STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT** 

STATE

N.C

STATE PROJECT REFERENCE NO

U-5315

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY\_WAKE

PROJECT DESCRIPTION MORRISVILLE PARKWAY EXTENSION AND NC 540 INTERCHANGE FROM SR 1625 (GREEN LEVEL CHURCH RD) TO NC 55 SITE DESCRIPTION HIGH MAST LIGHTING

#### **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET 1 2,2A LEGEND (SOIL & ROCK) SITE PLAN(S) 3-6 7-13 BORE LOG(S) 14 LABORATORY TESTING SUMMARY PERSONNEL

SHEETS

15

NO

1

J. HAMM

A. PAUL

R. LANE

S. HUNSBERGER

INVESTIGATED BY \_\_\_\_\_. LANE

DRAWN BY A. PAUL

CHECKED BY \_\_\_\_\_\_.

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

DATE \_\_SEPTEMBER 11, 2017

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY 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 POTALS 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 TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AT THE SITE DIFFERING FROM THASE INDERSITION RESULTING FROM THA COLLAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE AUDITIONAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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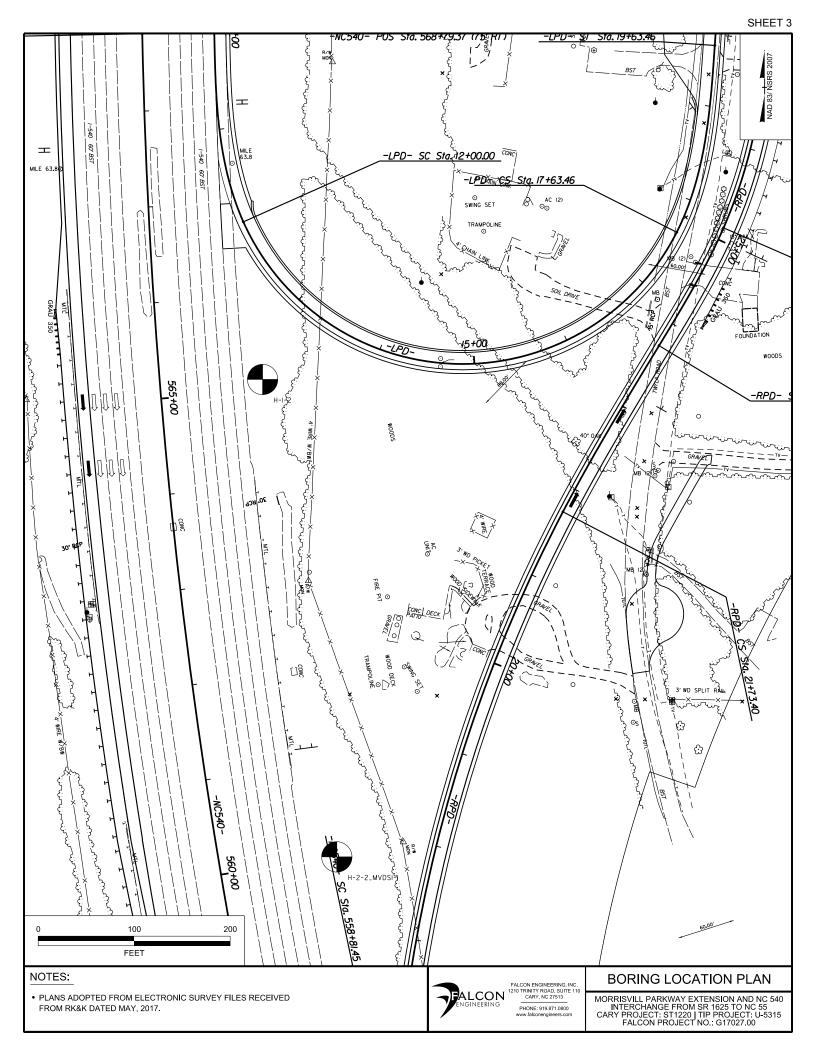
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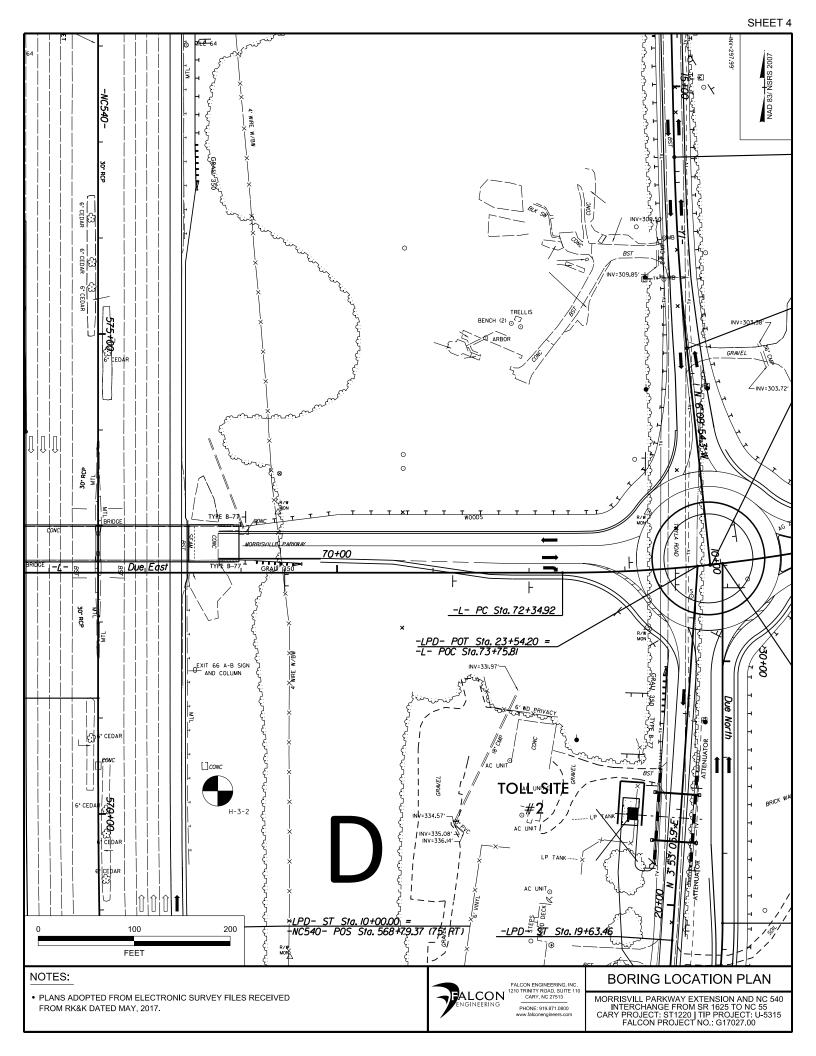
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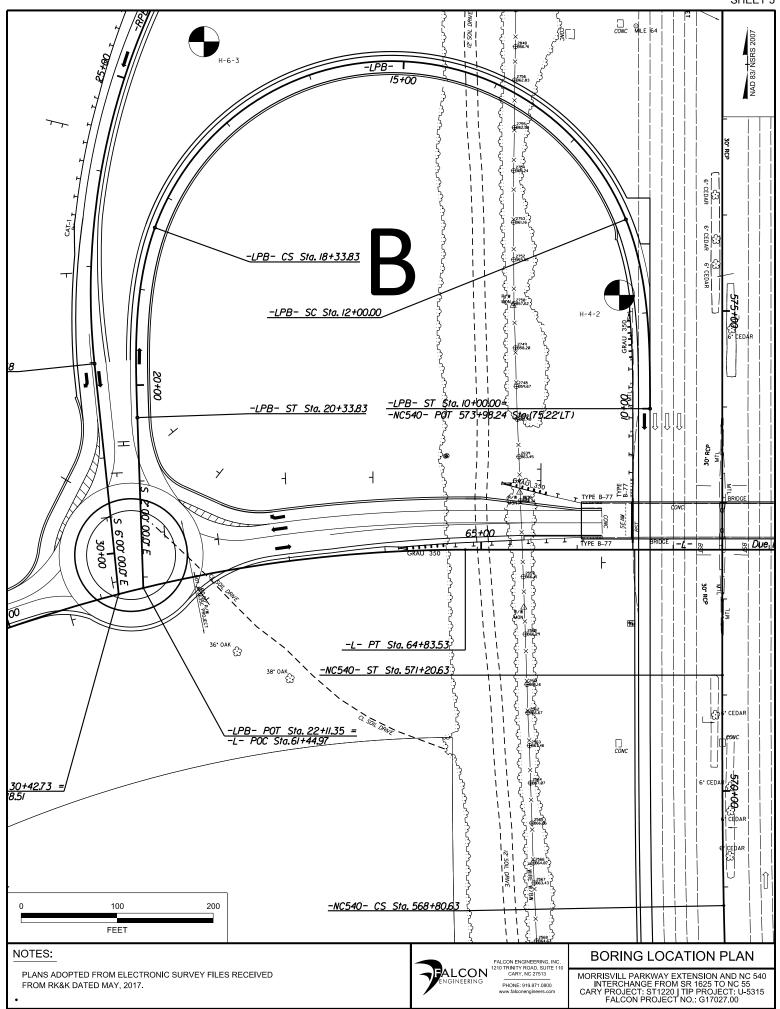
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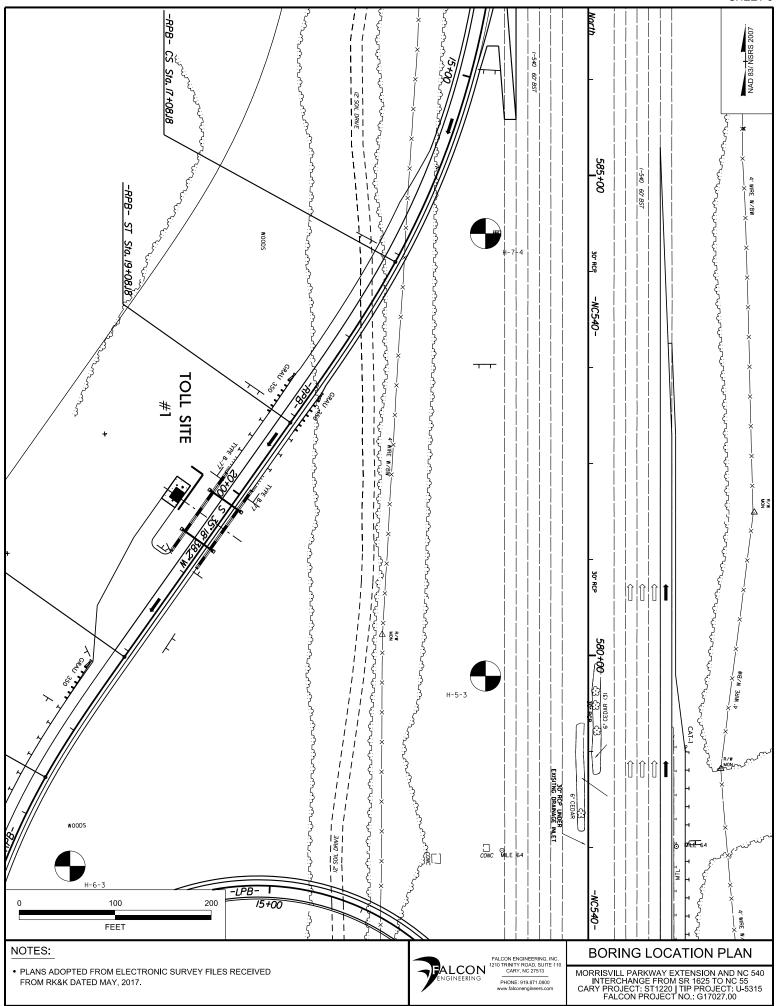
			PROJECT REPERENCE NO. SHEET NO.
			U–5315 2
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GE	OTECHN	ICAL EN	NGINEERING UNIT
SUB.	SURF	4 <u>CE</u> I	<b>NVESTIGATION</b>
SOIL AND	ROCK LEO	GEND, TERMS (PAGE	S, SYMBOLS, AND ABBREVIATIONS 1 OF 2)
	DESCRIPTION		GRADATION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CO BE PENETRATED WITH A CONTINUOUS FLIGHT PC	WER 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.
ACCORDING TO THE STANDARD PENETRATION TH IS BASED ON THE AASHTO SYSTEM. BASIC CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHT	DESCRIPTIONS GENERALLY INC	LUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS
AS MINERALOGICAL COMPOSITION, ANGULA	RITY, STRUCTURE, PLASTICITY,	ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:
SOIL LEGEND AND	AASHTO CLASSIFIC		ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION
GENERAL         GRANULAR MATERIALS           CLASS.         ( ≤ 35% PASSING *200)	SILT-CLAY MATERIALS ( > 35% PASSING #200)	ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.
GROUP         A-1         A-3         A-2           CLASS.         A-1-a         A-1-b         A-2-4         A-2-5         A-2-6         A-2		A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
SYMBOL 000000000000000000000000000000000000			SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50
2 PASSING *10 50 MX		RANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL
"10" 50 MX "40" 30 MX 50 MX 51 MN "200" 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35		SOILS SOILS PEAT	ORGANIC MATERIAL GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL
MATERIAL			UNDERLET INTERINE         SULS         UNITER         Interine           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE         1 - 10%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE         10 - 20%
	MN 40 MX 41 MN 40 MX 41 MN	SOILS WITH LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE
PI         6 MX         NP         10 MX         10 MX         11 MN         11           GROUP INDEX         Ø         Ø         Ø         Ø         4 MX	MN 10 MX 10 MX 11 MN 11 MN 8 MX 12 MX 16 MX ND MX	MODERATE ORGANIC	GROUND WATER
USUAL TYPES STONE FRAGS.	SILTY CLAYEY	ORGANIC SOILS MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
MAJUR GRAVEL, AND SAND GRAVEL AND SAND	SOILS SOILS		STATIC WATER LEVEL AFTER <u>24</u> HOURS
GEN. RATING EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
	- 30 ; PI OF A-7-6 SUBGROUP IS >	LL - 30	
	RANGE OF STANDARD	RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS
PRIMARY SOIL TYPE CONSISTENCY	PENETRATION RESISTENCE (N-VALUE)	COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 25/825 WITH SOIL DESCRIPTION OF ROCK STRUCTURES
GENERALLY VERY LOOSE	< 4 4 TO 10		SOIL SYMBOL
GRANULAR MEDIUM DENSE MATERIAL DENSE (NON-COHESIVE) VERVICE	10 TO 30 30 TO 50	NZA	ARTIFICIAL FILL (AF) OTHER AUGER BORING (A) CONE PENETROMETER
(NUN-LUHESIVE) VERY DENSE	> 50	< 0.25	
GENERALLY SOFT SILT-CLAY MEDIUM STIFF	2 TO 4 4 TO 8	0.25 TO 0.5 0.5 TO 1.0	
MATERIAL STIFF (COHESIVE) VERY STIFF	8 TO 15 15 TO 30	1 TO 2 2 TO 4	
HARD	OR GRAIN SIZE	> 4	
U.S. STD. SIEVE SIZE 4 10	40 60 200	270	
OPENING (MM) 4.76 2.00	0.42 0.25 0.075	0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF
BOULDER COBBLE GRAVEL (BLDR.) (COB.) (GR.)	COARSE FINE SAND SAND (CSE.SD.) (F SD.)	SILT CLAY (SL.) (CL.)	
GRAIN MM 305 75 2.0		0.05 0.005	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST
SIZE IN. 12 3		EDMC	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 27 - UNIT WEIGHT
SOIL MOISTURE SCALE FIELD M	CORRELATION OF T	EKMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC
	IPTION		DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK
- SATUR (SAT		ID; VERY WET, USUALLY THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS SPLIT SPOON           F - FINE         SL SILT, SILTY         ST SHELBY TUBE
LL LIQUID LIMIT PLASTIC RANGE < - WET -	(W) SEMISOLID; RE	DUIRES DRYING TO UM MOISTURE	FOSS FOSSILIFEROUS     SLI SLIGHTLY     RS - ROCK       FRAC FRACTURED, FRACTURES     TCR - TRICONE REFUSAL     RT - RECOMPACTED TRIAXIAL       FRAGS FRAGMENTS     \u03c6 - MDISTURE CONTENT     CBR - CALIFORNIA BEARING
	- (M) SOLID; AT OR	NEAR OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:
SLSHRINKAGE LIMIT		ITIONAL WATER TO	CME-45C     CLAY BITS     X AUTOMATIC MANUAL
	ATTAIN UPTIM	UM MUISTURE	CME-55
	ASTICITY	DRY STRENGTH	CME-550     C
NON PLASTIC SLIGHTLY PLASTIC	0-5 6-15	VERY LOW SLIGHT	VANE SHEAR TEST
MODERATELY PLASTIC	16-25 26 OR MORE	MEDIUM HIGH	
	COLOR		V NODU E DEZ TRICONE 'STEEL TEETH HAND AUGER
DESCRIPTIONS MAY INCLUDE COLOR OR COLOF MODIFIERS SUCH AS LIGHT, DARK, STRE			X     MOBILE B57     Image: Mobile and the second s

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	SOLI AND R	OCK LEGEND, TERMS, S	SVMBOIS AN	ID ARRREVIATION	JS
	SOIL MILD K	(PAGE 2)			10
	ROCK DES			TERMS AND DEFINITIONS	
ROCK LINE SPT REFUSA	INDICATES THE LEVEL AT WHICH NON-COAS AL IS PENETRATION BY A SPLIT SPOON SA	OULD YIELD SPT REFUSAL IF TESTED. AN INFERRED STAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. MPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS AQUIFER - A WATER BEARING	THAT HAVE BEEN TRANSPORTED BY WATER. G FORMATION OR STRATA.	
REPRESENTE	NON-COASTAL PLAIN MATERIAL, THE TRAN D BY A ZONE OF WEATHERED ROCK. RIALS ARE TYPICALLY DIVIDED AS FOLLOW:	NSITION BETWEEN SOIL AND ROCK IS OFTEN 5:	ARGILLACEOUS - APPLIED TO	ROCKS THAT HAVE BEEN DERIVED FROM SAND O ALL ROCKS OR SUBSTANCES COMPOSED OF C	CLAY MINERALS, OR HAVING
WEATHERED ROCK (WR)	NON-COASTAL PLAIN	N MATERIAL THAT WOULD YIELD SPT N VALUES > DT IF TESTED.	ARTESIAN - GROUND WATER	CLAY IN THEIR COMPOSITION, SUCH AS SHALE, THAT IS UNDER SUFFICIENT PRESSURE TO RIS	SE ABOVE THE LEVEL AT
CRYSTALLIN ROCK (CR)		RAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE. HIST.ETC.	SURFACE.	BUT WHICH DOES NOT NECESSARILY RISE TO (	
NON-CRYSTA ROCK (NCR)	ALLINE FINE TO COARSE G	RAIN METAMORPHIC AND NON-COASTAL PLAIN THAT WOULD YEILD SPT REFUSAL IF TESTED. ES PHYLLITE, SLATE, SANDSTONE, ETC.		NTS MIXED WITH SOIL DEPOSITED BY GRAVITY	
COASTAL PL SEDIMENTAR (CP)	AIN COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD K TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOT	TAL LENGTH OF ALL MATERIAL RECOVERED IN RUN AND EXPRESSED AS A PERCENTAGE.	THE CORE BARREL DIVIDED
FRESH	WEATH	ERING S MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIKE - A TABULAR BODY OF ROCKS OR CUTS MASSIVE RO	' IGNEOUS ROCK THAT CUTS ACROSS THE STRU DCK.	JCTURE OF ADJACENT
	HAMMER IF CRYSTALLINE.	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.	A STRATUM OR ANY PLANAR FEATURE IS INC	
(V SLI.)	OF A CRYSTALLINE NATURE.	HINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLO	<u>H)</u> - THE DIRECTION OR BEARING OF THE HORI; ICKWISE FROM NORTH. RACTURE ZONE ALONG WHICH THERE HAS BEEN	
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CLAY.	AND DISCOLORATION EXTENDS INTO ROCK UP TO IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR /STALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE AN	NOTHER PARALLEL TO THE FRACTURE. SPLITTING ALONG CLOSELY SPACED PARALLEL	
MODERATE (MOD.)		ULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS		DN SURFACE NEAR THEIR ORIGINAL POSITION 4	
	WITH FRESH ROCK.	HOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED		ORDERING A STREAM, BUILT OF SEDIMENTS DEF BLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED	
SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY SHOW K AND CAN BE EXCAVATED WITH A GEOLOGIS	AOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH T'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD. JOINT - FRACTURE IN ROCK	ALONG WHICH NO APPRECIABLE MOVEMENT HA	AS OCCURRED.
SEVERE (SEV.)		STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT N GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.	GE OR PROJECTION OF ROCK WHOSE THICKNES	
(324./	TO SOME EXTENT. SOME FRAGMENTS OF ST IF TESTED, WOULD YIELD SPT N VALUES >	RONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULAR	ROCK THAT THINS OUT IN ONE OR MORE DIR RLY MARKED WITH SPOTS OF DIFFERENT COLOF FRATION AND LACK OF GOOD DRAINAGE.	
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED TO S REMAINING. SAPROLITE IS AN EXAMPLE OF	STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE DIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK ROCK WEATHERED TO A DEGREE THAT ONLY MINOR		AINTAINED ABOVE THE NORMAL GROUND WATER	LEVEL BY THE PRESENCE
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT	IN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION	FORMED IN PLACE BY THE WEATHERING OF F (ROD) - A MEASURE OF ROCK QUALITY DESCRI OR GREATER THAN 4 INCHES DIVIDED BY THE	IBED BY TOTAL LENGTH OF
	ALSO AN EXAMPLE.	ARDNESS	RUN AND EXPRESSED AS A F		
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHAR SEVERAL HARD BLOWS OF THE GEOLOGISTS	P PICK. BREAKING OF HAND SPECIMENS REQUIRES S PICK.	ROCK. <u>SILL</u> - AN INTRUSIVE BODY	OF IGNEOUS ROCK OF APPROXIMATELY UNIFOR	RM THICKNESS AND
HARD	TO DETACH HAND SPECIMEN.	Y WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	THE BEDDING OR SCHISTOSI	) WITH ITS LATERAL EXTENT, THAT HAS BEEN TY OF THE INTRUDED ROCKS. ND STRIATED SURFACE THAT RESULTS FROM F	
MODERATELY HARD		UGES OR GROOVES TO 0.25 INCHES DEEP CAN BE T'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.	ST (PENETRATION RESISTANCE) (SPT) - NUMBER	
MEDIUM HARD		DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. EICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING	30 INCHES REQUIRED TO PRODUCE A PENETRA AMETER SPLIT SPOON SAMPLER. SPT REFUSAL	ATION OF 1 FOOT INTO SOIL
SOFT	CAN BE GROVED OR GOUGED READILY BY K	NIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM	REC.) - TOTAL LENGTH OF STRATA MATERIAL R AND EXPRESSED AS A PERCENTAGE.	
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCA	WATED READILY WITH POINT OF PICK. PIECES 1 INCH Y FINGER PRESSURE. CAN BE SCRATCHED READILY BY	LENGTH OF ROCK SEGMENTS THE TOTAL LENGTH OF STR	IGNATION (SROD) - A MEASURE OF ROCK QUALIT WITHIN A STRATUM EQUAL TO OR GREATER T ATA AND EXPRESSED AS A PERCENTAGE. MILS USUALLY CONTAINING ORGANIC MATTER.	
TERM	FRACTURE SPACING	BEDDING	BENCH MARK:		
VERY WID	DE MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET		ELEVAT	ION: FEET
MODERAT CLOSE VERY CLI	ELY CLOSE 1 TO 3 FEET Ø.16 TO 1 FOOT OSE LESS THAN Ø.16 FEET	THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:		
	INDUR	THINLY LAMINATED < 0.008 FEET			
FOR SEDIME	RUBBING WITH F	ING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
	GRAINS CAN BE	SY HAMMER DISINTEGRATES SAMPLE.			
	BREAKS EASILY GRAINS ARE DIF	WHEN HIT WITH HAMMER. FICULT TO SEPARATE WITH STEEL PROBE;			
	SHARP HAMMER	BREAK WITH HAMMER. BLOWS REQUIRED TO BREAK SAMPLE:			DATE 0 15 14
	SAMPLE BREAKS	GACROSS GRAINS.			DATE: 8-15-14









