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#### **CONTENTS** SHEET NO.

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2519B

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REFERENCE

<b>DESCRIPTION</b>
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 \_\_\_\_\_\_CUMBERLAND

PROJECT DESCRIPTION <u>FAYETTEVILLE OUTER LOOP</u> FROM SOUTH OF SR 1003 (CAMDEN RD.) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE RD.) SITE DESCRIPTION BRIDGE #447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 3438 AND SR 4176

# 3481 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	10

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSIFICACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION OF THE DEPARTMENT AS TO THE TYPE OF MATERNALS AND COCUMENTS FOR FINAL AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED 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 FOM THE ACTUAL CONDENSATION.

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

PERSONNEL

MID-ATLANTIC

HAMM, J.R.

GOODNIGHT, D.J.

INVESTIGATED BY GOODNIGHT, D.J.
DRAWN BYHILL, M.J.
CHECKED BYHAMM, J.R.
SUBMITTED BY FALCON ENG.
DATE <u>MAY 2017</u>

SEAL 39779	
Jeremy K Hamm 6/8/2017 ED7938089E22487 SIGNATURE DATE	

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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

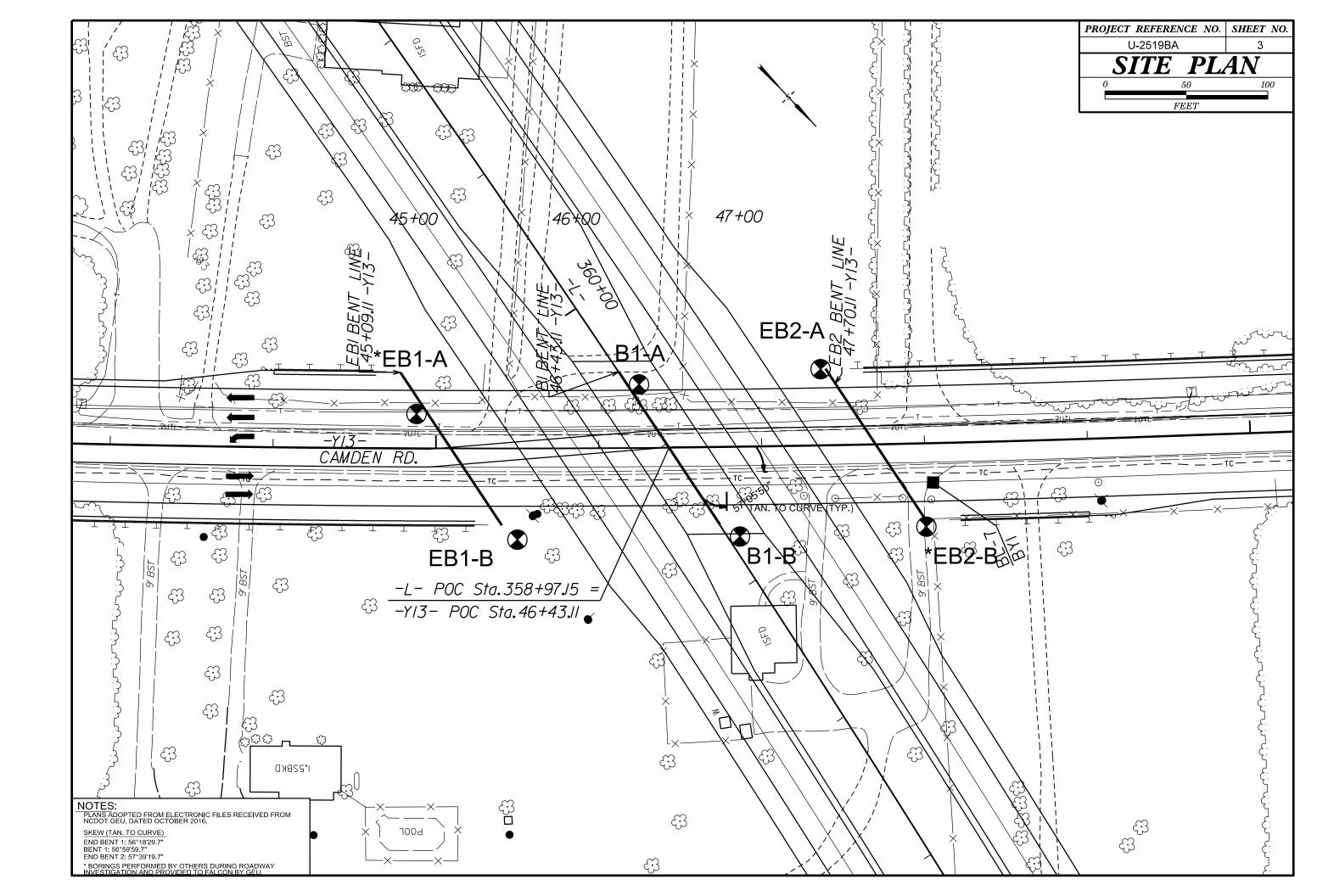
		SOIL (	DESCRI	PTIO	N			1		GRA	ADATION						ROCK DE	SCRIPTION	
BE PENETRAT ACCORDING IS BASE	NSIDERED UNCONSOLID TED WITH A CONTINUO TO THE STANDARD PE ED ON THE AASHTO S	JS FLIGHT PO NETRATION TE STEM. BASIC	WER AUGE	R AND Y TO T 20 IONS GEN	'IELD LESS 6,ASTM D1 NERALLY IN	THAN 100 BLOWS 586), SOIL CLASS CLUDE THE FOLLC	PER FOOT FICATION WING:	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	NDICATES ES A MIXI	THAT SOIL P	ORM PARTICLES ARE ALI	L APPROXIMA ZES OF TWO	ATELY THE SAME SIZE.	ROCK LINE INDI SPT REFUSAL I	ICATES THE S PENETRAT -COASTAL PI	LEVEL A TION BY PLAIN MA	AT WHICH NON-COA A SPLIT SPOON SA ATERIAL, THE TRA	WOULD YIELD SPT REFL ASTAL PLAIN MATERIAL AMPLER EQUAL TO OR L ANSITION BETWEEN SO	WOULD YIELD LESS THAN Ø.
AS MI	Y,COLOR,TEXTURE,MO IINERALOGICAL COMPOS	ITION, ANGULA	RITY, STRU	UCTURE,	PLASTICITY	, ETC. FOR EXAMP	_E,				TY OF GRAIN SOIL GRAINS IS DE		Y THE TERMS.				DIVIDED AS FOLLOW	/S:	
VERY	Y STIFF, GRAY, SILTY CLAY. SOIL LEGE	MOIST WITH INT					6	ANGULAR, SUBAN	NGULAR, <u>S</u>	SUBROUNDED, O			THE TENNS:	WEATHERED ROCK (WR)			NON-COASTAL PLA 100 BLOWS PER FO	IN MATERIAL THAT WOU DOT IF TESTED.	JLD YIELD SP1
GENERAL CLASS.	GRANULAR MATE (≤ 35% PASSING			-Clay Mai 15% Passin		ORGANIC MA1	ERIALS		MES SUCH	H AS QUARTZ.	FELDSPAR, MICA, THEY ARE CONSID	ALC, KAOLIN,		CRYSTALLINE ROCK (CR)				GRAIN IGNEOUS AND ME REFUSAL IF TESTED.	
CLASS. A-1-a		A-2 -2-5 A-2-6 A-2	A-4	A-5 A	-6 A-7 A-7-5. A-7 <u>-</u> 6	A-1, A-2 A-4, A- A-3 A-6, A-		HRE USED IN			ESSIBILITY	TED OF 510	JNIF ICHINCE.	NON-CRYSTALLI ROCK (NCR)			FINE TO COARSE O	GRAIN METAMORPHIC AN	
SYMBOL 0000			2	77.4				X MODEI	ERATELY (	MPRESSIBLE		LL < 31 LL = 31 -	- 50	COASTAL PLAIN			COASTAL PLAIN SE	DES PHYLLITE, SLATE, S EDIMENTS CEMENTED IN	NTO ROCK.BUT
% PASSING *10 50 M	1x					GRANULAR SIL T-	MUCK,	HIGHL	LY COMPR		E OF MATER	LL > 50		SEDIMENTARY R (CP)			SHELL BEDS, ETC.	CK TYPE INCLUDES LIM	ESTONE, SANDS
	1X 50 MX 51 MN 1X 25 MX 10 MX 35 MX 3	5 MX 35 MX 35	MX 36 MN	36 MN 36	MN 36 MN	SOILS SOILS	PEAT	ORGANIC MATERIAL		GRANULAR SOILS	SILT - CLAY SOILS		R MATERIAL						
MATERIAL PASSING =40 LL	40 MX	1 MN 40 MX 41 1 9 MX 11 MN 11 P	MN 40 MX	41 MN 40	MX 41 MN	SOILS WITH LITTLE OR MODERATE	HIGHLY	TRACE OF ORGANIC MAT LITTLE ORGANIC MAT MODERATELY ORGANIC HIGHLY ORGANIC	1ATTER TER	2 - 3% 3 - 5% 5 - 10% > 10%	3 - 5% 5 - 12% 12 - 20% > 20%	TRACE LITTLE SOME HIGHLY	1 - 10% 10 - 20% 20 - 35% 35% AND ABOVE	H VERY SLIGHT R (V SLI.) C	AMMER IF CF OCK GENERAL	RYSTALLI ALLY FRES A A BROKE	INE. SH, JOINTS STAINED, EN SPECIMEN FACE	TS MAY SHOW SLIGHT S SOME JOINTS MAY SHOW SHINE BRIGHTLY, ROCK F	W THIN CLAY C
USUAL TYPES STONE		4 MX	SILT	тү	MX NO MX	AMOUNTS OF ORGANIC MATTER	ORGANIC SOILS			R LEVEL IN BO	ND WATER		DRILLING	(SLI.) 1	INCH. OPEN	JOINTS M	MAY CONTAIN CLAY.	AND DISCOLORATION EX IN GRANITOID ROCKS SC RYSTALLINE ROCKS RING	OME OCCASIONA
MATERIALS S GEN, RATING AS SUBGRADE	SAND SAND GRA	Vel and sand	F	FAIR TO P	SOILS OOR	FAIR TO POOR	UNSUITABLE		PERCH	ED WATER, SA	EL AFTER <u>24</u> H TURATED ZONE, OR		RING STRATA	(MOD.) G	RANITOID RO	OCKS, MOST UNDER HA	T FELDSPARS ARE [	SCOLORATION AND WEATH DULL AND DISCOLORED, S SHOWS SIGNIFICANT LOSS	SOME SHOW CLA
	PI OF A-7-5 SUE					> LL - 30		- 0-11-		G OR SEEP				MODERATELY A	LL ROCK EXC	CEPT QUA		R STAINED. IN GRANITOI	
	COMPAC	NSISTENC	RANG	GE OF ST	ANDARD	RANGE OF U				25 (025	EOUS SYMBO			(MOD. SEV.) A	ND CAN BE E	EXCAVATE		KAOLINIZATION. ROCK SH ST'S PICK. ROCK GIVES '	
PRIMARY SOIL	CONSI	LOOSE		(N-VALU (N-VALU < 4 4 TO 1		COMPRESSIVE (TONS)		L ROADWAY EMBA WITH SOIL DE					SLOPE INDICATOR INSTALLATION	SEVERE AI (SEV.) RI	LL ROCK EXC EDUCED IN S O SOME EXTE	CEPT QUA STRENGTH FENT. SOM	ARTZ DISCOLORED ON H TO STRONG SOIL. ME FRAGMENTS OF S	R STAINED. ROCK FABRIC IN GRANITOID ROCKS ALI TRONG ROCK USUALLY R	L FELDSPARS 4
GRANULAR MATERIAL (NON-COHES)	BIVE) MEDIUM DE VERY	I DENSE NSE DENSE		10 TO 30 TO 30 TO 50	50	N/		ARTIFICIAL FI	Y EMBAN			٨	CONE PENETROMETER TEST	VERY AI SEVERE BI	LL ROCK EXC UT MASS IS	CEPT QUA	VELY REDUCED TO S	<u>&gt; 100 BPF</u> R STAINED. ROCK FABRIG SOIL STATUS,WITH ONLY F ROCK WEATHERED TO A	r FRAGMENTS O
GENERALLY SILT-CLAY MATERIAL	SI MEDIU S1	SOFT DFT 1 STIFF IFF		<pre>&lt; 2 2 TO 4 TO 8 TO 1</pre>	8 .5	< 0. 0.25 T 0.5 T( 1 T(	0.5 1.0 2				<ul> <li>CORE BORING</li> <li>MONITORING WE</li> <li>PIEZOMETER</li> </ul>	ш 🛉	SOUNDING ROD TEST BORING WITH CORE	VI COMPLETE RI SI	ESTIGES OF OCK REDUCED CATTERED CO	ORIGINAL D TO SOII	L ROCK FABRIC REM IL. ROCK FABRIC NO	AIN. <i>IF TESTED, WOULD</i> T DISCERNIBLE, OR DISC BE PRESENT AS DIKES	<u>YIELD SPT N N</u> ERNIBLE ONLY
(COHESIVE)	н	STIFF ARD		15 TO 30		2 10		ALLUVIAL SOI			INSTALLATION		- SPT N-VALUE		LSO AN EXAN	MPLE.	воск н	ARDNESS	
		EXTURE	<u>OR GR</u> 40			278				ECOMMEND	ATION SYMB		SIFIED EXCAVATION -					RP PICK. BREAKING OF H	HAND SPECIMEN
U.S. STD. SIEVE OPENING (MM)	SIZE	4 10 4.76 2.00	0.42		5 0.075	270 0.053			⊿ unsu	UITABLE WAST	E la	ACCEPT است USED IN	ABLE,BUT NOT TO BE N THE TOP 3 FEET OF	HARD C	AN BE SCRAT	TCHED BY	Y KNIFE OR PICK OM	NLY WITH DIFFICULTY. H	IARD HAMMER B
BOULDER (BLDR.)	COBBLE ( (COB.)	RAVEL (GR.)	COARS SAND (CSE, SI	)	FINE SAND (F SD.	SILT (SL.)	CLAY (CL.)			EPTABLE DEGF	RADABLE ROCK		MENT OR BACKFILL	MODERATELY C	XCAVATED BY	ATCHED BY BY HARD B	Y KNIFE OR PICK. G	OUGES OR GROOVES TO ( ST'S PICK. HAND SPECIM	
	305 75 12 3 SOIL MOI	2.0		0.2		0.05 0.0	05	AR - AUGER REFUSAL BT - BORING TERMINATED CL CLAY		MOD M	MICACEOUS 10DERATELY	WEA グ- U	- VANE SHEAR TEST - WEATHERED UNIT WEIGHT	MEDIUM C	AN BE EXCAN	VED OR G	N SMALL CHIPS TO F	DEEP BY FIRM PRESSU PEICES 1 INCH MAXIMUM	
	ISTURE SCALE BERG LIMITS)	FIELD M DESCR	OISTURE			IELD MOISTURE (	ESCRIPTION	CPT - CONE PENETRATION CSE COARSE DMT - DILATOMETER TES DPT - DYNAMIC PENETRAT	БТ	ORG O PMT - P	N PLASTIC IRGANIC PRESSUREMETER TE PAPROLITIC		DRY UNIT WEIGHT	SOFT C	ROM CHIPS T	ED OR GO	DUGED READILY BY I RAL INCHES IN SIZE	KNIFE OR PICK. CAN BE BY MODERATE BLOWS O	
	LIQUID LIMIT	- SATUR (SAT,				UID:VERY WET.U THE GROUND WA		e - VOID RATIO F - FINE FOSS FOSSILIFEROUS	TION TES	SD SA	ND, SANDY LT, SILTY	SS -	SPLIT SPOON SHELBY TUBE	VERY C	AN BE CARVE R MORE IN T	ED WITH		SURE. SAVATED READILY WITH F BY FINGER PRESSURE. CA	
PLASTIC BANGE		- WET -	(W)			EQUIRES DRYING MUM MOISTURE	то	FRAC FRACTURED, FRAC FRAGS FRAGMENTS	TURES	TCR - T	RICONE REFUSAL	RT -	RECOMPACTED TRIAXIAL - CALIFORNIA BEARING		INGERNAIL.	SPAC		T	BEDDING
	PLASTIC LIMIT							HI HIGHLY			ON SUBJECT		RATIO	TERM VERY WIDE			SPACING THAN 10 FEET	VERY THICKLY B	
	OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST	- (M)			NEAR OPTIMUM		DRILL UNITS:		ICING TOOLS: CLAY BITS	UN SUBJECT		TYPE:	WIDE MODERATELY CLOSE	CLOSE	3 TC 1 TC	0 10 FEET 0 3 FEET TO 1 FOOT	THICKLY BEDDED THINLY BEDDED VERY THINLY BE	) 1 Ø.
		- DRY -	(D)			DITIONAL WATER MUM MOISTURE	TO	CME-55		6" CONTINUOUS	FLIGHT AUGER	CORE SIZ	:E:	VERY CLOSE		LESS TH	HAN 0.16 FEET	THICKLY LAMINA THINLY LAMINAT	
		PL	ASTICI	ΤY						8 HOLLOW AUG		🗌 -в	🗌 -н	L				RATION	
NON PLA		PLAST	0-5	JEX (PI)		DRY STRE VERY L	OW	CME-550		HARD FACED FI TUNGCARBIDE				FOR SEDIMENTA FRIABLE	RY ROCKS,I	INDURATIO	RUBBING WITH	NING OF MATERIAL BY FINGER FREES NUMERO BY HAMMER DISINTEGR	OUS GRAINS:
MODERA	LY PLASTIC ATELY PLASTIC PLASTIC	2	6-15 16-25 26 OR MOR	RE		SLIGH MEDIU HIGH	м			CASING	W/ ADVANCER • STEEL TEETH		DLS: ST HOLE DIGGER ND AUGER	MODERAT	ELY INDURA	4TED	GRAINS CAN BE	E SEPARATED FROM SAI Y WHEN HIT WITH HAMM	AMPLE WITH ST
			COLOR								TUNGCARB.		INDING ROD	INDURATE	ED			IFFICULT TO SEPARATE BREAK WITH HAMMER.	WITH STEEL
	NS MAY INCLUDE COL TERS SUCH AS LIGH									CORE BIT			E SHEAR TEST	EXTREME	LY INDURAT	FED	SHARP HAMMER	BLOWS REQUIRED TO	BREAK SAMPLI

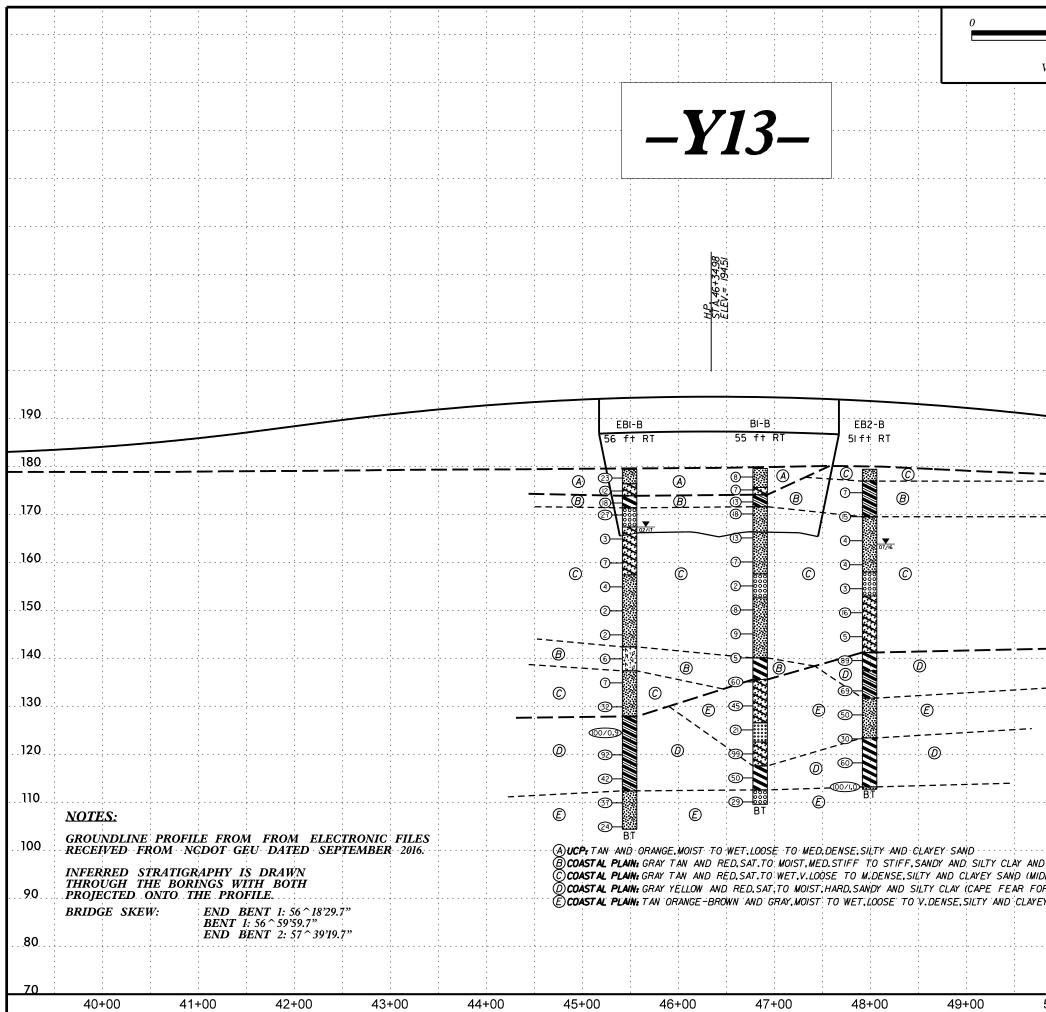
# PROJECT REPERENCE NO.



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ED. AN INFERRED	
D SPT REFUSAL. 1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
T N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
OCK THAT NCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
AL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED. IC. MAY NOT YIELD	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
STONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
COATINGS IF OPEN, HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
OCK UP TO AL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
TS. IN AY. ROCK HAS H AS COMPARED	<u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIG <sub>I</sub> NAL POSITION AND DISLODGED FROM PARENT MATERIAL.
H HO CUMPAKED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
RE DISCERNIBLE DF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
T ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
<u>VALUES &lt; 100 BPF</u> IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
NS REQUIRES	$\underline{SAPROLITE}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
DEEP CAN BE DETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. D BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
N FRAGMENTS NT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
. PIECES 1 INCH HED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BL-7: 36" REBAR WITH ALUMINUM TRAVERSE CAP
THICKNESS	N: 442842.4630 E: 1992799.3360
4 FEET 1.5 - 4 FEET	<u>-YI3- 48+05, 24 ft RT</u> ELEVATION: 178.99 FEET
.16 - 1.5 FEET 03 - 0.16 FEET	NOTES:
08 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
< 0.008 FEET	UCP - UNDIVIDED COASTAL PLAIN
EAT, PRESSURE, ETC.	
• TEEL PROBE:	
PROBE:	
.E;	DATE: 8-15-14





