBE: PROBE: DATE: 8-15-1-





100	200	PROJECT REFERENCE NO. SHE	ET NO.
FEET		R-3300B	4
VE = 2.5		NOISE WALL 22 AND RETAINING WALL PROFILES	WALL 2
% ORGANIC			
<u>4</u> <u>10</u> 			
6			
ODERATELY O	RGANIC		100
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			80
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	ADOI BY S	PTED FROM PLANS PROVIDED TANTEC DATED APRIL, 2020.	-10
	INFE THR(	RRED STRATIGRAPHY IS DRAWN DUGHT THE BORINGS WITH BOTH	
	PRO	JECTED ONTO THE PROFILE.	–20
	• • • • • • • • • • • • • • • • • • •		30
18+00	19+00		

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## GEOTECHNICAL BORING REPORT BORE LOG

١	VBS	40237	.1.1			Т	P R-3300	В	COUNT	Y PENDEF	R				GEOLOGIST GOODNI	GHT, D	.J.	WBS	<b>3</b> 40237	7.1.1			TIF	<b>P</b> R-3300	3	COUNTY
SITE DESCRIPTION NOISE WALL 22 FROM -Y10- STA. 47+25.36, 189.45' RT TO -Y19- STA								STA. 5	55+0	6.18	. 18, 24.50' RT GROUND WTR (ft)			SITE DESCRIPTION NOISE WALL					LL 22 I	. 22 FROM -Y10- STA. 47+25.36, 18						
BORING NO. NW22-1 STATION 9+97					OFFSET 1 ft LT				ALIGNMENT -NW22- 0 HR. 4.7		BORING NO. NW22-2					ST	STATION 10+97									
COLLAR ELEV.41.4 ftTOTAL DEPTH25.0 ft							NORTHING	<b>3</b> 239,5	03			EASTING 2,402,005	<u> </u>	<b>24 HR.</b> 5.0	O         COLLAR ELEV.         41.7 ft         TOTAL DEPTH         25.0 ft						:					
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 90% 03/01/2019									DRILL N	<b>IETHO</b>	D N	Mud F	Rotary	HAMM	ER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 90% 03/01/2019										
I	DRILLER WIGGINS, M. START DATE 01/30/20						0	COMP. DATE 01/30/20					SURFACE WATER DEP	TH N/	A	DRILLER WIGGINS, M.						<b>START DATE</b> 01/30/20				
E	LEV	DRIVE ELEV		BLO	W CO	UNT		BLOWS	PER FOO	Г	SAMP.				SOIL AND RO	CK DES	CRIPTION	ELEV	DRIVE	DEPTH	BLO	W COL	JNT		BLOWS	PER FOOT
	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0 :	25	50	75 100	NO.	Имо	I G	i e	LEV. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50 7
JT_LOGS.GPJ_NC_DDT.GDT_5/13/20	JRILL         LEV         (ft)         45         40         -         335         -         30         25         20	ER W DRIVE ELEV (ft) 37.9 35.4 32.9 27.9 22.9 22.9 17.9 17.9 17.9	IGGINS DEPTH (ft) 3.5 6.0 13.5 18.5 18.5 23.5	5, M. BLO 0.5ft 5 4 3 1 4 2 2	VV CO 0.5ft 7 3 6 6	UNT 0.5ft 5 3 2 10 6 3 2 10	0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <t< td=""><td>E 01/30/2 BLOWS   25                                                                                                     </td><td>0 PER FOO 50 </td><td>COMP. DA</td><td>TE 01/ SAMP: NO.</td><td>M M Sat. Sat. Sat. Sat.