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CONTE	NIS	
<u>SHEET</u>		<u>DES</u>
1	TITLE	SHEET

**S**<u>DESCRIPTION</u>

2 LEGEND
3 SITE PLAN
4 PROFILE(S)

5-6 CROSS SECTION(S)

7-9 BORE LOG & CORE REPORT(S)

O SOIL TEST RESULTS

## STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. <u>33727.1.1 (B-4490)</u>

F.A. PROJ. *BRNHS-0024(24)* 

COUNTY <u>CUMBERLAND</u>

PROJECT DESCRIPTION BRIDGE NO. 116 OVER CSX RR, NORFOLK

SOUTHERN RR, & HILLSBORO ST. ON NC 24-210

SITE DESCRIPTION <u>BRIDGE ON -L- OVER CSX RR & HILLSBORO</u>
ST. @ -L- STA. 29+57

 STATE
 STATE PROJECT REFERENCE NO.
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 N.C.

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 33727.1.1 (B-4490)
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#### **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 RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, COTECHNICAL ENGINEERING UNIT AT (9/9) 707-6850. 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 SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BORFHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU IN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEYELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR DINION 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 MIDICATED IN THE SUSSUPFACE INFORMATION.

PERSONNEL **S&ME, INC.** 

J.R. SWARTLEY

O.B. OTI

H.R. CONLEY

J.R. MATULA

INVESTIGATED BY J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE JUNE 2014



PROJECT: 33727.1.