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	PROPO	DSED GRADE		
				180
	EXISTING			170
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ID CLAYEY SILT ( IDDENDORF FOR	(MIDDENDORF FO. MATION)	RMATION)		
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50												CUASTA	L FLAIN: URANGE V.LOOSI	E TO DENSE.	BROWN TAN GRA CLAYEY SAND AND	SILTY SAND (N	UIST TU SAT.	FORMATION)		Ø						
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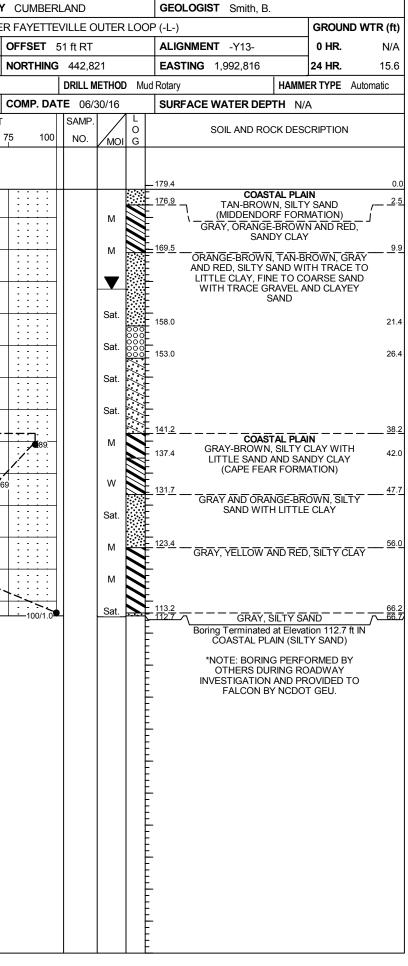
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SITE	DESCRIPTION	BR	DGE N	0.447	7 ON CAMDEN RE	D. (-Y13-) OVE	ER FAYETTE	VILLE O	UTER	LOO	P (-L-)		GROUND WTR (ft)	SITE	DESCR	RIPTION	BRID	DGE N	0. 447	ON CAMD	EN RD. (-)	(13-) OVI	ER F
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COLL	.AR ELEV. 1	78.7 ft		Т	OTAL DEPTH 79	9.8 ft	NORTHING	442,64	41		EAST	<b>ING</b> 1,992,551	<b>24 HR.</b> 17.0	COL	LAR EL	<b>EV</b> . 17	78.8 ft		тс	DTAL DEPT	<b>H</b> 75.0 ft		NO
DRILL	RIG/HAMMER E	FF./DA	TE SUM	/3359 (	CME-450 81% 11/09/2	2016		DRILL M	IETHOD	) Mu	d Rotary	НАММ	ER TYPE Automatic	DRILI	RIG/HAN	MMER EF	F./DATE	E MID	3964 CN	/IE-45C 83% (	08/09/2016		
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135	134.4 + 44.3	3	10	17	27.	::::::			м	N	-	GRAY AND BLACK SILTY SANDY CLAY WITH LIT	Y CLAY AND			± 40.0	2	2	5	•7	::::		: 1:
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125	124.4 + 54.3										-	ORANGE-BROWN AND R SILTY SAND WITH LIT	ED-BROWN,	125	125.3	<u>+ 53.5</u>	25	51	49/0.4			: ? * .	-
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120	119.4 + 59.3	32	50	50/0.4		· · · · · ·				日	-	(SANDY MUDSTO	,	120	120.3	<u>+ 58.5</u> +	19	37	55				+
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110	109.4 + 69.3										_	SAND, SILTY SAND WITH AND FINE TO COARSES	LITTLE CLAY,		110.3	68.5	8	16	21	::::			::
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105	104.4 + 74.3	8	25	23					Sat.					105	105.3	73.5	12	15	9		24 <u>.</u>		$\pm$
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	ŧ									E	<b>_</b>	COAŠTAL PLAIN SEDIMEN	NTARY ROCK		_	ŧ							
	ŧ									E		(SANDY MUDSTO	,			ŧ							
	÷									E		*NOTE: BORING PERFO OTHERS DURING RC	DADWAY		-	ŧ							
	ŧ									E		INVESTIGATION AND PR FALCON BY NCDO				ŧ							
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CUMBER	LAND			GEOLOGIST Hamm, J.			
R FAYETTE	VILLE O	UTER	LOO	P (-L-)		GROUN	ID WTR (ft)
OFFSET 5	56 ft RT			ALIGNMENT -Y13-		0 HR.	N/A
NORTHING	442,63	33		EASTING 1,992,650		24 HR.	12.0
	DRILL M	ETHOD	Mu	d Rotary	HAMME	R TYPE	Automatic
COMP. DAT	<b>FE</b> 02/1	13/17		SURFACE WATER DEPT	H N/A	۱	
	SAMP.		L O	SOIL AND ROCI	K DESC	RIPTION	
75 100	NO.	<u>/ MOI</u>	G				
				178.8			0.0
		м		UNDIVIDED CO 175.8			3.0
::::		W	$\langle \cdot \rangle$	TAN AND ORANG	E, CLA 2-6)	YEY SAN	ID5.5
		w w	000		AL PLAI		
		Ť		166.8 SILTY CI	LAY (A-	7)	<u>12.0</u>
		Sat.	//	(MIDDENDORI TAN AND RED, SLI	SILTY	SAND (A	
			$\mathbb{N}$	WITH IRON CEMEN TAN RED AND GR			
::::		Sat.	///	(A-2-7) WITH FA	T ĆLAY	LAYERS	S 22.0
		Sat.		TAN RED AND G		LTY SAN	D <u>22.0</u>
		Sal.		(A-	2-4)		
		Sat.					
::::		Sat.		- 141.8			37.0
		Sat.	~ ~	GRAY AND TAN, S (A-5) WITH FAT			
		Oat.		_ <u>136.8</u>			42.0
		Sat.		TAN AND RED, S WITH IRON CONC	RETION	NS AND F	
				CLAY L	AYERS	;	
::::		Sat.					51.5
		w		- DARK GRAY, SA			)
100/0.9				(CAPE FEAR	FORMA	ATION)	
• • • • • • • • • • • • • • • • • • • •		w		-			
		W		. 111.8			67.0
		w		GRAY, SILTY CS	SE. SAN	ID (A-2-4	)
+ • • • • •	4	w		 Boring Terminated a	t Eleveti	ion 103 9	ft IN 75.0
				COASTAL PLAIN	N (CAPE	E FEAR	
				FURM	ATION)		
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		317.1.F					I <b>P</b> U-251				Y CUMBER					DLOGIST Goodnight, D.			<b>3</b> 4817.					<b>P</b> U-251		COUN	
SITE	E DES	CRIPT	ON	BRID	GE N	D. 447	ON CAN	IDEN RD	. (-Y1	13-) OVE	ER FAYETTI	EVILLE	OUTE	RLO	OP (-L-)	)	GROUND WTR (ft)	SITE	DESCRI	PTION	BRID	DGE N	0. 447	ON CAM	DEN RD.	(-Y13-) O	JER I
BOF	ring M	<b>ю.</b> в	1-A			S	TATION	46+25			OFFSET	39 ft LT			ALI	GNMENT -Y13-	0 HR. N/A	BOR	ing no.	B1-B			S	TATION	46+86		0
COL	LAR	ELEV.	178	8.7 ft		Т	OTAL DE	<b>PTH</b> 65	.0 ft		NORTHING	<b>G</b> 442,7	752		EAS	<b>STING</b> 1,992,632	<b>24 HR.</b> 12.0	COL	LAR ELE	<b>V.</b> 17	79.1 ft		т	OTAL DEF	<b>PTH</b> 70.0	D ft	N
DRIL	.L RIG/H	IAMME	R EFF	./DATE	E MID	3964 CI	ME-45C 83	% 08/09/20	)16			DRILL	METHO	OD N	/lud Rotar	y HAMN	<b>IER TYPE</b> Automatic	DRILI	_ RIG/HAMI	MER EF	FF./DATE	e Mid;	3964 CI	ME-45C 83%	% 08/09/201	6	
DRI		Wigg		Λ.		S	TART DA	TE 02/	4/17		COMP. DA	<b>TE</b> 02/	/14/17	7	SUF	RFACE WATER DEPTH N	/A	DRIL	LER Wi				S		<b>FE</b> 02/13	3/17	С
ELEV				BLO	w col	JNT		BLO\	NS PE	ER FOOT	Γ	SAMP				SOIL AND ROCK DES	SCRIPTION	ELEV	DRIVE ELEV	DEPTH	BLO	w co	UNT		BLOW	S PER FO	ТС
(ft)	(ft		ft)	0.5ft	0.5ft	0.5ft	0	25	50	)	75 100	NO.	/m		ELEV		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
ł																											
180	_	_													178.7		0.0	180	170.0	-							
	177	+	.0	3	4	2		: ::	::	::::	: : : : :		м	000	175.7	UNDIVIDED COAST	AL PLAIN		178.3		3	4	4	•8 :	: : : :	: : : :	:
175		- <u>T</u>	.5	3	4	7		· · · ·					м		<u>₽ 173.2</u>	TAN, CLAYEY SAN		175	175.6	-	3	3	4	•7			÷
170	172	+	.0	7	13	15		28					М		170.7	- ORANGE AND TAN, SIL	AIN	170	170.6		7	6	7			: : : :	:
		<u>- + 0</u>		8	10	9	1 : : :	19	::	::::		1	M			(A-2-4) (MIDDENDORF FOR	1	170			6	9	9	: : ?	18	: : : :	:
165	165	.2 <u>+</u> 1;	3.5	-			· · /·	: ::	::	::::					<u>5 166.7</u>	RED-TAN, SLI. SILTY F. T		165	165.6	13.5	5	6	7		: : : :	: : : :	:
		ŧ		3	4	3	<b>●</b> 7 · ·	: : :	::				W		161.7		<u> </u>		1 1				ŕ	: <b>/</b> <sup>13</sup>	:   : : :	:   : : :	:
160	160	.2 <del> </del> 18	3.5	3	3	2							w	<i>%</i> ./	¥=	RED-TAN, CLAYEY SA	$\frac{10}{10} \frac{10}{(A-2-6)} = -2$	160	160.6	18.5	3	4	3				<u> </u>
		Ŧ.		Ū	Ū	-		: : :	::					~~~~	<u>↓</u> 156.7		22.0		155 6	- 						:   : : :	:
155	155	.2 <u>+ 2</u> ;	3.5	3	3	3						-	Sat	t.	-	WHITE AND TAN, SLIGHT (A-3)	LY SILTY SAND	155	155.6	23.5	1	1	1	¢2			<u>.</u>
150	150	.2 + 28	35				<i> i</i> :::	: : :	::					000	151 <u>.7</u>		$\overline{AND}$ $\overline{(A-2-4)}$ $  27.0$	150	150.6	28.5						:	:
100		<u> </u>	1	WОН	1	WOH	<b>∮</b> 1: : :	: : :				11	Sat	t	E.	2.0111 1.11, 0.211 0.		100			2	3	5		: : : :	: : : :	:
145	145	.2 <u>‡</u> 3:	3.5	_			<u>  i: : :</u>	: ::	::					/	<u>146.7</u>	RED-TAN, CLAYEY SA	AND (A-2-6)	145	145.6	33.5	3	4	5			: : : :	:
		ŧ		1	2	1	•3 • •	: : :	::				Sat	ι.	<u></u> ₹				1 1			-	Ŭ	.♥ <sup>9</sup> . :/:::	: : : :	: : : :	:
140	140	.2 <u>+</u> 38	3.5	4	9	17		26		<u></u>		-	м		139.2		39.5	140	140.6	38.5	1	1	4				÷
405	105	, <u>†</u> .,			-				:+						ł	TAN AND GRAY, SILTY		405	135.6	13 5							:
135	135	.2 <u>+ 4</u> ; +	3.5	28	52	48/0.3					100/0.8	•	w		134.7	COASTAL PLA	44.0 AIN	135	- 135.0 -	43.5	18	27	33			<b>7</b> 60	+
130	130	.2 + 48	3.5													GRAY AND TAN, CLAY (A-2-6) WITH LENSES OF	ΈΥ F. SAND	130	130.6	48.5							:
		Ŧ		20	32	48			::		80	1	W	· · · ·	Ĵ.	(CAPE FEAR FORM			1 7		16	19	26	:::	: ::,?	<b>4</b> 5	:
125	125	.2 = 5:	3.5	10	10			• • •						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	124.2		54.5	125	125.6	53.5	6	9	12			: : : :	:
		ŧ		13	12	22							M			GRAY, F. SANDY SILT			1			Ŭ					:
120	120	.2 <u>+</u> 58	3.5	14	26	37		: ::		63		-	М					120	120.6	58.5	22	48	51				
115		.2 _ 6;						: : :	::		S							445	115.6	63 5						: : : :	
115	115	.2 <u>7</u> 6;	3.5	17	36	55					91	<u>L</u>	M		113.7		65.0	115		- 05.5	12	21	29			50	
		Ŧ													Ę	Boring Terminated at Eleva COASTAL PLAIN (CA	PE FEAR	110	110.6	68.5		- 10	10				:
l		Ŧ													F	FORMATION	N)				9	13	16		29		
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CUMBERI	LAND			GEOLOGIST Hamm, J.	/ Goodr	night, D.	
R FAYETTE	VILLE O	UTER	LOO	P (-L-)		GROUN	ID WTR (ft)
OFFSET 5	55 ft RT			ALIGNMENT -Y13-		0 HR.	N/A
NORTHING	442,73	34		EASTING 1,992,742		24 HR.	FIAD
	DRILL M	ETHOD	) Mu	d Rotary	HAMME	RTYPE	Automatic
COMP. DAT			1110				
	SAMP.		L		II IN/ <i>F</i>	`	
75 100	NO.		0	SOIL AND ROC	K DESC	RIPTION	I
	110.	<u>/ MOI</u>	G				
				- 179.1			0.0
		м		UNDIVIDED C TAN, SILTY SAND (			ACE .
		w	$\sim$	175.1 RO 173.6 RO	OTS		4.0
		W		- 171.1 - COAST	AL PLAI	N	. <u> </u>
::::		W		TAN AND RED, S (MIDDENDOR			6)
::::		0-1		TAN, SILTY SAND	(A-2-4)	WITHCL	AY
::::		Sat.		AND CS	SE. SAN	D	
		Sat.		—			
		Oat.		<u>157.1</u>			22.0
		Sat.	000 000 000	WHITE, CSE	. SAND	(A-1-a)	
				<u>152.1</u>			27.0
		Sat.		TAN AND RED, SI	_1YF. S	SAND (A-2	2-4)
::::				:			
		Sat.					
		Sat.		139.6 GRAY AND RED,	SILTY	CLAY (A-	39.5 7)
			N	135.1			44.0
::::		W	$\mathbb{N}$				
::::		w	$\sim$	(CAPE FEAR	FORMA	ATION)	
::::		vv	$\mathbb{N}_{2}$				
		w		<u></u>	TY SAN	D (A-3)	<u> </u>
			0000	122.1			57.0
	99	w	$\mathbb{N}$	GRAY, CLAYE	Y SANL	) (A-2-6)	
				<u></u>			<u> 62.0</u>
		w	N	-	SILTT		
			000	GRAY, SLI. CLAYE	Y F. TO	CSE. SA	ND <u>67.0</u>
	-	_w_		<u>109.1</u> (A-	-1-b)		<u></u>
				Boring Terminated a COASTAL PLAI	N (CAPE	E FEAR	IL IIN
			ļĒ	FORM	1AŤION)		
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DRILL ROHAMMER EF. FJATE         MOSSAF CAR-45C 83% 6885/016         DRILL METHOD         Mul Relay         HAMMER TYPE         Ausmach           DRILLER         Wiggins, M.         STATE DATE         C2/15/17         COMP. DATE         C2/15/17         SUBFACE WATER DEPTH         NA           DEVELUER         Wiggins, M.         STATE DATE         C2/15/17         SUBFACE WATER DEPTH         NA           DEVELUER         Wiggins, M.         STATE DATE         C2/15/17         SUBFACE WATER DEPTH         NA           160         DEVELUER         MUL WORS PERFOOT         SOL AND ROCK DESCRIPTION         DEVELUER         MONORED CONSTAL R.M.         SOL AND ROCK DESCRIPTION           175         175.6         3.3         2         1	MDEN RD. (-Y13-) OVER 48+00	
BORING NO.         EB2:A         STATION         47:37         OFFSET         47:11         ALKAMMENT         Y13         0 HR         NA           COLLAR LEV.         178:51         TOTAL DEPTH         TOTAL DEPTH         NO         NO         FIAD         FIAD         COLLAR LEV.         178:41         COLLAR LEV.         178:41         TOTAL DEPTH         NO         NO         NO         FIAD         COLLAR LEV.         178:41         TOTAL DEPTH         NO         NO         NO         DRUL ROHAMMENE FFD. ALL SUMMER	48+00	0
COLLAR ELEV.         178.1         TOTAL DEPTH         70.0 ft         NORTHING         442.841         EASTING         1.92.702         24 HR         FIAD           DRULL Reidel Ammer PErion R         M03584 Ott <-50.58%, 80502016         DRUL NG MAURE RYPE Automics         DRUL NG MAURE RYPE Automics         DRUL NG MAURE RYPE Automics           DRULL REING         M01         DRUL NG MAURE RYPE Automics         SURFACE WATER DEPTH         NA         SURFACE WATER DEPTH         NA           ELEV         DEPTH         BLOW COUNT         BLOWS PER POOT         SURFACE WATER DEPTH         NA         SURFACE WATER DEPTH         NA           180         180         180         2         1         2         SURFACE WATER DEPTH         NA         ELEV         DPTH-ITM         BLOWS COUNT         BLOWS PER POOT         SURFACE WATER DEPTH         NA         ELEV CRIV         SURFACE WATER DEPTH         NA         SURFACE WATER DEPTH <th></th> <th></th>		
DRUL RIGHAMMER EFF.DATE         MD3864         CME-45C 85%         080.002016         DRUL RIGHAMMER EFF.DATE         SURFACE WADER         MAMER TYPE         Automatic           DRULE Wiggins, M.         START DATE         02/15/17         COMP. DATE         02/15/17         SURFACE WADER DEPTH         NA           000         0.001         <	<b>EPTH</b> 66.7 ft	N
DRULLER         WIGONS, M.         START DATE         0.2/15/17         COMP. DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DATE         DATE         0.2/15/17         SURFACE WATER DEPTH         DEPLIE         DEPLIE <th< th=""><th></th><th></th></th<>		
ELEY         Device permit         DEV COUNT         BLOWS PER FOOT         SAMP         L         SOL AND ROCK DESCRIPTION         DEPTINE         DEVERTINE         DEPTINE         DEVERTINE         DEPTINE         DEVERTINE         DEPTINE         <	1% 11/09/2016	
ELEV         Derry         BLOW COUNT         BLOW SPER FOOT         SAMP         U         0         SOL AND ROCK DESCRIPTION         DEPTHON         DEV         DOWN COUNT           180         175         100         0         25         50         75         100         NO         0         LEV. (b)         SOL AND ROCK DESCRIPTION         DEPTHON         DEP	ATE 06/30/16	c
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	BLOWS PER FOOT	T
1775       174.0       3.5       2       1       2       1       175       175.1 <td< th=""><th>25 50 7</th><th>75  </th></td<>	25 50 7	75 
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · · · · · · · · · · · · · · · · · ·	:
185       185.0       113.5       4       6       6       127       128.5       127       128.5	j15 <u></u>	· :
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135       135.0       43.5       19       33       38         130       130.0       48.5       15       21       31         125       125.0       53.5       -		++
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
10       21       01       052<		
120       120.0       58.5       32       68/0.4       68/0.4       116.5		-
115       115.0       68/0.4       119.2       60.2       13       23       37       1         115       115.0       63.5       68/0.4       110/0.9       116.5       67.0       115       114.2       65.2       13       23       37       1         110       110.0       68.5       68.5       110/0.9       111.5       67.0       115       23       77       1         110       110.0       68.5       67.0       67.0       67.0       115       23       77       1         110       108.5       108.5       70.0       70.0       10.0       10.0       10.0       10.0       10.0       10.0       10.0       10.0       111.5       11.5       11.5       11		:
110     110.0     68.5     67.0       22     24     23     77		
110       110.0       68.5		
Boring Terminated at Elevation 108.5 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)		



REFERENCE: U-2519BA	2 L 3 S 4 S 5 N 6-9 E	DESCRIPTION ITLE SHEET EGEND (SOIL & ROCK) ITE PLAN BL PROFILE BL PROFILE ORING LOGS ITE PHOTOGRAPHS	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT <b>STRUCTURE SUBSURFACE INVESTIGATION</b> COUNTY <u>CUMBERLAND</u> PROJECT DESCRIPTION <u>FAYETTEVILLE OUTER LOOP</u> FROM SOUTH OF SR 1003 (CAMDEN RD) TO SOUTH OF SR 1104 (STRUCTURE BRIDGE ON -L- (STA. 398+06.2 NBL) & (STA. 397+69.8 SBL) OVER UNNAMED TRIBUTARY TO STEWARTS CREEK
OJECT: 34817			

PR

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	10

#### CAUTION NOTICE

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

GENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARES ARE BASED ON A GEORERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARES ARE BASED ON A GEORECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORENUCE. THE LABORATORY SAMPLE DATA AND THE IN SITU INN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

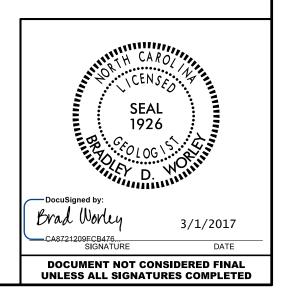
PERSONNEL

#### B. SMITH, PG

MIKE MOSELEY

MICHAEL MOSELEY

INVESTIGATED BY \_\_\_\_\_. B. WORLEY, PG DRAWN BY \_\_\_\_\_. WORLEY, PG CHECKED BY \_\_\_\_\_\_ D. DEWEY, PE SUBMITTED BY Engineering Services, PLLC DATE NOVEMBER, 2016



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

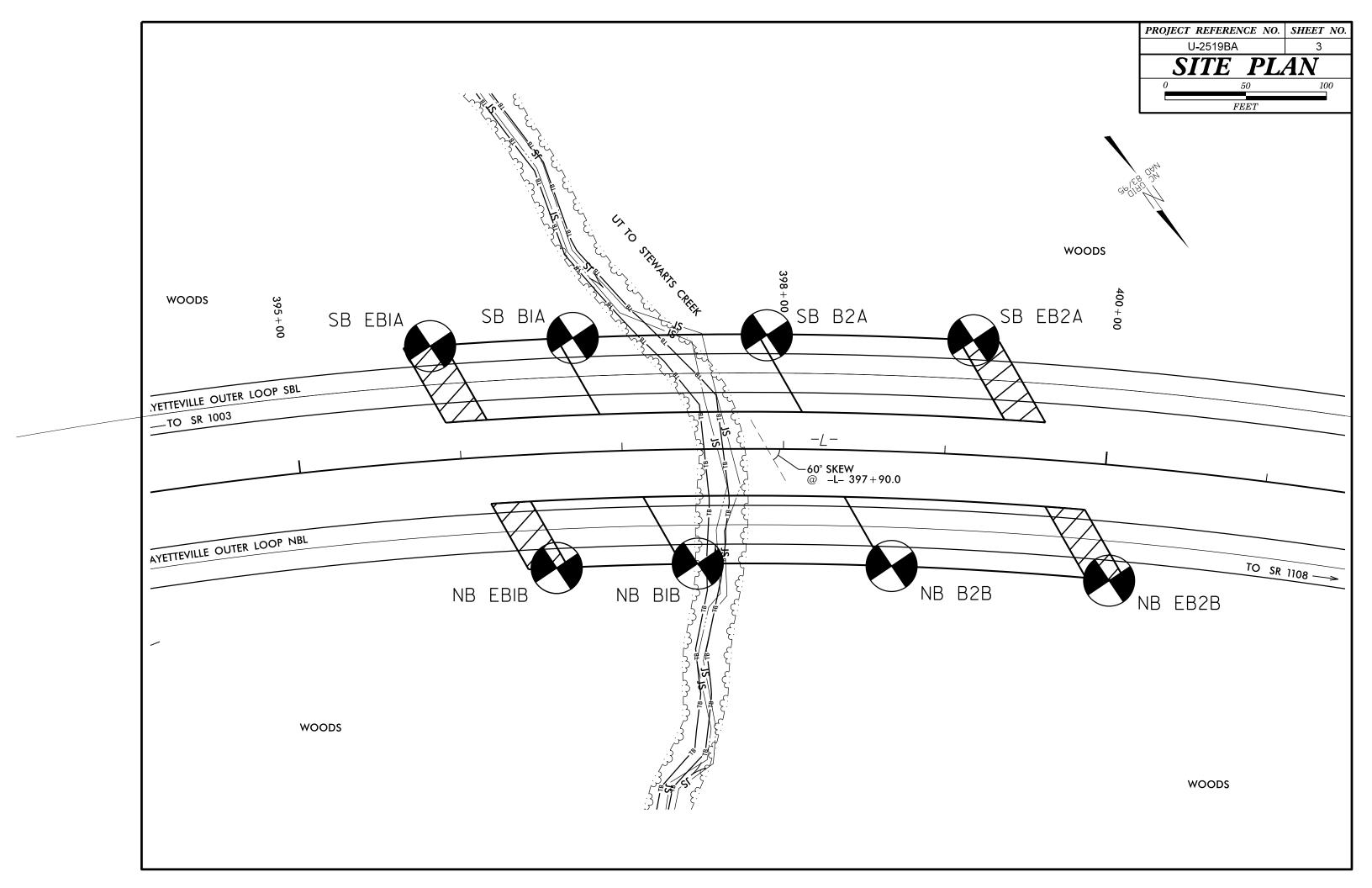
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

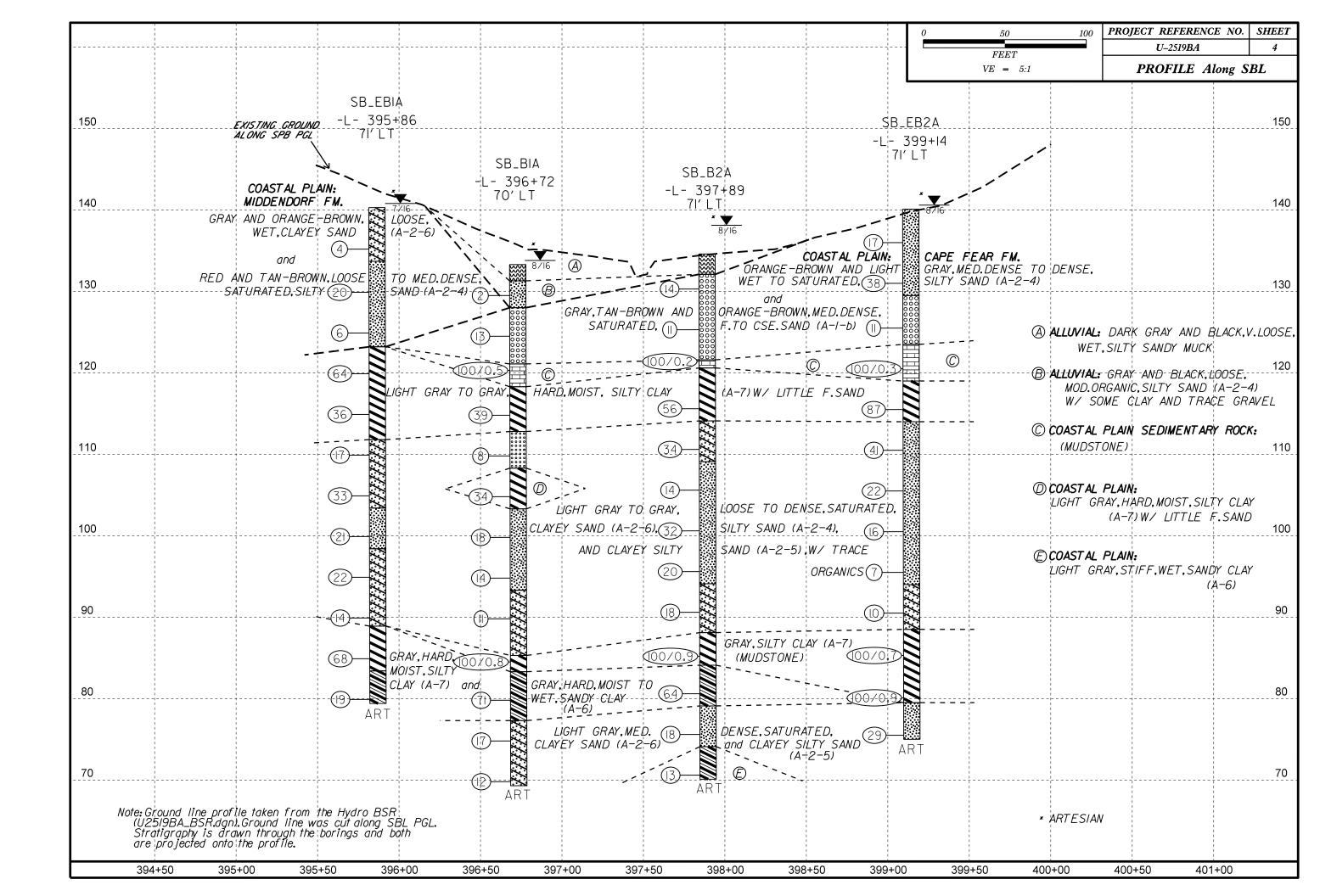
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED WILL WILLIE DIVIDED HIS FOLLOWS.	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
LLASS. ( \$ 334 FASSING 200) ( \$ 334 FASSING 200)	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	RUCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP         A-1         A-3         A-2         A-4         A-5         A-6         A-7         A-1, A-2         A-4, A-5           CLASS.         A-1-a         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A-7a         A-1, A-2         A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL DOODDOODDOOD	SLIGHTLY COMPRESSIBLE LL < 31	RUCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX GRANULAR SILL MUCK,	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN S1 MN S5 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS <u>SOILS</u> <u>OTHER MATERIAL</u>	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 501LS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	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 HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF 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 SOLIS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND 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
CEN BATING		(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 UNSUITABL	E 	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBCROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBCROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-YRL0E) (TUN5/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4 LOOSE 4 TO 10	SOIL SYMBOL SUBORING SLOPE INDICATOR	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR ELCOLE 10 TO 30 N/A MATERIAL DENSE 10 TO 30 N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING • SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE)         VERY STIFF         15 TO 30         2 TO 4           HARD         > 30         > 4	TTTTTT ALLUVIAL SOIL BOUNDARY A FIELDING TEN OF SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	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 THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TUP 3 FEET OF UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. 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
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	- CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	<u>STRATA ROCK QUALITY DESIGNATION (SROD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLIDE BEQUIRES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(BI) - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS     W - MOISTURE CONTENT     CBR - CALIFORNIA BEARING       HI HIGHLY     V - VERY     RATIO	FRACTURE SPACING BEDDING	BENCH MARK: SEE NOTE
	EQUIPMENT USED ON SUBJECT PROJECT	TERM         SPACING         TERM         THICKNESS           VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED         4 FEET	ELEVATION: FEET
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE         3 TO 10 FEET         THICKLY BEDDED         1.5 - 4 FEET           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET	
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	Note: Elevations derived using the TIN file. (u2519ba_ls_tin.tin)
PLASTICITY	X     DIEDRICH D-50     X     6" HOLLOW AUGERS     CORE SIZE:	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X         CME-450         HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	ART = Artesian
NON PLASTIC 0-5 VERY LOW		FRIABLE RUBBING WITH FINCER FREES NUMEROUS GRAINS: GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST	CRAINS CAN BE SERARATED FROM CAMPLE VITU STEEL PROPE	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X TRICONE 25/2 * TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		DIFFICULI 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.	DATE: 8-15-14

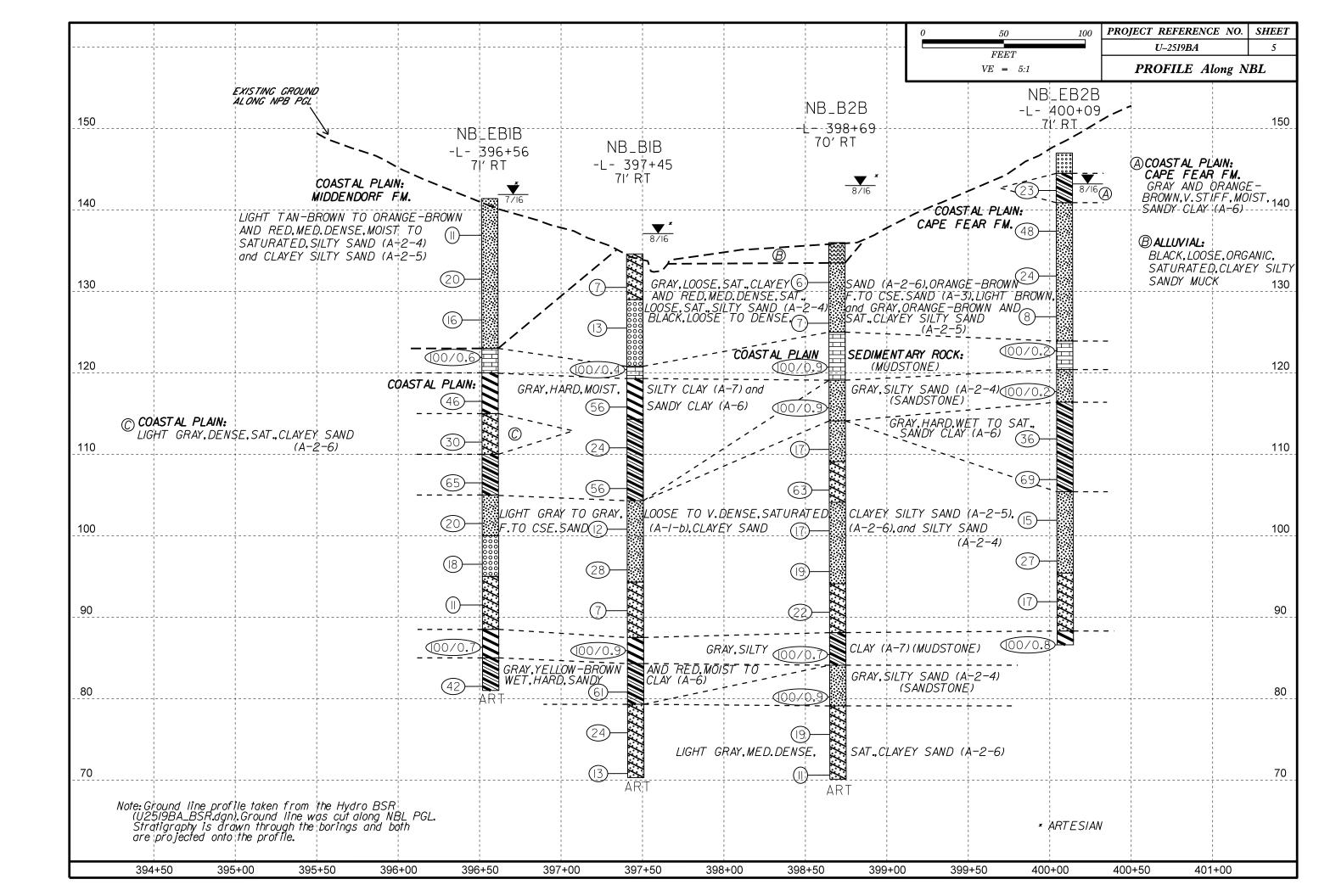
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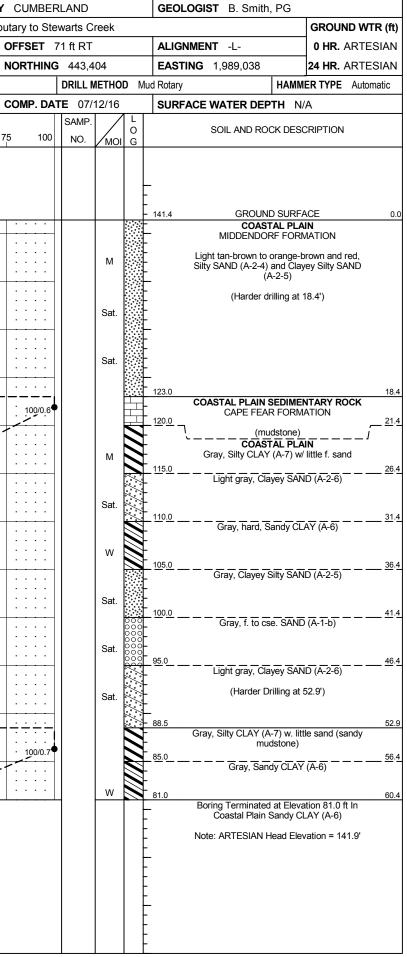
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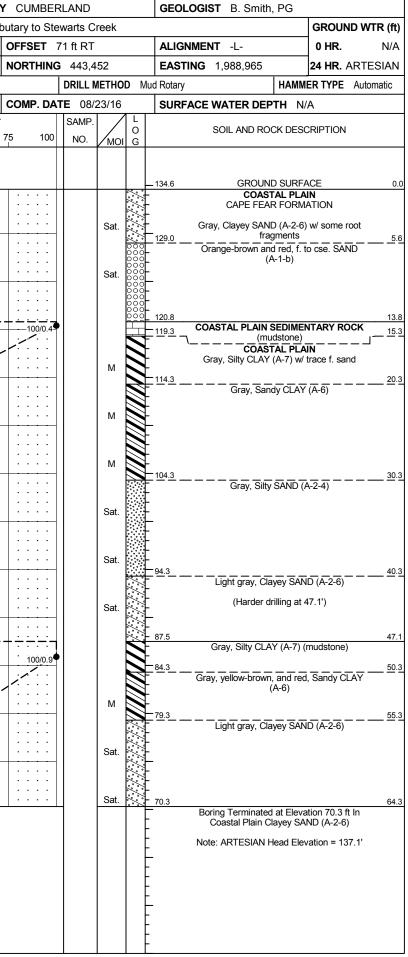