SHEET 6

WRS																			
1103	45429	).1.1			TI	P	J-5315	5		COL	JNTY	W.	AKE				GEOLOGIST R. Lane	,	
SITE	DESCR	IPTION	I MO	RRIS	/ILLE	PAR	KWA	Y EXT	FENS	ION A	ND I	NC 5	40 INT	ERCHA	NGE	FRO	I SR 1625 TO NC 55	GROUN	ID WTR (ft
ORI	NG NO.	MVD	S1-1_	H-2-2	S	TAT	ION 5	559+9	98			OFF	SET <sup>·</sup>	122 ft R <sup>-</sup>	Г		ALIGNMENT -NC540-	0 HR.	Dry
OLL	AR ELE	<b>EV</b> . 35	50.6 ft		Т	ΟΤΑ	L DEP	тн	13.7 f	ť		NOR	THING	<b>5</b> 748,1	77		EASTING 2,032,137	24 HR.	Dry
RILL	RIG/HAI	MMER E	FF./DA	TE TE	RI8016	MOB	ILE B-5	7 90%	6 02/22	2/2016				DRILL N	IETHO	DH.	S. Augers HAMN	IER TYPE	Automatic
RILL	ER E	step, J.	. E.		S	TAR	T DAT	E 0	5/17/1	7		CON	IP. DA	TE 05/	17/17			/A	
LEV (ft)		DEPTH (ft)	1	OW CO		0			OWS		оот	75	100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DES		DEPTH (
355		-															-		
350	-	-										-					350.6 3" TOPSOIL		0
550	349.6 -	- 1.0	12	32	42			1.							м		- RESIDUAL TAN, SILTY SAND	(A-2-4)	
	347.1	3.5				:	· · ·	·	· · ·		· · ·	14			101	1	_ <u>347.6</u>		3
345	-		28	45	55/0.4	.		.			• •	•	100/0.9				345.1 TAN, TRIASSIC SAN	DSTONE	5
	344.6 -	- 6.U	17	28	72/0.4	1 🗆				· ·			]				TAN-BROWN, TRIASSIC	MUDSTON	١E
	342.1	8.5	22	78/0.3	-	:	· · · ·	.	· · ·		•••		100/0.9						
40	-	-		10/0.0		Ľ		· ·		· · ·	• •	· ·	100/0.8	2		1	-		
	-	L				:		:	· · ·		•••						- 338.6 TAN, TRIASSIC SAN		<u>12</u>
F	337.1	13.5	100/0.2			μ.						<u> </u>	100/0.2	$\mathbf{H}$		1	336.9 Boring Terminated WITH		13 D
																	- PENETRATION TEST F Elevation 336.9 ft IN WE SANDSTON	R: TRIASSIO	

WBS														<u> </u>					
	45429	9.1.1			Т	P U-	5315		С	OUNT	ΥV	VAKE					GEOLOGIST R. Lane	<u>.</u>	
SITE	DESCR	IPTION	I MO	RRIS	/ILLE I	PARK	WAY	EXTEN	ISIO		NC	540 IN	NTE	RCHA	NGE I	FROM	/I SR 1625 TO NC 55	GROUN	ID WTR (ft
BORI	NG NO.	H-1-2	2		S	ΓΑΤΙΟ	<b>N</b> 56	65+11			OF	FSET	10	)7 ft R1	Γ		ALIGNMENT -NC540-	0 HR.	Dr
COLL	AR ELE	<b>EV.</b> 34	5.1 ft		т	DTAL	DEPT	<b>H</b> 14.5	5 ft		NO	RTHIN	١G	748,6	74		EASTING 2,032,060	24 HR.	Dr
								90% 02		)16						D H	1		Automatic
	ER E				-			05/17			CO	MP N		E 05/*			SURFACE WATER DEPTH N		
	DD1 (5									R F001				SAMP.	<b>V</b> /	1 L	JORIACE WATER DEFININ		
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft	1	0.5ft	0	2	25	50	(1001	75	10		NO.	моі	O G	SOIL AND ROCK DES	CRIPTION	DEPTH (
																	()		
350																			
	-	F															-		
	-	+																	
345	-	1.0				<u> </u>											345.1 3" TOPSOIL RESIDUAL		(
	344.1	L 1.0	9	17	36		· · ·		:	 53	·   ·	· · · · · ·			D		RED-ORANGE, CLAY (A-	6) MICAEO	US
340	341.6 -	- 3.5	6	11	14			25		••••	·   ·	· · ·			D				
540	339.1	6.0	24	56	44/0.4						-		-		D		- 339.6 WEATHERED R	DCK	5
	- 336.6	85	24	50	44/0.4		 		:		·   ·	100/0.	9 <b>•</b>				337.1 RED-ORANGE, TRIASSIC	MUDSTO	
335			77	23/0.1					•			_100/0.	6€				RED AND GRAY, TRIASSI	CMUDSTC	NE
	-	L							·		.   .								
	331.6 -	13.5	18	82/0.5					•	• • •	•   •	• • •					330.6		14
Ī		-		02/0.0					-			10	•				- Boring Terminated at Eleva WR: TRIASSIC MUE	tion 330.6 f	

															1		
WBS	45429	9.1.1			ד	ΊP	U-5315		COUNT	<b>Y</b> W	/AKE				GEOLOGIST R. Lane	ı	
SITE	DESCR		MO	RRISV	'ILLE	PA	ARKWAY E	XTEN	SION AND	D NC 5	540 INT	ERCHA	NGE F	RON	1 SR 1625 TO NC 55	GRO	UND WTR (ft)
BORI	NG NO.	H-3-2	2		S	БТА	<b>TION</b> 570	+24		OFF	SET 1	25 ft R	T		ALIGNMENT -NC540-	0 HR	<b>R.</b> Dry
COLL	AR ELE	<b>EV.</b> 34	2.2 ft		T	от	AL DEPTH	8.6 f	t	NOF	RTHING	749,1	78		EASTING 2,032,057	24 HR	<b>R.</b> 5.6
DRILL	RIG/HAI	MMER E	FF./DA	TE TR	18016	МС	DBILE B-57 9	0% 02/2	22/2016			DRILL N	NETHO	D H.S	S. Augers	HAMMER TYP	E Automatic
DRILL	ER E	step, J.	E.		S	БТА	RT DATE	05/17/	'17	CO	MP. DA	<b>TE</b> 05/	17/17		SURFACE WATER DEP	TH N/A	
ELEV (ft)		DEPTH (ft)		W COL 0.5ft		- (	0 25		50 50		100	SAMP. NO.	MOI	L O G	SOIL AND ROO ELEV. (ft)	CK DESCRIPTIC	)N DEPTH (f
345															-		
340	341.2 338.7 -	1.0 - 3.5	2	5	14		  			· · ·			D		340.7         ROADWAY           339.2         RES	DPSOIL EMBANKMENT /N, CLAY (A-6) SIDUAL SILT (A-4)	0 
335	336.2	6.0 - 8.5	100/0.3 60/0.1				· · · · ·	· · · · ·		  	100/0.7 100/0.3 60/0.1					RED ROCK IC SANDSTONE	8
	-	+ + + + +												-	Boring Terminate PENETRATION Elevation 333.6 f	TEST REFUSA	Lat
	- - - -	+ + + +													-		
	-													-			
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WBS	45429	.1.1			Т	IP U	J-5315			COUNT	r <b>y</b> w	/AKE				GEOLOGIST R. Lane	1	
	DESCR	IPTION	MO	RRISV	/ILLE	PAR	KWAY	EXTE	NSIC			540 INT	FERCH/	ANGE	FRO	I SR 1625 TO NC 55	GROU	ND WTR (ft
BORI	NG NO.	H-4-2	2		s	TATI	<b>ON</b> 57	75+17			OF	SET	108 ft L	Т		ALIGNMENT -NC540-	0 HR.	Dry
COLL	AR ELE	<b>V.</b> 33	39.2 ft		Т	OTAL	DEPT	<b>H</b> 8.6	6 ft		NO	RTHING	<b>3</b> 749,0	671		EASTING 2,031,826	24 HR.	4.4
DRILL	RIG/HAI	MMER E	FF./DA	TE TF	18016	MOBI	LE B-57	90% 0	2/22/2	2016	-		DRILL	METHO	DD H.	S. Augers HA		Automatic
DRILL	ER E	step. J	. E.		s	TAR		05/1	9/17	,	co	MP. DA	TE 05			SURFACE WATER DEPTH	N/A	
	DRIVE	DEPTH	1	w cou						ER FOO			SAMP	1	1-1			
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	25	50	)	75	100	NO.	Имо	0   G	SOIL AND ROCK D	SCRIPTION	I DEPTH (1
340																		
	338.2	1.0				<u>+</u> +-		· · · ·	· • • • • •		·   ·	• • •				- 339.2 5" TOPS( RESIDU	AL.	0
	- 	- 3.5	9	14	33	.				7 <b></b> ·		·		D		BROWN-RED, CLAY (A		DUS <u>3</u>
335		- 3.5	100/0.3			<u> -</u>						-100/0.3				333.7 TAN, TRIASSIC S		5
-	333.2	6.0	60/0.1			:	· · ·					• 60/0.1				NON-CRYSTALL GRAY, TRIASSIC S	INE ROCK	
	330.7 -	- 8.5	60/0.1			<u>   :</u>						<u>.</u>	-			330.6		8
	-	-	00/0.1	1								00/0.1				- Boring Terminated WI PENETRATION TES	T REFUSAL	at
	-	-														Elevation 330.6 ft IN N SANDSTC		IC
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404	429.1.1				Т	IΡU	J-5315		COUNT	Y W	AKE				GEOLOGIST R. Lane	
SITE DES	CRIPTI	ON	MOR	RIS	/ILLE	PAR	KWAY	EXTENS	ION AND	NC 5	40 INT	ERCHA	NGE	FROM	I SR 1625 TO NC 55	GROUND WTR (ft
BORING I	<b>NO.</b> H-	-6-3			S	ΤΑΤΙ	<b>ON</b> 24	+32		OFF	SET 6	64 ft LT			ALIGNMENT -RPB-	0 HR. Dr
OLLAR	ELEV.	331.	8 ft		Т	ΟΤΑΙ	DEPT	H 24.21	t	NOR	THING	i 749,9	35		EASTING 2,031,393	24 HR. Dr
RILL RIG				E TF						1		DRILL N	IETHO	D H.S	1	MER TYPE Automatic
RILLER								05/10/		CON		<b>FE</b> 05/ <sup>-</sup>				
		тн	BLOV		UNT			BLOWS	PER FOOT			SAMP.	▼∕	L	SOIL AND ROCK DES	
(II) (ft) 335	<u>)</u> (n	.) 0	.5ft	0.5ft	0.5ft	0	2	5	50	75	100	NO.	<u>/ MOI</u>	G	ELEV. (ft)	DEPTH (
330 330	+ + 1.8 + 1.0	0	2	4	6		1								331.8 RESIDUAL	
328	+ 1.3 † 3.1	5		4		-	•10						M	~		3
	1		4	10	14	1 :		24					м		ORANGE AND GRAY, SA	5
325 325	5.8 <u>+</u> 6.1	0	5	5	9	1	· · /· ••14			<u> </u>			м	/./.	ORANGE AND GRAY, C	LAYEY SAND
323	3.3 + 8.9	5	7	10	14		· · · · · ·			1			D		GRAY AND TAN, SILTY F.	TO CSE. SAND
320	‡					:	 	24							(A-2-4)	
	+ 10	_														1
_318	1.3 <u>† 13.</u> _	.5	6	20	33	1 :	· · ·	· · · ·	•53	·+-			D		GRAY AND BROWN, SILT WITH ROCK FRAGS, S	
315	1															
313	<u>1.3   18</u>	.5	32	55	45/0.2		· · ·	· · · ·		<b></b>					312.8	19
	Ŧ		52	55	45/0.2	:	· · ·	· · · ·		:	100/0.7				WEATHERED F GRAY, SILTST	ROCK
310	+								+	<u> </u>						0.12
308	1.3 7 23.	.5	22 6	68/0.2		.					100/0.7			11/A	307.6 Boring Terminated at Elev	24

WBS																	
	45429	).1.1			ТІ	<b>P</b> U-53	315		C	ידאטכ	YW	AKE				GEOLOGIST R. Lane	
SITE	DESCR	IPTION	I MO	RRIS\	/ILLE I	PARKW	VAY E	EXTEN	SION	AND	NC 5	40 INT	ERCHA	NGE	FROM	M SR 1625 TO NC 55 GROUND WT	rr (ft
ORI	NG NO.	H-5-3	3		S	TATION	I 579	9+79			OFF	SET	107 ft L1	-		ALIGNMENT -NC540- 0 HR.	Dry
OLL	AR ELE	<b>EV.</b> 33	35.1 ft		т	OTAL D	EPTH	<b>H</b> 13.9	ft		NOF	THING	<b>7</b> 50,1	32		EASTING 2,031,826 24 HR.	1.7
RILL	RIG/HAI	MMER E	FF./DA	TE TE	RI8016	MOBILE	B-57 9	90% 02/	22/201	6			DRILL N	IETHO	D H.:	S. Augers HAMMER TYPE Autor	natic
RILL	ER E	step. J.	. E.		S	TART D	ATE	05/18	/17		CON	IP. DA	TE 05/	18/17		SURFACE WATER DEPTH N/A	
LEV (ft)	000 (5	DEPTH (ft)		0W CO	UNT	0	25	BLOW				100	SAMP. NO.	МОІ	L O G	SOIL AND ROCK DESCRIPTION	PTH (
340		-														-	
335	-	-														335.1 3" TOPSOIL	(
F	334.1	1.0	6	7	7			· · ·	·   ·	· · ·	:					<b>RESIDUAL</b> RED AND GRAY, CLAY (A-6)	
-	331.6 -	- 3.5	8	42	58/0.2		•••				- -:-						
30	329.1	6.0							<u> </u>		+.	100/0.7				TAN, TRIASSIC SANDSTONE	
	- 326.6 -		100/0.4				•••		.   .			100/0.4	'				
25	- 320.0	- 0.5	100/0.2				•••	• • •		• • •		100/0.2					
	-	F													4	-	
Ļ	- 321.6 -	- 13.5	100/0				· ·	· · · · · ·	.   .	· · · · · ·						321.2	1:
	-	_	100/0.4									100/0.4			F	Boring Terminated at Elevation 321.2 ft IN WR: TRIASSIC SANDSTONE	

										-				.00				1		
	45429						J-5315						/AKE					GEOLOGIST R. Lane	1	
				RRIS						ION	AND					GE F	RON	I SR 1625 TO NC 55	4	ND WTR (ft
	NG NO.				S	ΓΑΤΙ	<b>ON</b> 5	84+4	40					107 ft				ALIGNMENT -NC540-	0 HR.	Dr
OLL	AR ELE	<b>EV.</b> 32	27.4 ft		T (	DTAI	_ DEP	тн	14.1 f	ť		NO	RTHIN	<b>G</b> 750	),593	3		EASTING 2,031,826	24 HR.	Dr
RILL	RIG/HAI	MMER E	FF./DA	TE T	RI8016	MOB	LE B-57	7 90%	6 02/2	2/2016	6			DRILI	_ ME1	тно	) Н.	Augers HAMM	ER TYPE	Automatic
RIL	<b>.ER</b> E	step, J	. E.		S	TAR	T DAT	<b>E</b> 0	5/18/1	17		COI	MP. DA	<b>TE</b> 0	5/18	/17		SURFACE WATER DEPTH N	A	
LEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	OW CO 0.5ft	UNT 0.5ft	0		BL 25	.ows	PER   50	FOOT	75	100	SAM NO		моі	L O G	SOIL AND ROCK DESC	CRIPTION	DEPTH
330		-															F			
	- 326.4	1.0				· ·		· ·	• • •	•		· ·	• • •		+			327.4 3" TOPSOIL WEATHERED RO	оск	
25	-	t	24	55	45/0.4	-		·				· ·	 100/0.9	<b>↓</b>				TAN, TRIASSIC SANI		;
	323.9 -	- 3.5	10	77	23/0.1		· · · · · ·	:	· · · · · ·		· · · · · ·	:	100/0.6	11			<i>M</i>	GRAY AND RED, TRIASSIO		ONE
20	321.4	6.0	28	72/0.3	-		· · · · · ·	:	· · · · · ·		· · · · · ·			11			Ø			
20	318.9	8.5	100/0			-		1.		1.		1.	_100/0.8	11						
	-	ŧ	100/0.3	3			· · ·	:	· · · · · ·		· · ·		100/0.3	T I			Ø			
15	-	ŧ				·		ŀ		•		·	• • •							
ł	313.9	13.5	75	25/0.1						•		•	 100/0.6	<b>↓</b>				313.3 Boring Terminated at Eleva	ion 212 2	14 ft INI
	-	ŧ															Ę	WR: TRIASSIC MUD	STONE	
	_	ŧ															F			
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### LABORATORY TEST RESULTS

Morrisville Pkwy. and 540 Interchange Wake County, North Carolina

Falcon Engineering Project Number: G17027.00 May 30, 2017

			PERC	ENTAGE PA	SSING				WATER	
SAMPL		ATION	Т	OTAL SAMPI	LE	LIQUIE	& PLASTIC	LIMITS	CONTENT	AASHTO
Location	Sample	Depth, ft	#10	#40	#200	LL	PL	PI	(%)	CLASSIFICATION
D-median	SS-1	18.5-20	97	68	42	39	23	16	19	A-6 (3)
RWIS/MVD	SS-2	3.5-5	99	96	45	28	19	9	18	A-4 (1)
CCTV-1	SS-3	8.5-10	98	60	25	34	30	4	20	A-2-4 (0)
CCTV-2	SS-4	13.5-15	99	90	65	35	24	11	16	A-6 (6)
B-outside	SS-5	3.5-5	100	100	61	35	26	9	15	A-4 (4)
TB1	SS-6	8.5-10	99	80	51	32	20	12	10	A-6 (3)
F-median	SS-7	3.5-5	75	68	55	30	20	10	11	A-4 (3)
F-outside	SS-8	23.5-25	100	98	89	54	29	25	23	A-7-6 (26)
D-median	SS-9	23.5-25	99	62	37	44	29	15	26	A-7-6 (2)
F-outside	SS-10	3.5-5	98	87	63	35	20	15	16	A-6 (7)
D-outside	SS-11	3.5-5	100	98	78	47	25	22	22	A-7-6 (18)
MVDS2-1	SS-12	6-7.5	100	99	83	49	27	22	25	A-7-6 (20)

Note: Laboratory Results included for Aesthetic Signs, ITS Devices, High Mast Lighting, and Tolling Infrastructure Borings. Some borings indicated above are found in separate investigation reports for their respective structures.

Reviewed by: John Sailly

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT STRUCTURE** SUBSURFACE INVESTIGATION COUNTY\_WAKE PROJECT DESCRIPTION MORRISVILLE PARKWAY EXTENSION AND NC 540 INTERCHANGE FROM SR 1625 (GREEN LEVEL CHURCH RD) TO NC 55

STATE

N.C

STATE PROJECT REFERENCE NO

U-5315

### SITE DESCRIPTION ITS EQUIPMENT

#### **CONTENTS**

SHEET NO. 1 2,2A 3-7 8-14 15

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN(S) BORE LOG(S) LABORATORY TESTING SUMMARY PERSONNEL

TOTAL SHEETS

16

NO

1

J. HAMM

A. PAUL

R. LANE

S. HUNSBERGER

INVESTIGATED BY \_\_\_\_\_. LANE

DRAWN BY A. PAUL

CHECKED BY \_\_\_\_\_\_.

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

DATE \_\_SEPTEMBER 11, 2017

#### CAUTION NOTICE

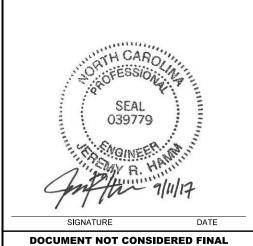
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY 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 POTALS 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 TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AT THE SITE DIFFERING FROM THASE INDERSITION RESULTING FROM THA COLLAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE AUDITIONAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PROIF

- 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 HANVIG REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY MAVES 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.

