D: R-2417C

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**ROJECT: 34431** 

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

### STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REF		NO. <u>3443</u>	81 ( <b>R</b> –24170	G)	F	.A. PRO	J. <u>STP</u>	<u>-NHF-421</u> (2)
PROJECT	DESCRIP		421 /NC 2 TO NC					
SITE DESC			BRIDGES	ON	-LREV	'- (US	421/NC	87)

STATE STATE PROJECT REFERENCE NO. SHEETS

N.C. 34431 (R-2417C) 1 /

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (9)9) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

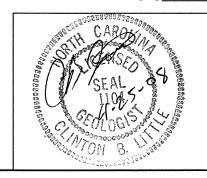
INVESTIGATED BY MURRAY
CHECKED BY LITTLE / JKM

APRIL 2008

SUBMITTED BY\_\_\_\_LITTLE

PERSONNEL
CC MURRAY

J. ESTEP



#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

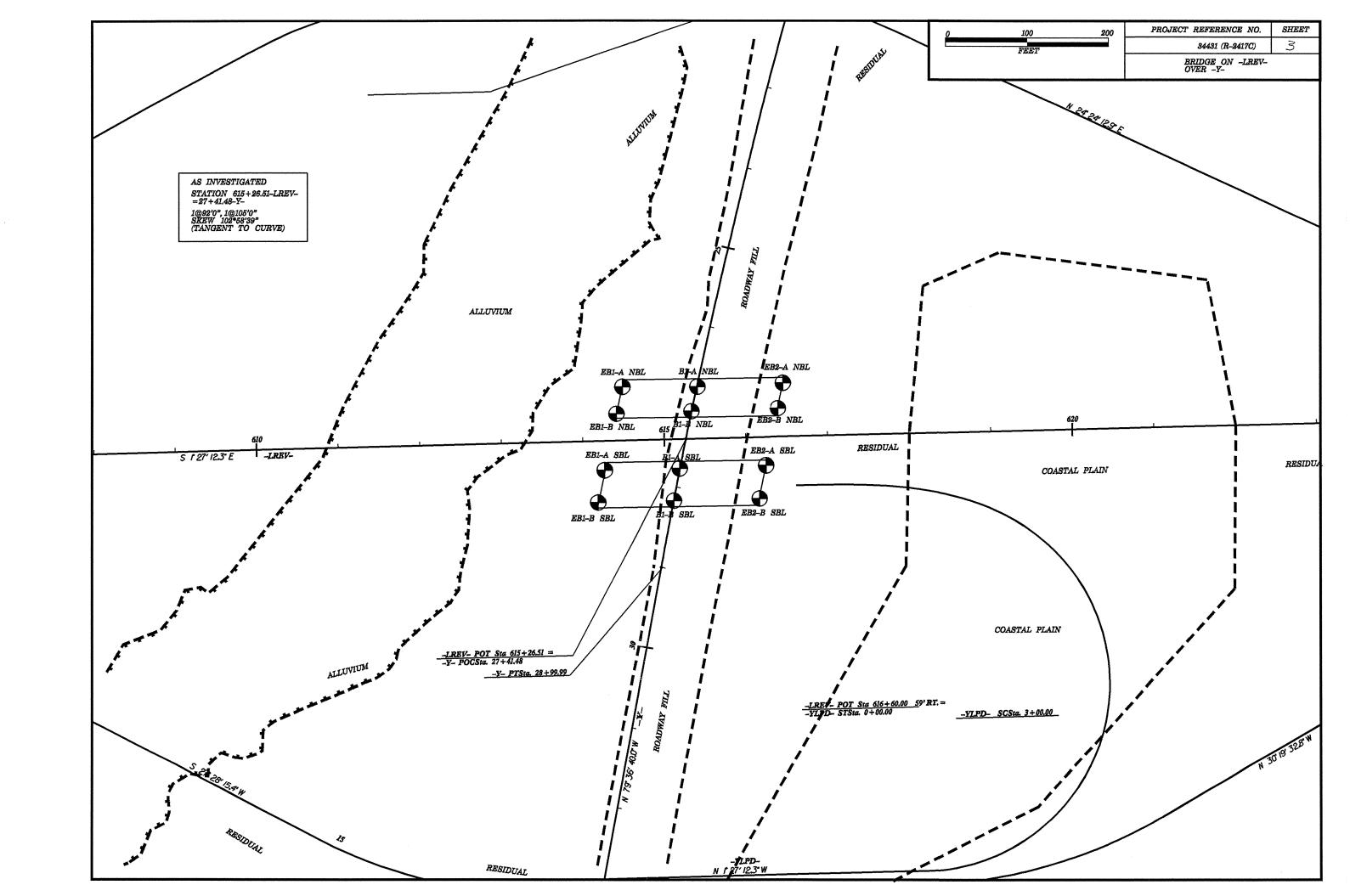
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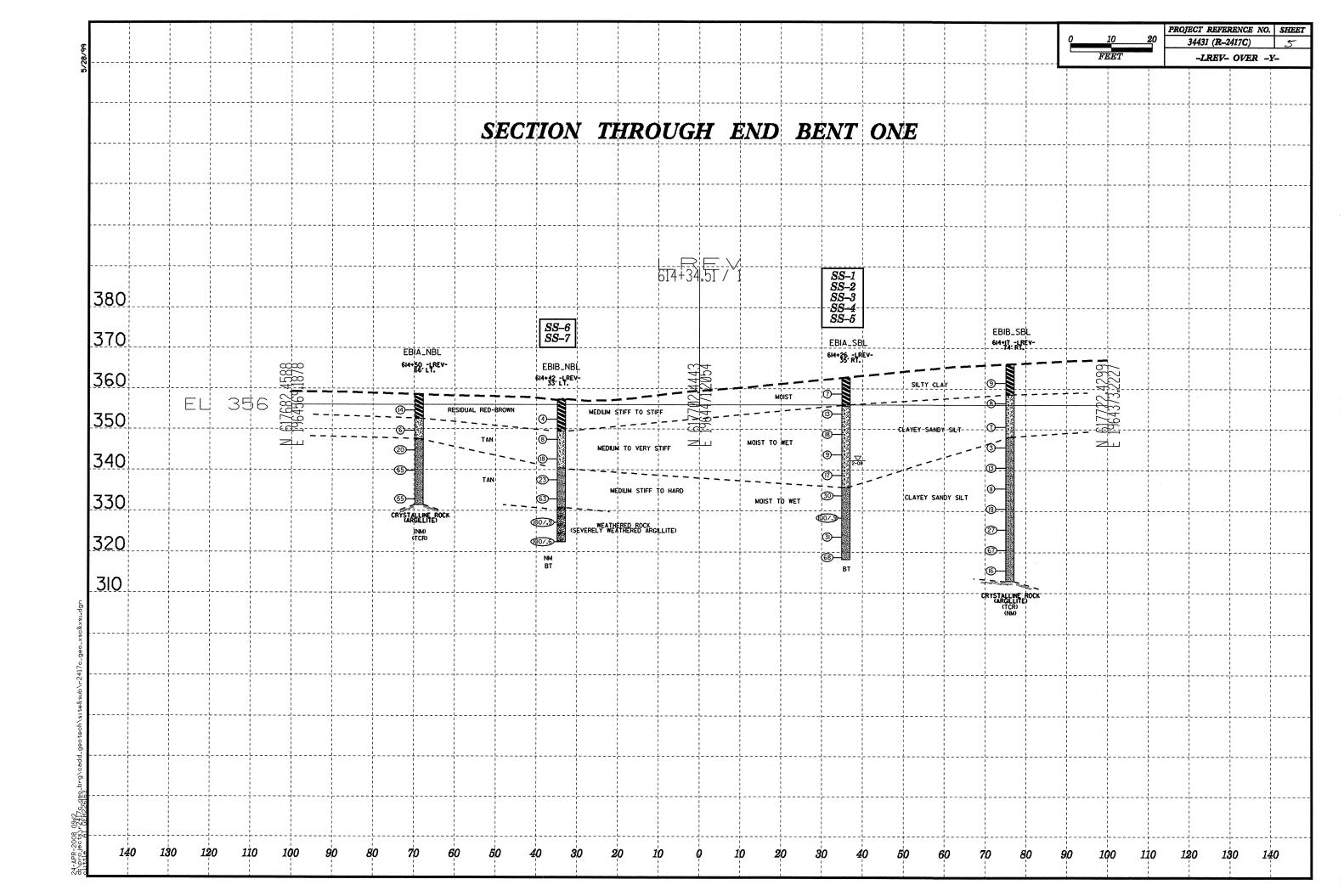
DIVISION OF HIGHWAYS

