This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document -

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page. This file or an individual page shall not be considered a certified document.

REFERENCE: W-5512	
PROJECT: 50079.1.1	

SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

<u>LINE</u>

-L-

<u>PROFILE</u> <u>CROSS</u> <u>PROFILE</u> <u>SECTION</u> <u>STATION</u> <u>PLAN</u> II+28.53 - 245+23.9I 9 - 11 12 - 16 4 - 8

STATE OF NORTH CAROLINA

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND

PROJECT DESCRIPTION SR-2220 (TOM STARLING RD) **FROM US-301 TO NC-87**

INVENTORY

STATE N.C.

SHEETS

NO.

1

20

CAUTION NOTICE

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

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

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

NOTES:

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

PERSONNEL

F. WRIGHT

J. WHITE

T. WILLIAMS

INVESTIGATED BY ______S&ME, INC.

DRAWN BY <u>B.</u>RATTI

CHECKED BY A.F. RIGGS, JR P.E.

SUBMITTED BY S&ME, INC.

RE	DATE	SIGNATURE	DATE

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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION			ROCK DESCRIPTION											
SOIL IS			ED, SEMI-CON	SOLIDATE	D. OR W		EARTH MATERIALS T	HAT CAN	WELL GRADED - INDICAT	ES A GOOD REPI	RESENTATION OF PART!	ICLE SIZES FROM FIN	E TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE				
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION				ICATION	UNIFORMLY GRADED - INDICATES THAT SUIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.			SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.										
IS B	BASED ON TH	E AASHTO SYS	EM. BASIC D	ESCRIPT	IONS GE	NERALLY I	NCLUDE THE FOLLOW	ING: NRS SUCH			ARITY OF GRAT		ie oneeo.	BLOWS IN NO REPRESENTED	N-COAS BY A	ZONE OF WE	MATERIAL, THE TR ATHERED ROCK.	ANSITION BETWEEN SOIL AND ROCK
A	S MINERALO	GICAL COMPOSIT	ION, ANGULAR	ITY, STR	UCTURE.	PLASTICIT	Y, ETC. FOR EXAMPL	E,	THE ANGULARIT	Y OR ROUNDNESS	OF SOIL GRAINS IS (DESIGNATED BY THE	TERMS:	ROCK MATERIA	ALS ARE	TYPICALLY	DIVIDED AS FOLLO	WS:
	VERY STIFF.G	RAY, SILTY CLAY, MO	NST WITH INTE				S, HIGHLY PLASTIC, A-7-6	5	ANGULAR, SUBAN	GULAR, SUBROUN	<u>JED</u> , OR <u>ROUNDED</u> .			WEATHERED			NON-COASTAL PLA	IN MATERIAL THAT WOULD YIELD SPT
GENERAL	5	GRANII AR MATERIA			-CLAY MA	HSSIFI TERIALS	CATION			MINERAL	OGICAL COMPOS	SITION		ROCK (WR)		5	FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC RO
CLASS.	(≤ 35% PASSING *2	20)	(>3	5% PASSI	NG #200)	ORGANIC MATE	RIALS	MINERAL NAM	IES SUCH AS QU	ARTZ, FELDSPAR, MICA,	TALC, KAOLIN, ETC.		CRYSTALLINE ROCK (CR)			WOULD YIELD SPT	REFUSAL IF TESTED. ROCK TYPE IN
GROUP	A-1	A-3	A-2	A-4	A-5 4	-6 A-7	A-1, A-2 A-4, A-5		ARE USED IN	DESCRIPTIONS	WHEN THEY ARE CONSI	DERED OF SIGNIFICAN	NCE.			<u>ب کر کے ال</u> ے	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTA
CLASS.	A-1-a A-1-b	A-2-4 A-2	5 A-2-6 A-2-	7		A-7-5, A-7-6	A-3 A-6, A-7				MPRESSIBILITY	11 4 21		ROCK (NCR)	INE		SEDIMENTARY ROC	K THAT WOULD YEILD SPT REFUSAL
SYMBOL				3	17.1				MODEF	RATELY COMPRESSIE	SIBLE	LL = 31 - 50		COASTAL PLA	IN		COASTAL PLAIN S	EDIMENTS CEMENTED INTO ROCK, BUT
% PASSING							SILT-		HIGHL	Y COMPRESSIBLE	-	LL > 50		SEDIMENTARY (CP)	ROCK		SPT REFUSAL. RO SHELL BEDS.ETC.	CK TYPE INCLUDES LIMESTONE, SANDS
*10 *40	50 MX 30 MX 50 MX	51 MN					GRANULAR CLAY	MUCK, PEAT		PERCEN	TAGE OF MATE	RIAL					WEAT	HERING