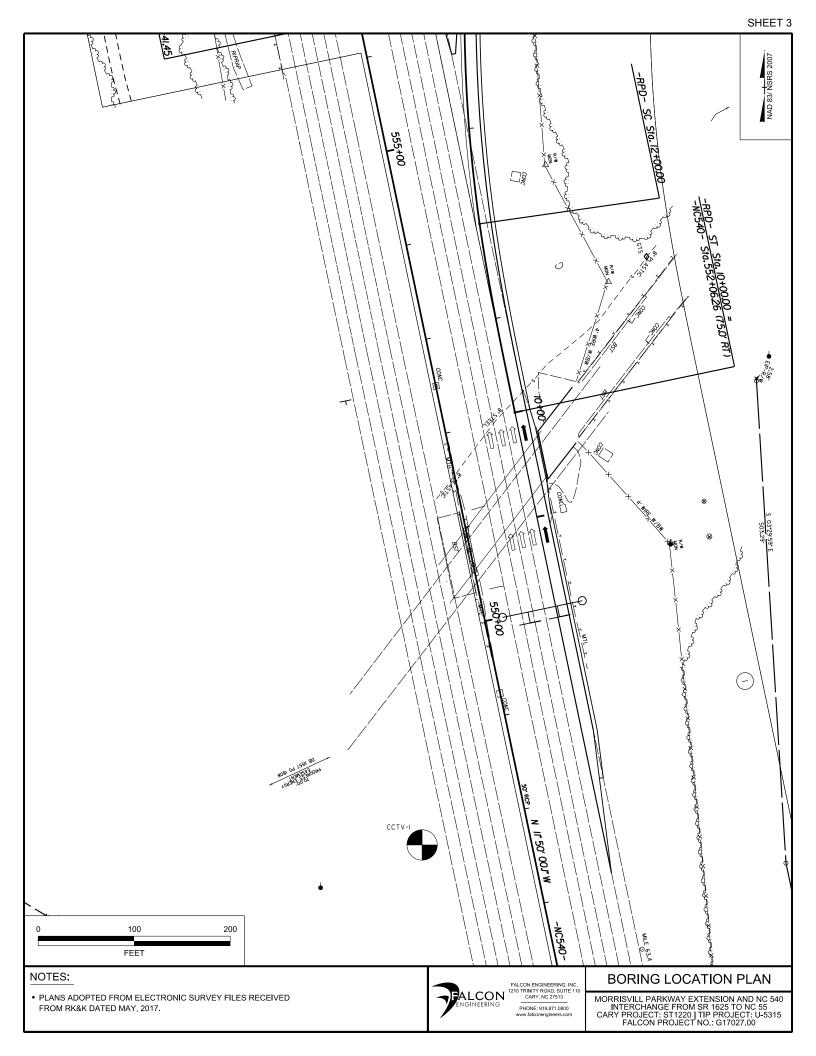


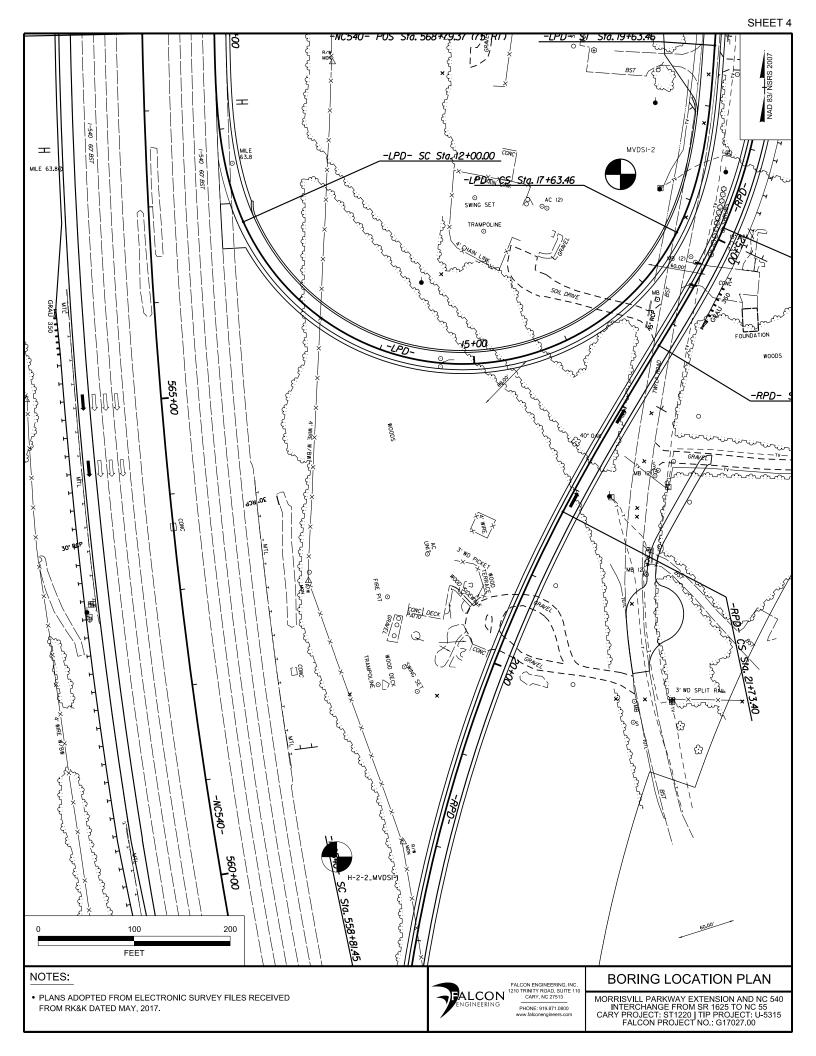
UNLESS ALL SIGNATURES COMPLETED

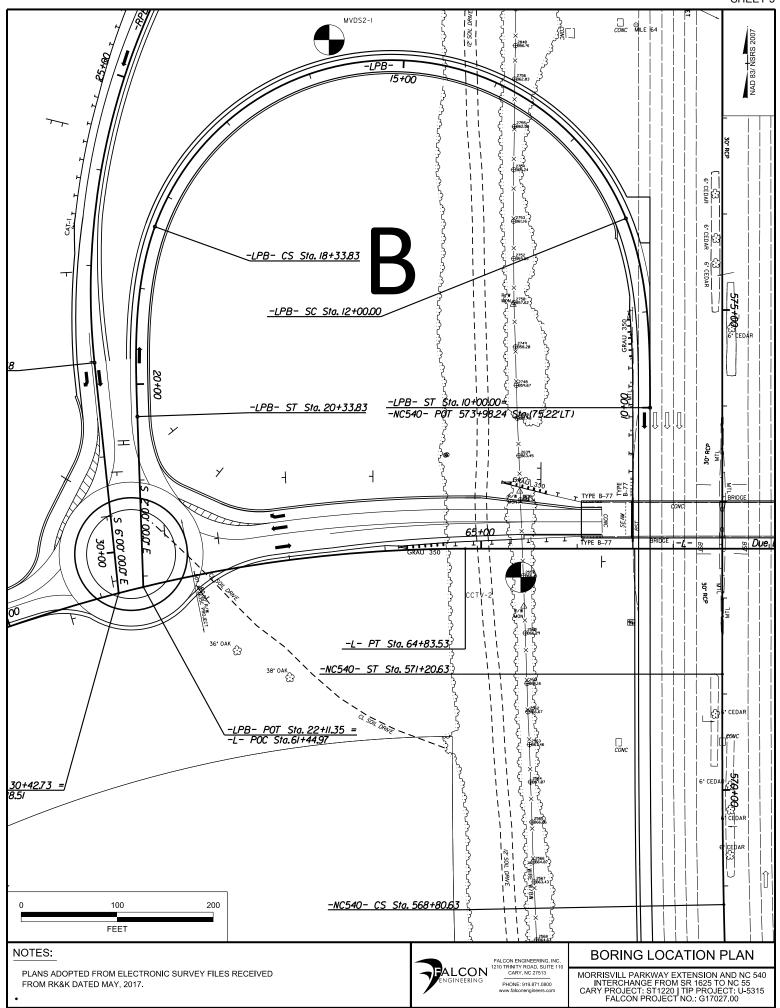
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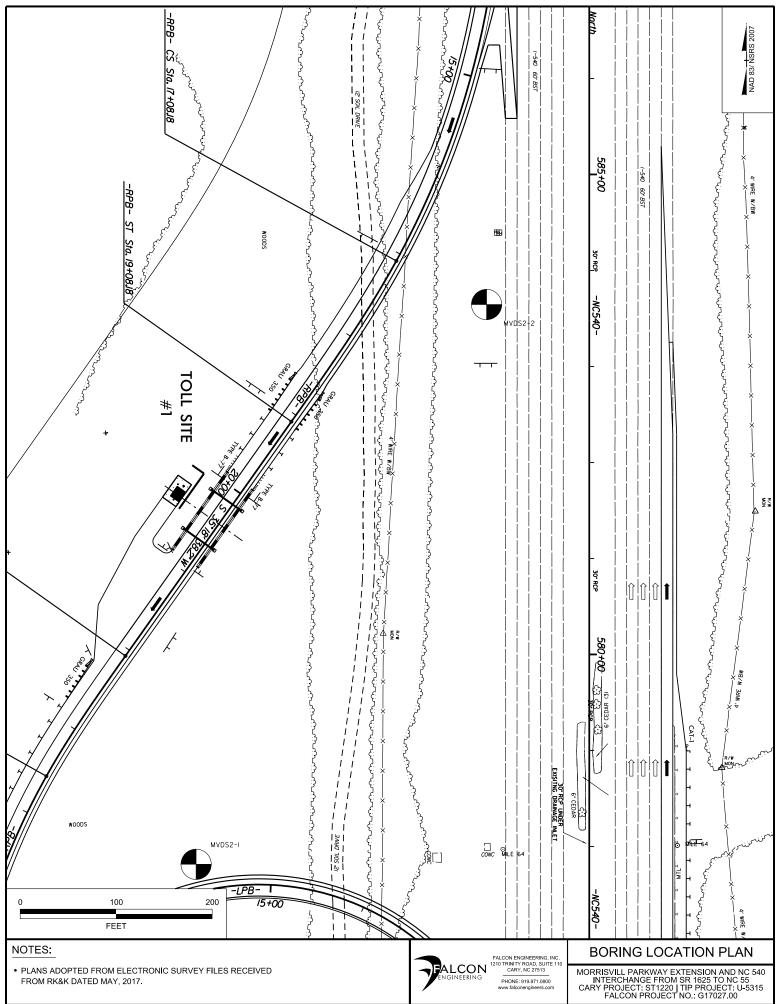
			PROJECT REPERENCE NO. SHEET NO.
			U–5315 2
	L	DIVISION OF	MENT OF TRANSPORTATION
GE	OTECHN	ICAL EN	NGINEERING UNIT
SUB.	SURF	4 <u>CE</u> I	<b>NVESTIGATION</b>
SOIL AND	ROCK LEO	GEND, TERMS (PAGE	S, SYMBOLS, AND ABBREVIATIONS 1 OF 2)
	DESCRIPTION		GRADATION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CO BE PENETRATED WITH A CONTINUOUS FLIGHT PC	WER 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.
ACCORDING TO THE STANDARD PENETRATION TH IS BASED ON THE AASHTO SYSTEM. BASIC CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHT	DESCRIPTIONS GENERALLY INC	LUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS
AS MINERALOGICAL COMPOSITION, ANGULA	RITY, STRUCTURE, PLASTICITY,	ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:
SOIL LEGEND AND	AASHTO CLASSIFIC		ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION
GENERAL         GRANULAR MATERIALS           CLASS.         ( ≤ 35% PASSING *200)	SILT-CLAY MATERIALS ( > 35% PASSING #200)	ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.
GROUP         A-1         A-3         A-2           CLASS.         A-1-a         A-1-b         A-2-4         A-2-5         A-2-6         A-2		A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
SYMBOL 000000000000000000000000000000000000			SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50
2 PASSING *10 50 MX		RANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL
"10" 50 MX "40" 30 MX 50 MX 51 MN "200" 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35		SOILS SOILS PEAT	ORGANIC MATERIAL GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS SOILS
MATERIAL			UNDERLET INTERINE         SULS         UNITER         Interine           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE         1 - 10%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE         10 - 20%
	MN 40 MX 41 MN 40 MX 41 MN	SOILS WITH LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE
PI         6 MX         NP         10 MX         10 MX         11 MN         11           GROUP INDEX         Ø         Ø         Ø         Ø         4 MX	MN 10 MX 10 MX 11 MN 11 MN 8 MX 12 MX 16 MX ND MX	MODERATE ORGANIC	GROUND WATER
USUAL TYPES STONE FRAGS.	SILTY CLAYEY	ORGANIC SOILS MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
MAJUR GRAVEL, AND SAND GRAVEL AND SAND	SOILS SOILS		STATIC WATER LEVEL AFTER <u>24</u> HOURS
GEN. RATING EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
	- 30 ; PI OF A-7-6 SUBGROUP IS >	LL - 30	
	RANGE OF STANDARD	RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS
PRIMARY SOIL TYPE CONSISTENCY	PENETRATION RESISTENCE (N-VALUE)	COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 25/825 WITH SOIL DESCRIPTION OF ROCK STRUCTURES
GENERALLY VERY LOOSE	< 4 4 TO 10		SOIL SYMBOL
GRANULAR MEDIUM DENSE MATERIAL DENSE (NON-COHESIVE) VERVICE	10 TO 30 30 TO 50	NZA	ARTIFICIAL FILL (AF) OTHER AUGER BORING (A) CONE PENETROMETER
(NUN-LUHESIVE) VERY DENSE	> 50	< 0.25	
GENERALLY SOFT SILT-CLAY MEDIUM STIFF	2 TO 4 4 TO 8	0.25 TO 0.5 0.5 TO 1.0	
MATERIAL STIFF (COHESIVE) VERY STIFF	8 TO 15 15 TO 30	1 TO 2 2 TO 4	
HARD	OR GRAIN SIZE	> 4	
U.S. STD. SIEVE SIZE 4 10	40 60 200	270	
OPENING (MM) 4.76 2.00	0.42 0.25 0.075	0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF
BOULDER COBBLE GRAVEL (BLDR.) (COB.) (GR.)	COARSE FINE SAND SAND (CSE.SD.) (F SD.)	SILT CLAY (SL.) (CL.)	
GRAIN MM 305 75 2.0		0.05 0.005	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST
SIZE IN. 12 3		EDMC	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 27 - UNIT WEIGHT
SOIL MOISTURE SCALE FIELD M	CORRELATION OF T	EKMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC
	IPTION		DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK
- SATUR (SAT		ID; VERY WET, USUALLY THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS SPLIT SPOON           F - FINE         SL SILT, SILTY         ST SHELBY TUBE
LL LIQUID LIMIT PLASTIC RANGE < - WET -	(W) SEMISOLID; RE	DUIRES DRYING TO UM MOISTURE	FOSS FOSSILIFEROUS     SLI SLIGHTLY     RS - ROCK       FRAC FRACTURED, FRACTURES     TCR - TRICONE REFUSAL     RT - RECOMPACTED TRIAXIAL       FRAGS FRAGMENTS     \u03c6 - MDISTURE CONTENT     CBR - CALIFORNIA BEARING
	- (M) SOLID; AT OR	NEAR OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:
SLSHRINKAGE LIMIT		ITIONAL WATER TO	CME-45C     CLAY BITS     X AUTOMATIC MANUAL
	ATTAIN UPTIM	UM MUISTURE	CME-55
	ASTICITY	DRY STRENGTH	CME-550     C
NON PLASTIC SLIGHTLY PLASTIC	0-5 6-15	VERY LOW SLIGHT	VANE SHEAR TEST
MODERATELY PLASTIC	16-25 26 OR MORE	MEDIUM HIGH	
	COLOR		V NODU E DEZ TRICONE 'STEEL TEETH HAND AUGER
DESCRIPTIONS MAY INCLUDE COLOR OR COLOF MODIFIERS SUCH AS LIGHT, DARK, STRE			X     MOBILE B57     Image: Mobile and the second s

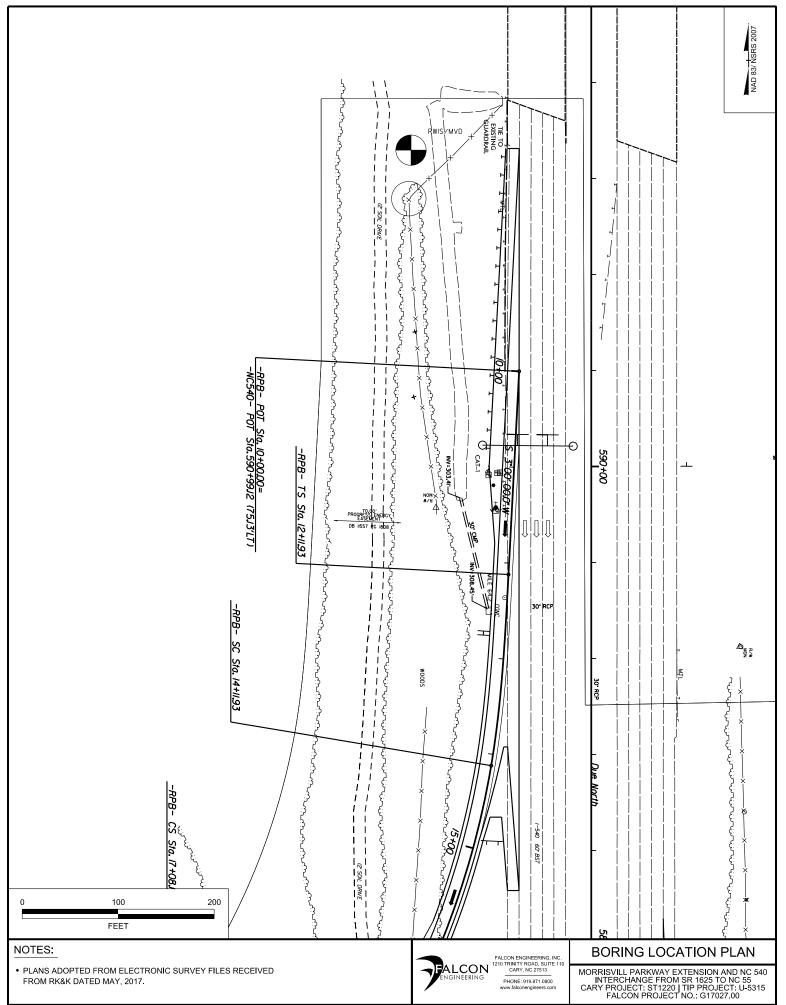
<u> </u>				PROJECT REFERENCE NO.	SHEET NO.
				U–5315	2A
	NORTH	CAROLINA DEPARTME DIVISION OF D		NSPORTATION	
	GEO1	ECHNICAL EN		NG UNIT	
	<b></b>				_
	SUBS	URFACE IN	<i>IVEST</i>	IGATION	[
	SOLI AND R	OCK LEGEND, TERMS, S	SVMBOIS AN	ID ARRREVIATION	JS
	SOIL MILD K	(PAGE 2)			10
	ROCK DES			TERMS AND DEFINITIONS	
ROCK LINE SPT REFUSA	INDICATES THE LEVEL AT WHICH NON-COAS AL IS PENETRATION BY A SPLIT SPOON SA	OULD YIELD SPT REFUSAL IF TESTED. AN INFERRED STAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. MPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS AQUIFER - A WATER BEARING	THAT HAVE BEEN TRANSPORTED BY WATER. G FORMATION OR STRATA.	
REPRESENTE	NON-COASTAL PLAIN MATERIAL, THE TRAN D BY A ZONE OF WEATHERED ROCK. RIALS ARE TYPICALLY DIVIDED AS FOLLOW:	NSITION BETWEEN SOIL AND ROCK IS OFTEN 5:	ARGILLACEOUS - APPLIED TO	ROCKS THAT HAVE BEEN DERIVED FROM SAND O ALL ROCKS OR SUBSTANCES COMPOSED OF C	CLAY MINERALS, OR HAVING
WEATHERED ROCK (WR)	NON-COASTAL PLAIN	N MATERIAL THAT WOULD YIELD SPT N VALUES > DT IF TESTED.	ARTESIAN - GROUND WATER	CLAY IN THEIR COMPOSITION, SUCH AS SHALE, THAT IS UNDER SUFFICIENT PRESSURE TO RIS	SE ABOVE THE LEVEL AT
CRYSTALLIN ROCK (CR)		RAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE. HIST.ETC.	SURFACE.	BUT WHICH DOES NOT NECESSARILY RISE TO (	
NON-CRYSTA ROCK (NCR)	ALLINE FINE TO COARSE G	RAIN METAMORPHIC AND NON-COASTAL PLAIN THAT WOULD YEILD SPT REFUSAL IF TESTED. ES PHYLLITE, SLATE, SANDSTONE, ETC.		NTS MIXED WITH SOIL DEPOSITED BY GRAVITY	
COASTAL PL SEDIMENTAR (CP)	AIN COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD K TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOT	TAL LENGTH OF ALL MATERIAL RECOVERED IN RUN AND EXPRESSED AS A PERCENTAGE.	THE CORE BARREL DIVIDED
FRESH	WEATH	ERING S MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIKE - A TABULAR BODY OF ROCKS OR CUTS MASSIVE RO	' IGNEOUS ROCK THAT CUTS ACROSS THE STRU DCK.	JCTURE OF ADJACENT
	HAMMER IF CRYSTALLINE.	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.	A STRATUM OR ANY PLANAR FEATURE IS INC	
(V SLI.)	OF A CRYSTALLINE NATURE.	HINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLO	<u>H)</u> - THE DIRECTION OR BEARING OF THE HORI; ICKWISE FROM NORTH. RACTURE ZONE ALONG WHICH THERE HAS BEEN	
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CLAY.	AND DISCOLORATION EXTENDS INTO ROCK UP TO IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR /STALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE AN	NOTHER PARALLEL TO THE FRACTURE. SPLITTING ALONG CLOSELY SPACED PARALLEL	
MODERATE (MOD.)		ULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS		DN SURFACE NEAR THEIR ORIGINAL POSITION 4	
	WITH FRESH ROCK.	HOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED		ORDERING A STREAM, BUILT OF SEDIMENTS DEF BLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED	
SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY SHOW K AND CAN BE EXCAVATED WITH A GEOLOGIS	AOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH T'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD. JOINT - FRACTURE IN ROCK	ALONG WHICH NO APPRECIABLE MOVEMENT HA	AS OCCURRED.
SEVERE (SEV.)		STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT N GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.	GE OR PROJECTION OF ROCK WHOSE THICKNES	
(324./	TO SOME EXTENT. SOME FRAGMENTS OF ST IF TESTED, WOULD YIELD SPT N VALUES >	RONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULAR	ROCK THAT THINS OUT IN ONE OR MORE DIR RLY MARKED WITH SPOTS OF DIFFERENT COLOF FRATION AND LACK OF GOOD DRAINAGE.	
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED TO S REMAINING. SAPROLITE IS AN EXAMPLE OF	STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE DIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK ROCK WEATHERED TO A DEGREE THAT ONLY MINOR		AINTAINED ABOVE THE NORMAL GROUND WATER	LEVEL BY THE PRESENCE
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT	IN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION	FORMED IN PLACE BY THE WEATHERING OF F (ROD) - A MEASURE OF ROCK QUALITY DESCRI OR GREATER THAN 4 INCHES DIVIDED BY THE	IBED BY TOTAL LENGTH OF
	ALSO AN EXAMPLE.	ARDNESS	RUN AND EXPRESSED AS A F		
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHAR SEVERAL HARD BLOWS OF THE GEOLOGISTS	P PICK. BREAKING OF HAND SPECIMENS REQUIRES S PICK.	ROCK. <u>SILL</u> - AN INTRUSIVE BODY	OF IGNEOUS ROCK OF APPROXIMATELY UNIFOR	RM THICKNESS AND
HARD	TO DETACH HAND SPECIMEN.	Y WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	THE BEDDING OR SCHISTOSI	) WITH ITS LATERAL EXTENT, THAT HAS BEEN TY OF THE INTRUDED ROCKS. ND STRIATED SURFACE THAT RESULTS FROM F	
MODERATELY HARD		UGES OR GROOVES TO 0.25 INCHES DEEP CAN BE T'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.	ST (PENETRATION RESISTANCE) (SPT) - NUMBER	
MEDIUM HARD		DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. EICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING	30 INCHES REQUIRED TO PRODUCE A PENETRA AMETER SPLIT SPOON SAMPLER. SPT REFUSAL	ATION OF 1 FOOT INTO SOIL
SOFT	CAN BE GROVED OR GOUGED READILY BY K	NIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM	REC.) - TOTAL LENGTH OF STRATA MATERIAL R AND EXPRESSED AS A PERCENTAGE.	
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCA	WATED READILY WITH POINT OF PICK. PIECES 1 INCH Y FINGER PRESSURE. CAN BE SCRATCHED READILY BY	LENGTH OF ROCK SEGMENTS THE TOTAL LENGTH OF STR	IGNATION (SROD) - A MEASURE OF ROCK QUALIT WITHIN A STRATUM EQUAL TO OR GREATER T ATA AND EXPRESSED AS A PERCENTAGE. MILS USUALLY CONTAINING ORGANIC MATTER.	
TERM	FRACTURE SPACING	BEDDING	BENCH MARK:		
VERY WID	DE MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET		ELEVAT	ION: FEET
MODERAT CLOSE VERY CLI	ELY CLOSE 1 TO 3 FEET Ø.16 TO 1 FOOT OSE LESS THAN Ø.16 FEET	THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:		
	INDUR	THINLY LAMINATED < 0.008 FEET			
FOR SEDIME	RUBBING WITH F	ING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
	GRAINS CAN BE	SY HAMMER DISINTEGRATES SAMPLE.			
	BREAKS EASILY GRAINS ARE DIF	WHEN HIT WITH HAMMER. FICULT TO SEPARATE WITH STEEL PROBE;			
	SHARP HAMMER	BREAK WITH HAMMER. BLOWS REQUIRED TO BREAK SAMPLE:			DATE 0 15 14
	SAMPLE BREAKS	GACROSS GRAINS.			DATE: 8-15-14





