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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE	NO. <u>33048</u> .	1.1 (B-342)	1)	F.A. PROJ. BI	RSTP-1002(7)
COUNTYCABA	IRRUS				
PROJECT DESCRI	PTION				

***************************************			·····		
SITE DESCRIPTION	√ BRIDGE	0271 ON	SR 1002	(CABARRUS	AVENUE)
OVER NORFO	LK SOUTH	IERN RA	ILROAD	BETWEEN	
CORBAN AVE	NUE AND	POWDER	STREE	Γ.	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33048.1.1 (B-3421)	1	14

CAUTION NOTICE

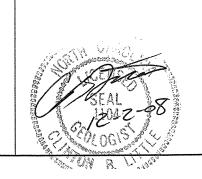
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1919 250-4088, NETTHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FELD BORNING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

CEMERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A CECTECHRICAL INTERPRETATION OF ALL AVAILABLE SUBSUBFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORRHOLE. THE LABORATORY SAMPLE DATA AND THE IN STIL (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DESCREE OF RELIBBILITY INNERENT IN THE STAMDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOSTUME CONDITIONS MODICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL MONSTUME CONDITIONS AND VARY CONSIDERABLY WITH TIME ACCORPING TO CLIMATIC COMDITIONS 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 WID 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 DESIGN WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE COPPARTMENT 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 NECESSARY TO SATISFY HUMBELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAMP FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY BEASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THIS COLUMN.

J. K. STICKNEY
C. L. SMITH
M. D. MAULDIN
INVESTIGATED BY J. E. BEVERLY
CHECKED BY C. B. LITTLE
SUBMITTED BY C. B. LITTLE
DATE NOVEMBER, 2008
VAIL

PERSONNEL



PROJECT REFERENCE NO. SHEET NO. 33048.I.I (B-342I)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