*200	15 MX 25 MX	10 MX 35 MX 35	1X 35 MX 35 M	IX 36 MN	36 MN 36	MN 36 MN	SOILS	_	ORGANIC MATERIAL	SOILS	AR SILT - ULAY	OTHER MATER	RIAL .	FRESH	ROCK F	RESH, CRYSTA	ALS BRIGHT, FEW JOIN	NTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL									TRACE OF ORGANIC MA	ATTER 2 - 3'	7. 3 - 57. 7. 5 - 127	TRACE 1	- 10% - 20%		HAMMER	≀ IF CRYSTAL	LINE.	
PASSING #40 LL	_	- 40 MX 41 M	1N 40 MX 41 M	N 40 MX	41 MN 40	MX 41 MN	SOILS WITH		MODERATELY ORGANIC	5 - 10	12 - 20%	SOME 20	- 35%	VERY SLIGHT	ROCK G	ENERALLY FR	RESH, JOINTS STAINED DKEN SPECIMEN FACE	, SOME JOINTS MAY SHOW THIN CLAY C SHINE BRIGHTLY BOCK BINGS UNDER H
PI	6 MX	NP 10 MX 10	1X 11 MN 11 M	N 10 MX	10 MX 11	MN 11 MN	MODERATE	HIGHL Y	HIGHLY ORGANIC	> 10%	. > 20%	HIGHLY 35	% AND ABOVE		OFAC	RYSTALLINE	NATURE.	
GROUP INDEX	Ø	0 0	4 MX	8 MX	12 MX 16	MX NO MX	AMOUNTS OF	SOILS		G	ROUND WATER			SLIGHT	ROCK G	ENERALLY FF	RESH, JOINTS STAINED	AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES	STONE FRAGS.	FINE SILTY	OR CLAYEY	SIL	тү	CLAYEY	MATTER		∇	WATER LEVEL	IN BORE HOLE IMMEDI	ATELY AFTER DRILLI	NG	(SLI.)	1 INCH. CRYSTA	OPEN JOINTS	5 MAY CONTAIN CLAY. AND DISCOLORED. C	. IN GRANITOID ROCKS SOME OCCASIONA RYSTALLINE ROCKS RING UNDER HAMMER
UF MAJUR MATERIALS	SAND	SAND GRAVE	. AND SAND	S01	LS	SOILS			▼	STATIC WATEF	≀ LEVEL AFTER <u>24</u>	HOURS		MODERATE	SIGNIFI	CANT PORTIO	NS OF ROCK SHOW D	ISCOLORATION AND WEATHERING EFFECTS
GEN, RATING							FAIR TO DOOD		. <u> </u>	PERCHED WAT	ER, SATURATED ZONE, O	R WATER BEARING ST	RATA	(MOD.)	GRANIT	DID ROCKS, M	OST FELDSPARS ARE	DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE		EXCELLENT TO GOU	U		FAIR TU F	UUK	POOR	UNSUITABLE		SPRING OR SE	FP				WITH F	RESH ROCK.	HAMMER BLUWS AND	SHUWS SIGNIFICANT LUSS OF STRENGTH
	1	PIOF A-7-5 SUBGR	OUP IS ≤ LL ·	- 30 ; PI O	F A-7-6 S	SUBGROUP IS	> LL - 30		0 00 -					MODERATELY	ALL RC	ICK EXCEPT (WARTZ DISCOLORED (DR STAINED. IN GRANITOID ROCKS, ALL F
		CON	SISTENC	Y OR	DENS	ENESS				MISCEL	LANEOUS SYMB	OLS		SEVERE	AND DIS	SCOLORED AN	D A MAJORITY SHOW	KAOLINIZATION. ROCK SHOWS SEVERE L
PRIMARY S	SOTE TYPE	COMPACTN	ESS OR	RAN(PENETE	GE OF S' RATION R	FANDARD	RANGE OF UN	STRENGTH		ANKMENT (RE)	25/025 DIP & DIP DI	RECTION		(100. 324./	IF TES	TED, WOULD Y	<u>IELD SPT REFUSAL</u>	IST S FICK. HOLK GIVES CLONK SOUND
		CONSIST	ENCY		(N-VALL	JE)	(TONS/F	T ²)	WITH SOIL DE	SCRIPTION	OF ROCK STR	UCTURES		SEVERE	ALL RO	ICK EXCEPT (WARTZ DISCOLORED (OR STAINED. ROCK FABRIC CLEAR AND E
GENERAL	LY	VERY L	DOSE		< 4				SOIL SYMBOL		DPT DMT TEST BC	DRING SLO	PE INDICATOR	(SEV.)	REDUCE	D IN STRENG	TH TO STRONG SOIL.	IN GRANITOID ROCKS ALL FELDSPARS A STRONG ROCK LISUALLY REMAIN.
GRANULA	AR N	MEDIUM	DENSE		10 TO	30	N/A				VST PMT		F PENETROMETER		<u>IF TES</u>	TED. WOULD Y	TELD SPT N VALUES	> 100 BPF
(NON-CO	HESIVE)	DENS			30 TO	50			THAN ROADWAY	EMBANKMENT	AUGER BORING	5 (A) TES	T	VERY	ALL RO	CK EXCEPT C	WARTZ DISCOLORED O	OR STAINED. ROCK FABRIC ELEMENTS AR
		VERY			/ 30		(0 2	5	INFERRED SOI	L BOUNDARY		• sou	NDING ROD	(V SEV.)	REMAIN	ING. SAPROLI	TE IS AN EXAMPLE O	FROCK WEATHERED TO A DEGREE THAT
GENERAL	LY	SOF	т		2 TO	4	Ø.25 TO	0.5			MW		T BORING		VESTIG	ES OF ORIGIN	AL ROCK FABRIC REM	AAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>
SILT-CL MATERIA	AY N	MEDIUM	STIFF F		4 TO 8 TO	8 15	0.5 TO	1.0 2	INFERRED ROCH	K LINE	O MONITORING W	VELL - WITH	+ CORE	COMPLETE	ROCK R	EDUCED TO S	SOIL, ROCK FABRIC NO	OT DISCERNIBLE, OR DISCERNIBLE ONLY
(COHESI)	VE)	VERY S	TIFF		15 TO	30	2 TO	4	TTTTT ALLUVIAL SOIL	BOUNDARY		J O- SPT	N-VALUE		ALSO A	N EXAMPLE.	dominiz na	The Price of Stranders
					> 30		> 4		<u> </u>					_			ROCK H	IARDNESS