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BOR	NG NO.	. SB_E	EB1A		S	TATION :	395+86		OFF	SET 7	71 ft LT			ALIGN	MENT -L-	0 HR. ARTESIA	BOF	RING NO	). NB_	EB1B		ST	TATION 39	96+56		0
COLI	AR ELE	<b>EV.</b> 14	0.3 ft		т	OTAL DEF	<b>TH</b> 60.9	) ft	NOR	THING	<b>4</b> 43,2	46		EAST	<b>ING</b> 1,989,023	24 HR. ARTESIA		LAR EL	<b>EV.</b> 14	41.4 ft		ТС	DTAL DEPT	<b>H</b> 60.4 f	ft	N
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DRIL	LER M	like Mo	seley		S	FART DAT	<b>E</b> 07/12	/16	CON	IP. DA	<b>TE</b> 07/ <sup>-</sup>	12/16		SURF	ACE WATER DEPTH	N/A	DRI			seley		ST	ART DATE	07/11/1	16	C
ELEV	DRIVE ELEV	DEPTH		W COL				S PER FO			SAMP.	▼∕			SOIL AND ROCK DES	SCRIPTION	ELEV	DRIVE ELEV	DEPTH	·——	W COL			BLOWS		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	/моі		ELEV. (ft)	)	DEPTH	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75
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	-	<b>†</b>						· · · ·	· ·   · ·					-				107.5	+ 33.9 +	25	28	37				- 65
105	105.9 -	- 34.4 -	10	12	21	· · · ·	• • • 33-	· · ·				Sat.	/./.	-			105		‡						, , , , , , , , , , , , , , , , , , ,	
	-	ŧ					· /· · ·	· · · ·						<u>    103.4                                    </u>	Gray, Clayey Silty SA	ND (A-2-5) 36	.9	102.5	+ + 38.9					· · · · · · · ·		:
100	100.9	39.4	5	6	15			·   · · ·   · ·	· ·   · ·	· · ·				-	, , , - , - , -	( -)	100		ŧ	6	8	12	· · · · • • 2			:
100	-	ŧ	5	0	15		21					Sat.		- 98.4		41			ŧ				· · · [.			
2	-	<b>†</b>						·   · · ·   · ·					//.		Gray, Clayey SAND	D (A-2-6)		97.5	+ 43.9	5	7	11	· · · ].			
95	95.9 -	44.4 -	8	11	11	· · · ·	•]   · · · · •22	· · ·				Sat.	//.	-	(Harder drilling at	t 51.4')	95		‡				· · · · · · · · · · · · · · · · · · ·		· · ·	·
	-	ŧ					<i>!</i>  :::	·   · · ·	· ·   · ·				<i></i>	-				92.5	+ + 48.9				: : <i>i</i> . :			
90 2 90	90.9	49.4	E	7	7	:::/:	·   · · · ·	 	· ·   · ·	· · ·			///	-			90		Ŧ	4	5	6				:
90	-	ŧ	5	7	7	14						W	<u>/</u> //	88.9		51			ŧ						<u> </u>	
	-	‡					·   · · · ·	·   · · ·	·   ·   · ·	· · ·				-	Gray, Silty CLAY	(A-7)		87.5	+ 53.9 +	23	57	43/0.2			$\overline{\begin{array}{c} \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline$	: ]
85	85.9 -	- 54.4 -	18	30	38			·   · ·	. <b> </b> ≠68			м		-			85		‡							·
	-	‡					.		· · <sup>1</sup> · ·	: : :				<u>83.4</u>	Gray, Sandy CLA	<u>Y (A-6)</u> — — — <u>56</u>	.9	82.5	+ + 58.9				· · · · ·	· · · · ·		-
60040 80	80.9	59.4	7	0	4.4			·   · · ·	· ·   · ·	· · ·				-		·/			+	12	19	23		• • • • • • • • • • • • • • • • • • • •	2	·
80		+	/	8	11	••••	19	· · · ·			-	W			Boring Terminated at Elev	60 vation 79 4 ft In	.9	-	‡							
	-	‡												-	Coastal Plain Sandy C				‡							
040	-	‡												-	Note: ARTESIAN Head Ele	evation = 140.8'		.	‡							
DLL	-	‡												-					‡							
	-	‡												-					‡							
	-	‡												-				-	‡							
	-	‡												-					‡							
	-	t									1			-					<u>†</u>							



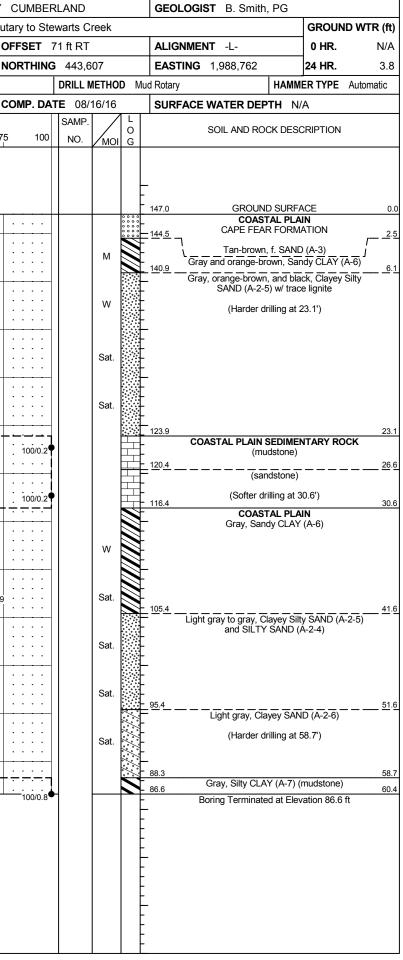
											_											
<b>WBS</b> 3481					<b>P</b> U-2519BA		Y CUMBE				GEO	LOGIST B. Smith, PG			34817					P U-2519		COUNTY
SITE DESCI	RIPTION	Dua	l Struc	ture B	ridge on -L- Over U	named Tri	ibutary to Ste	ewarts C	reek				GROUND WTR (ft)					I Strue	cture B	ridge on -L	- Over Unar	ned Tribut
BORING NO	<b>)</b> . SB_I	B1A		SI	<b>ATION</b> 396+72		OFFSET	70 ft LT			ALIG	SNMENT -L-	0 HR. N/A	BOR	ING NO.	NB_	B1B		ST	ATION 39	97+45	o
COLLAR EL	L <b>EV.</b> 13	33.3 ft		ТС	DTAL DEPTH 64.0	ft	NORTHING	<b>3</b> 443,2	293		EAS	TING 1,988,948	24 HR. ARTESIAN	COL		<b>EV.</b> 13	34.6 ft		ТС	DTAL DEPT	<b>H</b> 64.3 ft	N
DRILL RIG/HA	AMMER E	FF./DA	TE SL	IM0093	DIEDRICH D-50 88% 1	1/05/2015		DRILL N	METHO	<b>D</b> M	lud Rotar	/ HAMM	IER TYPE Automatic	DRILI	RIG/HAI	MMER E	FF./DA	re Sl	JM0093	DIEDRICH D	-50 88% 11/05	5/2015
DRILLER		seley		ST	ART DATE 08/23	16	COMP. DA	<b>TE</b> 08/	24/16		SUR	FACE WATER DEPTH N	/A	DRIL	LER M	like Mo	seley		ST	ART DATE	08/23/16	C
ELEV DRIVE		· – – – – – – – – – – – – – – – – – – –	W COL			PER FOOT		SAMP.	$\nabla$			SOIL AND ROCK DES	CRIPTION	ELEV	DRIVE ELEV	DEPTH	' <b></b>	W CO			BLOWS PE	
(ft) (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	Имо	G	ELEV. (	ft)	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 50	) 75
135	+										_			135		<u> </u>						
	<b>†</b>				<b> </b>						- 133.3 -	GROUND SURF/ ALLUVIAL	ACE 0.0		-	+						
130 130.5	+ 2.8						· · · · · ·			~~~~	<u>- 131.3</u> -	_ Black, highly organic, Silty Gray and black, mod. organ		130	131.5 -	3.1	2	3	4			
	Ŧ	1	1	1	<b>Q</b> <sup>2</sup>				w		 128.0	(A-2-4) w/ some clay and	trace gravel	100	-	+						
	‡				$\begin{vmatrix} \mathbf{x} & \cdots & \mathbf{y} \\ \cdot \mathbf{x} & \cdots & \mathbf{y} \\ \cdot \mathbf{x} & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot &$		·   · · · · ·			000	<u>120.0</u>				- 126.5 -	- 8.1						· · · · ·
125 125.5	+ 7.8	1	6	7			· · · · ·		Sat.	0000	-	CAPE FEAR FORM		125	-	F.	2	7	6	· · • 13		· · · ·
	‡						· · · · · ·			0000	-	Orange-brown and red, f. t (A-1-b)	to cse. SAND		-	ł						
120 120.8	+ 12.5				<b> </b>		 • +			000	121.1	COASTAL PLAIN SEDIME		120	121.8 -	12.8	6	8	100/0.4	· ·  · ·		· · · · ·
120	+	100/0.5					100/0.5					(mudstone)	15.0	120	-	F F						
	ŧ											COASTAL PLA	NN		- 116.8 -	17.8						
115 115.8	- 17.5	16	18	21			 		М	$\square$	-	sand	(A-T) w/ indice 1.	115	-	F	24	19	37			<b>4</b> 56 · ·
	ŧ										112.8	(Softer drilling at 2			-	Ļ						
110.8	+ 22.5									0 0 0 0 0 0 0 0 0 0 0 0		Light gray, f. SAND	D (A-3)		111.8 -	22.8	6	10	14			
110 110.0	+	4	3	5					Sat.	0 0 0 0 0 0 0 0 0 0 0 0	- 109.2		25.0	110	-	F					24	
	ŧ									$\mathbf{\tilde{N}}$	_ <u>108.3</u> _	Light gray, Silty CLAY (A-7)	w/ little f. sand 25.0		- 106.8 -	27.8						
105 105.8	27.5	13	14	20					м		-			105	. 1		14	26	30			<b>5</b> 6 · ·
	ł				•••••						<u>103.3</u>		30.0		-	Ł						
100.8	+ 32.5										_	Light gray, Silty SAND	D (A-2-4)		101.8 -	32.8	6	6	6			
100	1	7	7	11	•18				Sat.		_			100	_	E						+
	Ŧ										-				96.8 -	37.8						
95 95.8	37.5	6	5	9					Sat.		-			95	- 50.0	- 07.0	8	15	13		●28····	
	Ŧ		Ũ	Ŭ	· · · · · · · · · · · · · · · · · · ·				Sal.		<u>93.3</u>		40.0		-	F				/		
90.8	42.5									/./.	-	Light gray, Clayey SAN	ND (A-2-6)		91.8 -	42.8	4	4	3			
90 90.8	+ 42.5	4	4	7	↓ · · · · · · · · · · · · · · · · · · ·				Sat.	/./	-			90	-	F				••7 · ·		
	Ŧ									/./.	-				86.8 -	47.8						
85 85.8	47.5	30	43	57/0.3			· · · · · ·			/./.	- - 85.3		48.0	85	- 00.0		37	63/0.4	1			
	Ŧ		10	0170.0			100/0.8				8 <u>3.3</u>	Light gray, Silty CLAY (A-7	50.0		-	F						
00.0	T 52 5										-	Gray, Sandy CLAY			81.8	52.8	17	26	35			
80.8	+ 52.5	19	31	40			• ] • • • • • •71		w		-	(Softer drilling at 5	56.0')	80	_	F		20		· · · · ·	· · · · ·	. 61 .
	Ŧ						• · · · · ·				- 77.3		56.0		76.8 -	57.8					· · · / ·	
75 75.8	57.5	6	7	10			· · · · · ·				-	Light gray, Clayey SAN	ND (A-2-6)	75	- 10.0	- 57.0	10	10	14		24 · · ·	
	Ŧ		,	10	· · · · · · · · · · · · · · · · · · ·				Sat.	~~~~	-				-	F				/		
70.0	‡						· · · · · ·			<u></u>	-				- 71.8 -	62.8	6	5	8	117		
70 70.8	+ 62.5	4	5	7	12 <sup></sup>		 - <del></del>		Sat.	<u>/</u>	- 		64.0			<u>+</u>	0	5	0	• • • 13•	••••	
	Ŧ										-	Boring Terminated at Eleva Coastal Plain Clayey SA			-	ŧ.						
	Ŧ										-	Note: ARTESIAN Head Elev			-	÷						
	Ŧ										-				-	F						
	Ŧ										-				-	ŧ						
	Ŧ										-				-	F						
	Ŧ										F				-	F						
	‡										F				-	ŧ						
I		I						1	ı	1				L					. 1			



· · · · ·																											
COUNTY				U-2					'.1.FR7					OLOGIST B. Smith, PG	GI			TY CUMBER			• U-2519E					34817	
er Unamed Trib				-		Struc							GROUND WTR (ft)			reek		ibutary to Ste			-		I Struc				
		8+69			_			-	NB_				0 HR. N/A	GNMENT -L-				OFFSET			ATION 39					NG NO	
I	65.9 ft								EV. 13				24 HR. ARTESIAN	STING 1,988,849			1	NORTHING			TAL DEPT					AR ELI	
8% 11/05/2015						SL							AMMER TYPE Automatic		Mud Ro						DIEDRICH D-		re su				
	08/17/16		ATE		_			oseley	like Mo	RM	LLEF	DRIL	N/A	RFACE WATER DEPTH	SL	18/16		COMP. DA			ART DATE			-	like Mo	ER N	DRIL
OWS PER FOOT			•				BLOW		DEPTH (ft)			ELEV	DESCRIPTION	SOIL AND ROCK DES	0		SAMP.		PER FOOT				W COL		DEPTH	ELEV	ELEV (ft)
50	50	2	25	0	0.5ft	).5ft	5ft C	0.5f	(11)	(ft)	(1	(ft)	DEPTH (ft)	. (ft)	G ELE	/моі	NO.	75 100	50	5 :	0 2	0.5ft	0.5ft	0.5ft	(ft)	(ft)	(11)
									+			140									<u> </u>				<u> </u>	_	135
									F	1			k, highly organic, 25	ALLUVIAL Dark gray and black, hi	₩ ₩ ₩ 132.										F		
				<b></b>					<b>-</b>	1		135		Silty Sandy MI		w		· · · · · ·				8	6	5	3.3	131.3	130
				1.					F				ORMATION	CAPE FEAR FORM							· · · ·				F	-	
					3	3	2	2	3.9	32.1	13		e. SAND (A-1-b)	Light gray, f. to cse. SA											8.3	126.3	
				<b>P</b> 6.					F	-	_	130				Sat.		· · · · · ·			11	7	4	5	F	-	125
				i :					8.9	27.1	12		10.0												-	•	
· · ·   · · · ·	· · ·   ·		•••	•1 • •7	3	4	6	6	- 0.0			125			121. 120.			100/0.2	+					100/0.2	+ 13.0 -	121.6	120
				· · ·					F	-				(mudstone)											F	-	
· · ·   · · · ·	· · ·   ·		•••			2/0.4			14.4	21.6	12		7) w/ trace f. sand	Gray, Silty CLAY (A-7) w					· · · /.					40	18.0	116.6	
	· · · · ·	· · · ·		· ·		9/0.4	1 58	41	ŧ	-	_	120	20.5		114.	м		· · · · ·	<b>6</b> 56	· · · ·		33	23	12	ŧ	-	115
									-	1			SAND (A-2-6)	Light gray, Clayey SA											-	•	
· · ·   · · · ·	· · ·   ·		•••			5/0.4	5 65	35	- 19.4 -	<u>16.6</u> -		115				Sat.		· · · · · ·		•34		18	16	13	- 23.0 -	111.6	110
									ŧ	-	_		JD (A-2-5) and light	Gray, Clayey Silty SAND (	<u>109.</u>					1					ŧ	-	
;	· · · ·	· · · · · ·	•••			_		<u> </u>	24.4	11.6	11		ND (A-2-4)	gray, Silty SAND		0		· · · · · ·							28.0	106.6 ·	
			•17		9	8		7	F	-	_	110				Sat.		· · · · · ·			•14	9	5	4	F	-	105
									+							0		· · · · · ·							+	•	
					39	24	7	17	29.4	06.6 -		105				Sat.		· · · · · ·		• 32 · · ·		19	13	11	- <u>33.0</u>	101.6	100
/									ŧ	-	_									7					ŧ	-	
	· · ·   ·					_			- 34.4	01.6	10					0		· · · · · ·				- 10			- 38.0	96.6	
			•17	· · ·	11	6		6	÷	-	_	100	40.5		94.1	Sat.		· · · · ·			••••••••••••••••••••••••••••••••••••••	12	8	5	÷	-	95
			: <u> </u> :						ŧ.	- 1			SAND (A-2-6)	Light gray, Clayey SA	<u></u>										-	•	
· · ·   · · · ·	· · ·   ·		· I. · [19		10	9	2	12	- 39.4	96.6 - -	96	95	g at 46.5')	(Harder drilling at		Sat.		· · · · · ·	· · · · ·			11	7	4	+ 43.0 -	91.6	90
			· 1						F	-			46.5		88.1						· · · <b>I</b> ·				F	-	
· · ·   · · · ·	· · ·   ·		: 1		10	10		<u> </u>	44.4	91.6	9			Gray, Silty CLAY (A-7)	Y							50/0.4		40	48.0	86.6	
		2			12	10		7	F	-	_	90	50.5		84.1							56/0.4	44	19	F	-	85
	·		::4						F	]			Sandy CLAY (A-6)	Gray to gray-brown, Sand											F		
					35/0.2	65	9	29	- 49.4 -	36.6 - -	86	85				м						36	28	16	- <u>53.0</u>	81.6	80
									F	-			ilty SAND (A-2-5) 55.5	Light gray, Clayey Silty S	79.1										F	-	
					45/0.4	05		22	- 54.4	31.6	8												- 14	8	58.0	76.6	
				<u>⊢</u>	45/0.4	25	2	22	F	-	_	80	60.5		- 	Sat.				· · · ·	• <b>•</b> 18	7	11	0	F	-	75
									F	-			y CLAY (A-6)	Light gray, Sandy Cl											-		
· · · · · · · · · · · · · · · · · · ·	· · · · · ·	<u> </u>	· · ·		10	9	3	6	- <u>59.4</u>	76.6 -	76	75	64.5		70.1	w		· · · · · · ·		· · · ·	$\begin{vmatrix} \cdot & \cdot \\ \cdot & \cdot \\ \bullet \\ 13 \end{vmatrix}$	8	5	4	- 63.0 -	71.6	
			7.						ŧ	-	_		Elevation 70.1 ft In	Boring Terminated at Elev Coastal Plain Sandy (	F						<u>F</u>				F		
· · ·   · · · ·	· · ·   ·					_			64.4	71.6	7'			-	F										ŧ	•	
· · ·   · · · ·	· · ·   ·	· · ·	í1 <u> </u>	•	6	5	3	3	<u> </u>					NOLE. ANTESIAN HEAU LIC	F										ŧ.	-	
1			<u> </u>						- - - -																+ - - - -		
										-																	
	-	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •		6	9		6	- <u>59.4</u> - <u>64.4</u> 	76.6	-	75	64.5 Elevation 70.1 ft In dy CLAY (A-6)		70.1	w				· · · · · · · · · · · · · · · · · · ·	• • / • • • / • • • / •	8	5	4	63.0	71.6	

CUMBER	LAND			GEOLOGIST B. Smith, PO	G
utary to Stev	warts Ci	reek			GROUND WTR (ff
OFFSET 7	0 ft RT			ALIGNMENT -L-	0 HR. ARTESIAN
NORTHING	443,5	22		EASTING 1,988,867	24 HR. ARTESIAN
	DRILL N		<u>м</u>	· · ·	AMMER TYPE Automatic
				· · · · · · · · · · · · · · · · · · ·	
COMP. DAT		17/16		SURFACE WATER DEPTH	N/A
75 100	NO.	моі	0	SOIL AND ROCK I	DESCRIPTION
75 100	SAMP. NO.	MOI Sat. Sat. Sat.			URFACE         0           TAL         Clayey Silty Sandy           Clayey Silty Sandy        2           PLAIN
		Sat. Sat.			
<u> </u>			$\sim$	88.1	47
100/0.7		C-4		Gray, Silty CLAY (A	A-7) (mudstone) 51 _2-4) (sandstone)56
		Sat.	$ \begin{array}{c} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet &$	70.1 Boring Terminated at I Coastal Plain Claye Note: 0-HR: ARTESIAt 138.0 24-HR: ARTESIA 143.0	ey SAND (A-2-6) N Head Elevation = 0' AN Head Elevation =
	·				

											LUG															-	
	34817					<b>P</b> U-251				CUMBI				GEOLO	DGIST B. Smith, PC				34817					<b>P</b> U-2519		COUNT	
				I Struc	ture E	Bridge on	-L- Over	Uname			tewarts C	reek					OUND WTR (ft)					al Strue	cture B	ridge on -	L- Over U	named Tr	ibuta
BORI	NG NO.	. SB_E	EB2A		S	TATION	399+14			OFFSET	71 ft LT			ALIGN	MENT -L-	0 H	<b>R.</b> N/A	BOR	ING NO.	NB_I	EB2B		SI		400+09		OF
COLL	AR ELE	<b>EV.</b> 14	0.1 ft		Т	OTAL DE	<b>PTH</b> 65	.1 ft		NORTHIN	<b>IG</b> 443,4	437		EASTI	NG 1,988,745	24 H	R. ARTESIAN	COL	LAR ELE	<b>EV.</b> 14	47.0 ft		т	DTAL DEP	<b>TH</b> 60.4	ft	NC
DRILL	RIG/HAI	MMER E	FF./DA	TE SI	JM0093	DIEDRICH	D-50 88%	11/05/20	015		DRILL	METHO	DD N	/lud Rotary	HA	AMMER TY	PE Automatic	DRIL	RIG/HAI	MMER E	FF./DA	TE SI	JM0093	DIEDRICH	D-50 88% 1	1/05/2015	
DRIL	LER M	like Mo	seley		S		<b>FE</b> 08/1	6/16		COMP. D	<b>ATE</b> 08/	17/16		SURFA	CE WATER DEPTH	N/A		DRIL	LER M	ike Mo	seley		ST	TART DAT	<b>E</b> 08/12/	16	CC
ELEV	DRIVE ELEV	DEPTH						VS PER			SAMP.				SOIL AND ROCK [	DESCRIPTI	ION	ELEV	DRIVE ELEV	DEPTH	' <b> </b>					PER FOO	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7	75 10	0 NO.	Имо		ELEV. (ft)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
145		Ļ												L				150		_							
	-	‡												-					-	-							
140	-	+												- T 140.1	GROUND SL		0.0	445	-						!		
140		<u>+</u>												- 140.1	COASTAL	PLAIN		145	143.4	- - 3.6							
-	137.0	3.1		_	10		.   .	.	· · ·	· · · ·					CAPE FEAR FC				- 140.4	- 3.0	5	7	16				•
135	-	<u>+</u>	2		10	• • •	17					W			Brown, orange-brown, a SAND (A-2-4) w/	and light gra trace grave	ay, Silty el	140	-	-					× · · ·		•
	-	ł							· · ·										138.4	8.6	11	18	30				•
-	132.0	8.1	10	22	16		:   : `.`	. 38•   •				Sat.		, , ,					-	_		10	30			48	:
130	_	Ŧ							· · · ·					<u>129.5</u>	Tan-brown, orange-brow		<u>10.6</u>	135	_	-							
	-	Ŧ					/	.					000	Ē	SAND (A-1-b) w/	trace grave	el		132.9	_ 14.1	7	12	12		1		
125	126.5 -	<u>- 13.6</u>	woн	5	6	11		.				Sat.	000	Ē	(Harder drilling	g at 16.6')		130	-	-					24 · · · ·		
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	- 111.5 -	+ + 28.6					·   · · ·   · ·								and light gray, Silty SAN	ND (A-2-4) N	w/ trace		- 117.9	<u>- 29.1</u> -	100/0.2	5					:
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	- 91.5 <sup>-</sup>	- - 48.6					.	.	 				<u>/</u> ~/~	<del>.</del>	Light gray, Clayey	SAND (A-2	2-6)		97.9 -	- 49.1 -	9	15	12		27		:
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	-	Ŧ						<u> </u>		100/0.	97			- 79.5	Light gray, Silty S	AND (A-2-4	4) 60.6		-	-							
:	76.5	63.6			45		.		· · · · · ·										-	-							
	-	<b>†</b>	12	14	15		•29				Щ	Sat.		75.0	Boring Terminated at E	Elevation 74	65.1 5.0 ft In		-	F							
	-	Ŧ												F	Coastal Plain Silty				-	-							
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# SITE PHOTOGRAPH

Proposed Dual Structure Bridge on -L- Over Unnamed Tributary to Stewarts Creek



View Facing South from EB1-B toward EB1-B



View Facing North from B2-A toward B2-B



View Facing South from B1-B toward B1-A



View Facing South from EB2-B toward EB1-A

# SHEET 10

34817.1.FR7 (U-2519BA) Cumberland Co.

#### **CONTENTS** $\checkmark$ SHEET NO. 2519B 2 - 3 -5 6-7

#### **DESCRIPTION** TITLE SHEET LEGEND SITE PLAN PROFILE CROSS SECTION BORE LOG

# STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_\_\_\_\_\_CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1003 (CAMDEN RD.) TO SOUTH OF SR1104 (STRICKLAND BRIDGE RD.) SITE DESCRIPTION BRIDGE #450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 1406 AND SR 1112

# 3481 PROJEC

REFERENCE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	7

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLT TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

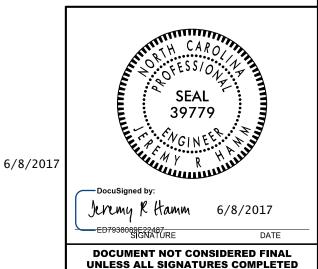
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS. THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY LARY 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.

MID ATLANTIC

MID AILANIIC
GOODNIGHT, D.J.
INVESTIGATED BYGOODNIGHT, D.J.
DRAWN BY
CHECKED BY
SUBMITTED BY FALCON ENG.
DATE <u>MAY 2017</u>