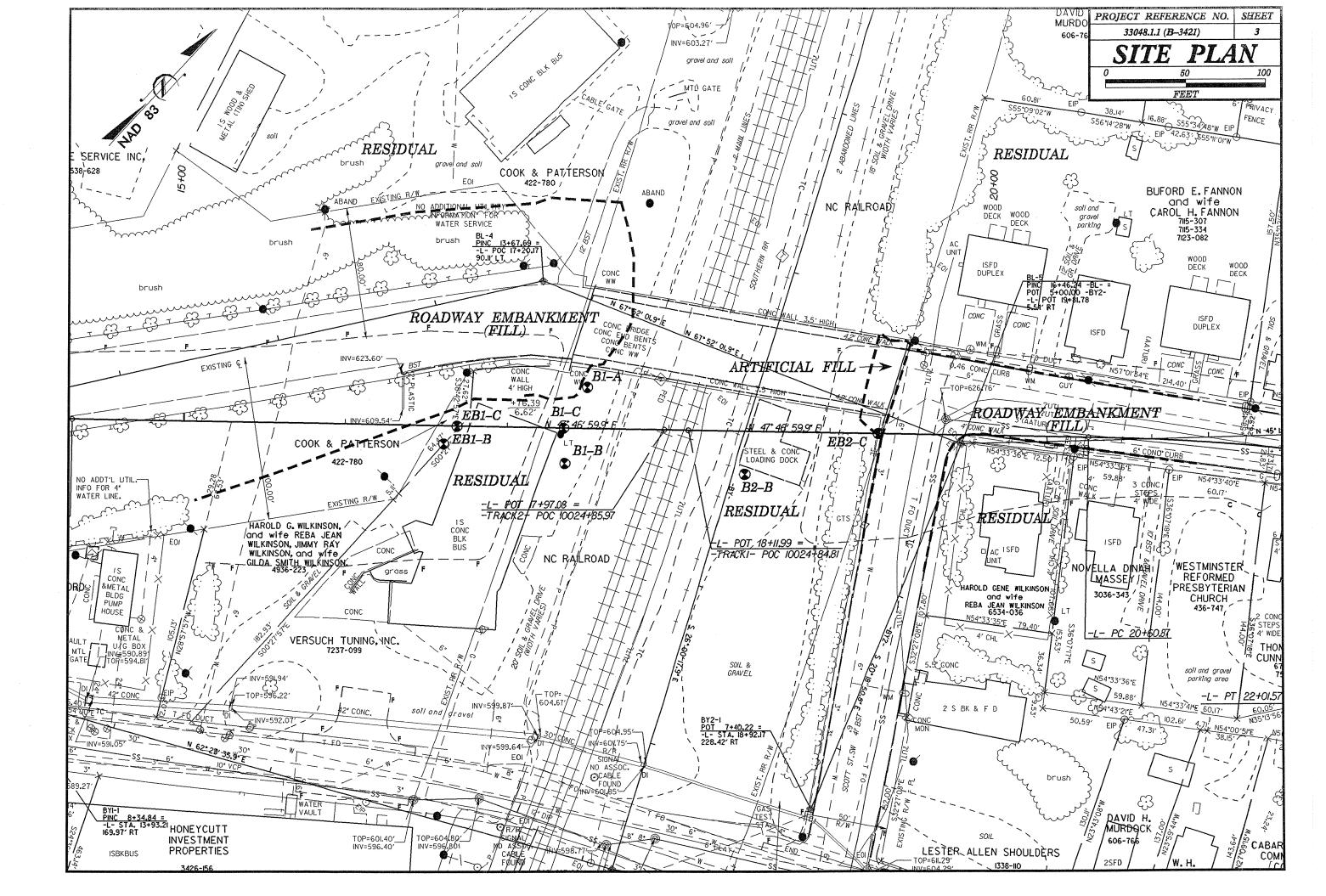
DIVISION OF HIGHWAYS

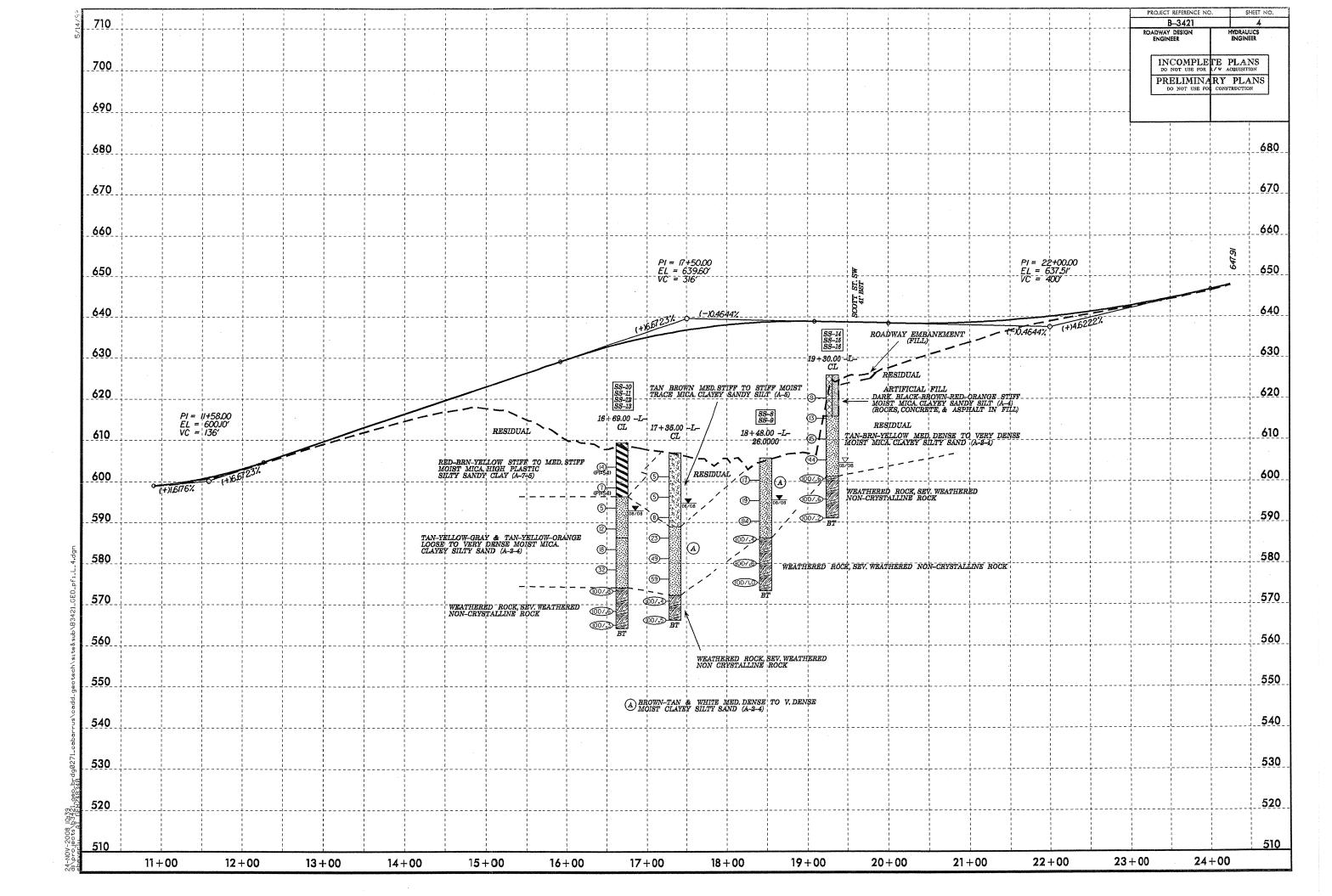
GEOTECHNICAL ENGINEERING UNIT

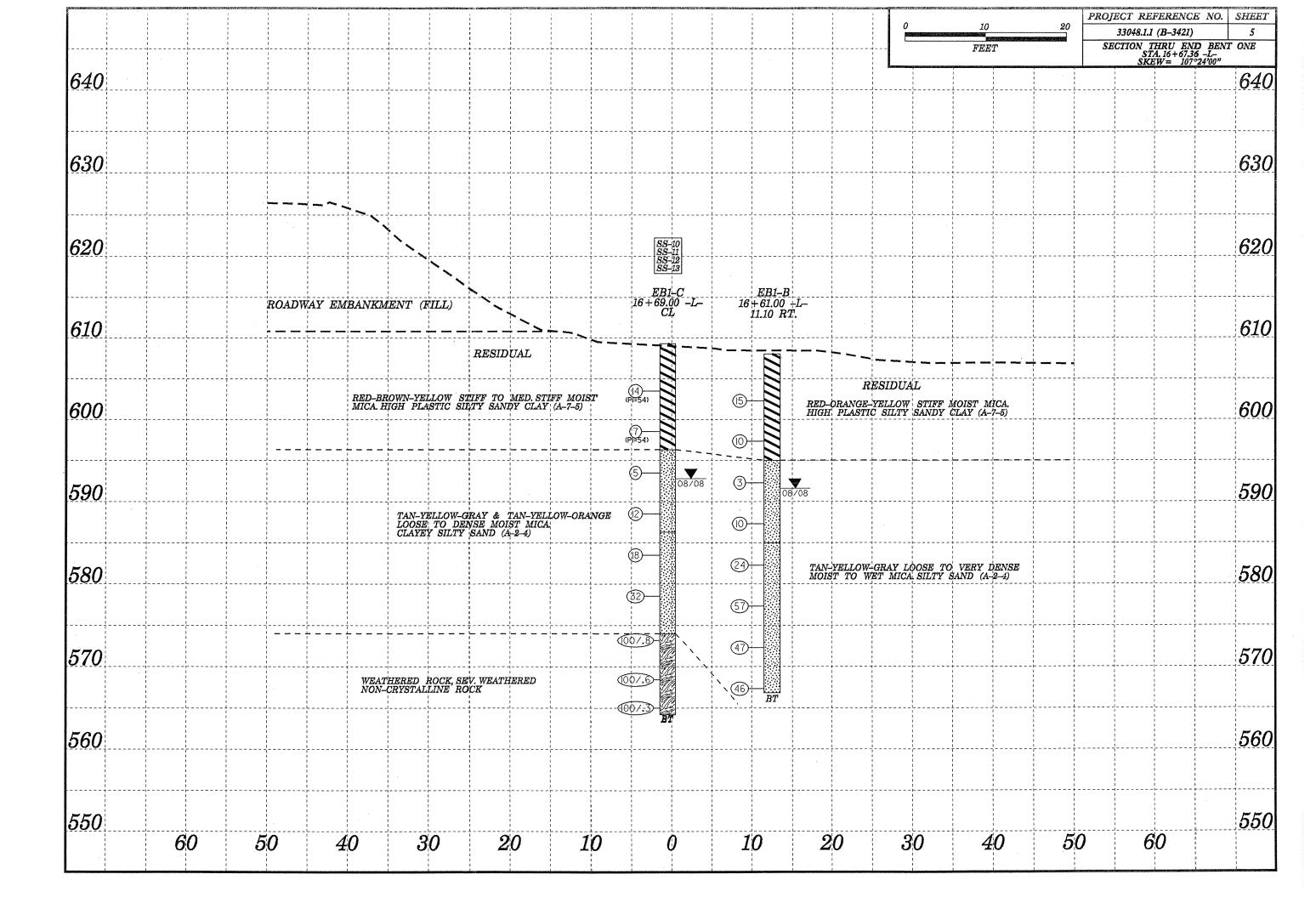
SUBSURFACE INVESTIGATION

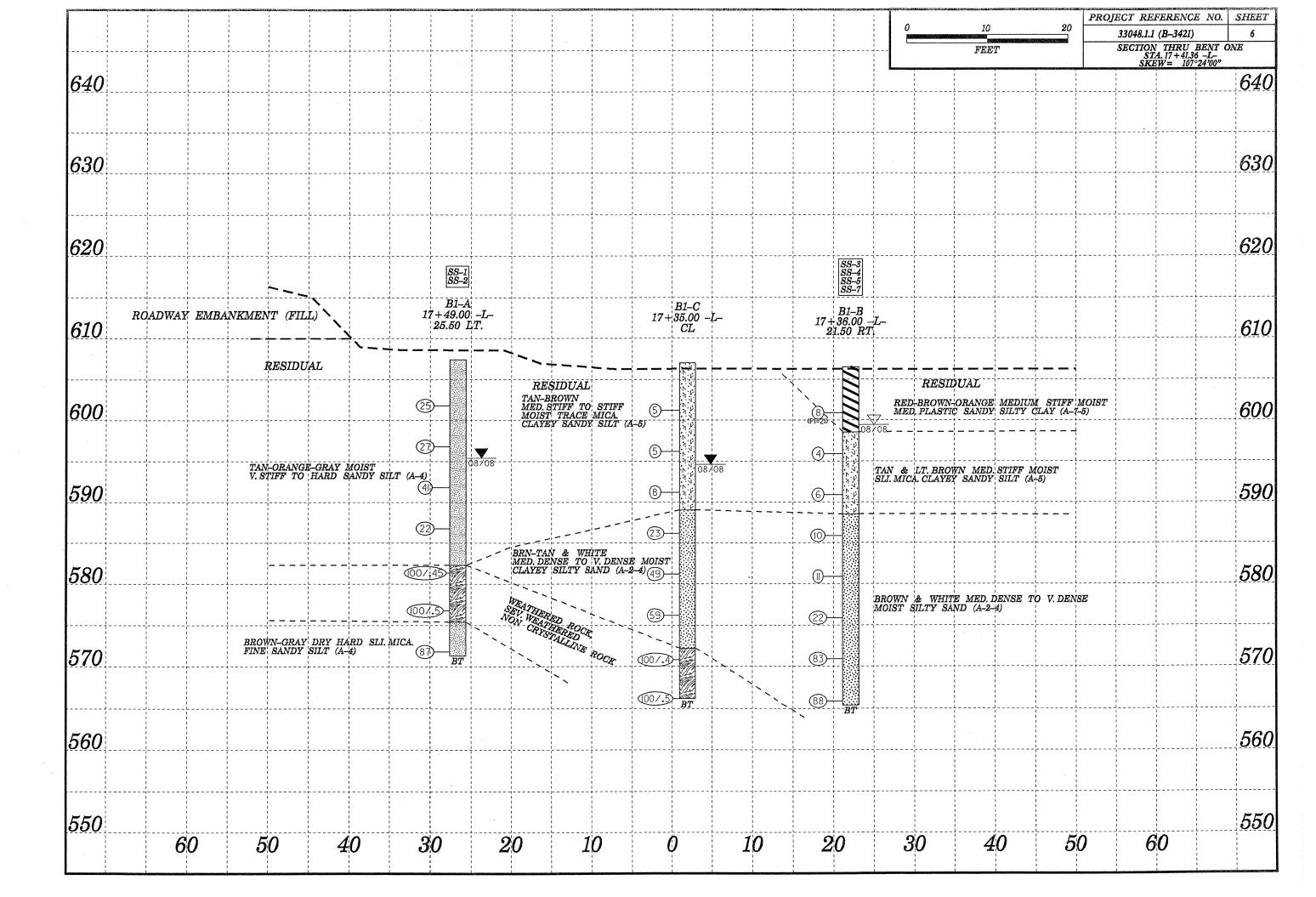
SOIL AND ROCK LEGEND TERMS SYMBOLS AND ABBREVIATIONS

		LEGEND, TERMS,	, SIMBOLS,				TERMS AND DEEDWITTONS
SOIL DESCRIPTION	GRADATION WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM	FINE TO COARSE.	HARD ROCK IS NON-		DESCRIPTION AT IF TESTED, WOULD YIELD SPT REFUS	SAL. AN INFERRED	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	UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAM POORLY GRADED)	1E SIZE. (ALSO	ROCK LINE INDICATE	S THE LEVEL AT WHICH NON-0	COASTAL PLAIN MATERIAL WOULD YIEL SAMPLER EQUAL TO OR LESS THAN 0	D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFER - A WATER BEARING FORMATION OR STRATA.
100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE	SIZES.		AIN MATERIAL, THE TRANSITION	ON BETWEEN SOIL AND ROCK IS OFTEN		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:	ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERM	ISI ANGULAR.		E TYPICALLY DIVIDED AS FOLI	LOWS:		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAID LAYERS, HIGHLY PLASTIC, A-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.	1	WEATHERED ROCK (WR)	NON-COASTAL PI BLOWS PER FOO	LAIN MATERIAL THAT WOULD YIELD SP	PT N VALUES > 100	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		CRYSTALL INF	FINE TO COARSE	E GRAIN IGNEOUS AND METAMORPHIC RE		AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	IN DESCRIPTIONS	CRYSTALLINE ROCK (CR)	GNEISS, GABBRO,			CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	<u> </u>	NON-CRYSTALLINE		E GRAIN METAMORPHIC AND NON-CDASTA DCK THAT WOULD YEILD SPT REFUSAL	IF TESTED, BOCK TYPE	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-7-6 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS MODERATELY COMPRESSIBLE LIQUID LIMIT EQUA	S THAN 31	ROCK (NCR) COASTAL PLAIN	INCLUDES PHYLL	LITE, SLATE, SANDSTONE, ETC. SEDIMENTS CEMENTED INTO ROCK, BUT		OF SLOPE.
SYMBOL 000000000000000000000000000000000000	HIGHLY COMPRESSIBLE LIQUID LIMIT GREA	ATER THAN 50 S	SEDIMENTARY ROCK		ROCK TYPE INCLUDES LIMESTONE, SANDS		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.
7. PASSING SILT- MUCK, GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SILT - CLAY				ATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
* 40 30 MX 50 MX 51 MN SILS SOILS SOILS SOILS SOILS	UNDANIC MATERIAL SOILS SOILS OTHE	ER MATERIAL F			DINTS MAY SHOW SLIGHT STAINING, RO		DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
I TOUTO J THAT	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE	1 - 10% 10 - 20%		IF CRYSTALLINE.	NED, SOME JOINTS MAY SHOW THIN CLA		HORIZONTAL.
LIDURU LIMIT 48 MX 41 MN 50 ILS WITH PLASTIC INDEX 6 MX NP 18 MX 11 MN 11 MN 11 MN 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SDME HIGHLY ORGANIC >10% >20% HIGHLY		V SLIJ CRYSTAL	S ON A BROKEN SPECIMEN FAC	CE SHINE BRIGHTLY. ROCK RINGS UNDE		DIP_DIRECTION_ODE_AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 6 6 6 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANIC	GROUND WATER			YGTALLINE NATURE. NFRALLY FRESH JOINTS STAIN	NED AND DISCOLORATION EXTENDS INTO	O ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILL		(SLI.) 1 INCH. (DPEN JOINTS MAY CONTAIN CL	AY. IN GRANITOID ROCKS SOME OCCASI	IONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS				. CRYSTALLINE ROCKS RING UNDER HAN DISCOLORATION AND WEATHERING EFF		FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR DRIGINAL POSITION AND DISLODGED FROM
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING ST	1	(MOD.) GRANITO:		RE DULL AND DISCOLORED, SOME SHOW ND SHOWS SIGNIFICANT LOSS OF STREM		PARENT MATERIAL.
SUBGRADE	SPRING OR SEEP		WITH FR	ESH ROCK.			FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS				D OR STAINED. IN GRANITOID ROCKS, AL DW KAOLINIZATION. ROCK SHOWS SEVER		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SPT OFT ONT TEST BORING FOR THE SOIL DESCRIPTION		MOD, SEV.) AND CAN		OGIST'S PICK. ROCK GIVES "CLUNK" SOU		THE FIELD.