		10	ATURE I		HIN	512E							EVENUATION	VERY HARD	CANNOT	BE SCRATCH	ED BY KNIFE OR SHA	ARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIE	EVE SIZE M)	4	4 10 .76 2.00	40 0.42	60 0.2	0 200 5 0.075	270 5 0.053				E WASTE	ACCEPTABLE,	BUT NOT TO BE		SEVERA	L HARD BLOW	VS OF THE GEOLOGIST	T'S PICK.
				COARS	SE	FINE			SHALLOW		ED EXCAVATION -	USED IN THE EMBANKMENT	OR BACKFILL	HARD	TO DET	ACH HAND SF	PECIMEN.	NET WITH DIFFICULIT. HARD HAMMER BI
(BLDR.)		:0B.) ((AVEL	SANE		SANE	(SL.)	(CL.)						MODERATELY	CAN BE	SCRATCHED	BY KNIFE OR PICK. (GOUGES OR GROOVES TO 0.25 INCHES DE
				(LSE. 5	0.0	(F 50		-		<u>H</u>	BBREVIALIUNS	VCT VANE		HARD	EXCAVA BY MOD	TED BY HARD) BLOW OF A GEOLOG 5.	IST'S PICK. HAND SPECIMENS CAN BE D
SIZE IN.	12	3	2.0		0.2	.5	0.05 0.00	10	BT - BORING TERMINATED	J MI	CA MICACEOUS	WEA WEATH	ERED	MEDIUM	CAN BE	GROOVED OF	R GOUGED 0.05 INCHE	S DEEP BY FIRM PRESSURE OF KNIFE O
	c		TURE - (OBBE			TERMS		- CL CLAY	MC	D MODERATELY	2 - UNIT WE	IGHT	HARD	CAN BE	EXCAVATED	IN SMALL CHIPS TO	PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL	MOISTURE	SCALE	FIELD MC	ISTURE					CSE COARSE	OF	- NUN PLASTIC	Zd - DRT UN.	WEIGHT	SOFT		CROVED OR	COUCED DEADTLY BY	WHEE OF DICK CAN BE EXCAVATED IN
(ATT	ERBERG LIN	MITS)	DESCRI	PTION	60	IDE FUR	FIELD MUISTURE DE	SURIPTION	DMT - DILATOMETER TEST	F PM	IT - PRESSUREMETER T	TEST <u>SAMPLE A</u>	BBREVIATIONS	3011	FROM C	HIPS TO SEV	ERAL INCHES IN SIZE	E BY MODERATE BLOWS OF A PICK POIN
			- SATURA	TED -	US	UALLY LI	QUID; VERY WET, US	UALLY	e - VOID RATIO	IUN IESI SA) SAND, SANDY	S - BULK SS - SPLIT :	SPOON		PIECES	CAN BE BRO	KEN BY FINGER PRES	SURE.
	1 101110	I IMIT	(SAT.)		FF	OM BELOW	W THE GROUND WAT	ER TABLE	F - FINE	SL	SILT, SILTY	ST - SHELBY	TUBE	SOFT	OR MOF	CARVED WIT RE IN THICKN	H KNIFE. CAN BE EXU ESS CAN BE BROKEN	CAVAIED READILY WITH POINT OF PICK. BY FINGER PRESSURE. CAN BE SCRATCH
PLASTIC								0	 FUSS FUSSILIFERUUS FRAC FRACTURED. FRACT 	TURES TC	I SLIGHILY R - TRICONE REFUSAL	RS - ROCK RT - RECOME	ACTED TRIAXIA		FINGER	NAIL.		
RANGE <			- WET -	(W)	AT	TAIN OPT	IMUM MOISTURE	0	FRAGS FRAGMENTS	w	- MOISTURE CONTENT	CBR - CALIF	DRNIA BEARING	F	RACT	URE SPF	ACING	BEDDING
" " PL L	PLASTI	C LIMIT _								V	- VERY					MODE	SPACING	
ОМ	OPTIMU	M MOISTURE	- MOIST	- (M)	SC	LID; AT O	R NEAR OPTIMUM M	IOISTURE	EUL	JIPMENT US	<u>ED UN SUBJEU</u>	I PRUJELI		WIDE		3	TO 10 FEET	THICKLY BEDDED 1.
SL		AGE LIMIT _									JL5:	HAMMER TIPE:		MODERATEL	Y CLOS	3E 1	TO 3 FEET	THINLY BEDDED 0.1
			- DRY - 1	(D)	RE	QUIRES A	DDITIONAL WATER	ГО				IN HOTOMATIC		VERY CLOS	θE	LESS	THAN 0.16 FEET	THICKLY LAMINATED 0.00
					AT	IAIN OPT	IMUM MOISTURE		CME-55		JUDUS FLIGHT AUGER	CORE SIZE:					The second	THINLY LAMINATED <
			PLA	STICI	TY						# HUGENS	Ш-в	Ш-н					
1			PLASTI	CITY IN	DEX (PI		DRY STREN	IGTH	CME-550		JED FINGER BITS	□-N		FUR SEDIMEN	ARY RO	JUKS, INDURA	DUDDING WITH	NING UF MATERIAL BY CEMENTING, HE
NON SI TO	PLASTIC	TIC		Ø-5 6-15			VERY LO SLIGHT	W	VANE SHEAR TEST	TUNGCA	RBIDE INSERTS	HAND TOOLS:		FRIABL	E		GENTLE BLOW	BY HAMMER DISINTEGRATES SAMPLE.
MOD	ERATELY PL	LASTIC	_	16-25			MEDIUM			CASING	W/ ADVANCER	POST HOLE	DIGGER	MODED			GRAINS CAN B	E SEPARATED FROM SAMPLE WITH ST
HIGH	HLY PLASTI	L	26		IKE		HIGH		PORTABLE HOIST		STEEL TEETH	HAND AUGE	2	MUDER	HELT I	NUURHIEU	BREAKS EASIL	Y WHEN HIT WITH HAMMER.
L			0	ULOR						TRICONE	TUNGCARB.	SOUNDING F	ROD	INDURA	TED		GRAINS ARE D	NEFFICULT TO SEPARATE WITH STEEL
DESCRIPT	IONS MAY	INCLUDE COLOF	OR COLOR	COMBIN	ATIONS	TAN, RED.	YELLOW-BROWN, BL	JE-GRAY).		CORE BIT		VANE SHEA	R TEST					DIGEN WITH HENRICH.
MO	DIFIERS SU	CH AS LIGHT,	DARK, STREA	KED, ETC	.ARE U	SED TO D	ESCRIBE APPEARAN	CE.		X <u>3-1/4"</u>	H.S.A.	X 1/2" STEE	L ROD	EXTREM	1ELY IN	DURATED	SAMPLE BREAK	S ACROSS GRAINS.