#### PROJECT REFERENCE NO. 33727.I.I (B-4490) SHEET NO.

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

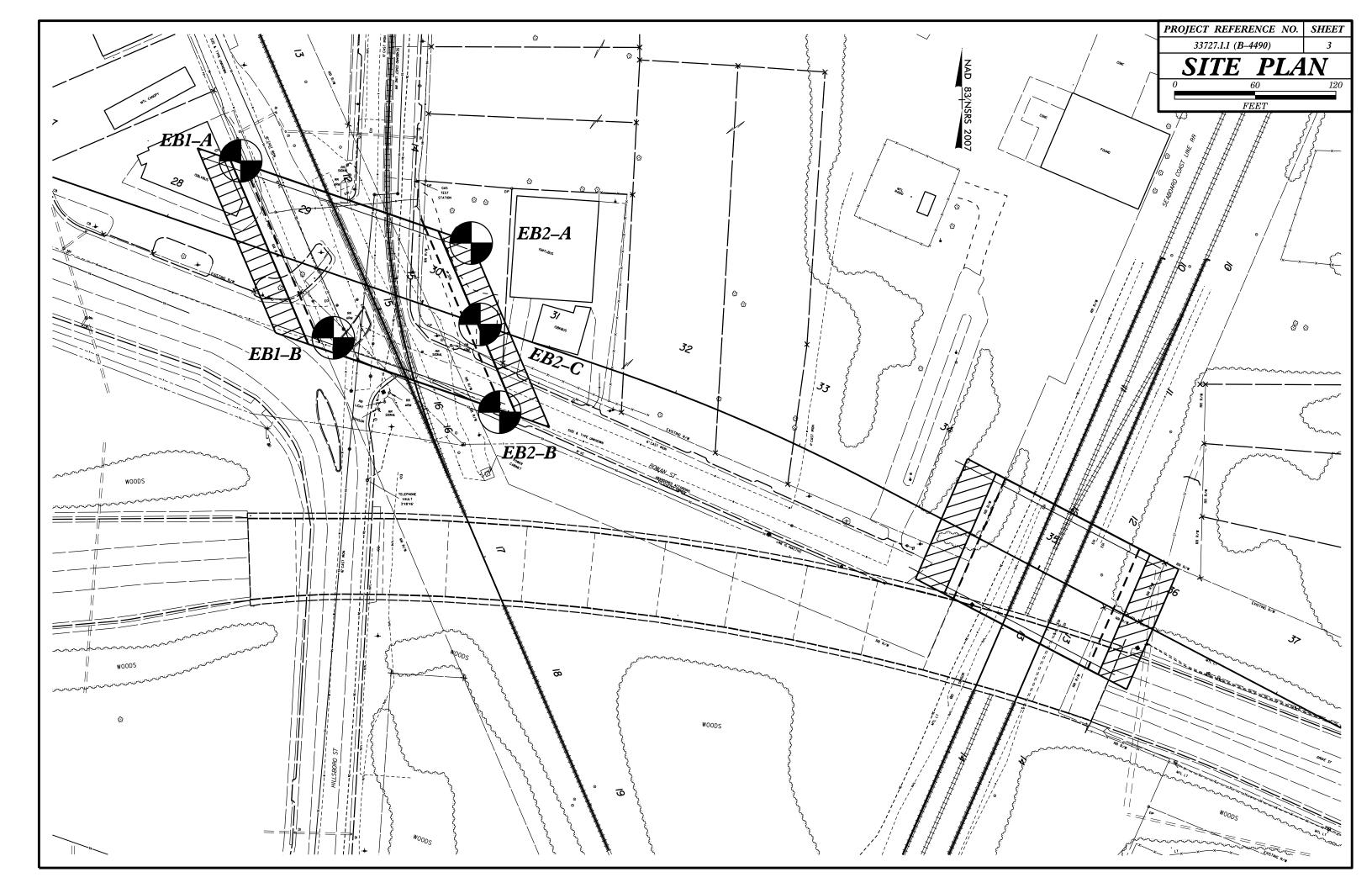
#### DIVISION OF HIGHWAYS

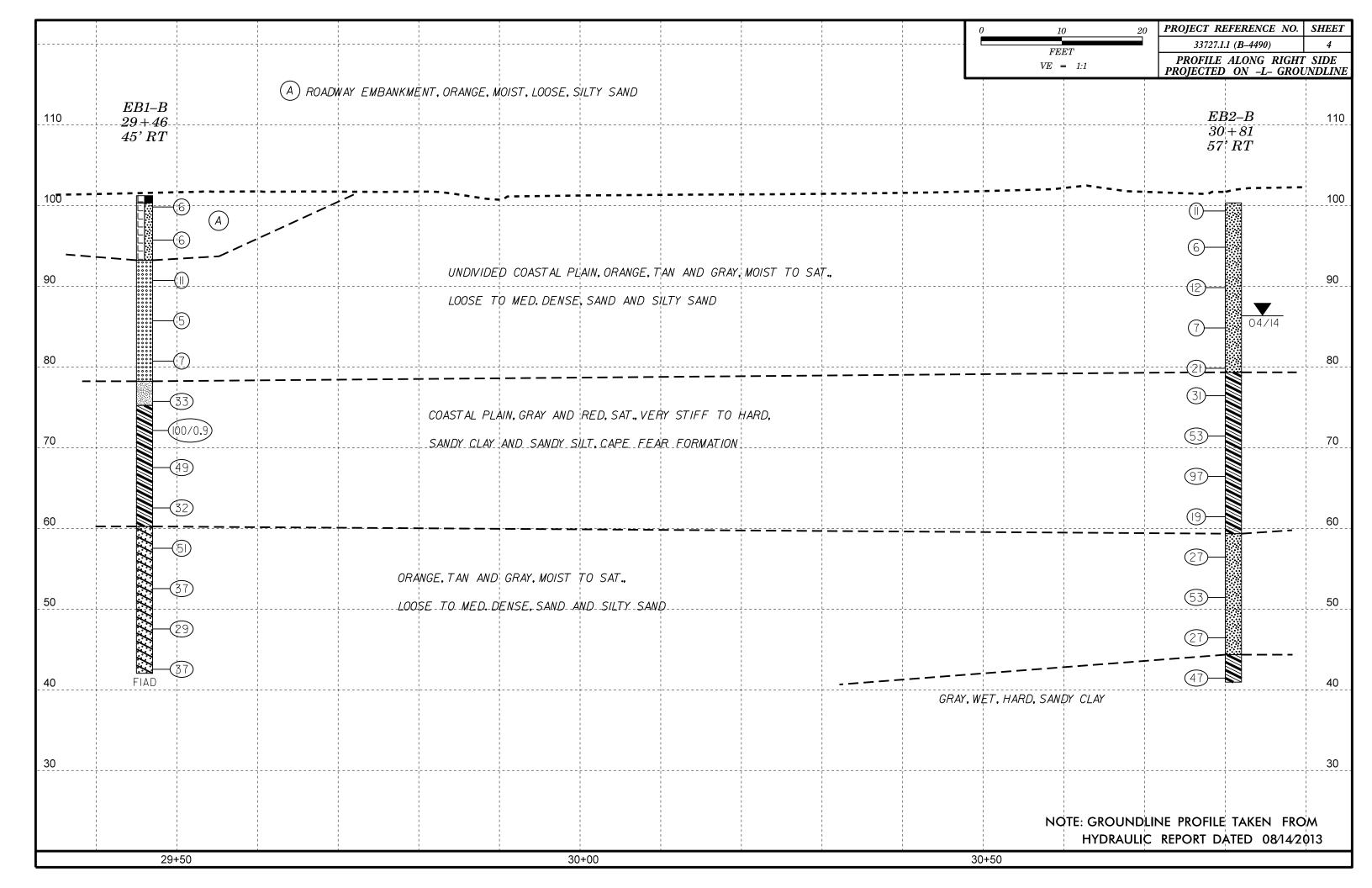
## GEOTECHNICAL ENGINEERING UNIT

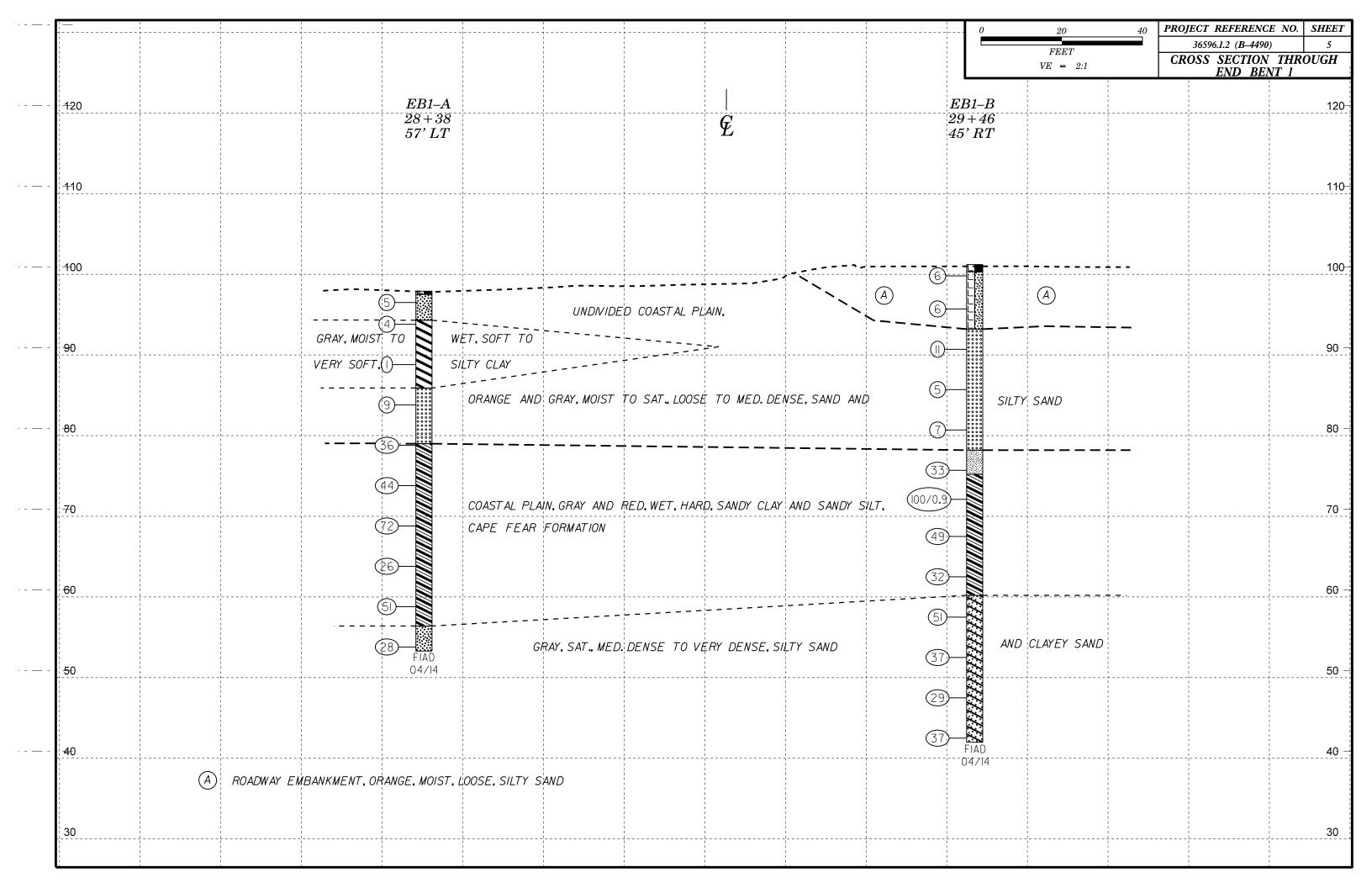
## SUBSURFACE INVESTIGATION

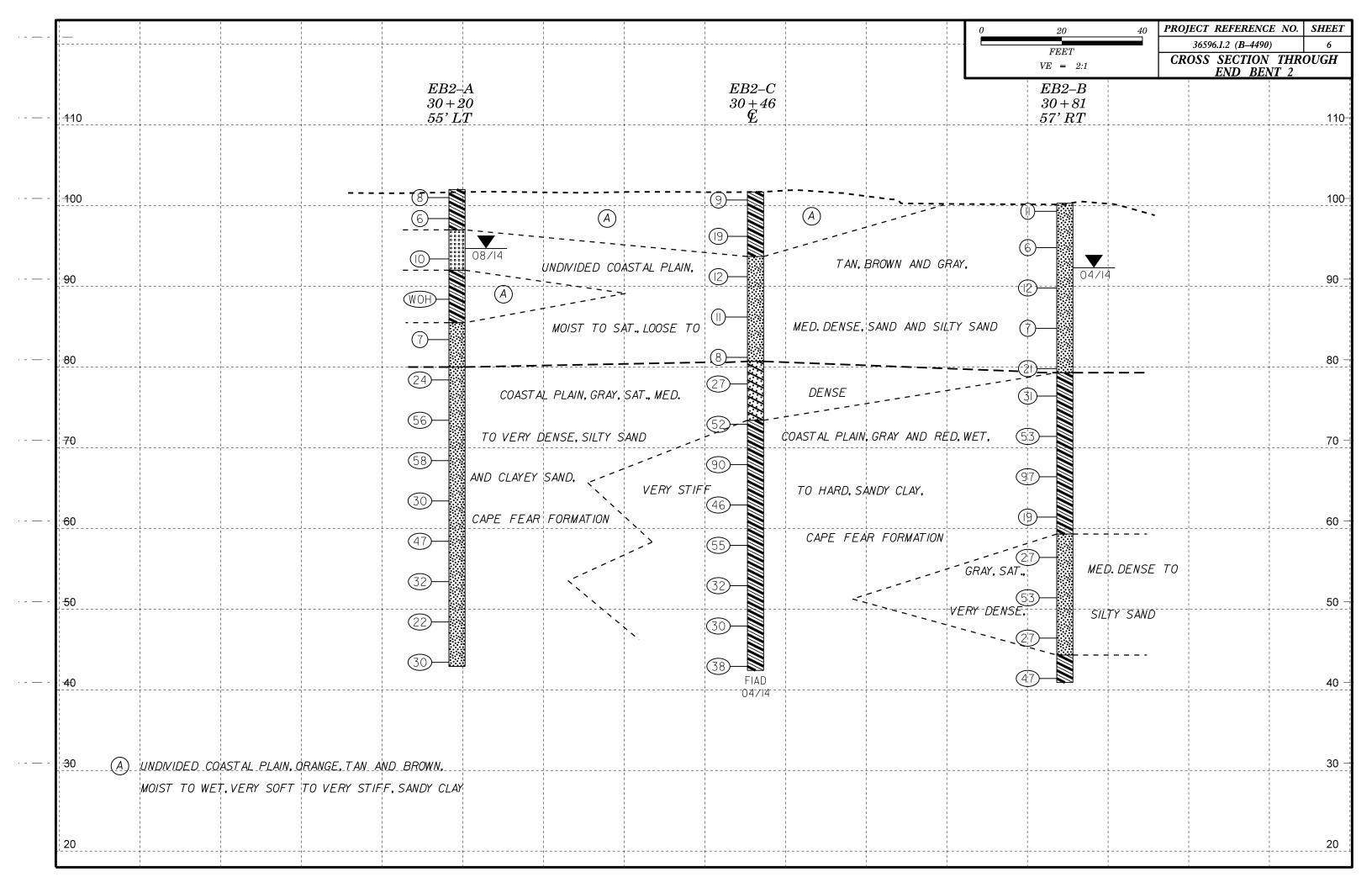
## SOIL AND BOCK LEGEND TERMS SYMBOLS AND ARRESTIATIONS