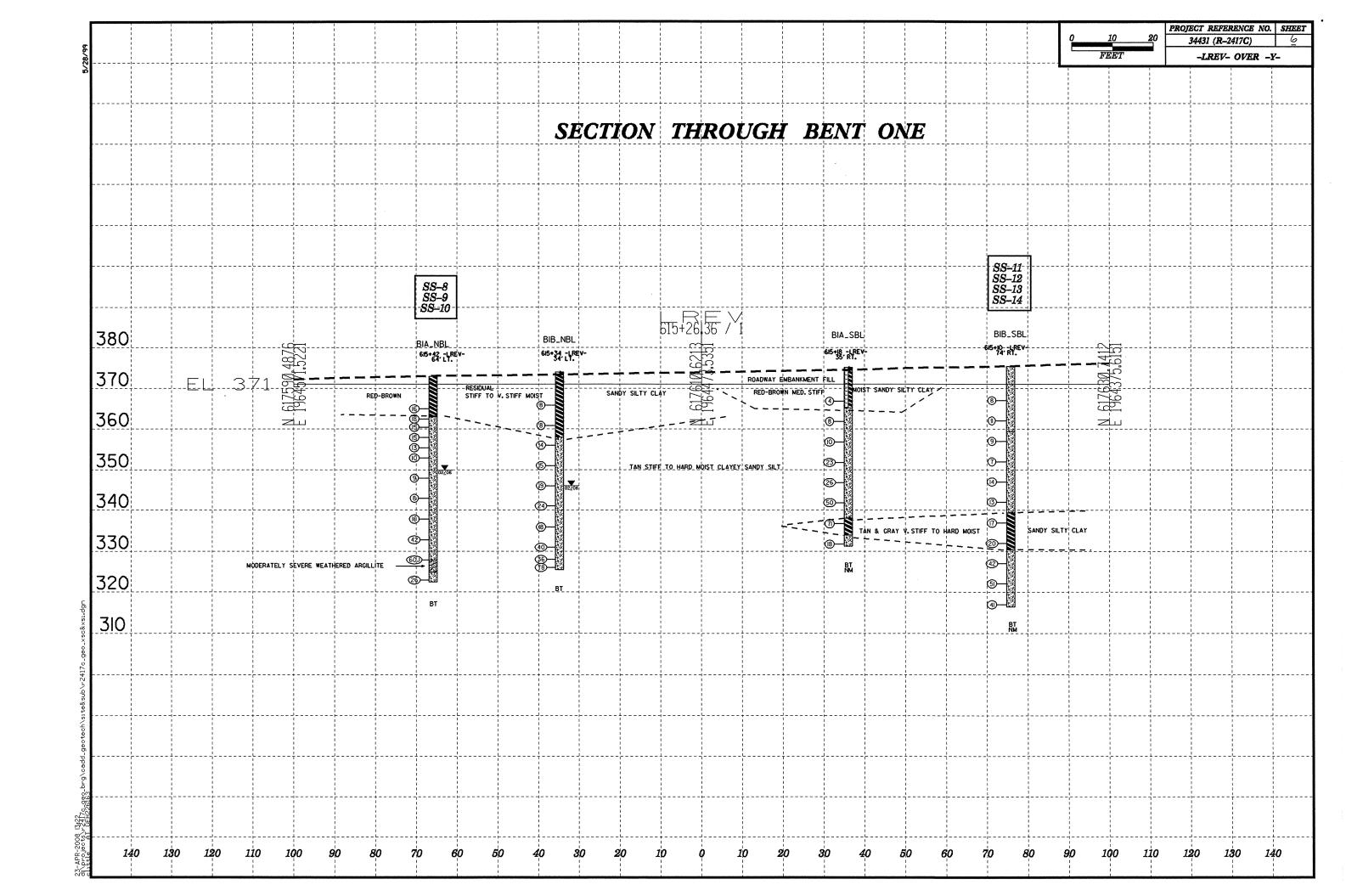
GEOTECHNICAL ENGINEERING UNIT

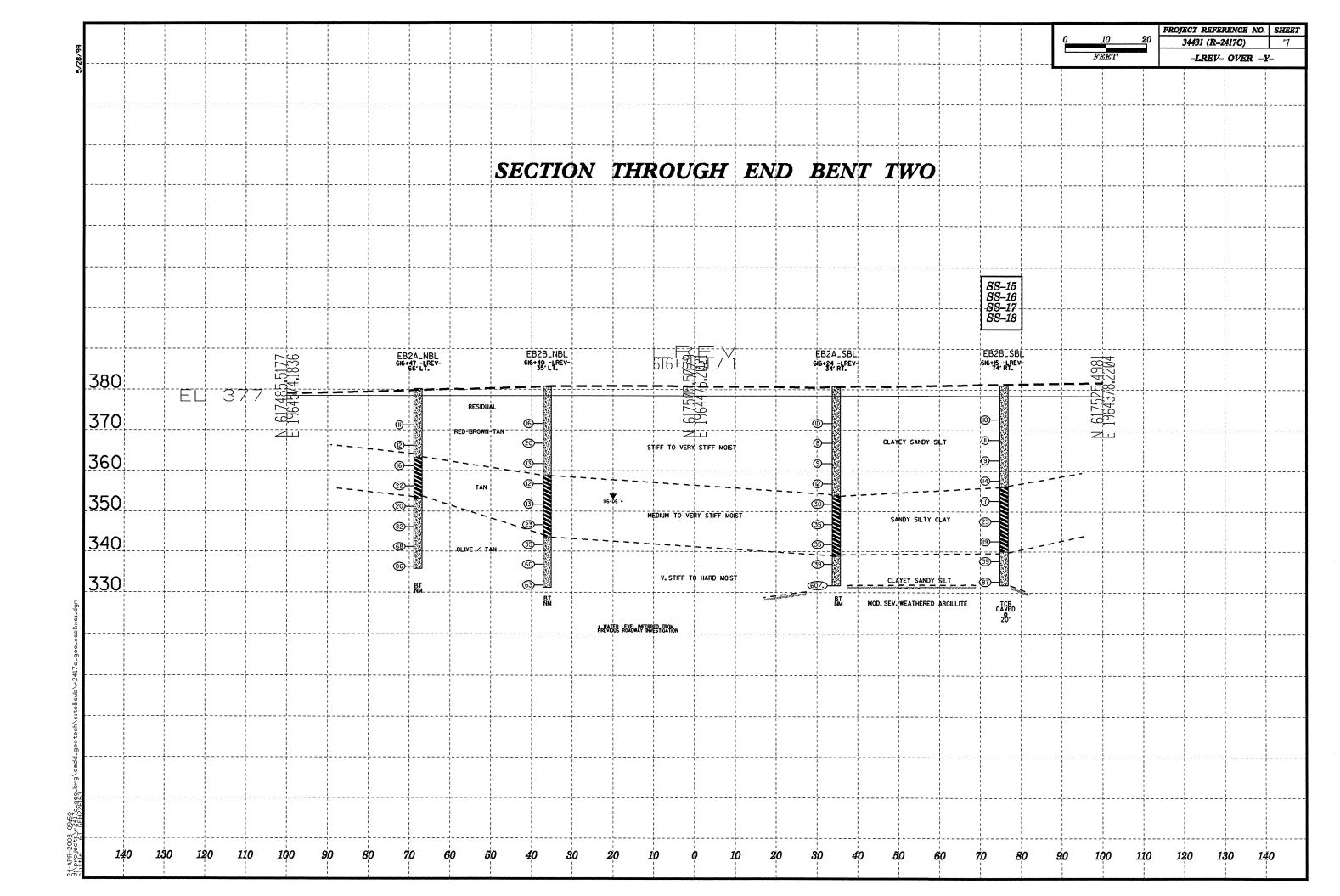
#### SUBSURFACE INVESTIGATION

	SOIL AND ROCK LEGENI	D, TERMS, SY	YMBOLS, AND ABBREVIA	ATIONS	
SOIL DESCRIPTION	GRADATION	T	ROCK D	DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 180 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ARSHITO TESE, ASTIN D-1586). SOIL CLASSIFICATION IS BASED ON THE ARSHITO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, ARSHITO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDLARITY, STRUCTURE, PLASTICTY, ELEC EXAMPLE  VERY SIFF, GAN, SUT CLAY, MOST WITH MIERBEDDED FIVE SAND LAYERS, MISHY PLASTIC, A-7-6	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  JUNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO POORLY GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDRESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	SP1 IN OF R00	RO ROCK IS NON-COASTAL PLAIN MATERIAL THAT CK LINE NOIDCATES THE LEVEL AT WHICH NON-CO T REFUSAL IS PENETRATION BY A SPLIT SPOON. NON-COASTAL PLAIN MATERIAL. THE TRANSITION MEATHERED ROCK. CK MATERIALS ARE TYPICALLY DIVIDED AS FOLLI MERED	IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED DOSTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS, N BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE DOWS:  AIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  ADUIFER - A WATER BEARING FORMATION OR STRATA.  AREMACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS LINDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION  GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS (< 35% PASSING *280) (> 35% PASSING *280)  ORGANIC MATERIALS	MINERAL OGICAL COMPOSITION  HÜNERAL NAMES SUCH AS DUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS  WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CDVC	TALLINE FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC ROCK THAT T REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.  CRUCHOUS URGALC SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31	NON-E ROCK	(NCR) SEDIMENTARY ROC	GRAIN METAMORPHIC AND NON-COASTAL PLAIN CK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE TE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		[AL PLA]N COASTAL PLAIN S	SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD ICK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
2. PASSING	PERCENTAGE OF MATERIAL  ORGANIC MATERIAL  GRANULAR SILT - CLAY  SOILS SOILS  OTHER MATERIAL		WEA	THERING	<u>Dike</u> - A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rock.
■ 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 18%  LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 28%	FRESH	HAMMER IF CRYSTALLINE.	INTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PLASTIC INDEX 6 MX NP 18 MX 18 MX 11 MX 11 MX 18 MX 18 MX 11 MX 18 MX 11 MX LITTLE OR HIGHLY	MODERATELY DRGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         >10%         >20%         HIGHLY         35% AND ABO		I.) CRYSTALS ON A BROKEN SPECIMEN FACE OF A CRYSTALLINE NATURE,	ED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, E SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	GROUND WATER  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGH (SLIJ)	1 INCH. OPEN JOINTS MAY CONTAIN CLA	ED AND DISCOLORATION EXTENDS INTO ROCK UP TO Y. IN GRANITOID POCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MATERIALS SAND SAND GRAVEL AND SAND SULS SULS PHATER	STATIC WATER LEVEL AFTER 24 HOURS  VPW PERCHED WATER SATURATED ZONE OR WATER REARING STRATA	MODER	RATE SIGNIFICANT PORTIONS OF ROCK SHOW I	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS, DISCOLORATION AND WEATHERING EFFECTS, IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AS A EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  O-(())  SPRING OR SEEP	COOM		E DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DISHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.  FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS  RANGE OF STANDARD I RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	MODER SEVERI	RE AND DISCOLORED AND A MAJORITY SHOW	OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (1)-VALUE)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION  PST CPT DAT TEST BORING DESIGNATION  SAMP PST PPT DAT TEST BORING DESIGNATION  SAMP DESIGNATION  SAMP DESIGNATION  DESIGNATION		IF TESTED, WOULD YIELD SPT REFUSAL	GIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY	S - BULK SAMP  SOIL SYMBOL  AUGER BORING  SS - SPLIT SPL	(SEV.)		OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED VITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME BOOK USUALLY REMAIN	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
MEDIUM DENSE	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  MONITORING WELL  SAMPLE	TUBE VERY (V SEV	IF TESTED, YIELDS SPT N VALUES > 101 SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED VJ THE MASS IS EFFECTIVELY REDUCED TO		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS, MOTILED 09071 - IRREQUIARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AFRATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SUFT 2 TO 4 0.25 TO 0.50 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  PIEZOMETER  A PIEZOMETER  RT - RECOMPAC		ETE ROCK REDUCED TO SOIL, ROCK FABRIC N	IC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL   STIFF   8 IU IS   1 TO 2	25/825 DIP & DIP DIRECTION OF SAMPLE	į.	ALSO AN EXAMPLE.	AY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES RATIO SA			HARDNESS	EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 48 60 200 270 DPENING (MM) 4.76 2.80 0.42 8.25 0.075 0.053	SOUNDING ROD REF- SPT REFUSAL		SEVERAL HARD BLOWS OF THE GEOLOG		PARENT ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
BOULDER	ABBRE VIATIONS  AR - AUGER REFUSAL HI. + HIGHLY ## - MOISTURE ( BT - BORING TERNINATED MED MEDIUM V - VERY	CONTENT	TO DETACH HAND SPECIMEN.	ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED  GOUGES OR GRODVES TO 0.25 INCHES DEEP CAN BE	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
GRAIN MM 385 75 2.0 8.25 0.05 0.005	BT - BORING TERMINATED MED MEDIUM Y - VERY  CL CLAY  MICA MICACEOUS VST - VANE SH  CPT - CONE PENETRATION TEST MOD MODERATELY  WEA WEATHER	HEAR TEST HARD		OGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE   FIELD MOISTURE   CURPO FOR FUELD MOISTURE   CURP	CSE COARSE NP - NON PLASTIC $\gamma$ - UNIT MEIG DHT - DILATOMETER TEST ORG ORGANIC $\gamma_{\rm d}$ - DRY UNIT DPT - DYNAMIC PENETRATION TEST PHT - PRESSUREMETER TEST	r WEIGHT HARD	D CAN BE EXCAVATED IN SMALL CHIPS T POINT OF A GEOLOGIST'S PICK.	HES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPP) OF A 148 LB, HAMMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EDUAL TO OR LESS THAN 0.1 FOOT PER 68 BLOWS.
GATTERBERG LIMITS)  PESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION  DESCRIPTION  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SAP SAPROLITIC F - FINE SD SAND, SANDY FOSS FOSSILIFEROUS SL SILT, SILT Y	SOFT		BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS NIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN NESSURE.	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
LL LIDUID LIMIT (SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES SLI - SLIGHTLY FRAGS FRAGMENTS TCR - TRICONE REFUSAL	VERI SOF		EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH N BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEDMENTS WITHIN A STRATUM BOULD TO R GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE - WET - (W) SEMISULIDIRE DATING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING	BEDDING TERM THICKNESS	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
OM OPTIMUM MOISTURE - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS:  ADVANCING TOOLS:  HAMMER TYPE:  X AUTOMATIC		IERM SPACING  ERY WIDE MORE THAN 10 FEET  1DE 3 TO 10 FEET	VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET	BENCH MARK: 330 (BL-330) N 6/7476.8/90 E 1964486.0680  ELEV 384.88 STA 134+87.92
SL SHRINKAGE LIMIT	6° CONTINUOUS FLIGHT AUGER CORE SIZE:	MC CL	ODERATELY CLOSE 1 TO 3 FEET LOSE 0.16 TO 1 FEET ERY CLOSE LESS THAN 0.16 FEET	THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	<u>=BY S1g 20+88.21 ELEVATION: FT.</u> NDTES:
ATTAIN OFTIMUM MOISTORE	A S PAULLOW HOOLING			THINLY LAMINATED < 0.008 FEET  JRATION	
PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH	- CME-45C HARD FACED FINGER BITS -N	FOR SE		NG OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW	TUNG,-CARBIDE INSERTS -H		ERIARI E RUBBING	WITH FINGER FREES NUMEROUS GRAINS:	
LOW PLASTICITY         6-15         SLIGHT           MED. PLASTICITY         16-25         MEDIUM	NW CASING X W/ ADVANCER HAND TODLS:  PORTABLE HOIST TRICONE STEEL TEETH POST HOUR DI	Dicare	GENTLE B	SLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE D.  TRICONE TUNG-CARB. HAND AUGER			AN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; ASILY WHEN HIT WITH HAMMER.	
COLOR	CORE BIT SOUNDING ROL	l l		RE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VANE SHEAR	TEST	EXTREMELY INDURATED SHARP HE	T TO BREAK WITH HAMMER. AMMER BLOWS REQUIRED TO BREAK SAMPLE: BREAKS ACROSS GRAINS.	
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SHEET

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ITE	DESCRI	PTION	US	421 - 1	NC 87	(SAN	FORD	BYPAS	S) OVER	US	121 BET	WEEN	NC 42	& N0			GROUND W	
ORI	NG NO.	EB1A	NBL	•	S	TATIO	<b>N</b> 61	4+50		OF	FSET (	6ft LT			ALIGNMENT		0 HR.	NN
OLL	AR ELE	<b>V.</b> 35	8.7 ft	·····	T	OTAL	DEPT	H 27.1	ft	NO	RTHING	617,6	89		EASTING		24 HR.	NN.
RILL	MACH	INE C	ME-5	50X	D	RILL I	/ETH	WN do	Casing v	// Ad	vancer					HAMMER TYPE		
TAR	T DATE	02/1	2/08		С	OMP.	DATE	02/12/0	)8	su	RFACE	WATER	DEPT	1 H	N/A	DEPTH TO ROC	K 27.1 ft	
LEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	·	0	2		PER FOO	75 	100	SAMP. NO.	моі	L 0 G	ELEV. (ft)	SOIL AND ROCK DES		DEPTH
	360	-					T 1		· 1						358.7 _	GROUND SURF RESIDUAL	ACE	
55	355.8	- 2.9 -	4	6	8		<b>j</b> <b>j</b> <b>p</b> 14			-   -			М			D-BRN & TAN STIFF ASTIC ((PI=13) SILTY		
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550	350.8	7.9 -	3	3	3	_			: : :	-			М			MED. STIFF MOIST C SILT (A-5)	LAYEY SANDY	
45	346.0	12.7	4	8	12		\. \. .\.						м	2.55	- 347.7 - TAN	RESIDUAL HARD MOIST CLAYE (A-4)	Y SANDY SILT	1
	341.0	- - 17.7										-			- -	<b>V</b> · · <b>/</b>		
40		<del>-</del> -	12	24	41				· · · /·	5			М		<u>-</u>			
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325	-													٠	- R	oring Terminated with EFUSAL at Elevation VERELY WEATHERE	331.6 ft ON	
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<del> </del>	DRIVE		т	W COI		DIVIP. DATE		PER FOOT	<u> </u>	SAMI		/ L	N/A	DEPTHION	OCK 34.9 R	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0 2		50		00 NO.	17	O II G	ELEV. (ft)	SOIL AND ROCK D		DEPTH (ft)
	360 - -	-				<u> </u>	· · · · ·	T	<del>                                      </del>	.			- 357.3	GROUND SU RESIDU	AL	0.0
355						<b> </b>			<u> </u>					BRN SOFT TO MI PLASTIC (PI=13) S	ED. STIFF MOIST SILTY CLAY (A-7-5)	
	353.3	- 4.0 -	1	2	2	<b>i</b>				:	м		-			
350	-					1				-		200				
	348.3	9.0				3:::				-			349.3	RESIDU	AL.	8.0
	-		2	4	4	. •8				SS-6	M		TAN	STIFF TO V. STIF SANDY SIL	F MOIST CLAYEY T (A-5)	
345	343.5 -	- 13.8										7	_			
	040.0 <del>-</del>	13.6	4	6	12	18					м	7.5		•		
340	_					1 }						2	340.3	BEALDI		17.0
	338.5 -	- 18.8	8	10	13	$I \cdots I$		1::::		.	- М		GI	RESIDU RY-TAN V. STIFF	TO HARD WET	
	-			"	10		23.			SS-7	- IVI		-	CLAYEY SANDY	SILI (A-4)	
335	333.8	23.5							<del>                                     </del>	_						
	1	-	10	24	39			63		:	W		<u>-</u>			
330	-	-							777			11/1	_ 330.8	WEATHERED	ROCK	26.5
	328.5 -	- 28.8 -	13	31	69/.4					:			<b>-</b>			
325	-	-			30,		: : : :		100/	.9			-			
323	323.5 <b>-</b>	- - 33.8							<del>                                     </del>	:1			<del></del>			
	-	-	19	75	25/.1			1	100/	6	_	Tr.	- 322.4 - Borin	g Terminated at El	evation 322 4 ft IN	34.9
320	_	-				-							_	WEATHERE		
	-	-											<b>-</b> -			
315	-	-											-			
	-	_														
	1	-											- -			
310	4	_											<del>-</del>			
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305	1	- -				•							- -			
	7	-											<del>-</del>			
	1	-			.				*				<del>-</del>			
300		<del>-</del>									1		<del>-</del>			
	]	<u>-</u>											• •			
295	<u>[</u>	-											•			
	1												<del>-</del>			
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290	$\exists$	- -											<del>-</del> 			
	1												•			
285	Ţ	• •											- 			
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202	1											1	-			
280			L									$oldsymbol{ol}}}}}}}}}}}}}}}}}}$				



SHEET

ECINC	<b>).</b> 344	31.1.	1	∐ID.		124170			COONT	LEE				GEOLOGIST Mu	11ay, C. C.	
DESCR	IPTION	US	421 -	NC 8	7 (S	SANFORD	BYPASS) OV	ER (	JS 421 BET	WEEN	NC 42	2 & N	IC 87		GROUND	WTR (f
NG NO.	EB1/	A_SBL	_	15	STA	ATION 614	4+26		OFFSET 3	5ft RT			ALIGNMENT	-LREV-	0 HR.	20.
AR ELE	V. 36	3.0 ft		一	гот	TAL DEPTH	44.5 ft		NORTHING	617,7	10		EASTING 1	,964,436	24 HR.	N
MACH	INE C	ME-5	50X											<del></del>	Automatic	
							·		SURFACE	WATER	DEP	гн І	N/A	<del> </del>		
001/5		<del></del>	OW CO		TT				JOIN AGE	·	V/	1 [		100.000		
ELEV	(ft)	ļ		<del></del>	-	0 25			75 100	1	///	0	i e	OIL AND ROCK DES	CRIPTION	DEPTH
(11)		-			$^{\cdot}$			~~~~	-	+	IVIO	ll G	ELEV. (II)			DEPIN
365	_												<b>-</b>			
1				<u> </u>	$+\!\!+$			····		<del> </del>	ļ		363.0			
360.0	3.0							: :				100		D-BRN MED. STIFF	MOISTLOW	
000.0	- 0.0	4	3	4	11	<b>♦</b> 7 · ·		<del>.</del> .		SS-1	М	100	- PLA	STIC (PI=13) SILTY	CLAY (A-7-5)	
-			ĺ		Ш	: \ : :			::::							
355.0	8.0					. \								RESIDUAL		
	-	4	5	8	71	13-				SS-2	М		TANS	STIFF TO V. STIFF M	OIST CLAYEY	•
1					Ш	:: \ :		: :					-	SANDT SILT (A	<del></del>	
350.0	13.0				4		<u> </u>	• •					-			
1	-	5	8	10		18			: : : :		М		_			
	-	<i>'</i>				$\cdots \not\models \cdot$						1	<b>-</b>			
345.0	18.0	3	4	5	$\dashv$	1		· ·				1	_			
1	- -					: <b>9</b> 9:::		: :		88-3	$\nabla$	, X	-			
240.0	- 22.0					: :\: :		: :					<del>-</del>			
340.0	23.0	3	8	9	$\exists$ $\vdash$	17					w	XX	_			
+	-							• •			,,	13	-			
335.0	28.0					<u> </u>						10.0	336.0	BESIDIIAI		2
-	-	4	10	20	11		30			SS-4	w		_ TAI	N HARD WET SAND	Y SILT (A-4)	
1	-				Ш			: :					_			
330.0	33.0				┨┞	• • • •		<u>```</u>	<u> </u>				_			
1	-	11	40	60/.4					100/.9		W		-			
+	-				Ш			٠. سنر					F			
325.0	38.0	10	16	15	$\dashv \vdash$					00.5			-			
1	-	.0		'`			31	: :		55-5	VV		<del>-</del> <del>-</del>			
320.0	- - 43 n							: :					<del>-</del>			
020.0	. 40.0	7	20	48	11						w		<del></del> - 318.5			4
1					T				<del> </del>					Terminated at Eleva	tion 318.5 ft IN	
1	.											-	-	HARD SANDY SIL	I (A-4)	
+												F	-			
Ŧ													<del>-</del> -			
1	.												-			
#	:												<u>-</u> -			
<u> </u>												F	-			
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+		l	İ									l F	<del>-</del> • ,			
ساس																
	DESCR NG NO.  AR ELE  MACH T DATE  DRIVE ELEV (ft)  365 _  355.0	DESCRIPTION NG NO. EB1/ AR ELEV. 36 . MACHINE 02/1 DRIVE DEPTH (ft) DEPTH (ft) DEPTH 365 360.0 3.0 355.0 8.0 345.0 18.0 345.0 18.0 345.0 28.0 335.0 28.0	DESCRIPTION US NG NO. EB1A_SBL AR ELEV. 363.0 ft  MACHINE CME-5 T DATE 02/12/08  DRIVE (ft) DEPTH (ft) 0.5ft  365	NG NO. EB1A_SBL  AR ELEV. 363.0 ft  MACHINE CME-550X  T DATE 02/12/08  DRIVE (ft) DEPTH (ft) 0.5ft 0.5ft  365	DESCRIPTION US 421 - NC 8  NG NO. EB1A_SBL	DESCRIPTION US 421 - NC 87 (3 NG NO. EB1A_SBL	DESCRIPTION US 421 - NC 87 (SANFORD NG NO. EB1A_SBL STATION 61.  AR ELEV. 363.0 ft TOTAL DEPTH.  MACHINE CME-550X DRILL METHO  T DATE 02/12/08 COMP. DATE  DEPTH BLOW COUNT (ft) 0.5ft 0.5	DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION   US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN	DESCRIPTION   US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 4: NG NO.   EB1A_SBL   STATION   614+26   OFFSET   35ft RT	DESCRIPTION   US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 42 & NOR NO. EB1A_SBL   STATION 614+26   OFFSET 35ft RT	DESCRIPTION US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 42 & NC 87  NG NO. EB1A_SBL	DESCRIPTION US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 42 & NC 87  NG NO. EB1A_SBL	DESCRIPTION   US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 42 & NC 87   GROUND 1 NG NO. EB1A_SBL   STATION 614+26   OFFSET 35ft RT   ALIGNMENT - LREV-   0 HR.



SHEET 9

	JECT N						R2417C							NTY						To	SEOLOGIST Mur	ray, C. C.	
					NC 8	37 (5	SANFOR	RD I	BYPA	ASS)	OVE	R U	S 42	1 BE	WE	EN 1	NC 4	2 & 1	IC 87			GROUND W	VTR (
	ING NO					STA	ATION (	314	+17				OFF	SET	74ft	RT			ALIGNME	NT	-LREV-	0 HR.	Ν
	LAR EL						TAL DEP							THING	61	7,71	8		EASTING	1	,964,397	24 HR.	Ν
DRIL	L MAC	HINE	CME-	550X		DRI	LL MET	101	D N	wc	asing	w/ A	Adva	ncer	•						HAMMER TYPE	Automatic	
STAI	RT DAT		<del></del>			CON	MP. DAT	E	02/1:	2/08		s	SURI	FACE	WAT	ER	DEP	TH	N/A		DEPTH TO ROC	K 53.2 ft	
ELEV (ft)	DRIVE	DEPTH (ft)	0.5ft	.OW CC		_	0	25			ER FOO		r	100	SA	- 1.	lacktriangledown/	0		S	DIL AND ROCK DESC	CRIPTION	
	(ft)	+ `	0.511	0.511	0.51	$^{H}$		ت		50		7 <u>5</u>		100	N	0.	/MO	l G	ELEV. (ft)				DEPTI
	370					Ш																	
	370	‡																	_ -				
		‡	<u> </u>			Ш									$oldsymbol{ol}}}}}}}}}}}}}}$				- - 366.5		GROUND SURFA	√CE	
365	-	$\frac{1}{1}$				1		+				-	• •					200	- RE	D-I	<b>RESIDUAL</b> BRN STIFF MOIST LO	OW PLASTIC	
	362.9	3.6	2	4	5	$\parallel \parallel$							: :	::				2000	<b>-</b> -		(PI=13) SILTY CLAY		
360		Ŧ	-	'									: :				М		-				
	357.9	8.6								•		•	• •						359.0		RESIDUAL		
		‡	3	3	5	$\mathbb{I}$	. 8			$\cdot$							М	1	_ TA		MED. STIFF TO STIF ET CLAYEY SANDY S		
355	-	‡				1		+		$\frac{1}{2}$		-						X 1/2		•••		3121 (74-0)	
	352.0	14.5					1: ::											X . 7	-				
350		‡	3	3	4		7			$\cdot \mid$			• •				M		- - 				
	347.0	19.5					<i>[</i>			: [		:T		::				2.7	- 348.5		RESIDUAL	······································	
345	347.0	19.5	3	1	2	11,	<b>j</b>					:	: :	::		- 1	w	: e : : :	TAN	М	ED STIFF TO HARD		
545	-	‡				11	<u>, y</u>	+		-	• • •	$\exists$	• •								SANDY SILT (A-	4)	
ļ	342.0	24.5	2	4	9	$ \cdot $	:/:::	:	·	:			: :	: :									
340		‡	~	"	J	1	• • ♦13•	╽:		- -		-	• •				W	66.66 66.8	-				
	337.0	29.5						:			: : :		: :						• •				
335	•	-	3	4	7	11	• <b>•</b> 11 •	:					: :				W		• •				
		<u> </u>					••/•	-		-		•							<del></del> -				
ا	332.0	34.5	4	8	11	$\parallel$						-	: :										
330	-	ļ.				$\parallel$	\	1		$\dot{+}$		$\frac{\cdot}{\cdot}$	<u> </u>	$\dot{H}$					• <del>-</del>				
-	327.0	39.5	6	11	16	$\prod$	\	\ :		:		:	· ·	::					•				
325	1	Ė	ľ	''	10	$\ \cdot\ $		2	7			-	• •						. · <del>-</del>				
	322.0	44.5						:	• •	`.\			: :	::					,				
320			15	22	45	11		:	: :		`` <b>`</b> ``	67	: :			l							
	]							-	٠ ; .	2+		-						ļ	-				
	317.0	49.5	4	5	11	$\  \cdot \ $		بر	· ·	-			: :										
315	-					11		+		+		$\exists$							-				
F						╁		<u> </u>		<u>-</u>			<u>-</u>	≟ــٰــ		╅			313.3 E	Bori	ng Terminated with T	RI-CONE	5
310	1	-																F	F	REF	USAL at Elevation 31 RELY WEATHERED	3.3 ft ON	
	‡	-																E	<del>-</del>				
305	‡	-																E					
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SHEET