PROJECT REFERENCE NO. 50079.1.1

2

	TERMS AND DEFINITIONS
D. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
N VALUES >	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ICK THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SUBFACE
CLUDES GRANITE,	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
AL PLAIN IF TESTED. C.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NOT YIELD STONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
RINGS UNDER	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
OATINGS IF OPEN.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
AMMER BLOWS IF	<u>UIP DIRECTION (DIP AZIMOTH</u>) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ICK UP TO L FELDSPAR R DWS	FAULT - A FRACTORE OF FRACTORE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
S. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
Y. ROCK HAS	PARENT MATERIAL.
ELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM, FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
OSS OF STRENGTH WHEN STRUCK.	FIELD. J <u>JINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
F STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
ALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
S. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
S REQUIRES	$\underline{SAPROLITE}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
LOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IONEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
EEP CAN BE ETACHED	$\underline{\rm SLICKENSIDE}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
DR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPI) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOLL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
FRAGMENTS IT. SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH ED READILY BY	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO ON GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
THICKNESS	BENCH MARK: BM2 RAIL ROAD SPIKE IN BASE OF 15" PINE
4 FEET	N 438309 E 2032308 FI FVATION: 96.68 FFFT
.5 - 4 ⊦LET 16 - 1.5 FEET	NOTEC.
3 - 0.16 FEET 18 - 0.03 FFFT	ELAD - EILLED IN AFTER DRILLING
0.008 FEET	
HI, PRESSURE, EIC.	
EEL PROBE;	
PROBE;	
;	DATE: 8-15-14

DATE	January 19, 2015	
TO:	Parsons Transportation Group 5540 Centerview Drive Suite 217 Raleigh, North Carolina 27606	Representative split-spoon and bulk soil samples were collect samples were submitted for laboratory analysis. Laboratory AASHTO Soil Classification System.
ATTENTION:	Mr. David L.Wilver, P.E.	The following alignment totaling 3.46 miles was investigate alignment are included in this report.
FROM:	S&ME, Inc. 3201 Spring Forest Road Raleigh, North Carolina 27616	Line Station -L- 11+28
STATE PROJECT: F. A. PROJECT: TIP NUMBER:	50079.1.1 N/A W-5512	Areas of Special Geoter 1. Loose Soils: The following area contains relatively loo may impact subgrade construction and may require stabiliza
COUNTY: DESCRIPTION:	Cumberland SR 2220 (Tom Starling Road) From US 301 to NC 87	Line Station -L- 143+50
SUBJECT:	Roadway Subsurface Investigation – Inventory Report	2. Ground Water: The following interval was found to exhib

Project Description

S&ME, Inc. has completed the authorized roadway inventory report for the above referenced project. This report was performed in accordance with our Subconsultant Professional Services Agreement between Parsons Transportation Group, Inc. and S&ME, Inc. dated June 15, 2014 and the terms and conditions stated within.

The project is located about 3 miles south of Fayetteville, North Carolina in Cumberland County. The project consists of approximately 3.5 miles of widening, resurfacing and realigning portions of the existing roadway along SR 2220 (Tom Starling Road) from US 311 to NC 87. The typical roadway section will consist of two lanes with added turn lanes and 8 to 11 foot wide shoulders with guardrails as needed.

A subsurface investigation was conducted by S&ME between October 27, 2014 and October 28, 2014 by performing 12 soil test borings. Drilling consisted of advancing 3-1/4 inch diameter hollow stem augers with standard penetration testing utilizing a Diedrich D-50 drill rig mounted on a track rig equipped with an automatic hammer. The borings were advanced to depths of 10 feet (elevations 81.6 to 91.1 feet) at ground surface elevations ranging from about 91.6 to 101.1 feet.