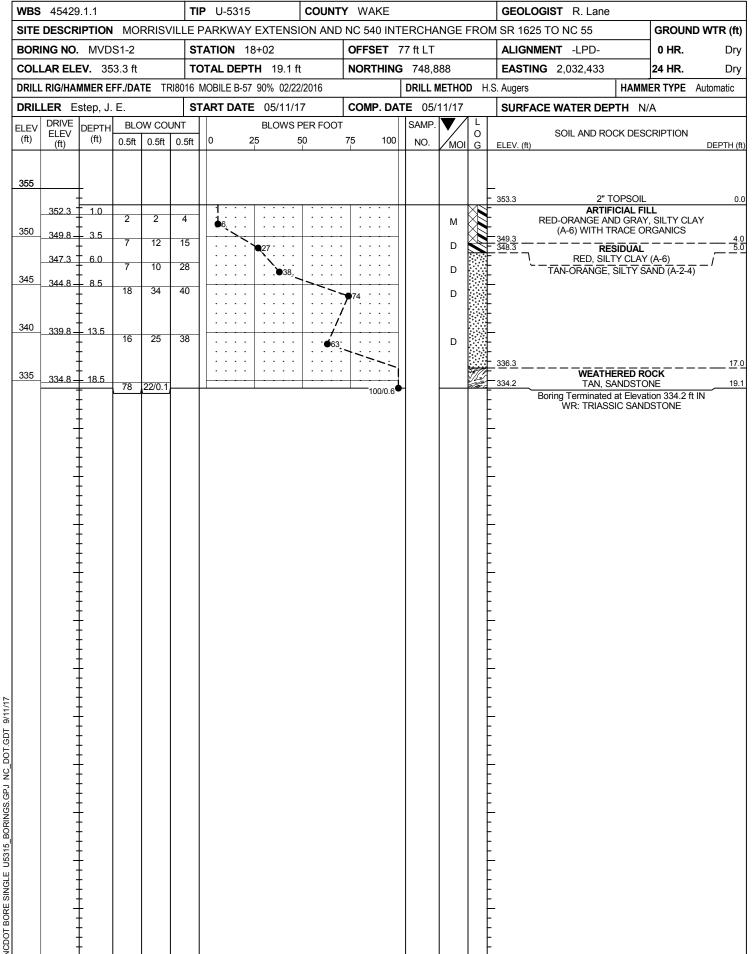






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WBS 4	45429	.1.1			TI	<b>P</b> U-5315	COUNT	Y WAKE				GEOLOGIST R. Lane	
SITE D	ESCRI	PTION	MO	RRIS\	/ILLE	PARKWAY EXTE	NSION AND	NC 540 IN	FERCHA	NGE I	FROM	I SR 1625 TO NC 55	GROUND WTR (ft)
BORIN	g no.	CCT	V-1		S	TATION 547+85		OFFSET	112 ft LT	-		ALIGNMENT -NC540-	0 HR. Dry
COLLA		<b>V</b> . 34	9.8 ft		т	OTAL DEPTH 30	.0 ft	NORTHIN	<b>3</b> 746,9	46		EASTING 2,032,151	24 HR. Dry
				TE TE		MOBILE B-57 90% (		1			D H.S	l	ER TYPE Automatic
		step, J.				TART DATE 05/		COMP. DA					
		DEPTH	1	OW CO			VS PER FOOT		SAMP.		L		~
(ft) E	ELEV (ft)	(ft)	0.5ft		0.5ft	0 25	50	75 100	NO.	моі	O G	SOIL AND ROCK DESC	CRIPTION DEPTH (f
	(11)										6		DEFIN
350	348.8	- 1.0										.349.8 3" TOPSOIL ROADWAY EMBAN	0. KMENT
	+	-	1	2	1	$  \phi_3 \cdots \cdots \cdots \cdots$				D		ORANGE, SANDY CLAY	
45	346.3	3.5	2	2	2					м			
	343.8	- 6.0	2									GRAY AND ORANGE, SAN	
	+ 341.3	- 8.5	2	2	3	<b>• • • • • • • • • •</b>	 	·   · · · · ·		М		342.8 TAN, CLAYEY SAND	(A-2-4)7.
340	341.3 	- 0.5	1	1	1				SS-3	20%			
	+	-				`\ · · ·   · ·					-		
3	336.3	- 13.5										.336.8	
35	4	-	3	4	6			· · · · ·		D		DARK RED, CLAT (A-0) I	IICACEOUS
	‡	-					· ·   · · · · · ·   · · · ·	·   · · · · ·					
	331.3	18.5	13	15	20			.		_			
30	+	-	13	15	20	<b></b>	5			D			
	Ŧ	-											
25	326.3	23.5	9	10	10		· ·   · · · · ·	· · · · · ·		D			
20	+	-	-									323.8	<u>26</u> .
		-					 	.   .				TAN, SANDY SILT	(A-4)
20	321.3	- 28.5	9	11	34	`	••••••••••••••••••••••••••••••••••••••	.		D	-	.319.8	30.0

WRS																	
1100	45429	9.1.1			TI	I <b>P</b> U-531	5		COUN	ry w	AKE				GEOLOGIST R. Lane		
SITE	DESCR	IPTION	MO	RRIS	/ILLE	PARKWA	Y EXTI	ENSIC	ON ANI	DNC	540 INT	ERCHA	NGE	FROM	I SR 1625 TO NC 55	GROUN	D WTR (ft
BORI	NG NO.	MVD	S1-1	H-2-2	S	TATION	559+98	3		OFF	SET	122 ft R	Г		ALIGNMENT -NC540-	0 HR.	Dry
OLL	AR ELE	<b>EV.</b> 35	50.6 ft		Т		<b>TH</b> 1	3.7 ft		NO	RTHING	<b>3</b> 748,1	77		EASTING 2,032,137	24 HR.	Dry
						MOBILE B-			2016					н п	1	ER TYPE	
	ER E					TART DA				CO		TE 05/			SURFACE WATER DEPTH N		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	1	OW CO					ER FOO	<u> </u>	100	SAMP. NO.			SOIL AND ROCK DESC		DEPTH (
355	-	-															
350	- 349.6	10												-	350.6 3" TOPSOIL RESIDUAL		0
			12	32	42	1				• • • 74			м		TAN, SILTY SAND	(A-2-4)	3
ŀ	347.1	3.5	28	45	55/0.4									MA-	WEATHERED RO		
345	- 344.6	6.0								· ·	100/0.9				345.1 TAN, TRIASSIC SANI TAN-BROWN, TRIASSIC		<u> </u>
	-	<b>†</b>	17	28	72/0.4		·   · · ·	· ·	· · · · · ·	: :	100/0.9				TAN-BROWN, TRIASSIC	MODSTON	L
ŀ	342.1	8.5	22	78/0.3			.	•••		·   ·	100/0.8	•					
40	-	F															40
	337.1	13.5													338.6 TAN, TRIASSIC SANI	STONE	. <u>12</u> 13
Ī		- 10.0	100/0.2								100/0.2			-	Boring Terminated WITH PENETRATION TEST R		)
															SANDSTONE		



									JRE	- L					
WBS	45429	9.1.1			T	<b>P</b> U-5315	С	OUNTY	' WAk	ΚE				GEOLOGIST R. Lane	
SITE	DESCR	IPTION	МО	RRIS	/ILLE	PARKWAY	EXTENSION	N AND I	NC 540	) INT	ERCHA	NGE	FRON	1 SR 1625 TO NC 55	GROUND WTR (ft
BORI	NG NO.	ССТ	V-2		S	TATION 6	5+41		OFFSE	ет з	80 ft RT			ALIGNMENT -L-	0 HR. Dry
COLL	AR ELE	<b>EV.</b> 33	36.0 ft		т	OTAL DEP	<b>TH</b> 23.8 ft		NORTI	HING	749,3	76		EASTING 2,031,723	24 HR. 16.9
RILL	RIG/HAI	MMER E	FF./DA	TE T	RI8016	MOBILE B-57	90% 02/22/20	)16			DRILL N	IETHO	D H.S	S. Augers HAMM	ER TYPE Automatic
DRILI	ER E	step. J	. E.		S		05/22/17		COMP		<b>FE</b> 05/2			SURFACE WATER DEPTH N	/A
LEV		DEPTH	1	ow co			BLOWS PER	I			SAMP.		1 - 1	1	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 :	25 50	7	75	100	NO.	мо	O G	SOIL AND ROCK DES	CRIPTION DEPTH (
340															
	-	ŧ													
	-	ŧ											ļĘ	336.0 3" TOPSOIL	0
335	335.0	1.0	3	3	4									ROADWAY EMBAN ORANGE AND TAN, SANE	KMENT
	- 332.5 -	3.5						· · · · · · · ·				D		OIVINGE AND TAN, OANE	
330	- - 330.0	6.0	3	4	7	[ •]11 [		· · · · · · · ·				D		330.5	5
.00	-330.0	- 0.0	6	6	7	· · • 13·						D	-	TAN, SILTY SAND	(A-2-4)
-	327.5 -	- 8.5 -	5	8	10			· · · · ·				D			
325	-	ŧ				· · · •	, 	· · · ·							
	- 322.5 -	- 13.5				$   \cdots  $		· · · · · · · ·						. <u>323.0</u>	13
320	-	-	7	9	15	] ::::	24.	 			SS-4	16%		RED, CLAY (A-6) WITH LEN	ISES OF SAND
20	-	ŧ												-	40
-	317.5 -	18.5	100/0.3	3				· · · ·	· · 100	.~.   )/0.3¶				<u>318.0</u> WEATHERED RO	
315	-	ŧ.								• •				TAN, TRIASSIC SANI	DSTONE
	- 312.5	- 23.5						 						312.2	23
Ē		20.0	100/0.3						100	D/0.3●				Boring Terminated at Eleva	tion 312.2 ft IN
	-	F											ΙĿ	WR: TRIASSIC SANE	DSTONE
	-	ţ											1 1		
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WBS	45429	.1.1			TI	IP U-5315		COUNTY	Y WAKE				GEOLOGIST R. Lane	
SITE [	DESCR	IPTION	MO	RRIS	VILLE	PARKWAY	EXTENS	ION AND	NC 540 IN	ITERCH	ANGE	FROM	1 SR 1625 TO NC 55	GROUND WTR (ft
BORI	NG NO.	MVD	S2-1		S	TATION 1	5+72		OFFSET	29 ft R	Т		ALIGNMENT -LPB-	0 HR. Dr
COLL	AR ELE	<b>IV.</b> 35	7.7 ft		Т	OTAL DEPT	<b>TH</b> 19.2 f	t	NORTHIN	<b>IG</b> 749.	.935		EASTING 2,031,523	24 HR. Dr
						MOBILE B-57						א מ	1	IER TYPE Automatic
	ER E								COMP. D					
		1		ow co				PER FOOT	COMP. D			1 - 1	SURFACE WATER DEPTH IN	/A
ELEV (ft)	ELEV	DEPTH (ft)	0.5ft	1					75 10			0	SOIL AND ROCK DES	
	(ft)	. ,	0.011	0.011	0.011		1			- 110.	/мо	I G	ELEV. (ft)	DEPTH (
360		_												
							1				_		357.7	0
355	356.7 -	- 1.0	3	3	6	. <b> </b>   . <b> </b> 9					м		<b>RESIDUAL</b> ORANGE AND TAN, CLAYE	Y SAND (A-2-6)
-	354.2	3.5	3	4	6			<u> </u>	<u> </u>					
	- 351.7	- 6.0	-	<b>–</b>							W		. <u>352.2</u>	<u></u>
350	-	-	5	7	9	· · • •16				SS-12	2 25%	N	PLASTIC CLAY (	
F	349.2	8.5	8	13	23						D			
	-	F									_	N	045.7	10
345	344.2	135							· · · ·				RED-BROWN AND GRAY	, SILTY SAND - 12
		- 10.0	11	21	46		· · · · ·		7		D		(A-2-4)	
	-						· · · · ·					-	. <u>341.2</u>	<u> </u>
340	339.2	18.5	45		00/0.0			<u> </u>	+				WEATHERED R RED-BROWN AND GRA	Y, TRIASSIC
		-	15	38	62/0.2	4			100/0.7	,•			Boring Terminated at Eleva	
	-	-										I F	WR: TRIASSIC SILT	STONE
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WBS	45429	9.1.1			T	IP (	J-5315			COUN	NTY	WAK	Έ				GEOLOGIST R. Lane	1	
SITE	DESCR		MO	RRIS	/ILLE	PAR	KWAY	EXTE	ENSI	AN AN	ND N	C 540	INT	ERCHA	NGE	FRO	1 SR 1625 TO NC 55	GROUND W	TR (fl
BORI	NG NO.	. MVC	S2-2		S	TAT	<b>ON</b> 5	83+64	ŀ		c	OFFSE	<b>T</b> 1	07 ft L1	Г		ALIGNMENT -NC540-	0 HR.	Dr
COLL	AR ELE	<b>EV.</b> 32	28.5 ft		Т	ΟΤΑ	L DEP	<b>TH</b> 1	3.9 ft		N	ORTH	HING	750,5	518		EASTING 2,031,826	24 HR.	4.6
ORILL	RIG/HAI	MMER E	FF./DA	TE TF	RI8016	MOB	ILE B-57	90%	02/22/	2016	- 1			DRILL M	<b>NETHO</b>	DD H.	S. Augers HAMN	ER TYPE Auto	matic
	LER E											COMP.		<b>E</b> 05/			SURFACE WATER DEPTH N	/A	
LEV	DRIVE	DEPTH		ow co		Π				ER FO				SAMP.		1 - 1			
(ft)	ELEV (ft)	(ft)	0.5ft			0	:	25	5		75	5	100	NO.	мо	0 I G	SOIL AND ROCK DES		EPTH
	()																	D	
330		F															328.5 3" TOPSOIL		
	327.5	1.0	56	44/0.3					•••	•••	•••	• • •	- 1			10	WEATHERED R	CK	
325	325.0	35	00	44/0.5		.						100	0.8				TAN, TRIASSIC SAN	DSTONE	
	-	ł	34	66/0.3	1	-						• 100	0/0.8				323.0		
	322.5 -	<del>-</del> 6.0	21	28	32	:	· · · · · ·		· · ·		·	· <del></del> -			D		321.5 RESIDUAL		
320	320.0	8.5							• •	•60	·						TAN, SILTY SAND		
	-	Ł	50	50/0.1		:		· ·	· · ·			- 100	0.6				WEATHERED R	<u>ъск</u>	
	-	F				.	• • •		• •	• •	•••						RED AND GRAY, TRIASSI	5 MUDSTONE	
315	315.0	13.5	100/0.4	1									0/0.4	1			- 314.6		1
	-	ŧ	100/0.	1								100	/0.4 -				Boring Terminated at Eleva WR: TRIASSIC MUE	tion 314.6 ft IN STONE	
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WBS	45429	.1.1			T	I <b>P</b> U-53	15		COU	NTY	WAKE				GEOLOGIST R. Lane		
SITE	DESCR	IPTION	MO	RRIS	VILLE	PARKW	AY E	XTENS	SION A		C 540 IN	TERCHA	ANGE	FRO	/I SR 1625 TO NC 55	GROUND	WTR (ft
BORI	NG NO.	RWI	S/MVE	)	S	TATION	593	3+30		O	FFSET	188 ft L	Т		ALIGNMENT -NC540-	0 HR.	Dry
COLL	AR ELE	<b>V</b> . 27	'9.9 ft		Т	OTAL DE	PTH	<b>1</b> 3.7	ft	N	ORTHIN	<b>G</b> 751,4	484		EASTING 2,031,745	24 HR.	FIAD
DRILL	RIG/HAI	MMER E	FF./DA	TE T	RI8016	MOBILE E	-57 9	90% 02/2	2/2016			DRILL	METHO	DH.	S. Augers HAMN	IER TYPE A	utomatic
DRILI	ER E	step. J.	E.		S	TART DA	TE	05/15/	17	С	OMP. DA				SURFACE WATER DEPTH N	/A	
ELEV	DRIVE	DEPTH		ow co				BLOWS			-	SAMP	1	1 - 1	1		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	о	25		50	75	5 100	NO.	Имо	O G	SOIL AND ROCK DES	CRIPTION	DEPTH (1
													1				
280															279.9 3" TOPSOIL		0
200	278.9	1.0				<u> </u>								L.	ROADWAY EMBAN	KMENT	
	- 276.4	- 35	2	3	3		•	· · · ·	· ·	· ·	· · · · ·		M		ORANGE TAN AND GRAY (A-4)	, SANDY SILT	Г
275	- 270.4	- 3.5	4	4	6	10	•					SS-2	18%		_		
	273.9 -	- 6.0	12	8	20		`\_										6
	271.4	8.5						28:	·+						BROWN AND GRAY, SIL 270.9 (A-2-4)		9.
270	-	-	11	36	64/0.2		•					$\bullet$					
	-	-						· · · · ·			· · · · ·	[			RED-BROWN AND GRA SILTSTONE		
F	266.4	13.5	100/0.2				•	• • • •		•••	· · · · ·	⊌	<u> </u>		266.2 Boring Terminated at Eleva		13 J
	-	-		1											WR: TRIASSIC SILT		N I
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### LABORATORY TEST RESULTS

Morrisville Pkwy. and 540 Interchange Wake County, North Carolina

Falcon Engineering Project Number: G17027.00 May 30, 2017

			PERC	ENTAGE PA	SSING				WATER	
SAMPL		ATION	Т	OTAL SAMP	LE	LIQUID	& PLASTIC	LIMITS	CONTENT	AASHTO
Location	Sample	Depth, ft	#10	#40	#200	LL	PL	PI	(%)	CLASSIFICATION
D-median	SS-1	18.5-20	97	68	42	39	23	16	19	A-6 (3)
RWIS/MVD	SS-2	3.5-5	99	96	45	28	19	9	18	A-4 (1)
CCTV-1	SS-3	8.5-10	98	60	25	34	30	4	20	A-2-4 (0)
CCTV-2	SS-4	13.5-15	99	90	65	35	24	11	16	A-6 (6)
B-outside	SS-5	3.5-5	100	100	61	35	26	9	15	A-4 (4)
TB1	SS-6	8.5-10	99	80	51	32	20	12	10	A-6 (3)
F-median	SS-7	3.5-5	75	68	55	30	20	10	11	A-4 (3)
F-outside	SS-8	23.5-25	100	98	89	54	29	25	23	A-7-6 (26)
D-median	SS-9	23.5-25	99	62	37	44	29	15	26	A-7-6 (2)
F-outside	SS-10	3.5-5	98	87	63	35	20	15	16	A-6 (7)
D-outside	SS-11	3.5-5	100	98	78	47	25	22	22	A-7-6 (18)
MVDS2-1	SS-12	6-7.5	100	99	83	49	27	22	25	A-7-6 (20)

Note: Laboratory Results included for Aesthetic Signs, ITS Devices, High Mast Lighting, and Tolling Infrastructure Borings. Some borings indicated above are found in separate investigation reports for their respective structures.

Reviewed by: John Sailly

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT** 

# **STRUCTURE** SUBSURFACE INVESTIGATION

STATE

N.C

STATE PROJECT REFERENCE NO

U-5315

COUNTY\_WAKE

PROJECT DESCRIPTION MORRISVILLE PARKWAY EXTENSION AND NC 540 INTERCHANGE FROM SR 1625 (GREEN LEVEL CHURCH RD) TO NC 55 SITE DESCRIPTION AESTHETIC SIGNS

#### **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET 1 2,2A LEGEND (SOIL & ROCK) SITE PLAN(S) 3-8 9-18 BORE LOG(S) 19 LABORATORY TESTING SUMMARY PERSONNEL

SHEETS

20

NO

1

J. HAMM

A. PAUL

R. LANE

S. HUNSBERGER

INVESTIGATED BY \_\_\_\_\_. LANE

DRAWN BY A. PAUL

CHECKED BY \_\_\_\_\_\_.