PRO	ECT NO	<b>)</b> . 344	31.1.	1	ID.	R	R2417C		C	OUNTY L	.EE				GEOLOGIST Mur	ray, C. C.	
SITE	DESCR	PTION	US	421 -	NC 87	7 (S	SANFORD	BYPASS) OVE	R US	421 BET	WEEN	NC 42	2 & N	C 87	•	GROUND V	VTR (f
BORI	NG NO.	B1A_	NBL		s	TA	ATION 61	15+42	0	FFSET 6	4ft LT			ALIGNMENT	-LREV-	0 HR.	N
COLL	AR ELE	V. 37	'2.9 ft		Т	ОТ	TAL DEPT	'H 50.5 ft	N	ORTHING	617,5	97		EASTING 1	,964,538	24 HR.	23.
DRIL	L MACH	INE (	ME-5	50X	D	RIL	LL METH	OD NW Casing	w/ A	dvancer					HAMMER TYPE	Automatic	
STAF	RT DATE	02/1	2/08		c	OM	MP. DATE	02/12/08	SI	URFACE V	VATER	DEP	TH 1	N/A	DEPTH TO ROC	K 45.0 ft	
LEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT	П		BLOWS PER FO	ОТ		SAMP.	<b>V</b> /	LO	9	OIL AND ROCK DES	CRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft		0 2	25 50	75	100	NO.	MOI	1 1	ELEV. (ft)	OIL AND ROOK BLO		DEPTH
							89								· · · · · · · · · · · · · · · · · · ·		
	375																
	-				<u> </u>	Ш								372.9	GROUND SURF	ACE	
	-	-					::: :		::	: : :					RESIDUAL BRN TAN V. STIFF		
370	_	Ŀ				1	<del></del>							PLA	STIC (PI=13) SANDY (A-7-5)	SILTY CLAY	
	_	Ŀ					1::1:	: : : :   : :	: :				100	-	,		
365	365.9	7.0	5	6	10	+L	] .				SS-8	м		-			
	363.4	9.5		ļ	1	$\prod$					-	1		362.9			1
	361.4	11.5	5	7	11							М	N. V	_	RESIDUAL STIFF TO HARD MC	IST TO WET	
360	358.9	14.0	3	7	8	11	15_				SS-9	М			CLAYEY SANDY SIL	T (A-5)	
	-		4	7	8	11	15					М		-			
355	356.4 -	- 16.5 -	3	5	8	+	13					М		-			
	353.9	19.0	4	5	5	4	- <b>7</b> .°-							<del></del>			
	-	-	"	١	"		· • 10 ·					M		•			
50	248.0	- 240			Ì	$\parallel$	. †					V		<u>.</u>			
	348.9	24.0	4	3	6	$\parallel$	9		::			w	X.V.	-			
.45	-	-							: :					-			
345	343.9	29.0		<u> </u>		╁	<u> </u>				·						
	-	_	4	3	5		- 68		::			W		-			
340	-	_					· i · ·		• •					-			
	338.9	34.0	3	6	10	-			::	::::		м		-			
	-								::			"	X	- '			
335	333.9	39.0				<u>]</u>  -							X	-			
		-	7	16	26			42	::		SS-10	М	X	-			
330		-						7	~:								
1	328.9	44.0	31	51	60/.1	$+ \Gamma$			$\cdot \cdot \mid$	````				327.9			4
	]	_								60.1				*	CRYSTALLINE R ARGILLITE	оск	
325	323.9	49.0				Jŀ			-				M	324.9	RESIDUAL		4
		_	6	11	15	Щ		26		<u> </u>	<b></b>		À É	322.4 TAN	/. STIFF MOIST TO SANDY SILT (A		5
20	_]	-											F		Terminated at Elevation	on 322.4 ft IN V	<b>7.</b>
	7	-						•					F	– SI -	TIFF CLAYEY SANDY	OILI (A-5)	
	3	<b>-</b>											F	- -			
15	4	-											F	-			
	7	-											F	•			
10	7	•												•			
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05	‡	- -												• •••			
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95	1												l F	•			



SHEET 10

SITE DESCRIPTION         US 421 - NC 87 (SANFORD BYPASS) OVER US 421 BETWEEN NC 42 & NC 87         GROUND WTR (ft)           BORING NO. B1B_NBL         STATION 615+34         OFFSET 34ft LT         ALIGNMENT -LREV-         0 HR. NM           COLLAR ELEV. 374.0 ft         TOTAL DEPTH 48.5 ft         NORTHING 617,604         EASTING 1,964,508         24 HR. 28.0	PRO.	ECT NO						2417C	<u> </u>		COU	NTY	LEE				GEOLOGIST Mur	ray, C. C.	
BORNING NO.   B18 NBL   STATION   615/24   N						L			BYPASS	S) OVER	L			NC 42	2 & N			<del></del>	WTR (ft)
COLLAR ELEV. 374.0   TOTAL DEPTH 48.5   NORTHING 517,504   EASTING 1,504.0   24 Hz. 28.0						<del></del>				,							r -LREV-	0 HR.	NM
DRILL MACHINE   CME-550X   DRILL METHOD   NV Casing wi Advancer   NA MAMMER TYPE   Automatic   START DATE   C21/208   COMP. DATE   C21/208   SURFACE WATER DEPTH   NA   DEPTH TO ROCK   NA										t				 304		EASTING	1,964,508	24 HR.	28.0
START DATE   02/12/08					50X						L		···········				HAMMER TYPE	Automatic	
ELEY (N OR CONT)   ELOW COUNT   ELOW SOUTH   ELOW COUNT   ELOW SPER POOT   SAMP   VO   G   ELEY (N O   COUNT)   ELOW COUNT   ELOW COUNT											,		WATER	R DEPT	TH N	1/A			
10		DRIVE		Γ	W COU		П				L			7	1-1		AND DOOK DES	CRIPTION	
370		ELEV			0.5ft	0.5ft		0 2	5	50	75	100	NO.	мо				CRIPTION	DEPTH (ft)
370																			
Section   Sect		375														<del>-</del>	ODOLIND OUDE	405	
350 361 12 2 3 5 4 10 3 5 6 9 4 5 5 6 9 4 5 5 3 3 5 4 5 4 5 4 5 4 5 5 5 5 5 5 6 7 17.0 4 1 2 12 2 12 2 12 2 12 2 12 2 12 2 12		_					${\sf H}$	.!		Τ	Π.,		-	<del> </del>	The same of	-	RESIDUAL		0.0
366 8 7 2 2 4 4 4 3 10 3 5 6 9 4 5 10 3 3 2 7 12 4 9 15 3 3 2 7 4 7 0 12 2 6 5 2 3 5 11 2 5 3 3 2 7 4 7 0 12 2 6 5 2 3 3 5 11 2 5 3 3 2 7 4 7 0 12 2 6 5 2 3 3 5 11 3 2 5 3 3 2 7 4 7 0 12 2 6 5 2 3 3 5 11 3 2 5 3 3 2 7 4 7 0 12 2 6 5 2 3 3 5 11 3 2 5 3 3 2 7 4 7 0 12 2 6 5 2 1 1 2 5 3 2 7 12 1 12 1 12 1 12 1 12 1 12 1 12		-	-							: : : :					200		IST LOW PLASTIC (P	I=13) SANDY	
381	370	-	_				$\ \cdot\ $	-:		<del>                                     </del>	+:					<u>,</u>	SILITY CLAY (A-	-7-5)	
368 318 122 2 3 5 5 5 6 9 9 9 9 15 3 5 8 10 320 320 4 9 15 320 45.0 5 11 25 325 7 7 7 7 12 28 52 5 320 47 7 12 28 52 5 325 5 320 47 7 12 28 52 5 325 5		366.8	7.2							1::::						•			
380	365	1	-	2	4	4		. 8			<u> </u>			M		<u>.</u>			
380			_							1::::						-			
357.0 17.0		361.8 _	_ 12.2 -	2	3	5	$\ $		· · · ·	: : : :				М		- -			
357.0 17.0 4 4 4 10	360	_	_				lŀ	. 7		<del> </del>	+-								16.0
355   320   220   3   3   3   3   3   3   3   3   3		357.0	17.0	ļ				: :\: :		: : : :	:   : :	: :				_		NOT OF AVEV	16.0
360	355	_	-	4	4	10	$\  \ $	· - •14		1		• •		M		_ TAN			
350   5   6   9   •15		250.0	-					::::::		: : : :	:   : :					-	•		
347 0 27 0		352.0	22.0	5	6	9	$\ $			::::				М		• •			
345 340 340 340 340 340 350 350 350 350 350 350 350 350 350 35	350		_				lŀ			+	+-					<del></del>			
342 0 32 0 4 2 0 15		347.0	27.0					::::		1::::				_		•			
340	345	_		2	7	12		• • • • 19		<u> </u>		• •				<del>-</del>			
340		-						<i>!:::</i>		1::::						•			
337.0 37.0 5 8 10 W 3 330 42.0 8 15 25 40 W 3 327.0 47.0 5 11 25 325 88.5 W 327.0 47.0 5 11 25 325 88.5 W 328.0 48.5 Boring Terminated at Elevation 325.5 ft IN HARD CLAYEY SANDY SILT (A-5) 320 330 330 330 330 330 330 330 330 330	0.40	342.0	32.0	4	9	15	11	: : : : \	24					w		• •			
332	340	-	-				$\ \cdot\ $	<del>/</del>		<del> </del>	+-					-	2		
332.0 42.0 8 15 25 48.5 329.0 45.0 8 15 25 48.5 325 48.5 325 5 8 40 5 8 8 15 25 48.5 325 5 8 8 8 15 25 48.5 325 5 8 8 8 15 25 48.5 325 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		337.0	37.0					:::/								•			
330 329 0 45 0 5 11 25	335	-	_	5	8	10	$\ \cdot\ $	• • • 18		<u> </u>	<u> </u>			W		<del>-</del> 			
330 329 0 45 0 5 11 25		332.0	420						\							<u>.</u>			
329.0 45.0 5 11 25	330	332.0	42.0	8	15	25	11	: : : :	40					w		• •			
327.0 47.0	330	329.0	45.0		44	25	$\  \cdot \ $		- :/- :	<del> </del>	+-:					<del></del>			
325		327.0	47.0				$\  \ $	: : : :	• •36	\- <u>``</u> :				l w		• •			
310 300	325		-	12	26	52	╀	• • • • •	• • • •	1	₩78		╂	╂		– Borin			
315		1	-												F	• н,	ARD CLAYEY SANDY	SILT (A-5)	-
315	320	-	-													•			
310		=	-													<del>-</del> ·			
310		1																	·
305	315	_	-																1
305		1	-												F	•			
305	310	1	- -													•			
300		-	-													<del>-</del>			
300		1	-						V		•					•			
	305	4	-													<del>-</del>			
		1	-													•			
	300	1	-													•			
295		7	-						•							<del>-</del>			
295   T		1	-												<b> </b>	• •		٠	
	295			<u> </u>	<u> </u>		L_						<u> </u>	<u></u>		•			

SHEET

PRO.	JECT NO	<b>D.</b> 344	31.1.1	1	ID.	. R	R2417C			COUN	TY	LEE				GEOLOGIST Mu	ray, C. C.	
SITE	DESCR	IPTION	US	421 - I	NC 8	7 (S	SANFORD	BYPASS	) OVER	US 421	BET	WEEN	NC 42	2 & N	C 87	-	GROUND W	VTR (fi
BORI	NG NO.	B1A_	SBL	************	1	STA	<b>TION</b> 615	5+18		OFFSI	ET 3	5ft RT			ALIGNMEN	IT -LREV-	0 HR.	NI
COLI	AR ELE	<b>EV.</b> 37	5.1 ft		7	тот	TAL DEPTH	43.8 ft		NORT	HING	617,6	18		EASTING	1,964,438	24 HR.	NN
DRIL	L MACH	IINE C	ME-5	50X	I	DRII	LL METHO	D NW (	Casing w	/ Advan	cer					HAMMER TYPE	Automatic	
STAF	RT DATE	02/1	2/08		7	CON	MP. DATE	02/12/08	3	SURF	ACE	WATER	DEPT	TH N	N/A	DEPTH TO ROC	K N/A	
ELEV	DRIVE	DEPTH	BLC	OW CO	JNT	П		BLOWS F	ER FOOT			SAMP.	<b>V</b> /	L	<del></del>	SOIL AND DOOK DES	CRIRTION	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	t	0 25	5	0	75 1	100	NO.	МОІ	O G	ELEV. (ft)	SOIL AND ROCK DES		DEPTH
	380 _	-				П									****			
	-	‡													-			
375	-	‡				П		*							- 375.1	GROUND SURF.	ACE	
3/3	-	-	<b>i</b>		<u> </u>	$\top$	ļT					<b>†</b>			_	ROADWAY EMBAN	KMENT	
	-	‡														RED BRN MED. STIFF N ASTIC (PI=13) SANDY		
370	-	‡					<u> </u>		• • • •	<u> </u>					<del>-</del> .	(A-7-5)		
	367.8	7.3									::				-			
	-	t	1	2	2		4:::				::		М	_ 800 _ 800	<b>.</b>			
365	-	t				$\parallel$	1			+					365.1	RESIDUAL		10
	362.8	12.3	3	3	5	$+$ $\parallel$	: <u>j</u> . : :				::		М		_ TAN	I STIFF MOIST SANDY (A-5)	CLAYEY SILT	
360	-	ŧ	·				· • • • •				• •		""					
	357.8	17.3												33	•			
	-	-	2	4	6	71	10				::		М		-			
355	_	F				-	· · · · · ·	• • • •						13	<del>-</del> ,			
	352.8	22.3	4	9	14	41		: : : :					١		•			
350	-	Ŧ.	"	] ,	'*		2:	3			::		M		•			
-	347.8	27.3								1					-			
	347.6	27.3	7	11	15	11		26					м		-			
345	_	<b>‡</b>					• • • • [	7		<u> </u>					<del>-</del>			
	342.8	32.3				$\rfloor  $				::					-			
340	-	<b>†</b>	11	21	29		::::	::::	50	: :	::		М		• •			
340	007.0					$\parallel$			. 1	+					<del>-</del> 338.1			37
	337.8 _	37.3	18	26	45	$\exists 1$				71	::		м	V		RESIDUAL	40TIO 044IDV	
335	-					1			· / / ?	Ϊ··	• •			1	•	STIFF MOIST LOW PL SILTY CLAY (A-		
	332.8	42.3				floor				::	::			, N	334.1	RESIDUAL		41
330	-	<u> </u>	7	8	10	#	• • • • 18		• • • •	1 · ·	• •	<b></b>	М	33	331.3	V. STIFF MOIST CLAY! (A-5)		43
555	-	-													Bori -	ng Terminated at Eleva HARD CLAYEY SANDY	tion 331.3 ft IN SILT (A-5)	
		-													•			
325														<u> </u>	<del></del>			
	4	-																
220	1	-													• •			
320	-	-				1									<del>-</del>			
	1	-												<u> </u>	• •			
315	1	-												[	-			
	1	_												l F	•			
	$\frac{1}{1}$	-												F	•			
310	Ŧ	-							•						<del>-</del>			
	7	-																
305	‡	-														•		
	7	-													<b></b>			
	‡	-																
300	+	-	l			1	**							<b> </b> -				



SHEET //

PRO	IECT NO	. 344	31.1.1	1	ID.	R2417C			COUN	ŢΥ	LEE	<del> </del>	<del></del>		GEOLOGIST Mu	rray, C. C.	
SITE	DESCRI	PTION	US	421 - I	NC 87	(SANFO	RD BYPAS	S) OVER	US 421	BET	WEEN	NC 42	2 & N	IC 87		GROUND W	TR (ft)
BORI	NG NO.	B1B_	SBL		S.	TATION	615+10		OFFSE	ET 7	4ft RT			ALIGNMENT	-LREV-	0 HR.	NM
	AR ELE			-	T	OTAL DE	PTH 58.9	ft	NORTI	HING	617,6	25		EASTING 1	,964,399	24 HR.	NM
DRIL	L MACH	INE C	ME-5	50X	D	RILL MET	HOD NW	Casing w	/ Advan	cer					HAMMER TYPE	Automatic	
STAF	T DATE	02/1	2/08		C	OMP. DAT	TE 02/12/0	8	SURF	ACE !	WATER	DEPT	TH 1	N/A	DEPTH TO ROC	K N/A	
ELEV (ft)	ELEV	DEPTH (ft)	BLC 0.5ft	0.5ft	<del></del>	1		PER FOOT 50	75	100	SAMP.		0		OIL AND ROCK DES		
(17)	(ft)	(1-7	0.511	0.511	0.511	$\mathbb{H}^{-}$		<u> </u>	<u>'ĭ</u>		NO.	MOI	l G	ELEV. (ft)			EPTH (ft)
										l							
	380	<b>-</b> -												-			
	-	-												<b>-</b> -			
375		-		-		<del>                                     </del>			<del></del>		<b>-</b>		- 1380 - 1380	- 375.4 	GROUND SURF	ACE	0.0
	1	-								::					BRN & TAN WITH Q MOIST SANDY CLA		
370	1	-				: : :				::				-			
370	368.0	- 7.4						<del> </del>						-			
	300.0	- / . <del></del>	3	3	5	: <b> </b> ; :		::::		::	SS-11	М		-			
365		<del>-</del>				11:4:	<u> </u>	1	1				1 × 1	<del>-</del>			
	363.0	12.4				]]:\:	:   : : : :	::::		::				- -			
360	1	- -	2	5	6	- 11	:   : : : :	::::		::		М	X X	- -		·	
360	358.0	17.4				<del>       </del>		<b> </b>	<b> </b>					<del></del> 359.4	RESIDUAL		16.0
	330.0	- 17.4	3	3.	6	. •9				::	SS-12	М	12.5		O TAN-GRY MED. S	TIFF TO STIFF	
355	_	- -				11:1:		1	<u> </u>					_	DIST CLATET SAND	I OILI (A-0)	
	353.0	22.4				]] :/: :	:   : : : :	: - : :		::			1	-			
050	1	- -	2	3	4	7 .	:   :	: : : :		::		М	N.	-			
350		-				1		+	+	$\exists$			13	_			
	348.0	27.4	3	5	9	1 : : 1		1::::	1::	: :		м	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_			
345		-				T.						"		_			
	343.0	32.4				]]::[:			1 : :					-			
	1	- -	2	5	8	• • 13	:   : : : :	1::::	: :	: :		М					
340	338.0	-				111		<del> </del>	+					339.4	RESIDUAL		36.0
	338.0	37.4	3	7	10	1 : : 1		1::::	: :	::	SS-13	м			N & GRY V. STIFF M		
335	1	-				$[\cdots]$		1	<u> </u>					_ PLAS	STIC (PI=13) SANDY (A-7-5)	SILTY CLAY	
	333.0	42.4				]]:::;		1::::	: :	: :			1000	-			
330	‡	-	4	8	12	:::	20	::::	:::	::		M	100	<del>-</del> - 330.4			45.0
330	328.0	- 47.4						<del> </del>	<del> </del>	=					<b>RESIDUAL</b> GRY HARD MOIST O	LAYEY SANDY	
225	020.0	1 . <del> 1</del>	7	18	24	1 :::		2		::	SS-14	М		- IAN X	SILT(A-5)	, D ( L L OAND)	
325	#	-					.† <i>,i</i>		• •					<del>-</del>			
	323.0	52.4	10	22	20	:::	:   : : : : : : : : : : : : : : : : : :	<b>V</b> : : : :		::				<del>-</del>			
320	‡	.	12	22	29	:::	:   : : : :	51		::				<del>-</del> -			
520	318.0	57.4					/	١	1					<del></del>			
	<u> </u>		9	19	22		41	<u> </u> ::::	:::	::				- - 316.5			58.9
315	1	-												- Boring	Terminated at Elevation		
	‡	.												- -	CENTET SANDT	JIE1 (17-0)	
310	‡	.												- -			
	‡	-											<u> </u>	<del></del>			
	1	.											1 6	•			
305	<u></u>												F	- 			
	1												F	 -			
300	‡	:					•						E	• •			
300		1		L <u>.</u>		L			***************************************				Щ				