</td><td></td><td></td><td>SOIL AND RO LEV. (ft) 1.4 GROUN UNDIVIDED TAN AND GR 8.4 BROWN, SILTYF LITTLE OR FRAC 2.4 6.4 Boring Terminatec UCF</td><td>TH N/. CK DES( COASTA AY, F. S/ SANIC SANIC SANIC GRAY, F I at Elevi SAND</td><td>A CRIPTION </td><td>DRII         ELEV         (ft)         45         40         35         30         25         20</td><td>LER V DRIVE ELEV (ft) 38.2 35.7 33.2 28.2 23.2 - 23.2 - - - - - - - - - - - - - - - - - - -</td><td>VIGGIN: DEPTH (ft) 3.5 6.0 8.5 13.5 13.5 13.5 13.5 13.5</td><td>S, M. BLO 0.5ft 5 2 WOH 6 3 2 3</td><td>W COL 0.5ft 6 2 1 6 4 2 3 3</td><td>ST JNT 0.5ft 2 1 8 5 2 3</td><td>ART DATI 0 0 - 1</td><td>: 01/30/2 BLOWS I 25                                             </td><td>0 1 PER FOOT 30 7                                                       </td></t<>	E 01/30/2 BLOWS   25                                                                                                     	0 PER FOO 50 	COMP. DA	TE 01/ SAMP: NO.	M M Sat. Sat. Sat. Sat.			SOIL AND RO LEV. (ft) 1.4 GROUN UNDIVIDED TAN AND GR 8.4 BROWN, SILTYF LITTLE OR FRAC 2.4 6.4 Boring Terminatec UCF	TH N/. CK DES( COASTA AY, F. S/ SANIC SANIC SANIC GRAY, F I at Elevi SAND	A CRIPTION 	DRII         ELEV         (ft)         45         40         35         30         25         20	LER V DRIVE ELEV (ft) 38.2 35.7 33.2 28.2 23.2 - 23.2 - - - - - - - - - - - - - - - - - - -	VIGGIN: DEPTH (ft) 3.5 6.0 8.5 13.5 13.5 13.5 13.5 13.5	S, M. BLO 0.5ft 5 2 WOH 6 3 2 3	W COL 0.5ft 6 2 1 6 4 2 3 3	ST JNT 0.5ft 2 1 8 5 2 3	ART DATI 0 0 - 1	: 01/30/2 BLOWS I 25                                             	0 1 PER FOOT 30 7                                                       
NCDOT BORE DOUBLE R3300_GEO_FALCON_CULVERT AND WALLS_GI		-																		* * * * * * * * * * * * * * * * * * * *						

TY PENDER GEOLOGIST GOODNIGHT, D.J.										
, 189	.45' RT TC	) -Y19- S	TA. 5	5+06.	18, 24.50' RT	GROUND WTR (ft)				
C	DFFSET	1 ft RT			ALIGNMENT -NW22-	<b>0 HR.</b> 3.4				
N	ORTHING	239,58	31		EASTING 2,401,942		24 HR.	4.0		
		DRILL M	ethod	) Mu	d Rotary	HAMME	R TYPE	Automatic		
C	OMP. DA	<b>TE</b> 01/3	30/20		SURFACE WATER DEPT	H N/A	١			
ОТ		SAMP.		L	SOIL AND ROC	K DESC	RIPTION			
75	5 100	NO.	моі	G		N D L O C				
		NO.	MOI 311% Sat. Sat. Sat.		41.7 GROUND UNDIVIDED C GRAY AND BROWN SAND (A-2-4) WITH 33.7 TAN AND LIGHT G TRACE C - - - - - - - - - - - - - - - - - - -	at Eleva SAND	CE PLAIN ITLY SILT ORGAN SAND (7 CS	0.0 TY F. IICS 		
## GEOTECHNICAL BORING REPORT BORE LOG

WB	<b>S</b> 4023	7.1.1			Т	IP R-3300	)B	COUNT	Y PENDER	200			GE	OLOGIST GOODNI	GHT, D.	.J.	WBS	<b>6</b> 40237	7.1.1			TIF	<b>P</b> R-3300	В	COUNT
SITI	E DESCF	RIPTION	NOIS	SE WA	LL 22	FROM -Y	10- STA. 4	7+25.36, 1	89.45' RT T	D -Y19- S	STA. 5	55+06	6.18, 24	4.50' RT		GROUND WTR (ft)	SITE	DESCR	IPTION	NOIS	SE WAI	LL 22 I	-ROM -Y1	0- STA. 47	+25.36, 18
BOF	ring no	. NW2	2-3		S	TATION	11+76		OFFSET	5 ft LT			AL	IGNMENT -NW22-		0 HR. 3.7	BOR	ing no.	NW2	2-4		ST	ATION 1	2+95	