Additionally the subsurface soils were probed with a 4 foot long, 1/2 inch diameter, steel, T-handled, probe rod to help identify soft/loose soils. A hand auger bucket was also used to obtain near surface soil samples for visual classification at soil test boring locations.

Line

-L-

Physiography and Geology

The project site is located within the Coastal Plain physiographic and geologic province of North Carolina. The Coastal Plain geologic region has been formed during past transgressive and regressive movements of the ocean into and out of North Carolina. As such, the Coastal Plain province is characterized by subdued topographic features and flat, low lying terrain.

Based on the 1985 Geologic Map of North Carolina, the primary geologic formation at this location is the Cape Fear Formation. The Cape Fear Formation consists of gray, sandy mudstone and blocky clay. The bedding of soils within the Cape Fear formation can be described as laterally continuous with some faint cross bedding. The Middendorf Formation is mapped nearby and lies above the Cape Fear Formation. The Middendorf Formation typically consists of sands, poorly indurated sandstone, and thin beds of sandy mudstone and clay. The lateral continuity of bedding within the Middendorf Formation is poor and cross bedding is common. The near surface soils at this site, within the boring termination depths, appear to be more recent Undifferentiated Coastal Plain sands eroded from the adjacent Middendorf Formation.

SHEET 3 OF 20

cted for visual classification and selected soil testing was performed in accordance with the

ed. Subsurface profiles and cross sections of the

n 8.53 to 245+23.91

chnical Interest

se non-cohesive soils (N-values less than 4) which tion.

0 to 148+00 bit a high water table, seasonal high ground water or the potential for ground water related construction problems :

> Station 141+50 to 150+00

Soil Properties

Soils present on this project include roadway embankment fill and Undifferentiated Coastal Plain deposits and soils of the Middendorf and Cape Fear Formations.

Roadway embankment fill materials were not encountered in the soil test borings performed for this investigation.

Undifferentiated Coastal Plain deposits were present at the ground surface in all soil test borings B-1 through B-12. The Undifferentiated Coastal Plain deposits consist of very loose to medium dense white, tan and gray to dark gray and black silty to clayey fine to coarse sand (A-2-4, A-2-7 and A-1-b) with trace amounts of organic matter. The organic content of the soil samples tested were less than 3%. The clayey sands (A-2-7) are highly plastic with a plastic index (P.I.) of 30. These soils appear to be moist to saturated.

The Cape Fear Formation was encountered in boring B-10 at depth of about 8 feet (elevation 83.8 feet) beneath the ground surface. These soils consist of highly plastic hard gray fine sandy silty clay (A-7-6). The plastic index of the sampled clay was 30. These clays appear to be moist.

Groundwater

Groundwater was measured in borings B-8, B-9, B-10, and B-11 at depths of 3.9 to 6.5 feet (elevations 86.4 to 88.9 feet) beneath the ground surface at completion of drilling. Stabilized water levels measured in open bore holes after 24 hours from completion of drilling ranged from 3.5 to 5.8 feet (elevations 86.8 to 88.1 feet) beneath the ground surface. Soil test boring B-8 was backfilled at completion of drilling and the remaining borings caved at depths of 4.3 to 6.3 feet beneath the ground surface. Based on these measurements and the depths at which saturated sands were encountered in the borings, groundwater is anticipated to be present within 3.5 to 6.3 feet beneath existing grades. The depth of water beneath the ground surface will fluctuate with seasonal precipitation and may occur at higher elevations at other times of the year. Perched ground water conditions may exist during the typically wetter months above less permeable clayey soils.

APPENDIX A

The following bulk samples were obtained to perform laboratory testing to determine the engineering properties of the on-site soils:

SAMPLE	LINE	STATION	DEPTH	TEST PERFORMED
S-1	-L-	39+30 5' RT	1.0'-5.0'	Standard Proctor and CBR
S-2	-L-	133+80 10' LT	1.0'-5.0'	Standard Proctor and CBR

QUALIFICATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. Any wetland, environmental, or contaminant assessment efforts are beyond the scope of this geotechnical exploration; and therefore, those issues are not addressed in this report. The conclusions and findings contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied, is made.

Conclusions and findings submitted in this report are based, in part, upon the data obtained from the geotechnical exploration. The nature and extent of variations between and outside of the SPT borings may not become evident until construction. If variations appear evident, then it will be necessary to re-evaluate the recommendations of this report. In the event that any changes in the grades, nature, design, or location of the proposed development are planned, the conclusions and findings contained in this report should be reviewed and modified or confirmed in writing.

S&ME appreciates the opportunity to be your geotechnical consultant on this project. If you have any questions or need additional information in regard to this report, please contact us.