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

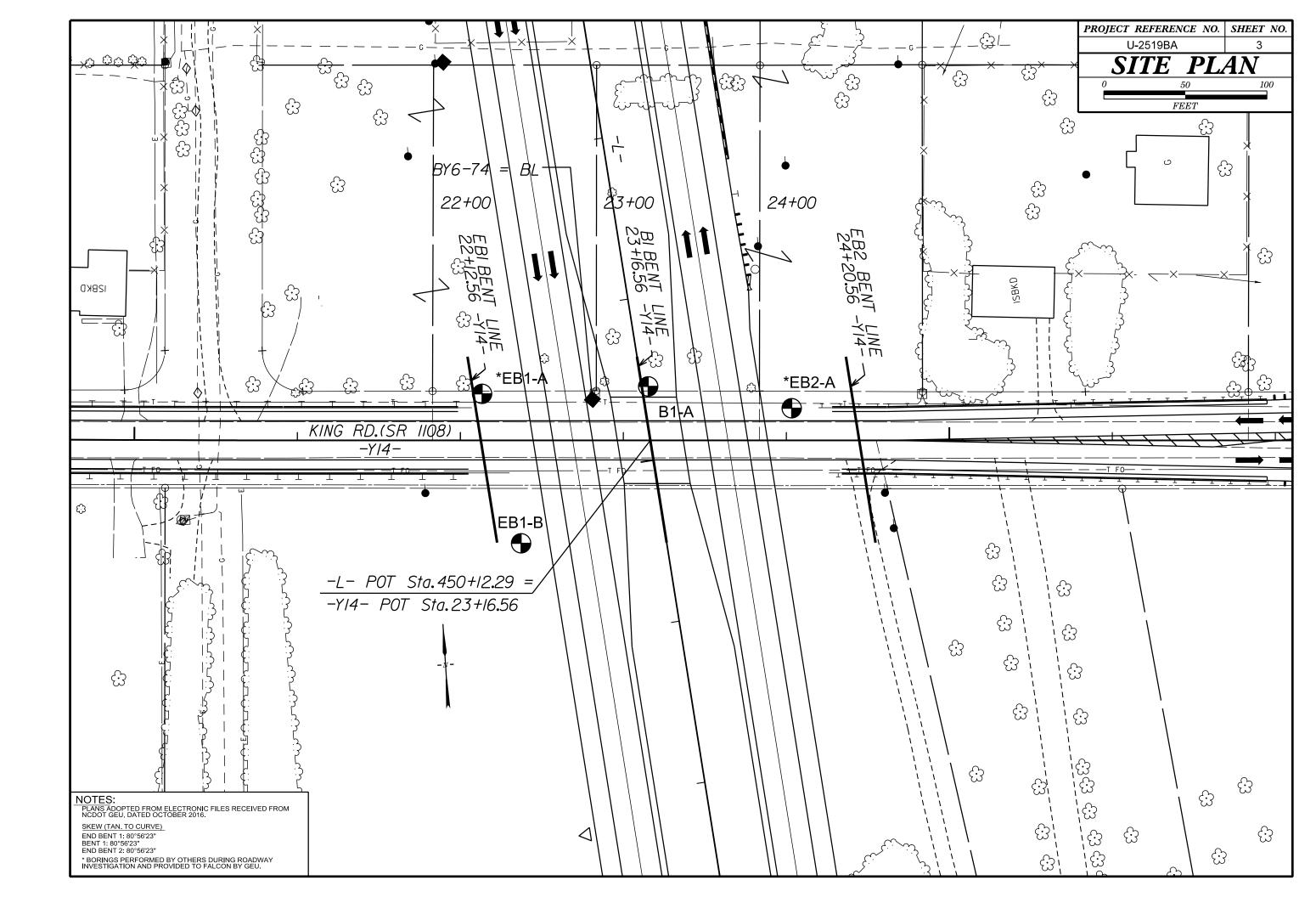
	SOIL	DESCRIPTION			GRADATION				ROCK DE	SCRIPTION
BE PENETRATED A ACCORDING TO T IS BASED ON	ERED UNCONSOLIDATED, SEMI-CO WITH A CONTINUOUS FLIGHT P( THE STANDARD PENETRATION T IN THE AASHTO SYSTEM. BASIC LICR, TEXTURE, MOISTURE, AASHT	DWER AUGER AND YIELD LES EST (AASHTO T 206, ASTM D DESCRIPTIONS GENERALLY I	S THAN 100 BLOWS PE 11586). SOIL CLASSIFIC NCLUDE THE FOLLOWIN	R FOOT CATION NG:	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL AF GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES ANGULARITY OF GRAINS	APPROXIMATELY THE SAME SIZE. OF TWO OR MORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS P BLOWS IN NON-COA REPRESENTED BY A	TES THE LEVE ENETRATION & ASTAL PLAIN A ZONE OF WE	L AT WHICH NON-COA BY A SPLIT SPOON S MATERIAL, THE TRA CATHERED ROCK.	WOULD YIELD SPT REFUSAL IF TESTED, AN INF STAL PLAIN MATERIAL WOULD YIELD SPT REFU AMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER ANSITION BETWEEN SOIL AND ROCK IS OFTEN
	RALOGICAL COMPOSITION, ANGUL				THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIG			RE TYPICALL	Y DIVIDED AS FOLLO	
	SOIL LEGEND AND	AASHTO CLASSIFI			ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITIO	ION	WEATHERED ROCK (WR)		100 BLOWS PER F	
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS ( > 35% PASSING #200)	ORGANIC MATERI	ALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDEREI	C, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)			GRAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GR CHIST FIC
GROUP A-1 CLASS. A-1-o A-1		A-4 A-5 A-6 A-7 2-7 A-75 A-6 A-75 A-7-6	A-1, A-2 A-4, A-5 A-3 A-6, A-7		COMPRESSIBILITY	ED OF SIGNIFICHNCE.	NON-CRYSTALLINE		FINE TO COARSE SEDIMENTARY ROC	GRAIN METAMORPHIC AND NON-COASTAL PLAIN K THAT WOULD YEILD SPT REFUSAL IF TESTED
SYMBOL 000000000000000000000000000000000000					MODERATELY COMPRESSIBLE L	LL < 31 LL = 31 - 50	ROCK (NCR) COASTAL PLAIN		COASTAL PLAIN S	DES PHYLLITE, SLATE, SANDSTONE, ETC. EDIMENTS CEMENTED INTO ROCK, BUT MAY NOT
% PASSING *10 50 MX			GRANULAR SILT-	MUCK,		LL > 50	SEDIMENTARY ROCK (CP)		SHELL BEDS, ETC.	CK TYPE INCLUDES LIMESTONE, SANDSTONE, CEM
*40 30 MX 50	9 MX 51 MN 5 MX 10 MX 35 MX 35 MX 35 MX 35	MX 36 MN 36 MN 36 MN 36 MN	SOILS SOILS	PEAT	ORGANIC MATERIAL SOILS SOILS	OTHER MATERIAL	FRESH ROCK			HERING ITS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDE
MATERIAL PASSING #40 LL - PI 6 MX	- 40 MX 41 MN 40 MX 41	MN 40 MX 41 MN 40 MX 41 MN MN 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR	HIGHLY	TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%           MODERATELY ORGANIC         5 - 10%         12 - 20%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMM VERY SLIGHT ROCK (V SLI.) CRYS	ER IF CRYSTA GENERALLY F	LLINE. RESH, JOINTS STAINED OKEN SPECIMEN FACE	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLO
GROUP INDEX Ø USUAL TYPES STONE FRA OF MAJOR GRAVEL, A	0 0 4 MX	8 MX 12 MX 16 MX NO MX SILTY CLAYEY SOILS SOILS	MODERATE AMOUNTS OF ORGANIC MATTER	organic Soils			SLIGHT ROCK (SLI.) 1 INCI	GENERALLY F H. OPEN JOINT	RESH, JOINTS STAINED S MAY CONTAIN CLAY.	AND DISCOLORATION EXTENDS INTO ROCK UP TO IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAF RYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MATERIALS SAND GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	Fair to Poor Poor	UNSUITABLE	▼     STATIC WATER LEVEL AFTER <u>24</u> HOUR       ▼     PERCHED WATER, SATURATED ZONE, OR WAY       ●     ●       ●     ●       ●     ●       ●     ●       ●     ●       ●     ●       ●     ●       ●     ●		(MOD.) GRAN	ITOID ROCKS, N	10ST FELDSPARS ARE	SCOLORATION AND WEATHERING EFFECTS. IN DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HA SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPA
		- 30 ; PI OF A-7-6 SUBGROUP IS CY OR DENSENESS RANGE OF STANDARD	RANGE OF UNC		MISCELLANEOUS SYMBOLS		SEVERE AND I (MOD. SEV.) AND I	DISCOLORED AI CAN BE EXCAV	ND A MAJORITY SHOW	R STAINED. IN GRANITOID ROCKS,ALL FELDSPARS KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STI ST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRU
GENERALLY	VERY LOOSE	PENETRATION RESISTENCE (N-VALUE) < 4 4 TO 10	(TONS/FT		ROADWAY EMBANKMENT (RE) 200820 DIP & DIP DIRECTI WITH SOIL DESCRIPTION → OF ROCK STRUCTUR SOIL SYMBOL → OF ROCK STRUCTUR Der Der Der Der Der Der Der Der Der Der		SEVERE ALL F (SEV.) REDU TO SI	ROCK EXCEPT CED IN STREN OME EXTENT.	QUARTZ DISCOLORED O GTH TO STRONG SOIL.	R STAINED, ROCK FABRIC CLEAR AND EVIDENT BUI IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLIN STRONG ROCK USUALLY REMAIN.
MATERIAL (NON-COHESIVE)	VERY DENSE	10 TO 30 30 TO 50 > 50 < 2	N/A < 0.25		ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKWENT AUGER BORING	CONE PENETROMETER TEST • SOUNDING ROD	VERY ALL I SEVERE BUT I (V SEV.) REMA	ROCK EXCEPT MASS IS EFFE INING. SAPROL	QUARTZ DISCOLORED O CTIVELY REDUCED TO ITE IS AN EXAMPLE O	x 100 drr R Stained. Rock Fabric Elements are discern Soil Status, with only fragments of strong F Rock Weathered to a degree that only min Main. <i>IF Tested, Would Yield SPt N Values &lt; 10</i>
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	SOFT MEDIUM STIFF STIFF VERY STIFF	2 TO 4 4 TO 8 8 TO 15 15 TO 30	0.25 TO 0 0.5 TO 1 1 TO 2 2 TO 4	.0	TT=TT= INFERRED ROCK LINE MY MONITORING WELL TTT=TT= INFERRED ROCK LINE MONITORING WELL TTT=TTT= INFERRED ROCK LINE MONITORING WELL TTT=TTT=TTTTTTTTTTTTTTTTTTTTTTTTTTTT	TEST BORING WITH CORE	COMPLETE ROCK	REDUCED TO	SOIL. ROCK FABRIC NO	T DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL ( Y BE PRESENT AS DIKES OR STRINGERS, SAPROLIT
		OR GRAIN SIZE	> 4		RECOMMENDATION SYMBOLS	<u>c</u>			ROCK H	ARDNESS
U.S. STD. SIEVE SIZE		40 60 200	270		UNDERCUT UNCLASSIFIED EXCAVATION -	UNCLASSIFIED EXCAVATION -			HED BY KNIFE OR SHA WS OF THE GEOLOGIST	RP PICK. BREAKING OF HAND SPECIMENS REQUIRES
OPENING (MM)	4.76 2.00	0 0.42 0.25 0.075 COARSE FINE			SHALLOW UNCLASSIFIED EXCAVATION -	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL		BE SCRATCHED ETACH HAND S		NLY WITH DIFFICULTY. HARD HAMMER BLOWS REQU
BOULDER (BLDR.) GRAIN MM 305	COBBLE GRAVEL (COB.) (GR.) 5 75 2.0	SAND SAND (CSE. SD.) (F SD	) SILI	CLAY (CL.)	ACCEPTABLE DEGRADABLE ROCK ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM	VST - VANE SHEAR TEST	HARD EXCA		D BLOW OF A GEOLOG	OUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE IST'S PICK. HAND SPECIMENS CAN BE DETACHED
SIZE IN. 12	3				BT - BORING TERMINATED MICA MICACEOUS CL CLAY MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT				S DEEP BY FIRM PRESSURE OF KNIFE OR PICK POI PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF
SOIL MOISTUR			FIELD MOISTURE DES	CRIPTION	CPT - CONE PENETRATION TEST         NP - NON PLASTIC           CSE COARSE         ORG ORGANIC           DMT - DILATOMETER TEST         PMT - PRESSUREMETER TEST	$\gamma_{ m d}$ - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS	SOFT CAN I		GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS BY MODERATE BLOWS OF A PICK POINT. SMALL, I
	- Satuf (Sat UID LIMIT		QUID: VERY WET. USUA W THE GROUND WATER		DPT - DYNAMIC PENETRATION TEST         SAP SAPROLITIC           e - VOID RATIO         SD SAND, SANDY           F - FINE         SL SILT, SILTY           FOSS FOSSILIFEROUS         SLICHTLY	S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK	VERY CAN E SOFT OR M	ES CAN BE BRI BE CARVED WI ORE IN THICKN	DKEN BY FINGER PRES TH KNIFE. CAN BE EXC	
PLASTIC RANGE <	- WET -		REQUIRES DRYING TO IMUM MOISTURE		FRAC FRACTURED, FRACTURES     TCR - TRICIONE REFUSAL       FRAGS FRAGMENTS     W - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING		TURE SP	ACING	BEDDING
	ASTIC LIMIT		INDIA NOISTONE		HI HIGHLY V - VERY	RATIO	TERM VERY WIDE		SPACING THAN 10 FEET	TERM THICKNESS
	TIMUM MOISTURE - MOIST RINKAGE LIMIT		R NEAR OPTIMUM MO				WIDE MODERATELY CL CLOSE	.0SE Ø	TO 10 FEET 1 TO 3 FEET 16 TO 1 FOOT	THICKLY BEDDED         1.5 - 4 FEE           THINLY BEDDED         0.16 - 1.5 FE           VERY THINLY BEDDED         0.03 - 0.16 F
	- DRY -		DDITIONAL WATER TO IMUM MOISTURE	J		CORE SIZE:	VERY CLOSE	LESS	THAN 0.16 FEET	THICKLY LAMINATED 0.008 - 0.03 THINLY LAMINATED < 0.008 FEE
	PL	ASTICITY			8' HOLLOW AUGERS	вн				RATION
NON PLASTI	IC	0-5	DRY STRENG VERY LOW		CME-550 HARD FACED FINGER BITS		FOR SEDIMENTARY FRIABLE	ROCKS, INDUR	RUBBING WITH	NING OF MATERIAL BY CEMENTING, HEAT, PRESSL FINGER FREES NUMEROUS GRAINS: BY HAMMER DISINTEGRATES SAMPLE.
SLIGHTLY P MODERATELY HIGHLY PLA	Y PLASTIC	6-15 16-25 26 OR MORE	SLIGHT MEDIUM HIGH		VARE SHEAR TEST CASING W/ ADVANCER	HAND TOOLS:	MODERATELY	INDURATED	GRAINS CAN B	E SEPARATED FROM SAMPLE WITH STEEL PROBE Y WHEN HIT WITH HAMMER.
		COLOR				HAND AUGER	INDURATED		GRAINS ARE D	IFFICULT TO SEPARATE WITH STEEL PROBE:
	AY INCLUDE COLOR OR COLOF S SUCH AS LIGHT, DARK, STRE				□ □ CORE BIT		EXTREMELY	INDURATED	SHARP HAMMER	BREAK WITH HAMMER. R BLOWS REQUIRED TO BREAK SAMPLE; S ACROSS GRAINS.

### PROJECT REFERENCE NO.



	TERMS AND DEFINITIONS
INFERRED REFUSAL	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
TEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ALUES >	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
AT S GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AIN STED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
NOT YIELD CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	$\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
S IF OPEN, BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
TO DSPAR	$\underline{FAULT}$ - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
IS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
CK HAS	$\underline{FLOAT}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
OMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ARS DULL F STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
T BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
OLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
CERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
DNG ROCK MINOR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
< 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
ALL AND ROLITE IS	ROCK DUALITY DESIGNATION (ROD) - A MEASURE OF ROCK DUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
JIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEODING OR SCHISTOSITY OF THE INTRUDED ROCKS.
N BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF) OF
K POINT. 3 OF THE	A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF IFOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EDUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
MENTS ALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
S 1 INCH ADILY BY	<u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BM (BY6-74): 36" REBAR WITH ALUMINUM TRAVERSE CAP
NESS EET	N: 448304.2038 E: 1987508.3025
FEET	<u>-YI4- 22+80, 25 ft LT</u> ELEVATION: 197.18 FEET
.5 FEET .16 FEET	NOTES:
.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
B FEET	UCP - UNDIVIDED COASTAL PLAIN
ESSURE, ETC.	
PORF.	

DATE: 8-15-14



						0	100	200	PROJECT REFERE	NCE NO. SI	HEET N
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							FEET $VE = 5$		BRIDGE NO. 450	ON KING RL	). (-Y14
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	PROPOSED GRADE										
			Щ	P.			PROPOSED GRADE -	<b>\</b>			
				P. TA:23+2363 LEV.= 213.83							
		EBI-A 28 ft LT	BI-A 33 ft L	.T EB2-A							
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									- EXISTING GROUND		
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80		© <sup>30</sup>	© (3)	© ©—							
		(B)		```@ <u></u> ©	STAL PLAIN: BI	ROWN ORANGE-BROWN W	HITE RED AND TAN.				
70	(B) <b>COAST AL PLAIN:</b> GRAY-RED YELLOW A	AND TAN. ®		©	MC CL	DIST TO SAT LOOSE TO AYEY AND CLEAN SAND	HITE RED AND TAN. DENSE SILTY AND (MIDDENDORF FORMATION	<b>'</b>			
70	B COAST AL PLAIN: GRAY-RED YELLOW A MOIST. TO WET.M.STI SANDY AND SILTY CL (MIDDENDORF FORMA	AY 6	B	© ©							]
	IMIDDENDORF TORMA	39		3-4							
60	······································										]
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50	······································			©—⊘	·····			<b></b>			
				000	ASTAL PLAIN: G	RAY_RED ORANGE-RED	YELLOW-BROWN AND TAN				
40					Ň	IOIST TO WET V.STIFF T CLAY AND SANDY SILT (C.	YELLOW-BROWN AND TAN O HARD SILTY AND SAND APE FEAR FORMATION)	r			
40			@				WN TAN AND GRAY				
		E BT	Ē (3	´ © ``		WET TO SAT M. DENSE CLAYEY AND SILTY SAND	VN TAN AND GRAY. TO V.DENSE. (CAPE FEAR FORMATION	<b>9</b>			
30										·	
			BT	@ <sub>@</sub> <b>\$</b> @coas	TAL PLAN: GR	AY RED ORANGE - RED YL	LLOW-BROWN AND TAN, HARD,SILTY AND SANDY E FEAR FORMATION)				
20				₩ 60 <b></b> BT	CLA	AY AND SANDY SILT (CAF	E FEAR FORMATION			·	]]
10								1		1 1 1 1	1
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	UNDLINE PROFILE FROM FROM ELECTRONIC FILES EIVED FROM NCDOT GEU DATED SEPTEMBER 2016										
	RRED STRATIGRAPHY IS DRAWN DUGH THE BORINGS WITH BOTH JECTED ONTO THE PROFILE.				- - -						
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80											
70											
	7+00 18+00 19+00 20+00 21+00	22+00	23+00	24+00	25+00	26+00	27+00	28+00	29+00	30+00	<u> </u>

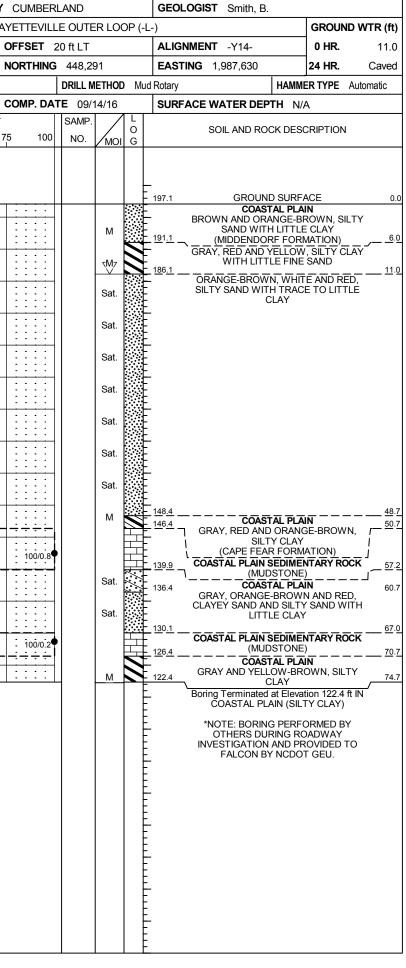
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	<b>190</b>	• • • • •						AND CLEAN SAND	B	<u> </u>			COAS	TAL PLAIN:	'AN GRAY GR I.STIFF TO	AY-TAN ANL HARD, SANDY	) ORANGE-BR	OWN.MOIST. CLAY	. @			
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	180			;					:	₃ <u> </u>	)COAS	TAL PLAINSGRAY TAN 0 MOIST TO S	AT V.LOOSE	TO DENSE	BROWN OR	NGE-BROWI	N AND RED-E W SAND	BROWN.	@			
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ADD_(								ANN₂TAN AND GRAY.MOIST SANDY AND SILTY CL (CAPE FEAR FORMAT	AY 💿	0/0.9		SILT	TY CLAY (CA	PE FEAR F	ORMATION)	- - -	:	:				
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NOTES: GROUND		SS SFC	TION AL	ONG BF	NT LINF	DRAWN		. 90
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PROJECT BRIDGE S		D THE C						
*BORING	EB1-B PE		ED BY C	THERS	DURING	ROADW	AY	
INVESTIC	BATION A	ND PRO	VIDED T		N BY NC	JUUI GE	U	
70	80 9	0 10	; )0 1	10 12	20 13	30 1∡	40 150	)

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	<b>3</b> 34817					<b>IP</b> U-2519			Y CUMBER				1	LOGIST Goodnigh	nt, D.	I	WBS	34817.1.FR7			TIF	<b>v</b> U-2519E	BA	COUNT	Y (
SITE	DESCR	IPTION	BRI	DGE N	0.45	0 ON KING	RD. (-Y14-	) OVER F	AYETTEVIL	LE OUTE	ER LO	OP (-l	L-)			GROUND WTR (ft)	SITE	DESCRIPTION	BRID	GE NO	D. 450	ON KING F	RD. (-Y14-	) OVER	FAY
BOF	ring no.	EB1-	A		s	TATION 2	2+13		OFFSET	28 ft LT			ALIG	NMENT -Y14-		0 HR. N/A	BOR	ING NO. EB1-	В		ST	ATION 22	2+37		OF
COL	LAR EL	<b>EV.</b> 19	97.3 ft		Т	OTAL DEP	<b>TH</b> 60.0 ft	:	NORTHING	<b>3</b> 448,3	812		EAS	<b>ING</b> 1,987,441		24 HR. FIAD	COL	LAR ELEV. 19	95.3 ft		ТС	TAL DEPT	<b>H</b> 68.7 ft	t	NC
DRIL	l Rig/Hai	/MER EF	F./DAT	e Mid	3964 C	CME-45C 83%	08/09/2016			DRILL N	NETHO	D Mu	d Rotary		HAMME	RTYPE Automatic	DRILL	RIG/HAMMER EF	F./DATE	SUM	0093 DI	EDRICH D-5	0 76% 11/09	/2016	
DRI	LER V		M.		S	TART DAT	E 02/16/1	7	COMP. DA	<b>TE</b> 02/	16/17		SURF	ACE WATER DEP	TH N/A	4	DRIL	LER Moseley,				ART DATE	09/15/1	6	C
ELEV	, DRIVE ELEV		' <b></b>	ow co	1	41		PER FOOT		SAMP.	· 🔻			SOIL AND RO	CK DESC	CRIPTION	ELEV	DRIVE ELEV DEPTH					BLOWS		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.			ELEV. (1			DEPTH (ft)	(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 I
200													_				200								
195	196.3	_ 										$\triangleleft$	197.3	GROUN	D SURFA		195								
195	193.8	3.5	3 WOH	4 WOH	2						M		- 194.3	BROWN-TA TAN, SLIGHTLY SI			195					· · · · ·			:
190	191.3	Т	6	29	44	• • • • •			73		M		<u>190.8</u> 189.3	_ (/	4-1-b)	6.5	190	<u>191.7 3.6</u>	2	4	10	• • • • 14			:
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185	183.8	<u> </u>					$\bigwedge : : : : : : : : : : : : : : : : : : :$						185.3	1(MIDDENDOI 1TAN, CLAYE			185		8	8	7	· • • 15		· · ·	<u>+</u> +
400		±	10	14	16	] ::::	30				м	0000	180.2	ORANGE-TA	N, F. SA	ND (A-3)	100	182.0 13.3	4	11	12				:
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175		ŧ				: : / <sup>#1</sup>	•					0000	<u>175.3</u>			22.0	175	177.0 1 18.3	4	3	2	•5•			:
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150		Į	6	9	10	] ::: <b>`</b>					Sat.	0000	-			<b>、</b> ,	150	152.0 43.3	6	8	12				:
150	148.8	48.5	26	64	36/0.2								<u>149.3</u>	TAN AND GRAY	Y, SILTY	CLAY (A-7) 48.0	150						<u> </u>		<u>:</u>
145		ŧ						::::	100/0.7	Ĩ			-	(CAPE FEA	RFORM	ATION)	145	147.0 1 48.3	27 7	73/0.4			::::	:::	:
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140	138.8	+ 					· · · ·						<u>140.3</u>	TAN AND GRAY,	CLAYEY	SAND (A-2-6) 57.0	140	+ +	45 5	55/0.3			· · · ·	· · ·	<u>.</u>
1		ŧ—	7	10	15	+	<b>2</b> 25				_Sat.		<u>137.3</u>	Boring Terminated	at Elevat	ion 137.3 ft IN 60.0	135	137.0 58.3	5	8	9				
	-	Ŧ											-	COASTAL PLAIN FOR	(A-2-6) ( MATION)	CAPE FEAR	100	132.0 ± 63.3				::::	1		:
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CUMBERLAND			GEOLOGIST Smith, B.		
YETTEVILLE OUTE	R LOO	P (-L·	)	GROU	ND WTR (ft)
OFFSET 63 ft RT			ALIGNMENT -Y14-	0 HR.	15.8
NORTHING 448,2	19		EASTING 1,987,459	24 HR.	Caved
DRILL M	ETHOD	Mud	Rotary HAMM	IER TYPE	Automatic
COMP. DATE 09/	15/16		SURFACE WATER DEPTH N	/A	
75 100 NO.		L O G	SOIL AND ROCK DES	CRIPTION	١
	0		195.3 GROUND SUR		0.0
	м		192.8 TAN-BROWN, FIN (MIDDENDORF FOF GRAY AND ORANGE-BR	E SAND MATION)	2.5 NDY
	м		CLAY 184.2		11.1
	₹₩7		ORANGE-BROWN, GRA SILTY SAND WITH LITT	E CLAY A	ED,
	Sat.		179.5 CLAYEY SAN	ID	15.0
			<u>174.5</u> GRAY, SANDY		20.8
	M		169.5 ORANGE-BROWN AND SAND WITH LITTL		<u>_TY25.8</u>
	Sat.		163.5 GRAY, SANDY		<u>31.8</u>
	м		159.5 ORANGE-BROWN, RED GRAY, SILTY SAND WITH		
	Sat.		GRAT, SILTT SAND WITH		
	Sat.	Ē	<u>148.0</u>		<u> </u>
100/0.9			COASTAL PLAIN SEDIME (MUDSTON (CAPE FEAR FORI	E)	OCK
	Sat.		139.0 COASTAL PL COASTAL PL ORANGE-BROWN AND SAND		<u>56.3</u> LTY
	Sat.		131.0 COASTAL PLAIN SEDIME (MUDSTON)		<u>оск</u> — <u>64.3</u>
100/0.4		<u> </u>	126.6 Boring Terminated at Elev COASTAL PLAIN SEDIME (MUDSTON)	ation 126.6 NTARY R	
			*NOTE: BORING PERI OTHERS DURING R INVESTIGATION AND P FALCON BY NCDO	oadway Rovided	

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WBS	34817.	1.FR7			TI	P U-2519	9BA	COUNT	Y CUMBER	LAND			GEC	LOGIST Goodnight, D.		WBS	<b>3</b> 4817.1.FR7	,		TI	<b>P</b> U-251	9BA	COU	NTY
SITE	DESCRI	PTION	BRID	DGE N	0. 450	ON KING	RD. (-Y1	1-) OVER F	AYETTEVILI		ER LOO	OP (-	L-)		GROUND WTR (ft)	SITE	DESCRIPTION	I BRID	DGE N	IO. 450	ON KING	3 RD. (-Y	14-) OVEF	
BORI	NG NO.	B1-A			ST	TATION 2	23+15		OFFSET :	33 ft LT			ALIC	SNMENT -Y14-	0 HR. Dry	BOR	RING NO. EB2-	A		S	TATION	24+03		OF
COLL	AR ELE	<b>V.</b> 19	7.1 ft		тс	DTAL DEP	<b>TH</b> 69.2	ft	NORTHING	448,3	10		EAS	<b>TING</b> 1,987,543	24 HR. FIAD	COL	LAR ELEV. 1	97.1 ft		т	OTAL DE	<b>PTH</b> 74	.7 ft	N
DRILL	RIG/HAM	MER EFF	F./DATE	E MID	3964 CN	/IE-45C 83%	6 08/09/2016	i	1	DRILL N	NETHOD	D Mu	ud Rotary	HAN	IMER TYPE Automatic	DRILI	L RIG/HAMMER E	FF./DATE	E SUM	M0093 D	IEDRICH [	)-50 76% 1	1/09/2016	
DRILL	LER W	iggins, l	M.		ST	ART DAT	E 02/16	'17	COMP. DA	TE 02/	16/17		SUR	FACE WATER DEPTH	N/A	DRIL	LER Moseley	. M.		S	FART DA	TE 09/1	4/16	C
	DRIVE			w co				S PER FOO		SAMP.		1 L				ELEV			w co		Π		NS PER FC	
(ft)	ELEV (ft)			0.5ft		0	25	50	75 100	NO.	мо	O G	ELEV.	SOIL AND ROCK D	ESCRIPTION DEPTH (fi	(ft)	ELEV (ft)	0.5ft	-	0.5ft	0	25	50	75
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	193.6	3.5	2	2				: : : :					194.1	TAN, SLIGHTLY SILT		-	193.6 3.5	4	5	7		: : :	:::::	::
190	191.1	6.0	2	2 14	2 11	4		:   : : :	:   : : : :		M	$\sim$	<u>    191.6   </u>	TAN, SILTY CLAYEY	SAND(A-2-5)	190	‡	4	5	'		: : :	:: : : :	::
	188.6	8.5	4	7	9				: ::::		м	//	_	RED-TAN, CLAYEY	SAND (A-2-6)		188.6 8.5	5	9	12			:: ::	::
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-	183.6	- 13.5	9	18	25	::::		43			w	0000	-		D (A-3)		183.9 13.2	2	4	12	::;	16	:: ::	::
180													<u>180.1</u>	TAN, F. SANDY SILT	<u>17.0</u>	180	$\frac{1}{178.9}$ $\frac{1}{18.2}$				: : : `	$\mathbf{x}$		
F	178.6	- 18.5	3	4	5						w	$\mathbf{N}$	-	TAN, F. SANDY SILT	Y GLAY (A-7)		1/0.9 - 10.2	8	13	11		24		
175	173.6	23.5						· · · ·	· · · · · ·				-			175	$\frac{1}{173.9} + \frac{1}{23.2}$							· · ·
			2	2	5	•7			:   : : : :		w		-				<u> </u>	2	1	1	<b>•</b> 2			::
170	168.6	- 28.5										0000	<u>170.1</u>	RED-TAN, SLIGHTLY S	ILTY SAND (A-3)	170	168.9 28.2							
165	1		4	5	6	11					Sat.	0000	- 165 1			165	<u>‡</u>	1	1	1	<b>•</b> <sup>2</sup> · · ·		:: ::	
105	163.6	33.5		10	10				: : : : :				<u>165.1</u>	TAN, SLIGHTLY SILTY F		105	163.9 33.2	1	1	2				
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150													<u>149.6</u>		47.5	150	$\frac{1}{148.9 \pm 48.2}$							
F	148.6	48.5	20	60	40/0.2				- 100/0.7				-	GRAY, SILTY CI	_AY (A-7)		140.9 40.2	2	5	18	<b>!</b> ÷÷	<b>P</b> 23		::
145		53.5						· · · ·					145.1	(CAPE FEAR FOI	RMATION) <u>52.0</u>	145	$\frac{1}{143.9} \pm 53.2$					· •		
			23	47	53/0.4				100/0.9				_	GRAY, SANDY C	LAY (А-б)		<u> </u>	22	50	50/0.4		: : : :		::
140	138.6	58.5											-			140	138.9 58.2	_	10	10		<u></u>		<u> </u>
135	1		8	10	14		<b>9</b> 24				W				62.0	135	<u>‡</u>		10	13		23		::
	_133.6	63.5	5	5				: : : :	: : : : :		0-4			TAN, SILTY SAN	D (A-2-4)	100	133.9 63.2	5	6	4		: : :	::::	::
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	128.6	68.5	35	65/0.2					100/0.7			$\sim$	127.9	TAN-GRAY, CLAYEY	SAND (A-2-6) 69.2		128.9 68.2	100/0.2			:::	: : :	:: ::	
130	1			00/012					100/0.7				_	Boring Terminated at Ele COASTAL PLAIN (A-2-	evation 127.9 ft IN 6) (CAPE FEAR	125	<u> </u>				:::	: : : :	:: :F	÷:
	+	-											-	FORMATIO	DŃ)		123.9 73.2	15	25	35	:::		:: : <b> </b> 6	 ;0
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# **CONTENTS** SHEET NO.