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

DATE \_\_SEPTEMBER 11, 2017

#### CAUTION NOTICE

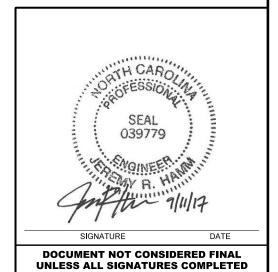
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY 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 POTALS 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 TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AT THE SITE DIFFERING FROM THASE INDERSITION RESULTING FROM THA COLLAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE AUDITIONAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

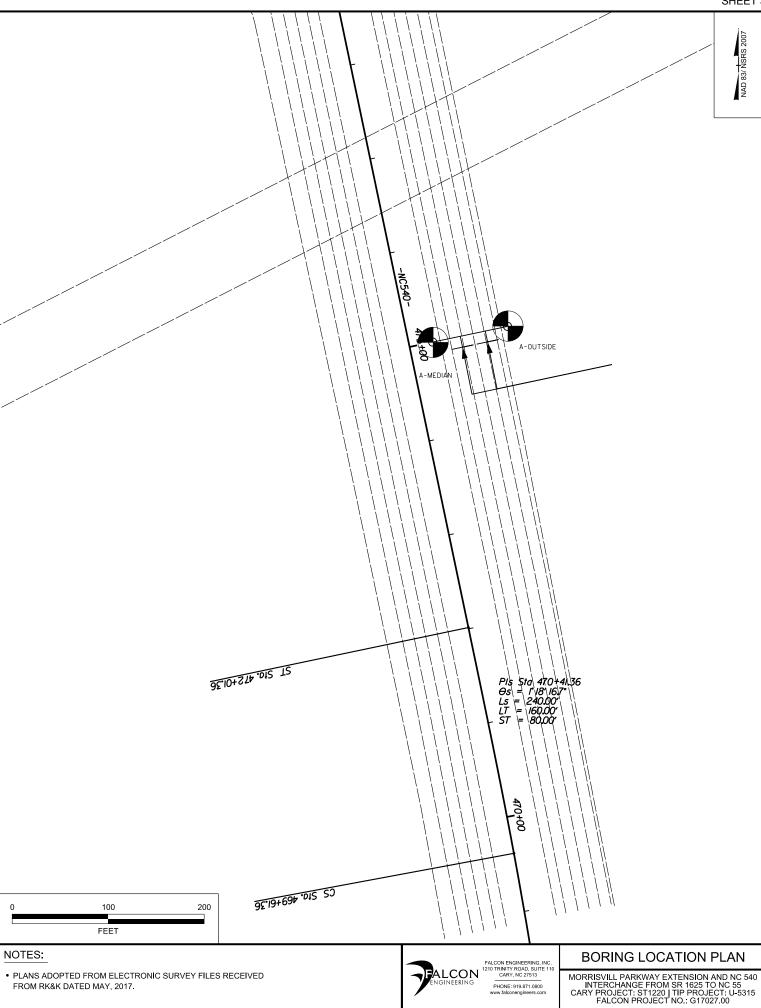
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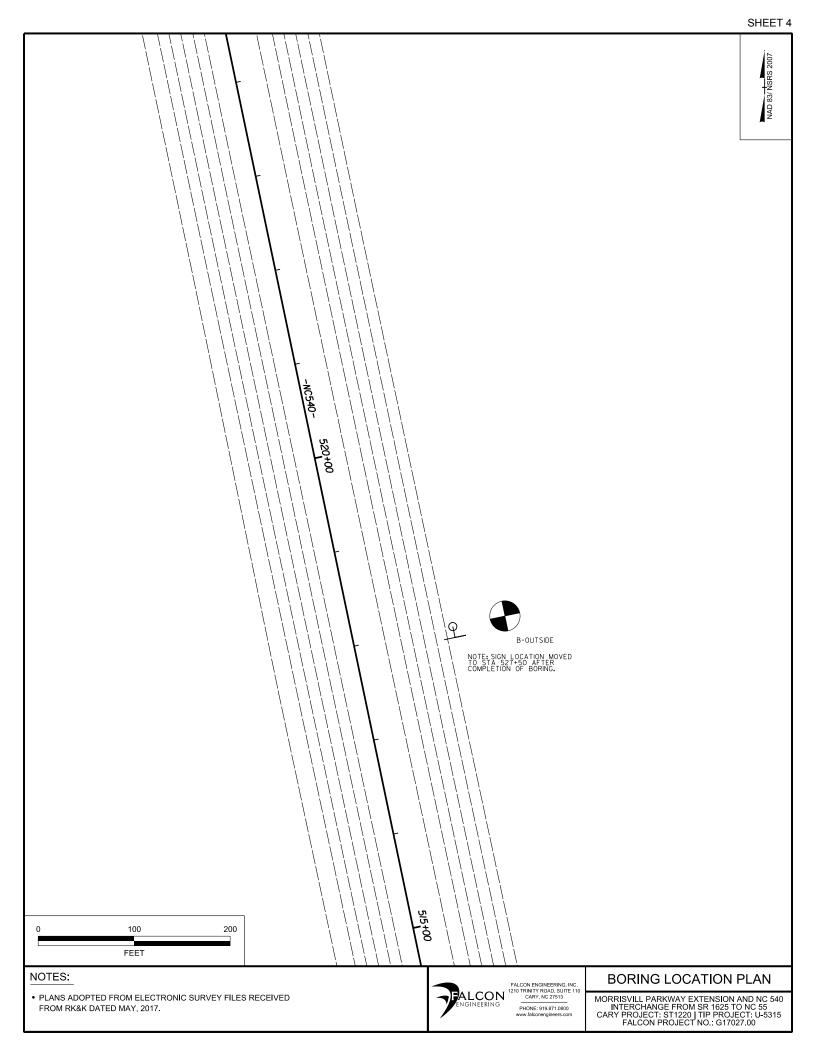
- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HANVIG REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY MAVES ANY CLAIMS FOR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