SHEET

PROJ	ECT NO	<b>).</b> 344	131.1.1	1	ID.	R	R2417C		COUNTY	LEE			GEOLOGIST Murr	ay, C. C.
SITE	DESCR	IPTION	ı US	421 - I	NC 87	7 (S	SANFORD BYPASS)	OVER	US 421 BET	WEEN	NC 42	2 & N	C 87	GROUND WTR (
BORII	NG NO.	EB2/	A_NBL	-	s	TA	ATION 616+47		OFFSET 6	66ft LT			ALIGNMENT -LREV-	0 HR. N
COLL	AR ELE	E <b>V</b> . 37	78.8 ft		Т	ОТ	TAL DEPTH 44.5 ft		NORTHING	617,4	92		<b>EASTING</b> 1,964,543	24 HR. N
DRILL	MACH	INE C	CME-5	50X	D	RIL	LL METHOD NW Ca	sing w/	Advancer				HAMMER TYPE	Automatic
STAR	T DATE	02/1	2/08		С	ON	WP. DATE 02/12/08		SURFACE	WATER	DEPT	TH 1	N/A DEPTH TO ROCK	K N/A
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	JNT	$\prod$	BLOWS PE	R FOOT		SAMP.	V	LO	SOIL AND ROCK DESC	RIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	Щ	0 25 50		75 100	NO.	MOI		ELEV. (ft)	DEPTH
	380 _	_												0.77
	-		<del> </del>	<u> </u>		+	. ]		Τ	<del> </del>	<u> </u>	(N)	378.8 GROUND SURFA	CE
	-	_											RED-BRN AND TAN STIFF M SANDY SILT (A-	
375		-				$\mathbf{l}$			+			A.V	<del>-</del>	-,
	-	Ŀ											-	
370	370.8	8.0	4	5	6	+L					М		- - -	
		-	•			$\prod$	- 1				"	7.7	 -	
	265.0	120										\ \(\frac{1}{2}\)	<del>-</del> -	•
365	365.8 _	<u>13.0</u>	4	5	7	1 -	12	• • • •			м		• ••	
	1	<u> </u>					::/::		::::				• •	
	360.8	18.0					:::::						_ 361.8 RESIDUAL	
360	_	_	4	7	9	11	16		<u> </u>	•	M	100	TAN STIFF TO V. STIFF N PLASTIC (PI=11) SANDY S	
	+												(A-7-5)	SILTI OLAT
355	355.8	23.0		10		$\prod$							• •	
	7	-	4	10	12				<b> </b>		- M		<del>-</del> -	
	1					$\ $			: : : :				_ _ 351.8	2
350	350.8	_ 28.0	5	8	12	$\ \cdot\ $					١	12.3	RESIDUAL TAN HARD MOIST CLAYEY	
						$\prod$	20				М		- (A-5)	SANDI SILI
1	245 0	- 22.0											• •	
345	345.8	_ 33.0	12	17	65	╢		· · · · · · · · · · · · · · · · · · ·			м	1.7	- -	
	1	-							/		"			
	340.8	38.0							/				-	
340	-	-	10	23	45	11			s		М		<u>-</u>	
	7	-				Ш		· · ·				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	•	
335	335.8	43.0				$\prod$			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				• •	
-	‡	<del>-</del>	18	35	51	井			86		M	, N.		204 0 ft IN
	‡	-										<u> </u>	Boring Terminated at Elevation HARD CLAYEY SANDY S	on 334.3 ft IN SILT (A-5)
30		-								1			<u>.                                      </u>	
	1	-											•	
	Ŧ												•	
25	#	-											<del>-</del>	
	‡	•								1				
20	‡	.												
	#	-										lE	<del>-</del>	
	1											F		
15		.										F		
	Ŧ			•									<del>-</del>	
	‡	.												
10	#	.		l									_	
	‡	.	l										•	
	+											F		
05	+			1									-	
	‡													
	+			1								l F		

# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET

PRO	JECT N	O. 344	431.1. <sup>-</sup>	1	ID.	. F	R2417C	COUNTY	<u>L</u>	EE				GEOLOGIST	Murray, C. C.	
SITE	DESCR	IPTION	I US	421 -	NC 8	7 (	SANFORD BYPASS) OVER	R US 421 B	ETV	VEEN	NC 42	2 & N	C 87		GROUND V	VTR (ft)
BOR	NG NO	. EB2	B_NBI	L.	5	STA	<b>ATION</b> 616+40	OFFSET	35	ft LT			ALIGNMEN'	T -LREV-	0 HR.	NM
COLI	AR ELI	<b>EV</b> . 37	79.5 ft			тот	TAL DEPTH 49.5 ft	NORTHI	NG	617,4	98		EASTING	1,964,511	24 HR.	NM
DRIL	L MACH	IINE (	ME-5	50X	I	DRI	ILL METHOD NW Casing	v/ Advance	г					HAMMER TY	PE Automatic	
STAF	RT DATI	E 02/1	2/08			COL	MP. DATE 02/12/08	SURFAC	EW	ATER	DEPT	TH N	i/A	DEPTH TO R	OCK N/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		-     t	BLOWS PER FOC 0 25 50	T 75 10	- 11	SAMP. NO.	MOI	L 0 G	ELEV. (ft)	SOIL AND ROCK [		DEPTH (fi
	380 _	Ļ											<b>—</b> 379.5	GROUND SU	JRFACE	0.
		‡							.			\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	- RED	<b>RESIDU</b> -BROWN & TAN S	TIFF TO V. STIFF	
375		Ŧ							:				- M	OIST CLAYEY SA	NDY SILT (A-5)	
		Ī														
370	371.3	8.2	6	8	8	41			:		.,		- -			
010	-	‡					16				M		<u>.                                    </u>			
	366.5	13.0	5	8	12	41						33	- -			
365	_	Ŧ	ľ	l°	12		20		+		М		<u>.</u>			
	361.5 -	18.0					::/: :::: :::						- -	,		
360	-	ŧ	2	5	8		•13		-		М		- 			
	356.5	23.0											- 357.5	RESIDU		22.0
355	-		3	5	7		• 12				М		TAN S		TIFF MOIST SANDY	,
		<b>+</b>											•	SILTI OLAT	(A-1-5)	
350	351.5 -	28.0	2	5	8	$\exists 1$	13	:   : : : :			М					
	-	-							$\mathbb{I}$				<del></del> -			
345	346.5 -	33.0	5	10	13	$+$ $\parallel$		:   : : : :			м		•			
<u> </u>	-	ļ.							11				<del>-</del> ·			
	341.5	38.0	8	14	21	41							342.5	RESIDU		37.0
340	-	-		'	2'	$\prod$	35		$\dashv$		М		i i i i i i i i i i i i i i i i i i i	V. STIFF TO HARI SANDY SIL	D MOIST CLAYEY T (A-5)	
	336.5 -	43.0				$\prod$		:   : : : :								
335	_		16	25	35		60		-		М		_'			
	331.5 -	- 48.0										3	•			-
330	~		29	29	34	$\downarrow \downarrow$	63	<u> </u>	4		M	33	330.0	- T'IIII		49.5
	-											-		g Terminated at El ARD CLAYEY SAN	evation 330.0 ft IN IDY SILT (A-5)	
325		_											· ·			
	1	-														
320																
	. ]	_										lE	<del>-</del>			
315	-	-										E		·		
		-										-	-			
	1															
310	-	-										E	-			
	‡	-										E				
305	‡	-										E	-			
	†	-														
300	1	-							1							



SHEET

PRO	JECT N	0. 34	431.1.	1	ID.	R2	417C				T	COUNTY	LEE				GEOLOGIST Mui	ray, C. C.	
SITE	DESCR	IPTION	us	421 -	NC 8	7 (SA	NFO	RD I	BYPAS	S) OVE	RU	IS 421 BE	TWEEN	NC 4	2 &	NC 87		GROUND W	TR (ft
BOR	ING NO.	. EB2	A_SBI	L	5	STAT	ION	616	+24			OFFSET	34ft RT			ALIGNMEN	IT -LREV-	0 HR.	NM
COL	LAR ELI	<b>EV.</b> 3	79.4 ft		7	ГОТА	L DE	PTH	49.1	ft	ı	NORTHING	<b>3</b> 617,	512		EASTING	1,964,442	24 HR.	NN
DRIL	L MACH	INE (	CME-5	550X		ORILI	. MET	HOI	D NW	Casing	w/ /	Advancer					HAMMER TYPE	Automatic	
STAI	RT DATE	E 02/1	12/08		C	OMF	. DAT	E	02/12/0	)8		SURFACE	WATER	R DEP	TH	N/A	DEPTH TO ROC	<b>K</b> 49.1 ft	
ELEV	DRIVE ELEV	DEPTH	BLO	ow co	UNT	$\prod$			BLOWS	PER FO	ОТ		SAMP	. 🔻	L		SOIL AND ROCK DES	~PIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25		50	7	5 100	NO.	МС		•	COLETIND ROOK DEC		EPTH (
		ŀ																	
	380 _	1												1		379.4	GROUND SURF	ACE	0
	-	ļ				$\prod$			· · · ·							RED.	<b>RESIDUAL</b> -BRN GRY & TAN MED	STIFE MOIST	
375	-	‡					i : :		 							1	CLAYEY SANDY SIL	T (A-5)	
010	-	‡					1.	+		<b> </b>			11			<b>‡</b>			
	371.2	8.2						:	· · · ·	1::	• •					1	•		
370	-	-	4	5	5	11:	10	-		<u> </u>	• •			М		<b>;</b> }			
	-	‡		ļ				:	· · · ·							<b>;</b> }			
365	366.4 -	13.0	3	3	5	-  :	- · ·	:   ·						м		<b>‡</b>			
	-	F					Ť°	:		1				"		<b>;</b>		•	
	361.4 <b>-</b>	18.0					i									<b>‡</b>			
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	7	-						┿		<b>\</b>				IVI		<b>.</b>	(A-5)	CANADA CALA	
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SHEET

PRO	JECT NO	<b>)</b> . 344	131.1.	1	ID.	F	R241	7C					CO	JNTY	LEE	*******			GEOLOGIST M	urray, C. C.	
	DESCR				NC 8	7 (5	SANI	ORE	BY	PAS	S) O	/ER	US 4	21 BE	TWEE	NC 4	2 & 1	NC 87		GROUND V	VTR (ft)
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	AR ELE							DEPT					<u> </u>		<b>G</b> 617,	520		EASTING	1,964,402	24 HR.	NM
	L MACH			50X		ORI	LL M	ETH	OD	NW	Casi	ng w	Adv	ancer			····		HAMMER TYP	E Automatic	
STAF	RT DATE	02/1	·			ON	MP. C	DATE					L	RFACE	WATE	R DEP	TH	N/A	DEPTH TO RO	CK N/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		-	0	2			PER F 50		75	100	SAMF	MC	LOG	ELEV. (ft)	SOIL AND ROCK DE		DEPTH (ft)
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l	337.2	42.4	4	14	25	$\  \ $	: :		. ``	<b>3</b> 9.	: :	: :	:		SS-18	М		- OLIVE	RESIDUAL HARD MOIST CLAY		
335	+	-				$\ \cdot\ $					-		₽ <u>:</u>			1		<del>-</del>	(A-5)		
	332.2	47.4	11	38	40	$\prod$		::					1					- -			
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# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY

T	n	MIA	
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R-2417C

#### REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	3443111	County	LEE		Owner
Date: Sampled	2/7/08	Received	3/7/08		Reported 3/12/08
Sampled from		**********		Ву	C C MURRAY
Submitted by	N WAINAINA			-	1995 Standard Specifications

744050 TO 744068 4/25/08

#### TEST RESULTS

Proj. Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Lab. Sample No.		744050	744051	744052	744053	744054	744055
Retained #4 Sieve	%	-	-	-	_	-	
Passing #10 Sieve	%	100	100	100	100	100	100
Passing #40 Sieve	%	97	97	97	94	93	96
Passing #200 Sieve	%	83	78	78	64	71	71

#### MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	7.1	6.3	5.5	13.2	11.2	6.7
Fine Sand Ret - #270	%	16.4	24.5	24.9	34.5	29.0	33.5
Silt 0.05 - 0.005 mm	%	37.9	48.9	51.3	42.2	51.7	47.7
Clay < 0.005 mm	%	38.5	20.3	18.3	10.1	8.1	12.2
Passing #40 Sieve	%	-	-	-	-	-	_
Passing #200 Sieve	%	_	-	-	-	-	-

L. L.	51	49	48	39	40	41
P. I.	17	6	8	3	8	7
AASHTO Classification	A-7-5(17)	A-5(8)	A-5(9)	A-4(2)	A-4(6)	A-5(6)
Station	614+26	614+26	614+26	614+26	614+26	614+42
OFFSET	35 R	35 RT	35 RT	35 RT	35 RT	33LT
ALIGNMENT	L REV	L REV	L REV	L REV	L REV	L REV
Depth (Ft)	3.00	8.00	18.00	28.00	38.00	9.00
to	4.50	9.50	19.50	29.50	39.50	10.50

cc: C C MURRAY Soils File

> Soils Engineer Page 1

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAY MATERIALS & TESTS UNIT** SOILS LABORATORY

T. I. P. No. R-2417C

#### REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	3443111	County	LEE		Owner
Date: Sampled	2/7/08	Received	3/7/08		<b>Reported</b> 3/12/08
Sampled from				Ву	C C MURRAY
Submitted by	N WAINAINA			-	1995 Standard Specifications

744050 TO 744068 4/25/08

#### TEST RESULTS

Proj. Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Lab. Sample No.	744056	744057	744058	744059	744060	744061
Retained #4 Sieve %	_	-	-	-	-	-
Passing #10 Sieve %	100	100	100	100	100	98
Passing #40 Sieve %	96	97	98	98	99	95
Passing #200 Sieve %	73	72	· 76	80	91	75

#### MINUS NO. 10 FRACTION

SOIL MORTAR - 100%					•		
Coarse Sand Ret - #60	%	8.1	6.3	4.3	4.7	1.8	4.9
Fine Sand Ret - #270	%	31.0	31.6	29.6	26.4	14.0	30.2
Silt 0.05 - 0.005 mm	%	50.7	39.8	47.9	50.7	55.8	44.6
Clay < 0.005 mm	%	10.1	22.3	18.3	18.3	28.4	20.3
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	***	_	-	**	_

L. L.	38	52	48	44	54	53
P. I.	3	13	9	9	9	9
AASHTO Classification	A-4(3)	A-7-5(11)	A-5(9)	A-5(9)	A-5(14)	A-5(10)
Station	614+42	615+42	615+42	615+42	615+10	615+10
OFFSET	33LT	64LT	64LT	64LT	74RT	74RT
ALIGNMENT	L REV	L REV	L REV	L REV	L REV	L REV
Depth (Ft)	18.80	7.00	11.50	39.00	7.40	17.40
to	20.30	8.50	13.00	40.50	8.90	18.90

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No.	R-2417C						
	REPORT ON SAM	IPLES OF	SOILS FOR	QUALITY	7		
Project	3443111	County	LEE		Owner		
Date: Sampled	2/7/08	Received	3/7/08		Reported	3/12/08	
Sampled from		•		By	C C MURR	AY	
-	NI XX/A INI A INI A					Standard Spec	cifications
Submitted by	N WAINAINA			•			
744050 TO 74400 4/25/08	68	T	EST RESUL	TS			
Proj. Sample No	).	SS-13	SS-14	SS-15	SS-16.	SS-17	SS-18
Lab. Sample No		744062	744063	744064	744065	744066	744067
Retained #4 Si		-	-	-	-	-	
Passing #10 Si		100	100	100	100	100	100
Passing #40 Si		98	98	100	99	99	99
Passing #200 S	ieve %	81	79	79	83	81	79
		MINU	S NO. 10 FRA	CTION			
SOIL MORTAR	R - 100%		`				
Coarse Sand	Ret - #60 %	4.1	4.7	0.6	1.8	1.8	2.2
Fine Sand Re	et - #270 %	26.0	27.0	32.9	27.6	28.2	31.4
Silt 0.05 - 0.0	005 mm %	47.7	52.1	44.2	52.3	51.7	52.1
Clay < 0.005	mm %	22.3	16.2	22.3	18.3	18.3	14.2
Passing #40 Si		-	-		_	_	_
Passing #200 S	ieve %	-	-	-	-	-	
L. L.		51	44	49	48	46	41
P. I.		12	9	8	9	11	9
AASHTO Class	sification	A-7-5(13)		A-5(10)	A-5(11)	A-7-5(11)	A-5(8)
Station		615+10	615+10	616+15	616+15	616+15	616+15
OFFSET		74RT	74RT	74RT	74RT	74RT	74RT
ALIGNMENT		L REV	L REV	L REV	L REV	L REV	L REV
Depth (Ft)		37.40	47.40	7.40	12.40	27.40	42.40
	to	38.90	48.90	8.90	13.90	28.90	43.90

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAY** MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No.	R-2417C	-					
	REPORT ON SAM	MPLES OF	SOILS FOR	R QUALIT	Y		***************************************
Project	3443111	County	LEE		Owner		
Date: Sampled	2/7/08	Received	3/7/08		Reported	3/12/08	
Sampled from		-	***	Ву	C C MURF		
Submitted by	N WAINAINA			. •	***************************************	Standard Spe	ecifications
·			**************************************				
744050 TO 74406 4/25/08	8						
		T)	EST RESUL	TS			
Proj. Sample No.		SS-19					
Lab. Sample No.		744068					
Retained #4 Sie		-					
Passing #10 Sie		100					
Passing #40 Sie		98					
Passing #200 Sig	eve %	80					
	•	MINUS	S NO. 10 FŔA	CTION			
SOIL MORTAR	- 100%				1		I i
Coarse Sand R		5.7					
Fine Sand Ret		22.1	1				
Silt 0.05 - 0.00		43.8				<del>                                     </del>	
Clay < 0.005 r		28.4	1				
Passing #40 Sie	eve %	-					
Passing #200 Sie	eve %						
						· · · · · · · · · · · · · · · · · · ·	<u> </u>
L. L.		46					
P. I.		15					
AASHTO Classif	fication	A-7-5(14)					
Station		614+00					
OFFSET		165LT					
ALIGNMENT		L REV					
Depth (Ft)		0.00					
	to	1.50					
		ı	1 1		i i	1	

D: R-2417C

ROJECT: 34431

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

**CONTENTS** 

HEET	<b>DESCRIPTION</b>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE ALONG CULVERT
5	SOIL SAMPLE TEST RESULTS

#### STRUCTURE SUBSURFACE INVESTIGATION

ROJ. RE	FERENCE NO.	34431 (R-241)	7C)	. F.A. PROJ	. STP-NHF-421(
COUNTY	LEE				
ROJECT	DESCRIPTION	US 421/NC	87 SANFO	RD BYPA	SS
<b>FROM</b>	EAST OF	NC 42 TO N	C 87 NEAR	SR 1138	
ITE DES	CRIPTION $\_{m c}$	ULVERT @	612 + 27 - LR	EV-	

N.C. 34431 (R-2417C)	1	5

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNE LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEFARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORNING LOSS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

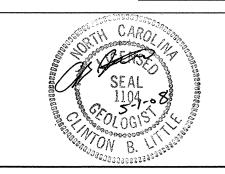
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUBFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU IN-PLACE TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSITURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOSITURE CONDITIONS MOSTOR CONDITIONS OF VARY CANSIGNED AT TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN. MANY CASES THE FINAL DESIGN DETALS 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 CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTICATION MADE, NOR THE INTERPREPATIONS MADE, OR PINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTICATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR IS ALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS; ENCOUNTERED AT THE SITE DIFFERING FROM THE ACTUAL CONDITIONS; ENCOUNTERED AT THE SITE DIFFERING FROM THE ACTUAL CONDITIONS.