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT2)	WITH SOIL DESCRIPTION VST PHT LEST BURING	DESIGNATIONS S - BULK SAMPLE			* D OR STAINED, ROCK FABRIC CLEAR AN	D EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LODSE 44 TO 10	SOIL SYMBOL AUGER BORING		SEV.) IN STRE		ANITOID ROCKS ALL FELDSPARS ARE K		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER	SAMPLE		ED, YIELDS SPT N VALUES > 1			LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50	THAN ROADWAY EMBANKMENT - CORE BORING	OI OILLOI IODL			D OR STAINED. ROCK FABRIC ELEMENTS TO SOIL STATUS. WITH ONLY FRAGMENT:		MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT <2 <0.25	INFERRED SOIL BOUNDARY MONITORING WELL	SAMPLE (N	REMAININ	G. SAPROLITE IS AN EXAMPLE	DF ROCK WEATHERED TO A DEGREE S RIC REMAIN. <i>IF TESTED YIELDS SPT</i>	SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY	INFERRED ROCK LINE . A PIEZOMETER	1			NOT DISCERNIBLE, OR DISCERNIBLE ON		RESIDUAL (RES,) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	ALLUVIAL SOIL BOUNDARY INSTALLATION	SAMPLE	SCATTER	ED CONCENTRATIONS. QUARTZ I	MAY BE PRESENT AS DIKES OR STRING		ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
HARD >30 >4	25/825 DIP & DIP DIRECTION OF SLOPE INDICATOR INSTALLATION	CBR ~ CALIFORNIA BEARING	ALSU AN	EXAMPLE,	HARDNESS		ROCK SEGMENTS EQUAL TO OR CREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES — SPT N-VALUE	RATIO SAMPLE	VERY HARD CANNOT		SHARP PICK, BREAKING OF HAND SPEC	IMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SOUNDING ROD REF SPT REFUSAL		SEVERA	L HARD BLOWS OF THE GEOLOG	GIST'S PICK.		PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
COARGE FINE	ABBREVIATIONS			SCRATCHED BY KNIFE OR PIC ACH HAND SPECIMEN.	K ONLY WITH DIFFICULTY. HARD HAMM	ER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER	AR - AUGER REFUSAL HI HIGHLY BT - BORING TERMINATED MED MEDIUM				CK. GOUGES OR GROOVES TO 0.25 INCH		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	CL CLAY MICA MICACEOUS CPT - CONE PENETRATION TEST MOD MODERATELY	VST - VANE SHEAR TEST WEA WEATHERED	BY MOD	ERATE BLOWS.	OLOGIST'S PICK. HAND SPECIMENS CAN		SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	CSE CDARSE NP - NON PLASTIC DMT - DILATOMETER TEST ORG ORGANIC	7 - UNIT WEIGHT			ICHES DEEP BY FIRM PRESSURE OF KN TO PEICES I INCH MAXIMUM SIZE BY R		A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE COURSE TO SEE THE PROPERTY OF THE PRO	DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST	/d Sin 6/11 //226/1/	POINT (DF A GEOLOGIST'S PICK.			A 2 INCH DUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	F - FINE SD SAND, SANDY		FROM C	CHIPS TO SEVERAL INCHES IN	BY KNIFE OR PICK. CAN BE EXCAVATE SIZE BY MODERATE BLOWS OF A PICK	POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIDUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	FOSS FOSSILIFEROUS SL SILT, SILTY FRAC FRACTURED, FRACTURES SLI SLIGHTLY			CAN BE BROKEN BY FINGER P	PRESSURE. EXCAVATED READILY WITH POINT OF F	PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY
LL LIOUID LIMIT	FRAGS FRAGMENTS TCR - TRICONE REFUSAL		SOFT OR MOR	E IN THICKNESS CAN BE BROK	EN BY FINGER PRESSURE, CAN BE SCR	RATCHED READILY 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.
RANGE < - WET - (W) SEMISULID REDUIRES DRYING (U	EQUIPMENT USED ON SUBJECT PROJ	JECT		RE SPACING	BEDDING)	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT HITHIN OF THOM MUISTURE	DRILL UNITS: ADVANCING TOOLS: HA	AMMER TYPE:	TERM	SPACING	<u>TERM</u>	THICKNESS > 4 FEET	BENCH MARK: #2 IS A R.R. SPIKE SET I'UP FROM BASE OF POWER POLE
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		AUTOMATIC MANUAL	VERY WIDE WIDE	MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED THICKLY BEDDED	1.5 - 4 FEET	303.4' RIGHT OF -BL- STA. 12+33.80 ELEV. 603.7 NAVD 88 ELEVATION: 603.7 FT.
SL SHRINKAGE LIMIT	- L MUBILE B	005 0175	MODERATELY CLOSE		VERY THINLY BEDDED	0.16 - 1.5 FEET 0.03 - 0.16 FEET	
REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		ORE SIZE:	CLOSE VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED THINLY LAMINATED	0.008 - 0.03 FEET < 0.008 FEET	NOTES:
PLASTICITY	-1 -	3		IND	URATION		
PLASTICITY INDEX (PI) DRY STRENGTH			OR SEDIMENTARY ROCK	S. INDURATION IS THE HARDEN	ING OF THE MATERIAL BY CEMENTING,	HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	X CME-550	-н	FRIABLE		WITH FINGER FREES NUMEROUS GRAIN BLOW BY HAMMER DISINTEGRATES SAM		
MED. PLASTICITY 16-25 MEDIUM	PORTABLE HOIST TRICONE STEEL TEETH	HAND TOOLS: POST HOLE DIGGER	**************************************	004410	CAN BE SEPARATED FROM SAMPLE WIT		
HIGH PLASTICITY 26 OR MORE HIGH	TRICONE TUNGCARB.	HAND AUGER	MODERATELY		EASILY WHEN HIT WITH HAMMER.		
COLOR	CORE BIT	SDUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH ST LT TO BREAK WITH HAMMER.	TEEL 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 1		LI IU BREAK WITH HAMMER. HAMMER BLOWS REQUIRED TO BREAK SA	AMPLE;	
					BREAKS ACROSS GRAINS.		
							PEVICED 02/23/04