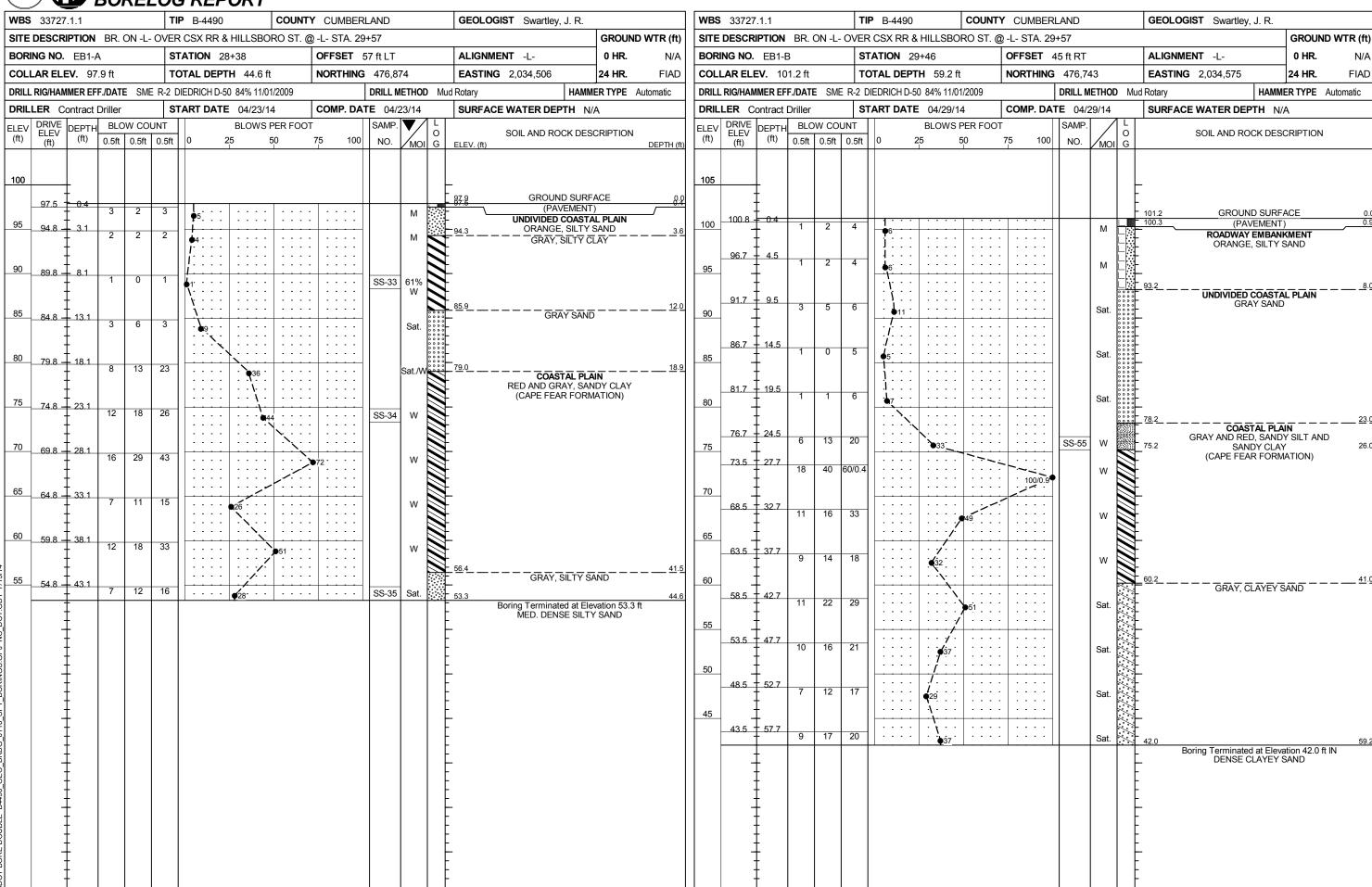
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS											
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS								
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.								
THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL	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. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.								
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,								
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:  VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDE</u> D, OR <u>ROUNDED</u> .	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.  CONSTALLINE  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE								
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELOSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	GROUND SURFACE.  CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.								
CLASS. (\$ 35% PASSING *200) (> 35% PASSING *200)  GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM								
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 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50	ROCK (NCR)	OF SLOPE.								
SYMBOL B00000000000000000000000000000000000	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPI REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SPILL BEDS, ETC.	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.								
Z PASSING  10 50 MX SILT-  GRANULAR CLAY MUCK.	PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT								
4 0 38 MX 58 MX 51 MX	UNUANIL MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE								
LTOUTD LTMTT	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 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC   5 - 10%   12 - 20%   SOME   20 - 35%   HIGHLY ORGANIC   >10%   >20%   HIGHLY   35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	<u>OIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.								
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE AMOUNTS OF AMOUNTS OF	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 ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.)  1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.								
MATERIALS SAND SAND SAND SAND SUILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM								
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.								
SUBGRADE   FOUR   PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.  MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.								
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN								
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE)  WITH SOIL DESCRIPTION  POPT ONT TEST BORING  W/ CORE	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.								
VERY LODGE	AUCED DODING COT N VALUE	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 KAQLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO								
GRANIII AR LOOSE 4 TO 10	5512 5111502	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.								
MATERIAL   MEDIUM DENSE   10 TO 30   10/H	ARTIFICIAL FILL (AF) OTHER ————————————————————————————————————	IF TESTED, VIELDS SPT N VALUES > 100 BPF  VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	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	— INFERRED SOIL BOUNDARY MONITORING WELL	(V 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.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN								
VERY SOFT	TITETITE INFERRED ROCK LINE A PIEZOMETER	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 < 100 BPF	INTERVENING IMPERVIOUS STRATUM.								
SILT-CLAY	INSTALLATION  TTTTT ALLUVIAL SOIL BOUNDARY  SLOPE INDICATOR	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.								
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/025 DIP & DIP DIRECTION OF	SCATTERED CONCENTRATIONS, GUARTZ 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 ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND								
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES  CONE PENETROMETER TEST	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE.								
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	● SOUNDING ROD	VERY HARD  CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES  SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK,	SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE 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	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.								
(BLDR,) (CUB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED  CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	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 OR SLIP PLANE.								
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	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 PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	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  OUTPERBERG LIMITS)  DESCRIPTION	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	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	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	OF STRATUM AND EXPRESSED AS A PERCENTAGE.								
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRACT FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS 20 - MOISTURE CONTENT CBR - CALIFORNIA BEARING	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - 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 SEMISOLIDE REQUIRES DRYING TO	HI HIGHLY V - VERY RATIO	FINGERNAIL.	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.								
RANGE - WET - (W) SEMISULITY REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING  TERM SPACING IERM THICKNESS									
NOICE AND COLUDE AT OR NEAR ORTHWIN MOLETURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FFFT VERY THICKLY BEDDED > 4 FEET	BENCH MARK: BL-6, -L- STA., 33+08.2I, 68.94' RT  N: 476596.7086 E: 2034898.9756								
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE 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: 98.90 FT.								
REQUIRES ADDITIONAL WATER TO	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:								
ATTAIN UPTIMUM MUISTURE	BK-51 8' HOLLOW AUGERS	THINLY LAMINATED < 0.008 FEET									
PLASTICITY	CME-45C HARD FACED FINGER BITS -N	INDURATION  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.									
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW	CME-550 TUNGCARBIDE INSERTS -H	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS:									
LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM	CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.									
HIGH PLASTICITY 16-25 HIGH	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.									
COLOR	TRICONE TUNG,-CARB.  HAND AUGER SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	LONE BIT	DIFFICULT TO BREAK WITH HAMMER.									
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VARE SHEAR LEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.									
	·		REVISED 09/23/09								