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REFERENCE

1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-9	BORE LOGS

**DESCRIPTION** 

# STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_\_\_\_\_\_CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1003 (CAMDEN RD.) TO SOUTH OF SR1104 (STRICKLAND BRIDGE RD.) SITE DESCRIPTION BRIDGE #451 ON STONEY POINT RD. (-Y16-) OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 1109 AND SR 1104

# 3481 PROJEC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	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-FLACED 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 SOL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

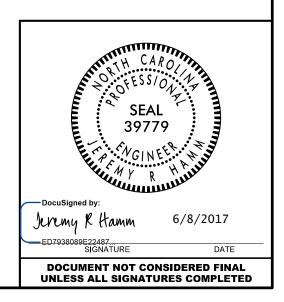
THE BIDDER OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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	
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MID ATLANTIC

MID AILANIIC
GOODNIGHT, D.J.
INVESTIGATED BYGOODNIGHT, D.J.
DRAWN BY
CHECKED BY
SUBMITTED BY FALCON ENG.
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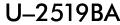


# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

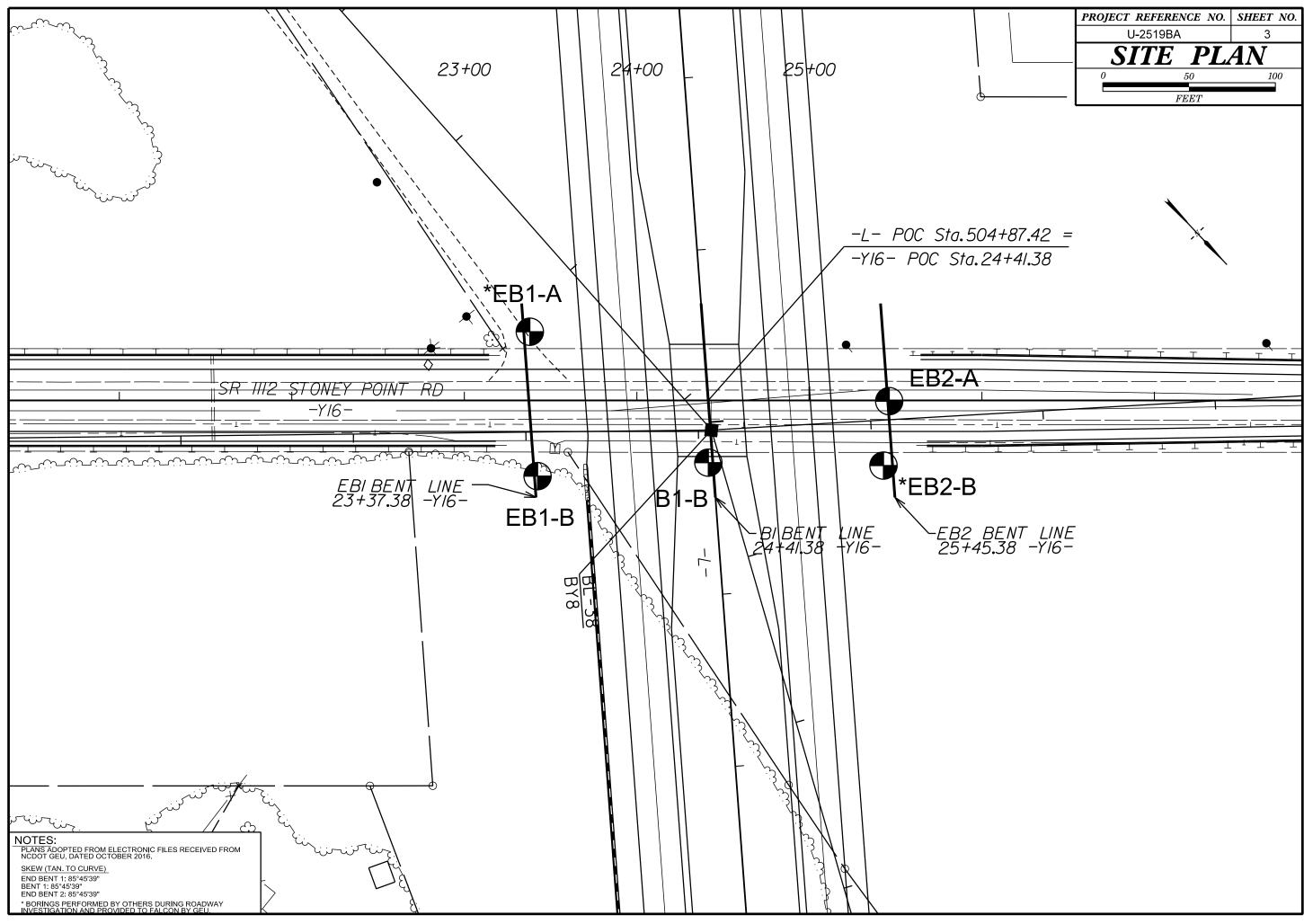
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

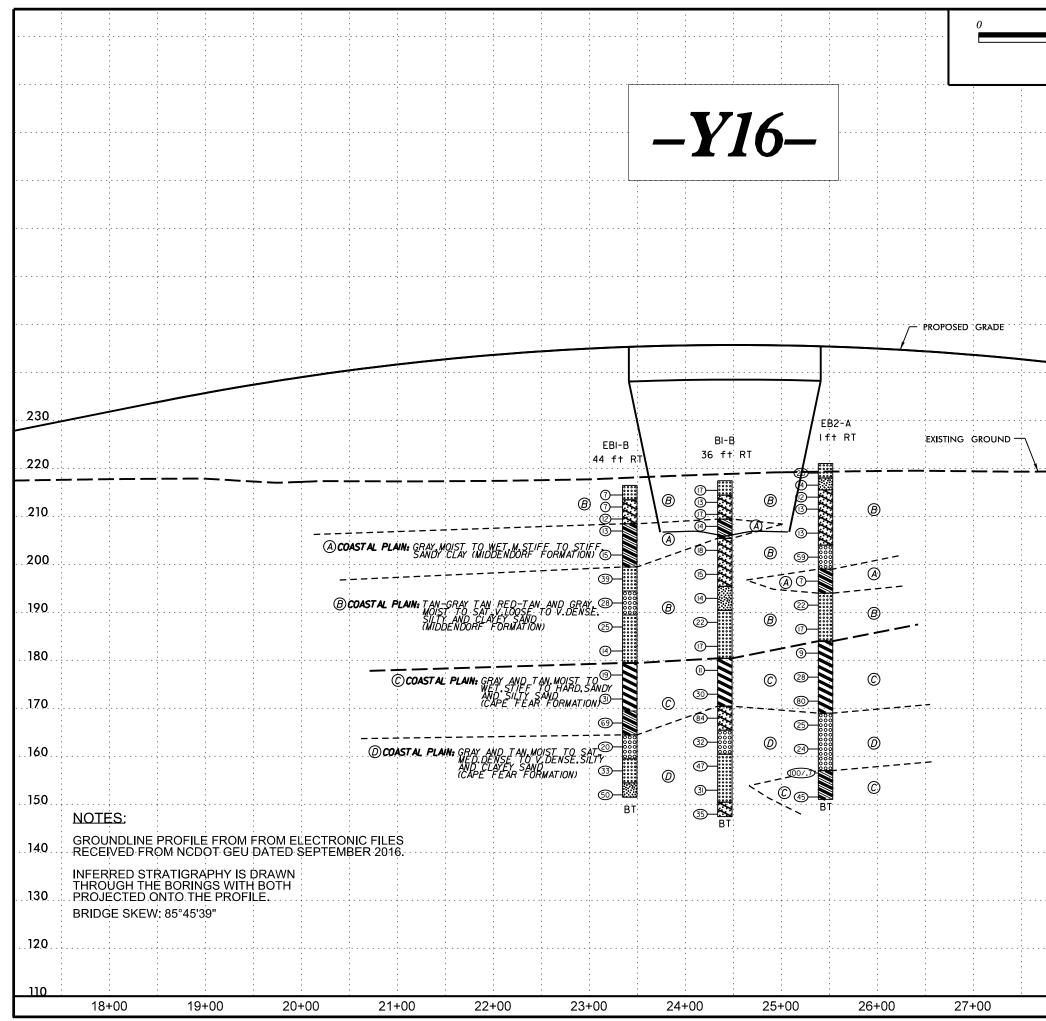
SOIL DESCRIPTION			GRADATION		RC	DCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EAR BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS TH ACCORDING TO THE STANDARP PENETRATION TEST (MASHTO I 206, ASTM DISA IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCL CONFIDENCE OF DETUNION OUTPUES AUGUST OF DATA OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DESCRIPTIONS OF DETUNION OF THE ASHTO SYSTEM, BASIC DESCRIPTIONS OF DESCRIPTIONS OF DISCRIPTIONS OF DESCRIPTIONS OF	HAN 100 BLOWS PER FOOT 5). SOIL CLASSIFICATION UDE THE FOLLOWING:	UNIFORMLY GRADED - IN	ES A GOOD REPRESENTATION OF PARTICL DICATES THAT SOIL PARTICLES ARE ALL S A MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	ROCK LINE INDICATES THE LEVEL AT WHICH SPT REFUSAL IS PENETRATION BY A SPLIT	AL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN H NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT F SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT , THE TRANSITION BETWEEN SOIL AND ROCK IS OF IORK
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER F AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, E	TC. FOR EXAMPLE,		Y OR ROUNDNESS OF SOIL GRAINS IS DES		ROCK MATERIALS ARE TYPICALLY DIVIDED	
VERY STIFF.GRAY.SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIG SOIL LEGEND AND AASHTO CLASSIFICA			GULAR, SUBROUNDED, OR ROUNDED.	SIGNATED BY THE TENNS.		STAL PLAIN MATERIAL THAT WOULD YIELD SPT N VA WS PER FOOT IF TESTED.
GENERAL         GRANULAR MATERIALS         SILT-CLAY MATERIALS           CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)	ORGANIC MATERIALS		MINERALOGICAL COMPOSI TES SUCH AS QUARTZ, FELDSPAR, MICA, TA DESCRIPTIONS WHEN THEY ARE CONSIDE	LC, KAOLIN, ETC.	CRYSTALLINE	COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK TH. (IELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GABBRO, SCHIST, ETC.
[1ASS All- All- A-2-4 A-2-5 A-2-7 A-7-5	1, A-2 A-4, A-5 A-3 A-6, A-7	HRE USED IN	COMPRESSIBILITY	THED OF SIGNIFICHNCE.		COARSE GRAIN METAMORPHIC AND NON-COASTAL PLA
Close         H-15         H-16         H-27         H-27         H-27         A7.6           SYMBOL         000000000000000000000000000000000000			ITLY COMPRESSIBLE	LL < 31	ROCK (NCR) ROCK TY	TARY ROCK THAT WOULD YEILD SPT REFUSAL IF TES (PE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
00000000000000000000000000000000000000	SILT-		RATELY COMPRESSIBLE Y COMPRESSIBLE	LL = 31 - 50 LL > 50	SEDIMENTARY ROCK	. PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY N USAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, BEDS, ETC.
	ANULAR CLAY MULK,			IAL		WEATHERING
•200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	SOILS	ORGANIC MATERIAL TRACE OF ORGANIC M	SOILS SOILS	OTHER MATERIAL TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, HAMMER IF CRYSTALLINE.	FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS
MATERIAL PASSING *40 LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN P1 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR HIGHLY	LITTLE ORGANIC MAT MODERATELY ORGANIC HIGHLY ORGANIC		LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS (V SLI.) CRYSTALS ON A BROKEN SPECIA	S STAINED, SOME JOINTS MAY SHOW THIN CLAY COATING MEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER
GROUP INDEX         Ø         Ø         Ø         Ø         4         MX         8         MX         12         MX         16         MX         ND         MX	MUDERATE ORGANIC		GROUND WATER		OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH. JOINTS	S STAINED AND DISCOLORATION EXTENDS INTO ROCK UP
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL AND SAME SALETY OF CLAYEY SAME CRAVEL AND SAME SAME SAME SAME SAME SAME SAME SAME	ORGANIC SOILS		WATER LEVEL IN BORE HOLE IMMEDIAT STATIC WATER LEVEL AFTER <u>24</u> HI		(SLI.) 1 INCH. OPEN JOINTS MAY CONT CRYSTALS ARE DULL AND DISC	TAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELD OLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOW
MATERIALS SANU		 	PERCHED WATER, SATURATED ZONE, OR			K SHOW DISCOLORATION AND WEATHERING EFFECTS. IN PARS ARE DULL AND DISCOLORED,SOME SHOW CLAY. ROC
	NR TO POOR UNSUITABLE		SPRING OR SEEP		DULL SOUND UNDER HAMMER BL WITH FRESH ROCK.	OWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS CO
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL	L - 30	0 00 -				COLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSP
	RANGE OF UNCONFINED		MISCELLANEOUS SYMBO	LS		ITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN S
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE CONSISTENCY (N-VALUE)	COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	L ROADWAY EMB			IF TESTED, WOULD YIELD SPT F	<u>REFUSAL</u> COLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT
GENERALLY         VERY LOOSE         < 4           GRANII AR         LOOSE         4 TO 10			SPT DPT DMT TEST BORI		(SEV.) REDUCED IN STRENGTH TO STR	ONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAI IENTS OF STRONG ROCK USUALLY REMAIN.
MATERIAL         MEDIUM DENSE         10 TO 30           MATERIAL         DENSE         30 TO 50           (NON-COHESIVE)         VEDV DENSE         50	N/A		LL (AF) OTHER AUGER BORING	CONE PENETROMETER		<u>COLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISC</u>
VERY DENSE         > 50           VERY SOFT         < 2	< 0.25	INFERRED SOI	4	SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN E	DUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRO XAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY
GENERALLY SOFT 2 TO 4 SILT-CLAY MEDIUM STIFF 4 TO 8	0.25 TO 0.5 0.5 TO 1.0	INFERRED ROOM	K LINE MW MONITORING WEL			ABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES</u> FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMA
MATERIAL STIFF 8 TO 15 (COHESIVE) VERY STIFF 15 TO 30	1 TO 2 2 TO 4	ALLUVIAL SOI		SPT N-VALUE		DUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPR
HARD > 30 TEXTURE OR GRAIN SIZE	> 4			-	F	ROCK HARDNESS
	270			JL 5 	VERY HARD CANNOT BE SCRATCHED BY KNI SEVERAL HARD BLOWS OF THE	FE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQU
	0.053		🛆 UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF		OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS R
BOULDER COBBLE GRAVEL COARSE FINE SAND SAND	SILT CLAY	SHALLOW UNDERCUT	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	
(BLDR.) (CDB.) (GR.) (CSE. SD.) (F SD.)	(SL.) (CL.) 0.05 0.005	AR - AUGER REFUSAL	ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST		OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CA A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHE
SIZE IN. 12 3		BT - BORING TERMINATED CL CLAY	) MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT		.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS
SOIL MOISTURE - CORRELATION OF TE	RMS	CPT - CONE PENETRATION CSE COARSE		$\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIEL	D MOISTURE DESCRIPTION	DMT - DILATOMETER TES	T PMT - PRESSUREMETER TES	ST <u>SAMPLE ABBREVIATIONS</u> S - BULK		ADILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGM ES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMA NGER PRESSURE.
	D;VERY WET,USUALLY HE GROUND WATER TABLE	e – VOID RATIO F – FINE	SD SAND, SANDY SL SILT, SILTY	SS - SPLIT SPOON ST - SHELBY TUBE		AN BE EXCAVATED READLY WITH POINT OF PICK. PIECE
		<ul> <li>FOSS FOSSILIFEROUS</li> <li>FRAC FRACTURED, FRAC</li> </ul>	SLI SLIGHTLY	RS – ROCK RT – RECOMPACTED TRIAXIAL	SOFT OR MORE IN THICKNESS CAN BE FINGERNAIL.	E BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED REA
(PI) - WEI - (W) ATTAIN OPTIMU	JIRES DRYING TO M MOISTURE	FRAGS FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING	FRACTURE SPACING	BEDDING
		HI HIGHLY	V - VERY		TERM SPACING VERY WIDE MORE THAN 10	FEET VERY THICKLY BEDDED 4 FE
UM _ UPTIMUM MOISTURE	EAR OPTIMUM MOISTURE	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	WIDE 3 TO 10 FEE MODERATELY CLOSE 1 TO 3 FEE	
SL SHRINKAGE LIMIT	TIONAL WATER TO	X CME-45C	X CLAY BITS	X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FO VERY CLOSE LESS THAN 0.16	OT VERY THINLY BEDDED 0.03 - 0.1
- DRY - (D) ATTAIN OPTIMU		CME-55	6' CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERT CLUSE LESS THEN 0.10	THICKET CHMINHTED 0.008 - 0. THINLY LAMINATED < 0.008
PLASTICITY			8 HOLLOW AUGERS	В		INDURATION
NON PLASTIC	DRY STRENGTH VERY LOW	CME-550		□-N	DURE	HE HARDENING OF MATERIAL BY CEMENTING,HEAT,PRE BING WITH FINGER FREES NUMEROUS GRAINS;
NON PLASTIC 0-5 SLIGHTLY PLASTIC 6-15	SLIGHT	VANE SHEAR TEST	TUNGCARBIDE INSERTS	HAND TOOLS:		ILE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OR MORE	MEDIUM HIGH	PORTABLE HOIST	TRICONE 'STEEL TEETH	POST HOLE DIGGER		NS CAN BE SEPARATED FROM SAMPLE WITH STEEL PI AKS EASILY WHEN HIT WITH HAMMER.
COLOR			TRICONE TUNGCARB.	HAND AUGER	INDURATED GRAI	NS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESC			CORE BIT	VANE SHEAR TEST		ICULT TO BREAK WITH HAMMER. RP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; PLE BREAKS ACROSS GRAINS.
					SHMF	CE ONENKO HUNOJO UNHINO.

# PROJECT REFERENCE NO.



TERMS AND DEFINITIONS TO 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. AL PLAIN IF TESTED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. MAY NOT YIELD STONE, CEMENTED CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN Y. ROCK HAS AS COMPARED FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. FELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO VIDENT BUT ITS LATERAL EXTENT. ARE KAOLINIZED LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. RE DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE S. SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. S REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  $\underline{\text{SLICKENSIDE}}$  - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE ETACHED STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL B PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS IT. SMALL, THIN STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BM (BL-38): 36" REBAR WITH ALUMINUM TRAVERSE CAP THICKNESS N: 4534.4280 E: 1988530.7290 4 FEET 1.5 - 4 FEET -YI6- 24+43, 17 ft RT ELEVATION: 217.96 FEET 16 - 1.5 EEET NOTES: - 0.16 FEE 98 - Ø.Ø3 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING 0.008 FEET UCP - UNDIVIDED COASTAL PLAIN AT. PRESSURE. ETC. TEEL PROBE:





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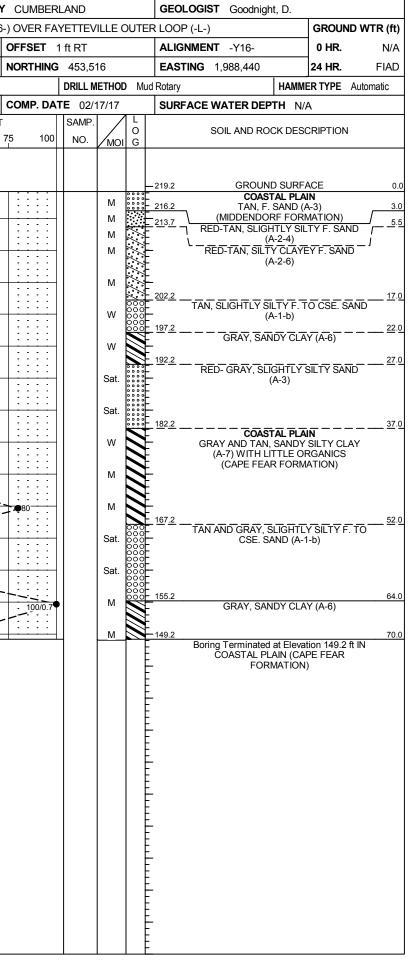
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	CUMBERLAND	GEOLOGIST Smith, B.	WBS 34817.1.FR7 TIP U-2519BA CO	UNTY CUMBERLAND	GEOLOGIST Goodnight, D.
SITE DESCRIPTION Bridge No. 451 on Stoney Point Rd. (-Y16-) over F		GROUND WTR (ft)	SITE DESCRIPTION BRIDGE NO. 451 ON STONEY POINT RD.		-
	OFFSET 40 ft LT	ALIGNMENT -Y16- 0 HR. N/A	BORING NO. EB1-B STATION 23+42	OFFSET 44 ft RT	ALIGNMENT -Y16- 0 HR. N/A
COLLAR ELEV.         218.4 ft         TOTAL DEPTH         69.7 ft	NORTHING 453,354	EASTING 1,988,577 24 HR. 20.5	COLLAR ELEV. 216.5 ft TOTAL DEPTH 65.0 ft	NORTHING 453,422	EASTING 1,988,626 24 HR. FIAD
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	COMP. DATE 09/22/16	SURFACE WATER DEPTH N/A	DRILLER Wiggins, M. START DATE 02/17/17	COMP. DATE 02/17/17	SURFACE WATER DEPTH N/A
DRUCE R         Missieg,			ELEV DRIVE DEPTH BLOW COUNT BLOWS PER F		
	75 100 100 10	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV         ELEV         DEF In         ELEV         0.5ft         0.5ft         0.5ft         0         25         50	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION
220			220		
		218.4 GROUND SURFACE 0.0 COASTAL PLAIN			
215 214.9 3.5		TAN-BROWN AND ORANGE-BROWN,			COASTAL PLAIN         0.0           COASTAL PLAIN         0.0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	м <u>к</u>	SILTY SAND (MIDDENDORF FORMATION)6_		· · ·   · · · ·	213.5 LIGHT GRAY, SLIGHTLY SILTY F. SAND 3.0 (A-3)
		GRAY, RED AND ORANGE-BROWN, SANDY CLAY	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		(MIDDENDORF FORMATION)
			$    +   4   5   8     \cdot \cdot \bullet_{13}   \cdot \cdot \cdot \cdot   \cdot$	::: ::::   M	TAN AND GRAY, SANDY CLAY (A-6)
205 205.2 <u>13.2</u> 3 7 7 <u>- 14.</u>		-			
				· · · · · · · · · · · · · · · · · · ·	
		<u>197.7</u>			
195 195.2 23.2 17 20 14 34 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Sat.	- SILTY SAND WITH TRACE TO LITTLE			
		CLAY	$+$ 14 16 12 $4_{28}$	Sat. 000	SAND (A-1-b)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sat.	-			189.5
				Sat.	
	Sat.		183.0 33.5	Sat.	
	Sat.	178.9 39.5		0000	179.5 37.0
		<b>COASTAL PLAIN</b> GRAY, SILTY CLAY	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	::: ::::     M 🗙	COASTAL PLAIN
175         175.2         43.2         ······         ·····         ·····         ·····         ·····         ·····         ·····         ·····         ·····         ······         ······         ······         ······         ·······         ········         ·······		- (CAPE FEAR FORMATION)			ORGANICS (WOOD FRAGMENTS) (CAPE FEAR FORMATION)
				::: ::::       ∧ 🗙	E ` I
					<u> </u>
		GRAY, SILTY SAND		M	164.5 52.0
	Sat.				GRAY, F. TO CSE. SAND (A-1-b)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Sat.			· · · · · · · · · · · · · · · · · · ·	159.5
			$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $	Sat.	°L (A-3)
$\mathbb{S}$ 24 28 32	Sat.				151.5
	· · · ·			<u>···</u>	L 151.5 (A-1-b) 65.0 Boring Terminated at Elevation 151.5 ft IN
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Boring Terminated at Elevation 148 7 ft IN			COASTAL PLAIN (CAPE FEAR FORMATION)
		COASTAL PLAIN (SILTY SAND)			
		*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY			È l
		- INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU.			E I
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### GEOTECHNICAL BORING REPORT BORE LOG

								1																
	34817					IP U-2519			Y CUMBER					OGIST Goodnight, D.			34817.				<b>TIP</b> U-25		COUNT	
SITE	DESCR	RIPTION	BRII	DGE N	0. 451	ON STON	NEY POINT	RD. (-Y16	6-) OVER FA	YETTEV	ILLE (	OUTE	R LOOP	(-L-)	GROUND WTR (ft)	SITE	DESCRI	PTION	BRID	GE NO. 4	51 ON STO	ONEY POIN	IT RD. (-Y1	6-) (
BOR	NG NO.	B1-B			S	TATION 2	24+41		OFFSET	36 ft RT			ALIGN	IMENT -Y16-	0 HR. N/A	BOR	ing no.	EB2-/	A		STATION	25+46		0
COLI	LAR EL	<b>EV.</b> 21	7.4 ft		Т (	OTAL DEP	<b>TH</b> 70.0 f	t	NORTHING	<b>4</b> 53,47	78		EAST	<b>NG</b> 1,988,544	24 HR. FIAD	COL	LAR ELE	<b>V.</b> 21	19.2 ft		TOTAL DE	<b>PTH</b> 70.0	) ft	N
DRILL	. RIG/HAM	MMER EF	F./DAT	e Mid	3964 C	ME-45C 83%	6 08/09/2016			DRILL M	IETHOE	D Mu	d Rotary	НАММ	ER TYPE Automatic	DRILI	RIG/HAM	MER EF	F./DATE	MID3964	CME-45C 83	3% 08/09/2016	6	
DRIL	LER V	Viggins,	M.		S	TART DAT	E 02/16/1	7	COMP. DA	TE 02/	16/17		SURF	ACE WATER DEPTH N	Ά	DRIL	LER W	iggins,	M.		START DA	TE 02/17	/17	C
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT		BLOWS	PER FOO	T	SAMP.	▼/		-	SOIL AND ROCK DES		ELEV	DRIVE ELEV	DEPTH	BLOV	V COUNT		BLOW	S PER FOO	л Т
(ft)	(ft)	(ft)		0.5ft	0.5ft	0	25	50	75 100	NO.	моі		ELEV. (ft		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft 0.5	ft 0	25	50	75
220																220								
	216.4	± 											217.4	GROUND SURF			218.2	-	9	10 10		<b>1</b>   : : : :		÷
215	213.9	+	5	9	8	<b></b> 1	7		· · · · ·		м	0000	-214.4	COASTAL PLA TAN, F. SAND (	A-3)3.0	215	215.7	3.5	4	6 8	┥┝╧ᡒ	14	· · · ·	<u>+</u>
- / -	211.4	6.0	6	5	8	] · · • • 13					M			(MIDDENDORF FOR TAN, SILTY CLAYEY S/			213.2		4	5 7		2	:	:
210	208.9	8.5	6	9	8	<b>∳</b> 1	7				M		209.4	GRAY, SANDY CLA	8.0	210		- 0.0	3	5 8	_  <u>- · · ·</u> ∳	3		<u>+</u>
205		ŧ	4	6	8						M		205.4		12.0	205	205.7	- 13.5			: : : !:		: : : :	:
	203.9	13.5	5	8	10		18	::::	: : : : :		м	$\langle \cdot \rangle$	_ — — — :	TAN-GRAY, CLAYEY SILT	Y SAND (A-2-6)	200		-	5	6 7		3	: : : :	:
200		ŧ		Ĭ		: : : : : :						///	-			200	200.7	18.5	13	26 33		: : : : :	< <u> </u>	:
	198.9	<u>+ 18.5</u>	3	6	9	· · •15	;				м	$\sim$	•					-		20 33	'   [ : : :	: :		:
195	402.0	‡											195.4	TAN-GRAY, CLAYEY SILT	22.0	195	195.7	23.5	3	3 4			: :::	<u>:</u>
	193.9	<u> </u>	3	6	8	<b>1</b> 4					w		-	TAN-GRAT, CLATET SILT	f SAND (A-2-5)			-					: : : :	:
190	188.9	+ + 28.5				$  \cdot \cdot \cdot \cdot \cdot \cdot$							190.4		A-3) <u>27.0</u>	190	190.7	- 28.5	17	14 8	+	• <u>22</u>	: : : :	
		<del>-</del>	10	12	10		<b>P</b> 22				Sat.	0000					105 7					$f \mid \vdots \vdots \vdots$	:	:
185	183.9	± 33.5			-							0000				185	185.7	33.5	6	7 10			· · · · ·	<u>+</u>
400		ŧ	6	8	9	: : 🟓	7				Sat.	0000	180.4		37.0	100	180.7	38 5				: : : :	: : : :	:
180	178.9	38.5	2	4	7								- 100.4		NN	180			4	2 7	<b>│├</b> •∳-			+
175		Ŧ	2	4	1						M	N		GRAY, SILTY CLA (CAPE FEAR FORM	Y (A-7) 1ATION)	175	175.7	43.5					: : : :	:
110	173.9	43.5	7	12	18		30				м		-			110		-	7	11 17	'   <u></u>	1 028 		:
170		ŧ											<u>170.4</u>		47.0	170	170.7	48.5	13	30 50		: : : :	] <b> </b>	
	168.9	<u>+</u> 48.5 +	26	37	47				<b>1</b>		м	///		GRAY, CLAYEY SAN	D (A-2-6)			-		30 50	' [:::	: : : :		-7'
165	162.0	Ŧ				::::			=			200	165.4	GRAY, SLIGHTLY SILTY	<u>52.0</u>	165	165.7	53.5	8	12 13		· · · · ·		:
	163.9	<u> </u>	11	16	16		€32				Sat.	õõõ	-	GRAY, SLIGHTLY SILTY SAND (A-1-b	)			-		·-   '`			:   : : :	:
160	158.9	+ 58 5										000	160.4	GRAY, SLIGHTLY SILTY	SAND (A-3) 57.0	160	160.7	- 58.5	10	10 14		24	·   · · ·	<u>;</u>
		Ŧ	15	21	26			47	:   : : : : :		Sat.	0000			( · · •/		<sub>155</sub>	62 5						:
155	153.9	+ 63.5		L								0 0 0 0 0 0 0 0 0 0 0 0				155	155.7	- 63.5	19	60 40/0	1		· · · ·	÷F
150		ŧ	19	17	14				: : : : :		Sat.	0000	150.4		67 A	450	150.7	68 5				: : : :	:	
150	148.9	68.5	10	15	20		<u> </u>				Set.	$\sim$		LIGHT GRAY, CLAYEY		150		-	12	21 24	┎╻┝╧╧╧		<b>9</b> 45	<u>+</u>
		Ŧ	12	15	20		<u> </u>	1	-	4	_Sat		<u>    147.4                               </u>	Boring Terminated at Eleva COASTAL PLAIN (CA	70.0 147.4 ft IN		1	-						
	-	ŧ											-	COASTAL PLAIN (CA FORMATION	I) I)			-						
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### SHEET 8