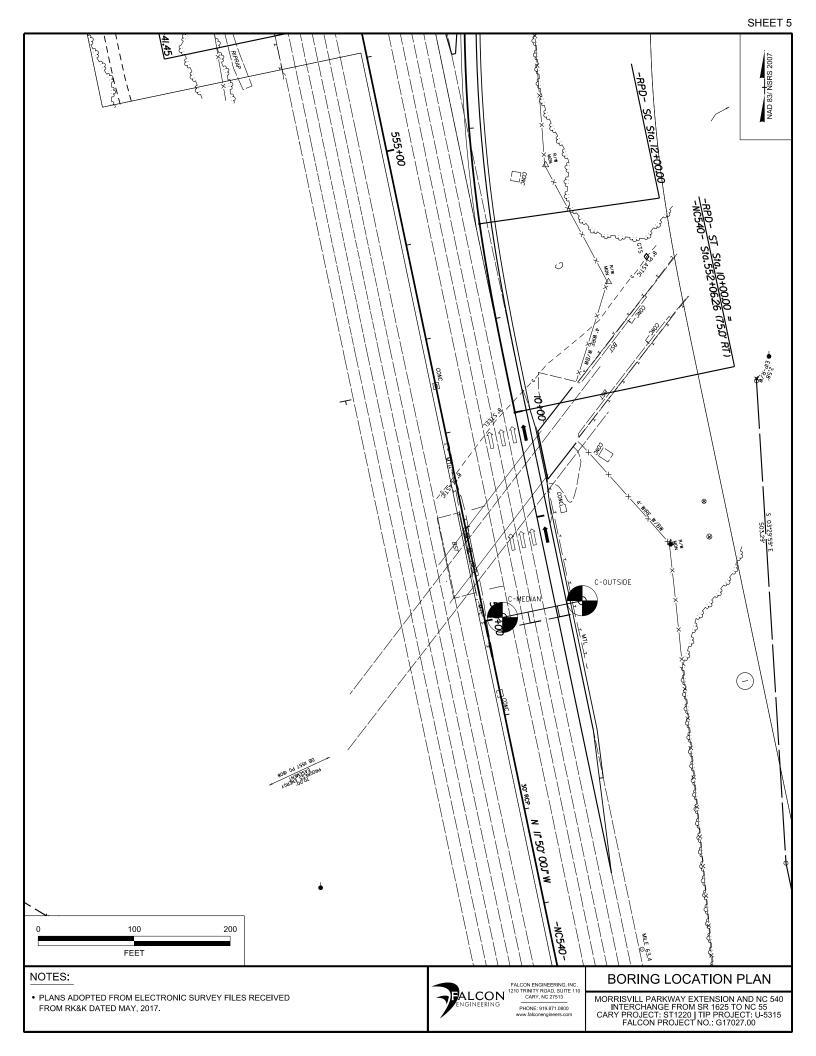


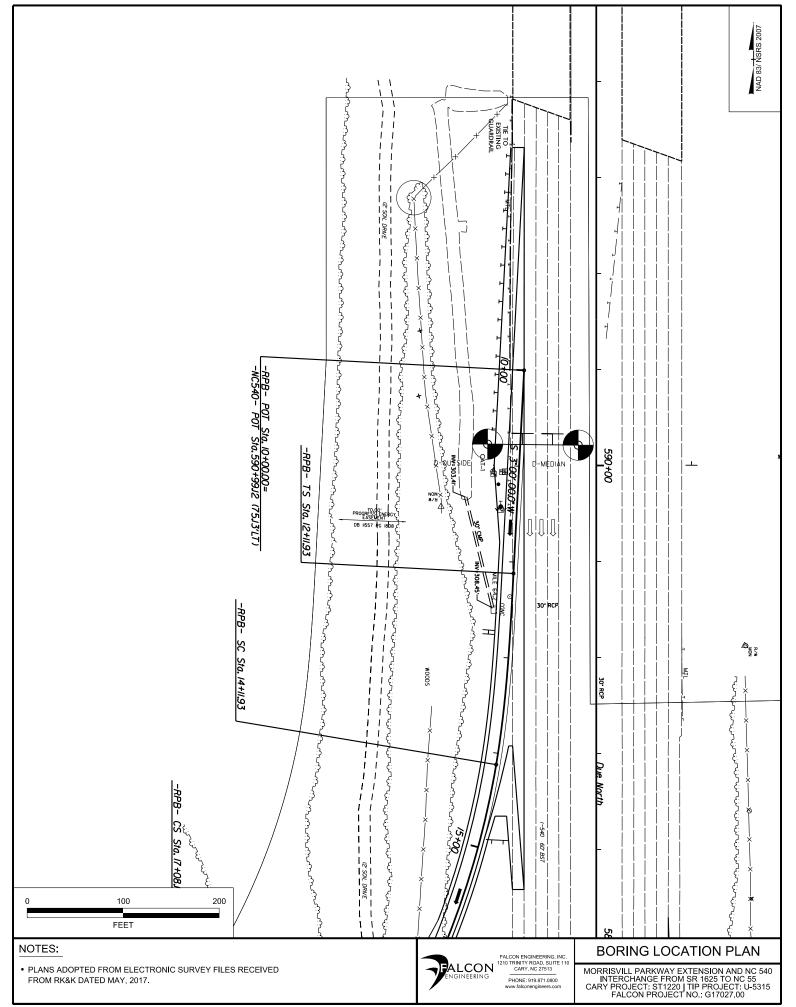
		PROJECT REFERENCE NO.	SHEET NO.										
		U–5315	2										
NORTH CAROLINA DEPA DIVISION	OF HIGH	WAYS											
GEOTECHNICAL	ENGIN	EERING UNIT											
SUBSURFACE	SUBSURFACE INVESTIGATION												
	MS, SYMB E 1 OF 2)	OLS, AND ABBREVIATIO	NS										
SOIL DESCRIPTION		GRADATION											
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER F	UNIFORMLY GF	- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZE RADED - INDICATES THAT SOIL PARTICLES ARE ALL APPRO	DXIMATELY THE SAME SIZE.										
ACCORDING TO THE STANDARD PENETRATION TEST (AGSHTO T 206, ASTM DIS68), SOIL CLASSIFICATI IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS S		INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF ANGULARITY OF GRAINS	TWO OR MORE SIZES.										
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIF, GRAY, SILTY CLAY, MOIST WITH INTERBEDED FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6	THE #	ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNAT	ED BY THE TERMS:										
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGUL	LAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION											
$ \begin{array}{ c c c c c } \hline GRANULAR MATERIALS & SILT-CLAY MATERIALS \\ CLASS. & (\leq 35%, PASSING = 200) & (> 35%, PASSING = 200) \\ \hline \end{array} $		NERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KA											
GROUP CLASS.         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-o         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A-7, A-3         A-6, A-7	AR	E USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF COMPRESSIBILITY	SIGNIFICANCE.										
ULHOJA (A1-10) (A1-10) (A2-4) (A2-2) (A2-6) (A2-27) (A2-6) (A2-27) (A2-6) (A2-6		SLIGHTLY COMPRESSIBLE LL <	31 31 - 50										
	~~~~	HIGHLY COMPRESSIBLE LL >											
"10 50 MX GRANULAR CLAY	CK, AT	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY SOILS SOILS G											
MM dE M CE AM CE AM CE AM DI AM CS AM CI 905-	TRACE OF C	RGANIC MATTER 2 - 3% 3 - 5% TRA											
PASSING *40 	MODERATEL	ORGANIC 5 - 10% 12 - 20% SOM											
	HLY HIGHLY ORG	ANIC > 10% > 20% HIG GROUND WATER	HLY 35% AND ABOVE										
USUAL TYPES STORE FRAGS. FINE STUTY OF CLAYEY STUTY CLAYEY NATER	ils 🗸		FTER DRILLING										
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	<b>▼</b>	STATIC WATER LEVEL AFTER 24 HOURS											
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UN			BEARING STRATA										
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	SPRING OR SEEP											
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS											
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRE CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	TH ROA	DWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION											
GENERALLY VERY LOOSE < 4 LOOSE 4 TO 10		SYMBOL SYMBOL	SLOPE INDICATOR										
MATERIAL MEDIUM DENSE 10 TO 30 N/A	M												
(NUN-CUHESIVE) VERY DENSE > 50		4											
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5		ERRED SOIL BOUNDARY	SOUNDING ROD     TEST BORING										
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2		ERRED ROCK LINE MONITORING WELL →	WITH CORE										
(COHESIVE)         VERY STIFF         15 TO 30         2 TO 4           HARD         > 30         > 4	ALL	INSTALLATION	SPT N-VALUE										
TEXTURE OR GRAIN SIZE													
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053		UNSUITABLE WASTE	CLASSIFIED EXCAVATION - CEPTABLE,BUT NOT TO BE ED IN THE TOP 3 FEET OF										
BOULDER COBBLE GRAVEL COARSE FINE SILT CL (BLDR.) (COB.) (GR.) SAND SAND (SL.) (CL.)		T ACCEPTABLE DEGRADABLE ROCK EM	BANKMENT OR BACKFILL										
(ELUR.)         (CUB.)         (CSE. SD.)         (F SD.)         (SL.)         (CSE. SD.)           GRAIN         MM         305         75         2.0         0.25         0.005         0.005	AR - AUGER RE	FUSAL MED MEDIUM	/ST - VANE SHEAR TEST										
SIZE IN. 12 3	BT - BORING T	ERMINATED MICA MICACEOUS	VEA WEATHERED γ- UNIT WEIGHT										
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PE	NETRATION TEST NP - NON PLASTIC OR ORGANIC	$\gamma_{d}$ - DRY UNIT WEIGHT										
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRI	ION DMT - DILATOM	ETER TEST PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS - BULK										
- SATURATED - USUALLY LIQUID; VERY WET, USUALL' (SAT.) FROM BELOW THE GROUND WATER T	e - VOID RATI	SD SAND, SANDY S	SS - SPLIT SPOON ST - SHELBY TUBE										
	FOSS FOSSIL	IFEROUS SLI SLIGHTLY F	RT - RECOMPACTED TRIAXIAL										
RANGE - WET - (W) SEMISULID; REQUIRES DRYING TO (PI) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGM		CBR - CALIFORNIA BEARING RATIO										
			JECT										
OM _ OPTIMUM MOISTURE - MUIST - (M) SULU; HI OK NEHR OPTIMUM MUIST SL _ SHRINKAGE LIMIT	DRILL UNITS:		MER TYPE:										
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE													
PLASTICITY	CME-55		- 512Е: -В П-Н										
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550		-N										
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT           MODEPATELY PLASTIC         16-25         MEDIUM	VANE SHE	AR TEST	D TOOLS:										
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE		POST HOLE DIGGER HAND AUGER										
COLOR	X MOBILE	B57 TRICONE TUNGCARB.	SOUNDING ROD										
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GR MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			VANE SHEAR TEST										
		LJ   LJ											

<u> </u>				PROJECT REFERENCE NO.	SHEET NO.
				U–5315	2A
	NORTH	CAROLINA DEPARTME DIVISION OF D		NSPORTATION	
	GEO1	ECHNICAL EN		NG UNIT	
	<b></b>				_
	SUBS	URFACE IN	VES1	IGATION	Ι
	SOLI AND R	OCK LEGEND, TERMS, S	SVMBOIS A	ND ABBREVIATIO	VS
	SOIL MILD K	(PAGE 2)			10
	ROCK DES			TERMS AND DEFINITIONS	
ROCK LINE SPT REFUSA	INDICATES THE LEVEL AT WHICH NON-COAS AL IS PENETRATION BY A SPLIT SPOON SA	OULD YIELD SPT REFUSAL IF TESTED. AN INFERRED STAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. MPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS AQUIFER - A WATER BEARI	THAT HAVE BEEN TRANSPORTED BY WATER. NG FORMATION OR STRATA.	
REPRESENTE	NON-COASTAL PLAIN MATERIAL, THE TRAN D BY A ZONE OF WEATHERED ROCK. RIALS ARE TYPICALLY DIVIDED AS FOLLOW:	NSITION BETWEEN SOIL AND ROCK IS OFTEN 5:	ARGILLACEOUS - APPLIED	ROCKS THAT HAVE BEEN DERIVED FROM SAND TO ALL ROCKS OR SUBSTANCES COMPOSED OF	CLAY MINERALS, OR HAVING
WEATHERED ROCK (WR)	NON-COASTAL PLAIN	N MATERIAL THAT WOULD YIELD SPT N VALUES > DT IF TESTED.	ARTESIAN - GROUND WATER	CLAY IN THEIR COMPOSITION, SUCH AS SHALE THAT IS UNDER SUFFICIENT PRESSURE TO R	ISE ABOVE THE LEVEL AT
CRYSTALLIN ROCK (CR)		RAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE, HIST.ETC.	SURFACE.	BUT WHICH DOES NOT NECESSARILY RISE TO	
NON-CRYSTA ROCK (NCR)	ALLINE FINE TO COARSE G	RAIN METAMORPHIC AND NON-COASTAL PLAIN THAT WOULD YEILD SPT REFUSAL IF TESTED. ES PHYLLITE, SLATE, SANDSTONE, ETC.		S THAT CONTAIN APPRECIABLE AMOUNTS OF C ENTS MIXED WITH SOIL DEPOSITED BY GRAVITY	
COASTAL PL SEDIMENTAR (CP)	AIN COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD K TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TO	DTAL LENGTH OF ALL MATERIAL RECOVERED IN E RUN AND EXPRESSED AS A PERCENTAGE.	N THE CORE BARREL DIVIDED
FRESH	WEATH	ERING S MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE F		
	HAMMER IF CRYSTALLINE. FROCK GENERALLY FRESH, JOINTS STAINED, 1	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.	H A STRATUM OR ANY PLANAR FEATURE IS IN TH) - THE DIRECTION OR BEARING OF THE HOR	
(V SLI.) SLIGHT	OF A CRYSTALLINE NATURE.	HINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CL		
(SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR (STALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE A	NOTHER PARALLEL TO THE FRACTURE. SPLITTING ALONG CLOSELY SPACED PARALLEL	
MODERATE (MOD.)		COLORATION AND WEATHERING EFFECTS. IN ULL AND DISCOLORED,SOME SHOW CLAY. ROCK HAS HOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.	ON SURFACE NEAR THEIR ORIGINAL POSITION	
MODERATELY	WITH FRESH ROCK.	STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPA	BORDERING A STREAM, BUILT OF SEDIMENTS DE ABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZE	
SEVERE (MOD. SEV.)		AOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH T'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.		K ALONG WHICH NO APPRECIABLE MOVEMENT H	
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR REDUCED IN STRENGTH TO STRONG SOIL. I	STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT N GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.	DGE OR PROJECTION OF ROCK WHOSE THICKNES	
VERY	TO SOME EXTENT. SOME FRAGMENTS OF ST IF TESTED, WOULD YIELD SPT N VALUES > ALL ROCK EXCEPT QUARTZ DISCOLORED OR			ARLY MARKED WITH SPOTS OF DIFFERENT COLO AERATION AND LACK OF GOOD DRAINAGE.	DRS. MOTTLING IN SOILS
SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED TO S REMAINING. SAPROLITE IS AN EXAMPLE OF	DIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK ROCK WEATHERED TO A DEGREE THAT ONLY MINOR IN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPER		
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT	DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATIO	IL FORMED IN PLACE BY THE WEATHERING OF <u>N (ROD)</u> - A MEASURE OF ROCK QUALITY DESCR OR GREATER THAN 4 INCHES DIVIDED BY THE	RIBED BY TOTAL LENGTH OF
	ROCK HA		RUN AND EXPRESSED AS A <u>SAPROLITE (SAP.)</u> - RESIDU ROCK.	PERCENTAGE. AL SOIL THAT RETAINS THE RELIC STRUCTURE	OR FABRIC OF THE PARENT
VERY HARD HARD	SEVERAL HARD BLOWS OF THE GEOLOGIST'S	P PICK. BREAKING OF HAND SPECIMENS REQUIRES S PICK. _Y WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY	OF IGNEOUS ROCK OF APPROXIMATELY UNIFO D WITH ITS LATERAL EXTENT, THAT HAS BEEN	
MODERATELY	TO DETACH HAND SPECIMEN. CAN BE SCRATCHED BY KNIFE OR PICK. GO	UGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED A	ITY OF THE INTRUDED ROCKS. AND STRIATED SURFACE THAT RESULTS FROM	FRICTION ALONG A FAULT
HARD MEDIUM	BY MODERATE BLOWS.	IT'S PICK. HAND SPECIMENS CAN BE DETACHED DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.		ST (PENETRATION RESISTANCE)(SPT) - NUMBER 3 30 INCHES REQUIRED TO PRODUCE A PENETR	
HARD		EICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE D TO OR LESS THAN 0.1 FOO	IAMETER SPLIT SPOON SAMPLER. SPT REFUSAL T PER 60 BLOWS.	L IS PENETRATION EQUAL
SOFT		NIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN JRE.	TOTAL LENGTH OF STRATU	<u>REC.)</u> - TOTAL LENGTH OF STRATA MATERIAL I M AND EXPRESSED AS A PERCENTAGE. SIGNATION (SROD) - A MEASURE OF ROCK QUAL)	
VERY SOFT		WATED READILY WITH POINT OF PICK. PIECES I INCH Y FINGER PRESSURE. CAN BE SCRATCHED READILY BY	LENGTH OF ROCK SEGMENT THE TOTAL LENGTH OF ST	S WITHIN A STRATUM EQUAL TO OR GREATER RATA AND EXPRESSED AS A PERCENTAGE. OILS USUALLY CONTAINING ORGANIC MATTER.	
TERM	FRACTURE SPACING	BEDDING	BENCH MARK:		
VERY WIE WIDE	3 TO 10 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET		ELEVA	TION: FEET
CLOSE VERY CLI	Ø.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:		
	INDUR		-		
FOR SEDIME	RUBBING WITH F	ING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
	GRAINS CAN BE	BY HAMMER DISINTEGRATES SAMPLE. SEPARATED FROM SAMPLE WITH STEEL PROBE:			
INDUF	GRAINS ARE DI	WHEN HIT WITH HAMMER. FICULT TO SEPARATE WITH STEEL PROBE: 3REAK WITH HAMMER.			
EXTR	SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE; ACROSS GRAINS.			DATE: 8-15-14
L					

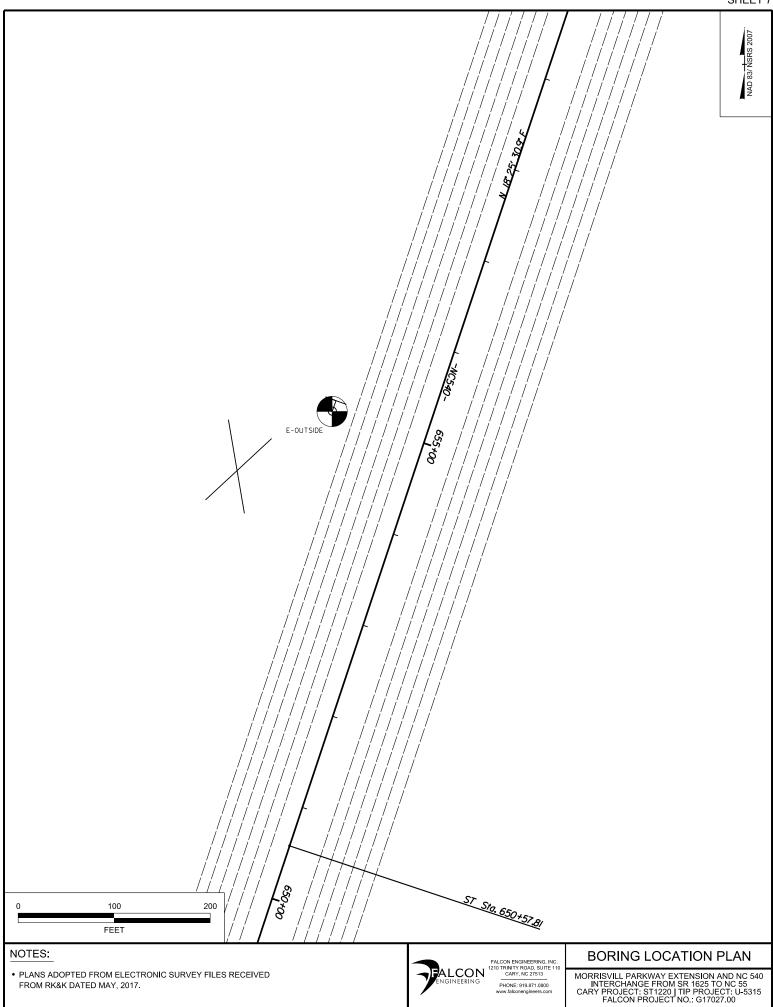


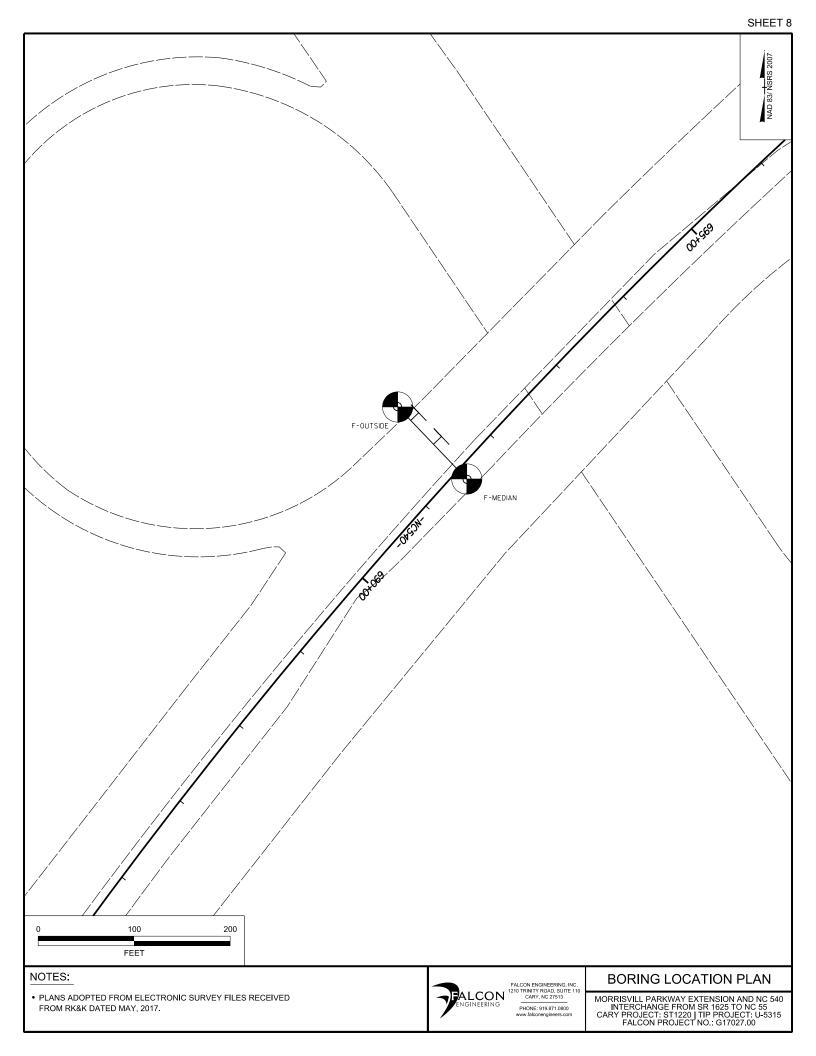






SHEET 6





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	45429						U-5315			WAKE				GEOLOGIST R. Lane	1	
SITE	DESCR	IPTION	I MO	RRIS\	/ILLE	PA	RKWAY	EXTENS	ION AND	NC 540 IN	TERCH	ANGE	FRO	/ SR 1625 TO NC 55	GROUN	ND WTR (ft
BORI	NG NO.	A-ME		I	s	TA	TION 47	5+00		OFFSET	25 ft R	Γ		ALIGNMENT -NC540-	0 HR.	Dr
COLL	AR ELI	<b>EV.</b> 34	13.3 ft		Т	от	AL DEPT	H 13.8 f	t T	NORTHIN	<b>G</b> 739,	843		EASTING 2,033,779	24 HR.	Dr
DRILL	RIG/HA	MMER E	FF./DA	TE TH	RI8016	МС	BILE B-57	90% 02/22	2/2016		DRILL	METHO	DD H.	S. Augers HAMN	IER TYPE	Automatic
DRILI	LER E	step, J	. E.		s	TA	RT DATE	05/16/1	7	COMP. DA	<b>TE</b> 05	/16/17		SURFACE WATER DEPTH N	/A	
ELEV	DRIVE	DEPTH	BLC	OW CO	UNT	Π		BLOWS I	PER FOOT		SAMP	. 💙/				
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	<b> </b>	) 2	5 5	50	75 100	NO.	мо	0   G	SOIL AND ROCK DES	CRIPTION	DEPTH (
345																
	-	E											F	- 343.3 2" TOPSOIL		C
	342.3	1.0	11	21	24							D		341.8 <b>ROADWAY EMBAN</b> TAN-ORANGE, SANDY SII	TY CLAY	(A4) / 1
340	339.8	3.5	15	27	34	┨┝										
	337.3	6.0							→ → <sup>61</sup>			D				0.0
335	-	ţ	8	12	19			•31.				D		_335.3		8
	334.8 -	- 8.5	14	30	70	11						D		DARK RED AND RED,		
	-	ŧ					· · · · ·	· · · · ·						MUDSTONE		
330	329.8 -	13.5	100/0 0					· · · ·		· · · ·						$\frac{13}{13}$
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SITE	DESCR		I MO	RRIS	/ILLE	PAR	KWAY	EXTE	NSI	AN AN	N DI	C 540	) INT	ERCHA	NGE	FRO	1 SR 1625 TO NC 55	GROUN	D WTR (ft)
BORI	NG NO.	A-OL	JTSID	Е	S	ΓΑΤΙΟ	<b>DN</b> 47	75+00			0	OFFSE	<b>ET</b> 1	04 ft R	Т		ALIGNMENT -NC540-	0 HR.	Dry
COLL	AR ELI	<b>EV.</b> 34	2.9 ft		т	OTAL	DEPT	<b>H</b> 14	l.1 ft		N	IORTI	HING	739,8	860		EASTING 2,033,857	24 HR.	Dry
ORILL	RIG/HA	MMER E	FF./DA	TE TH	RI8016	MOBIL	E B-57	90% (	)2/22/	2016				DRILL M	NETHO	DDH.	S. Augers HAMN	IER TYPE	Automatic
DRIL	LER E	step, J	. E.		S	TART	DATE	05/*	16/17	7	C	OMP	. DA1	E 05/	16/17		SURFACE WATER DEPTH N	/A	
LEV	DRIVE	DEPTH		ow co						ER FO	ОТ			SAMP.	<b>V</b> /	1 - 1	I		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	25	5	0	75	5	100	NO.	мо		SOIL AND ROCK DES	CRIPTION	DEPTH (
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	-	ŧ															342.9 3" TOPSOIL		0
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340	339.4 -	3.5			20		(	<b>2</b> 5 📥 -	<u></u>				· ·		D		TAN, SILTY SAND		3
	-	ţ	18	35	65/0.4		· · · · · ·		· · · ·	•••			 5/0.9				DARK RED AND GRAY	, TRIASSIC	
335	336.9 .	6.0	11	33	67/0.3		· · · · · ·		· · ·	•••			::1				MUDSTONE		
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330	329.4 <sup>-</sup>					·						• •							
-	329.4	13.5	59	51/0.1	<b> </b>							100	5/0.6€	-		9774	328.8 Boring Terminated at Eleva	tion 328.8 f	14 t IN
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SITE	DESCR	IPTION	I MO	RRIS	/ILLE	PA	RKWAY	EX1	TENS	ION AN	D NC	540 INT	ERCHA	NGE	FRO	1 SR 1625 TO NC 55	GROUND WTF	R (ft
ORII	NG NO.	B-OL	JTSID	E	S	TAT	TION 5	18+0	00		OF	FSET <sup>·</sup>	160 ft R <sup>-</sup>	Г		ALIGNMENT -NC540-	0 HR.	Dry
OLL	AR ELE	<b>EV</b> . 30	)5.8 ft		Т	ОΤΑ	AL DEP	тн	14.1 f	t	NO	RTHING	<b>3</b> 744,0	78		EASTING 2,033,030	24 HR.	Dry
RILL	RIG/HAI	MMER E	FF./DA	TE TF	1 RI8016	MO	BILE B-57	7 90%	6 02/22	2/2016	1		DRILL M	IETHO	<b>D</b> H.	S. Augers HAMM	ER TYPE Automa	atic
RILL	.ER E	step J	F		S	TAF		E 0!	5/22/1	7	co	MP. DA	TE 05/2					
	DRIVE	DEPTH	1	ow cou						· PER FOC			SAMP.	_	1 L			
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	10	:	25	į	50	75	100	NO.	мо	O G	SOIL AND ROCK DESC ELEV. (ft)		PTH (
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05	- 304.8	- 1.0				╆		-		<b></b>						305.8 5" TOPSOIL ROADWAY EMBAN	KMENT	(
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-	302.3	3.5	4	9	16	11	· · · · · ·	25	· · ·		· ·		SS-5	15%			/	
00	299.8 -	6.0	5	18	30	┨┝		-`	~					D		GRAY AND RED, CLAY (A-4		6
	297.3	8.5								48						297.8 RESIDUAL GRAY AND RED, CL	AY (A-6)	8
95	-	t i	29	71/0.5			· · · · · · · ·		· · · · · ·		:   :	· · 100				WEATHERED RO	DCK	
.35	-	F.						1.								- RED AND GRAY, MU	DSTONE	
	292.3	13.5	61	39/0.1	-		· · · ·	:	· · ·	· · ·	· · ·					291.7		14
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SITE	DESCR	IPTION	MO	RRIS	/ILLE	PAR	KWAY	<u>' EX</u>	<u>rens</u>	ION	AND	NC 5	540 INT	ERCH/	NGE	FRO	M SR 1625 TO NC 55	GROUI	ND WTR (ft
ORI	NG NO.	C-M	EDIAN	I	S	TAT	<b>ON</b> 5	50+0	00			OFF	SET	19 ft RT			ALIGNMENT -NC540-	0 HR.	Dr
OLL	AR ELE	<b>EV</b> . 35	51.0 ft		Т	ΟΤΑΙ	_ DEP	тн	13.91	ft		NOF	RTHING	<b>3</b> 747, <sup>•</sup>	183		EASTING 2,032,235	24 HR.	Dr
RILL	RIG/HAI	MMER E	FF./DA	TE TF		MOBI	LE B-57	7 90%	6 02/2	2/2010	<u> </u>				METHO	D H			Automatic
RILI	ER E	sten .I	F		S	TAR		F 0!	5/16/*	17		CO		TE 05/			SURFACE WATER DEPTH		
1		DEPTH	1	OW CO			DAI		.ows			001		SAMP.	-	1 L T	CONTACE WATER DEF TH		
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-	347.5 -	- 3.5	11	27	31	:	· · · · · ·	:	· · · · · ·	Ì.	· · ·	:	· · · ·		D				
45	345.0	6.0						·					<u></u>				- <u>345.5</u>		
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SITE	DESCR		МО	RRIS	/ILLE	PAR	KWAY	EXT	ENS	ION A	ND	NC 5	540 INT	ERCHA	NGE	FRO	/I SR 1625 1	FO NC 55	GROU	IND WTR (ft
ORI	NG NO.	. C-Ol	JTSID	)E	S	TATI	ON 5	50+0	0			OFF	SET	104 ft R	Т		ALIGNME	NT -NC540-	0 HR.	. Dry
OLL	AR ELE	<b>EV</b> . 35	50.2 ft				DEP			ť				<b>3</b> 747,2			EASTING	2,032,318	24 HR.	
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	<b>ER</b> E	1		OW CO			DAI			PER F		CUI	VIP. DA	SAMP.		1 L T	SURFACE	WATER DEPTI	n n/A	
LEV (ft)	ELEV	DEPTH (ft)	0.5ft	1	1	0	:	вц 25		рек г 50		75	100	NO.	17	0		SOIL AND ROCK	DESCRIPTIO	
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45	-	ł	6	6	13		••• <u>•</u> 1	9	· · ·	<u> </u>	 	<u> </u>			м		<u>345.2</u> <u>R</u> E	D AND GRAY, CLA	AY (A-6) MICA	EOUS5
ŀ	344.2	6.0	11	47	53/0.3		· · ·	· ·	· · · ·	· ·	•••	·						GRAY, TRIASSI		Ξ
	341.7 -	8.5	39	61/0.4	-				• •			.	100/0.8	<b>7</b>	┣┻-					-
40	-	F	39	01/0.4				· ·	· ·			<u> </u>	100/0.9				-			
	-	ŧ				:	· · · · · ·		· · · ·		•••	:								
ŧ	336.7 -	- 13.5	100/0.:	3				• •	• •		• •	•	100/0.3	•		<i>911</i>	336.4 Bo	oring Terminated at	Elevation 336	13 4 ft IN
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WBS	45429	9.1.1			T	I <b>P</b> U-5315		COUNT	Y WA	AKE				GEOLOGIST R. Lane	
SITE	DESCR		MO	RRIS	/ILLE	PARKWAY	EXTENSI	ON AND	NC 54	40 INT	ERCHA	NGE	FROM	I SR 1625 TO NC 55	GROUND WTR (f
BORI	NG NO.	. D-MI	EDIAN	٧	S	TATION 59	0+21		OFFS	SET ´	19 ft LT			ALIGNMENT -NC540-	0 HR. Dr
COLL	AR ELE	<b>EV.</b> 3′	15.5 ft		Т	OTAL DEPTI	H 30.0 ft	:	NOR	THING	751,1	75		EASTING 2,031,914	24 HR. Dr
ORILL	RIG/HAI	MMER E	FF./DA	TE T	RI8016	MOBILE B-57	90% 02/22	/2016			DRILL N	IETHO	<b>D</b> H.S	S. Augers HAMM	ER TYPE Automatic
ORILI	ER E	step. J	. E.		S	TART DATE	05/18/1	7	сом	IP. DA	<b>TE</b> 05/				/A
LEV	DRIVE	DEPTH	1	ow co				PER FOOT			SAMP.		1 L		
(ft)	ELEV (ft)	(ft)	0.5ft		1	0 25		50	75	100	NO.	мо	O G	SOIL AND ROCK DES	CRIPTION DEPTH
	()														DEFIN
320															
320	-	ŧ													
	-	t													
315	-													315.5 3" TOPSOIL ROADWAY EMBAN	
	314.5	+ 1.0	2	3	5							D		BROWN-ORANGE AND GR	AY, CLAY (A-6)
-	312.0	3.5	4	3	4							D		MICACEOUS WITH TRAC	E ORGANICS
310	- 309.5	+ - 6.0							<u> </u>						
	-	t	4	4	5		· · · · ·					D	L		
	307.0	8.5	3	3	5							D			
305	-	ł												202 E	1
	302.0	I 13.5												. <u>303.5</u> ALLUVIAL	<u> </u>
300		- 10.0	3	3	5	·••8 · ·						D		BROWN ORANGE BLACK SANDY CLAY (A-6) WI	
	-	ŧ				. <u>.</u>								ORGANICS	
_	297.0	18.5				.      .	· · · ·	· · · ·							
295	-	t	4	4	4	• • • • • • • • • • • • • • • • • • • •					SS-1	19%			