07) (f) (f) 0.98 0.98 0.98 0.98 0.98 0 25 90 75 100 NO 460 0 SELEV.III DISPRACE  100 00.4 2.0 2 3 3 3 6. SST.  SST. M. M. M. SANDY CLAY  100 00.4 2.0 2 3 3 3 6. SST.  SST. M. M. M. SANDY CLAY  100 00.4 2.0 0 0.98 0.98 0.98 0.98 0.98 0.98 0.98	
Collar File   10-20	EASTING 2,034,699  24 HR. 8.0 Cave  D Mud Rotary  HAMMER TYPE Automatic
DRILLER   Context   First	D Mud Rotary HAMMER TYPE Automatic
DRILLER   Contract Driller   START DATE   08/14/13   COMP. DATE   08/15/14   SURFACE WATER DEPTH   N/A	
ELEV (P)	SURFACE WATER DEPTH N/A
105   106   107   107   108	
102.0 0.0 11 4 4 4 1 1 1 4 4 4 1 1 1 1 1 1 1 1 1	O SOIL AND ROCK DESCRIPTION  I G
TAN AND BROWN, SANDY CLAY  95	
95 94.4 7.6 4 4 6 9 13 17 18 40 9 13 17 48 18 18 18 18 18 18 18 18 18 18 18 18 18	- 100.3 GROUND SURFACE UNDIVIDED COASTAL PLAIN
90 89.4 12.6 WOH WOH WOH 85.8 WW SSt. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	TAN AND GRAY, SILTY SAND
90 89.4 12.6 WOH	
85 84.4 17.6 1 3 4 7 SS-9 Sat. 8.0 79.4 22.6 8 12 12 7.5 74.4 27.6 8 27 29 56 Sat. 8.1.4 7.5 Sat. 8.1.4 8.0 9 13 17 8.0 6.5 Sat. 8.1.4 8.0 9 13 17 8.5 8.1.4	
80 79.4 22.6 8 12 12	
75 74.4 27.6 8 27 29	
70 694 326 17 18 40 58. Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat	COASTAL PLAIN  RED AND GRAY, SANDY CLAY  (CAPE FEAR FORMATION)
70 69.4 32.6 17 18 40	
65 64.4 37.6 9 13 17 Sat. Sat. Sat. Sat.	
†	
Sat. 57.4 42.9 9 13 14 SS-22 Sat.	59.3
	59.3 — — — GRAY, SILTY SAND — — — 4
50 49.4 52.6 9 13 9 622 Sat	<u>-</u>
45 44.4 57.6 10 12 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	GRAY, SANDY CLAY 5
50 49.4 52.6 9 13 9 22 Sat.  45 44.4 57.6 10 12 18 Sat.  Boring Terminated at Elevation 42.9 ft IN MED. DENSE SILTY SAND  Sat. 42.9 Solve Silty Sand  WW	40.9 50  Boring Terminated at Elevation 40.9 ft IN
	- HARD SANDY CLAY
	-
	<del> </del>

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## SHEET 9 OF 10

WBS	33727	1.1.1			TI	<b>P</b> B-4490		COUNTY	CUMBER	RLAND			GEOLOGIST Swartley, J. R.				
SITE	DESCR	IPTION	BR.	ON -L-	OVEF	R CSX RR &	HILLSBOF	O ST. @	-L- STA. 2	9+57			•	GROUND WTR (ft)			
BORI	NG NO.	EB2-0	<u> </u>		ST	TATION 30	+46		OFFSET	CL			ALIGNMENT -L-	<b>0 HR</b> . N/A			
COLI	AR ELE	<b>EV</b> . 10	1.7 ft		т	OTAL DEPT	<b>H</b> 59.3 ft		NORTHING	476,7	53		<b>EASTING</b> 2,034,684	<b>24 HR</b> . FIAD			
DRILL	RIG/HAM	IMER EF	F./DATI	E SME	R-2 D	DIEDRICH D-50	84% 11/01/	1 2009		DRILL N	METHOE	D Mu	Id Rotary HAMMER TYPE Autom				
DRIL	LER C	ontract	Driller		ST	TART DATE	04/21/14		COMP. DA				SURFACE WATER DEPTH N/	A			
ELEV	DRIVE	DEPTH	BLC	W COL	JNT		BLOWS P	ER FOOT		SAMP.		1 [					
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 50	)	75 100	NO.	МОІ	O G	SOIL AND ROCK DES	CRIPTION			
105																	
	-	F															
	101.7 -	0.0	5	5	4		1		T		ļ.,		101.7 GROUND SURF. UNDIVIDED COASTA				
100	_	F			7	. 69			ļ · · · · ·		M		- ORANGE AND TAN, SA				
	97.2	4.5				::\:\::											
95		7.0	12	9	10	19					М						
33	-	‡				<del>  ; .  </del>							_ _93.7	8.0			
	92.2	9.5	4	5	7	: : /. :					١.,		TAN, SILTY SA	ND			
90	-	<u> </u>			,	. •12.			<u> </u>		M		_				
	-	<u> </u>				:::::											
	87.2	14.5	2	2	9						Sat.						
85	_	ŀ				<del>  .    </del>			<del>                                     </del>				-				
	82.2	19.5				: :::											
80	_	F	4	3	5	8					Sat.			<u>21</u> .0			
	78.9	22.8	10	12	15					SS-23	Sat.	//// ////	GRAY, CLAYEY S	SAND			
	-	ļ.	"		10		27			33-23	Sat.	·//	(CAPE FEAR FORM	IATION)			
75	700	†					. ,		ļ · · · · ·			////	-				
	73.9 -	27.8	18	23	29			• • • • •52• • •			Sat./W			<u>IDY CLAY</u> <u>28.3</u>			
70	-	‡											, -	-			
70	68.9 -	32.8							`\				_				
	-	<u> </u>	16	32	58				90		W						
65	-	<u> </u>							1				_				
	63.9 -	37.8	12	18	28			/ [		SS-24	l w						
	-	Ĺ				::::	: : : : \	 	1::::								
60	58.9 <b>-</b>	42.8						<b>\</b>	<del> </del>				-				
	-		12	22	33			55		SS-25	w						
55	=	F							: : : :								
	53.9	47.8	9	13	19		/				l w		_				
	-	F			-	::::	32				"						
50	48.9 -	52.8					1						-				
	40.9 -	52.0	10	12	18		30				w						
45	-	ļ.				::::	./: : :										
70	43.9	57.8	11	15	23		. \		: : : :				-				
	-	-	''	15	23		∳38-				W		42.4 Boring Terminated at Eleva	59.3 ation 42.4 ft IN			
	_	‡											HARD SANDY C	LAY			
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PROJ. NO. - 33727.1.1 ID NO. - B-4490 COUNTY - CUMBERLAND

EB1-A

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY W	EGHT		% PAS	SING (S	EVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡIJ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-33	57 LT	28+38	81-9.6	A-7-5(35)	66	29	31	31	16.6	77.3	100	98	95	61.1	_
SS-34	57 LT	28+38	23.1-24.6	A-6(4)	35	13	22.8	34.2	32 <i>9</i>	102	100	86	50	_	-
SS-35											-				

*EB1-B* 

			S	OIL T	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO		%	BYWEIG	HT	% PASSING (SIEVES)					%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡĮ	C SAND	F.SAND	SIIT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-55	45RT	29+46	24.5-26.0	A-4(1)											

EB2-A

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO		%	BYWEIG	HT		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡŢ	C SAND	F SAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-7	55 LT	30+20	2.6-4.1	A-6(5)	32	16	31.1	18.2	163	34.4	97	75	52	_	_
SS-8	55 LT	30+20	12.6-14.1	A-6(7)	31	16	7.5	37.0	15.1	40.4	100	97	62	_	_
SS-9	55 LT	30+20	17.6-19.1	A-2-4(0)	23	NP	5.9	75.0	9.0	10.1	100	100	26	-	-
SS-10	55 LT	55LT 30+20 22.6-24.1 A-2-4(0) 37 NP 62.7 16.7 12.5 8.1 97 54 23 -									_				

*EB2-C* 

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO		૾ૢ	BYWEIG	HT		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡĮ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-23	CL	30+46	22.8-24.3	A-2-6(0)	38	16	57.6	22.4	16.0	41	96	58	23	-	-
SS-24	CL	30+46	37.8-39.3	A-6(1)	37	13	31.5	37.6	22.7	81	100	85	36	_	1
SS-25	CL	30+46	42.8-44.3	A-6(1)	36	12	37.4	30.3	22.1	10.2	99	77	37	_	_

ER2-R

EBZ-B	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO		% BYWEGHT				% PAS	SING (S		૪	%	
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡĮ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-22	57RT	30+81	429-441	A-2-4(0)	28	8	43.4	30.8	16.8	9.0	99	76	29	-	-



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**CONTENTS** 

**DESCRIPTION** 

BORE LOG & CORE REPORT(S)

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LEGEND

SITE PLAN

PROFILE(S)

CROSS SECTION(S)

SOIL TEST RESULTS

**SHEET** 

## STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33727.1.1 (B-4490) F.A. PROJ. **BRNHS-0024(24)** COUNTY \_\_CUMBERLAND PROJECT DESCRIPTION BRIDGE NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR, & HILLSBORO ST. ON NC 24-210

SITE DESCRIPTION BRIDGE ON -L- OVER NORFOLK SOUTHERN

**CAUTION NOTICE** 

N.C.