## GEOTECHNICAL BORING REPORT BORE LOG

COLLAR ELEV.         217.5 ft         TOTAL DEPTH         74.7 ft         NORTHING         453,543         EASTING         1,988,466         24 HR         FIAD           DRILL RIGHAMMER EF, DATE         SUM0033 DIEDRICH D-50 76% 11/09/2016         DRILL METHOD         Mud Rotary         HAMMER TYPE         Automatic           DRILLER         Moseley, M.         START DATE         10/03/16         COMP. DATE         10/03/16         SURFACE WATER DEPTH         NA           ELEV         PENH         BLOW COUNT         BLOWS PER FOOT         NO.         NO.         SOIL AND ROCK DESCRIPTION         DEPTH (0)           220         0         1.5         0         25         50         75         100         NO.         GRAV AND CRANCE BROWN         DEPTH (0)           221         2.4.0         3.5         -								URE L						
BORING NO.         EB2-8         STATION         25+43         OFFSET         38 If RT         ALIGNMENT         -/16         24 HR         11.0           COLLAR ELEV.         217.5 It         TOTAL DEPTH         74.7 It         MORTHING         433,543         EASTING         1,988,466         24 HR         FLAM         FLAM <th>WBS</th> <th>34817.1.FR7</th> <th></th> <th></th> <th>TI</th> <th>P U-2519BA</th> <th>COUNTY</th> <th>CUMBER</th> <th>LAND</th> <th></th> <th>GEOLOGIST S</th> <th>mith, B.</th> <th></th> <th></th>	WBS	34817.1.FR7			TI	P U-2519BA	COUNTY	CUMBER	LAND		GEOLOGIST S	mith, B.		
COLLAR ELEV.         217.5 ft         TOTAL DEPTH         74.7 ft         NORTHING         453,543         EASTING         1,988,486         24 HR.         FIAD           DRILL REHONAMMER EFF.DATE         START DATE         1003/16         COMP. DATE         1003/16         SURFACE WATER DEPTH         N/A           DRILLER         Modely, M.         START DATE         1003/16         COMP. DATE         1003/16         SURFACE WATER DEPTH         N/A           200         0         0.58         0.58         0.57         100         N/A         SURFACE WATER DEPTH         N/A           201         0         0.58         0.58         0.57         100         N/A         SURFACE WATER DEPTH         N/A           202         0         0         5.8         0.57         100         N/A         0         ELEV.(b)         SURFACE WATER DEPTH         N/A           203         1.12         3.5         7         1.12	SITE	DESCRIPTION	Bridg	je No. 4	51 or	n Stoney Point Rd. (-Y1	6-) over F	ayetteville O	uter Loop	(-L-)			GROUND W	/TR (ft)
COLLAR ELEV.         217.5 ft         TOTAL DEPTH         74.7 ft         NORTHING         453.543         EASTING         1,988,468         24 HR.         FIAD           DRILL REHOMMINE REF.ARE         START DATE         1003/16         COMP. DATE         1003/16         SURFACE WATER DEPTH         N/A           DRILL PENDAMMER REF.ARE         START DATE         1003/16         COMP. DATE         1003/16         SURFACE WATER DEPTH         N/A           DRILL PENDAMMER REF.ARE         BLOWS PER FORTOT         BLOWS PER FORTOT         SURFACE WATER DEPTH         N/A           200         0         0.581         0.571         25         50         75         100         N/A         SURFACE WATER DEPTH         N/A           200         0         0.581         0.571         0.25         50         75         100         N/A         SURFACE WATER DEPTH         N/A           201         203.4         1.3.2         5         7         111	BORI	NG NO. EB2-E	3		S	TATION 25+43		OFFSET 3	88 ft RT		ALIGNMENT -	Y16-	0 HR.	11.0
DRILL REHAMMER EFF.DATE         SUM033 DIEDRICH D-30 76% 11082016         DRILL METHOD         Mad Rolary         HAMMER TYPE         Automatic           DRILLE Moseley, M.         START DATE         1003/16         COMP. DATE         1003/16         SURFACE WATER DEPTH         NA           ELEV         DRILL METHOD         Mod         Gal         0.51         255         75         100         Mod         Comp. Date         SURFACE WATER DEPTH         NA           280           Solid And Rolary         BUOY SPER FOOT	COLI	AR FLEV 21	7 5 ft		Т					3	FASTING 1.98	8 466	24 HR	
DRILLER         Moseley, M.         START DATE         10/03/16         COMP. DATE         10/03/16         SURFACE WATER DEPTH         NA           ELEV         ENVE         DepTH         BLOW COUNT							016		-					
ELEV         DEVE (R)         DEVT (R)         BLOW COUNT (R)         BLOWS PER FOOT (R)         SAMP NO.         NO.         SAMP (R)         NO.         SOIL AND ROCK DESCRIPTION (R)         DepTH (R)           220         215         214.0         35         4         5         1				= 50IVI	-									omatic
LEV       LEV       LEV       LEV       LEV       LEV       LEV       Sold AND ROCK DESCRIPTION         200       0.08       0.08       0.08       0.00       0.08       0.00       0.0	DRIL					1						ER DEPTH N//	4	
215       214.0       3.5       -						4				• <b>/</b>  0		AND ROCK DESC		DEPTH (ft)
216       35	220										L 217.5	GROUND SURF	ACE	0.0
210       200       8.5       3       4       5         205       204.3       13.2       5       7       111         200       193.3       18.2       5       7       111         200       193.3       18.2       5       7       111         200       193.3       18.2       7       8       12       100         195       194.3       22.3       7       8       12       100       101	215						::::				1	COASTAL PLA	IN	
210       200.0       8.5       3       5       7       112         205       204.3       13.2       5       7       11       112       111         200       199.3       118.2       5       7       11       118       111         200       199.3       118.2       5       7       11       118       111         190       199.3       182.3       7       8       12       6       111       118       268.5        GRAY, RED AND ORANCE BROWN       113         190       199.3       182.3       7       8       12       6       111       118       261.5        GRAY, RED AND ORANCE BROWN       113         190       189.3       182.2       7       8       12       6       111       118       261.5        Sat       Sat<		214.0 3.5	3	4	5		::::	::::		м	•	CLAY		
205       204.3       13.2       5       7       11       112       114         200       190.3       18.2       3       8       12       114       114         200       190.3       18.2       3       8       12       114       114         190       193.3       18.2       3       8       12       114       114         190       180.3       28.2       7       8       12       114       114       114         180       170       180.3       28.2       7       8       12       116       111       114       114         180       170       183.3       12       116       116       116       116       1144       1144       1144       114	210	Ŧ				$  :\tilde{I}:: ::::$					(MID	DENDORF FORM	MATION)	
205       204 2       132		209.0 8.5	3	5	7	• • 12 • • • •	::::	::::			F			
July         132         5         7         11         1         10         10         11<	205	<u>±</u>								N.:-	<u> </u>		GE-BROWN,	<u> 11.0</u>
200       199.3       18.2		204.3 13.2	5	7	11		::::	::::		Sat.	CLAYEY	SAND AND SILTY	SAND WITH	
195       194.3       23.2       3       7       8       12       60       11	200	<u>±</u>					::::	::::		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		AGE TO LITTLE	CLAT	
194.3       22       3       7       8         190       180.3       22.2       7       8       12         185       184.3       33.2       6       8       10         180       170.3       38.2       7       8       12         175       174.3       43.2       6       10       16         160       169.3       48.2       12       26       11         166       164.3       53.2       6       14       17       16         150       154.3       63.2       22       23       30       11       1000.9         150       149.3       68.2       11       12       17       1000.9       151.8		199.3 18.2	3	8	12	20 · · · ·	::::	::::		Sat. 🔨	\$- }			
190       180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       28.2       7       8       12       191.8       25.1         180.3       33.2       6       8       10       161.8       10       161.8       26.1         170.1       169.3       48.2       12       20       41       10       100.0.9       110.8       110.8       111.8       12.1       100.0.9       1156.8       COASTAL PLAIN SEDIMENTARY ROCK       60.1       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.8       111.	195	101 3 + 33 3				: : : <i>[</i> :   : : : :	::::	::::			, , , , , , , , , , , , , , , , , , ,			
190       180 3       28.2       7       8       12         186       184.3       33.2       6       8       10         180       170       38.2       3       0       2       2         175       174.3       43.2       6       10       16       28.2       10         160       169.3       48.2       12       20       41       28.2       17.1.8       GRAY, SILTY CLAY AND SANDY CLAY         170       169.3       48.2       12       20       41       28.2       12       20       41         166       164.3       53.2       6       14       17       631       10       651         150       149.3       68.2       12       23       30       15       154.3       63.2       20       41       593         155       154.3       63.2       20       41       593       1000.9       151.8       COASTAL PLAN SEDIMENTARY ROCK       603         145       144.3       73.2       9       13       17       636       1000.9       151.8       COASTAL PLAN SEDIMENTARY ROCK       603         145       144.3       73.2       9 <t< td=""><td></td><td></td><td>3</td><td>7</td><td>8</td><td></td><td>::::</td><td>::::</td><td></td><td>Sat.</td><td>101 8</td><td></td><td></td><td>25.7</td></t<>			3	7	8		::::	::::		Sat.	101 8			25.7
185       184.3       33.2       6       8       10       100       179.3       38.2       10       100       179.3       38.2       10       188       10       188       10       188       10       11	190	100 3 + 200 3					::::	::::						20.7
188.3       33.2       6       8       10         180       179.3       38.2       3       0       2         175       174.3       43.2       6       10       16         170       160.3       48.2       12       20       41         165       164.3       53.2       6       14       17         160       150.3       58.2       20       41       53.3         155       154.3       63.2       20       41       53.3       1000.9         150       149.3       68.2       11       12       17       63.3       1000.9         145       144.3       73.2       9       13       17       62.9       1000.9         145       144.3       73.2       9       13       17       62.9       1000.9         145       144.3       73.2       9       13       17       62.9       17       62.9         145       144.3       73.2       9       13       17       62.9       11       17       63.1       11       12.8       142.8       74.2         145       144.3       73.2       9       13		189.3 28.2	7	8	12	20 · · · ·		::::		Sat				
180       179.3       38.2       3       0       2         175       174.3       43.2       6       10       16         175       174.3       43.2       6       10       16         170       169.3       48.2       12       20       41         165       164.3       53.2       6       14       17         165       154.3       63.2       0       1       1000.9         155       154.3       63.2       0       1       1       1000.9         150       149.3       68.2       11       12       17       1000.9         145       144.3       73.2       9       13       17       1000.9         145       144.3       73.2       9       13       17       129       1000.9         145       144.3       73.2       9       13       17       129       1000.9         145       144.3       73.2       9       13       17       129       1000.9         145       144.3       73.2       9       13       17       129       1000.9         145       144.3       73.2       9	185					::::; ::::	: : : :	::::			÷			
1/0.3       382       3       0       2         175       174.3       43.2       -       -       -       -       -       -       40:         175       174.3       43.2       -       -       -       -       -       -       -       40:         170       169.3       48.2       -       -       -       -       -       -       -       -       -       -       40:         165       164.3       53.2       - <td></td> <td>184.3 - 33.2</td> <td>6</td> <td>8</td> <td>10</td> <td></td> <td>::::</td> <td>::::</td> <td></td> <td>Sat.</td> <td>E</td> <td></td> <td></td> <td></td>		184.3 - 33.2	6	8	10		::::	::::		Sat.	E			
1/0.3       382       3       0       2         175       174.3       43.2       -       -       -       -       -       -       40:         175       174.3       43.2       -       -       -       -       -       -       -       40:         170       169.3       48.2       -       -       -       -       -       -       -       -       -       -       40:         165       164.3       53.2       - <td>180</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>::::</td> <td>::::</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	180						::::	::::						
175       174.3       43.2       Coastal Plan         170       169.3       48.2       1       20       41       59/0.4       166.8		179.3 + 38.2	3	0	2					Sat	Ē			
1143       432       6       10       16         170       169.3       48.2       12       20       41         165       164.3       53.2       6       14       17         160       159.3       58.2       22       23       30         155       154.3       63.2       20       41       59/0.4         150       149.3       68.2       11       12       17         145       144.3       73.2       9       13       17       26       100/0.9         144.3       73.2       9       13       17       30       11       12       17         144       12       13       17       30       11       12       16       12.8       142.8       74.3         144.3       73.2       9       13       17       30       11       12       14       17       142.8       142.8       74.3         144       144.3       73.2       9       13       17       30       11       11       12.8       142.8       142.8       142.8       74.3         145       144.3       73.2       9       13       17 </td <td>175</td> <td>‡</td> <td></td> <td></td> <td></td> <td>  <sup>^</sup>.x.:: ::::</td> <td>::::</td> <td>::::</td> <td></td> <td>Ň</td> <td><u> </u></td> <td>COASTAL PLA</td> <td>IN</td> <td><u> </u></td>	175	‡				<sup>^</sup> .x.:: ::::	::::	::::		Ň	<u> </u>	COASTAL PLA	IN	<u> </u>
170       169.3       48.2		<u>174.3 + 43.2</u>	6	10	16	26				м				
169.3       48.2       12       20       41         165       164.3       53.2       6       14       17         160       159.3       58.2       22       23       30         155       154.3       63.2       6       14       17         150       149.3       68.2       11       12       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         145       144.3       73.2       9       13       17         146       149.3       142.8	170	Ŧ										PE FEAR FORM	ATION)	45.7
165       164.3       53.2       GRAY, SILTY SAND       50.3         160       159.3       58.2       GRAY, SILTY SAND       50.3         155       154.3       63.2       63.2       100/0.9       60.3         150       149.3       68.2       11       12       17       100/0.9         145       144.3       73.2       9       13       17       0.30       1.1         145       144.3       73.2       9       13       17       0.30       1.1       1.1         145       144.3       73.2       9       13       17       0.30       1.1       1.1         145       144.3       73.2       9       13       17       0.30       1.1		169.3 + 48.2	12	20	41		61			w	-			
164.3       53.2       6       14       17       61	165	Ŧ		-							<u> </u>			<u> 50.7</u>
160       159.3       58.2       22       23       30       53.1       11       153.1       115.1	105	164.3 + 53.2	6	14	17			· · · · ·		Sat	<b>}</b>			
159.3       58.2       22       23       30 <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> : <u>60</u> :	160	Ŧ	Ŭ											
155       154 3       63 2       20       41       59/0.4       59/0.	100	159.3 + 58.2	22	23	30		<b>9</b> 50			Sat	<u>}</u>			
154 3       63 2       20       41       59/0.4	155	Ŧ		20	00		♥ <sup>53.</sup>							<u> 60.7</u>
150       149.3       68.2       11       12       17       12.2       100/0.9         145       144.3       73.2       9       13       17       13.0       17       14.2 <td>155</td> <td>154.3 + 63.2</td> <td>20</td> <td>11 6</td> <td>50/0 /</td> <td>  :::: ::::</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	155	154.3 + 63.2	20	11 6	50/0 /	:::: ::::								
149.3       68.2       11       12       17		Ŧ	20		5,0.4	• • • •   •••••••					<u>_</u> <u>151.8</u>			<u> 65</u> .7
145       144 3       73 2       9       13       17       1 <t< td=""><td>150</td><td>149.3 + 68.2</td><td>11</td><td>12</td><td>17</td><td></td><td></td><td></td><td></td><td>ect</td><td></td><td></td><td></td><td></td></t<>	150	149.3 + 68.2	11	12	17					ect				
144.3       7.3.2       9       13       17       : : : : : : : : : : : : : : : : : : :	4.45	Ŧ		12	17	$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$				Sat. //				
Boring Terminated at Elevation 142.8 ft IN     COASTAL PLAIN (CLAYEY SAND)     *NOTE: BORING PERFORMED BY     OTHERS DURING ROADWAY     INVESTIGATION AND PROVIDED TO	145		0	12	17					set %	× 142 0			74 7
*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO		Ŧ		13	17	<u> </u>			1	<u>Jai.</u>	Boring Ter			
Image: Second second		Ŧ									COAS	FAL PLAIN (CLAY	(EY SAND)	
	150										L OTH	ers during ro Gation and Pr	DADWAY	
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SHEET 9

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 $\overline{\mathcal{A}}$ 2519B REFERENCE

> 3481 PROIEC

#### DESCRIPTION TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE WITH SOIL TEST RESULTS

### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

### COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1033 (CAMDEN RD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE RD) SITE DESCRIPTION NOISE WALL NWIA RIGHT OF -Y13- 16+81 TO 22+21

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSIFICACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

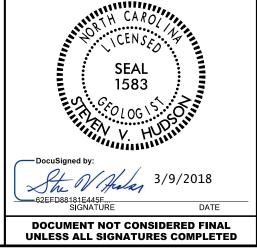
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE VIDUCT TACTORS. THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION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

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

PERSUNNEL
CHRIS ALEXANDER
MIKE D. MASON
T. SPENCER
STEVEN HUDSON
INVESTIGATED BY
DRAWN BY
CHECKED BY J. LEE STONE, LG
SUBMITTED BY
DATE FEBRUARY 2018

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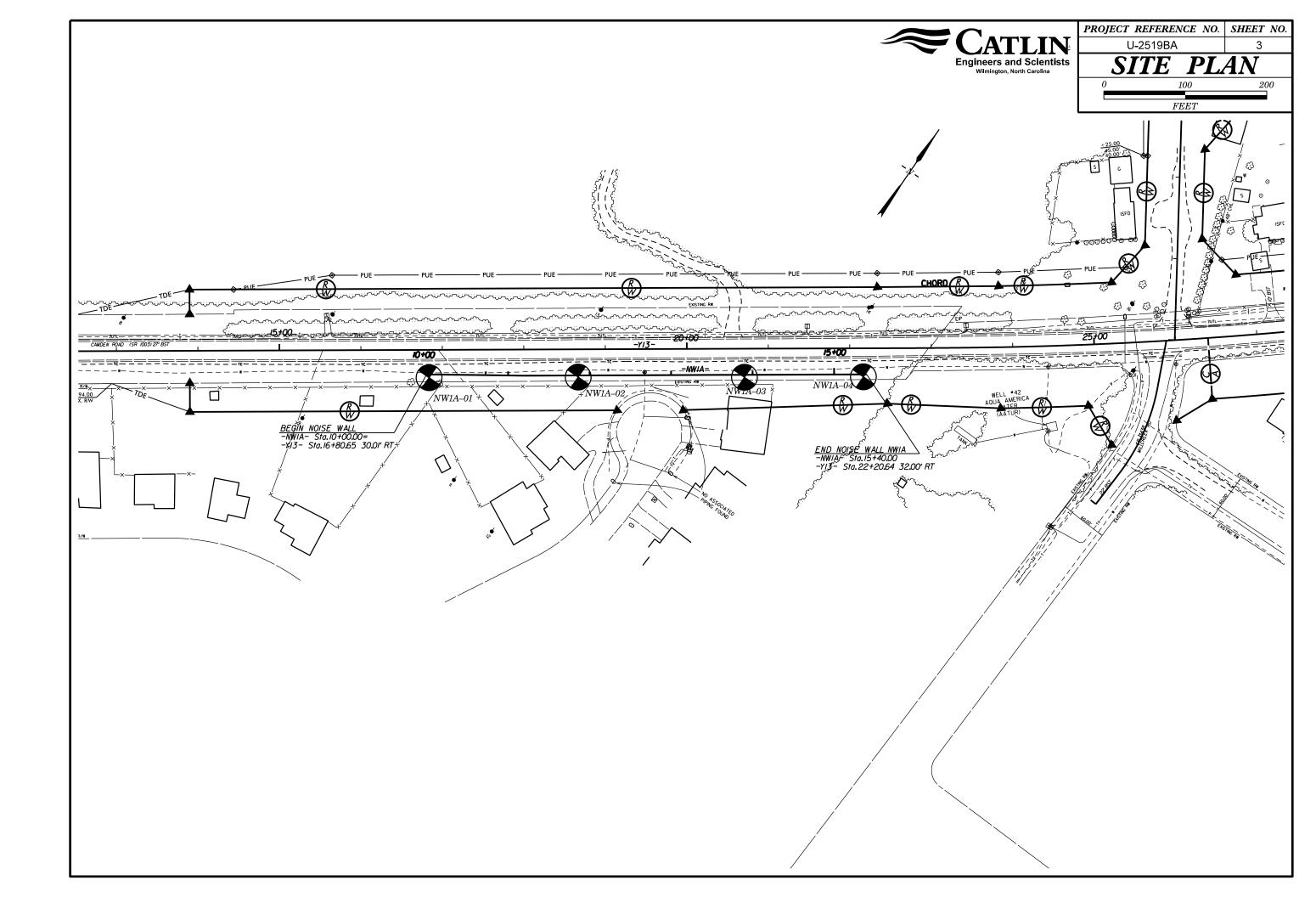


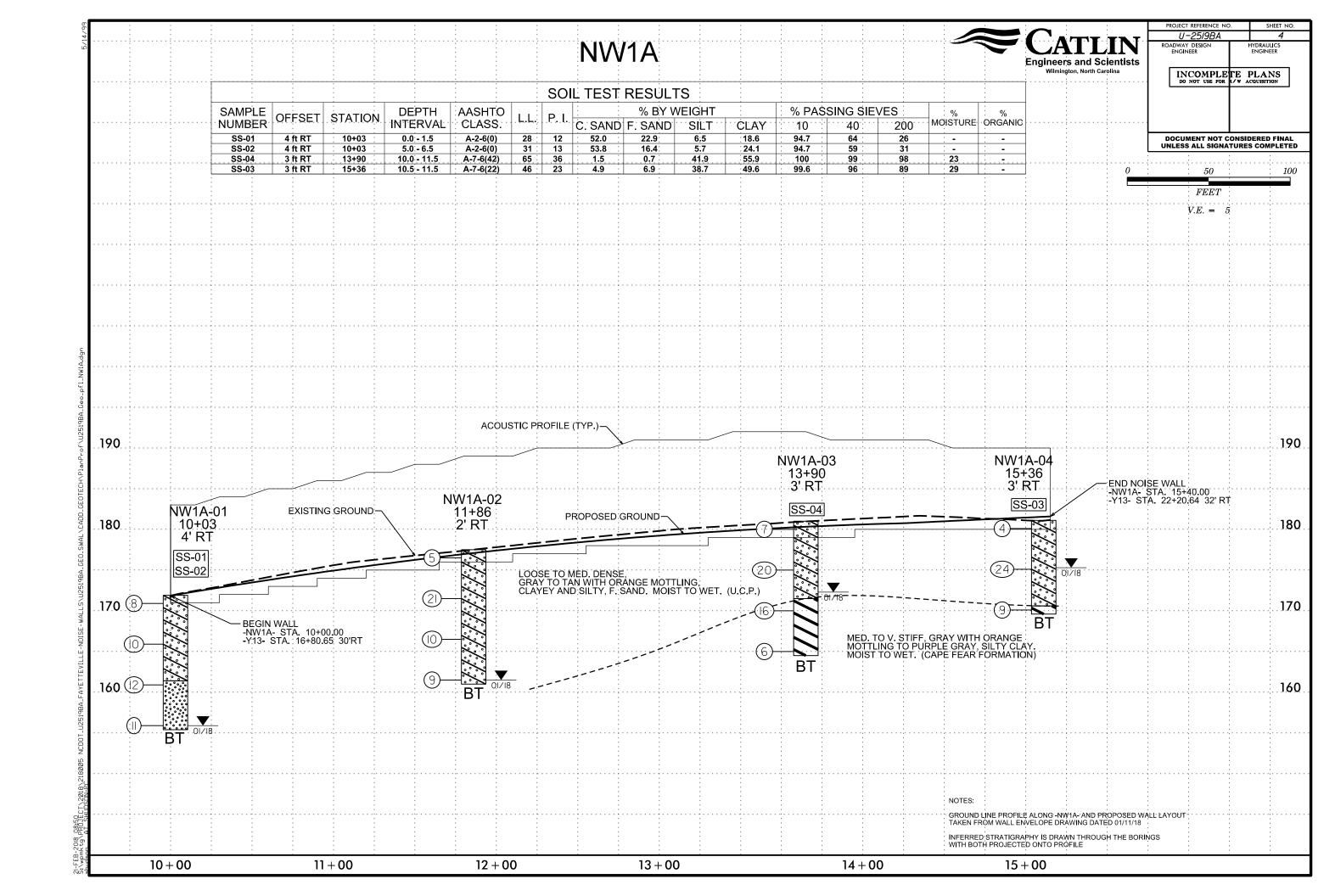
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL C	ESCRIPTION			GRADATION			ROCK DESCRIPTION			
BE PENETRATED WIT ACCORDING TO THE IS BASED ON T	D UNCONSOLIDATED, SEMI-CON TH A CONTINUOUS FLIGHT POU STANDARD PENETRATION TE THE AASHTO SYSTEM, BASIC I	VER AUGER AND YIELD LESS ST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	THAN 100 BLOWS PER FOOT 586). SOIL CLASSIFICATION ICLUDE THE FOLLOWING:	UNIFORMLY GRADED - IN	TES A GOOD REPRESENTATION OF PARTICL NDICATES THAT SOIL PARTICLES ARE ALL IS A MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS P BLOWS IN NON-COA	TES THE LEVEL AT WHICH NON-CO PENETRATION BY A SPLIT SPOON S ASTAL PLAIN MATERIAL, THE TR	WOULD YIELD SPT REFUSAL IF TESTI ASTAL PLAIN MATERIAL WOULD YIELD AMPLER EQUAL TO OR LESS THAN Ø. ANSITION BETWEEN SOIL AND ROCK		
AS MINERALO	R, TEXTURE, MOISTURE, AASHTC DGICAL COMPOSITION, ANGULA	RITY, STRUCTURE, PLASTICITY	,ETC. FOR EXAMPLE,		Y OR ROUNDNESS OF SOIL GRAINS IS DES		REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:				
	GRAY, SILTY CLAY, MOIST WITH INT	ERBEDDED FINE SAND LAYERS. AASHTO CLASSIFI			VIGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSIT		WEATHERED ROCK (WR)	NON-COASTAL PLA	AIN MATERIAL THAT WOULD YIELD SPI FOOT IF TESTED.		
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS ( > 35% PASSING #200)	ORGANIC MATERIALS		MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)		GRAIN IGNEOUS AND METAMORPHIC RC REFUSAL IF TESTED. ROCK TYPE IN		
GROUP A-1 CLASS. A-1-o A-1-b	A-3 A-2 A-2-4 A-2-5 A-2-6 A-2-	A-4 A-5 A-6 A-7 7 A-7 A-7 A-7 A-7-5	A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTA CK THAT WOULD YEILD SPT REFUSAL		
SYMBOL 000000000000000000000000000000000000				MODEF MODEF	HTLY COMPRESSIBLE RATELY COMPRESSIBLE LY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN S	IDES PHYLLITE, SLATE, SANDSTONE, ET EDIMENTS CEMENTED INTO ROCK, BUT ICK TYPE INCLUDES LIMESTONE, SANDS		
% PASSING *10 50 MX			GRANULAR SILT- CLAY MUCK,	HIGHL	PERCENTAGE OF MATERI	LL > 50	(CP)	SHELL BEDS, ETC.	HERING		
*40 30 MX 50 MX *200 15 MX 25 MX	(51 MN) (10 MX 35 MX 35 MX 35 MX 35 M	1X 36 MN 36 MN 36 MN 36 MN	SOILS SOILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH ROCK		NTS MAY SHOW SLIGHT STAINING, ROCK		
MATERIAL PASSING #40 LL — PI 6 MX	- 40 MX 41 MN 40 MX 41 M	N 40 MX 41 MN 40 MX 41 MN N 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR HIGHLY MODERATE STRUKS	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMM VERY SLIGHT ROCK (V SLI.) CRYS	IER IF CRYSTALLINE. GENERALLY FRESH, JOINTS STAINEI	), SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY, ROCK RINGS UNDER H		
GROUP INDEX Ø USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND	0 0 4 MX FINE SILTY OR CLAYEY SAND GRAVEL AND SAND	8 MX 12 MX 16 MX NO MX SILTY CLAYEY SOILS SOILS	AMOUNTS OF SOILS ORGANIC MATTER	▽	GROUND WATER		(SLI.) 1 INCH	H. OPEN JOINTS MAY CONTAIN CLAY	) AND DISCOLORATION EXTENDS INTO RC . IN GRANITOID ROCKS SOME OCCASIONA RYSTALLINE ROCKS RING UNDER HAMMEI		
MATERIALS SAND GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABL		STATIC WATER LEVEL AFTER <u>24</u> HC PERCHED WATER, SATURATED ZONE, OR SPRING OR SEEP		(MOD.) GRANI DULL	ITOID ROCKS, MOST FELDSPARS ARE	ISCOLORATION AND WEATHERING EFFECT DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH		
	PI OF A-7-5 SUBGROUP IS ≤ LL	- 30 ; PI OF A-7-6 SUBGROUP IS	> LL - 30		MISCELLANEOUS SYMBO	I C	MODERATELY ALL P	ROCK EXCEPT QUARTZ DISCOLORED	DR STAINED. IN GRANITOID ROCKS, ALL F KAOLINIZATION. ROCK SHOWS SEVERE L		
PRIMARY SOIL TYPE	COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH		<b>35 /035</b>		(MOD. SEV.) AND (		IST'S PICK. ROCK GIVES "CLUNK" SOUND		
GENERALLY	CONSISTENCY VERY LOOSE LOOSE	(N-VALUE) < 4 4 TO 10	(TONS/FT <sup>2</sup> )				SEVERE ALL F (SEV.) REDUC TO SC	ROCK EXCEPT QUARTZ DISCOLORED CED IN STRENGTH TO STRONG SOIL. OME EXTENT. SOME FRAGMENTS OF			
MATERIAL (NON-COHESIVE)	MEDIUM DENSE DENSE VERY DENSE VERY SOFT	10 TO 30 30 TO 50 > 50 < 2	N/A < 0.25		ILL (AF) OTHER Y EMBANKMENT AUGER BORING	CONE PENETROMETER TEST	VERY ALL F SEVERE BUT P	MASS IS EFFECTIVELY REDUCED TO	<u>&gt; 100 BPF</u> DR STAINED. ROCK FABRIC ELEMENTS AF SOIL STATUS, WITH ONLY FRAGMENTS OI DF ROCK WEATHERED TO A DEGREE THAT		
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	SOFT MEDIUM STIFF STIFF VERY STIFF	2 TO 4 4 TO 8 8 TO 15 15 TO 30	0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4			L TEST BORING WITH CORE	COMPLETE ROCK	REDUCED TO SOIL. ROCK FABRIC N	MAIN. <u>IF TESTED, WOULD YIELD SPT N N</u> DT DISCERNIBLE, OR DISCERNIBLE ONLY AY BE PRESENT AS DIKES OR STRINGERS		
	HARD	> 30	> 4		INSTREETION	0	-		IARDNESS		
U.S. STD. SIEVE SIZE	4 10	OR GRAIN SIZE 40 60 200	270		RECOMMENDATION SYMBO	JL 5 		OT BE SCRATCHED BY KNIFE OR SH RAL HARD BLOWS OF THE GEOLOGIS	ARP PICK. BREAKING OF HAND SPECIMEN T'S PICK.		
OPENING (MM)	4.76 2.00	0.42 0.25 0.075 COARSE FINE	0.053	- SHALLOW	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN E		NLY WITH DIFFICULTY. HARD HAMMER B		
(BLDR.) ((	0BBLE GRAVEL (COB.) (GR.) 75 2.0	SAND SAND (CSE, SD.) (F SD.	) (SL.) (UL.)		ACCEPTABLE DEGRADABLE ROCK ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	MODERATELY CAN E HARD EXCAN	BE SCRATCHED BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DI IST'S PICK. HAND SPECIMENS CAN BE D		
SIZE IN. 12	3 SOIL MOISTURE - 1	0.25 CORRELATION OF	0.05 0.005	BT - BORING TERMINATED CL CLAY CPT - CONE PENETRATION	D MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT $\gamma_{\rm A}$ - DRY UNIT WEIGHT	MEDIUM CAN E HARD CAN E	BE GROOVED OR GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE C PEICES 1 INCH MAXIMUM SIZE BY HARD		
SOIL MOISTURE (ATTERBERG LI	IMITS) DESCRI	PTION	IELD MOISTURE DESCRIPTION	CSE - COARSE	ORG ORGANIC ST PMT - PRESSUREMETER TES	e	SOFT CAN E	BE GROVED OR GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN E BY MODERATE BLOWS OF A PICK POIN SURE.		
	- SATURA (SAT. ) LIMIT		NUID:VERY WET.USUALLY THE GROUND WATER TABLE	e - VOID RATIO F - FINE - FOSS FOSSILIFEROUS	SD SAND, SANDY SL SILT, SILTY SLI SLIGHTLY	SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK	SOFT OR M		CAVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH		
	- WET -		EQUIRES DRYING TO MUM MOISTURE	FRAC FRACTURED, FRACT FRAGS FRAGMENTS	w - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	FRAC	TURE SPACING	BEDDING		
	IC LIMIT MOIST	- (M) SOLID; AT OR	NEAR OPTIMUM MOISTURE	DRILL UNITS:	V - VERY UIPMENT USED ON SUBJECT ADVANCING TOOLS:	PROJECT HAMMER TYPE:	TERM VERY WIDE WIDE MODERATELY CL	<u>SPACING</u> MORE THAN 10 FEET 3 TO 10 FEET .OSE 1 TO 3 FEET	TERM VERY THICKLY BEDDED THICKLY BEDDED 1 THINLY BEDDED 0.		
	KAGE LIMIT DRY -		DITIONAL WATER TO MUM MOISTURE	CME-45C	CLAY BITS	X AUTOMATIC MANUAL	CLOSE VERY CLOSE	0.16 TO 1 FOOT LESS THAN 0.16 FEET	VERY THINLY BEDDED 0.0 THICKLY LAMINATED 0.00 THINLY LAMINATED (		
'	PLA	STICITY			X 8" HOLLOW AUGERS	Вн			RATION		
NON PLASTIC SLIGHTLY PLAS		CITY INDEX (PI) 0-5 6-15	DRY STRENGTH VERY LOW SLIGHT	X CME-550	HARD FACED FINGER BITS	HAND TOOLS:	FOR SEDIMENTARY FRIABLE	RUBBING WITH	NING OF MATERIAL BY CEMENTING, HE I FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY P HIGHLY PLAST	IC 2	16-25 6 OR MORE	MEDIUM HIGH	PORTABLE HOIST	X CASING W/ ADVANCER TRICONE <u>2 <sup>15</sup>/16</u> STEEL TEETH	POST HOLE DIGGER	MODERATELY		BE SEPARATED FROM SAMPLE WITH ST Y WHEN HIT WITH HAMMER.		
	(	COLOR		┫┌┐ <u></u>	TRICONE' TUNGCARB.		INDURATED		DIFFICULT TO SEPARATE WITH STEEL BREAK WITH HAMMER.		
	INCLUDE COLOR OR COLOR WCH AS LIGHT, DARK, STREA		YELLOW-BROWN, BLUE-GRAY). SCRIBE APPEARANCE.			VANE SHEAR TEST	EXTREMELY		R BLOWS REQUIRED TO BREAK SAMPLI KS ACROSS GRAINS.		