	-	ł							· ·					.293.5 RESIDUAL	2
-	292.0	23.5	9	12	9						SS-9	26%	N	ORANGE AND GRAY, MO	
290	-	ŧ			-						- 55-9	20 /0	N	PLASTIC CLAY (A-7-6)	MOTTLED
	-	‡				:: <i>i</i> ::	· · · · ·						N		
-	287.0 -	28.5	4	5	5	<b>/</b>   . ∳10 .	· · · · ·					D	N	285.5	30
	-	ŧ								I				Boring Terminated at Eleva RESIDUAL (A-7	tion 285.5 ft IN
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WBS	45429	9.1.1			Т	ΠP	U-5315		COUNT	Y WA	AKE				GEOLOGIST R. Lane		
SITE	DESCR	IPTION	MC	RRIS\	/ILLE	PA	ARKWAY	EXTENS	ON AND	NC 54	40 INT	ERCHA	NGE	FRON	I SR 1625 TO NC 55	GROUND WT	R (ft)
BORI	NG NO.	D-Ol	JTSIC	)E	s	STA	ATION 59	0+22		OFFS	SET ´	113 ft LT	-		ALIGNMENT -NC540-	0 HR.	Dry
COLL	AR ELE	<b>EV.</b> 30	)5.6 ft		Т	тот	TAL DEPT	H 24.1 f	t	NOR	THING	<b>i</b> 751,1	76		EASTING 2,031,820	24 HR.	Dry
DRILL	RIG/HAI	MMER E	FF./DA	TE TE			OBILE B-57					DRILL N		<b>D</b> H.S	I	IER TYPE Auton	
	ER E						ART DATE			СОМ		TE 05/*			SURFACE WATER DEPTH N		
1			1	OW CO					PER FOOT			SAMP.		1 L	SOR ACE WATER DEPTIT	/A	
LEV (ft)	ELEV	DEPTH (ft)	0.5ft	-			0 2		50	75	100	NO.		0	SOIL AND ROCK DES		
. ,	(ft)		0.51	0.51	0.51							NO.	/моі	G	ELEV. (ft)	DE	PTH (1
310		Ļ															
	-	ŧ												ΙĿ			
	-	Ł												ΙĿ	305.6 3" TOPSOIL		0.
305	304.6 -	- 1.0	2	2	2		+							FN	- ROADWAY EMBAN	IKMENT	
	302.1	3.5	2		2		<b>4</b>						М	LN	RED AND GRAY, MODERA CLAY (A-7-6) WITH TRAC		
200	- 102.1	- 3.5	1	3	4			· · · · ·				SS-11	22%	LN	200.4		5
300	299.6 -	6.0	9	13	18	┨┟				1.					<u>300.1</u> RESIDUAL		5.
	297.1	8.5						•31			•••		М		RED AND GRAY, CL	AY (A-6)	
295		- 0.0	18	28	35								D				
295	-	ŧ							<u> </u>	+					-		
	292.1	13.5									•••						
290	-	F	17	24	35				•59		•••		D				
	-	F								×.	<u>,</u>				-		
-	287.1	18.5	31	69/0.4	_		· · · · ·	· · · · ·							287.6 WEATHERED R	оск	<u> </u>
285	-	Ł		69/0.4						• 1	100/0.9				RED AND GRAY, MU		
	-	ł									· ·						
	282.1	23.5	82	18/0.1				· · · ·			· · · ]				281.5		24
	-	ŧ	<u> </u>	10/011	1					1	00/0.6				Boring Terminated at Eleva WR: TRIASSIC MUE		
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NBS	45429	).1.1			Т	IΡU	J-5315			COUNT	TY V	/AKE				GEOLOG	IST R. Lane			
SITE	DESCR	IPTION	MC	RRIS	/ILLE	PAR	KWAY	EXTE	NSIC	on and	D NC	540 IN	TERCH	ANGE	FROM	M SR 1625	TO NC 55		GROUN	ID WTR (ft
BORI	NG NO.	E-Ol	JTSID	ЭE	S	ΤΑΤΙ	<b>ON</b> 6	55+00			OFI	SET	101 ft L	.Т		ALIGNME	NC540-	-	0 HR.	Dry
COLL	AR ELE	<b>EV.</b> 35	51.9 ft		Т	ΟΤΑΙ	DEP1	<b>FH</b> 13	.8 ft		NO	RTHIN	<b>G</b> 757	594		EASTING	2,031,824		24 HR.	Dr
	RIG/HAI									2016	_		1		н п	S. Augers	, ,-	НАММ		Automatic
	ER E												<b>TE</b> 05				E WATER DEI			
				OW CO			DAIL			ER FOO					1 L T	JURFACE			A	
LEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft	-		0	2	веоч 25	50 50		75	100		MO	0		SOIL AND RC	OCK DES	CRIPTION	DEDTU
	(11)		0.0.0	0.0.1		$\square$							110.		I G	ELEV. (ft)				DEPTH (
355		+													-	-				
	-	F													l F	351.9	3" 1	TOPSOIL		C
350	350.9	- 1.0	15	21	27	1.											RE	SIDUAL		·
	348.4	3.5							•●4 · ·	8						348.9	RED, CLAY (			3
	-	t	55	45/0.3		:	· · · · · ·			· · · · · ·	: :	100/0.8	•				RED, TRIAS			
345	345.9 -	6.0	44	66/0.3		_:			•••		• •	-100/0.8				_				
-	343.4	8.5	37	63/0.3	-	:	· · ·			· · ·	: :		!							
	-	ł		00/0.0		·			•••			100/0.8	<b>?</b>			<b>.</b>				
40	-	F										· · · ·	!			<u>339.4</u>				12
F	338.4	13.5	100/0.3	3		·		• • •	•••		•   •	-100/0.3	<b>-</b>				AN-BROWN, TR			
	-	ŧ															WR: TRIAS	SIC SANE	STONE	
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BORING NO.         F-MEDIAN         STATION         691+49         OFFSET         14 ft RT         ALIGNMENT         NC540         0 HR.         D           COLLAR ELEV.         370.7 ft         TOTAL DEPTH         29.9 ft         NORTHING         760,794         EASTING         2,033,528         24 HR.         D           DRILL REIGHAMMER EF-DATE         TRIBOIG MOBILE B-S7 90% 02222016         DRILL METHOD         HS. Augers         HAMMER TYPE Automatic           DRILL EX         TOTAL DEPTH         BLOWS PER FOOT         COMP. DATE         D5/18/17         SURFACE WATER DEPTH         N/A           LEV         PPTH         BLOWS PER FOOT         ISAMP         NO.         N/A         ELEV. (tt)         SOIL AND ROCK DESCRIPTION           370         360.7         1.0         25         50         75         100         NO.         N/AO         G         ELEV. (tt)         SOIL AND ROCK DESCRIPTION           3865         364.7         7         4         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>URE</th> <th>LUG</th> <th></th> <th></th> <th></th> <th></th>										URE	LUG				
BORING NO.         F-MEDIAN         STATION         691+49         OFFSET         14 ft RT         ALIGNMENT         NC540         0 HR.         D           COLLAR ELEV.         370.7 ft         TOTAL DEPTH         29.9 ft         NORTHING         760,794         EASTING         2,033,528         24 HR.         D           DRILL REIGHAMMER EF-DATE         TRIBOIG MOBILE B-S7 90% 02222016         DRILL METHOD         HS. Augers         HAMMER TYPE Automatic           DRILL EX         TOTAL DEPTH         BLOWS PER FOOT         COMP. DATE         D5/18/17         SURFACE WATER DEPTH         N/A           LEV         PPTH         BLOWS PER FOOT         ISAMP         NO.         N/A         ELEV. (tt)         SOIL AND ROCK DESCRIPTION           370         360.7         1.0         25         50         75         100         NO.         N/AO         G         ELEV. (tt)         SOIL AND ROCK DESCRIPTION           3865         364.7         7         4         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11 <th>WBS</th> <th>45429</th> <th>9.1.1</th> <th></th> <th></th> <th>Т</th> <th>IP U-5315</th> <th></th> <th>COUNT</th> <th>WAKE</th> <th></th> <th></th> <th></th> <th>GEOLOGIST R. Lane</th> <th></th>	WBS	45429	9.1.1			Т	IP U-5315		COUNT	WAKE				GEOLOGIST R. Lane	
COLLAR ELEV.         370.7 ft         TOTAL DEPTH         29.9 ft         NORTHING         760.794         EASTING         2.033.528         24 HR.         D           DRILL RIGHAMMER EFF, JDATE         TRI8016         MOBILE B-57         90%         02222016         DRILL METHOD         H.S. Augers         HAMMER TYPE         Automatic           DRILL RESHEP, J. E.         START DATE         05/18/17         COMP. DATE         05/18/17         SURFACE WATER DEPTH         N/A           1EV         DEPTH         BLOW COUNT         BLOWS PER FOOT         SAMP.         V         L         SOIL AND ROCK DESCRIPTION           370         360.7         1.0         3.6         7.5         100         NO.         MOIL         ELEV. (0)         SOIL AND ROCK DESCRIPTION           370         3.6         7         4         11         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	SITE	DESCR		MO	RRIS	VILLE	PARKWAY	TENSIC	N AND	NC 540 II	TERCH	IANGE	FRO	M SR 1625 TO NC 55	GROUND WTR (ff
OLLAR ELEV.         370.7 ft         TOTAL DEPTH         29.9 ft         NORTHING         760.794         EASTING         2.033,528         24 HR.         D           RILL RIGHAMMER EFF./DATE         TR8016         MOBILE 8-57         90% 0222/2016         DRILL METHOD         HAMMER TYPE         Automatic           RILLER         Estep, J. E.         START DATE         05/18/17         COMP. DATE         06/18/17         SURFACE WATER DEPTH         N/A           EV         DPTH         BLOW SPER FOOT         BLOWS PER FOOT         NO.         MOI         G         ELEV. (ft)         SOIL AND ROCK DESCRIPTION           76            TO SOIL         BLOWS PER FOOT         NO.         MOI         G         ELEV. (ft)         SOIL AND ROCK DESCRIPTION           76                SOIL AND ROCK DESCRIPTION         DEPTH           76                SOIL AND ROCK DESCRIPTION         DEPTH           76	ORI	NG NO	. F-MI	EDIAN	1	S	TATION 69	1+49		OFFSET	14 ft R	Т		ALIGNMENT -NC540-	0 HR. Dr
RILL RIGHAMMER EFF./DATE         TR8016         MOBILE B-57         90% 02222016         DRILL METHOD         H.A. Augers         HAMMER TYPE         Automatic           RILLER         Estep, J. E.         START DATE         05/18/17         COMP. DATE         05/18/17         SURFACE WATER DEPTH         N/A           E.V         DEV         0         2.5         50         75         100         NO.         V/A         0         2.5         50         75         100         NO.         V/A         0         2.6         0.25         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0	OLL	AR ELI	<b>EV.</b> 37	70.7 ft		Т	OTAL DEPTI	<b>1</b> 29.9 ft		NORTHI	<b>IG</b> 760	,794		EASTING 2,033,528	-
RILLER         Estep, J. E.         START DATE         05/18/17         COMP. DATE         05/18/17         SURFACE WATER DEPTH         N/A           LEV         0         0.5ft	RILL	RIG/HA	MMER E	FF./DA	TE T	RI8016	MOBILE B-57	90% 02/22/2	2016		DRILL	METHO	DD H.	S. Augers HAMN	
LEV (ft)         DERVE (ft)         DERVE (ft)         DERVE (ft)         DERVE (ft)         DERVE (ft)         DERVE (ft)         DERVE (ft)         Solit AND ROCK DESCRIPTION (ft)         DERVE (ft)         Solit AND ROCK DESCRIPTION (ft)         DEPTH           75         0         5         0         25         50         75         100         No.         MOI G         ELEV. (ft)         SOIL AND ROCK DESCRIPTION (ft)         DEPTH           75         369.7         1.0         3         4         7         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11	RILL	ER E	step. J	. E.		S	TART DATE	05/18/17		COMP. D					/A
Lick       ELEV       CL min       Osti			<u> </u>	1	ow co								<b>A</b> . 1		
75     70     360,7     1.0     3     4     7       367,2     3.5     6     7     4     11     1       367,2     3.5     6     7     4     11     1       367,2     3.5     6     7     4     11     1       367,2     3.5     6     7     4     11     1       367,2     3.5     6     7     4     11     1       362,2     8.5     11     10     5     15     11%       60     367,2     13.5     12     16     8     15       355     12     16     8     24     1     1       362,2     18.5     19     10     19     29     1       361,2     18.5     19     10     19     29     1       362,2     28.5     19     30     700.4     1     1000.9       362,2     28.5     19     10     19     29     1       364,4     19     10     19     29     1     1       362,2     18,5     19     10     19     29     1       362,2     19     30     700.4     10     10<				'⊢	-		0 25			75 10	0 NO.	Имо			CRIPTION DEPTH (1
370       360.7       10       3       4       7         367.2       3.5       6       7       4       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11		. ,						I		1					
370       360.7       10       3       4       7         367.2       3.5       6       7       4       11       11       11       11       11       RED AND ORGANICS         3665       364.7       6.0       4       9       11       20       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11%       11% </td <td>875</td> <td></td>	875														
380.7       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0 <td< td=""><td><u>,,,,</u></td><td>-</td><td>ŧ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>- ·</td><td></td></td<>	<u>,,,,</u>	-	ŧ											- ·	
370       369.7       1.0       Image: constraint of the second			‡												
367.2       3.5       6       7       4         366       364.7       6.0       4       9       11         366       364.7       6.0       4       9       11         366       362.2       8.5       11       10       5         366       367.2       13.5       11       10       5         367.2       13.5       12       16       8       24       15         355       352.2       18.5       19       10       19       229       10         366       347.2       23.5       4       5       5       1000.9       M       344.2       WEATHERED ROCK       2         343.2       28.5       19       30       70/0.4       1000.9       1000.9       M       344.2       WEATHERED ROCK       2         340.8       19       30       70/0.4       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9       1000.9	570	369.7 -	- 1.0				╞╌┹╍╌┤					+			
367.2       3.5       6       7       4       9       11			‡	3	4	7	. • <u>11</u>		· · · · ·			D			
		_307.2		6	7	4			· · · · ·		SS-	7 11%			
382.2       8.5       11       10       5       11       10       5       11       10       5       11       10       5       11       10       5       11       10       5       11       10       5       11       10       15       11       10       15       11       10       15       11       10       15       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11	200	364.7 -	6.0	4	9	11								_	
360		362.2	8.5	11	10	-			· · · ·						
357.2       13.5       12       16       8	360		Ł	''	10	5	•15							- - 359.7	11
357.2       13.5       12       16       8         355       352.2       18.5       19       10       19         350       347.2       23.5       4       5       5         347.2       23.5       4       5       5         342.2       28.5       19       30       70/0.4         19       30       70/0.4       100/0.9       344.2       WEATHERED ROCK       2         340.8       340.8       2       340.8       2       340.8       2			ł				· · · <b>\</b>								LL
352.2       18.5       19       10       19       10       19       10       19       10       19       10       19       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10	ŀ	357.2	13.5 	12	16	8						D			/
19       10       19       10       19       10       19       10       19       10       19       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10 <td< td=""><td>55</td><td>-</td><td>Ŧ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>WITH TRACE GRAVEL AN</td><td>7, CLAY (A-6) ID ORGANICS</td></td<>	55	-	Ŧ											WITH TRACE GRAVEL AN	7, CLAY (A-6) ID ORGANICS
347.2     23.5     4     5     5       347.2     23.5     4     5     5       342.2     28.5     19     30     70/0.4       19     30     70/0.4     100/0.9       100/0.9     100/0.9		352.2	T 18.5												
347.2       23.5       4       5       5	350		Ŧ	19	10	19		<b>9</b> 29				D		•	
345       4       5       5			Ŧ				/							-	
445	ŀ	347.2	23.5	4	5	5			· · · · ·			М			
342.2       28.5       19       30       70/0.4       · · · · · · · · · · · · · · · · · · ·	845	-	ŧ				. •10							- 	26
19       30       70/0.4		342.2	+						· · · · ·					WEATHERED R	OCK
Bonng Ternimated at Levalor 340.0 mm     WR: TRIASSIC MUDSTONE		012.2	- 20.0	19	30	70/0.4			· · · · ·	<u> </u>			10	340.8	29
		-	ŧ							100/0.				- Boring Terminated at Eleva WR: TRIASSIC MUE	ISTONE
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	45429					<b>P</b> U-5315			<b>Y</b> WAKE					GEOLOGIST R. Lane		
SITE	DESCR	RIPTION	MO	RRIS\	/ILLE	PARKWAY	EXTENSI	ON AND	NC 540	NTER		NGE F	RON	SR 1625 TO NC 55	GROUNE	OWTR (ft)
BORI	NG NO	. F-Ol	JTSID	E	S	TATION 69	91+57		OFFSET	• 91 ft	LT			ALIGNMENT -NC540-	0 HR.	Dry
OLL	AR EL	<b>EV.</b> 37	71.9 ft		т	OTAL DEPT	<b>H</b> 30.0 ft		NORTH	NG 7	60,86	69		EASTING 2,033,456	24 HR.	Dry
RILL	RIG/HA	MMER E	FF./DA	TE TR	RI8016	MOBILE B-57	90% 02/22	/2016		DR	ILL M	ETHOD	) H.S	Augers HAMM	ER TYPE	Automatic
RILI	ER E	step, J	. E.		S	TART DATE	05/17/1	7	COMP.						A	
LEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	1	OW CO	UNT		BLOWS F	PER FOOT		SA	MP. 10.	МОІ	L O G	SOIL AND ROCK DES		DEPTH (f
375																
370	370.9	+ - 1.0	2	2	4	 						[	-8-	371.9 3" TOPSOIL ROADWAY EMBAN	KMENT	0.
	368.4	+ 3.5	2	2	1	•6						М		RED-BROWN, CLA	r (A-6)	
		1	2	3	5					: ss	S-10	16%				
365	365.9	6.0	7	3	3					•		M				
	363.4	8.5										lvi l				
	· ·	‡	4	6	6	<b>1</b> 2				•		М				
360		t								•		l				
	358.4	13.5	11	11	14	• • • • •				•		l		357.9		14.
		Ŧ	''		14		25					М	S	355.9 GRAY-RED, SANDY SILT		
55	-	‡								·			N	RED AND GRAY, MODERA		
	353.4	18.5	15	9	10	::: <i>i</i>				•			X	CLAY (A-7-6) W/ TRACE ORGANICS A	ND GRAVEI	
		ł		5		9.19	9			•		м	Y	W/ TRACE ORGANICO A		-
350	-	Ŧ							+ • • •	-			S			
	348.4	23.5	3	5	9	::!:				·   _		23%	X			
		ł	ľ	Ŭ	Ű	•14.				·   -	S-8	23%	Y	045.4		00
45	-	Ŧ						~~~	+ • • •	-			S	<u>345.4</u> RED AND GRAY, CL	AY (A-6)	<u></u> <u>26</u>
ŀ	343.4	28.5	40	46	43				•	•						
ŀ		<u>+</u>								9				341.9 Boring Terminated at Eleva	ion 341.9 ft	30. IN
	-	ŧ											F	RESIDUAL (A-	5)	
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### LABORATORY TEST RESULTS

Morrisville Pkwy. and 540 Interchange Wake County, North Carolina

Falcon Engineering Project Number: G17027.00 May 30, 2017

			PERC	ENTAGE PA	SSING				WATER	
SAMPL		ATION	Т	OTAL SAMP	LE	LIQUID	& PLASTIC	LIMITS	CONTENT	AASHTO
Location	Sample	Depth, ft	#10	#40	#200	LL	PL	PI	(%)	CLASSIFICATION
D-median	SS-1	18.5-20	97	68	42	39	23	16	19	A-6 (3)
RWIS/MVD	SS-2	3.5-5	99	96	45	28	19	9	18	A-4 (1)
CCTV-1	SS-3	8.5-10	98	60	25	34	30	4	20	A-2-4 (0)
CCTV-2	SS-4	13.5-15	99	90	65	35	24	11	16	A-6 (6)
B-outside	SS-5	3.5-5	100	100	61	35	26	9	15	A-4 (4)
TB1	SS-6	8.5-10	99	80	51	32	20	12	10	A-6 (3)
F-median	SS-7	3.5-5	75	68	55	30	20	10	11	A-4 (3)
F-outside	SS-8	23.5-25	100	98	89	54	29	25	23	A-7-6 (26)
D-median	SS-9	23.5-25	99	62	37	44	29	15	26	A-7-6 (2)
F-outside	SS-10	3.5-5	98	87	63	35	20	15	16	A-6 (7)
D-outside	SS-11	3.5-5	100	98	78	47	25	22	22	A-7-6 (18)
MVDS2-1	SS-12	6-7.5	100	99	83	49	27	22	25	A-7-6 (20)

Note: Laboratory Results included for Aesthetic Signs, ITS Devices, High Mast Lighting, and Tolling Infrastructure Borings. Some borings indicated above are found in separate investigation reports for their respective structures.

Reviewed by: John Sailly

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT** 

STATE

N.C

STATE PROJECT REFERENCE NO

U-5315

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY\_WAKE

PROJECT DESCRIPTION MORRISVILLE PARKWAY EXTENSION AND NC 540 INTERCHANGE FROM SR 1625 (GREEN LEVEL CHURCH RD) TO NC 55 SITE DESCRIPTION TOLLING INFRASTRUCTURE

#### **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET 1 2,2A LEGEND (SOIL & ROCK) SITE PLAN(S) 3-4 5-8 BORE LOG(S) 9 LABORATORY TESTING SUMMARY PERSONNEL

SHEETS

11

NO

1

J. HAMM

A. PAUL

R. LANE

S. HUNSBERGER

INVESTIGATED BY \_\_\_\_\_. LANE

DRAWN BY A. PAUL

CHECKED BY \_\_\_\_\_\_.

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

DATE \_\_SEPTEMBER 11, 2017

#### CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY 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 POTALS 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 TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AS HE DEEN SICESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED AT THE SITE DIFFERING FROM THASE INDERSITION FOR AND RESULTING FOM THA COLLAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE AUDITIONAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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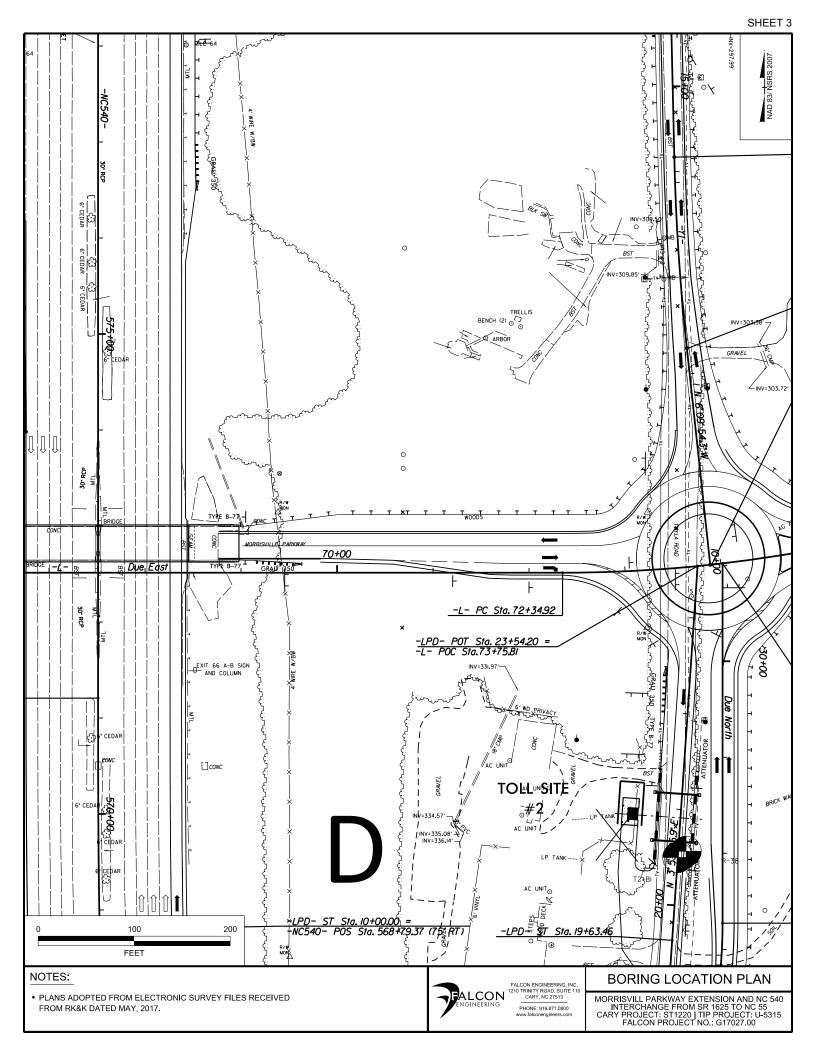
- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HANVIG REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY MAVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
- ....... OFESSION 1 11111111111111 SEAL 039779 HAMM GINE EMY R. SIGNATURE DATE **DOCUMENT NOT CONSIDERED FINAL**