Very truly yours,

ter

Forrest E. Wright, EIT Staff Professional

SHEET 3A OF 20

almen F. Rigip &

Abner F. Riggs, Jr., P.E. Senior Geotechnical Engineer N.C. Registration No. 14155





PLANS PREPARED BY		_
BABGONIS	PROJECT REFERENCE NO	D. SHEET NO.
5540 CENTERVIEW DR., SUITE 217 RALEIGH, NORTH CARDLINA 27606	W-55/2	5
FOR NORTH CAROLINA DEPT. OF TRANSPORTATION	RW SHEET N	10.
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	PRELIMINA DO NOT USE POI	RY PLANS CONSTRUCTION

9 SHEET SEE 50 + 00STA Ļ MATCH LINE













E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT)	<u>//0</u> ICS
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT)	NS 130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT)	<u>NS</u> 130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	NS 130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) SS-1	130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	130 120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	130 120 110
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	120
E SAND WITH TRACE OF GRAVEL (MOIST TO WET) TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	120
TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) O COARSE SAND (SAT)	120 110
TO COARSE SAND WITH TRACE TO LITTLE GRAVEL (SAT) TO COARSE SAND (SAT)	110
O COARSE SAND (SAT)	110
<u>[95-1]</u>	
B-04 B-05	
STA 94+68 37 BJ -L	100
	90
	¤V
	70
<i>FURE OF</i> <i>ICTION</i> % 0.1" 0.2"	
ND ND ND	
	60
92 93 94 95	
	150
]40
]30
	120
+	14.4
	100
	
	80
	0
	70
ISEL SHELTS OTIV FUR TO PLAN	60
105 106 107 108	



—

	1				1	PROJEC	T REFERENCE	NO.	SI	HEET NO.
	i				 	ROADWA	<u>V-55/2</u> Y DESIGN		HYDRAU	
	·				 	ENGI	NEER		ENGINE	ER
	1				1					
	1				1		ELIMIN	IARY	PLA	NS
+					 		DO NOT USE	FOR CONS	TRUCTIO	N
	1				1 1 1					
	i				1		į			130
	CBR V	VALUES	5			+ !				
ACTIO	N MOISTUR	RE OF	0.1"	0.2"						
9.7	13.9	9 9	10.7	14.3]	i ±	i J			120
	1				1 1 1	1 1 1	1 1 1			
	1					1				110
TAL	PLAIN+ DENSE WHI	 ГЕ ТС	DARK G	RAY SI	LTY COARS	È TO FINE				
-2					 		1			
<u> </u>			·		 	: ; +	, , ,			100
33+8 -L	-				1		1			
- -		_						1		
						±	; `	•		
		_			1	1	 			
Τ.	-5 A'				 		 			
NIT 4	TRACE OF	SHA	I GRAVE	(5 17)	1					
, ה ווא	TRACE OF	SMAL	LGRAVEL	(SAI)			1			
						+				7_0
					1					
	1				 					40
13	4		135		1:	36		137		
						;	1			
					1 1 1	1	1			
	1				 	1 1 1	1 1 1	1		150
+					+	4 ! !	-	-+		
						CDD VALUE			1	
1110	141770774	DDV	0.00	COM	DACTION	CBR VALUE				140
ANIC ENT	DENSITY (I	PCF)	OPT. MOISTURE	%	(PCF) CC	OISTURE OF OMPACTION	% 0.1"	0.2"		
,)	ND ND		ND ND	_	ND ND	ND ND	ND ND	ND ND		120
)	ND ND	_	ND ND	_	ND ND	ND ND	ND ND	ND ND		ISU
				•		1	 		•	
					 	¦	¦ 			120
	1		1				- - -			
					1	1	1			
	·				+			$-\frac{1}{1}$		
O BL	ACK SILTY MATTER (M	OIST					1			
	 		SS-5		- - -					100
+		SŢ,	4 146+9	0						
		ے 				·	<u>.</u>		1	
 -\$	 -	<u>Ö</u>								90
_ +	4	Š					1 			
	$\langle \rangle$	9–	<u>– ю́о́о́</u> вт		 					80
÷	Ext;	STING	GEEUFNID	DITCH	i —		 ! !			
	1				I I I	<u>,</u>	 			
+			RIGHT	DITC	4		 - 			70
	1			F.	1	/		וי		
	1			SHEE	TS II-13	FOR -L				40
14	6		147		1	49	1			60
14	0		147		∡	ŧð		149		



		0 2.5 5	PROJ. R	REFERENCE NO.	SHEET NO.
40 4	5 50	55	60	65 70	7/5 105
-1	+				
)4	1 I 1 I 1 I 1 I				100
3+05	±		+		<i>IOO</i>
-L-					95
	;		†		
	 				90
	·				
	; ;; -				85
г. <u>т</u> . д. з	<u>.</u>	 			
					95
 		, , , , , ,			90
	; ; ; _				
	¦		_¦_		
	; ; ; ; ;		+		
·····				÷	
	 		1		
<u>_</u>	· · · · · · · · ·				
·	· · · · · · · · · · · · · · · · · · ·		+		
	<u>+</u>				
	, , , , , , , , , , , , , , , , , , ,		+		
<u> </u> ·	<u> </u> +		-¦		
	1 I 1 I 1 I 1 I				
·			<u>+</u>		
		CBR VALU	JES		
OPT.	COMPACTION	MOISTURE (OF 01"	0.2"	
MOISTURE %	(PCF)ND	COMPACTION	% 0.1 ND	ND	
	+		+		.90
40 4	5 50	55	60	65 70	7,5



	0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
		W-5512	13
40 45	50 55 	60 65 70	
			100
· · · · · · · · · · · · · · · · · · ·		+	100
		· · · · · · · · · · · · · · · · · · ·	95
	+		
			90
· · · · · · · · · · · · · · · · · · ·			<i>100</i>
	<u></u>		<u> </u>
	. I I I I I I		
• - + +		•	:
i i 	i i 	i i i i i i i i i	
R-05			
STA 94+68	, i }		
44'RT -L-	.		
2			6
(3)			
	; 	· +	85
	. 0/		
VED WEI S			100
			95
· · · · · · · · · · · · · · · · · · ·			
÷ i			
· ¦			85
			05
		<u>+</u>	£
		•	
+ +			
			85
+	 I I I I I I I I I		
40 4 5	50 55	60 65 70	75