STATE STATE PROJECT REFERENCE NO.

33727.1.1 (B-4490)

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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 RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (19) 707-6850. 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 SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BORFHOLE, THE LABORATORY SAMPLE DATA MNO THE IN SITU IN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES. POPERIDATION AND WAND AS WELL AS COTTER PROACTIONAL OF 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 SUBSUBFACE 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 CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR DINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSUBFACE 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 MIDICATED IN THE SUBSUBFACE INFORMATION. THOSE INDICATED IN THE SUBSURFACE INFORMATION.

> PERSONNEL S&ME, INC.

J.R. SWARTLEY

O.B. OTI

H.R. CONLEY

J.R. MATULA

INVESTIGATED BY J.R. SWARTLEY

N.T. ROBERSON

SUBMITTED BY\_ N.T. ROBERSON

JUNE 2014



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.

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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.

#### PROJECT REFERENCE NO. 33727.I.I (B-4490) SHEET NO.

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

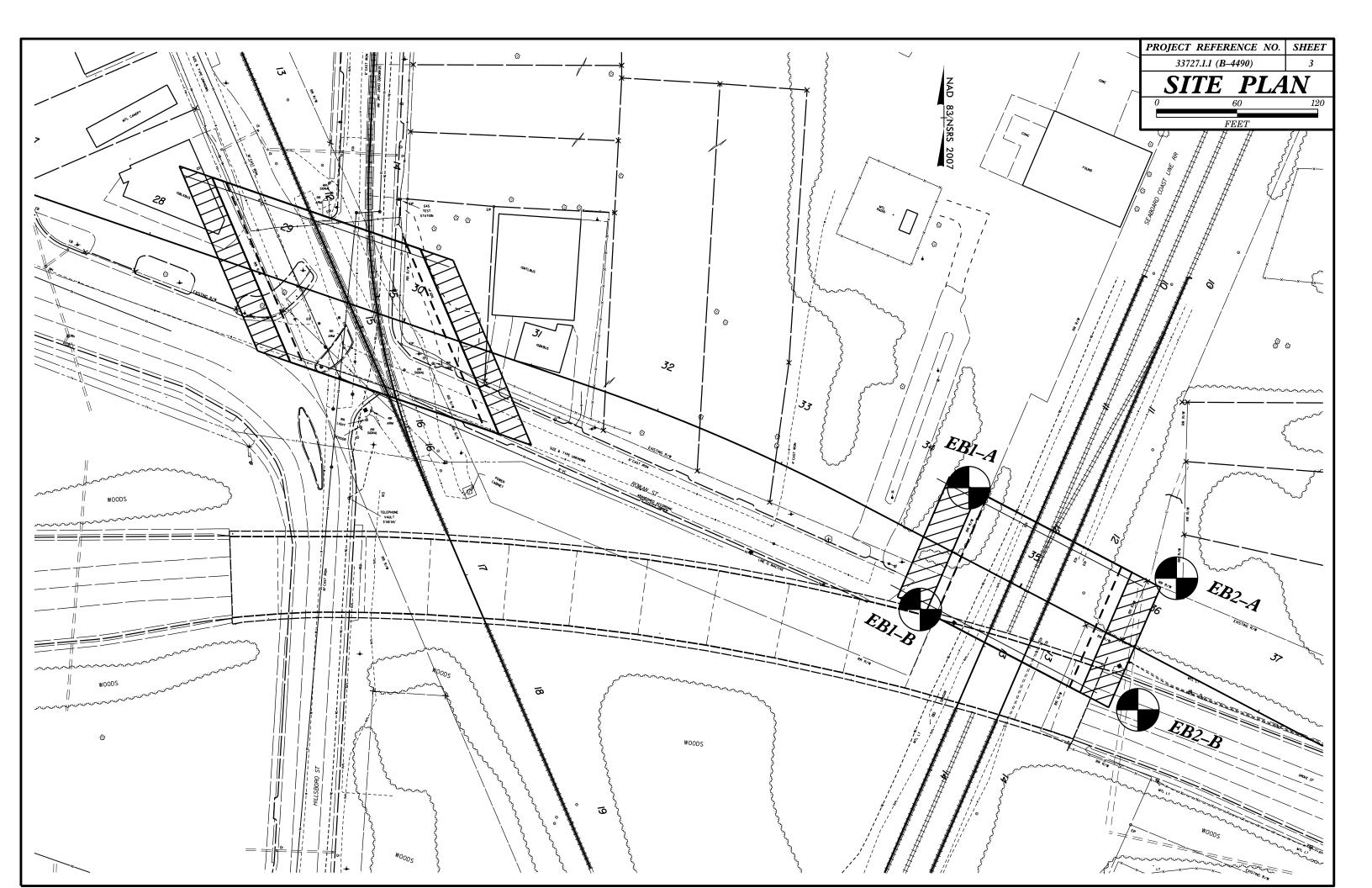
#### DIVISION OF HIGHWAYS

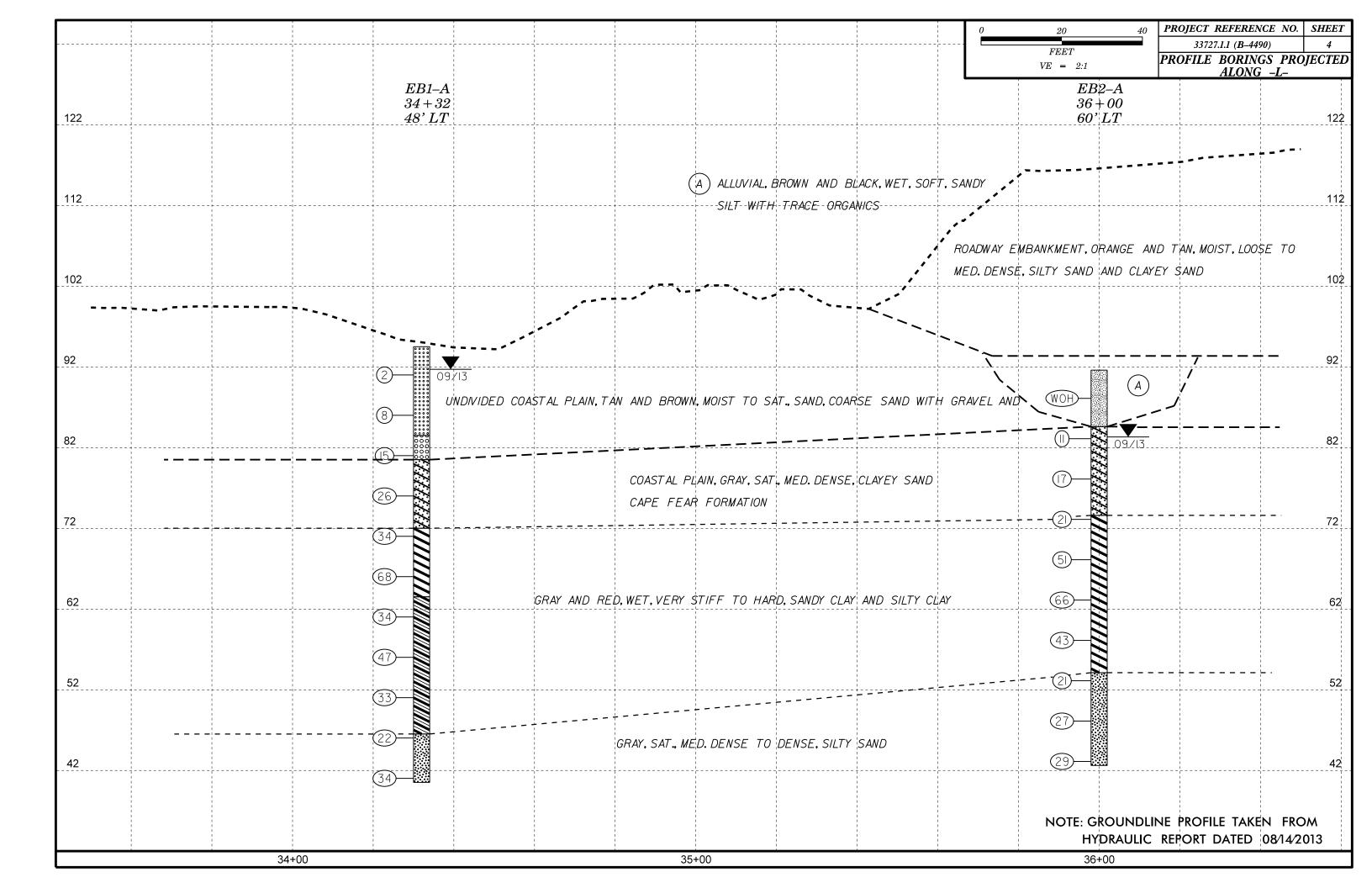
## GEOTECHNICAL ENGINEERING UNIT

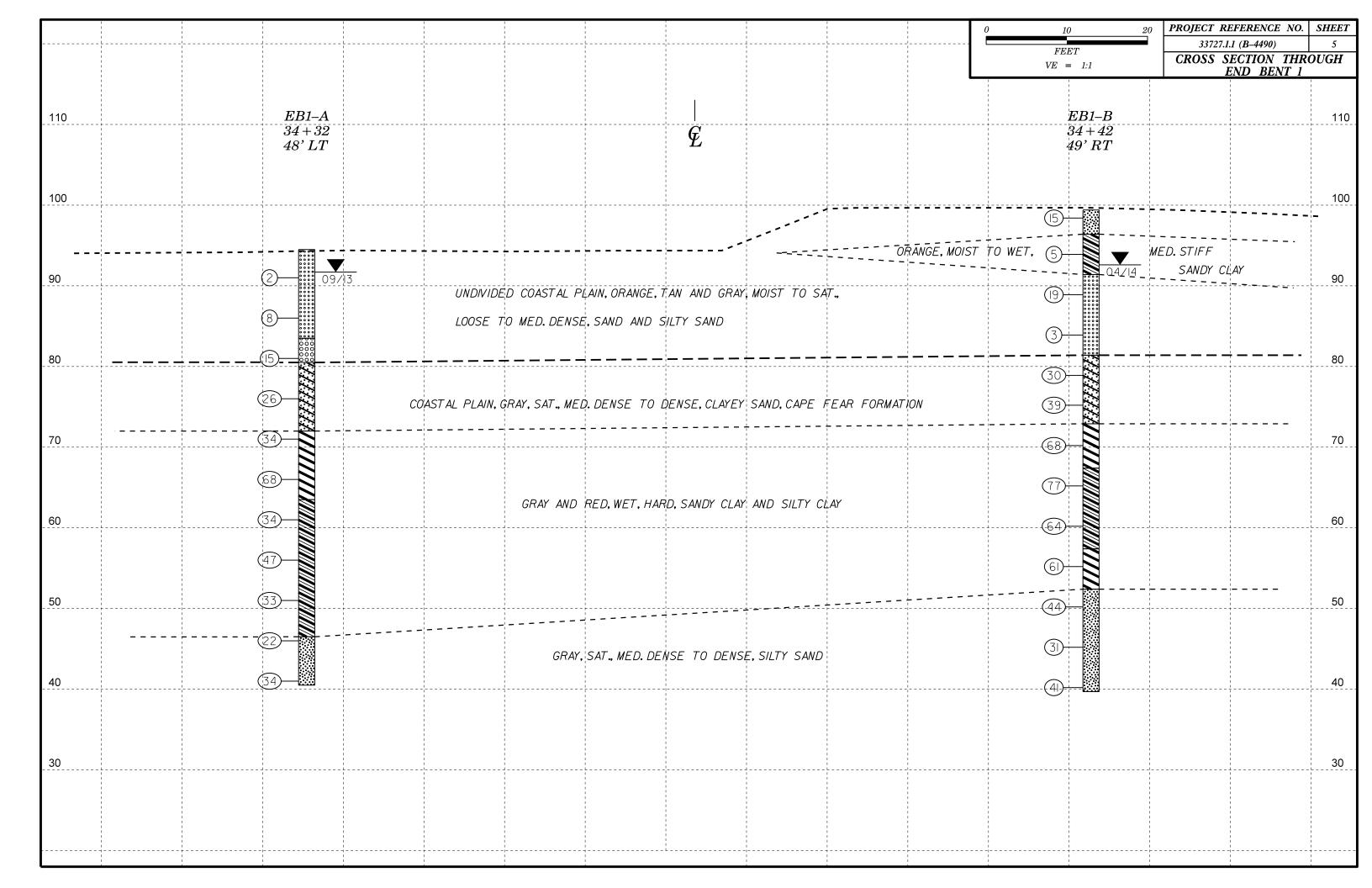
## SUBSURFACE INVESTIGATION

## SOIL AND BOCK LEGEND TERMS SYMBOLS AND ARRESTIATIONS

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS											
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS								
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.								
THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL	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. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.								
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,								
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:  VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDE</u> D, OR <u>ROUNDED</u> .	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.  CONSTALLINE  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE								
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELOSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	GROUND SURFACE.  CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.								
CLASS. (\$ 35% PASSING *200) (> 35% PASSING *200)  GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM								
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 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50	ROCK (NCR)	OF SLOPE.								
SYMBOL B00000000000000000000000000000000000	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPI REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SPILL BEDS, ETC.	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.								
Z PASSING  10 50 MX SILT-  GRANULAR CLAY MUCK.	PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT								
4 0 38 MX 58 MX 51 MX	UNUANIL MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE								
LTOUTD LTMTT	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 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC   5 - 10%   12 - 20%   SOME   20 - 35%   HIGHLY ORGANIC   >10%   >20%   HIGHLY   35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	<u>OIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.								
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE AMOUNTS OF AMOUNTS OF	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 ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.)  1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.								
MATERIALS SAND SAND SAND SAND SUILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM								
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.								
SUBGRADE   FOUR   PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.  MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.								
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN								
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE)  WITH SOIL DESCRIPTION  POPT ONT TEST BORING  W/ CORE	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.								