ED. AN INFERRED	TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
SPT REFUSAL. FOOT PER 60	ALLUVIUM (ALLUV.) - SUILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
IN THEORY	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ICK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
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AL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
IF TESTED. C.	CULLUVIUM - ROCK FRADMENTS MIXED WITH SOLL DEPOSITED BY GRAVITY ON SLOPE OR AT BUTTOM
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
RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
	HORIZONTAL.
OATINGS IF OPEN, AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
L FELDSPAR R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
Y. ROCK HAS	PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH	FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT	<u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
E DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR ALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
S. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
EEP CAN BE	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
ETACHED	OR SLIP PLANE.
DR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS IT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR OREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: LOCATIONS AND ELEVATIONS OBTAINED WITH REAL TIME
THICKNESS	KINEMATICS (RTK) SURVEY GRADE POSITIONING SYSTEM (GPS)
4 FEET .5 - 4 FEET	ELEVATION: FEET
16 - 1.5 FEET	NOTES:
13 - 0.16 FEET 18 - 0.03 FEET	
0.008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	





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2

- 3

DESCRIPTION

LEGEND (SOIL & ROCK)

PROFILE WITH SOIL TEST RESULTS

TITLE SHEET

SITE PLAN

 $\overline{\mathcal{A}}$ 2519B REFERENCE

> 3481 PROIEC

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

### COUNTY \_\_\_\_\_CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1033 (CAMDEN RD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE RD) SITE DESCRIPTION NOISE WALL NWIB RIGHT OF -Y13 - 30 + 59 TO 36 + 22

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

### CAUTION NOTICE

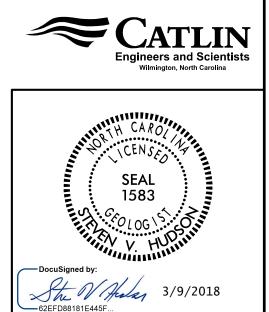
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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.

CENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER 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
CHRIS ALEXANDER
MIKE D. MASON
T. SPENCER
INVESTIGATED BY
DRAWN BY <u>STEVEN HUDSON</u>
CHECKED BY J. LEE STONE, LG
SUBMITTED BY STEVEN HUDSON, LG
DATE FEBRUARY 2018



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE

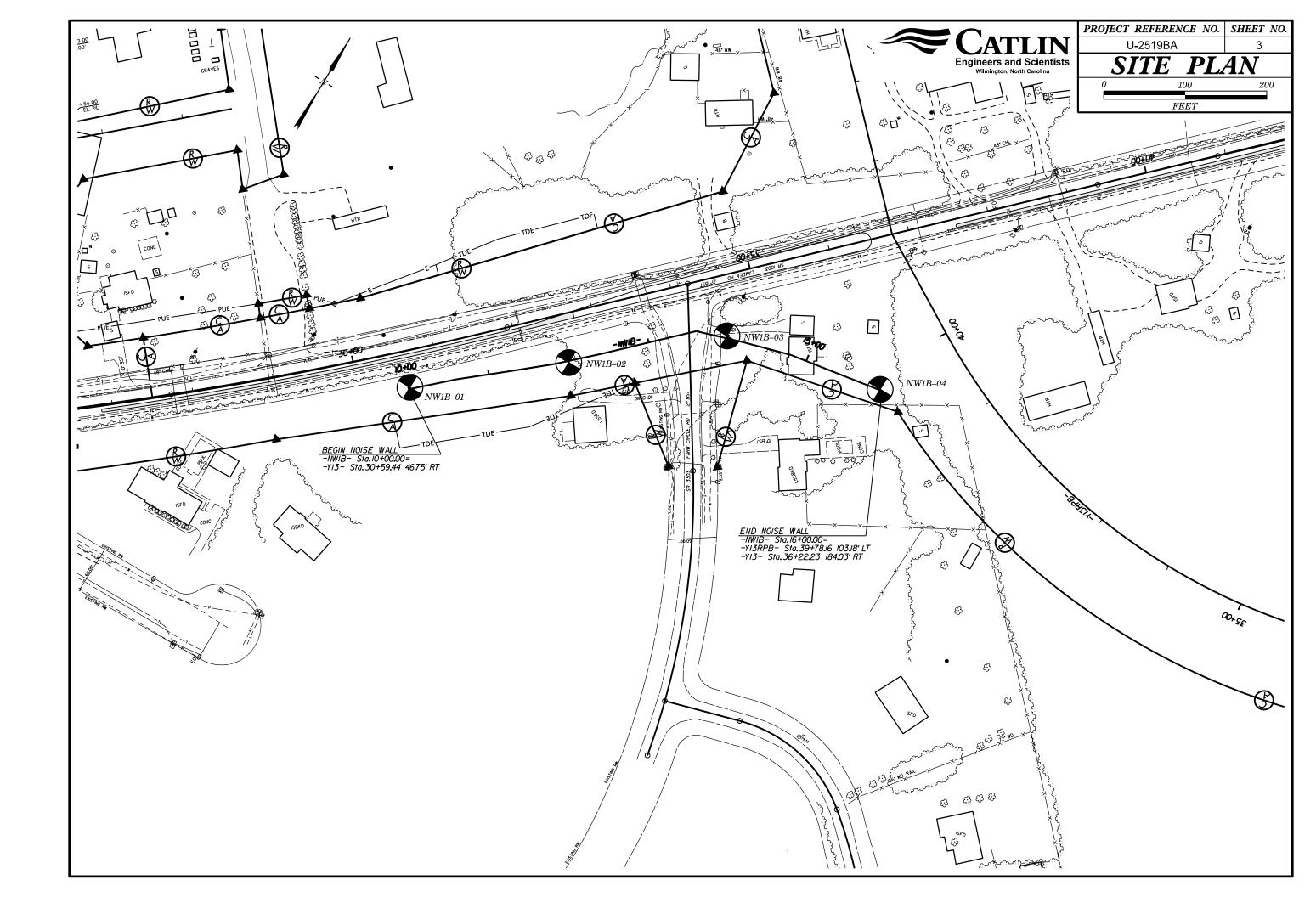
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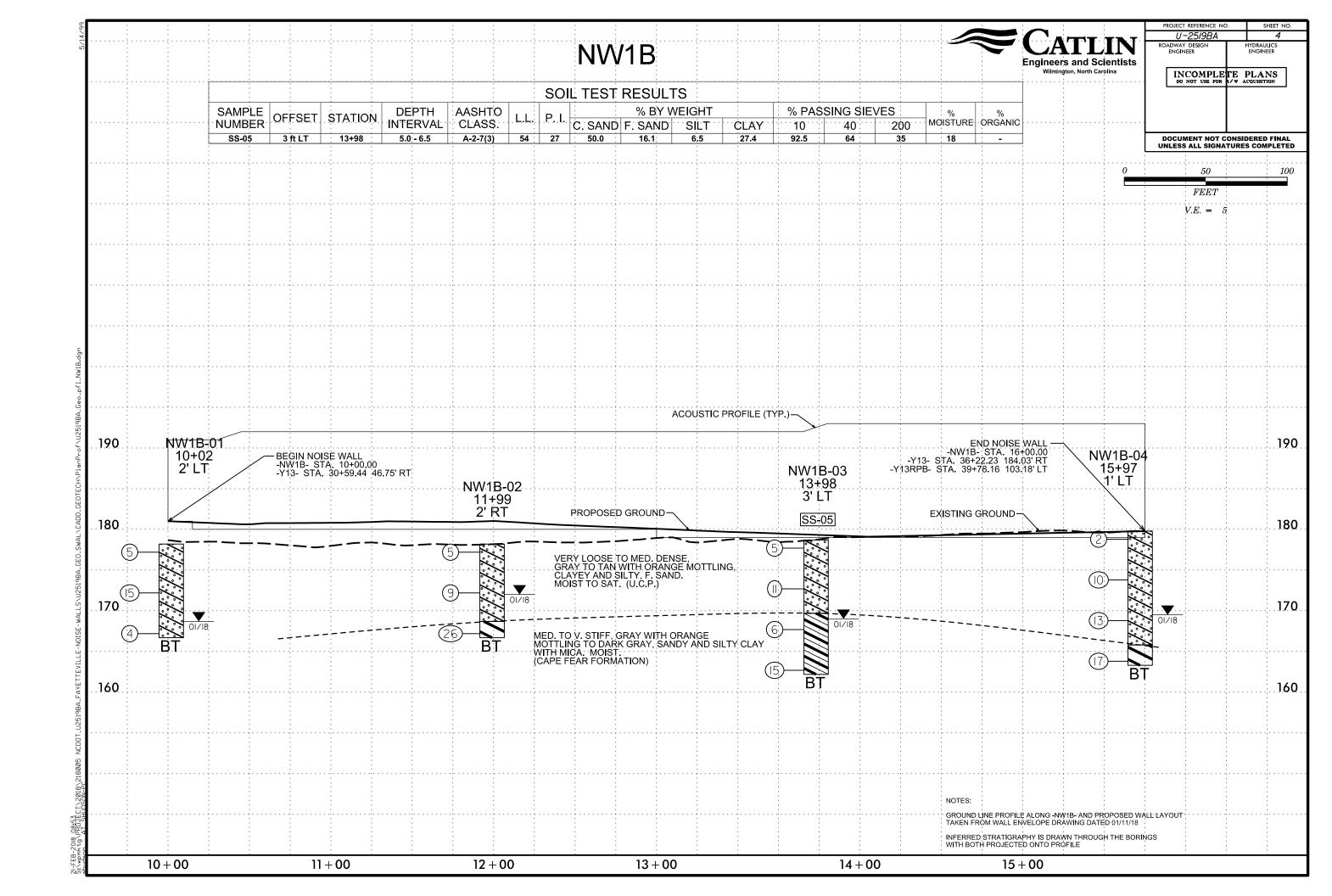
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL C	ESCRIPTION			GRADATION			ROCK DESCRIPTION			
BE PENETRATED WIT ACCORDING TO THE IS BASED ON T	D UNCONSOLIDATED, SEMI-CON TH A CONTINUOUS FLIGHT POU STANDARD PENETRATION TE THE AASHTO SYSTEM, BASIC I	VER AUGER AND YIELD LESS ST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	THAN 100 BLOWS PER FOOT 586). SOIL CLASSIFICATION ICLUDE THE FOLLOWING:	UNIFORMLY GRADED - IN	TES A GOOD REPRESENTATION OF PARTICL NDICATES THAT SOIL PARTICLES ARE ALL IS A MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS P BLOWS IN NON-COA	TES THE LEVEL AT WHICH NON-CO PENETRATION BY A SPLIT SPOON S ASTAL PLAIN MATERIAL, THE TR	WOULD YIELD SPT REFUSAL IF TESTI ASTAL PLAIN MATERIAL WOULD YIELD AMPLER EQUAL TO OR LESS THAN Ø. ANSITION BETWEEN SOIL AND ROCK		
AS MINERALO	R, TEXTURE, MOISTURE, AASHTC DGICAL COMPOSITION, ANGULA	RITY, STRUCTURE, PLASTICITY	,ETC. FOR EXAMPLE,		Y OR ROUNDNESS OF SOIL GRAINS IS DES		REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:				
	GRAY, SILTY CLAY, MOIST WITH INT	ERBEDDED FINE SAND LAYERS. AASHTO CLASSIFI			VIGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSIT		WEATHERED ROCK (WR)	NON-COASTAL PLA	AIN MATERIAL THAT WOULD YIELD SPI FOOT IF TESTED.		
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS		MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	LC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)		GRAIN IGNEOUS AND METAMORPHIC RC REFUSAL IF TESTED. ROCK TYPE IN		
GROUP A-1 CLASS. A-1-o A-1-b	A-3 A-2 A-2-4 A-2-5 A-2-6 A-2-	A-4 A-5 A-6 A-7 7 A-7 A-7 A-7 A-7-5	A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTA CK THAT WOULD YEILD SPT REFUSAL		
SYMBOL 000000000000000000000000000000000000				MODEF MODEF	HTLY COMPRESSIBLE RATELY COMPRESSIBLE LY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN S	IDES PHYLLITE, SLATE, SANDSTONE, ET EDIMENTS CEMENTED INTO ROCK, BUT ICK TYPE INCLUDES LIMESTONE, SANDS		
% PASSING *10 50 MX			GRANULAR SILT- CLAY MUCK,	HIGHL	PERCENTAGE OF MATERI	LL > 50	(CP)	SHELL BEDS, ETC.	HERING		
*40 30 MX 50 MX *200 15 MX 25 MX	(51 MN) (10 MX 35 MX 35 MX 35 MX 35 M	1X 36 MN 36 MN 36 MN 36 MN	SOILS SOILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH ROCK		NTS MAY SHOW SLIGHT STAINING, ROCK		
MATERIAL PASSING #40 LL — PI 6 MX	- 40 MX 41 MN 40 MX 41 M	N 40 MX 41 MN 40 MX 41 MN N 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR HIGHLY MODERATE STRUKS	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMM VERY SLIGHT ROCK (V SLI.) CRYS	IER IF CRYSTALLINE. GENERALLY FRESH, JOINTS STAINEI	), SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY, ROCK RINGS UNDER H		
GROUP INDEX Ø USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND	0 0 4 MX FINE SILTY OR CLAYEY SAND GRAVEL AND SAND	8 MX 12 MX 16 MX NO MX SILTY CLAYEY SOILS SOILS	AMOUNTS OF SOILS ORGANIC MATTER	▽	GROUND WATER		(SLI.) 1 INCH	H. OPEN JOINTS MAY CONTAIN CLAY	) AND DISCOLORATION EXTENDS INTO RC . IN GRANITOID ROCKS SOME OCCASIONA RYSTALLINE ROCKS RING UNDER HAMMEI		
MATERIALS SAND GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABL		STATIC WATER LEVEL AFTER <u>24</u> HC PERCHED WATER, SATURATED ZONE, OR SPRING OR SEEP		(MOD.) GRANI DULL	ITOID ROCKS, MOST FELDSPARS ARE	ISCOLORATION AND WEATHERING EFFECT DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH		
	PI OF A-7-5 SUBGROUP IS ≤ LL	- 30 ; PI OF A-7-6 SUBGROUP IS	> LL - 30		MISCELLANEOUS SYMBO	I C	MODERATELY ALL P	ROCK EXCEPT QUARTZ DISCOLORED	DR STAINED. IN GRANITOID ROCKS, ALL F KAOLINIZATION. ROCK SHOWS SEVERE L		
PRIMARY SOIL TYPE	COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH		<b>35 /035</b>		(MOD. SEV.) AND (		IST'S PICK. ROCK GIVES "CLUNK" SOUND		
GENERALLY	CONSISTENCY VERY LOOSE LOOSE	(N-VALUE) < 4 4 TO 10	(TONS/FT <sup>2</sup> )				SEVERE ALL F (SEV.) REDUC TO SC	ROCK EXCEPT QUARTZ DISCOLORED CED IN STRENGTH TO STRONG SOIL. OME EXTENT. SOME FRAGMENTS OF			
MATERIAL (NON-COHESIVE)	MEDIUM DENSE DENSE VERY DENSE VERY SOFT	10 TO 30 30 TO 50 > 50 < 2	N/A < 0.25		ILL (AF) OTHER Y EMBANKMENT AUGER BORING	CONE PENETROMETER TEST	VERY ALL F SEVERE BUT P	MASS IS EFFECTIVELY REDUCED TO	<u>&gt; 100 BPF</u> DR STAINED. ROCK FABRIC ELEMENTS AF SOIL STATUS, WITH ONLY FRAGMENTS OI DF ROCK WEATHERED TO A DEGREE THAT		
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	SOFT MEDIUM STIFF STIFF VERY STIFF	2 TO 4 4 TO 8 8 TO 15 15 TO 30	0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4			L TEST BORING WITH CORE	COMPLETE ROCK	REDUCED TO SOIL. ROCK FABRIC N	MAIN. <u>IF TESTED, WOULD YIELD SPT N N</u> DT DISCERNIBLE, OR DISCERNIBLE ONLY AY BE PRESENT AS DIKES OR STRINGERS		
	HARD	> 30	> 4		INSTREETION	0	-		IARDNESS		
U.S. STD. SIEVE SIZE	4 10	OR GRAIN SIZE 40 60 200	270		RECOMMENDATION SYMBO	JL 5 		OT BE SCRATCHED BY KNIFE OR SH RAL HARD BLOWS OF THE GEOLOGIS	ARP PICK. BREAKING OF HAND SPECIMEN T'S PICK.		
OPENING (MM)	4.76 2.00	0.42 0.25 0.075 COARSE FINE	0.053	- SHALLOW	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN E		NLY WITH DIFFICULTY. HARD HAMMER B		
(BLDR.) ((	0BBLE GRAVEL (COB.) (GR.) 75 2.0	SAND SAND (CSE, SD.) (F SD.	) (SL.) (UL.)		ACCEPTABLE DEGRADABLE ROCK ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	MODERATELY CAN E HARD EXCAN	BE SCRATCHED BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DI IST'S PICK. HAND SPECIMENS CAN BE D		
SIZE IN. 12	3 SOIL MOISTURE - 1	0.25 CORRELATION OF	0.05 0.005	BT - BORING TERMINATED CL CLAY CPT - CONE PENETRATION	D MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT $\gamma_{\rm A}$ - DRY UNIT WEIGHT	MEDIUM CAN E HARD CAN E	BE GROOVED OR GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE C PEICES 1 INCH MAXIMUM SIZE BY HARD		
SOIL MOISTURE (ATTERBERG LI	IMITS) DESCRI	PTION	IELD MOISTURE DESCRIPTION	CSE - COARSE	ORG ORGANIC ST PMT - PRESSUREMETER TES	e	SOFT CAN E	BE GROVED OR GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN E BY MODERATE BLOWS OF A PICK POIN SURE.		
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	- WET -		EQUIRES DRYING TO MUM MOISTURE	FRAC FRACTURED, FRACT FRAGS FRAGMENTS	w - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	FRAC	TURE SPACING	BEDDING		
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'	PLA	STICITY			X 8" HOLLOW AUGERS	Вн			RATION		
NON PLASTIC SLIGHTLY PLAS		CITY INDEX (PI) 0-5 6-15	DRY STRENGTH VERY LOW SLIGHT	X CME-550	HARD FACED FINGER BITS	HAND TOOLS:	FOR SEDIMENTARY FRIABLE	RUBBING WITH	NING OF MATERIAL BY CEMENTING, HE I FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY P HIGHLY PLAST	IC 2	16-25 6 OR MORE	MEDIUM HIGH	PORTABLE HOIST	X CASING W/ ADVANCER TRICONE <u>2 <sup>15</sup>/16</u> STEEL TEETH	POST HOLE DIGGER	MODERATELY		BE SEPARATED FROM SAMPLE WITH ST Y WHEN HIT WITH HAMMER.		
	(	COLOR		┫┌┐ <u></u>	TRICONE' TUNGCARB.		INDURATED		DIFFICULT TO SEPARATE WITH STEEL BREAK WITH HAMMER.		
	INCLUDE COLOR OR COLOR WCH AS LIGHT, DARK, STREA		YELLOW-BROWN, BLUE-GRAY). SCRIBE APPEARANCE.			VANE SHEAR TEST	EXTREMELY		R BLOWS REQUIRED TO BREAK SAMPLI KS ACROSS GRAINS.		



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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
RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
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DR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
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ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: LOCATIONS AND ELEVATIONS OBTAINED WITH REAL TIME
THICKNESS	KINEMATICS (RTK) SURVEY GRADE POSITIONING SYSTEM (GPS)
4 FEET .5 - 4 FEET	ELEVATION: FEET
16 - 1.5 FEET	NOTES:
13 - 0.16 FEET 18 - 0.03 FEET	
0.008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	





2

- 3

4-5

 $\checkmark$ 2519B REFERENCE

> 3481 PROIEC

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

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_\_\_\_\_CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1033 (CAMDEN RD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE RD) SITE DESCRIPTION NOISE WALL NW4B RIGHT OF -L-451+75 TO 473+43

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	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.

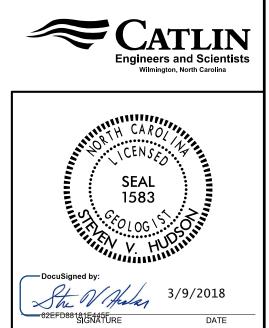
CENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

PERSUNNEL
CHRIS ALEXANDER
MIKE D. MASON
T. SPENCER
INVESTIGATED BY STEVEN HUDSON
DRAWN BY <u>Steven Hudson</u>
CHECKED BY J. LEE STONE, LG
SUBMITTED BY
DATE FEBRUARY 2018

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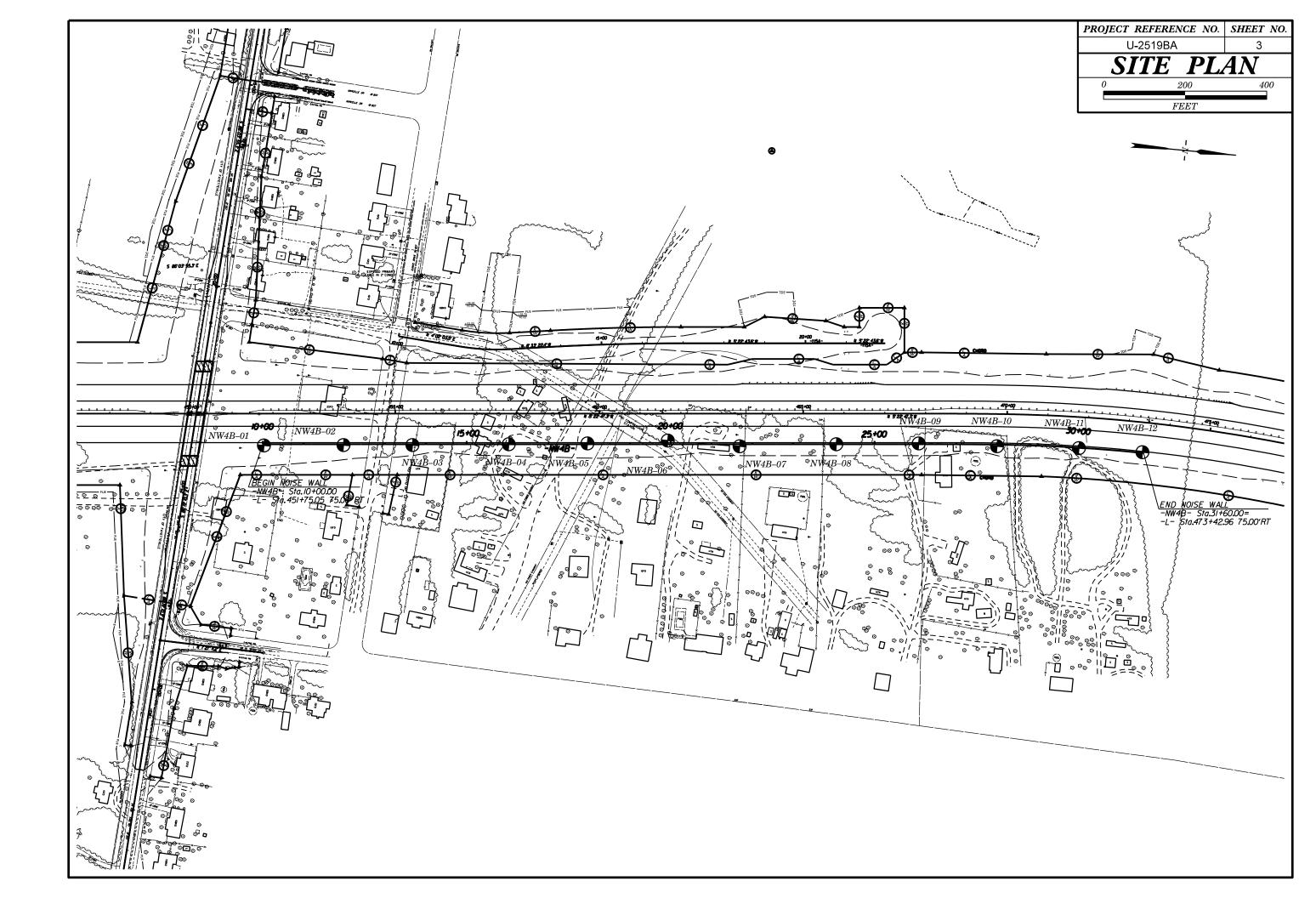
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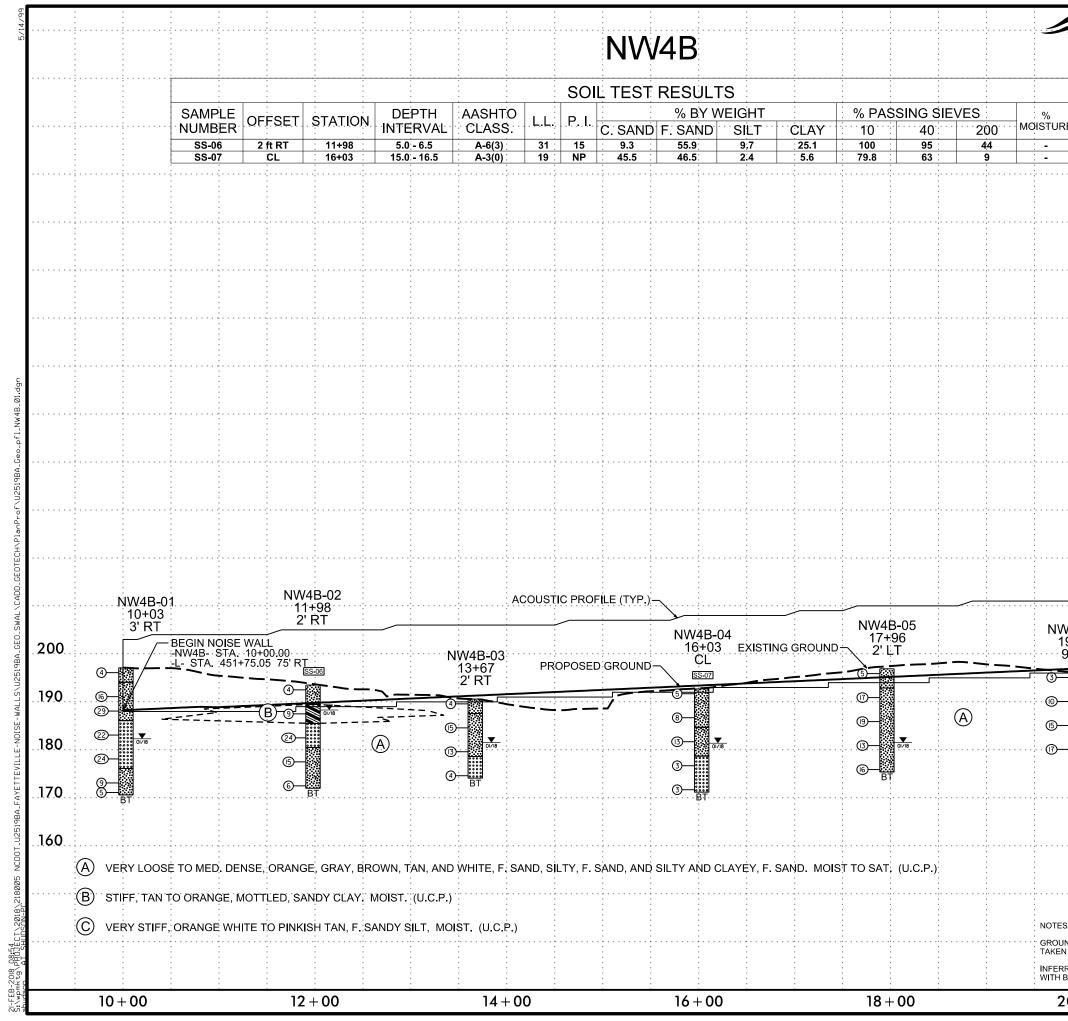
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL	DESCRIPTION		Т	GRADATION			ROCK DE	SCRIPTION
BE PENETRATED ACCORDING TO IS BASED	DERED UNCONSOLIDATED, SEMI-CO D WITH A CONTINUOUS FLIGHT P D THE STANDARD PENETRATION T ON THE AASHTO SYSTEM, BASIC	DWER AUGER AND YIELD LESS EST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	THAN 100 BLOWS PER FOOT 586). SOIL CLASSIFICATION ICLUDE THE FOLLOWING:	UNIFORMLY GRADED - IN	TES A GOOD REPRESENTATION OF PARTICL NDICATES THAT SOIL PARTICLES ARE ALL IS A MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS P BLOWS IN NON-COA	TES THE LEVEL AT WHICH NON-CO PENETRATION BY A SPLIT SPOON S	WOULD YIELD SPT REFUSAL IF TESTI IASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EQUAL TO OR LESS THAN Ø. NANSITION BETWEEN SOIL AND ROCK
AS MINE	COLOR, TEXTURE, MOISTURE, AASH ERALOGICAL COMPOSITION, ANGUL	ARITY, STRUCTURE, PLASTICITY	,ETC. FOR EXAMPLE,		ANGULARITY OF GRAIN			ARE TYPICALLY DIVIDED AS FOLLO	)ws:
VERY S	STIFF.GRAY.SILTY CLAY,MOIST WITH IN SOIL LEGEND AND	TERBEDDED FINE SAND LAYERS			VIGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSI		WEATHERED ROCK (WR)	NON-COASTAL PLI 100 BLOWS PER P	AIN MATERIAL THAT WOULD YIELD SP1 FOOT IF TESTED.
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS ( > 35% PASSING = 200)	ORGANIC MATERIALS		MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	ALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)		GRAIN IGNEOUS AND METAMORPHIC RC T REFUSAL IF TESTED. ROCK TYPE IN
GROUP A- CLASS. A-1-o	A-1-b A-2-4 A-2-5 A-2-6 A-	A-4 A-5 A-6 A-7 2-7 A-75 A-7-5	A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COAST
SYMBOL 000000				MODEF	HTLY COMPRESSIBLE RATELY COMPRESSIBLE LY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN S	JDES PHYLLITE, SLATE, SANDSTONE, ET GEDIMENTS CEMENTED INTO ROCK, BUT DCK TYPE INCLUDES LIMESTONE, SANDS
% PASSING *10 50 MX			GRANULAR SILT- MUCK,	HIGHL	PERCENTAGE OF MATER	LL > 50	(CP)	SHELL BEDS, ETC	HERING
	50 MX 51 MN 25 MX 10 MX 35 MX 35 MX 35 MX 35	MX 36 MN 36 MN 36 MN 36 MN	SOILS SOILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH ROCK		NTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING #40 LL - PI 6 M	40 MX 41 MN 40 MX 41	MN 40 MX 41 MN 40 MX 41 MN MN 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR HIGHLY MODERATE DESCRIPTION	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMM VERY SLIGHT ROCK (V SLI.) CRYS	MER IF CRYSTALLINE. CGENERALLY FRESH, JOINTS STAINED	D, SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX Ø USUAL TYPES STONE F OF MAJOR GRAVEL	FRAGS. FINE STILTY OR CLAYEY	8 MX 12 MX 16 MX NO MX SILTY CLAYEY SOILS SOILS	AMOUNTS OF SOILS ORGANIC MATTER		GROUND WATER		(SLI.) 1 INCH	H. OPEN JOINTS MAY CONTAIN CLAY	D AND DISCOLORATION EXTENDS INTO RC . IN GRANITOID ROCKS SOME OCCASIONA RYSTALLINE ROCKS RING UNDER HAMMEI
MATERIALS SAN GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	 ε −	STATIC WATER LEVEL AFTER <u>24</u> HU PERCHED WATER, SATURATED ZONE, OR SPRING OR SEEP		(MOD.) GRANI DULL	ITOID ROCKS, MOST FELDSPARS ARE	ISCOLORATION AND WEATHERING EFFECT DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH
		- 30 ; PI OF A-7-6 SUBGROUP IS	> LL - 30		MISCELLANEOUS SYMBO		MODERATELY ALL P	ROCK EXCEPT QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F KAOLINIZATION. ROCK SHOWS SEVERE L
PRIMARY SOIL 1	COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH		<b>JE (0)E</b>		(MOD. SEV.) AND (		IST'S PICK. ROCK GIVES "CLUNK" SOUND
GENERALLY	VERY LOOSE	(N-VALUE) (N-VALUE) < 4 4 TO 10	(TONS/FT <sup>2</sup> )				SEVERE ALL F (SEV.) REDUC TO SC	ROCK EXCEPT QUARTZ DISCOLORED ICED IN STRENGTH TO STRONG SOIL. SOME EXTENT. SOME FRAGMENTS OF	
MATERIAL (NON-COHESIV	YE) MEDIUM DENSE DENSE VERY DENSE VERY SOFT	10 TO 30 30 TO 50 > 50 < 2	N/A < 0.25		ILL (AF) OTHER Y EMBANKMENT AUGER BORING	CONE PENETROMETER TEST	VERY ALL F SEVERE BUT P	MASS IS EFFECTIVELY REDUCED TO	OR STAINED. ROCK FABRIC ELEMENTS AF SOIL STATUS, WITH ONLY FRAGMENTS OI DF ROCK WEATHERED TO A DEGREE THAT
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	SOFT MEDIUM STIFF STIFF VERY STIFF	2 TO 4 4 TO 8 8 TO 15 15 TO 30	0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4			LL + TEST BORING WITH CORE SPT N-VALUE	COMPLETE ROCK	REDUCED TO SOIL. ROCK FABRIC N	MAIN. <u>IF TESTED, WOULD YIELD SPT N N</u> OT DISCERNIBLE, OR DISCERNIBLE ONLY AY BE PRESENT AS DIKES OR STRINGERS
	HARD	> 30	> 4		INSTREETION	0	-		HARDNESS
U.S. STD. SIEVE S		OR GRAIN SIZE	270		RECOMMENDATION SYMBO	JL 5 		IOT BE SCRATCHED BY KNIFE OR SH RAL HARD BLOWS OF THE GEOLOGIS	ARP PICK. BREAKING OF HAND SPECIMEN T'S PICK.
OPENING (MM)	4.76 2.0		0.053	SHALLOW	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN E		DNLY WITH DIFFICULTY. HARD HAMMER B
BOULDER (BLDR.)	COBBLE GRAVEL (COB.) (GR.) 05 75 2.0	SAND SAND (CSE, SD.) (F SD.	) (SL.) (UL.)		ACCEPTABLE DEGRADABLE ROCK ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	MODERATELY CAN E HARD EXCAN	BE SCRATCHED BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DI DIST'S PICK. HAND SPECIMENS CAN BE D
	12 3	0.25 CORRELATION OF	0.05 0.005 TERMS	BT - BORING TERMINATED CL CLAY CPT - CONE PENETRATION	D MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT $\gamma_{4}$ - DRY UNIT WEIGHT	MEDIUM CAN E HARD CAN E	BE GROOVED OR GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE C PEICES 1 INCH MAXIMUM SIZE BY HARD
	RG LIMITS) DESCR	RIPTION	IELD MOISTURE DESCRIPTION	CSE COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRAT	ORG ORGANIC ST PMT - PRESSUREMETER TES	e e e e e e e e e e e e e e e e e e e	SOFT CAN E	BE GROVED OR GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN E BY MODERATE BLOWS OF A PICK POIN SSURE.
	- SATUI (SA IQUID LIMIT		NUID; VERY WET, USUALLY THE GROUND WATER TABLE	e - VOID RATIO F - FINE - FOSS FOSSILIFEROUS	SD SAND, SANDY SL SILT, SILTY SLI SLIGHTLY	SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK	SOFT OR M		CAVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH
	- WET		EQUIRES DRYING TO MUM MOISTURE	FRAC FRACTURED, FRACT FRAGS FRAGMENTS	w - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	FRAC	CTURE SPACING	BEDDING
ом о	LASTIC LIMIT MOIST	- (M) SOLID; AT OF	NEAR OPTIMUM MOISTURE	HI HIGHLY EQU DRILL UNITS:	V - VERY UIPMENT USED ON SUBJECT ADVANCING TOOLS:	RATIO PROJECT HAMMER TYPE:	TERM VERY WIDE WIDE MODERATELY CL	<u>SPACING</u> MORE THAN 10 FEET 3 TO 10 FEET _OSE 1 TO 3 FEET	TERM VERY THICKLY BEDDED THICKLY BEDDED 1 THINLY BEDDED 0.
SL SI	HRINKAGE LIMIT DRY -		DITIONAL WATER TO MUM MOISTURE	CME-45C	CLAY BITS	X AUTOMATIC MANUAL	CLOSE VERY CLOSE	0.16 TO 1 FOOT LESS THAN 0.16 FEET	VERY THINLY BEDDED 0.0 THICKLY LAMINATED 0.00 THINLY LAMINATED <
	PL	ASTICITY			X 8" HOLLOW AUGERS	Вн			RATION
NON PLAS SLIGHTLY		TICITY INDEX (PI) 0-5 6-15	DRY STRENGTH VERY LOW SLIGHT	X CME-550	HARD FACED FINGER BITS	HAND TOOLS:	FOR SEDIMENTARY FRIABLE	RUBBING WITH	NING OF MATERIAL BY CEMENTING.HE I FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.
	ELY PLASTIC	16-25 26 OR MORE	MEDIUM HIGH	PORTABLE HOIST	X CASING W/ ADVANCER X TRICONE <u>2 <sup>15</sup>//6</u> STEEL TEETH	POST HOLE DIGGER	MODERATELY		BE SEPARATED FROM SAMPLE WITH ST Y WHEN HIT WITH HAMMER.
		COLOR		4 🗂 🤺	TRICONE TUNGCARB.		INDURATED		DIFFICULT TO SEPARATE WITH STEEL D BREAK WITH HAMMER.
	MAY INCLUDE COLOR OR COLO RS SUCH AS LIGHT, DARK, STRE				CORE BIT	VANE SHEAR TEST	EXTREMELY	INDURATED SHARP HAMME	R BLOWS REQUIRED TO BREAK SAMPLI KS ACROSS GRAINS.