1		0 2.5 5	PROJ. REF	ERENCE NO.	SHEET NO.
25	20			5512	<u> </u>
2'3 	30 	ວບ 4/U !	4'5 5'0 	2'C v	
 				 	95
->-	<u> </u>	·	i		
		i i 	· · · · · · · · · · · · · · · · · · ·		
	, , , ,				inn
		1 I 1 I 1 I 1 I			05
	 1 1 1		· +	 	33
	_ +	·¦			
	 	$\frac{1}{2}$ $\frac{1}{2}$			
 				 	: 85
			·	 	<i></i>
·			·++	 	95
>	∽ <u>⊹</u>	· =	· +	 	.90
 	 L			 	
					100
	.			 	
				 	: .95
	<u> </u>				
 	 I I		· +	 	90
			· +	 	85
	1 1 1	1 I 1 I 1 I 1 I			
I		CBR VALUES	·		
ΩΡΤ	COMPACTION	MOISTIDE OF		_	
STURE %	(PCF)	COMPACTION %	0.1" 0.2	" .	
ND	ND	ND	ND NI		
25	30	35 40	45 50	55	60



1		0 2.5 5	PROJ. REFERE	PROJ. REFERENCE NO.	
25	30	35 40	45 50	55	60
	· 				
	+		+		
	· +	 	<u>+</u>		! <i>100</i>
	·				.95
					.90
	· <u>+</u>				85
	·				
			+		
<u> </u>					
					80
					95
	· 				
<u> </u>		-			6
					.50
					05
	· #		<u>+</u>	 	63
	· 				80
	· +				 + 1
	· +		 	 •	 ! !
		CBR VALUES			
OPT.	COMPACTION	MOISTURE OF	0.1" 0.2"		
ND	(PCF) ND	ND	ND ND		
	· +		+	 	
25	3'0	3'5 1'0	<i>1</i> /5 5'0	55	60
25	30	35 40	45 50	55	60



		0 2.5 5	PROJ. REFERENCE NO. W-5512		SHEET NO. 16	
2¦0	25 30	35	4 <mark>0</mark>	45 50	⁵⁵ 105	
					<i>100</i>	
					95	
		· — — — — — –			m	
91.08	30					
		·			85	
	- +					
					100	
			· +			
			, , , , , ,			
			<u></u>			
		· · · · · · · · · · · · · · · · · · ·	 			
<u> </u>) 8 -					
 		 	 		<i>8</i> 5	
			 		80	
·	-+					
90.8	88		+			
 			 		95	
·			- <u> </u> 		co	
 	-+	 	 			
1		CBR VALUES	1			
OPT.	COMPACTION	MOISTURE OF	0.1"	0.9"	<i>100</i>	
OISTURE %	(PCF) ND	COMPACTION %	0.1 ND	ND		
	·		<u></u>			
<u>90</u> .9	30		 	1 I 1 I 1 I 1 I 1 I 1 I		
	-+		+			
20	25 30	35	40	45 50	55	

Form No. TR-T99-2

Revision No. : 0 Revision Date: 11/21/07

Moisture - Density Report



Quality Assurance S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616 S&ME Project #: 1305-14-079 W-5512 Report Date: 11/5/14 Project Name: Tom Starling Road (SR2220) Test Date(s): 11/3 - 11/5/14 Client Name: Parsons Transportation Group Inc. Client Address: Raleigh, North Carolina Boring #: B-2 S-1 Sample Date: 10/27/2014 Sample #: Location: STA 39+30 -L-Offset: 5' RT 1 - 5 ft Depth: Sample Description: White Silty Fine to Coarse SAND (A-2-4) (0) **Maximum Dry Density** 116.8 PCF. **Optimum Moisture Content** 11.4% AASHTO T99 -- Method A Soil Properties Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Natural 130.0 Moisture 4.6% **100% Saturation** 2.650 Content Curve Assumed 125.0 Specific 2.650 Gravity Liquid Limit 14 Plastic Limit 0 120.0 Plastic Index N.P. % Passing 3/4" 100.0% 115.0 3/8" 100.0% #4 100.0% #10 97.0% 110.0 #40 73.0% #60 52.0% #200 16.1% 105.0 **Oversize** Fraction Bulk Gravity 1 100.0 % Moisture 0.0 5.0 10.0 15.0 20.0 25.0 % Oversize MDD Moisture Content (%) Opt. MC Moisture-Density Curve Displayed: Fine Fraction 🗵 Corrected for Oversize Fraction (ASTM D 4718) Sieve Size used to separate the Oversize Fraction: #4 Sieve 🗵 3/8 inch Sieve □ 3/4 inch Sieve Mechanical Rammer Manual Rammer Dry Preparation 🗵 Moist Preparation □ References / Comments / Deviations: AASHTO T88: Particle Size Analysis of Soils AASHTO T265: Laboratory Determination of Moisture Content of Soils AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop 11/5/14 104-01-0703 Mal Krajan, ET Laboratory Manager Technical Responsibility Certification # Position Date This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Form No. TR-D1833-T193-3