VERY LODGE	AUCED DODING COT N VALUE	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 KAQLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO								
GRANIII AR LOOSE 4 TO 10	5512 5111502	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.								
MATERIAL   MEDIUM DENSE   10 TO 30   10/H	ARTIFICIAL FILL (AF) OTHER ————————————————————————————————————	IF TESTED, VIELDS SPT N VALUES > 100 BPF  VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	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	— INFERRED SOIL BOUNDARY MONITORING WELL	(V 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.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN								
VERY SOFT	TITETITE INFERRED ROCK LINE A PIEZOMETER	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 < 100 BPF	INTERVENING IMPERVIOUS STRATUM.								
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0   MATERIAL   STIFF   8 TO 15   1 TO 2	INSTALLATION  TTTTT ALLUVIAL SOIL BOUNDARY  SLOPE INDICATOR	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.								
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/025 DIP & DIP DIRECTION OF	SCATTERED CONCENTRATIONS, GUARTZ 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 ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND								
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES  CONE PENETROMETER TEST	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE.								
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	● SOUNDING ROD	VERY HARD  CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES  SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK,	SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE 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	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.								
(BLDR,) (CUB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED  CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	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 OR SLIP PLANE.								
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	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 PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	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  OUTPERBERG LIMITS)  DESCRIPTION	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	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	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	OF STRATUM AND EXPRESSED AS A PERCENTAGE.								
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRACT FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS 20 - MOISTURE CONTENT CBR - CALIFORNIA BEARING	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - 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 SEMISOLIDE REQUIRES DRYING TO	HI HIGHLY V - VERY RATIO	FINGERNAIL.	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.								
RANGE - WET - (W) SEMISULITY REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING  TERM SPACING IERM THICKNESS									
NOICE AND COLUDE AT OR NEAR ORTHWIN MOLETURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FFFT VERY THICKLY BEDDED > 4 FEET	BENCH MARK: BL-6, -L- STA., 33+08.2I, 68.94' RT  N: 476596.7086 E: 2034898.9756								
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE 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: 98.90 FT.								
REQUIRES ADDITIONAL WATER TO	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:								
ATTAIN UPTIMUM MUISTURE	BK-51 8' HOLLOW AUGERS	THINLY LAMINATED < 0.008 FEET									
PLASTICITY	CME-45C HARD FACED FINGER BITS -N	INDURATION  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.									
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW	CME-550 TUNG,-CARBIDE INSERTS -H	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS:									
LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM	CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.									
HIGH PLASTICITY 16-25 HIGH	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.									
COLOR	TRICONE TUNG,-CARB.  HAND AUGER SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	LONE BIT	DIFFICULT TO BREAK WITH HAMMER.									
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VARE SHEAR LEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.									
	·		REVISED 09/23/09								