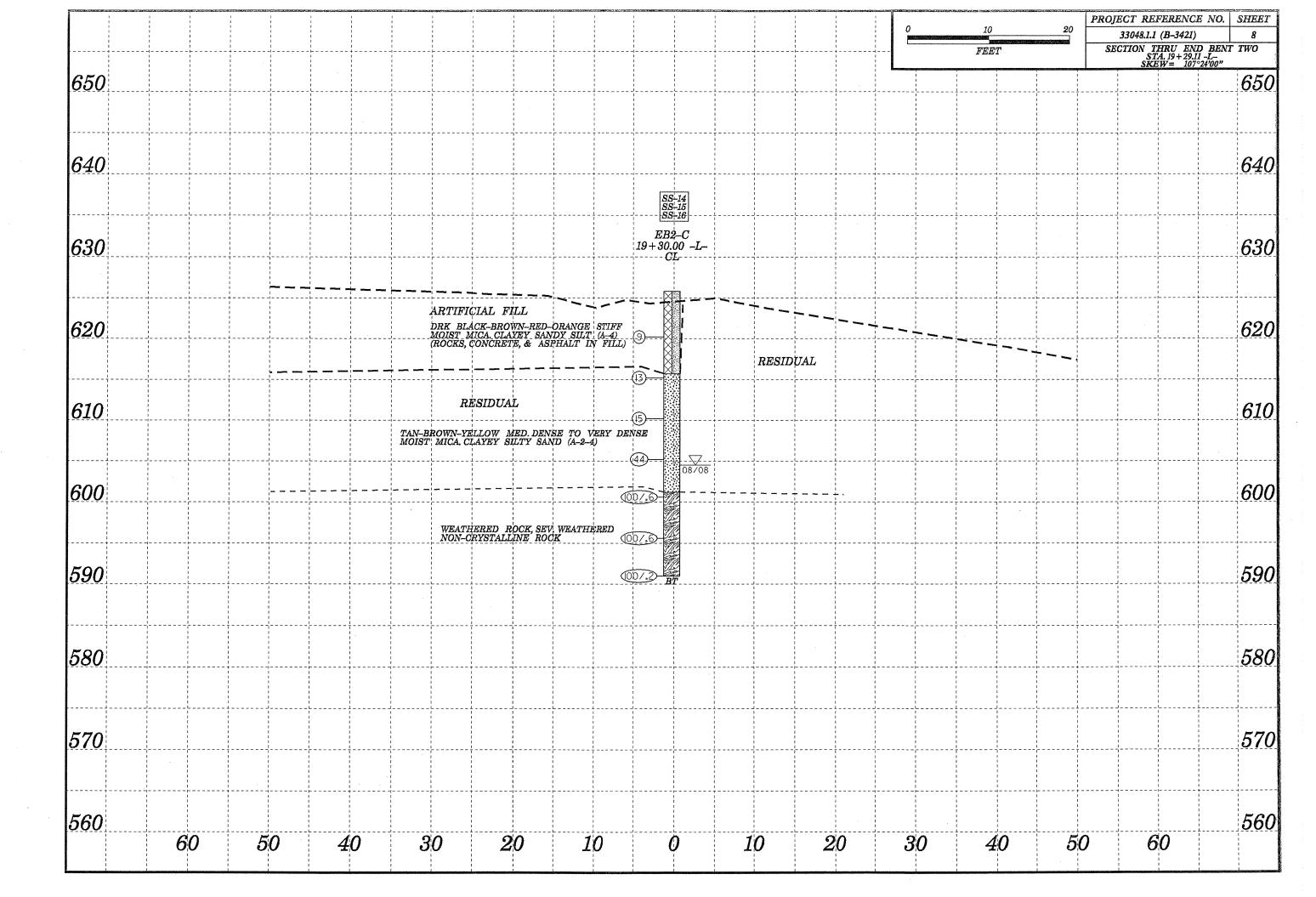








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640												: :	SREW = 107°	640
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														200
630										 				630
620												! ! ! !		620
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1												 + 		
610								- 	18+	B2-B 48.00 -L- 5.00 RT.				610
600														600
					RES	IDUAL			17-		RESIDUAL			
								t	19-	08708 TAN-E	BROWN & WHITE MED. DE	ì		
<i>590</i>									94	11:1:11	SILTY SAND (A-2-4)			590
 									(00/.4					
<i>580</i>												 		580
000									100/.8	WEAT NON-	HERED ROCK, SEV. WEATHE CRYSTALLINE ROCK	ERED		000
								; 1 1 	(00/1.0	BT		: : : :		
<i>570</i>										BT				570
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700							.d						J	F.C.C
560								 				i 		560
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<i>550</i>												; ; ; ;		550
	60	50	40	30	20	10	0	10	20	30	40	<i>50</i>	60	1





SHEET **BORELOG REPORT** GEOLOGIST Stickney, J. K. **COUNTY CABARRUS** PROJECT NO. B3421 ID. 33048.1.1 GROUND WTR (ft) SITE DESCRIPTION BRIDGE OVER NORFOLK SOUTHERN RR ON SR 1002 ALIGNMENT -L-OFFSET 11ft RT 0 HR. 15.6 BORING NO. EB1-B STATION 16+61 16.4 COLLAR ELEV. 608.0 ft TOTAL DEPTH 41.2 ft **NORTHING** 605,072 **EASTING** 1,525,755 24 HR. HAMMER TYPE Automatic DRILL MACHINE CME-550X DRILL METHOD NW Casing w/ Advancer START DATE 08/22/08 COMP. DATE 08/22/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A ELEV CHI DEPTH (ft) SAMP. **BLOW COUNT BLOWS PER FOOT** NO. MOI G SOIL AND ROCK DESCRIPTION 0.5ft 0.5ft 0.5ft 75 25 100 ELEV. (ft) 610 **GROUND SURFACE** RESIDUAL RED ORANGE YELLOW STIFF MOIST MICA. HIGH PLASTIC SILTY SANDY CLAY (A-7-5) 605 M 600 598.3 4 M 595 RESIDUAL
TAN YELLOW GRAY LOOSE TO MED.
DENSE MOIST TO WET MICA. SILTY
SAND (A-2-4) 593.3 + 14.7 -₩ ₩3... 590 588.3 1 19.7 W 585 RESIDUAL 583.3 7 24.7 TAN YELLOW GRAY MED. DENSE TO VERY DENSE MOIST MICA. SILTY SAND M . (A-2-4) 580 5783 1 M **9**57 575 573.3 16 10 M 570 568.3 + 39.7 20 26 M 566.8 Boring Terminated at Elevation 566.8 ft TAN YELLOW GRAY DENSE SILTY SAND 565 (A-2-4) 560 555 550 545 540 535

NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

DBO	JECT N			A A AMERICA			3048.1.1	OI VI	COL	INITY	CABAR	RIIS		GEOLOGIST St	ickney I K
	·			IDGE				SOUTHERN RR C	L		CABAIN			GEOLOGIST St	GROUND WTR (ft)
	INGNO						ATION 16	***************************************		SET	<u></u>	·····		ALIGNMENT -L-	0 HR. 14.9
	LARELI						TAL DEPTI				605,0	85		EASTING 1,525,753	24 HR. 16.5
	L MACH							DD NW Casing w	<u> </u>					HAMMER TYPE	i
	RT DATI						VIP. DATE				WATER	DED	TLI N		
	DRIVE	1		ow co		TT	VIP. DATE	BLOWS PER FOOT	<u> </u>	KFACE	SAMP.	DEP	1	/A DEPTH TO KO	CK N/A
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft			-	0 25		75	100	NO.	/	0	SOIL AND ROCK DE	SCRIPTION DEPTH (ft)
	(11)	 	10.011	10.01	10.01	+					110.	/MO	G	ELEV. (ft)	DEPTH (II)
040															
610	-	<u> </u>	ļ	ļ	ļ	$\!$	1 1				<u> </u>			609.3 GROUND SUR	FACE
		‡					: : [: : :]		1:	: : :				RED BROWN YELLOW S	STIFF TO MED.
605	604.5	4.8					[]		.					STIFF MOIST MICA. HIGH SILTY SANDY CLA	
		4.0	3	6	8	11	6 14		1:	: : :	SS-10	М			
		ł					: /::		:						
600	599.5	9.8	<u> </u>	<u> </u>	<u> </u>	┧┝			 					-	
	-	Ŧ	2	3	4		9 7		:			M			
595		F							:	: : :				596.3 RESIDUAL	13.0
	594.5	14.8	1	2	3	$\dagger \dagger$	5		-		SS-11	TIMP	 	TAN YELLOW GRAY LO DENSE MOIST MICA. C	OSE TO MED.
		ļ.					1		:					SAND (A-2-	
590	589.5 -	19.8] -	./		<u> </u>						
	-	<u> </u>	3	5	7		1 2		:	: : :	SS-12	M			
585	-	-	ļ				1.1.		:	: : :				586.3 RESIDUAL	23.0
303	584.5	24.8	4	7	11	\mathbf{H}	- t		+-		SS-13	M		TAN YELLOW GRAY ME	ED. DENSE TO
	-	-							:	: : :	30-13	101		DENSE MOIST MICA. SIL	1 1 SAND (A-2-4)
580	579.5 -	29.8)	····	<u> </u>						
ľ	-		2	11	21			32	1:	: ::		М			
	-	<u> </u>							1:						
575	574.5	34.8	27	57	43/.3	$\ \cdot\ $								574.0	35.3
ĺ	.]	-	21	"	407.0		::::		1:	100/.8		M		WEATHERED F SEV. WEATHERED NON-	
570	569.5 -	- 20.0												ROCK	
Ī	208.5	09.0	40	53	47/.1	11			-	. 100/.6		M			
	}	_													
565	565.3	44.0	100/.3			l				100/.3		M		564.2	45.1
1	Ŧ	-											F	Boring Terminated at Eleva SEV. WEATHERED NON-	ation 564.2 ft IN -CRYSTALLINE
560	7	-											F	ROCK	
	7	-											F		
	‡	-						•							
555	‡	-													
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530													ŀ		

SHEET BORELOG REPORT **COUNTY CABARRUS** GEOLOGIST Stickney, J. K. ID. 33048.1.1 PROJECT NO. B3421 GROUND WTR (ft) SITE DESCRIPTION BRIDGE OVER NORFOLK SOUTHERN RR ON SR 1002 OFFSET 26ft LT ALIGNMENT -L-0 HR. 11.4 STATION 17+49 BORING NO. B1-A 12.0 COLLAR ELEV. 607.4 ft TOTAL DEPTH 36.1 ft **NORTHING** 605.158 **EASTING** 1,525,795 24 HR. HAMMER TYPE Automatic DRILL MACHINE CME-550X DRILL METHOD NW Casing w/ Advancer **START DATE** 08/14/08 **COMP. DATE** 08/14/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A DRIVE DEPTH BLOW COUNT SAMP. **BLOWS PER FOOT** MOI G SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft (ft) 50 NO. 100 (ft) 610 **GROUND SURFACE** 607.4 RESIDUAL
TAN-ORANGE-GRAY MOIST V. STIFF TO
HARD SANDY SILT (A-4) 605 602.8 SS-1 M 600 597.8 595 592.8 14.6 M 590 587.8 - 19.6 11 11 M 585 M 51 582.8 - 24.6 45 55/.45 WEATHERED ROCK · 100/.45 SEV. WEATHERED NON CRYSTALLINE 580 ROCK ... 577.8 29.6 18 41 59/.5 575 RESIDUAL BROWN-GRAY DRY HARD SLI. MICA. FINE SANDY SILT (A-4) 572.8 - 34.6 42 SS-2 D Boring Terminated at Elevation 571.3 ft IN DRY HARD SANDY SILT (A-4) 570 565 560 555 550 545 540 535

NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

	IECT NO					. 330		Nihanda rakalikalpa saaka sa jarga j		<u> </u>		CABAR	RUS			GEOLOGIST Sti		
				IDGE					ERN RR C	r				Western belongstern en en en	-T		GROUND	-
	NG NO.						ION 1	···		 		22ft RT			ALIGNMEN		0 HR.	7
	AR ELE							Γ H 41.11		L		605,1	14		EASTING		24 HR.	
	MACH			550X					Casing w							HAMMER TYPE		
	DRIVE			ow co		COMP	, DATE	08/14/0	PER FOOT	l	FACE	SAMP.	DEP	TH N	1/A	DEPTH TO ROC	K N/A	
(ft)	ELEV (ft)	DEPTH (ft)	0.5ft			ft 0	2		50 	75 1	100	NO.	MO	0	ELEV. (ft)	SOIL AND ROCK DES	CRIPTION	DEPTH
310	_	_																
305	-	-				-	I	T	T	T			-		- 606.5	GROUND SURF	ACE	
	7	-					 		T	+					RED MO	BROWN ORANGE N IST MED. PLASTIC (F	IEDIUM STIFF I=21) SANDY	•
-	601.9	4.6	1	3	5	_ :	i:::		: : : :		: : :				· · · · · · · · · · · · · · · · · · ·	SILTY CLAY (A-		
300	1	-	'	3	5		8 · ·		 	<u> • · · · · · · · · · · · · · · · · · · </u>		SS-3	M					
	596.9	- - 9.6							: : : :	1	: : :			11	598.5	RESIDUAL		
595		-	1	1	3	16	4 · · ·	: : : :	: : : :	:	: : :	SS-4	М			I & LT. BROWN MED. MICA. CLAYEY SAN		
	7	- -								1					- ·		, ,	
-	591.9	14.6	2	2	4	- 1		: : : :		: :				133	•			
90	\pm	- -	_	-	,	1	96	· · · ·	<u> </u>				M	133	-			
	586.9	. 19.6					<u>.</u>							M	588.5	RESIDUAL	251.05 70.1	
85	1		3	4	6	7 L	\$ 10 ·		:	: :		SS-5	М			OWN & WHITE MED. ENSE MOIST SILTY S		
	1] : :								-			
<u>,</u>	581.9	24.6	2	4	7	- :	1						м					
80	+	-				-	.\.		 	+-			'''		-			
L	576.9	29.6	<u> </u>		<u> </u>]	: '\;			: :	::							
75	#	· •	3	8	14	11:	• • 🔑	22 · · · ·	• • • •				М		_			
	571.9	34.6				:			 - :	::								
70	7/13	J4.6	8	32	51	:	: : :		: : ` : ` :	-	33	SS-7	М					
	‡	•								1.					-			
	566.9	39.6	19	29	59	- :			: : : :	1	1::		R.J					
65	$= \pm$					 	1		L	1 -	\$ 88·		М.	畔	565.4 Boring	Terminated at Elevati	on 565.4 ft IN	V. 4
	Ī														DĒ	ENSE MOIST SILTY S	AND (A-2-4)	
30	+													E	-			
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55	‡																	
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PROJEC					D. 33048.1.1		COUNTY		RRU	S		GEOLOGIST Sti	ckney, J. K.	
			BRIDG	E OVE	ER NORFOLK SC		ON SR 1002		·				GROUND V	VTR (
BORING					STATION 17+3		OFFSET	CL			ALIGNMEN	Γ -L-	0 HR.	10.
COLLAR					TOTAL DEPTH		NORTHIN	G 605	,130	~~~	EASTING 1	,525,802	24 HR.	12.
DRILL M					DRILL METHOD		T					HAMMER TYPE	E Automatic	
START D	V/F I				COMP. DATE 0		SURFACE			EPTH N	I/A	DEPTH TO ROO	CK N/A	
ELEV ELE	EV DLF	,,,		OUNT		-OWS PER FOO ⁻ 50		SAME	₽.		S	OIL AND ROCK DES	SCRIPTION	
- '''	,	1	0.0	71 0.3			75 100	NO.	M	01 G	ELEV. (ft)			EPTH
61	,													
	1										-			
	1			_							607.0	GROUND SURF	ACE	0
605	+									17.7	TAN	RESIDUAL BROWN MED. STI		
602.	2 + 4.8									7	MOIS	T TRACE MICA, CL SILT (A-5)	AYEY SANDY	
	Ŧ	2	2	3	\$ 5				М	12 12		0,2, (1,0)		
	Ŧ				1									
597.	2 7 9.8	+-	2	3			: : : :							
95	+				\$5	•• ••••	• • • •		M-M-	长让				
592.2	2 + 14.8			.										
90	Ŧ	2	3	5	.08		: : : :		М					
	Ŧ									7	589.0			18.0
587.2	19.8	3	9	14	1 ::: `						BROWN	RESIDUAL TAN & WHITE MED	DENSE TO V	********
35	Ŧ								М		DENS	E MOIST CLAYEY ((A-2-4)	SILTY SAND	
582.2	24.8		· .]]::::: :`>						•	, ,		
30	\pm	15	23	26		49			Μ,					
	Ī					\ \								
	29.8	9	26	33		/			М					
5	+	-					 	į		1				
572.2	34.8		40	577.4				l		5	72.2			240
0 .	‡	28	43	57/.4			100/.4		М		SEV W	WEATHERED ROC EATHERED NON CI	CK PVSTALLING	34.8
567.2	39.8											ROCK	INTO TALLINE	
5		29	71/.5	——]	1		100/.5		M	56	56.2			40.8
1 -	‡						1007.5			[-	Boring Te SEV. WE	erminated at Elevation EATHERED NON-CF	n 566.2 ft IN RYSTALLINE	
	†		l							E		ROCK		
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PROJECT NO. B3421 D. 33948.1.1 COUNTY CABARRUS GEOLOGIST Stickney, J.K.	
STREET DESCRIPTION BRIDGE OVER NORFOLK SOUTHERN RR ON SR 1002 STATION 18-48 OFFSET 26ft RT	
Dening No. 62-8	WTR (f
DRILL MACHINE CME-S50X DRILL METHOD NW Casing w/ Advancer HAMMER TYPE Automatic START DATE 08/20/08 COMP. DATE 08/20/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A	, NM
START DATE 08/20/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A	10.3
BLOWS PER FOT SAMP SAMP SOILAND ROCK DESCRIPTION SAMP SOILAND ROCK DESCRIPTION SAMP SOILAND ROCK DESCRIPTION SOILAND ROCK DESCRIPTION SOILAND ROCK DESCRIPTION SAMP SOILAND ROCK DESCRIPTION SOILAND ROCK DESCRIPTION SAMP SOILAND ROCK DESCRIPTION SOILAND ROCK DESCRIPTION SAMP SOILAND ROCK DESCRIPTION SOILAND ROCK DESCRIPTION	
610	
610	
805 6013 4.4 4 8 9 611 596.3 9.4 4 7 12 618 659 650 65	DEPTH (ft
601 3 4.4 8 9	0.0
600	V.
595	
595	
590 591.3 14.4 19 37 57 29.4 586.3 19.4 19 37 57 29.4 580 586.3 29.4 44 41 59/.3 100/.6 575 25 38 62/.5 560 560 560	
19 37 57 19 37 57 19 37 57 100/.4 586.3 19.4 100/.4 586.3 19.4 100/.4 586.3 100/.4 586.3 100/.6 100/.6	
19 37 57 19 37 57 19 37 57 100/.4 586.3 19.4 100/.4 586.3 19.4 100/.4 586.3 100/.4 586.3 100/.6 100/.6	
585	
S81.3 24.4	19.4
580 581.3	
575	
575	
575	
570 SEV. WEATHERED NON-CRYSTALLINE ROCK 565 560	
570 - SEV. WEATHERED NON-CRYSTALLINE ROCK 565	32.4
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540	
535	
530 +	

SHEET

BORELOG REPORT COUNTY CABARRUS GEOLOGIST Stickney, J. K. PROJECT NO. B3421 **ID.** 33048.1.1 GROUND WTR (ft) SITE DESCRIPTION BRIDGE OVER NORFOLK SOUTHERN RR ON SR 1002 BORING NO. EB2-C STATION 19+30 OFFSET CL ALIGNMENT -L-0 HR. 21.3 NM COLLAR ELEV. 625.8 ft TOTAL DEPTH 34.8 ft **NORTHING** 605,261 **EASTING** 1,525,947 24 HR. HAMMER TYPE Automatic DRILL MACHINE CME-550X DRILL METHOD NW Casing w/ Advancer **START DATE** 08/22/08 COMP. DATE 08/22/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A ELEV DRIVE ELEV (ft) SAMP. DEPTH BLOW COUNT **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION 0 (ft) 0.5ft 0.5ft 0.5ft NO. MOI G ELEV. (ft) 25 50 75 100 630 **GROUND SURFACE** 625 ARTIFICIAL FILL DRK BLACK BROWN RED ORANGE STIFF MOIST MICA. CLAYEY SANDY SILT (A-4) ROCKS, CONCRETE, & ASPHALT IN FILL 620 SS-14 M 615 SS-15 M RESIDUAL
TAN BROWN YELLOW MED. DENSE TO
VERY DENSE MOIST MICA. CLAYEY SILTY SAND (A-2-4) M 606.2 605 SS-16 VM7 D 600 76 24/.1 WEATHERED ROCK _100/.6 SEV. WEATHERED NON-CRYSTALLINE 80 595 20/.1 _100/.6 591.2 + 34.6 590 100/.2 Boring Terminated at Elevation 591.0 ft IN SEV. WEATHERED NON-CRYSTALLINE ROCK 585 580 575 570 565 560 555

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No.	B-3421					
	REPORT ON SAM	IPLES OF	SOILS FOR C	UALIT	Y	
Project	33048.1	County	CABARRUS		Owner	
Date: Sampled	8/14/08	Received	9/5/08		 Reported	9/9/2008
Sampled from	BRIDGE			Ву	J E BEVER	LY
Submitted by	N WAINAINA				1995	Standard Specifications
748553 TO 74856	57					

11/24/08

TEST RESULTS

Proj. Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-7
Lab. Sample No.		748553	748554	748555	748556	748557	748558
Retained #4 Sieve	%	-	. .	-		-	_
Passing #10 Sieve	%	100	100	100	99	100	100
Passing #40 Sieve	%	97	99	99	67	68	69
Passing #200 Sieve	%	52	39	80	39	35	25

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%		•					
Coarse Sand Ret - #60	%	7.3	3.9	2.8	39.4	40.8	44.9
Fine Sand Ret - #270	%	57.7	-70.7	27.2	27.0	30.5	35.7
Silt 0.05 - 0.005 mm	%	31.0	21.4	33.4	23.5	20.6	15.3
Clay < 0.005 mm	%	4.1	4.1	36.5	10.2	8.1	4.1
Passing #40 Sieve	%	-	-	_	-	_	-
LOCATION	%	B1-A	B1-A	B1-B	B1-B	B1-B	B1-B