_	M.R. MOORE
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<u>-</u>	2 / 7 / D D / 57
INVESTIGATED BY	MURKAY
CHECKED BY	LITTLE
SUBMITTED BY_	LITTLE
DATE	APRII. 2008

PERSONNEL
CC MURRAY

J. ESTEP



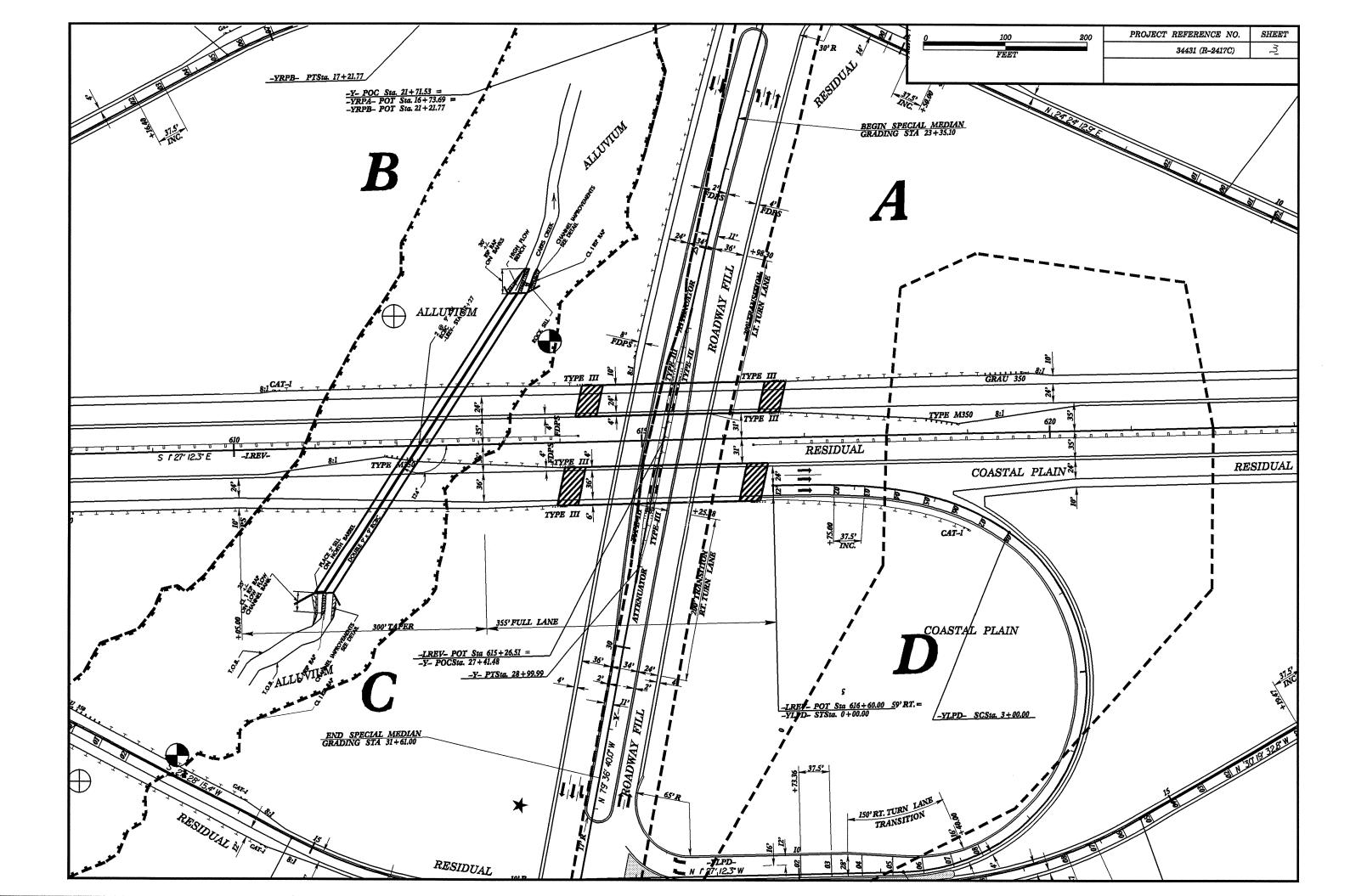
#### PROJECT REFERENCE NO. 3443I (R-24I7C) SHEET NO.

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

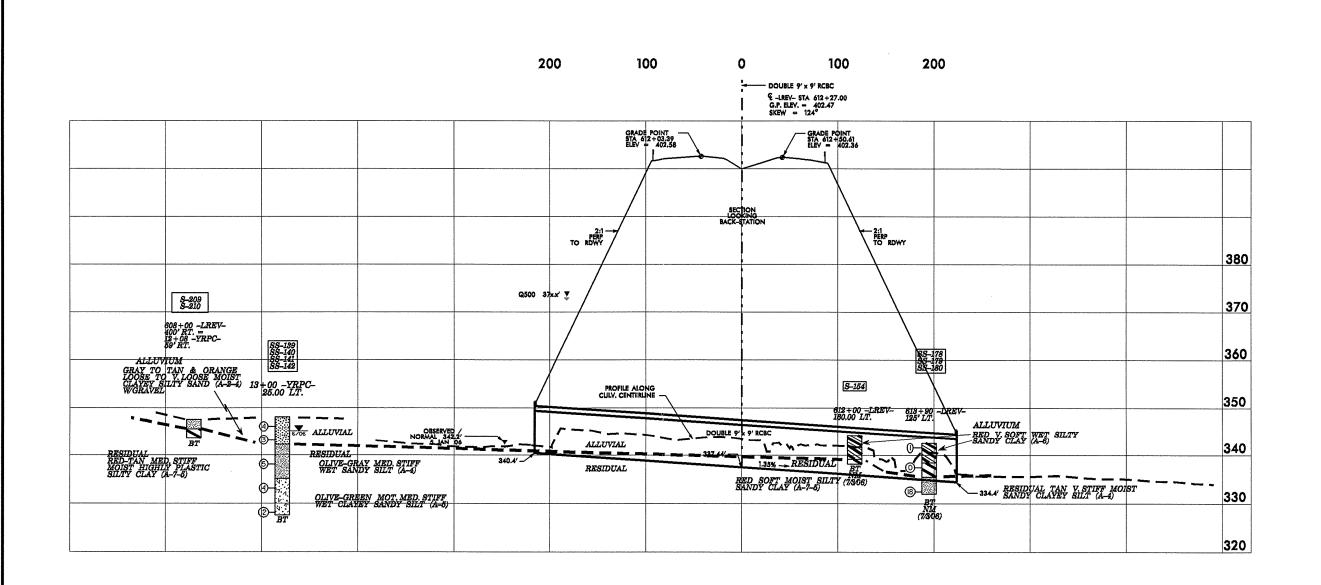
#### GEOTECHNICAL ENGINEERING UNIT

#### SUBSURFACE INVESTIGATION

	SOIL AND ROCK	LEGEND, TERMS, SY	YMBOLS, AND ABBREVIA	ATIONS	
SOIL DESCRIPTION	GRADATION			ESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLICHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST LASHIOT 1208, ASTM D-15861, SOIL CLASSIFICATION IS BASED ON THE AGAPTIO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AGAPTIO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:  VER STAFF, BANSOT CLX, MOST WITH IMPREDICED THE SIMO LARRENGEW PLASTE, 4-7-6	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FIL UNFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME POORLY GRADED  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZ  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDRESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS SUBANGULAR, SUBROUNDED, OR ROUNDED.	SIZE. (ALSO RDC: SPT IZES. IN OF ROC:	DCK LINE INDICATES THE LEVEL AT WHICH NON-CO PT REFUSAL IS PENETRATION BY A SPLIT SPOON S N NON-COASTAL PLAIN MATERIAL. THE TRANSITION F WEATHERED ROCK. DCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLO THERED  NON-COASTAL PLA THERED	NIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	ARENLEUUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND,  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,  OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY	ROCK	((CR) WOULD YIELD SPT GNEISS, GABBRO, S	GRAIN IGNEOUS AND METAMORPHIC ROCK THAT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, CHIST, ETC. GRAIN METAMORPHIC AND NON-COASTAL PLAIN K THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE	AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.  CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS. A-1-a   A-1-b   A-2-4   A-2-5   A-2-6   A-2-7   A-7-5   A-3   A-6, A-7   SYMBDL   800000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS T MODERATELY COMPRESSIBLE LIQUID LIMIT GENER HIGHLY COMPRESSIBLE LIQUID LIMIT GREATE PERCENTAGE OF MATERIAL	THAN 31 TO 31-50 COASTA	TAL PLAIN INCLUDES PHYLLIT  TAL PLAIN COASTAL PLAIN SI  MENTARY ROCK SHELL BEDS. ETC.	IE, SLATE, SANDSTONE, ETC. EDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD CK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	OF SLOPE.  CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
= 10	ODCANIC MATERIAL GRANULAR SILT - CLAY	R MATERIAL 1 - 10% 10 - 20% 20 - 35%  FRESH  VERY S	SH ROCK FRESH, CRYSTALS BRIGHT, FEW JOI HAMMER IF CRYSTALLINE.	THERING  NTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER  D, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.   DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.   DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
RASTIC INDEX   6 MX   NP   18 MX   18 MX   11 MN   11 MN   18 MX   18 MX   11 MN   11 MN   11 MN   11 MN   11 MN   11 MN   18 MX   12 MX   16 MX   1	Y HIGHLY ORGANIC >10% >20% HIGHLY  GROUND WATER	35% AND ABOVE (V SLI.	OF A CRYSTALLINE NATURE.  HT ROCK GENERALLY FRESH, JOINTS STAINE!  1 INCH. OPEN JOINTS MAY CONTAIN CLAY  CRYSTALS ARE DULL AND DISCOLORED. (	SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF  D AND DISCOLORATION EXTENDS INTO ROCK UP TO  C. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  SISCOLORATION AND WEATHERING EFFECTS. IN	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO DIVE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN.RATING AS A SUBGRADE  EXCELLENT TO GOOD  FAIR TO POOR  FAIR TO POOR  FAIR TO POOR  POOR  POOR  UNSUI  CONSISTENCY OR DENSENESS	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STR.  SPRING OR SEEP  MISCELLANEOUS SYMBOLS	RATA (MDD.)	GRANITOID ROCKS, MOST FELDSPARS ARE DULL SOUND UNDER HAMMER BLOWS AND WITH FRESH ROCK.  RATELY ALL ROCK EXCEPT OUARTZ DISCOLORED	DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.
PRIMARY SDIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (1974) (TONS/FTZ)  GENERALLY VERY LODSE (4 (1974) (19	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION  SOIL SYMBOL  AUGER BORING	SAMPLE (MOD. S. S BULK SAMPLE (SEV.)	SEV.) AND CAN BE EXCAVATED WITH A GEOLOG IF TESTED, WOULD TIELD SPT REFUSAL ALL ROCK EXCEPT DUARTZ DISCOLDRED IN STRENGTH TO STRONG SOIL. IN GRAN	IST'S PICK, ROCK GIVES "CLUNK" SDUND WHEN STRUCK.  OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED ITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO TITS LATERAL EXTENT.
DEFINITION   DENSE   10 TO 30	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  MONITORING WELL  THE THAN THAN THE	SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE (V SEV. RS - ROCK SAMPLE	EV.) THE MASS IS EFFECTIVELY REDUCED TO REMAINING, SAPROLITE IS AN EXAMPLE (		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.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	******** ALLUVIAL SOIL BOUNDARY    INSTALLATION   FIREZUME LER	RT - RECOMPACTED TRIAXIAL COMPLE SAMPLE  CBR - CALIFORNIA BEARING RATIO SAMPLE	SCATTERED CONCENTRATIONS. QUARTZ MA ALSO AN EXAMPLE.	OT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND BY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270  OPENING (MM) 4.76 2.00 6.42 8.25 8.075 8.053	SOUNDING ROD GEE SPT REFUSAL  ABBREVIATIONS	VERY HARD	SEVERAL HARD BLOWS OF THE GEOLOGI	HARP PICK. BREAKING OF HAND SPECIMENS REQUIRES ST'S PICK. ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BDULDER   COBBLE   GRAVEL   SAND   SAND   SAND   (SL.)   (CL.)	BT - BORING TERMINATED MED MEDIUM V CL CLAY MICA MICACEOUS V CPT - CONE PENETRATION TEST MOD MODERATELY W	VST - VANE SHEAR TEST HARD WEA WEATHERED	DERATELY CAN BE SCRATCHED BY KNIFE OR PICK.  RD EXCAVATED BY HARD BLOW OF A GEOLD BY MODERATE BLOWS.	GOUGES OR GROOVES TO 8.25 INCHES DEEP CAN BE DOIST'S PICK. HAND SPECIMENS CAN BE DETACHED	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPP) OF
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST ORG ORGANIC  DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST	$\gamma$ - UNIT WEIGHT MEDIL HARD HARD	RD CAN BE EXCAVATED IN SMALL CHIPS TO POINT OF A GEOLOGIST'S PICK. FT CAN BE GROVED OR GOUGED READILY B	IES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  D PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE  Y KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS  ZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	A 140 LB. HAMMER FALLING 30 INCHES REDUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TAE PLASTIC   PLASTIC	FOSS FOSSILIFEROUS SL SILT, SILTY	VERY SOFT	PIECES CAN BE BROKEN BY FINGER PRE RY CAN BE CARVED WITH KNIFE. CAN BE E		OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION ISROD - A MEASURE OF ROCK QUALITY DESCRIBED BY  TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE  TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANDE - WET - (W) SEMISOLIO REDUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJE		FRACTURE SPACING	BEDDING THICKNESS	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	E MOBILE B CLAY BITS X	AUTOMATIC MANUAL VEI	IERM	TERM	BENCH MARK:  ELEVATION: _ FT.
- DRY - (D) REDUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH	L BK-51 X 8° HOLLOV AUGERS L HARD FACED FINGER BITS L HARD FACED FINGER BITS	]-B ]-N FOR SE		THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET  RATION  G OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	NOTES: -
NONPLASTIC	X CME-550 NW CASTAIC X N/ ADVANCED	-H ND TOOLS:   POST HOLE DIGGER   HAMD AUGER	MODERATELY INDURATED GRAINS CA BREAKS EA	WITH FINGER FREES NUMEROUS GRAINS; LOW BY HAMMER DISINTEGRATES SAMPLE. IN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; ASILY WHEN HIT WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT	SOUNDING ROD  VANE SHEAR TEST	DIFFICULT  EXTREMELY INDURATED SHARP HA	RE DIFFICULT TO SEPARATE WITH STEEL PROBE; TO BREAK WITH HAMMER. MMER BLOWS REQUIRED TO BREAK SAMPLE; REAKS ACROSS GRAINS.	



0	100	200	PROJECT REFERENCE NO.	SHEET
	FEET		34431 (R-2417C)	4
	VE = 5		Culvert Profile	



SOIL SAM	PLE DATA												R-2417C		
													CULVER'	T @ 612+2	7 -LREV-
SAMPLE	<b>OFFSET</b>	<b>STATION</b>	<b>DEPTH</b>	<b>AASHTO</b>	<u>LL</u>	<u>PI</u>	C. SAND	F. SAND	SILT	<b>CLAY</b>	10	<u>40</u>	<u>200</u>	MOIST	<b>ORGAN</b>
			<u>LREV</u>												
S-209	400 RT	608+00	0.00-2.00	A-4(0)	21	5	33.1	23.1	27.8	16.0	91	71	44	-	-
S-210	400 RT	608+00	2.00-4.00	A-7-5(35)	71	35	9.6	6.8	13.3	70.2	100	94	85	_	-
S-154	160+LT	612+00	1.00-4.00	A-6(7)	40	20	24.0	31.4	14.4	30.2	99	89	50	-	-
SS-178	125 LT	613+90	0.00-1.50	A-6(7)	38	13	18.7	16.7	28.4	36.2	94	83	65	-	-
SS-179	125 LT	613+90	4.00-5.50	A-7-6(12)	41	16	13.1	14.3	38.5	34.2	97	90	75	-	•
SS-180	125 LT	613+90	9.00-10.50	A-4(3)	36	5	16.1	26.3	53.6	4.0	100	90	67	-	-

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# (D: R-2417C

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Site Vicinity Map

Test Boring Logs

Core Reports

Site Photographs

Core Photographs

Boring Location Plan

NCDOT Geotechnical Engineering Unit

Generalized Subsurface Profile 22.0' RT. of -19FLY-

Soiland Rock Classification Sheet

Generalized Subsurface Cross Sections
Cross Section Through End Bent No. I

Cross Section Through End Bent No. I

Cross Section Through End Bent No. 2

Summary of Laboratory Test Data

Sheet I

Sheet 2

Sheet 3

Sheet 4

Sheet 5

Sheet 6

Sheet 7

Sheet 8

Sheet 14 Sheets 15 & 16

Sheets 9 - 13

Title Sheet

# ROJECT: 34431.1.1

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

#### STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO	34431.1.1	F.A. PRO	J. STP-NHF-421(2)
COUNTY			
PROJECT DESCRIPTION		(SANFORD	BYPASS)
FROM EAST OF NC			
SITE DESCRIPTION BRIL	OGE No. 137		
ON -I9FLY- OVER -	LRev- (SANFORI	) BYPASS)	

STATE STATE PROJECT REFERENCE NO. SHEET SHEETS N.C. 34431.1.1 1 16

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919) 250-4088, NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORNING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 BORNINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORRHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INFERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSTUME CONDITIONS NIDICATED IN THE SUBSURFACE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATION, THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS AND VARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES ONT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE EPPARTMENT AS TO THE TYPE OF MATERIALS AND COMDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS INCESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPRENSATION OF FOR AN EXENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

For Letting

L. RAUP

N. BRADLEY

J. HONEYCUTT

T. CLEARY

M. MOSELEY

J. WALKER

R. NORWOOD

K. RICHARDSON

P. PHELPS

T. PEREZ

INVESTIGATED BY S&ME, INC.