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110			T. LOOSE TO MED. DENSE,	MOIST	ORANGE - AND - TAN	<i>L00SE</i>	TO-MED. DENSE, SILTY-SAND		110
	SILTY SAND AND CLAYE	Y SAND			AND	CLAYE	TY SAND		
				1 1 1					
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	COASTAL P					<u>L</u> _			
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-	33727				<b>IP</b> B-4490			Y CUMBE				GEOLOGIST Oti, O. B.			<b>WBS</b> 33					<b>IP</b> B-4490			CUMBER			0	<b>GEOLOGIST</b> Swartley, J		
-					R NORFOL		ERN RR @	1					-	ND WTR (ft)				R. ON -L					) -L- STA. 35						ND WTR (ft)
	RING NO.				TATION 3			OFFSET				ALIGNMENT -L-	0 HR.	N/A	BORING					TATION 3			OFFSET 4				ALIGNMENT -L-	0 HR.	
	LAR ELE				OTAL DEP		t	NORTHIN				<b>EASTING</b> 2,035,061	24 HR.	2.8	COLLAR					OTAL DEP			NORTHING				<b>EASTING</b> 2,035,025	24 HR.	
					CME-55 92%			T		METHOD		,		Automatic						DIEDRICH D-						Mud Ro	-	HAMMER TYPE	Automatic
	LER Co				TART DAT			COMP. D				SURFACE WATER DEPTH N	<u>'A</u>		DRILLER					TART DAT			COMP. DA			<u>    S</u>	SURFACE WATER DEPT	H N/A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	BLOW C	ft 0.5ft			PER FOO <sup>*</sup> 50	ı 75 10			Ö,	SOIL AND ROCK DES	CRIPTION		ELEV DRI (ft) CF		H BI	OW CO	0.5ft	-		PER FOOT 50	75 100	SAMP.	1 /	OI G	SOIL AND ROCH	C DESCRIPTION	N
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## SHEET 8 OF 10

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SITE	DESC	RI	PTION	BR.	ON -L	- OVE	R NORFOLI	SOUTHE	RN RR @	-L- STA. 35	+23						GROUI	ND WTR (ft
BORI	ING N	Ο.	EB2-	Ą		S	TATION 3	6+00		OFFSET	60 ft LT			ALIGNME	NT -L-		0 HR.	N/A
COLI	LAR E	LE	<b>V</b> . 91	.6 ft		T	OTAL DEP	<b>ΓH</b> 49.0 ft	:	NORTHING	476,5	77		EASTING	2,035,215		24 HR.	2.0
DRILL	RIG/H	AM	MER EF	F./DAT	E RF	00074 C	CME-55 92%	07/12/2011			DRILL N	ETHO	D Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER	Co	onley, H	1. R.		S	TART DATI	E 09/12/1	3	COMP. DA	TE 09/	12/13		SURFACE	WATER DE	PTH N	A	
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SITE	DES	CRIPT	ION I	BR. ON	-L- OV	ER NORF	OLK S	OUTHE	RN RR @	L- STA.	35+23						GROUN	ND WTR (ft)	SI	TE DESC	RIPTION	BR. (	ON -L-	- OVER	NORFOL	SOUTH	ERN RR (	@ -L- STA. 3	5+23						GROUND	WTR (ft)
BOR	ING N	NO. E	B2-B			STATION	I 36+2	20		OFFSET	40 ft F	RT		ALIGNI	MENT -L-		0 HR.	N/A	В	ORING NO	. EB2-l	В		ST	ATION 36	6+20		OFFSET	40 ft R1	-		ALIGNM	ENT -L-		0 HR.	N/A
COL	LAR	ELEV.	125.	2 ft		TOTAL D	EPTH	94.1 ft		NORTHI	NG 476	6,480		EASTIN	<b>IG</b> 2,035,18	37	24 HR.	FIAD	C	OLLAR EL	. <b>EV</b> . 12	25.2 ft		TC	TAL DEPT	<b>H</b> 94.1	ft	NORTHING	<b>G</b> 476,4	480		EASTING	<b>3</b> 2,035,187	7	24 HR.	FIAD
DRILI	_ RIG/I	HAMME	R EFF./	DATE S	SME R-2	DIEDRICH	HD-50 8	4% 11/01	1/2009		DRIL	L METI	H <b>OD</b> M	Mud Rotary		HAMN	MER TYPE	Automatic	DF	RILL RIG/HA	MMER EF	F./DATE	E SME	E R-2 D	IEDRICH D-5	0 84% 11/0	01/2009		DRILL	METHO	OD M	ud Rotary		HAMN	ER TYPE	Automatic
DRIL	LER	Cont	ract Dr	iller		START D	ATE	04/28/1	4	СОМР. [					CE WATER	<b>DEPTH</b> N	I/A			RILLER (					ART DATE	04/28/	14	COMP. DA	<b>ATE</b> 04	/28/14	1	SURFAC	E WATER D	EPTH N	'A	
ELEV (ft)	DRI' ELE (ft		PTH_(ft)(	BLOW 0.5ft 0.5	ount oft 0.5	ft 0	25		PER FOOT 50		SAN 00 NO	'	MOI G	ELEV. (ft)	SOIL AND	ROCK DES	SCRIPTION	N DEPTH (f	ELI (f	EV DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		0 2		PER FOO	T 75 100	SAMF NO.	1/	L O OI G		SOIL AND I	ROCK DES	CRIPTION	
130		_												_					_5	0	<u> </u>			+		Mat	ch Line		<del>                                     </del>			<del>_</del>	GRAY, SIL	.TY SAND (	continued)	
125	124	1.6	0.6											- - 125.2 - 124.6		OUND SURF		0. 			+ 77.6 -	11	14	20		34				Sat		- - - 				81 (
120		2.6	2.6	4 6			11				-		и <u> </u>			NAY EMBAN	KMENT	ŒY	4	42.6	82.6	12	18	30			48			w		= :::= - - -	GRA	Y, SANDY (	CLAY	
	_117	7.6	7.6	4 6	6	- 1	12				-	1	и								87.6	15	25	30			55			Sat		39.2 - -	GRA	Y, SILTY S	AND	86.0
115		2.6 = 1	2.6	5 6	6 6						-		v L	109.2					3	32.6	92.6	17	30	38					-	w		34.2	- – – GRA	Y, SANDY (	CLAY	91.0
110		7.6 - 1				- 1	12				-		VI S	109.2				16.			<del>                                     </del>						<del>_</del>	<b>9</b> 68		VV		31.1 E	Boring Termina HARI	ated at Elev D SANDY (	ation 31.1 ft CLAY	94.1 IN
05				2 5	5 7	] ; <b>*</b>	12				-     -	-50 N	V	<del>,</del>							† †											- - -				
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	92.	.6 <del>-</del> 3	2.6	3 4	6	- : j : j	0				-	1	VI	94.2 - - -	TAN AND BL	DED COASTA ACK, SILTY ACE ORGAN	Y SAND WI	<u>31</u> . ITH			Ī											-				
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85	82.	.6 + 4	2.6								- - -										‡											- - -				
80		Ī		10   10	0   20			30			-	S	at.	81.2	GR/	AY, SANDY	CLAY -	44.			Ī											<del>-</del> -				
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	72.	.6 + 5	2.6	14 1	5 29			• • • • • • • • • • • • • • • • • • •	4		- - -		<i>N</i>	74.2	GR	AY, SILTY C	CLAY	<u>51</u> .			† 											- - -				
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65	62.	.6 + 6			-	::				· · · ·	- - -			64.2		ĀY, SILTY S	SAND	61.			‡											- - -				
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55	57.	6 + 6	7.6	12 18	8 35				53		: - -	\	^ <b>\</b>	54.2				<u>71</u> .			<u> </u>															
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## PROJ. NO. -33727.1.1 ID NO. - B-4490 COUNTY -CUMBERLAND