COL	LAR EL	<b>EV.</b> 43	6.7 ft		<b>T</b>	OTAL DEF	<b>TH</b> 30.0	ft	NORTHING	<b>3</b> 239,6	50		EA	STING 2,401,912		<b>24 HR.</b> 4.0	COL	LAR ELI	<b>EV.</b> 42	.0 ft		ТС	TAL DEP	<b>FH</b> 30.0 ft	t
DRIL	l Rig/Hai	MMER EF	F./DATE	MID	1904 C	ME-45B 90%	03/01/2019			DRILL	<b>IETHO</b>	<b>D</b> M	ud Rota	ry	HAMM	ER TYPE Automatic	DRIL	RIG/HAN	IMER EF	F./DATI	E MID1	1904 CN	IE-45B 90%	03/01/2019	
DRI	LLER V	VIGGIN	S, M.		S	TART DAT	E 01/30/	20	COMP. DA	<b>TE</b> 01/	30/20		SU	RFACE WATER DEP	TH N//	Α	DRIL	LER W	/IGGIN	S, M.		ST	ART DAT	E 01/29/2	0
ELE\	/ DRIVE ELEV		BLO	w co	JNT		BLOWS	PER FOO	T	SAMP.				SOIL AND ROO	CK DESC	CRIPTION	ELEV	DRIVE	DEPTH	BLC	W COL	JNT		BLOWS	PER FOOT
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	I G	ELEV	′. (ft)		DEPTH (ft)	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50
45		Ļ											L				45		Ļ						
	42.7	+ 1.0				<u> </u>						0000	43.7		D SURFA	ACE0.0		-	ŧ						
10	40.0	+	2	3	4				 		м	0000	40.7		7, F. SAN	ND (A-3)	10	41.0	1.0			_	<u> </u>		
40	40.2	<u> </u>	8	10	10		20					-		BROWN, SILTY F	. SAND ORGAN	(A-2-4) WITH	40		- 35	3	3	4	•7		
	37.7	6.0	5	4	3						Sat				0110/11				1 3.5	6	4	4			
35	35.2	8.5			10								<u>35.7</u>			A-3) <u>8.0</u>	35	36.0	6.0	2	1	2	<u> </u>		
		Ŧ	4	1	10	· · <b>`</b> ₽1	7				Sat.	0000			0, 110 (,			33.5	8.5	6	7	10			
		Ŧ										0000	-						Ŧ				<b>1 1</b>		
30	30.2	<u> </u> 13.5 	3	4	7			+ • • •			Sat.	0 0 0 0 0 0 0 0 0 0 0 0	-				30		F					+ • • • •	+ • • • •
		Ŧ										0000	-					28.5	<u>† 13.5</u> †	4	4	6	· · · · · · · · · · · · · · · · · · ·		
25	25.2	† † 18.5											-				25	-	ŧ						
		Ŧ	4	2	2	<b>•</b> 4 · · ·					Sat.	0000	-					23.5	18.5			_	· · · ·		
		ŧ				[[::::			· · · · · ·			0000	-						ŧ	3	4	5			
20	20.2	+ 23.5	3	2	3						Sat	0000	-				20		ŧ						
		‡							· · · · · ·			0000	-					18.5	<u>† 23.5</u>	4	3	5			
15	15.2	+							· · · · · ·			0000	-				15		ŧ						
10		+ 20.0	15	19	17		• • 36				Sat.	0000	 13.7			30.0	15	13.5	- 28.5				<u> </u>		
		‡											F	Boring Terminated UCP	l at Eleva P: SAND	ation 13.7 ft IN			-	6	7	7	• • • • • • • • • • • • • • • • • • •		
	-	‡											-					-	ŧ						
3/20		‡											F					-	ŧ						
T 5/1		‡											F					-	ŧ						
I.GD	-	‡											-					-	ŧ						
B		ŧ											-					-	ŧ						
NC		ŧ											F						t						
S.GP		ŧ											F						ŧ						
00 0		ŧ											E						ł						
		ł											F						ł						
S O		Ŧ											F						Ŧ						
NALL		Ŧ											F					-	ŧ						
	-	ŧ											F					-	ŧ						
ERT A		‡											F						ŧ						
ULVE		‡											F					-	ŧ						
SN C		‡											F						ŧ						
ALCC		ŧ											F					-	ŧ						
0.	-	ŧ											-					-	ŧ						
G		ŧ											F						ŧ						
R330		ŧ											F						ŧ						
SLE 1		Ŧ											F					-	ŧ						
DOUE		Ŧ											F					.	Ŧ						
DRE [	.	Ŧ											F					-	Ŧ						
DT BC		Ŧ											F					.	Ŧ						
NCDC		Ŧ											F						Ŧ						

PENDER				GEOLOGIST GOODNIG	GHT, D.	J.	