CHECKED BY A.F. RIGGS, JR.

SUBMITTED BY S&ME, INC.

DATE APRIL 4, 2008

PERSONNEL
S. JOHNSON



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NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

DRAWN BY: T. PEREZ

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

#### DIVISION OF HIGHWAYS

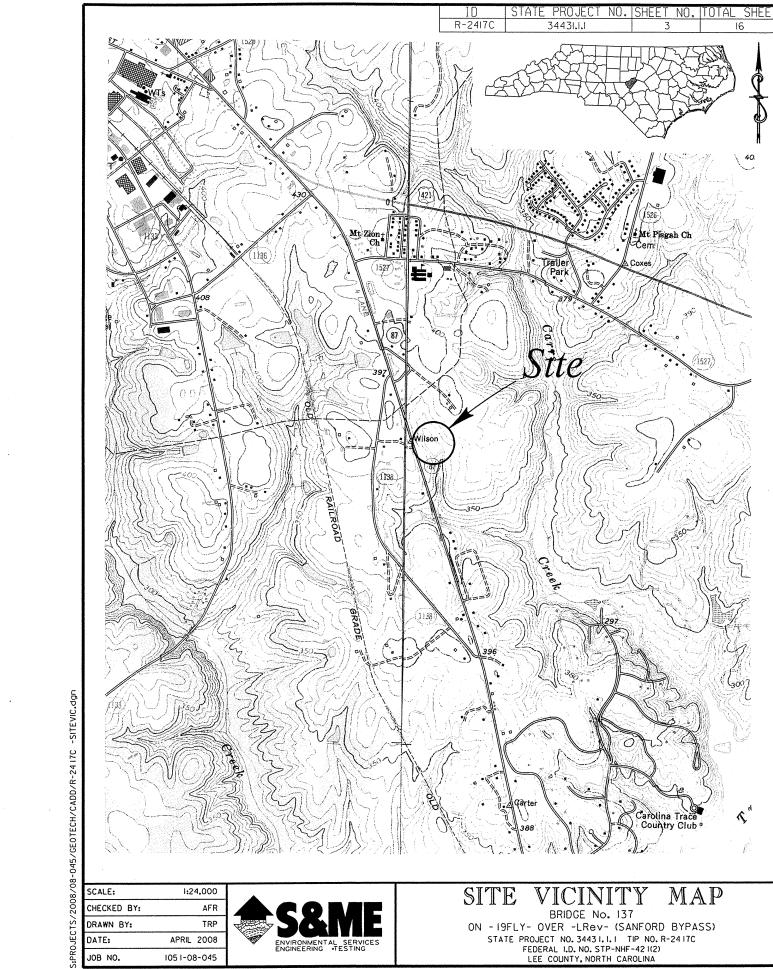
GEOTECHNICAL ENGINEERING UNIT

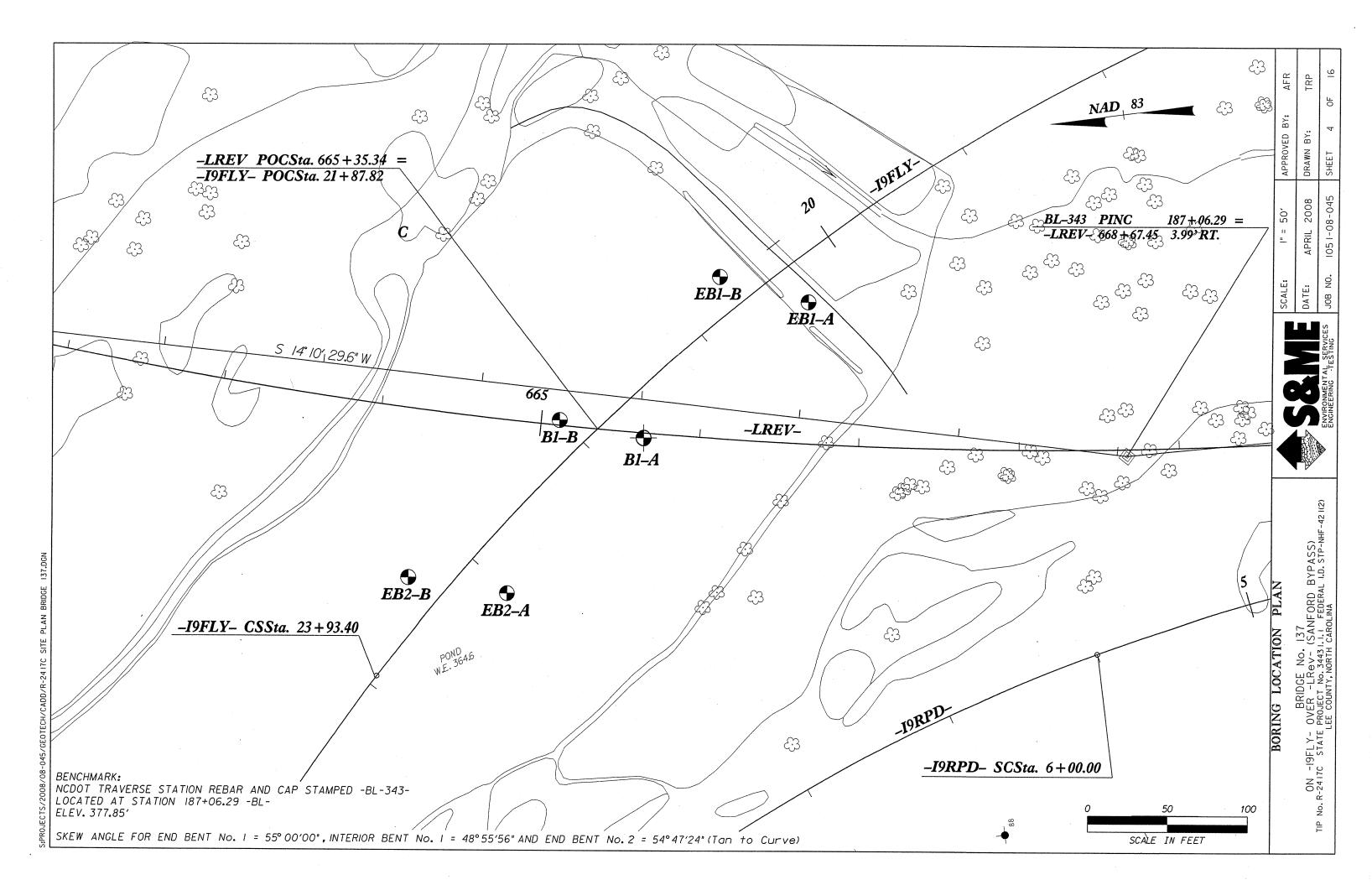
#### SUBSURFACE INVESTIGATION

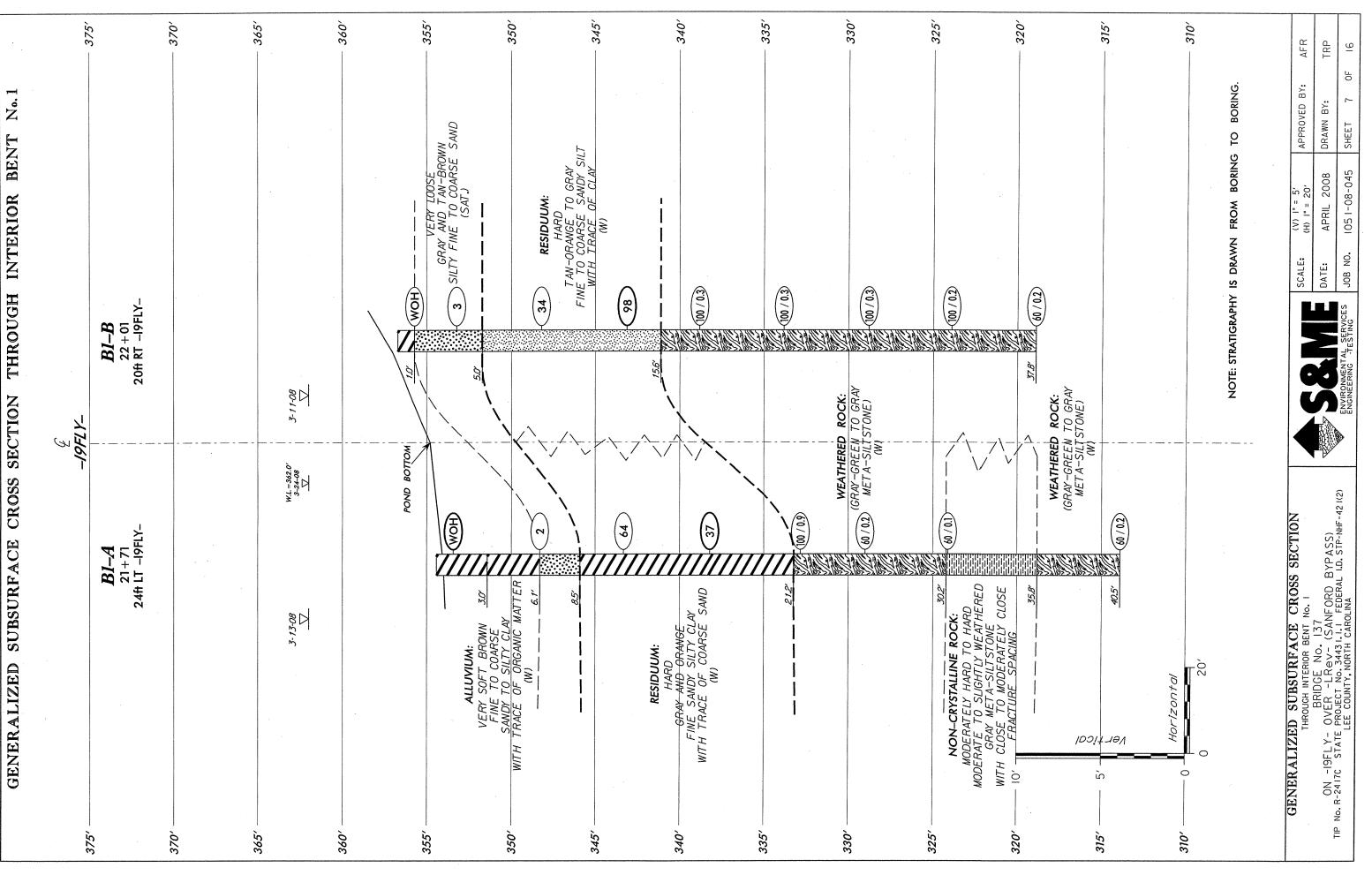
#### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		DEGETTE, TEICHE		· · · · · · · · · · · · · · · · · · ·			TEDMO AND DEFINITIONS
SOIL DESCRIPTION	GRADATION  WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM	FINE TO COARSE		OASTAL PLAIN MATERIAL THA	DESCRIPTION IT WHEN TESTED, WOULD YIELD SPT REFUS		TERMS AND DEFINITIONS ALLUYIUM (ALLUY,) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN	UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAM	ME SIZE. (ALSO			COASTAL PLAIN MATERIAL WOULD YIELD S I SAMPLER EQUAL TO OR LESS THAN 0.1 F		AQUIFER - A WATER BEARING FORMATION OR STRATA.
100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE  ANGULARITY OF GRAINS	SIZES.	IN NON-COASTAL PLATOF WEATHERED ROCK.		ON BETWEEN SOIL AND ROCK IS OFTEN RE	PRESENTED BY A ZONE	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TE	FRMS: ANGULAR.		TYPICALLY DIVIDED AS FOLO	OWS:		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED ROCK (WR)	NON-COASTAL PI	LAIN MATERIAL THAT YIELDS SPT N VALU	JES > 100 BLOWS	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ļ	CRYSTALLINE	of ar of ar or	E GRAIN IGNEOUS AND METAMORPHIC ROCK	THAT	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		ROCK (CR)	WOULD YIELD SP	PT REFUSAL IF TESTED. ROCK TYPE INCL SCHIST.ETC.	UDES GRANITE.	GROUND SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. (.95% PASSING *200) (.85% PASSING *200) (.85% PASSING *200) (.85% PASSING *200) (.85% PASSING *200)	COMPRESSIBILITY		NON-CRYSTALLINE	FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTAL	PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7   A-7-6 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LES	SS THAN 30	ROCK (NCR)	INCLUDES PHYLL	.ITE, SLATE, SANDSTONE, ETC.	72372BI NOCK THE	OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LIQUID LIMIT 31- HIGHLY COMPRESSIBLE LIQUID LIMIT GRE		COASTAL PLAIN SEDIMENTARY ROCK	SPT REFUSAL. R	SEDIMENTS CEMENTED INTO ROCK. BUT MA OCK TYPE INCLUDES LIMESTONE, SANDSTO		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.
% PASSING SILT-	PERCENTAGE OF MATERIAL		(CP)	SHELL BEDS, ETC	C. ATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
# 10 50 MX GRANULAR CLAY PEAT	ORGANIC MATERIAL GRANULAR SILT- CLAY SOILS SOILS OT	HER MATERIAL				í	ROCKS OR CUTS MASSIVE ROCK.
200 15 MX 25 MX 0 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN S MN	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE	1 - 10%		F CRYSTALLINE.	OINTS MAY SHOW SLIGHT STAINING ROCK	1 .	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LOUID LIMIT 40 MX41 MN 40 MX41 MN 40 MX41 MN 40 MX41 MN SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE  MODERATELY ORGANIC 5 - 10% 12 - 20% SOME	20 - 35% V			ED, SOME JOINTS MAY SHOW THIN CLAY C	***************************************	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDEX 6 MX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	HIGHLY ORGANIC >10% >20% HIGHLY	Y 35% AND ABOVE		S ON A BHOKEN SPECIMEN FAU STALLINE NATURE.	CE SHINE BRIGHTLY. ROCK RINGS UNDER H	1	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
AMOUNTS OF SOILS					ED AND DISCOLORATION EXTENDS INTO RO	ick up to	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRACS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC OF MAJOR GRAVEL AND SAND SOILS SOILS MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRIL  STATIC WATER LEVEL AFTER 24 HOURS.	LLING.			AY. IN GRANITOID ROCKS SOME OCCASIONA . CRYSTALLINE ROCKS RING UNDER HAMME!		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SHIND STATES AND SOLES	PERCHED WATER, SATURATED ZONE OR WATER BEARING				DISCOLORATION AND WEATHERING EFFECT		FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITAB		) (			RE DULL AND DISCOLORED, SOME SHOW CLA ID SHOWS SIGNIFICANT LOSS OF STRENGTH		PARENT MATERIAL.
SUBGRADE P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	SPRING OR SEEPAGE		WITH FRES				FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS		SEVERE AND DISCO	OLORED AND A MAJORITY SHO	O OR STAINED. IN GRANITOID ROCKS, ALL F WW KAOLINIZATION. ROCK SHOWS SEVERE L	OSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION  POP DPT DMT TEST BORING	SAMPLE		BE EXCAVATED WITH A GEOLO D. WOULD YIELD SPT REFUSAL	OGIST'S PICK. ROCK GIVES "CLUNK" SOUND		THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
CONSISTENCY (N-VALUE) (TONS/FT2 )		DESIGNATIONS	SEVERE ALL ROCK	S EXCEPT QUARTZ DISCOLORE	D OR STAINED ROCK FABRIC CLEAR AND	EVIDENT BUT REDUCED	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GENERALLY VERY LOOSE 4  COONE 4 TO 10	SOIL SYMBOL CPT TEST BORING	S- BULK SAMPLE		GTH TO STRONG SOIL. IN GRA SOME FRAGMENTS OF STRONG	ANITOID ROCKS ALL FELDSPARS ARE KAOL ROCK USUALLY REMAIN.	INIZED TO SOME	ITS LATERAL EXTENT.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN AUGER BORING	SS- SPLIT SPOON		D, YIELDS SPT N VALUES > 10	<del></del>	17	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENSE 30 TO 50  VERY DENSE >50	ROADWAY EMBANKMENTS				O OR STAINED. ROCK FABRIC ELEMENTS AF O SOIL STATUS, WITH ONLY FRAGMENTS OF	TE DISCEMINIBLE DOT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT	INFERRED SOIL BOUNDARIES - CORE BORING    STIFT   INFERRED ROCK LINE	SAMPLE	REMAINING	S. SAPROLITE IS AN EXAMPLE	OF ROCK WEATHERED TO A DEGREE SUCH RIC REMAIN. <i>IF TESTED, YIELDS SPT N I</i>	THAT ONLY MINOR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1	MUNITURING WELL	RS- ROCK SAMPLE			NOT DISCERNIBLE, OR DISCERNIBLE ONLY		RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	25/025 DIP/DIP DIRECTION OF PIEZOMETER INSTALLATION	RT- RECOMPACTED TRIAXIAL SAMPLE		D CONCENTRATIONS. QUARTZ M	MAY BE PRESENT AS DIKES OR STRINGERS	. SAPROLITE IS	ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARD >30 >4	ROCK STRUCTURES  SLOPE INDICATOR INSTALLATION	CBR - CBR SAMPLE	AC30 AN E		HARDNESS		ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AN EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	SOUNDING ROD     SPT N-VALUE		VERY HARD CANNOT E		SHARP PICK. BREAKING OF HAND SPECIME	NS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270  OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	➤ WATER LOSS			HARD BLOWS OF THE GEOLOG			PARENT ROCK. <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
COARSE FINE	ABBREVIATIONS			SCRATCHED BY KNIFE OR PICK CH HAND SPECIMEN.	K ONLY WITH DIFFICULTY, HARD HAMMER	1	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL
BOULDER	AR - AUGER REFUSAL PMT - PRESSUREM	,			K. GOUGES OR GROOVES TO 0.25 INCHES I	DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
GRAIN MM 305 75 2.0 0.25 0.05 0.005	BT - BORING TERMINATED SD SAND, SANDY CL CLAY SL SILT, SILTY			ED BY HARD BLOW OF A GEOL RATE BLOWS.	LOGISTS PICK. HAND SPECIMENS CAN BE D	JE TACHED	SLIP PLANE.
SIZE IN. 12° 3°	CPT - CONE PENETRATION TEST SLI SLIGHTLY CSE COARSE TCR - TRICONE RE				CHES DEEP BY FIRM PRESSURE OF KNIFE	ON LICK FOUNT	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST  DPT - DYNAMIC PENETRATION TEST  ORY UNIT WEIGH	HT		F A GEOLOGISTS PICK.	TO PEICES I INCH MAXIMUM SIZE BY HARD	- I	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	e - VOID RATIO	Pro-			BY KNIFE OR PICK. CAN BE EXCAVATED IN	N FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	FOSS FOSSILIFEROUS V VERY			CAN BE BROKEN BY FINGER PE			OF STRATUM AND EXPRESSED AS A PERCENTAGE.
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED VST - VANE SHEAF		VERY CAN BE C	CARVED WITH KNIFE. CAN BE	EXCAVATED READILY WITH POINT OF PICK EN BY FINGER PRESSURE. CAN BE SCRATC	PIECES I INCH	<u>STRATA ROCK QUALITY DESIGNATION (S.R.Q.Q.)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE
PLASTIC SEMISOLID, REQUIRES DRYING TO	MED MEDIUM	-	FINGERNA	AIL.			TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (1,5,) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
HANGE - WET - (W) ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PRO	DJECT		E SPACING	BEDDING TERM	HICKNESS -	TOPSOIL 11.52 - SOUR HEE SOILS OSCIALLY CONTINUED CHOMING MATTER.
PLL - PLASTIC LIMIT	I DRICE ONLYS: I HOVENCING TOURS:	HAMMER TYPE:	TERM VERY WIDE	SPACING MORE THAN 10 FEET		4 FEET	BENCH MARK: NCDOT Traverse Station Rebar & Cap Stamped -BL-343-
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	MOBILE B- DRAG BITS	X AUTOMATIC X MANUAL	WIDE	3 TO 10 FEET		5 - 4 FEET - 5 - 1.5 FEET -	Located at Station -BL- 187+06.29 ELEVATION: 377.85'
SL _ SHRINKAGE LIMIT		CORÉ SIZE:	MODERATELY CLOSE CLOSE	1 TO 3 FEET 0.16 TO 1 FEET	VERY THINLY BEDDED 0.0	3 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	BK-51 8* HOLLOW AUGERS	П-в	VERY CLOSE	LESS THAN 0.16 FEET	THINLY LAMINATED <	8 - 0.03 FEET 0.008 FEET	
PLASTICITY	CME-45C HARD FACED FINGER BITS				URATION		
PLASTICITY INDEX (PI) DRY STRENGTH	THING -CAPRIDE INSERTS	F(	OR SEDIMENTARY ROCKS,		ING OF THE MATERIAL BY CEMENTING, HEA	T, PRESSURE, ETC.	
NONPLASTIC         0-5         VERY LOW           LOW PLASTICITY         6-15         SLIGHT	CME-550x	н	FRIABLE		WITH FINGER FREES NUMEROUS GRAINS; BLOW BY HAMMER DISINTEGRATES SAMPLE.		
MED. PLASTICITY 16-25 MEDIUM	PORTABLE HOIST   TRICONE 2-7/8" STEEL TEETH	HAND TOOLS:  POST HOLE DIGGER	MODERATELY II	NOURATED GRAINS C	CAN BE SEPARATED FROM SAMPLE WITH ST		
20 07 1012	TDICONE TUNG CORR	HAND AUGER	Joenniee I	BREAKS E	EASILY WHEN HIT WITH HAMMER.		
COLOR	OTHER   CORE BIT	SOUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH STEEL TO BREAK WITH HAMMER.	PROBE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	☐ OTHER OTHER 3-1/4* H.S.A.	VANE SHEAR TEST	EXTREMELY INC	DURATED SHARP HA	AMMER BLOWS REQUIRED TO BREAK SAMPL	E;	
		OTHER		SAMPLE 8	BREAKS ACROSS GRAINS.		