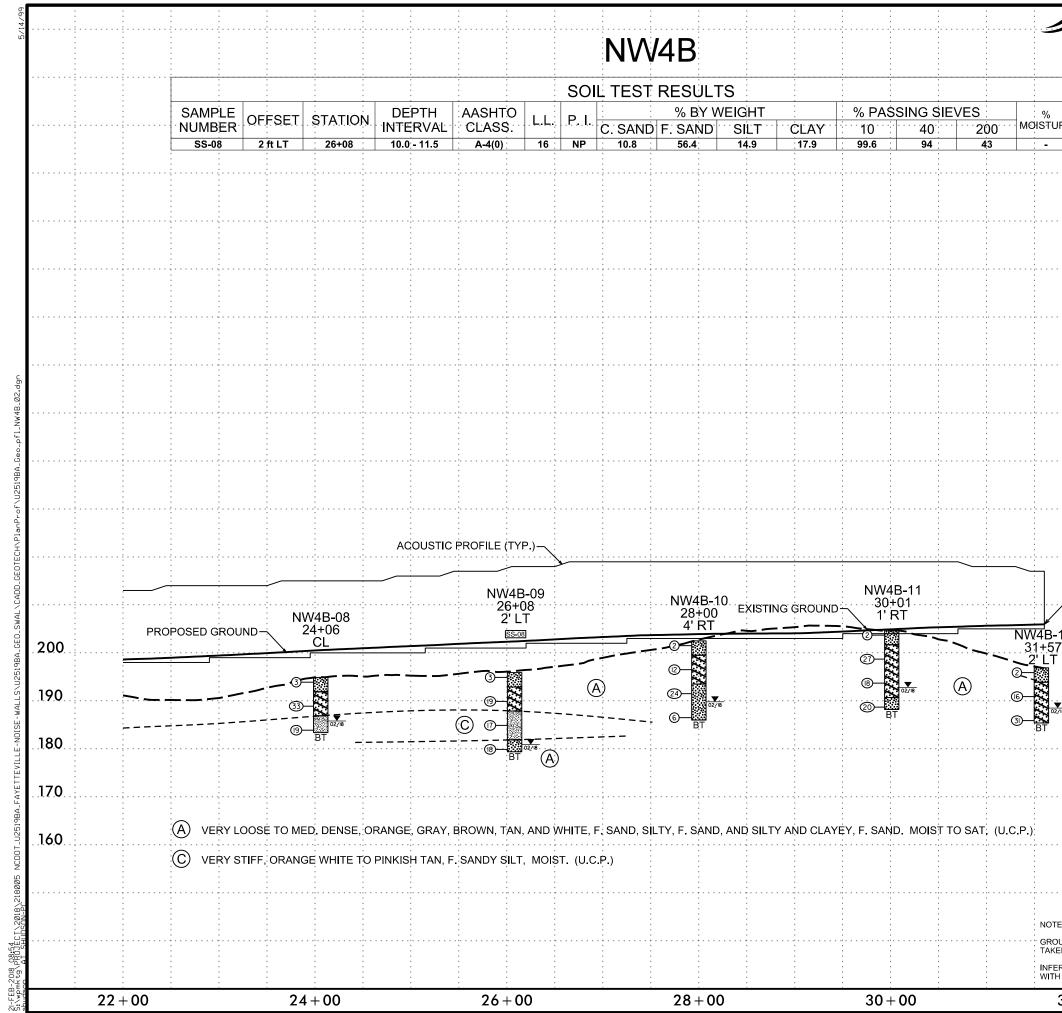


ED. AN INFERRED	TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
SPT REFUSAL. FOOT PER 60	ALLUVIUM (ALLUV.) - SUILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
IN THEORY	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ICK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLUDES GRANITE.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
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AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
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PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR OREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: LOCATIONS AND ELEVATIONS OBTAINED WITH REAL TIME
THICKNESS	KINEMATICS (RTK) SURVEY GRADE POSITIONING SYSTEM (GPS)
4 FEET .5 - 4 FEET	ELEVATION: FEET
16 - 1.5 FEET	NOTES:
13 - 0.16 FEET 18 - 0.03 FEET	
0.008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	





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 $\overline{\mathcal{A}}$ 2519B REFERENCE

> 3481 PROIEC

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

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1033 (CAMDEN RD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE RD) SITE DESCRIPTION NOISE WALL NWS RIGHT OF -L-505+40 TO 516+66

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND 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.

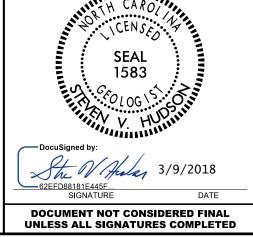
CENERAL SOL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

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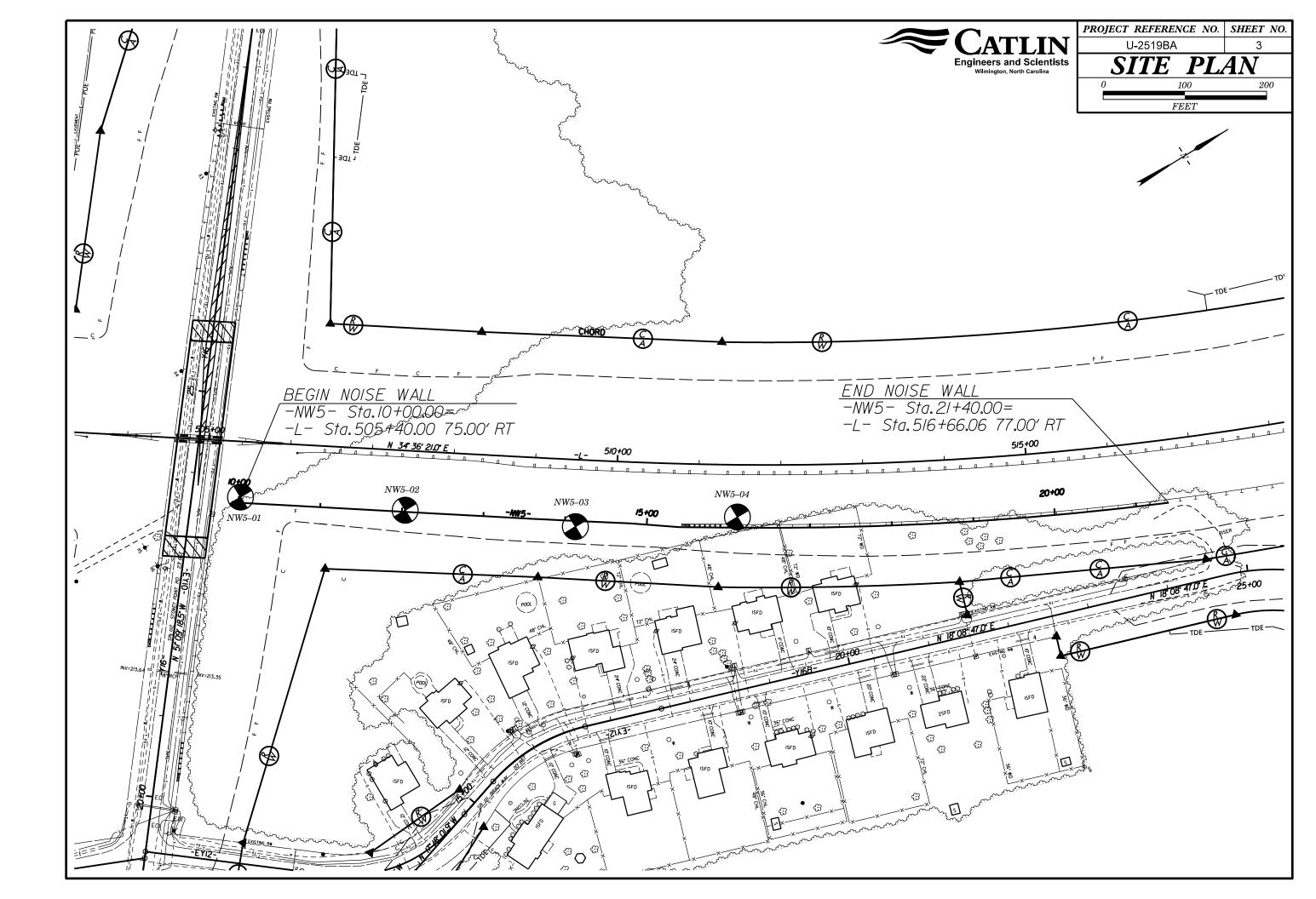


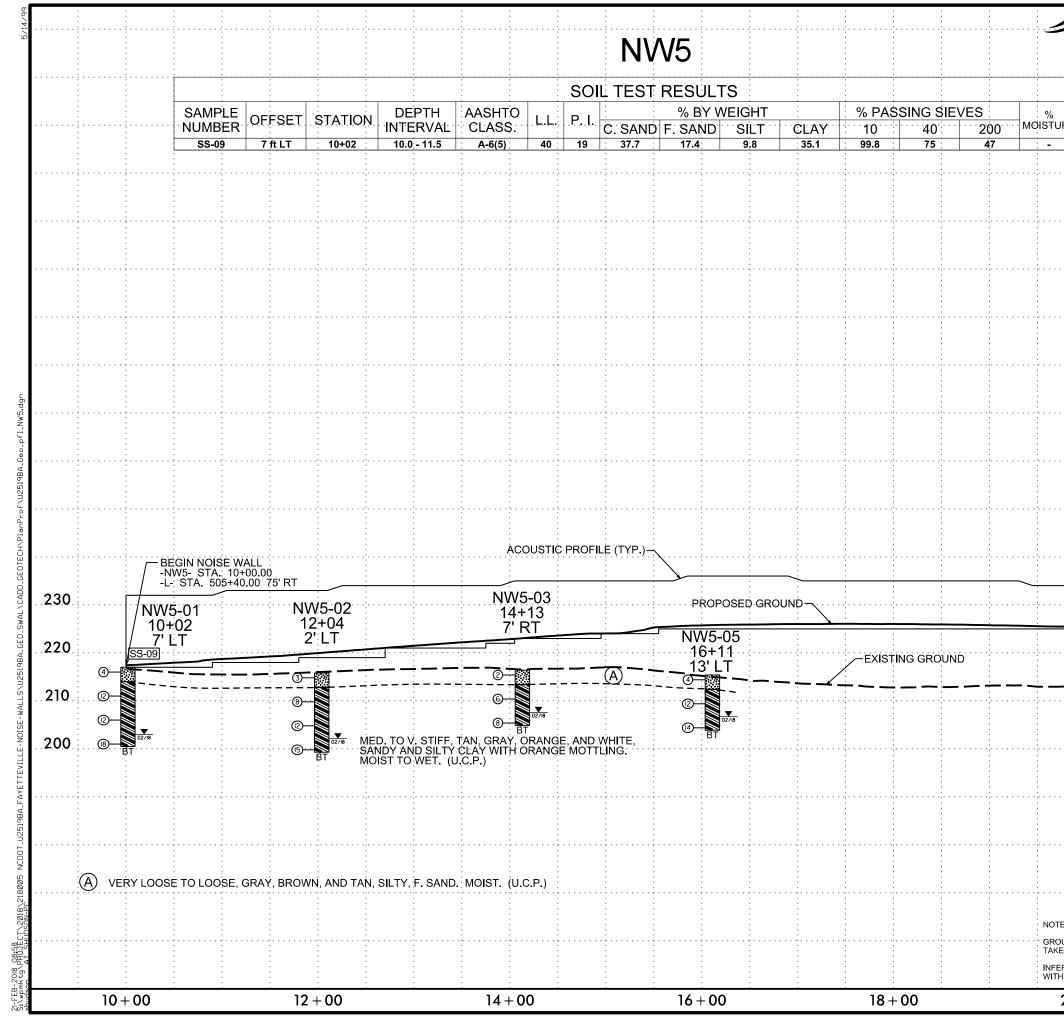
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL	DESCRIPTION		Т	GRADATION			ROCK DE	SCRIPTION
BE PENETRATED ACCORDING TO IS BASED	DERED UNCONSOLIDATED, SEMI-CO D WITH A CONTINUOUS FLIGHT P D THE STANDARD PENETRATION T ON THE AASHTO SYSTEM, BASIC	DWER AUGER AND YIELD LESS EST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	THAN 100 BLOWS PER FOOT 586). SOIL CLASSIFICATION ICLUDE THE FOLLOWING:	UNIFORMLY GRADED - IN	TES A GOOD REPRESENTATION OF PARTICL NDICATES THAT SOIL PARTICLES ARE ALL IS A MIXTURE OF UNIFORM PARTICLE SIZE	APPROXIMATELY THE SAME SIZE. ES OF TWO OR MORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS P BLOWS IN NON-COA	TES THE LEVEL AT WHICH NON-CO PENETRATION BY A SPLIT SPOON S	WOULD YIELD SPT REFUSAL IF TESTI IASTAL PLAIN MATERIAL WOULD YIELD SAMPLER EQUAL TO OR LESS THAN Ø. NANSITION BETWEEN SOIL AND ROCK
AS MINE	COLOR, TEXTURE, MOISTURE, AASH ERALOGICAL COMPOSITION, ANGUL	ARITY, STRUCTURE, PLASTICITY	,ETC. FOR EXAMPLE,		ANGULARITY OF GRAIN			ARE TYPICALLY DIVIDED AS FOLLO	)ws:
VERY S	STIFF.GRAY.SILTY CLAY,MOIST WITH IN SOIL LEGEND AND	TERBEDDED FINE SAND LAYERS			VIGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSI		WEATHERED ROCK (WR)	NON-COASTAL PLI 100 BLOWS PER P	AIN MATERIAL THAT WOULD YIELD SP1 FOOT IF TESTED.
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING ■200)	SILT-CLAY MATERIALS ( > 35% PASSING = 200)	ORGANIC MATERIALS		MES SUCH AS QUARTZ, FELDSPAR, MICA, TA	ALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)		GRAIN IGNEOUS AND METAMORPHIC RC T REFUSAL IF TESTED. ROCK TYPE IN
GROUP A- CLASS. A-1-o	A-1-b A-2-4 A-2-5 A-2-6 A-	A-4 A-5 A-6 A-7 2-7 A-75 A-7-5	A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN	N DESCRIPTIONS WHEN THEY ARE CONSIDE	RED OF SIGNIFICANCE.	NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COAST
SYMBOL 000000				MODEF	HTLY COMPRESSIBLE RATELY COMPRESSIBLE LY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN S	JDES PHYLLITE, SLATE, SANDSTONE, ET GEDIMENTS CEMENTED INTO ROCK, BUT DCK TYPE INCLUDES LIMESTONE, SANDS
% PASSING *10 50 MX			GRANULAR SILT- MUCK,	HIGHL	PERCENTAGE OF MATER	LL > 50	(CP)	SHELL BEDS, ETC	HERING
	50 MX 51 MN 25 MX 10 MX 35 MX 35 MX 35 MX 35	MX 36 MN 36 MN 36 MN 36 MN	SOILS SOILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY SOILS SOILS	OTHER MATERIAL	FRESH ROCK		NTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING #40 LL - PI 6 M	40 MX 41 MN 40 MX 41	MN 40 MX 41 MN 40 MX 41 MN MN 10 MX 10 MX 11 MN 11 MN	SOILS WITH LITTLE OR HIGHLY MODERATE DESCRIPTION	TRACE OF ORGANIC MA LITTLE ORGANIC MATT MODERATELY ORGANIC HIGHLY ORGANIC	ATTER 2 - 3% 3 - 5% TER 3 - 5% 5 - 12%	TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMM VERY SLIGHT ROCK (V SLI.) CRYS	MER IF CRYSTALLINE. CGENERALLY FRESH, JOINTS STAINED	D, SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX Ø USUAL TYPES STONE F OF MAJOR GRAVEL	FRAGS. FINE STILTY OR CLAYEY	8 MX 12 MX 16 MX NO MX SILTY CLAYEY SOILS SOILS	AMOUNTS OF SOILS ORGANIC MATTER		GROUND WATER		(SLI.) 1 INCH	H. OPEN JOINTS MAY CONTAIN CLAY	D AND DISCOLORATION EXTENDS INTO RC . IN GRANITOID ROCKS SOME OCCASIONA RYSTALLINE ROCKS RING UNDER HAMMEI
MATERIALS SAN GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	 ε −	STATIC WATER LEVEL AFTER <u>24</u> HU PERCHED WATER, SATURATED ZONE, OR SPRING OR SEEP		(MOD.) GRANI DULL	ITOID ROCKS, MOST FELDSPARS ARE	ISCOLORATION AND WEATHERING EFFECT DULL AND DISCOLORED, SOME SHOW CLA SHOWS SIGNIFICANT LOSS OF STRENGTH
		- 30 ; PI OF A-7-6 SUBGROUP IS	> LL - 30		MISCELLANEOUS SYMBO		MODERATELY ALL P	ROCK EXCEPT QUARTZ DISCOLORED	OR STAINED. IN GRANITOID ROCKS, ALL F KAOLINIZATION. ROCK SHOWS SEVERE L
PRIMARY SOIL 1	COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH		<b>JE (0)E</b>		(MOD. SEV.) AND (		IST'S PICK. ROCK GIVES "CLUNK" SOUND
GENERALLY	VERY LOOSE	(N-VALUE) (N-VALUE) < 4 4 TO 10	(TONS/FT <sup>2</sup> )				SEVERE ALL F (SEV.) REDUC TO SC	ROCK EXCEPT QUARTZ DISCOLORED ICED IN STRENGTH TO STRONG SOIL. SOME EXTENT. SOME FRAGMENTS OF	
MATERIAL (NON-COHESIV	YE) MEDIUM DENSE DENSE VERY DENSE VERY SOFT	10 TO 30 30 TO 50 > 50 < 2	N/A < 0.25		ILL (AF) OTHER Y EMBANKMENT AUGER BORING	CONE PENETROMETER TEST	VERY ALL F SEVERE BUT P	MASS IS EFFECTIVELY REDUCED TO	OR STAINED. ROCK FABRIC ELEMENTS AF SOIL STATUS, WITH ONLY FRAGMENTS OI DF ROCK WEATHERED TO A DEGREE THAT
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	SOFT MEDIUM STIFF STIFF VERY STIFF	2 TO 4 4 TO 8 8 TO 15 15 TO 30	0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4			LL + TEST BORING WITH CORE SPT N-VALUE	COMPLETE ROCK	REDUCED TO SOIL. ROCK FABRIC N	MAIN. <u>IF TESTED, WOULD YIELD SPT N N</u> OT DISCERNIBLE, OR DISCERNIBLE ONLY AY BE PRESENT AS DIKES OR STRINGERS
	HARD	> 30	> 4		INSTREETION	0	-		HARDNESS
U.S. STD. SIEVE S		OR GRAIN SIZE	270		RECOMMENDATION SYMBO	JL 5 		IOT BE SCRATCHED BY KNIFE OR SH RAL HARD BLOWS OF THE GEOLOGIS	ARP PICK. BREAKING OF HAND SPECIMEN T'S PICK.
OPENING (MM)	4.76 2.0		0.053	SHALLOW	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN E		DNLY WITH DIFFICULTY. HARD HAMMER B
BOULDER (BLDR.)	COBBLE GRAVEL (COB.) (GR.) 05 75 2.0	SAND SAND (CSE, SD.) (F SD.	) (SL.) (UL.)		ACCEPTABLE DEGRADABLE ROCK ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	MODERATELY CAN E HARD EXCAN	BE SCRATCHED BY KNIFE OR PICK.	GOUGES OR GROOVES TO 0.25 INCHES DI DIST'S PICK. HAND SPECIMENS CAN BE D
	12 3	CORRELATION OF	0.05 0.005 TERMS	BT - BORING TERMINATED — CL CLAY CPT - CONE PENETRATION	D MICA MICACEOUS MOD MODERATELY	WEA WEATHERED $\gamma$ - UNIT WEIGHT $\gamma_{4}$ - DRY UNIT WEIGHT	MEDIUM CAN E HARD CAN E	BE GROOVED OR GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE C PEICES 1 INCH MAXIMUM SIZE BY HARD
	RG LIMITS) DESCR	RIPTION	IELD MOISTURE DESCRIPTION	CSE COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRAT	ORG ORGANIC ST PMT - PRESSUREMETER TES	e e e e e e e e e e e e e e e e e e e	SOFT CAN E	BE GROVED OR GOUGED READILY BY	KNIFE OR PICK. CAN BE EXCAVATED IN E BY MODERATE BLOWS OF A PICK POIN SSURE.
	- SATUI (SA IQUID LIMIT		NUID; VERY WET, USUALLY THE GROUND WATER TABLE	e - VOID RATIO F - FINE - FOSS FOSSILIFEROUS	SD SAND, SANDY SL SILT, SILTY SLI SLIGHTLY	SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK	SOFT OR M		CAVATED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH
	- WET		EQUIRES DRYING TO MUM MOISTURE	FRAC FRACTURED, FRACT FRAGS FRAGMENTS	w - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	FRAC	CTURE SPACING	BEDDING
ом о	LASTIC LIMIT MOIST	- (M) SOLID; AT OF	NEAR OPTIMUM MOISTURE	HI HIGHLY EQU DRILL UNITS:	V - VERY UIPMENT USED ON SUBJECT ADVANCING TOOLS:	RATIO PROJECT HAMMER TYPE:	TERM VERY WIDE WIDE MODERATELY CL	<u>SPACING</u> MORE THAN 10 FEET 3 TO 10 FEET _OSE 1 TO 3 FEET	TERM VERY THICKLY BEDDED THICKLY BEDDED 1 THINLY BEDDED 0.
SL SI	HRINKAGE LIMIT DRY -		DITIONAL WATER TO MUM MOISTURE	CME-45C	CLAY BITS	X AUTOMATIC MANUAL	CLOSE VERY CLOSE	0.16 TO 1 FOOT LESS THAN 0.16 FEET	VERY THINLY BEDDED 0.0 THICKLY LAMINATED 0.00 THINLY LAMINATED <
	PL	ASTICITY			X 8" HOLLOW AUGERS	Вн			RATION
NON PLAS SLIGHTLY		TICITY INDEX (PI) 0-5 6-15	DRY STRENGTH VERY LOW SLIGHT	X CME-550	HARD FACED FINGER BITS	HAND TOOLS:	FOR SEDIMENTARY FRIABLE	RUBBING WITH	NING OF MATERIAL BY CEMENTING.HE I FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.
	ELY PLASTIC	16-25 26 OR MORE	MEDIUM HIGH	PORTABLE HOIST	X CASING W/ ADVANCER X TRICONE <u>2 <sup>15</sup>//6</u> STEEL TEETH	POST HOLE DIGGER	MODERATELY		BE SEPARATED FROM SAMPLE WITH ST Y WHEN HIT WITH HAMMER.
		COLOR		4 m – – – – – – – – – – – – – – – – – –	TRICONE TUNGCARB.		INDURATED		DIFFICULT TO SEPARATE WITH STEEL D BREAK WITH HAMMER.
	MAY INCLUDE COLOR OR COLO RS SUCH AS LIGHT, DARK, STRE				CORE BIT	VANE SHEAR TEST	EXTREMELY	INDURATED SHARP HAMME	R BLOWS REQUIRED TO BREAK SAMPLI KS ACROSS GRAINS.



ED. AN INFERRED	TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
SPT REFUSAL. FOOT PER 60	ALLUVIUM (ALLUV.) - SUILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
IN THEORY	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ICK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLUDES GRANITE.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
IF TESTED. C.	CULLUVIUM - ROCK FRADMENTS MIXED WITH SOLL DEPOSITED BY GRAVITY ON SLOPE OR AT BUTTOM
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
RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
	DIE - THE HIGHE HI WHICH H STRATON OR HIGT FEMIORE FEMIORE IS INCLINED FROM THE HORIZONTAL.
OATINGS IF OPEN, AMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
L FELDSPAR R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
S. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
Y. ROCK HAS	PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
ELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH	FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT	<u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
E DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
ONLY MINOR ALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
S. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
EEP CAN BE	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
ETACHED	OR SLIP PLANE.
DR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS IT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR OREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
ED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: LOCATIONS AND ELEVATIONS OBTAINED WITH REAL TIME
THICKNESS	KINEMATICS (RTK) SURVEY GRADE POSITIONING SYSTEM (GPS)
4 FEET .5 - 4 FEET	ELEVATION: FEET
16 - 1.5 FEET	NOTES:
13 - 0.16 FEET 18 - 0.03 FEET	
0.008 FEET	U.C.P. = UNDIVIDED COASTAL PLAIN
AT, PRESSURE, ETC.	
EEL PROBE;	
PROBE:	





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