9.45' RT TO	-Y19- S	5TA. 55	5+06.	18, 24.50' RT		GROUN	D WTR (ft)
OFFSET 2	2 ft RT			ALIGNMENT -NW22-		0 HR.	3.6
NORTHING	239.72	28		EASTING 2.402.003		24 HR.	3.2
		FTHOD	) Mu	d Rotary			Automatic
		20/20	, iviu				
CONF. DAI		<u>19/20</u>	LI	JURFACE WATER DEFT		\	
75 100	NO		0	SOIL AND ROC	K DESC	RIPTION	
1			6				
			-	-			
			F	42.0 GROUND	SURFA	CE	0.0
							2-4)
				MODERATE	LYOR	GANIC	,,
		Sat.					
	SS-59	66%		—			
		0-4	0000	<u>34.0</u> TAN, F. S	SAND (A	-3)	<u> </u>
: : : :		Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		-		
+			0 0 0 0 0 0 0 0 0 0 0 0	_			
		Sat.	0 0 0 0 0 0 0 0 0 0 0 0				
			0000				
			0 0 0 0 0 0 0 0 0 0 0 0	<u> </u>			
		Sat.	0000				
			0000				
		<u>.</u>	0 0 0 0 0 0 0 0 0 0 0 0				
		Sat.	0 0 0 0 0 0 0 0 0 0 0 0				
			0000	14.0			28.0
		w		GRAY, SILTY	SAND	(A-2-4)	
				Boring Terminated	at Eleva	tion 12.0 f	t IN
				UCP. SIL	LTT SAP	ID	
				_			
			F	_			
				_			
				-			
				—			
			F	-			
				_			
			F				

## GEOTECHNICAL BORING REPORT BORE LOG

١	NBS	40237	.1.1			Т	IP R-33	800B		COUNT	Y PENDER				GE	EOLOGIST GOODNIG	GHT, D.	.J.	WE	<b>SS</b> 402	237.1.1			ТІ	P R-3300	)B	COUNTY
;	SITE	DESCR	IPTION	NOIS	SE WA	LL 22	FROM -	-Y10-	STA. 47	+25.36, 1	89.45' RT TC	) -Y19- \$	STA. 5	5+06	6.18, 2	24.50' RT		GROUND WTR (ft)	SIT	E DES	CRIPTION	NOI	SE WA	LL 22	FROM -Y	10- STA. 47	425.36, 18
I	BORI	NG NO.	NW2	2-5		S	TATION	14-	+19		OFFSET [·]	17 ft LT			AL	IGNMENT -NW22-		0 HR. 3.9	BO	ring n	<b>IO.</b> NW2	22-6		S	TATION	15+00	
•	COLL	AR ELE	<b>EV.</b> 43	.7 ft		Т	OTAL DI	EPTH	<b>H</b> 30.0 f	t	NORTHING	239,8	25		EA	<b>ASTING</b> 2,402,083		<b>24 HR.</b> 5.2	со	LLAR I	<b>ELEV</b> . 4	2.0 ft		т	OTAL DEF	<b>TH</b> 25.0 f	t
I	ORILL	RIG/HAN	IMER EF	F./DATI	E MID	1904 C	ME-45B 9	0% 03	8/01/2019			DRILL M	/IETHO	D M	lud Rota	ary	HAMME	ER TYPE Automatic	DRI	ll Rig/H	IAMMER E	FF./DAT	E MID	1904 CI	ME-45B 90%	03/01/2019	
I	DRILL	ER W	/IGGIN	S, M.		S	TART D	ATE	01/29/2	0	COMP. DA	TE 01/	29/20	_	SU	JRFACE WATER DEPT	<b>H</b> N//	4	DR	ILLER	WIGGIN	IS, M.		S	TART DAT	E 01/29/2	20
E	LEV	DRIVE ELEV	DEPTH	BLC	W CO	UNT			BLOWS	PER FOOT	г	SAMP.	▼⁄			SOIL AND ROC	K DESC	CRIPTION	ELE			H BLO	ow co	JNT		BLOWS	PER FOOT
	(π)	(ft)	(π)	0.5ft	0.5ft	0.5ft	0	25	5	50	75 100	NO.	Имо	I G	ELE	V. (ft)		DEPTH (ft	) (π)	(ft)	, (π)	0.5ft	0.5ft	0.5ft	0	25	50
	45		Ļ												L.				45		_						
		42.7 -	- 1.0				<u>   </u>			· · · ·			-	0000	43.7		OASTA	L PLAIN	2		‡						