STATE PROJECT NO. SHEET NO. TOTAL SHEETS 34431.1.1 2 16







		SCALE:	(V) I" = 5' (H) I" = 20'	APPROVED BY:	<b>.:</b>	AF
		DATE:	APRIL 2008	DRAWN BY:		T.
ŠŠ	RVICES NG	JOB NO.	105 1-08-045	SHEET 8	Ą	9

SHEET

PROJ	ECT N	O. 344	31.1.1		ID.	R-2	417C				cou	INTY	Lee				GEOLOGIST N		
SITE	DESCR	RIPTIO	N Brid	ge #1:	37 on	19FL	Y over	-LRev-	Sanford	d Byp	ass							GROUND	WTR (f
BORI	NG NO	. EB1-	·A		S	TATI	ON 20	)+34			OFF	SET 2	25ft LT			ALIGNM	ENT -19FLY-	0 HR.	15.0
COLL	AR EL	<b>EV.</b> 36	6.6 ft		T	OTA	L DEP	TH 44.6	3 ft		NOR	THING	612,6	84		EASTING	<b>3</b> 1,963,542	24 HR.	N/N
DRIL	L MACH	HINE (	CME-5	50	D	RILL	METH	IOD 3-	1/4" HS	A							HAMMER TY	PE Automatic	
STAF	T DAT	E 03/2	26/08		C	OMP	. DATE	03/26	6/08		SUR	FACE	WATER	R DEF	'TH	N/A	DEPTH TO R	OCK 38.0 ft	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT			BLOW	S PER I				SAMP.	lacksquare	L		SOIL AND ROCK D	ESCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25 1	50	······································	75 	100	NO.	MO	I G	ELEV. (ft)			DEPTH (
	370 _ - -	<u></u>															GROUND SU		0.
365	-					L			<u> </u>		•					_	Artificial F Medium Stiff	Brown	
	362.3 <sup>-</sup>	4.3				:	: : :		:   :			: : :				-	Fine to Coarse Silty CLA	·Υ	
000	- 002.0		4	3	5	]  ;	8	: : :				: : :	SS-1	24.3%		- 360.1	(A-7-5)		6.
360	-	‡				T					1.				X	-	Soft Brown Fine Sandy SI		
	357.3	9.3	2	2	2	<u> </u>		: : :			:	: : :	SS-2	22.0%		<del>-</del> -	(A-4) with Some		
355	-	‡	-	-	_	T	4				-					355.1	Loose Brown Silty		11.
	352.3	14.3				j.					:					-	(A-2-4) with Trace of		
050		‡	, 2	2	2	1   <b>•</b> •	4	: : :				: : :	1	-Sat	X.	-			17.
350	_	‡							-   -		-					<u> 349.6</u>	Alluviun		
	347.3	19.3	2	1	1		: : :	: : :			:	: :	SS-3	12.4%		-	Soft Brown Fine Sandy CL		
345	-	‡	-					ļ · · · ·			╁-					345.1	(A-6) with Little		21.
	342.3	24.3				:					1:	: : :				_	Residuu Very Stiff Brown Fin		
340		‡	10	11	13	] :		24			-	: : :		W		340.1	(A-4)		26.
340	-	‡				1			·   -		1.					-	Hard Gray-Green (A-4)	Clayey SILT	
	337.3	29.3	32	26	27	:		: : :	.     .		:			w		225.6			31.
335		‡			-	lŀ		1	- €53		<del> -</del> -	===			W	<u> 335.6</u>	Weathered		
	332.3	34.3				:	: : :	: : :			:	- : :			1/1	-	(Gray-Green Meta	3-311Stone)	
330		‡	100/0.4	<del>4</del>		:	: : :	: : :			:	100/0.4	1	W	10	-			
330	-	‡				-					1.				10	328.6	Non-Crystallin	e Bock	38.
	327.3	† 39.3 †	60/0.1			:	: : :					60/0.1	1	w		- ^	Medium Hard Gray-Gre	en Meta-Siltstone	€
325	_	‡				<u>                                   </u>		<u> </u>	-		+				3077	_324.6	Weathered	Rock	42.
	322.3	44.3		]	1.	:	: : :	: : :			.			w		322.0	(Gray-Green Meta	a-Siltstone)	44.
320	-	-	100/0.3	3   								100/0.3				_ В 	oring Terminated at El Weathered Rock: ( Meta-Siltst	Gray-Green	n
		Ŧ														_	1) Advanced 3-1/4" H	SA to 44.3 feet.	
315	-	‡														_	•		
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## NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 9 OF 16

Q.	プU	V.	BO	RE	LO	C	REF	POR	T										
PRO	JECT N	<b>O</b> . 344	431.1.	1	ID.	. [	R-2417C			COUN	TY	Lee					GEOLOGIST L. F	Raup	
SITE	DESCF	RIPTIO	<b>N</b> Brio	dge #1	37 on	19	FLY over	-LRev-	Sanford E	Bypass								GROUND W	/TR (ft)
BOR	ING NO	. EB1	-B		9	ST.	ATION 2	0+69		OFFSI	ET 2	21ft RT	-		ALIGI	NMEN	<b>T</b> -19FLY-	0 HR.	N/A
COL	LAR EL	EV. 35	59.0 ft			Ю	TAL DEP	TH 24.8	3 ft	NORTI	HING	612,	737		EAST	ING	1,963,565	24 HR.	N/A
DRIL	L MACI	HINE (	CME-4	5C	1	R	ILL MET	HOD Ro	tary Was	h w/2-7/8"	Tric	one&N	IW Cas	sing			HAMMER TYPE	Manual	
STAI	RT DAT	E 03/1	3/08		C	0	MP. DAT	E 03/13	/08	SURFA	ACE	WATE	R DEF	PTH	3.0ft		DEPTH TO ROO	K N/A	
ELEV (ft)	DRIVE ELEV	DEPTH	J	OW CC	T	4			S PER FO			SAMP	'. ▼/	16		5	OIL AND ROCK DES	CRIPTION	•
(11)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	+	0 :	25 .L	50 	75 l	100	NO.	MO	l G	ELEV. (ft)				EPTH (ft)
														-	.		WATER SURFACE (	03/13/08)	
	360 359.0	0.0													359.0		POND BOTTO	M	0.0
	-	-	WOH	WOH	WOH	•	woh · ·		-		-		Sat.		-		Artificial Fill: Very Loose Bro		
355	-	4.0					- : : :	: : :	-						355.5		Silty Fine to Coarse (A-2-4)		3.5
	354.4 <i>-</i>	- 4.6 -	4	3	2	1	5				-	SS-4	Sat.	000	<b>₹ \</b>	L	With of Trace Organi	c Matter	
	_	_						: : :			-		1	000	351.0		Alluvium: Loose Tan Silt	у	8.0
350	349.4	- 9.6			10			<u> </u>	·   · · ·						- 1		Fine to Coarse SA (A-1-b)		
	]		4	5	10		15				-		W		F 1		with Trace of CI Residuum:	ay	
345	-	[									-				F	Stiff to	Hard Gray-Green to SILT	Orange Clayey	
	344.3	14.7	17	19	15	$\ $		34			-		w		F		(A-4)		
	1	-						. [							341.0				18.0
340	339.3	- 19.7				H	*** * *				=		١.,,		_	(C	Weathered Roc Prange and Gray Meta		19.0
	1	-	80	20/0.1					:   : : :	. 100/	0.6		W		F		range and eray meta	-onisione)	
335		_					: : : :	: : :			-				F				
	334.3	24.7	60/0.1/			╀				60/	0.1		\w_	<i>F1/1</i>	334.2		oring Terminated with		24.8
330.	]	- - -															ation Test Refusal at E Non-Crystalline Rock Meta-Siltstone.	: Hard Gray	
	+	-													<u>.</u>	-	nced NW Casing to 9 temporary casing	a).	
325	1	-													- -	3) !	/anced 2-7/8" Tricone feet. ⊃ond water used as di	rillina fluid.	
320	1	-														4) Appr 5) I	oximate drilling fluid d No loss of drilling fluid	ensity 62.4 pcf. observed.	
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HEET 10 OF 16

PRO	JECT N	<b>IO</b> . 34	431.1.	.1	ID.	R-2	2417C			C	OUNTY	Lee			GEOLOGIS	T I Raun	
SITE	DESC	RIPTIC	N Bri	dge #1				r -LRev- :	Sanford F						JOLOLOGIS	GROUND V	NTD //
	ING NO				<del></del>		ION 2				FFSET	24ft I T			ALIGNMENT -19FLY-		
COL	LAR EL	<b>.EV</b> . 3	54.5 ft		T	ОТА	L DEF	PTH 40.5	ft		ORTHIN		798		EASTING 1,963,472	0 HR. 24 HR.	N/A
DRIL	L MAC	HINE	CME-4	45C	D	RILI	MET	HOD Ro	tarv Was					sina8	<u></u>	TYPE Manual	N/A
STA	RT DAT	<b>E</b> 03/	13/08					E 03/13/			URFACE		<del></del>			O ROCK 30.2 ft	
ELEV	DRIVE ELEV	DEPTH	BL	ow co	TAUC	П		BLOW	S PER FO			SAMP.	7	11	DET III	5 10 5 10 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25	50	75	100	NO.	МО	0 1 G	SOIL AND RO	CK DESCRIPTION	EPTH (ft
															WATER SUR	FACE (03/13/08)	
	360 _																
	-	<del> </del>													· •		
355	-														<u>.</u>		
000	354.5 <del>-</del>	- 0.0	WOH	WOH	WOH	•wo		T · · · ·	<del></del>	-		SS-5	56.2%			BOTTOM vium:	0.0
	-	-				T.	 ∆û				: : : :	33-3	150.2%		<ul> <li>Very Soft Brown</li> </ul>	vn Coarse Sandy CLAY	3.0
350	349.4-	- - 5.1				] <u> </u> _	• • •	ļ · · · ·	<u> </u>	-				7	- (A	-7-5) of Fine Sand	9.0
	-	-	1	1	1	<b>∳</b> ż		: : : :	:::	:			W		Very Soft Brown	Fine Sandy CLAY	6.1
345	1	<u>-</u>				<u> </u>					: : : :				346.0 With Trace of	7-5) Organic Matter	8.5
	344.4	- 10.1 -	30	32	32	-			j.	;			w			Tan-Brown Coarse SAND	
	1	-				:	: : :			-			,,,			2-4) Juum:	
340	339.3	15.2				  -			4	4				1	Hard Gray	and Orange / Silty CLAY	
	7	•	16	10	27	:		37	:::			SS-6	28.2%		(A-	7-6) f Coarse Sand	
335	I							: :  : :						1	With Hace o	Coarse Sand	
	334.3	20.2	29	41	59/0.4	·		· L :	<u> </u>				w		333.3		21.2
l	Ŧ					:				: [ :	100/0.9					ed Rock: a-Siltstone)	
330	329.3	25.2				ŀ			<del>                                     </del>				101		-	·	
	· I		60/0.2			:				: :	60/0.2		W				
325	224.2					:		: : : :		$\cdot \mid \cdot$							
-	324.3	30.2	60/0.1							.   .	- 60/0.1		W		324.3 Non-Crysta	lline Rock:	30.2
	1					:				:   :					Moderately I Moderate to Sli	lard to Hard ghtly Weathered	
320	+					<del> </del>			<del>                                     </del>	-					Gray Meta	a-Siltstone rately Close Fracture	35.6
	‡			-		:			: : :						Spa	cing rom 31.8 to 32.8 Feet	00.0
315	314.2	40.3				Ŀ			<u> </u>	·   ·					3 Joints at 10 2 joints at 40	to 20 Degrees	.
F	+		60/0.2			Ц			1		60/0.2	<u> </u>	w		314.0 Weathers (Soft to Me	ed Rock:	40.5
310	‡													E		v Severe Weathered	
010	‡			1										F	With Close to Model	ately Close Fracture	
	‡			l	ĺ									ļ	4 Joints at 4	l0 Degrees	
305	‡		1		ĺ									L	Boring Terminated at Weathered Rock: (	Medium Hard Gray	. ]
	Ŧ		l	1										þ	Meta-Sii	,	1
300	‡		1	. [									l	F	feet tempora	sing to 10.1 feet (8.5 ary casing).	
	‡				l									-	2) Advanced 2-7/8" T fee	t.	1
	Ŧ		.	. 1										þ	3) Advanced NWD4 Co 40.3 t	eet.	
295	‡													F	4) Pond Water Use 5) Approximate Drillir	d as Drilling Fluid. In Fluid Density 62 4	
	Ŧ	. [										***************************************		þ	pci 6) No Loss of Drillir	· -	
290	‡		l									1		F	,	5 5 5 5 5 7 6 G.	
	‡		-				,							F			
	‡	l												F			
285	‡													F			
	‡				l									F			
	+			- 1	1						1	1	1	L			

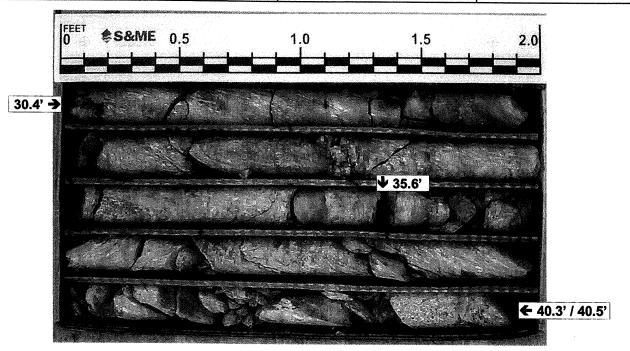
SHEET

2	<u>/ \</u>		<u> </u>	KEE	SUF	(IN	GRE	PU:	RI			
	JECT N					-24170				. 1	DUNTY Lee GEOLOGIST L. Raup	
SITE	DESC	RIPTIO	N Brid	dge #137	on 191	LY ov	er -LRev	- Sanf	ord By	/pas	S GROUND W	TR (ft)
BOR	RING NO	. B1-A	4		STA	TION	21+71			OI	FFSET 24ft LT ALIGNMENT -19FLY- 0 HR.	N/A
COL	LAR EL	<b>EV.</b> 3	54.5 ft		тот	AL DE	PTH 40	.5 ft		NC	ORTHING 612,798 EASTING 1,963,472 24 HR.	N/A
DRIL	L MACI	HINE (	CME-4	15C	DRII	L ME	THOD R	otary	Wash	w/2	-7/8" Tricone&NW Casing&NWD4 HAMMER TYPE Manual	<del></del>
STA	RT DAT	E 03/1	13/08		CON	IP. DA	TE 03/1	3/08		SI	JRFACE WATER DEPTH 7.5ft DEPTH TO ROCK 30.2 ft	
COR	E SIZE	NWD <sub>4</sub>	4				IN 9.9 ft			DF	RILLER M. Moseley	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STF REC. (ft) %	RQD (ft)	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	EPTH (ft)
	324.1 324.1	30.4	1.0		(5.5)	1					Begin Coring @ 30.4 ft	
320	319.1	35.4	5.0	3:30 2:30 2:30 2:30 3:30	(5.0) 100% (4.3)	(4.2) 84% (0.2)			(4.2) 81%		Non-Crystalline Rock:  Moderately Hard to Hard  Moderate to Slightly Weathered  Gray Meta-Slitstone  318.9  With Close to Moderately Close Executive Species	35.6
315	314.2	40.3		2:15 2:30 2:00 2:00/0.9	88%	4%		(4.1) 87%	N/A		Joints at 40 to 50 degrees(continued)  Weathered Rock:	
310	-	-		N=60/0.2						110	Severe to Moderately Severe Weathered Gray Meta-Siltstone With Close to Moderately Close Fracture Spacing) 4 Joints at 40 degrees	40.5
	-	-									Boring Terminated at Elevation 314.0 ft in Weathered Rock: (Medium Hard Gray Meta-Siltstone).	
305	-										1) Advanced NW Casing to 10.1 feet (8.5 feet temporary casing).  2) Advanced 2-7/8" Tricone Roller to 30.4 feet.  3) Advanced NWD4 Core Barrel from 30.4 to 40.3 feet.  4) Pond Water Used as Drilling Fluid.	
300	-	-									5) Approximate Drilling Fluid Density 62.4 pcf. 6) No Loss of Drilling Fluid Observed.	
295	-	- -									<u>-</u> <u>-</u>	
290	- - - - -	- - -									<u>-</u> <u>C</u> C	
285		•									- - - - -	
280		•						·			• •  -	
275	#	•									<del>-</del>	
270	‡	•									- - -	
265	‡ ‡										<del>-</del>	
260	† †	•									: : -	
255	1										· - -	
250	‡ †										· · ·	
245	<u></u>									ŀ	<del>-</del>	