L. L.		31	30	66	- 44	37	30
P. I.		4	3	21	9	8	5
AASHTO Classification		A-4(0)	A-4(0)	A-7-5(22)	A-5(1)	A-2-4(0)	A-2-4(0)
Station		17+49	17+49	17+36	17+36	17+36	17+36
OFFSET		25.5 LT	25.5 LT	21.5 LT	21.5 RT	21.5 RT	21.5 RT
ALIGNMENT		L	L	L	L	L	L
Depth (Ft)		5.10	35.10	5.10	10.10	20.10	35.10
	to	6.10	36.10	6.10	11.10	21.10	36.10

cc: JEBEVERLY Soils File

Soils Engineer

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

T. I. P. No. B-3421

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	33048.1	County	CABARRUS		Owner
Date: Sampled	8/14/08	Received	9/5/08		Reported 9/9/2008
Sampled from	BRIDGE			Ву	J E BEVERLY
Submitted by	N WAINAINA	,			1995 Standard Specifications

748553 TO 748567

11/24/08

·		T.F.	ST RESUL	ATS			
Proj. Sample No.		SS-8	SS-9	SS-10	SS-11	SS-12	SS-13
Lab. Sample No.		748559	748560	748561	748562	748563	748564
Retained #4 Sieve	%	***	_	-		-	-
Passing #10 Sieve	%	96	96	98	96	92	96
Passing #40 Sieve	%	72	72	81	64	58	64
Passing #200 Sieve	. %	32	29	70	34	27	22

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	35.7	36.8	20.5	41.0	47.5	47.1
Fine Sand Ret - #270	%	38.8	40.2	9.9	29.6	29.2	35.5
Silt 0.05 - 0.005 mm	%	21.4	19.0	12.7	17.2	17.2	13.3
Clay < 0.005 mm	%	4.1	4.1	56.9	12.2	6.1	4.1
Passing #40 Sieve	%		-	-	-	-	-
LOCATION	%	B2-B	B2-B	FB1-C	FB1-C	FB1-C	FB1-C

L. L.	29	26	90	39	25	35
P. I.	4	NP	54	9	5	NP
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-7-5(40)	A-2-4(0)	A-2-4(0)	A-2-4(0)
Station	18+48	18+48	16+69	16+69	16+69	16+69
OFFSET	26 RT	26 RT	C/L	C/L	C/L	C/L
ALIGNMENT	L	L	L	L	L	L
Depth (Ft)	4.90	14.90	5.30	15.30	20.30	25.30
	to 5.90	15.90	6,30	16.30	21.30	26.30

M & T Form 503

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

T. I. P. No.	B-3421							
	REPORT OF	N SAN	IPLES OF	SOILS FOI	R QUALITY	7		
Project	33048.1		County	CABARRU	JS	Owner	,	
Date: Sampled	8/14/08		Received	9/5/08		Reported	9/9/2008	,
Sampled from	BRIDGE				By	J E BEVER	ZLY	
Submitted by	N WAINAINA				_	1995	Standard Sp	ecifications
,					•		_	
748553 TO 74856	57							
11/24/08	,,							
				EST RESUL				
Proj. Sample No			SS-14	SS-15	SS-16			
Lab. Sample No.			748565	748566	748567			ļ
Retained #4 Sie		%		-	-			-
Passing #10 Sie		%	100	97	96	<u> </u>		
Passing #40 Sie Passing #200 Si		%	82 37	70 32	75			
1 dssing #200 51		/0	J/	J 32	20			
			MINUS	NO. 10 FRA	CTION			
SOIL MORTAR	- 100%							
Coarse Sand F		%	31.1	38.4	37.6			
Fine Sand Ret	- #270	%	38.2	33.9	41.8			
Silt 0.05 - 0.00		%	16.5	17.6	16.5			
Clay $< 0.005 \text{ r}$	***************************************	%	14.2	10.2	4.1			
Passing #40 Sie	eve	%		-				
LOCATION		%	FB2-C	FB2-C	FB2-C			
		-					-	
L. L.	****		29	34	30			
P. I.	~ .·		9	7	NP		_	<u> </u>
AASHTO Classif	ncation		A-4(0)	A-2-4(0)	A-2-4(0)			
Station OFFSET			19+30	19+30	19+30			<u></u>
ALIGNMENT			C/L L	C/L· L	C/L L		<u> </u>	<u> </u>
Depth (Ft)			5.10	10.10	20.10		<u> </u>	
Deptii (14)	to	$\overline{}$	6.10	11.10	21.10			
	<u> </u>	'	0.10	11.10	21.10			

Soils Engineer Page 3

PROJECT: 33048.1.1

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. RE	FERENCE N	o. <i>33048.1.1 (1</i>	B-3421)		F.A. PR	OJ	
	<u>CABARI</u>						
PROJECT	DESCRIPTI	ON BRIDGE	NO. 266	ON S	R 1002	(CABARRUS	AVE
OVER	SOUTHER	N RAILWAY	7				
							·····
SITE DES	CRIPTION _	RETAINING	WALL I	VO. 1			
-L- PO	T 10 + 63 +	-/- RT. TO -	YI- POT	10 + 63	+/- R	<i>T</i> .	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTA:
N.C.	33048.1.1 (B-3421)	1	5

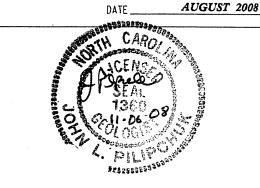
CAUTION NOTICE

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 FELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, CEOTECHNICAL ENGINEERING LUNT AT 1919 250-0408. NETHER THE SUBSURFACE FLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

CENERAL 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 OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN STU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIBELITY INSERENT IN THE STANDARD TEST METHOD. THE OBSERVE WATER LEVELS OR SOIL MOSTUME CONDITIONS NOILATED IN THE SUBSUBFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOIL MOISTUME CONDITIONS MOLIC 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 REASON RESULTENG FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THEORY OF THE PROMETY OF THE PROPERTY OF THE SUBSURFACE INFORMATION.

	PERSONNEL
	C.C. MURRAY
•	J.E. ESTEP
, market	M.R. MOORE
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INVESTIGATED BY	C.B. LITTLE
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SUBMITTED BY	C.B. LITTLE



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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

OON DECODIOTION	ODAGATION		
SOIL DESCRIPTION	GRADATION MELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK DESCRIPTION HAPO ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED	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	UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO POORLY GRADED)	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SYT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
180 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1286, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTD SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO DR MORE SIZES.	IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETVEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	ADUJEER - A WATER BEARING FORMATION OR STRATA. ARENACEDUS - 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:	ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF BOIL GRAINS IS DESIGNATED BY THE TERMS, ANGULAR,	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEDUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
VERY STIFF, GRAY, SATY CLAY, MOST WITH INTERBEDDED FINE SHID LAVERS, HIGHLY PUSTIC, 4-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	CRYSTALLINE ROCK (CR) FINE TO CDARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	GROUND SURFACE.
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREDUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a-1-b A-2-4 A-2-5 A-2-7 A-4, A-5 A-6 A-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANOSTONE, 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	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
y Pocsing	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
# 10 50 HX GRANULAR CLAY MUC	ODCANIC MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
# 40 30 MX 56 MX 51 MN SOILS PEA	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIDUID LIMIT 48 MX 41 MN 46 MX 41 MN 48 MX 41 MN 48 MX 41 MN SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.
PLASTIC INDEX 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN LITTLE OR HIGH	HIGH A DECAMIC	(V SLL.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP_DIRECTION (DIP_AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 8 8 8 4 MX 8 MX 12 MX 16 MX No MX MODERATE DRGA	GROUND WATER	OF A CRYSTALLINE NATURE. — SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY DRGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN.RATING AS A EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUIT	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD,) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
SUBGRADE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SPI CET DESTRING SAMPLE DESIGNATIONS SPI CET TEST BORING DESIGNATIONS	IF TESTED. WOULD YIELD SPT. REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VERY LOOSE	S - BULK SAMPLE	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED (SEV.) IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GRANII AR LODSE 4 TO 10	SS - 3PLIT SPOON	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER CORE BORING SAMPLE	IF TESTED, VIELDS SPT N VALUES) 180 BPF	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
VERY DENSE >50	ST - SHELBY TUBE INFERRED SOIL BOUNDARY SAMPLE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT IV SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT <2 <0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.50	MONITORING WELL BS - BOCK SAMPLE	REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N. VALUES < 180 RPF	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 8.5 TO 1.0	A PIEZOMETER A PIEZOMETER RT - RECOMPACTED TRIAXIAL		RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	SAMPLE SLOPE INDICATOR	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
HARD >30 >4	25/825 DIP & DIP DIRECTION OF INSTALLATION CBR - CALIFORNIA BEARING ROCK STRUCTURES RATIO SAMPLE	ROCK 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	SPT N-VALUE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SDIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	SOUNDING ROD REF SPT REFUSAL	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	PARENT ROCK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY (BLDR.) (COB.) (GR.) (AR - AUGER REFUSAL HI HIGHLY # - MOISTURE CONTENT BY - BORING TERMINATED MED MEDIUM V - VERY	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 8.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
USE, SD.7 IF SD.7	BT - BORING TERMINATED MED MEDIUM V - VERY CL CLAY MICA MICACEDUS VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT DR
GRAIN MM 305 75 2.0 0.25 0.005 0.005 SIZE IN 12 3	CPT - CONE PENETRATION TEST MOD MODERATELY WEA WEATHERED CSE COARSE NP - NON PLASTIC 7 - UNIT WEIGHT	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST ORG ORGANIC 70- DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL 1S PENETRATION EQUAL TO OR LESS
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST N • - VOID RATIO SAP - SAPROLITIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS) DESCRIPTION DESCRIPTION	F - FINE SD SAND, SANDY	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	FOSS FOSSILIFEROUS SL SILT, SILTY FRAC FRACTURED, FRACTURES SLI SLIGHTLY	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY
LL_ LIQUID LIMIT	FRAGS FRAGMENTS TCR - TRICONE REFUSAL	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY 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.
PLASTIC SEMISOLID: REQUIRES DRYING TO	EQUIPMENT USED ON SUBJECT PROJECT	FINGERNALL. FRACTURE SPACING BEDDING	JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE		TERM SPACING IERM THICKNESS	DELICULATION .
OPTIMUM MOISTURE - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTUR	DITTE SITTED AND THE MANUAL MA	VERY MIDE MORE THAN 12 FET VERY THICKLY BEDDED > 4 FEET	BENCH MARK:
OM DPTIMUM MOISTURE - MOIST - (M) SULID; AT UK NEAR DPTIMUM MUISTUR SL SHRINKAGE LIMIT	MOBILE B- CLAY BITS	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: FT.
REQUIRES ADDITIONAL WATER TO	G' CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES: .
- DRY - (D) ATTAIN OPTIMUM MOISTURE	BK-51 X 8* HOLLOW AUGERSB	THINLY LAMINATED < 0.008 FEET	BORING ELEVATIONS OBTAINED FROM B3421_LS_TNL_040226.TIN
PLASTICITY	CME-45C HARD FACED FINGER BITS N	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X THING -CAPPIDE INCEPTS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 9-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	X CME-550	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MED. PLASTICITY 16-25 MEDIUM	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	CONTROL ON SE SERVICIO FORM CAMP F. 1971 CONTROL CONTROL	•
	TRICONE TUNG,-CARB. HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER,	
COLOR	CORE BIT SOUNDING ROD	INDURATED GRAINS ARE 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	DIFFICULT TO BREAK WITH HAMMER.	
TROUBLETO SOUTH TO EXOTE, DRING, STREAMED, ETC. MINE USED TO DESCRIBE METERMANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	

PROJECT REFERENCE NO. 33048.I.I (B-342I)

j.