	10	40.2	- 25	2	2	2	<b> </b>   <b>•</b> 4 : :	•••	· · · · ·				м	0000	-	GRAY, TAN, AND BF	ROWN,	F. SAND (A-3)	1	41.	0 - 1.0	1	-	2	<u></u>		
_	40	40.2	- 3.5	1	0	1													40	38	$\frac{+}{5+35}$	'		2	<b>4</b> 4		
	ŀ	37.7 -	<u> </u>	6	11	8		•••	· · · · ·					****	<u>- 37.7</u>		s (wo	<u>OD)6.0</u>	-			1	2	2	<b> </b>   <b>∳</b> 4 ∐ ∐		
	35	35.2	8.5	7	10	13		: ŬĬ					0-1	~~~~	<u>35.7</u>		ID (A-3)	WITH8.0	35	36.	0 <u>  6.0</u> _	WOF	woн	2			
		-	ł	'		10		· ·••2	3				Sat.			INTERMITTENT L CL	ENSES	OF SANDY		33.	5 <u>+</u> 8.5	6	8	10			
		-	405					2.	· · · · ·												ţ				:::/		
_	30		13.5	3	4	4	. 68						Sat.						30		- - - - - - - - - - - - - - - - - - -						<u> </u>
		-	ŧ						· · · ·											20.		3	3	3	<b>4</b> 6		
	25	25.2	18.5	2	4	4									• •				25		1						
		-	ŧ		4	4	. •8 ·	•••	· · · ·				Sat.							23.	5 + 18.5	3	4	5			
		-	+				· ŀ ·    · ŀ ·		· · · · ·												ţ				. ¶ ⁹ .		
_	20		23.5	3	4	7		1.					Sat.						20		- +				$\left  \frac{1}{1} \frac{1}{1} \right $	· · · · ·	· · · ·
		-	ł				:{:		· · · ·					0000						10.	5 <u> </u>	5	5	8	· · •		
	15	15.2	28.5											0000	15.7			ND (A-2-4) 28.0	4		1						
	ŀ	-	<u> </u>		2	4	<u> </u> ∳6					SS-60	20%		<u> </u>	Boring Terminated	at Eleva	ation 13.7 ft IN			ŧ						
		-	ŧ												Ł	UCP: CLA	YEY SA	AND			ŧ						
0			ŧ												F						+						
5/13/2		-	ŧ												Ł						ţ						
DT		-	ŧ												Ł						1						
OT.G		-	ŧ												Ł						ŧ						
D V		-	ł												Ł						ł						
PJ P		-	ŧ												F						$\pm$						
GS.G		-	Ł												Ł						ł						
		-	Ł												F						Ŧ						
B		-	Ł												F						ł						
ALLS		-	E												E						Ŧ						
N D		-	F												F						Ŧ						
RT AN		-	F												F						Ŧ						
LVER		-	F												F						Ŧ						
		-	F												F						Ŧ						
CO		-	ŧ												F						Ŧ						
P_FA		-	ŧ												F						Ŧ						
6 G		-	ŧ												F						ŧ						
3300		-	ŧ												F						ŧ						
щ		-	ŧ												F						Ŧ						
OUB		-	ŧ												F						‡						
RE D		-	ŧ												F						‡						
T BO		-	ŧ												F						‡						
<b>VCDO</b>		-	ŧ												F						ŧ						

PENDER				GEOLOGIST GOODNIGH	T, D	J	
9.45' RT TO	-Y19- S	TA. 55	5+06.	18, 24.50' RT		GROUN	D WTR (ft)
OFFSET 5	ft RT			ALIGNMENT -NW22-		0 HR.	3.4
NORTHING	239,86	3		EASTING 2,402,158		24 HR.	4.0
	DRILL M	ETHOD	) Muc	Rotary	AMME	R TYPE	Automatic
COMP. DAT	FE 01/2	29/20		SURFACE WATER DEPTH	N/A		
	SAMP.		L				