**SHEET 11 of 16** 

#### **CORE PHOTOS**

Project No.: 1051-08-045	ID No.: R-2417C	Location: Lee Co., NC	Boring No.: B1-A
Site Description: Bridge No	o. 137 on -l9FLY- over -LRev	/- (Sanford Bypass)	Driller: M. Moseley
Collar Elev.: 354.5 ft.	Core Size: NWD4	Equipment: CME-45C	Geologist: L. Raup
Elev. at T.D.: 314.0 ft.	Total Depth: 40.5 ft.	Total Run: 9.9 ft.	Date: 3/13/2008



Box 1 of 1
Top of Box @ 30.4 feet; Bottom of Box @ 40.5 feet



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 12 OF 16

				431.1					-2417					**************************************			YTV	Le	e						0	EOLOGIS	<b>T</b> L. R	aup/S. Johr	nson
SITE	DES	CRIF	סודי	N Br	idge	#13	37 on	I9F	LY o	ver -	LRev	/- Sa	anfo	rd B	ypas	ss												GROUND	
BOR	ING 1	10.	B1-E	3			S	TA	TION	22	+01		**********		0	FFS	ET	20f	t RT			T	ALIC	SNME	ENT	-19FLY-		0 HR.	N/A
COL	LAR	ELE\	<b>/.</b> 3	56.8 f	t		Т	ОТ	AL D	EPT	<b>H</b> 37	7.8 f	t		N	ORT	HIN	G 6	512,8	348						963,490		24 HR.	N/A
DRIL	L MA	CHI	NE (	CME-	45C	;		RIL	L ME	THO	OD F	Rota	iry V	Vash							sina	l.			-, 		TYPE	Automatic	1 1/7
	RT DA								P. D/											R DE		5 21	F <del>t</del>	<del></del>	-	DEPTH TO			
ELEV	DRIV	ELD	EPTH	Т		COL		TT			BLO			FOC		J1(1	AGL		AMP.	V	71	J.21				DEPIRIO	ROCI	N/A	
(ft)	ELE (ft)	/ 10	(ft)	0.5ft		.5ft	0.5ft	0		25			50	00	75 		100		NO.	MC	O	E	LEV. (	ft)	SC	OIL AND ROC	K DESC		DEPTH (ft
																				V		T			V	VATER SURF	ACE (0:		DET TITUE
	360	1																				L					,		
	0.50	, ‡																				E							
355	356.	+	0.0	WOH	<del>I</del> w	он	WOH		NOH .	- T			Τ.		. T			+		w			56.8 55.8				OTTON	Λ	0.0 1.0
355	354.	3 + :	2.5	1	4	1	2	17.		$\exists$			+-		+									1		Very Soft G		Clay	T
		‡		'		'	2	1	13 		· · ·	 	:		-		: :			Sat.		L 35	51.8		V	Vith Trace of	Organic	Matter	5.0
350	240 1	; + ;	7 E							•	- ].		-		-	• •						F			ver	y Loose Gray (A-2		ie SAND	T 5.0
Ì	349.	<del>,</del>	7.5	18	+	7	17	11		-					.   .					w		F				Resid Hard Tan-Or		Gray	
		Ŧ								-		<u>``</u>	<del> </del>	: :	:   :		: :					F			1	Fine to Coars	e Sandy	SILT	
345	344.2	<u>,</u> ‡1	2.6					-	• • •	$\dashv$		• •	ļ.,	· <u>``</u>	-							L				A- with Trac	-4) e of Cla	у	
		7		26	3	3	65						:		:   :	`~		8 S	S-7	11.6%	· 🎆	Ė							
240		‡											:				: : [				-	34	1.2					***	15,6
340	339.2	<u>+ 1</u>			_				· · ·	$\pm$			-		+		$\dashv$			W		_			((	Weathere Gray-Green N			,
		+		100/0. 	.3					-		-	:			100	0/0.3			VV		_			•	,			
335		Ŧ								-			] :									_		•					
	334.2	+ 2		100/0.	]			-				-			١.	400	VO 2			w		<del></del>							
		‡			Ĭ								:	 	:	100					1	-							
30	200.0	Ι.					`	Ŀ		$\cdot$			•				.					-							
+	329.2	+ 2		100/0.:	_  3	l										100.	/0.3 <sup>+</sup>			W		-							
		Ŧ											-				. 1					-							
25	324.2	+ 32	2.6				.	<u> </u>		1		-	•	• • •	╽.	• •						-							
ľ		‡		100/0.	2			:		:	· · ·	:	•		:	100	/0.2 <b>•</b>			W		-							
		<u>†</u>						1:		:		:		. <b>.</b> .								•							
20	319.2	+ 37						-		-					+-		$\dot{\perp}$			101		- - 319	9.0			•			37.8
		1		60/0.2	7		,									60/	/0.2 <sup>—</sup>			VV		•	<del></del>	Bori	ng T We:	erminated at lathered Rock	Elevation	n 319.0 ft in	57.0
315		<u></u>																				•				Meta-Silt	stone).		
		İ					1														F			1) Adv	vanc	ced NW Casir	ng to 7.5	feet (6.1 feet	
		Ŧ					l																	2) A	dvar	temporary nced 2-7/8" Ti	ricone Ř	oller to 37.6	
310		Ŧ																				<del></del>		3)	Pon	feet od Water Use	d as Drill	ling Fluid.	
		‡									*													4) Á <sub>l</sub>	ppro	ximate Drillin pcf.	g Fluid D	Density 62.4	
305	;	‡																			E			5)	No I	oss of Drillin	g Fluid C	Observed.	
<u>55</u>		‡																			E	-							
		±																			F					•			
00		Ŧ								٠.											F								
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85		<b>†</b>																			F								
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PRO.	JECT N	O. 344	31.1.1	1	ID.	R-2417C			COUNTY	Lee			GEOLOGIST	L. Raup	
					 37 on	I9FLY ove	r -LRev- Saı	nford Byp	ass					GROUND W	/TR (ft
	NG NO					TATION 2			OFFSET	30ft LT			ALIGNMENT -19FLY-	0 HR.	N/A
	AR EL				T	OTAL DE	<b>TH</b> 32.8 ft		NORTHING	612,8	395		<b>EASTING</b> 1,963,388	24 HR.	N/A
	L MACI			5C	D	RILL MET	HOD Rotar	y Wash v	v/2-7/8" Tric	one&N\	W Cas	sing	HAMMER TY	'PE Manual	
	RT DAT						E 03/12/08		SURFACE				1.9ft DEPTH TO R	OCK N/A	
ELEV	DRIVE	DEPTH		ow co	UNT	П	BLOWS P	ER FOOT		SAMP.	<b>V</b> /	1 L	SOIL AND ROCK I	DESCRIPTION	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	<b>1</b>   0	25 5	0	75 100	NO.	MO	O G	ELEV. (ft)		EPTH (ft
											•		WATER SURFAC	CE (03/12/08)	
	360											] -			
		Ė											<u>-</u>		
	357.1	0.0	WOH	WOH	WOH	<del>                                     </del>			<del>   </del>	90.8	148.89		357.1 POND BO		0.0
355	354.4 <del>-</del>	2.7	VVOH	WOR	WOII	WOH · ·				33-0	140.07		Very Soft Brown Organic Silt	Moderately	
		<u> </u>	WOH	WOH	WOH	₩oh:					W		(A-7-5	5)	
		t				: : : :			: : : :				With Trace of Fine a Organic Conte		7.0
350	349.4	7.7	<u></u>		2	↓├ <del>─</del> ;			1			000	Loose Tan Fine to		
		F	5	4	2	<b>•</b> 6	1		: : : :		Sat.	000	(A-1-b with Trace	of Silt	
345		F					· · · ·		L			000	345.1		12.0
	344.4	<del>-</del> 12.7	57	43/0.3	1				100/0.8		w		Weathered (Orange Meta-		
		‡											341.1		16.0
340	339.4	17.7	1										Residuu Hard Orange C		
			6	11	29	] ::::	•40				W		(A-4)		
		‡					: :   -					5077	336.1 Weathered	Pock:	21.0
335	334.4	22.7	75	05/0.4		l <del> </del>	1				l w		(Tan to Gray Me		
		F	/5	25/0.1					100/0.6	1			<u>.</u>		
330		F											· •		
	329.4	<del>- 27.7</del>	60/0.2						60/0.2		W		<del>-</del>		
		‡											<u>-</u> -		
325	324.4 <i>-</i> -	327									١	W.	- 324.3		32.8
			60/0.1						60/0.1		<u> </u>	$\cap$	Boring Terminated Penetration Test Refusa	with Standard	
		ţ											ft on Non-Crystalline Meta-Silts	Rock: Hard Gray	
320	-	t				İ								*	
		ł											Advanced NW Casing temporary c	asing).	
315		-											2) Advanced 2-7/8" Tric Feet.		
	-	Ŧ					•				ĺ		<ul><li>3) Pond Water Used</li><li>4) Approximate Drilling</li></ul>	as Drilling Fluid. Fluid Density 62.4	
		Ŧ											pcf. 5) No Loss of Drilling		
310	-	‡											- 0) NO 2000 OI DIMING	Tidla Oboot vou.	
		‡											• <del>-</del>		
305		‡ .									İ		•		
JUU	-	‡											<del>-</del> -		
		‡											• •		
300		t							-				<u>.                                    </u>		
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295	-	Ŧ				:									
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200		‡									1		<del>.</del>		
290	-	‡								\$			-		
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NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 13 OF 16

PRO	JECT NO	<b>)</b> . 344	431.1.	1	ID.	R-2417C		COUNTY	Lee			GEOLOGIST L. R	aup/S. Johns	son
SITE	DESCR	IPTIO	N Bric	ige #1	37 on	19FLY over	-LRev- Sanford By	/pass					GROUND W	/TR (fi
BOR	ING NO.	EB2	-B		s	STATION 2	3+35	OFFSET	23ft RT			ALIGNMENT -19FLY-	0 HR.	N/A
COL	LAR ELI	EV. 35	58.6 ft		Т	OTAL DEP	<b>TH</b> 24.3 ft	NORTHING	612,9	955		<b>EASTING</b> 1,963,406	24 HR.	N/A
DRIL	L MACH	INE (	CME-4	5C	D	RILL METH	IOD Rotary Wash	w/2-7/8" Tric	one&N	W Cas	sing	HAMMER TYPE	Manual	
STA	RT DATE	03/1	2/08		С	OMP. DATE	€ 03/12/08	SURFACE	WATE	R DEF	TH:	3.4ft DEPTH TO ROC	K N/A	
ELEV	DRIVE ELEV	DEPTH		DW CC		<u> </u>	BLOWS PER FOO	ì	SAMP.	$\mathbf{V}$	L	SOIL AND ROCK DES	CRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 50 I I	75 100	NO.	MOI		ELEV. (ft)		EPTH (
											-	WATER SURFACE (C	03/12/08)	
	360													
	358.6	0.0	WOH	WOH	WOH	♠ ŵóн · ·		.	SS-9	Sat.	33	- 358.6 POND BOTTOI - Alluvium	***************************************	0
355												<ul> <li>Very Loose to Loose Gray</li> <li>Organic Silty Fine to Coa</li> </ul>	Moderately arse SAND	
	354.4	4.2	3	2	3	5				Sat.		(A-2-4) With Trace of Clay and W	ood Pieces	
												Organic Content =	6.2%	7.
350	349.4	9.2				<del>   </del>				]	7	Residuum: Very Stiff Orange C	narsa	
	‡		5	10	13	: : : : •	23		SS-10	31.5%		to Fine Sandy Silty	CLAY	
345	‡											- (A-7-5) - 345.6		13.
040	344.4	14.2	5	10	14					l w		− Very Stiff Gray Clayey - (A-4)	SILT	
i							24,			"		•		
340	339.4	19.2					· · · · · · · · ·					<b>-</b> 339.6		19.
			28	72/0.5				100/1.0		w		Weathered Rock Gray Meta-Siltsto		
	†							:::::				· · · · · · · · · · · · · · · · · · ·	110)	
335	334.4	24.2	60/0.1/					60/0.1	ļ	w		T334.3		24.3
	1		00/0.1					30/3.1			1 E	Boring Terminated with S Penetration Test Refusal at E	levation 334.3	
330	土											ft on Non-Crystalline Rock Meta-Siltstone.	: Hard Gray	
	$\overline{1}$											1) Advanced NW Casing to 9.	2 feet (4.3 feet	
	Ŧ											temporary casing 2) Advanced 2-7/8" Tricone	).	
325	1										-	_ Feet.		
	‡											Pond Water Used as Di     Approximate Drilling Fluid	Density 62.4	
320	‡		-									pcf. 5) No Loss of Drilling Fluid	Observed.	
20	+											<del>.</del>		
	‡						•							
15	#											-	•	
	‡													
	#													
10	+										-	-		
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	Ŧ										F	•		
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290	#													
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285	1	1	- 1	i	1			1	j	- 1	L			- 1
285	<u> </u>										E			

#### SUMMARY OF LABORATORY TEST DATA

#### Soil Classification and Gradation

S&ME Project #:	1051-08-045			Test Date(s):	3/28 - 4/2/2008
State Project No.:	34431.1.1	County: Lee	·	Report Date:	4/2/2008
Federal ID No.:	STP-NHF-421(2)	TIP No.:	R-2417C		
Project Name:	Bridge No. 137 on -I9Fl	LY- Over -LRev-			
Client Name:	NCDOT				
Client Address:	Raleigh, North Carolina				

		Sample	AASHTO		Total %	Passing			Т	otal Mort	ar Fractio	on				Organic	Moisture
Boring	Sample	Depth	Classification		Siev	/e #			Coarse	Fine			LL	PL	PI	Content	Content
No.	No.	(Feet)		10	40	60	200	270	Sand	Sand	Silt	Clay				%	%
EB1-A	SS-1	4.3	A-7-5 (12)	93	82	76	68	63	18	15	33	34	51	34	17	ND	24.3
EB1-A	SS-2	9.3	A-4 (1)	91	61	51	38	35	45	17	17	21	33	23	10	ND	22.0
EB1-A	SS-3	19.3	A-6 (2)	92	67	55	40	35	40	22	19	19	38	22	16	ND	12.4
EB1-B	SS-4	4.6	A-1-b (0)	89	42	30	19	16	66	16	10	8	14	13	1	ND	ND
B1-A	SS-5	0.0	A-7-5 (11)	98	87	83	78	76	16	6	34	44	44	31	13	ND	56.2
B1-A	SS-6	15.2	A-7-6 (12)	99	97	95	78	64	4	32	39	25	41	26	15	ND	28.2
B1-B	SS-7	12.6	A-4 (1)	100	61	54	43	37	46	18	. 30	6	39	31	8	ND	11.6
EB2-A	SS-8	0.0	A-7-5 (21)	100	98	97	94	91	3	6	41	50	54	37	17	13.3	148.8
EB2-B	SS-9	0.0	A-2-4 (0)	97	68	53	30	26	45	28	15	12	36	33	3	6.2	ND
EB2-B	SS-10	9.2	A-7-5 (18)	100	93	89	75	65	11	24	41	24	62	43	19	ND	31.5

Notes: ND=Not Determined, N.P.=Nonplastic

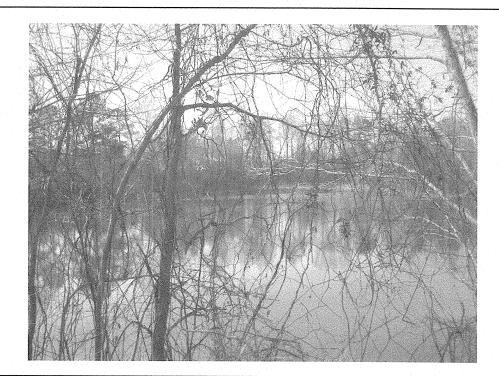
Technical Responsibility:

B. Riggs

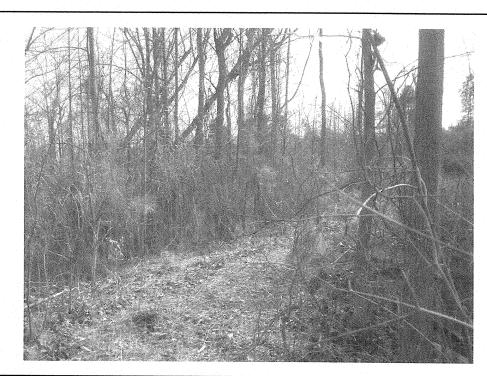
- 18hry

Geotechnical Engine

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Photograph No. 1: This photograph was taken from the south approach, along the -I9FLY- alignment, looking northwest.



Photograph No. 2: This photograph was taken from the right side of the -I9FLY- alignment, looking southwest, across proposed End Bent No. 1.



Photograph No. 3:
This photograph was taken from the left side of the -I9FLY- alignment, looking northeast, across proposed End Bent No. 1.



Photograph No. 4: This photograph was taken from the right side of the -I9FLY- alignment, looking south, across proposed Interior Bent No. 1.



Photograph No. 5:

This photograph was taken from the left side of the -I9FLY- alignment, looking north, across proposed Interior Bent No. 1.



#### Photograph No. 6:

This photograph was taken from the right side of the -I9FLY- alignment, looking south, across proposed End Bent No. 2.



#### Photograph No. 7:

This photograph was taken from the left side of the -I9FLY- alignment, looking north, across proposed End Bent No. 2.



#### Photograph No. 8:

This photograph was taken from the north approach, along the -I9FLY- alignment, looking southeast.