SITE DESCRIPTION BRIDGE NO. 286 ON SR 1002 (CASARRIUS AVE.) OVER SOUTHERN RAILWAY ORTHOD 1:20		ECT NO					B-3421			COUNT					GEOL	OGIST Mu		
COLLAR ELEV. 584.1 ft				BRID	GE NO	1			ABARRUS				RN R				GROUND	WTR (
DRILL MACHINE CME-550X DRILL METHOD H.S. Augers FAMMER TYPE Automatic START DATE 06/10/08 COMP. DATE 06/10/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK 30.2 ft BLOW SERF FOOT 75 100 SOL AND ROCK DESCRIPTION SOL AND ROCK DESCRIPTION SOL AND ROCK DESCRIPTION SSL 0.5ft 0						+											0 HR.	21.
START DATE 08/10/08 COMP. DATE 06/10/08 SURFACE WATER DEPTH N/A DEPTH TO ROCK 30.2 R ELEV (1)	COLL	AR ELE	V. 594	4.1 ft		T	OTAL DE	PTH 30.	2 ft	NORTHI	NG 60	4,665		EASTING	1,525,4	07	24 HR.	16.
ELEV DEPTH	DRILL	MACH	INE CI	ME-550	OX	D	RILL ME	THOD H.	S. Augers						HAM	MER TYPE	Automatic	
695 696 697 698	STAR	T DATE	06/10	0/08		C	OMP. DA	TE 06/10	0/08	SURFAC	CE WAT	ER D	EPT	H N/A	DEP.	TH TO RO	CK 30.2 ft	
596 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			' }	·		4					1 1			S	OIL AND	ROCK DESC	RIPTION	
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SS-3 1 19.1	-	-					: : :		: : : :	1 ' 1				582.1		ALLINGAL		12
75.0 19.1 1 2 3 6 6 0.1 1 2 3 6 6 0.1 1 5 6 0.1 1 5 6 0.1 1 6 6 0.	0.08	14.1	<u> </u>	2	1 2		ļ					١		GRAY	SOFT MO	DIST TO WE	MED. (PI=20)	
75.0 19.1 1 2 3 5 5 5 5 5 5 5 5 5	-	-		~	-		•4 · · · · · · · · · · · · · · · · · · ·				SS-3	MY.		- -	PLASTIC	SILTY CLAY	(A-7-6)	
1 2 3 6 60/1	75.0	101					1							- -				
SANDY SILT (A-4) 570.0 24.1 1 2 3	-	- 13.1	1	2	3	11	5				SS-4	7W7			-GREEN	MED STIFE	WET CLAYEY	19
1	1	-										- <u>V</u> -		-				
65.0 29.1 3 6 60/.1	70.0	24.1]	<u> </u>							GR/	AY-TAN M	ED. STIFF L	OW (PI=15)	23
55.0 29.1 3 6 60/.1 60/.	1	-	1	2	3		5				SS-5	W		_ PL	ASTIC SIL	.TY SANDY	CLAY (A-6)	
3 6 60/.1	1	-				$\ $	1							<u>.</u>				
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 583.9 ft ON HARD CRYSTALLINE ROCK Other Samples: ST-1 (14.1 - 15.1) ST-2 (24.1 - 28.1)	65.0	29.1	3	6	60/.1	止								564.0				30.
PENETRATION TEST REFUSAL at Elevation 563.9 ft ON HARD CRYSTALLINE ROCK Other Samples: ST-1 (14.1 - 16.1) ST-2 (24.1 - 26.1)	1	<u>-</u>								60/.1			1			~~~		30
Other Samples: ST-1 (14.1 - 16.1) ST-2 (24.1 - 26.1)	#	• •												PENET	RATION 7	EST REFUS	AL at Elevation	i
ST-1 (14.1 - 16.1) ST-2 (24.1 - 26.1)	1												-	• •		ND CITTOTA	LLINE ROOK	
	#													ST-1 (14.1 - 16.1			
	+												1	- 51-2(24.1 - 26.	1)		
													 					
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ROCK SAMPLE RESULTS

STATION

DEPTH RQD UNIT WT

(MPsi)

INTERVAL

SAMPLE NO. OFFSET

PROJECT: 33048.1.1 (B-3421)

COUNTY: CABARRUS

SITE DESCRIPTION: WALL #1 -L- POT 10+63+/- RT. TO -Y1- POT 10+63+/- RT.

SOILS	SAMPLE RES	SULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH	AASHTO	N	L.L.	P.I.		% BY WEIC	GHT		% PA	SSING S	IEVES	%	%	UNIT	VOID
			INTERVAL	CLASS				C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	WT. (d)	RATIO
SS-1	46 RT	11+20 -L-	4.10-5.60	A-4(0)	6	30	6	31.8	36.7	15.3	16.2	98	81	37	*			
SS-2	46 RT	11+20 -L-	9.10-10.60	A-4(0)	6	32	6	27.2	40.1	14.5	18.2	98	83	39				
SS-3	46 RT	11+20 -L-	14.10-15.60	A-7-6(22)	4	45	20	0.6	4.3	34.3	60.8	100	100	97				
SS-4	46 RT	11+20 -L-	19.10-20.60	A-4(0)	5	23	4	6.3	53.3	20.2	20.3	100	98	51				
SS-5	46 RT	11+20 -L-	24.10-25.60	A-6(7)	5	35	15	10.7	34.0	18.7	36.5	100	96	61				
ST-1	46 RT	11+20 -L-	14.10-16.10	PRESENTLY B	EING T	ESTED												
ST-2	46 RT	11+20 -L-	24.10-26.10	PRESENTLY B	EING T	ESTED												

2."

(MPsi)

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. RE	FERENCE NO.	33048.1.1 (B-3421)		F.	_ F.A. PROJ					
	<u>CABARRU</u>										
PROJECT	DESCRIPTION	BRIDGE	NO. 266	ON	SR	1002	(CABARRUS	AVE			
<u>OVER</u>	SOUTHERN	RAILWAY	7								
SITE DES	SCRIPTION	TAINING	WALL N	VO. 2							
	OC 14+18 +/-					- RT					

STATE	STATE PROJECT REPERENCE NO.	SHEET NO.	TOTA
N.C.	33048.1.1 (B-3421)	1	5

CAUTION NOTICE

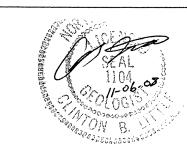
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FELD BORING LOGS, ROCK CORES, AND SOLL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS. NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

DENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA MITHAIN THE BORRHOLE. THE LABORATORY SAMPLED DATA AND THE IN SITU (IN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABLITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSTURE CONDITIONS NORLETED IN THE SUBSURFACE RIVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATIONS THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MORE OF CONDITIONS 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 NOTWARKANTO OR OLD AND THE PROJECT. THE DEFARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL 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 THOSE INDICATED IN THE SUBSURFACE INFORMATION.

	J.E. ESIEF
_	M.R. MOORE
_	
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_	
INVESTIGATED B	Y_C.B. LITTLE
CHECKED BY	C.B. LITTLE
	C.B. LITTLE
DATE	AUGUST 2008
VAIC	