75 100	NO.	MOI	O G	SOIL AND ROCK I	DESC	RIPTION	
			$\square$				
				-			
				42.0 GROUND SI	URFA	CE	0.0
		М		UNDIVIDED COA TAN AND GRAY,	ASTAL F. SAI	. <b>PLAIN</b> ND (A-3)	
				 DARK BROWN, SILT	<u>Y F. S</u>	AND (A-2	<u>-4)</u>
				WITH TRACE (	ORGA	NICS	
+ • • • • •	SS-61	37%	F	- 34.0			8.0
		Sat.		TAN AND GRAY,	F. SA	ND (A-3)	
		-					
<u> </u>				-			
		Sat.					
			0000				
		Sat.	0000				
+			0000	-			
		Sat.		17.0			25.0
		Jul.		Boring Terminated at I	Elevat	ion 17.0 f	25.0 t IN
				UCP: S/	and		
				-			
			F	-			
				-			
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			LLC				]

## GEOTECHNICAL BORING REPORT BORE LOG

<b>WBS</b> 40237.1.1	TIP R-3300B COUN	TY PENDER	GEOLOGIST GOODNIGHT, D	).J.	WBS	<b>S</b> 40237	7.1.1		TI	<b>P</b> R-3300E	COUN	TY PENDER	۲	GE	OLOGIST GOODNIGH	HT, D.J.	
SITE DESCRIPTION NOISE WAL	L 22 FROM -Y10- STA. 47+25.36,	189.45' RT TO -Y19- STA. 55+06	.18, 24.50' RT	GROUND WTR (ft)	SITE	E DESCR	RIPTION	NOISE	WALL 22	FROM -Y10	- STA. 47+25.36,	189.45' RT T	O -Y19- ST	A. 55+06.18, 24	4.50' RT	GROUND	WTR (ft)
BORING NO. NW22-7	STATION 51+78	OFFSET 14 ft RT	ALIGNMENT -Y19-	<b>0 HR.</b> 1.4	BOR	ring no.	. NW22	-8	S	TATION 52	2+76	OFFSET	14 ft RT	AL	IGNMENT -Y19-	0 HR.	2.0
COLLAR ELEV. 40.9 ft	TOTAL DEPTH 20.0 ft	<b>NORTHING</b> 239,939	EASTING 2,402,223	<b>24 HR.</b> 3.1	COL	LAR EL	. <b>EV.</b> 42.	2 ft	Т	OTAL DEPT	H 20.0 ft	NORTHIN	<b>G</b> 240,005	EA	STING 2,402,296	24 HR.	4.4
DRILL RIG/HAMMER EFF./DATE MID19	904 CME-45B 90% 03/01/2019	DRILL METHOD M	ud Rotary HAMN	IER TYPE Automatic	DRIL	l Rig/Han	MMER EFF	./DATE	MID1904 CI	ME-45B 90% 0	3/01/2019		DRILL ME	THOD Mud Rota	ry H	IAMMER TYPE Au	tomatic
DRILLER WIGGINS, M.	<b>START DATE</b> 01/29/20	COMP. DATE 01/29/20	SURFACE WATER DEPTH N	/Α	DRIL	LLER W	VIGGINS	, М.	S		01/29/20	COMP. DA	ATE 01/29	/20 SU	RFACE WATER DEPTH	N/A	
ELEV DRIVE DEPTH BLOW COUI	NT         BLOWS PER FOO           0.5ft         0         25         50	75 100 NO. MOU G	SOIL AND ROCK DES		ELEV (ft)	/ DRIVE ELEV (ft)	DEPTH (ft)	BLOW 0.5ft 0	COUNT 5ft 0.5ft	0 2	BLOWS PER FOO 5 50	DT 75 100	SAMP. NO.		SOIL AND ROCK	DESCRIPTION	