3201 Spring Forest Road Raleigh, NC. 27616 B-2 S-1 (1 - 5 ft) Proctor Page 1 of 1 Sheet 17

CBR (California Bearing Ratio) of Laboratory Compacted Soil AASHTO T 193



Forest R W-55	oad, Ralei 12	gh, Nor	th Car Reno	rolina 276	16		
W-55	12		Reno				
			Report Date:			11/10/14	
			Test	Date(s)	11/3 - 10	0/10/14	
le #. S.1			Samn	le Date: 1	0/27/14		
feat: 5' E	т		De	nth (ft): 1	5 ft		
$D(A_2)$	$\frac{1}{4}(0)$		De	pui (it). 1	- 5 ft.		
116.8	PCF	Opti	mum N	Aoisture C	ontent:	11.4%	
CBR spec		-1	% Retair	ned on the 3/	4" sieve:	0.0%	
Chill Asia	State Brates	Cor	rected	CBR Val	ues		
.3 (CBR at 0.1	in. 2	3.1	СВ	R at 0.2 in	. 30.4	
217 200		12.2.2.2.2.2.2			22.20.20.20	AND STOLL	
						-	
ed Value a	t.2"						
	1º					19	
					_		
						1.1	
-							
1							
						-	
Strain (inches)	30		0.40		0.50	
L Strain (inclies)		17	N. W. LE	man for the series		
antad in .	6" CPD	d in case	danse	iele			
acted in a	U CBK mole	i in accor	aance w	un G			
			Aft	er Soaking			
5	F	inal Dry I	Density (PCF)	1	15.3	
5.3	Avera	age Final	Moisture	e Content	1:	5.2%	
3%	Moisture	Content	(top 1" a	fter soaking)	1:	5.8%	
6%		Perce	nt Swell		0	.1%	
eight	10.0		Surcha	arge Wt. pe	r sq. Ft.	50.9	
ndex	N.P.						
						a series and	
and the second se		-					

Laboratory Manager Position

11/10/14 Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-T99-2

Revision No. : 0 Revision Date: 11/21/07

Moisture - Density Report



Form No. TR-D1833-T193-3 Revision No. 0

Inc. Raleigh 5-14-079	, 3201 Spring Forest	Road, Raleigh, N	anth Canalina 2			
5-14-079			orth Carolina 2	616		
0 11 0/7	W-5512		Report Date:	11/5/14		
Project Name: Tom Starling Roa			Test Date(s):	11/3 - 11/5/14		
sons Transpo	rtation Group, Inc.		C. Non the Contract	in light new se		
eigh, North (Carolina		ALL ALL ALL AND			
	Sample #:	S-2	Sample Date:	5/6/14 - 5	/7/14	
3+80 -L-	Offset:	10' LT	Depth:	1 - 5	ft	
White and (Gray Silty Coarse to Fin	ne SAND (A-2-4)	(0)		1.00	
ty 116.4	PCF.	Op Mathod 4	timum Moistur	e Content	11.1%	
ture-Density R	elations of Soil and Soil	- Aggregate Mixture	es	Soil Prop	erties	
			Carlos and Carlos	Natural		
	100% Sati	uration		Moisture	1.6%	
	2.650 Curv	e		Content		
			221	Assumed	2 650	
				Gravity	2.030	
				Liquid Limit	14	
				Plastic Limit	0	
				Plastic Index	N.P.	
					% Passing	
				3/4"	100.0%	
				3/8"	100.0%	
				#4	100.0%	
				#10	100.0%	
				#40	83.0%	
				#60	67.0%	
				#200	23.5%	
					and the start	
				Oversize Fi	action	
				Bulk Gravity		
				% Moisture		
5.0	10.0 15.0	20.0	25.0	% Oversize		
		and the second	the second se			
	3+80 -L- White and C ty 116.4	3+80 -L- Offset: White and Gray Silty Coarse to Fin ty 116.4 PCF. AASHTO T99 - fure-Density Relations of Soil and Soil 2.650 100% Satu 0 0 1 0 1 0 1 0 1 0 1 0 1 0 0	3+80 -L- Offset: 10' LT White and Gray Silty Coarse to Fine SAND (A-2-4) ty 116.4 PCF. Op AASHTO T99 - Method A ture-Density Relations of Soil and Soil-Aggregate Mixture 2.650 100% Saturation 2.650 100% Saturation 2.650 100% Saturation	sample #. 3-2 Sample Date. 3+80 -L- Offset: 10' LT Depth: White and Gray Silty Coarse to Fine SAND (A-2-4) (0) ty 116.4 PCF. Optimum Moistur AASHTO T99 Method A ture-Density Relations of Soil and Soil-Aggregate Mixtures	Sample #. 3-2 Sample Date. 3/01/4 - 3 3+80 - L- Offset: 10' LT Depth: 1 - 5 1 White and Gray Silty Coarse to Fine SAND (A-2-4) (0) Ty 116.4 PCF. Optimum Moisture Content AASHTO T99 Method A Soil Prop. Natural fure-Density Relations of Soil and Soil-Aggregate Mixtures Natural Moisture Content Curve Content Assumed Specific Gravity Liquid Limit Plastic Limit Plastic Index % Pass. 3/8" #4 #10 #40 #60 #200 Oversize Ff Bulk Gravity % Moisture	



3201 Spring Forest Road Raleigh, NC. 27616

B-7 S-2 (1 - 5 ft) Proctor Page 1 of 1

Sheet 18

3201 Spring Forest Road Raleigh, NC. 27616