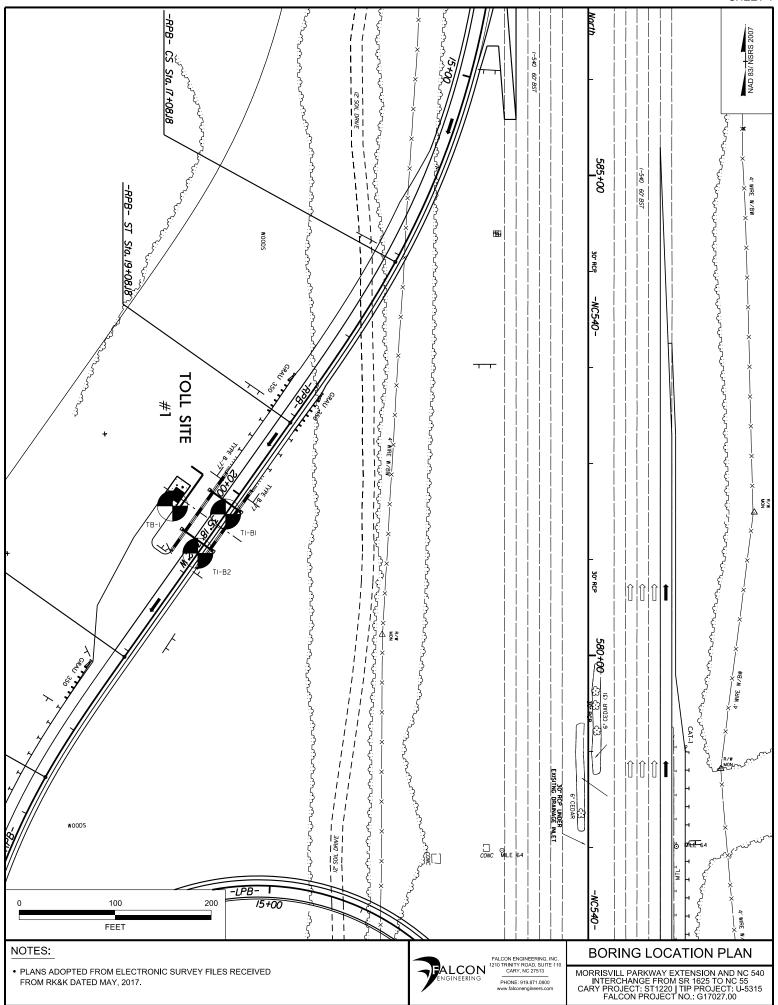
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			PROJECT REPERENCE NO. SHEET NO.
			U–5315 2
	L	DIVISION OF	MENT OF TRANSPORTATION
GE	OTECHN	ICAL EN	NGINEERING UNIT
SUB.	SURF	4 <u>CE</u> I	<b>NVESTIGATION</b>
SOIL AND	ROCK LEO	GEND, TERMS (PAGE	S, SYMBOLS, AND ABBREVIATIONS 1 OF 2)
	DESCRIPTION		GRADATION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CO BE PENETRATED WITH A CONTINUOUS FLIGHT PC	WER 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.
ACCORDING TO THE STANDARD PENETRATION TH IS BASED ON THE AASHTO SYSTEM. BASIC CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHT	DESCRIPTIONS GENERALLY INC	LUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS
AS MINERALOGICAL COMPOSITION, ANGULA	RITY, STRUCTURE, PLASTICITY,	ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:
SOIL LEGEND AND	AASHTO CLASSIFIC		ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION
GENERAL         GRANULAR MATERIALS           CLASS.         ( ≤ 35% PASSING *200)	SILT-CLAY MATERIALS ( > 35% PASSING #200)	ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.
GROUP         A-1         A-3         A-2           CLASS.         A-1-a         A-1-b         A-2-4         A-2-5         A-2-6         A-2		A-1, A-2 A-4, A-5 A-3 A-6, A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
SYMBOL 000000000000000000000000000000000000			SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50
2 PASSING *10 50 MX		RANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL
"10" 50 MX "40" 30 MX 50 MX 51 MN "200" 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35		SOILS SOILS PEAT	ORGANIC MATERIAL GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL
MATERIAL			UNDERLET INTERINE         SULS         UNITER         Interine           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE         1 - 10%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE         10 - 20%
	MN 40 MX 41 MN 40 MX 41 MN	SOILS WITH LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE
PI         6 MX         NP         10 MX         10 MX         11 MN         11           GROUP INDEX         Ø         Ø         Ø         Ø         4 MX	MN 10 MX 10 MX 11 MN 11 MN 8 MX 12 MX 16 MX ND MX	MODERATE ORGANIC	GROUND WATER
USUAL TYPES STONE FRAGS.	SILTY CLAYEY	ORGANIC SOILS MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
MAJUR GRAVEL, AND SAND GRAVEL AND SAND	SOILS SOILS		STATIC WATER LEVEL AFTER <u>24</u> HOURS
GEN. RATING EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
	- 30 ; PI OF A-7-6 SUBGROUP IS >	LL - 30	
	RANGE OF STANDARD	RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS
PRIMARY SOIL TYPE CONSISTENCY	PENETRATION RESISTENCE (N-VALUE)	COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 25/825 WITH SOIL DESCRIPTION OF ROCK STRUCTURES
GENERALLY VERY LOOSE	< 4 4 TO 10		SOIL SYMBOL
GRANULAR MEDIUM DENSE MATERIAL DENSE (NON-COHESIVE) VERVICE	10 TO 30 30 TO 50	NZA	ARTIFICIAL FILL (AF) OTHER AUGER BORING (A) CONE PENETROMETER
(NUN-LUHESIVE) VERY DENSE	> 50	< 0.25	
GENERALLY SOFT SILT-CLAY MEDIUM STIFF	2 TO 4 4 TO 8	0.25 TO 0.5 0.5 TO 1.0	
MATERIAL STIFF (COHESIVE) VERY STIFF	8 TO 15 15 TO 30	1 TO 2 2 TO 4	
HARD	OR GRAIN SIZE	> 4	
U.S. STD. SIEVE SIZE 4 10	40 60 200	270	
OPENING (MM) 4.76 2.00	0.42 0.25 0.075	0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF
BOULDER COBBLE GRAVEL (BLDR.) (COB.) (GR.)	COARSE FINE SAND SAND (CSE.SD.) (F SD.)	SILT CLAY (SL.) (CL.)	
GRAIN MM 305 75 2.0		0.05 0.005	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST
SIZE IN. 12 3		EDMC	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 27 - UNIT WEIGHT
SOIL MOISTURE SCALE FIELD M	CORRELATION OF T	EKMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC
	IPTION		DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK
- SATUR (SAT		ID; VERY WET, USUALLY THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS SPLIT SPOON           F - FINE         SL SILT, SILTY         ST SHELBY TUBE
LL LIQUID LIMIT PLASTIC RANGE < - WET -	(W) SEMISOLID; RE	DUIRES DRYING TO UM MOISTURE	FOSS FOSSILIFEROUS     SLI SLIGHTLY     RS - ROCK       FRAC FRACTURED, FRACTURES     TCR - TRICONE REFUSAL     RT - RECOMPACTED TRIAXIAL       FRAGS FRAGMENTS     \u03c6 - MDISTURE CONTENT     CBR - CALIFORNIA BEARING
	- (M) SOLID; AT OR	NEAR OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:
SLSHRINKAGE LIMIT		ITIONAL WATER TO	CME-45C     CLAY BITS     X AUTOMATIC MANUAL
	ATTAIN UPTIM	UM MUISTURE	CME-55
	ASTICITY	DRY STRENGTH	CME-550     C
NON PLASTIC SLIGHTLY PLASTIC	0-5 6-15	VERY LOW SLIGHT	VANE SHEAR TEST
MODERATELY PLASTIC	16-25 26 OR MORE	MEDIUM HIGH	
	COLOR		V NODU E DEZ TRICONE 'STEEL TEETH HAND AUGER
DESCRIPTIONS MAY INCLUDE COLOR OR COLOF MODIFIERS SUCH AS LIGHT, DARK, STRE			X     MOBILE B57     Image: Mobile and the second s

<u> </u>			PROJECT REFERENCE	NO. SHEET NO.
			U–5315	
	NORTH	CAROLINA DEPARTME DIVISION OF D		TON
	GEO1	ECHNICAL EN		<b>NIT</b>
	<b></b>			
	SUBS	URFACE IN	IVESTIGAT	ION
	SOLI AND R	OCK LEGEND, TERMS, S	SVMBOLS AND ABBRE	VIATIONS
	SOIL MILD K	(PAGE 2)	-	
	ROCK DES		TERMS AND DE	EFINITIONS
ROCK LINE SPT REFUSA	INDICATES THE LEVEL AT WHICH NON-COAS AL IS PENETRATION BY A SPLIT SPOON SA	OULD YIELD SPT REFUSAL IF TESTED. AN INFERRED STAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. MPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPO AQUIFER - A WATER BEARING FORMATION OR STRATA.	
REPRESENTE	NON-COASTAL PLAIN MATERIAL, THE TRAN ED BY A ZONE OF WEATHERED ROCK. RIALS ARE TYPICALLY DIVIDED AS FOLLOW:	NSITION BETWEEN SOIL AND ROCK IS OFTEN S:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN D ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTAN	NCES COMPOSED OF CLAY MINERALS, OR HAVING
WEATHERED ROCK (WR)	NON-COASTAL PLAIN 100 BLOWS PER FO	N MATERIAL THAT WOULD YIELD SPT N VALUES > OT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSIT ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIEN	INT PRESSURE TO RISE ABOVE THE LEVEL AT
CRYSTALLIN ROCK (CR)		RAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, HIST.ETC.	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NEC SURFACE.	
NON-CRYSTA ROCK (NCR)	ALLINE FINE TO COARSE G	RAIN METAMORPHIC AND NON-COASTAL PLAIN THAT WOULD YEILD SPT REFUSAL IF TESTED. ES PHYLLITE, SLATE, SANDSTONE, ETC.	CALCAREDUS (CALC.) - SOILS THAT CONTAIN APPRECIA <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEP OF SLOPE.	
COASTAL PL SEDIMENTAR (CP)	AIN COASTAL PLAIN SE	DIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD X TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS	
FRESH	WEATH	IERING S MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUT ROCKS OR CUTS MASSIVE ROCK.	
	HAMMER IF CRYSTALLINE. T ROCK GENERALLY FRESH, JOINTS STAINED, 1	SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLAP HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BE	
(V SLI.) SLIGHT	OF A CRYSTALLINE NATURE.	HINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH, FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHI	
(SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR YSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY	FRACTURE.
MODERATE (MOD.)		COLORATION AND WEATHERING EFFECTS. IN ULL AND DISCOLORED,SOME SHOW CLAY. ROCK HAS HOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR PARENT MATERIAL.	
MODERATELY	WITH FRESH ROCK.	STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT	
SEVERE (MOD. SEV.)		AOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH T'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD.	
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR REDUCED IN STRENGTH TO STRONG SOIL. I	STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT N GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROU ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT I	
VERY	TO SOME EXTENT. SOME FRAGMENTS OF ST IF TESTED, WOULD YIELD SPT N VALUES > ALL ROCK EXCEPT QUARTZ DISCOLORED OR		MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS USUALLY INDICATES POOR AERATION AND LACK OF GO	
SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED TO S REMAINING. SAPROLITE IS AN EXAMPLE OF	OIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK ROCK WEATHERED TO A DEGREE THAT ONLY MINOR IN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	PERCHED WATER - WATER MAINTAINED ABOVE THE NOP OF AN INTERVENING IMPERVIOUS STRATUM.	
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT	DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY TH ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF RO ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCH	OCK QUALITY DESCRIBED BY TOTAL LENGTH OF
	ROCK HA		RUN AND EXPRESSED AS A PERCENTAGE. <u>SAPROLITE (SAP.)</u> - RESIDUAL SOIL THAT RETAINS THE ROCK.	E RELIC STRUCTURE OR FABRIC OF THE PARENT
VERY HARD HARD	SEVERAL HARD BLOWS OF THE GEOLOGIST'S	P PICK. BREAKING OF HAND SPECIMENS REQUIRES S PICK. LY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APP RELATIVELY THIN COMPARED WITH ITS LATERAL EXTE	
MODERATELY	TO DETACH HAND SPECIMEN.	NUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROC <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THA	
HARD	BY MODERATE BLOWS.	ST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE. <u>STANDARD PENETRATION TEST (PENETRATION RESISTA</u> A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO	
MEDIUM HARD		DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. EICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAM TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.	MPLER. SPT REFUSAL IS PENETRATION EQUAL
SOFT		NIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN JRF.	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PE STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASU	ERCENTAGE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCA	WATED READILY WITH POINT OF PICK. PIECES I INCH Y FINGER PRESSURE. CAN BE SCRATCHED READILY BY	LENGTH OF ROCK SECMENTS WITHIN A STRATUM EQUA THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A <u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING	AL TO OR GREATER THAN 4 INCHES DIVIDED BY A PERCENTAGE.
TERM	FRACTURE SPACING SPACING	BEDDING	BENCH MARK:	
VERY WIE WIDE	DE MORE THAN 10 FEET 3 TO 10 FEET ELY CLOSE 1 TO 3 FEET	VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET		ELEVATION: FEET
CLOSE VERY CLI	0.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:	
	INDUR			
FOR SEDIME	RUBBING WITH F	ING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE.		
MODE	GRAINS CAN BE	ST HAMMER DISINIEGRATES SAMPLE. SEPARATED FROM SAMPLE WITH STEEL PROBE: WHEN HIT WITH HAMMER.		
INDUF	GRAINS ARE DI	FICULT TO SEPARATE WITH STEEL PROBE: BREAK WITH HAMMER.		
EXTR	SHARP HAMMER	BLOWS REQUIRED TO BREAK SAMPLE: 3 ACROSS GRAINS.		DATE: 8-15-14





WBS	45429	0.1.1			Т	ΊP (	U-5315		COUN	TY V	VAKE				GEOLOGIST R. Lane
SITE	DESCR	IPTION	I MO	RRIS	/ILLE	PAR	RKWAY	EXTENS	SION AN	D NC	540 INT	ERCHA	NGE	FROM	A SR 1625 TO NC 55 GROUND WTR (f
BORII	NG NO.	T2-B	1		s	TAT	<b>ION</b> 20	0+50		OF	FSET (	CL			ALIGNMENT -LPD- 0 HR. Dr
COLL	AR ELE	<b>EV</b> . 34	4.7 ft		Т	ΌΤΑ	L DEPT	<b>H</b> 14.3	ft	NC	RTHING	<b>5</b> 749,1	09		EASTING 2,032,537 24 HR. Dr
DRILL	RIG/HAI	MMER E	FF./DA	TE TF	RI8016	MOB	ILE B-57	90% 02/2	2/2016			DRILL N	ИЕТНС	DD H.S	S. Augers HAMMER TYPE Automatic
DRILL	ER E	step, J.	. E.		s	TAR		05/11/	17	cc	MP. DA	TE 05/	11/17		SURFACE WATER DEPTH N/A
	DRIVE	DEPTH		ow co					PER FOC			SAMP.	▼/	1-1	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	25	50	75	100	NO.	Имо	0   G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH
345															_344.7
_	343.7 -	- 1.0												N	RESIDUAL
	- 341.2	- 3.5	2	2	4	!	6			: .			M		ORANGE AND GRAY, SANDY, _ <u>341.7</u> MODERATELY PLASTIC CLAY (A-7-6)3
340	_	E .	11	16	22	1Ľ		►		·   ·			D		TAN AND ORANGE, SILTY SAND (A-2-4)
┝	338.7 -	6.0	13	18	23	:	•••	· · / ·		:   :		1	D		
	336.2	8.5				:				:   :		1			
335	-	F	10	15	15			●30				1	D		- RED BROWN AND ORANGE, SILT (A-4)
	-	-				:			1	-		1		F	
F	331.2	13.5	9	91/0.3						· ·	<u> </u>			477	<u></u>
Γ	-	-	<u> </u>	1							100/0.8				ORANGE AND TAN, SANDSTONE
	-														Boring Terminated at Elevation 330.4 ft IN WR: TRIASSIC SANDSTONE
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SITE	DESCR		I MO	RRIS	/ILLE	PARK	WAY	EXT	ENSI	ON A	ND N	VC 54	40 INT	ERCHA	NGE	FROM	M SR 1625 TO NC 55 GROUND WTR (ft)
BOR	ING NO.	. T1-B	2		S	ΤΑΤΙΟ	<b>DN</b> 2	0+75				OFFS	SET (	CL			ALIGNMENT -RPB- 0 HR. Dry
COLI	LAR ELI	<b>EV.</b> 34	0.3 ft		Т	OTAL	DEPT	<b>TH</b> 1	14.4 ft			NOR	THING	<b>7</b> 50,2	260		EASTING 2,031,526 24 HR. Dry
DRILL	RIG/HA	MMER E	FF./DA	TE TF	RI8016	MOBIL	E B-57	90%	02/22	/2016				DRILL I	METHO	D H.:	S. Augers HAMMER TYPE Automatic
DRIL	LER E	step, J.	E.		S	TART	DATE	E 05	5/10/1	7		сом	P. DA	TE 05/	/10/17		SURFACE WATER DEPTH N/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)		OW CO	UNT	0			OWS F	PER FC	тос	75	100	SAMP. NO.	-	L	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (f
345																	`
340	339.3	1.0										<u> </u>					- 340.3 0. - RESIDUAL
335	336.8	3.5	3 13	2 23	5 41			· · ·	· · ·	,	• • • •		· · · · · ·		M D		TAN ORANGE AND GRAY, SILTY, <u>MODERATELY PLASTIC CLAY (A-7-6)</u> TAN AND GRAY, SILTY SAND (A-2-4)
<u></u>	334.3 -	‡	23	41	58		· · · ·	· · ·	· · ·	· · · · · · · · · · · · · · · · · · ·	· · ·		`	99 	D		- 
330	-	+	35	65/0.3			· · ·	· ·	· · ·	· · ·	· · · ·	· i 	00/0.8				- GRAY AND BLACK, SANDSTONE
	326.8	13.5	24	76/0.4			· · ·	· · ·	· · ·	· · · ·	· ·	· · · · ·	00/0.9	-			
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WBS	45429	0.1.1			T	ΊΡ L	J-5315		COUNT	<b>Y</b> WA	KE				GEOLOGIST	R. Lane		
SITE	DESCR	IPTION	MO	RRIS\	/ILLE	PAR	KWAY	EXTENS	ION AND	NC 54	0 INT	ERCHA	NGE	FROM	/I SR 1625 TO N	C 55	GRC	OUND WTR (f
BORI	NG NO.	T1-B	1		S	TATI	<b>ON</b> 20	)+25		OFFS	ET (	CL			ALIGNMENT	-RPB-	0 H	<b>R.</b> Dr
COLL	AR ELE	<b>EV.</b> 33	8.7 ft		_ T	OTAI	_ DEPT	<b>H</b> 9.4 ft		NORT	THING	750,3	01		EASTING 2,0	31,555	24 H	<b>R.</b> Dr
DRILL	RIG/HAI	MMER E	FF./DA	TE T	RI8016	MOBI	ILE B-57	90% 02/2	2/2016			DRILL M	<b>IETHO</b>	<b>D</b> H.:	S. Augers		HAMMER TY	PE Automatic
DRILL	ER E	step, J.	E.		S	TAR	T DATE	05/10/	17	COM	P. DAT	<b>FE</b> 05/	12/17		SURFACE WA	TER DEPT	H N/A	
LEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT			BLOWS	PER FOOT			SAMP.	▼/			L AND ROCK		ON
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50	75	100	NO.	мо		ELEV. (ft)		DESCRIPTI	DEPTH
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	- 337.7	- 1.0				+	1							Ł	338.7	RESID	μαι	(
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335	335.2	3.5	12	27	41					8			D		RED-BR	OWN AND G	RAY, SILTY I	SAND
-	332.7 -	6.0	9	44	56/0.4													5
330	330.2	8.5	-			۲ <u> </u>  .										TAN, MUI		
-			36	64/0.4						10	00/0.9	-	<u> </u>			erminated at		
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SITE D BORIN COLLA DRILL I DRILL	NG NO. AR ELE	TB1	I MOI	RRIS	VILLE		5 Y EXTENS	COUNT			ERCHA	NGE	FROM		TR. Lane	GROUN	ID WTR (ft
BORIN COLLA DRILL	NG NO. AR ELE	TB1	I MOI	RRIS			Y EXTENS	ION AND	NC 54	40 INT	ERCHA	NGE I	FROM	1 SR 1625 TO	D NC 55	GROUN	ID WTR (ft
COLLA DRILL	AR ELE																
DRILL					5	TATION 2	20+50		OFFS	SET 5	50 ft RT			ALIGNMEN	IT -RPB-	0 HR.	Dry
DRILL		EV. 33	6.2 ft		т	OTAL DEF	<b>TH</b> 19.8	ft	NOR	THING	750,3	10		EASTING	2,031,500	24 HR.	Dry
LEV		MMER E	FF./DA	TE TI	RI8016	MOBILE B-5	57 90% 02/2	2/2016			DRILL N	IETHO	D H.S	6. Augers	HAM		Automatic
LEV	ER E	step J	F		S		<b>E</b> 05/12/ <sup>-</sup>	17	сом	P. DAT	<b>FE</b> 05/ <sup>-</sup>			-			
		DEPTH		w co				PER FOOT			SAMP.	▼/	L	1			
	ELEV (ft)	(ft)	0.5ft	0.5ft	1	o		50	75	100	NO.	мо	O G	ELEV. (ft)	SOIL AND ROCK DES	SCRIPTION	DEPTH
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<u>,,,,</u>	-	-															
	4	-												336.2	5" TOPSOI	_	C
335	335.2	1.0	3	3	4							D		GR	ALLUVIAL AY AND RED, CLAY (A		FD
L	332.7	- - 3.5								· · ·				332.2 MIC	CACEOUS WITH TRAC	CE ORGAN	CS4
30	330.2	- 6.0	4	17	28			45 <b></b> .		· · ·		D	-		GRAY, SILTY SAN		
	1	-	28	40	48			· · · ·	].>	●88.		D		328.2		5(((2-1)	
-	327.7 -	- 8.5 -	11	15	27			2		· · ·	SS-6	10%		D/	ARK RED, CLAY (A-6)	MICACEOU	JS
25	4	-					· · · · · · · · · · · · · · · · · · ·		· · ·	•••				324.2			12
	322.7	- - 13.5											-	GR	AY, SILTY, F. TO CSE	. SAND (A-2	2-4)
320	4	-	17	24	33			•57 · · ·	· ·   · ·	· · ·		D	-				
	-	-							<u> </u>				-				
_	317.7 -	- 18.5 -	17	40	60/0.3				· ·				<i>777</i>	<u>317.7</u>	WEATHERED F		<u>18</u> 18
	_	-					1	1	1	00/0.8			Ē		RED AND GRAY, MI		
	1	_											Ŀ	Don	WR: TRIASSIC MU	DSTONE	
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WBS	IÍIGÈÈÈ			TI	<b>P</b> U-5315	COUN	TY WAKE				GEOLOGIST Evans, T. E.		
SITE	DESCRIPTION	MO	RRIS	/ILLE	PARKWAY AND NC5	40 INTE	RCHANGE					GROUNI	OWTR (ft)
BOR	I <b>NG NO.</b> R-38			S	<b>TATION</b> 28+02		OFFSET 3	38 ft LT			ALIGNMENT -RPD-	0 HR.	Dry
COL	<b>LAR ELEV.</b> 34	4.0 ft		т	DTAL DEPTH 15.0 ft		NORTHING	i 749,1	15		EASTING 2,032,545	24 HR.	Dry
DRILL	RIG/HAMMER E	FF./DA	TE SI	DS1873	CME-550X 79% 08/21/207	13		DRILL N	IETHO	DH	.S. Augers HAMI	IER TYPE	Automatic
DRIL	LER Contract	Drille	r	S	TART DATE 07/14/1	4	COMP. DA	<b>FE</b> 07/ <sup>-</sup>	14/14		SURFACE WATER DEPTH	I/A	
ELEV (ft)	DRIVE ELEV (ft) (ft)	BLC 0.5ft	OW CO 0.5ft			PER FOOT	- 75 100	SAMP. NO.	моі	L O I G	SOIL AND ROCK DES	CRIPTION	DEPTH (ft)
345	343.0 _ 1.0										344.0 GROUND SURF		0.0
340	340.5 - 3.5 	3 16	3 25	5 23	• • • • • • • • • • • • • • • • • • • •			SS-23	25% № М	Ŋ		OTTLED, SII	<u> </u>
	338.0 6.0	16	21	27		48    48	  		м		- 338.5 SAND (A-2-4 TAN AND BLACK, SILTY F	) . SAND (A-2	- <del>4)</del> <u>-5.5</u> 8.0
335	<u>335.5 + 8.5</u> + +	10	18	23	••••••••••••••••••••••••••••••••••••••				D		RED-BROWN, F. SAND	Y CLAY (A-6)	)
330	- 330.5 - 13.5	43	57/0.2			· · · · ·	100/0.7				332.0 WEATHERED R 329.8 TAN AND GRAY, TRIASSI	C SANDSTO	
	***************************************										Boring Terminated at Elev WR: Triassic San	Istone	



### LABORATORY TEST RESULTS

Morrisville Pkwy. and 540 Interchange Wake County, North Carolina

Falcon Engineering Project Number: G17027.00 May 30, 2017

			PERC	ENTAGE PA	SSING				WATER	
SAMPL	E IDENTIFIC	ATION	Т	OTAL SAMPI	LE	LIQUID	& PLASTIC	LIMITS	CONTENT	AASHTO
Location	Sample	Depth, ft	#10	#40	#200	LL	PL	PI	(%)	CLASSIFICATION
D-median	SS-1	18.5-20	97	68	42	39	23	16	19	A-6 (3)
RWIS/MVD	SS-2	3.5-5	99	96	45	28	19	9	18	A-4 (1)
CCTV-1	SS-3	8.5-10	98	60	25	34	30	4	20	A-2-4 (0)
CCTV-2	SS-4	13.5-15	99	90	65	35	24	11	16	A-6 (6)
B-outside	SS-5	3.5-5	100	100	61	35	26	9	15	A-4 (4)
TB1	SS-6	8.5-10	99	80	51	32	20	12	10	A-6 (3)
F-median	SS-7	3.5-5	75	68	55	30	20	10	11	A-4 (3)
F-outside	SS-8	23.5-25	100	98	89	54	29	25	23	A-7-6 (26)
D-median	SS-9	23.5-25	99	62	37	44	29	15	26	A-7-6 (2)
F-outside	SS-10	3.5-5	98	87	63	35	20	15	16	A-6 (7)
D-outside	SS-11	3.5-5	100	98	78	47	25	22	22	A-7-6 (18)
MVDS2-1	SS-12	6-7.5	100	99	83	49	27	22	25	A-7-6 (20)

Note: Laboratory Results included for Aesthetic Signs, ITS Devices, High Mast Lighting, and Tolling Infrastructure Borings. Some borings indicated above are found in separate investigation reports for their respective structures.

Reviewed by: John Sailly