DRILL RIG/HAMMER EPF./DATE         MIDIS           DRILLER WIGGINS, M.           ELEV (ft)         DEPTH ELEV (ft)         BLOW COUL (ft)           45	304 CME-43B 90% 03/01/2019       START DATE     01/29/20       NT     BLOWS PER FOO       0     25     50       3     1     5     -       1     2     -     -       2     -     -     -       1     2     -     -       25     -     -     -       3     1     -     -       1     2     -     -       25     -     -     -       3     15     -     -       5     -     -     -	DRILL METHOD     MI       COMP. DATE     01/29/20       01     SAMP.       75     100       NO.     MOI       G     MOI       SS-62     32%       V     W       SS-62     32%       Sat.     Sat.	SOIL AND ROCK DES ELEV. (ft) 40.9 GROUND SURF UNDIVIDED COAST/ BROWN AND GRAY, SLIC 37.9 SAND (A-3) WITH TRAC DARK BROWN, SILTY F. MODERATELY OF 32.9 TAN. F. SAND ( 20.9 Boring Terminated at Elev UCP: SAND 20.9	A CRIPTION DEPTH (ft) CRIPTION DEPTH (ft) CACE O.0 AL PLAIN HTLY SILTY F. E ORGANICS SAND (A-2-4),	JRIL           DRIL           ELEV           (ft)           45           40           35           30           25	L RIG/HAM	Wind EPF VIGGINS DEPTH (ft) - 3.5 - 3.5 - 3.5 - 4 - 3.5 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4	JUATE       a, M.       BLOW       0.5ft       0       2       4       6       3       4	MID1904 Cr ST COUNT 5ft 0.5ft 3 3 4 6 3 3 6 9 5 7 5 5 5 5	1     1       0     2       1     1       0     2       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1	3/01/2019 01/29/20 BLOWS PER FOC 5 50 	COMP. DA	DRILL ME           ATE         01/29           SAMP.         0           NO.         0           NO.         0	HUU     Mud     Rota       /20     SU       /20     Su	RFACE WATER DEPTH SOIL AND ROCK GROUND S UNDIVIDED CO TAN-GRAY, F DARK BROWN, SL SAND (A-2-4) WITH TAN, F. SA Boring Terminated at UCP: S	AMMERTYPE AU I N/A DESCRIPTION SURFACE ASTAL PLAIN SAND (A-3) IGHTLY SILTY F. TRACE ORGANICS IND (A-3) Elevation 22.2 ft IN SAND	0.0 3.0 5 8.0 8.0
NCDOT BORE DOUBLE R3300_GEO_FALCON_CULVERT AND W																	

# GEOTECHNICAL BORING REPORT BORE LOG

v	/BS	40237	.1.1			ТІ	<b>P</b> R-330	0B	COUN	TY PENDE	R				GEOLOGIST GOODNI	GHT, D.	.J.	WB	<b>S</b> 40237	7.1.1			ТІ	<b>P</b> R-3300	B	COUNT	Y
S	ITE C	DESCR	IPTION	NOIS	SE WA	LL 22	FROM -Y	10- STA. 4	7+25.36,	189.45' RT	TO -Y19-	STA.	55+0	6.18	3, 24.50' RT		GROUND WTR (ft)	SIT	E DESCR	IPTION	NOIS	SE WA	LL 22	FROM -Y1	0- STA. 47	+25.36, 1	89
В	ORIN	ig no.	NW2	2-9		S	TATION	53+84		OFFSET	22 ft R1	Г			ALIGNMENT -Y19-		<b>0 HR.</b> 2.4	BOF	ring no.	NW2	2-10		ST	TATION 5	4+92		6
С	OLL	AR ELE	<b>EV.</b> 43	3.4 ft		т	OTAL DEI	<b>PTH</b> 20.0	ft	NORTHIN	<b>IG</b> 240,	063			EASTING 2,402,381		<b>24 HR.</b> 4.0	COL	LAR EL	<b>EV.</b> 46	6.2 ft		тс	DTAL DEP	<b>TH</b> 20.0 f	t	1