PERSONNEL C.C. MURRAY



CONTENTS

DESCRIPTION

TITLE SHEET

SOIL TEST RESULTS

LEGEND

SITE PLAN PROFILE(S) BORE LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

	SOIL AND RO	CK LEGEND, TERM	MS, SYMBOLS, AND ABBR	EVIATIONS	
SOIL DESCRIPTION	GRADATION		I RO	OCK 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	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES <u>UNIFORM</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY TH	FROM FINE TO COARSE. € SAME SIZE.(ALSO	ROCK LINE INDICATES THE LEVEL AT WHICH	RL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED N NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D-1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR	MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT	SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. ANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS		OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED A		ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SUTY CLAY, MOST WITH INTERBEDDED FINE SIMD LAYERS, HIGHLY PLASTIC, IA-7-6	THE ANGULARITY OR ROUNDNESS OF GOIL GRAINS IS DESIGNATED BY THE SUBANGULAR, SUBROUNDED, OR ROUNDED.	TERMS: ANGULAR,	NUMUA	STAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITIO	DN	151, 151,	ER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL DRANULAR MATERIALS SILT-CLAY MATERIALS DRGANIC MATERIALS (≤ 35% PASSING *200) (> 35% PASSING *200) CRGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE INVENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	USED IN DESCRIPTIONS	ROCK (CR) WOULD YI	COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT ELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	GROUND SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY		HON COVETALINE FINE TO	ABBRO, SCHIST, ETC. COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
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	LESS THAN 31	DOCK (MCD) SEDIMENT	ARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000		EQUAL TO 31-50 GREATER THAN 50	COASTAL PLAIN COASTAL	PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY IREC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
X PASSING	PERCENTAGE OF MATERIA	L	(CP) SHELL BE	DS, ETC.	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
# 40 30 MX 50 MX 51 MN SOILS CLAY PEAT	ORGANIC MATERIAL GRANULAR SILT - CLAY SDILS SOILS	OTHER MATERIAL		WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
2 200 13 11 23 11 10 11 35 MX 35 MX 35 MX 35 MX 35 MN 35 MN 35 MN 35 MN 35 MN		ACE 1 - 10% ITLE 10 - 20%	FRESH ROCK FRESH, CRYSTALS BRIGHT, HAMMER IF CRYSTALLINE.	FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIGUID LIMIT 48 MX 41 MN 48 MX 41 MX	MODERATELY ORGANIC 5 - 10% 12 - 20% SOM	ME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS (V SLI.) CRYSTALS ON A BROKEN SPECIM	STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. EN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
GROUP INDEX 8 8 8 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANI	110	SHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.		THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
USUAL TYPES STONE FRACE. FINE SILTY OR CLAYEY SILTY CLAYEY DRGANIC SOILS	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER D	DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS (SLI.) 1 INCH. OPEN JOINTS MAY CONTA	STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO IN CLAY. IN GRANITOID ROCKS 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.
OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS		CRYSTALS ARE DULL AND DISCO	ORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN_RATING AS A EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	F PERCHED WATER, SATURATED ZONE, OR WATER BEARI	ING STRATA		SHOW DISCOLORATION AND WEATHERING EFFECTS. IN IRS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
SUBGRADE	SPRING OR SEEP		DULL SOUND UNDER HAMMER BLO WITH FRESH ROCK.	WS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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			MODERATELY ALL ROCK EXCEPT QUARTZ DISCO	DLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS		SEVERE AND DISCOLORED AND A MAJORIT	Y SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE CONFIGURES OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT2)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SPT CPT DET OFT TEST BORIN	NG SAMPLE DESIGNATIONS	IF TESTED. WOULD YIELD SPT RE	FUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE 4 TO 10	SOIL SYMBOL AUGER BORING	S - BULK SAMPLE	SEVERE ALL ROCK EXCEPT QUARTZ DISCO	DURED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER	SS - SPLIT SPOON SAMPLE	EXTENT. SOME FRAGMENTS OF ST IF JESTED YIELDS SPT N VALUE		ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NDN-COHESIVE) DENSE 30 TD 50 VERY DENSE >50	THAN ROADWAY EMBANKMENT - CORE BORING	ST - SHELBY TUBE	VERY SEVERE ALL ROCK EXCEPT DUARTZ DISCO	ILORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
VERY SOFT <2 <0.25	INFERRED SDIL BOUNDARY MONITORING WEL	\$AMPLE	REMAINING. SAPROLITE IS AN EX	CED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK AMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE, PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF A
GENERALLY SOFT 2 TO 4 0.25 TO 0.50 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE A PIEZOMETER A NOTAL ATTOM	RS - HUCK SAMPLE	VESTIGES OF THE ORIGINAL ROCK	FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SOIL BOUNDARY INSTALLATION	RT - RECOMPACTED TRIAXIAL SAMPLE	SCATTERED CONCENTRATIONS. DUA	ABRIC NOT DISCERNIBLE,OR DISCERNIBLE ONLY IN SMALL AND ARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
HARD >30 >4	25/825 DIP & DIP DIRECTION OF SLOPE INDICATOR INSTALLATION	CBR - CALIFORNIA BEARING	ALSO AN EXAMPLE.	OOK HADDINGOO	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 AI
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES SPT N-VALUE	RATIO SAMPLE		OCK 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 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SOUNDING ROD REF SPT REFUSAL		VERY HARD CANNOT BE SCRATCHED BY KNIF SEVERAL HARD BLOWS OF THE (E OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEOLOGIST'S PICK.	PARENT ROCK.
COARSE FINE	ABBREVIATIONS		HARD CAN BE SCRATCHED BY KNIFE D TO DETACH HAND SPECIMEN.	R PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	AR - AUGER REFUSAL HI HIGHLY BT - BORING TERMINATED MED MEDIUM			R PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	CL CLAY MICA MICACEDUS	VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A	A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SIZE IN. 12 3	CSE COARSE NP - NON PLASTIC	WEA WEATHERED 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED O.	35 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE COURSE TO STANDARD TO STANDAR	DMT - DILATOMETER TEST ORG ORGANIC DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST	$\gamma_{ m d}$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL C POINT OF A GEOLOGIST'S PICK.	HIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	• - VOID RATIO SAP SAPROLITIC F - FINE SD SAND, SANDY		SOFT CAN BE GROVED OR GOUGED REA	DILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	THAN 0.1 FOOT PER 60 BLOWS.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	FOSS FOSSILIFEROUS SL SILT, SILTY		PIECES CAN BE BROKEN BY FINC	S IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN SER PRESSURE.	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
LL LIQUID LIMIT (SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES SLI SLIGHTLY FRAGS FRAGMENTS TCR - TRICONE REFUSAL		VERY CAN BE CARVED WITH KNIFE. CA SOFT OR MORE IN THICKNESS CAN BE	N BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	<u>Strata rock quality designation (srod) -</u> a measure of rock quality described by total length of rock segments within a stratum equal to or greater than 4 inches divided by the
PLASTIC SEMISOLID; REQUIRES DRYING TO			FINGERNAIL.	BOOKEN BY FINGER FRESSURE, CAN BE SCRATCHED READILY BY	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PI	ROJECT	FRACTURE SPACING	BEDDING	TOPSOIL (TS,) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
COLID AT OD ATAD ODTIVIAL ACCOUNT	DRILL UNITS: ADVANCING TOOLS:	HAMMER TYPE:	TERM SPACING	TERM THICKNESS VERY THICKLY BEDDED > 4 FEET	BENCH MARK:
OM OPTIMUM MOISTURE - MDIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	MOBILE B- CLAY BITS	X AUTOMATIC MANUAL	VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET	THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: FT.
REQUIRES ADDITIONAL WATER TO	6' CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET	VERY THINLY BEDDED 0.03 - 0.16 FEET	
- DRY - (D) ATTAIN OPTIMUM MOISTURE	BK-51 X 8' HOLLOW AUGERS		VERY CLOSE LESS THAN 0.16 FEE	THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	NOTES: BORING ELEVATIONS OBTAINED FROM B3421_LS_TNL_040226.TIN
PLASTICITY	CME-45C HARD FACED FINGER BITS			INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 8-5 VERY LOW	X TUNG,-CARBIDE INSERTS	П-н		RDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
LOW PLASTICITY 6-15 SLIGHT	X CME-550 CASING W/ ADVANCER			BING WITH FINGER FREES NUMEROUS GRAINS: ITLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH	HAND TOOLS: POST HOLE DIGGER	MODERATELY INDURATED GRA	INS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:	
COLOR	TRICONE TUNGCARB.	HAND AUGER	BRE	AKS EASILY WHEN HIT WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT	SDUNDING ROD		NINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; FICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		VANE SHEAR TEST	EXTREMELY INDURATED SHA	ARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
		<u> </u>	SAN	MPLE BREAKS ACROSS GRAINS.	

REVISED 02/23/06

PROJECT REFERENCE NO.

33048.I.I (B-342I)

SHEET NO.

ROJECT NO. 33048.1.1	D. B-3421	COUNTY Cabarrus	GEOLOGIST Murra	ay, C. C.
TE DESCRIPTION BRIDGE NO.	. 266 ON SR 1002 (CABARRUS)	AVE.) OVER SOUTHERN RAIL	NAY	GROUND WTR (f
ORING NO. 1420	STATION 14+20	OFFSET 70ft RT	ALIGNMENT -L-	0 HR. 20.0
DLLAR ELEV. 591.0 ft	TOTAL DEPTH 24.5 ft	NORTHING 604,866	EASTING 1,525,616	24 HR. 8.0
RILL MACHINE CME-550X	DRILL METHOD H.S. Augers		HAMMER TYPE	Automatic
ART DATE 06/10/08	COMP. DATE 06/10/08	SURFACE WATER DEPTH N	/A DEPTH TO ROCK	C 24.5 ft
EV DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0.5ft	BLOWS PER FOOT 0 25 50 7	SAMP. L O NO. MOI G FI	SOIL AND ROCK DESCR	IPTION
95			LEV. (ft)	DEPTH (
7.1 3.9 3 2 3	P 5	 	91.0 GROUND SURFAC ARTIFICIAL FILL BLACK-TAN-BRN MED. STIFI WET LOW (PI=11) PLASTIC S CLAY (A-6)	F MOIST TO
2.1 8.9 2 2 3	•5	SS-12 W	RESIDUAL TAN MED. STIFF SAT. LOW (PI SILTY SANDY CLAY ((A-6) 11
7.1 13.9 4 5 6	. • 11	SS-13 W	OLIVE-TAN STIFF TO HARD WE SANDY SILT (A-4)	
2.1 18.9 5 11 23	34			
7.1 7 23.9		569	9.0 WEATHERED ROCK 6.5 (SEV. WEATH. CRYSTALLIN	<u>22</u>
			PENETRĂTION TEST REFUSA 566.5 ft ON HARD CRYSTALI	

TEST RESULTS

PROJECT: 33048.1.1 (B-3421)

COUNTY: CABARRUS SITE DESCRIPTION: WALL #2 -L- POC 14+18+/- RT. TO -L- POT 15+15+/- RT.

	L SAMPLE F O. OFFSET		DEPTH	AASHTO	N	L.L.	P.I.		% BY WEIG	GHT		% PAS	SSING S	SIEVES	%	%	UNIT	VOID	ROCK SAMPLE RESULTS SAMPLE NO. OFFSET STATION DEPTH ROD UNIT WT Q(MPa) E(N	(MPa)
	,		INTERVAL	CLASS				C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	WT. (d)	RATIO		MPsi)
SS-11	70 RT	14+20 -L-	3.90-5.40	A-6(1)	5	30	11	32.4	24.3	18.9	24.3	89	70	42	,					
SS-12	70 RT	14+20 -L-	8.90-10.40	A-6(1)	. 5	27	11	39.7	24.1	11.9	24.3	95	70	38						
SS-13	70 RT	14+20 -L-	13.90-15.40	A-4(5)	11	38	10	5.3	47.6	24.8	22.3	100	98	60						