D	RILL I	RIG/HAM	IMER EF	F./DATE	E MID	1904 CI	ME-45B 90%	6 03/01/2019		_	DRILL	METHC	DD N	/lud F	Rotary	HAMME	ER TYPE Automatic	DRIL	.L RIG/HAI	MMER EF	F./DATE	E MID	1904 CN	/IE-45B 90%	03/01/2019		_
D	RILL	ER W	/IGGIN	S, M.		S		<b>FE</b> 01/29/2	20	COMP. D	<b>ATE</b> 01	/29/20			SURFACE WATER DEP	TH N/A	۹	DRI	LLER V	VIGGIN	S, M.		ST	ART DAT	E 01/28/2	20	0
EL	EV	DRIVE ELEV	DEPTH	BLO	W COL	JNT		BLOWS	PER FOO	DT	SAMF	°. ▼∕			SOIL AND RO	CK DESC	CRIPTION	ELE\	/ DRIVE ELEV	DEPTH	BLO	W COL	JNT		BLOWS	PER FOO	Г
_		(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	75 10	NO.	/мс	) G	E	ELEV. (ft)		DEPTH (f	) (11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25 	50	
4	15		+											F.				50		+							
		42.4	1.0				· · · ·			• • • • •		-	000	- 4	UNDIVIDED		L PLAIN			Ŧ							
4	10	- 30 0	35	4	4	3	• • •					M	000	4	BROWN AND 1	AN, F. S	SAND (A-3)	45	45.2	1.0				+	<del></del>	1	-
			- 0.0	1	4	4	- 🛉 8 -						_	F	TAN AND BROWN SANI	n, SLIGH D (A-2-4)	ILY SILTY F. )		407	Ŧ	1	2	2	<b>•</b> 4			
	ŀ	37.4	<u>    6.0    </u>	2	2	4						w		F					42./	<u> </u>	2	2	2	<b>4</b>			•
3	35	34.9	8.5	3	3	3						Sat	000		<u>5.4</u> TAN, F.	SAND (A	A-3) <u>8</u> .	40	40.2	<u> </u>	3	4	5				-
		-	F		-	-	$\P^{6^{\circ}}$						000						37.7	8.5	12	12	7				-
3	30	29.9	[ 13.5															35		Ŧ					9		-
			- 10.0	2	5	7	• •12					Sat.							227	I 12 5					· · · ·		•
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- 2	25	24.9	18.5	5	6	6						l w	0 0 0 0 0 0 0 0 0	÷			00	30		ŧ				· · · ·			-
	F						<u> </u>					<u> </u>	000	<u> </u>	Boring Terminated	at Eleva	ation 23.4 ft IN		27.7	18.5	8	11	12		/		
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T١	Ρ	EN	DE	R						GEOLC	GIS	Т	GOODN	IGHT, D.	J.		
18	89.4	5' R	RT -	ГО	-Y1	9- S	TA. 55	5+06	.18	3, 24.50'	RT				GROUN	ND WI	R (ft)
	OF	FSE	ET	2	4 ft	RT				ALIGN	MEN	Т-	Y19-		0 HR.		1.5
	NO	RT	HIN	G	24	0,09	90			EASTIN	IG	2,40	)2,477		24 HR.		7.6
					DRI	LL M	ETHOD	M	ud F	Rotary				HAMME	R TYPE	Auton	natic
	со	MP	. D	AT	Έ	01/2	28/20			SURFA	CE \	NAT	ER DE	PTH N//	4		
Т					SA	MP.	/	L									
	75		10	0	N	О.	моі	G					AND RC				
						O.	MOI M W W W			16.2 T 18.2 14.2 26.2	DAR		GROUN DIVIDED WN, AN ROWN, 3 'ITH LIT' TAN, F	ID SURF/ COASTA D GRAY, SILTY F. S TLE ORG, SAND (A d at Eleva P: SAND	ACE <b>PLAIN</b> F. SAND SAND (A- ANICS -3)	(A-3)	8.0 12.0 20.0
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