EB1-A

			S	OIL T	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	EGHT		% PAS	SING (S	EVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡĮ	C SAND	F SAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-18	48 LT	34+32	17.5-19.0	A-2-6(0)	40	13	51.8	24.1	18.1	61	96	63	28	-	-
SS-19	48 LT	34+32	22.5-24.0	A-7-6(5)	43	15	20.7	39.8	31.4	81	100	89	49	-	-
SS-20	48 LT	34+32	32.5-34.0	A-6(2)	40	13	25.8	42.0	24.1	81	100	90	39	-	_
SS-21	48 LT	34+32	48 D-49 D	A-2-4(0)	33	NP	66.0	23.7	8.3	2.0	97	62	13	_	-

*EB1-B* 

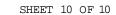
			S	OIL 7	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO		%	BYWEG	НТ		% PAS	SING (S	EVES)		%	્રે
NO.	OFFSET	STATION	<b>I</b> NTERVAL	CLASS.	LL.	ΡĮ	C SAND	F SAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-13	49RT	34+42	19.5-21.0	A-2-6(1)	40	15	43.3	26.4	193	11.0	93	71	32	-	-
SS-14	49RT	34+42	28 2-29 .7	A-7-6(7)	43	15	20.9	28 <i>9</i>	36.2	14.0	100	89	57	-	_
SS-15	49RT	34+42	43.2-44.7	A-7-6(9)	44	15	8.8	36.5	38.6	16.0	100	96	66	-	_
SS-16	49 RT	34+42	53 <i>2</i> -54 <i>.</i> 7	A-2-4(0)	40	NP	56.3	30.4	93	4.0	99	72	16	-	-

EB2-A

LDZ-A															
			S	OIL T	$\Gamma E_{s}$	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO		%	BYWEIG	HT		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	<b>I</b> NTERVAL	CLASS.	LL.	ΡJ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-22	60 LT	36+00	25-4.0	A-4(2)	25	9	23.6	29.8	28.3	18.3	100	87	52	-	3.8
SS-23	60 LT	36+00	75-9.0	A-2-6(0)	35	13	47.3	28.8	15.7	81	85	58	24	-	-
SS-24	60 LT	36+00	18.0-19.0	A-7-5(10)	46	16	7.5	39 <i>.</i> 4	45 D	81	100	97	64	-	-
SS-25	60 LT	36+00	27 5-29 0	A-7-6(4)	46	20	44.8	16.4	25.6	13.2	97	64	40	_	_
SS-26	60 LT	36+00	37.5-39.0	A-2-4(0)	31	9	32.9	41.2	18.8	71	100	92	32	_	_

*EB2-B* 

			S	OIL 7	TE.	ST	<b>RE</b>	SUI	LTS						
SAMPLE			DEPTH	AASHTO		%	BYWEG	НТ		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	<b>I</b> NTERVAL	CLASS.	LL.	ΡĮ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-50	40RT	36+20	17.6-19.1	A-2-7(2)	45	23	34 D	36.0	15	28.5	99	79	32	-	ı
SS-51	40RT	36+20	47.6-49.1	A-2-6(1)	37	15	51 D	22.4	165	102	97	72	29	_	1
SS-52	40RT	36+20	72.6-74.1	A-2-4(0)	32	8	28.9	48.2	16.8	61	100	88	29	-	-



3

STATE OF NORTH CAROLINA

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

**CONTENTS** 

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND SITE PLAN & PROFILE

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUN	NTY_	CUN	1BEF	RLAN	D							
PROJ	JECT	DES	CRIP.	TION _	BR.	. <i>NO</i> .	. 116	OV	ER	CS	$\boldsymbol{X}$	RR,
NO.	RFO	LK	SOU	THER	$^{2}N$	RR	હ	HI	LLS	BO	RO	ST.
SITE	DES	CRIP	TION	MSE	R	ETA	INI	<b>VG</b>	WA	<b>LL</b>	NC	). <i>1</i>

STATE PROJECT REFERENCE NO. 3 B-4490

#### **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 RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. 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 DES 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS.

- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY 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.

	D.G. PINTER
	J.R. SWARTLEY
	O.B. OTI
INVESTIGATED	BY J.R. SWARTLEY

**PERSONNEL** 

CHECKED BY N.T. ROBERSON SUBMITTED BY N.T. ROBERSON AUGUST 2015

9/25/2015

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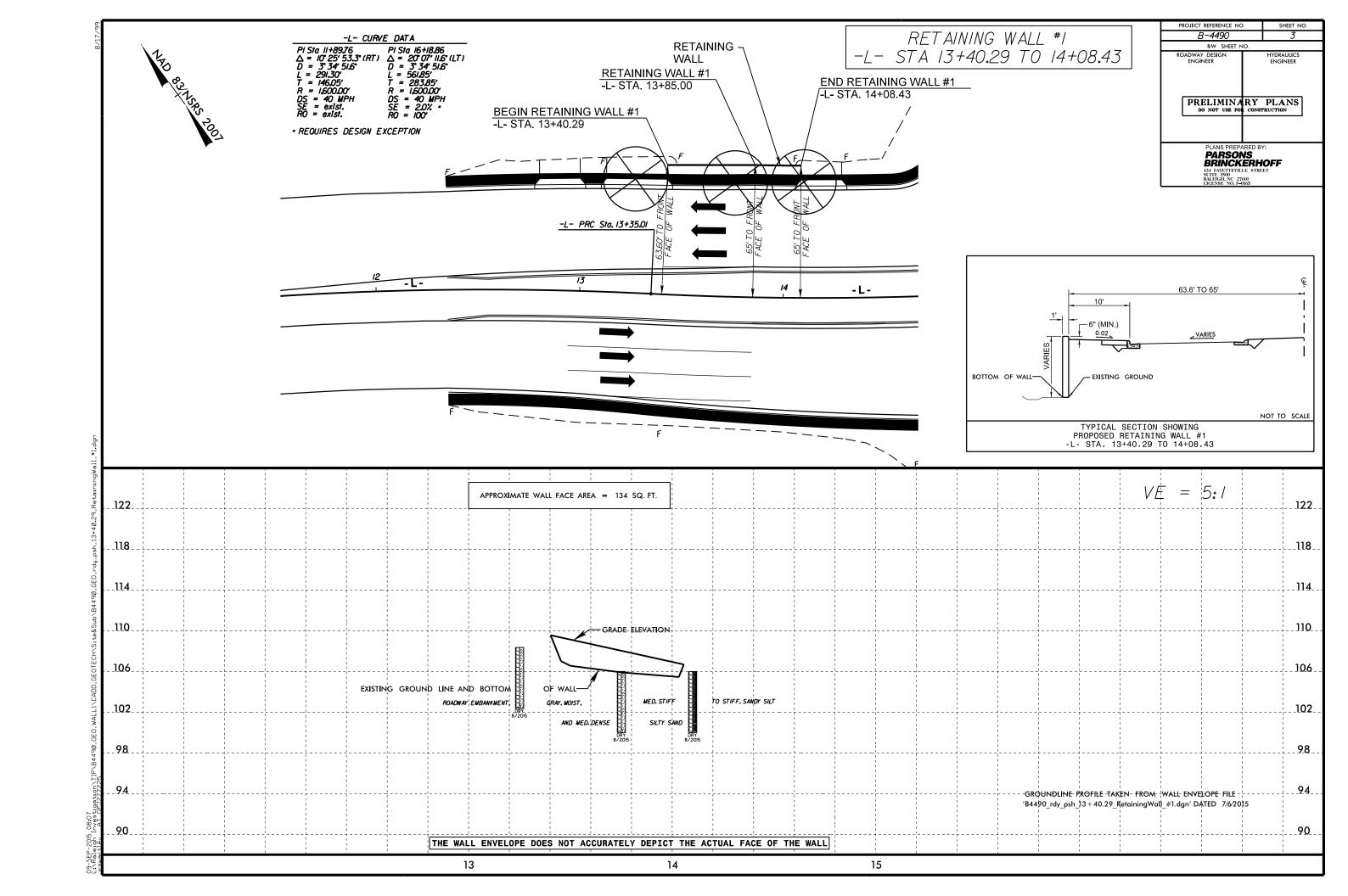
DATE

PROJECT REFERENCE NO. SHEET NO. 2

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

## SUBSURFACE INVESTIGATION

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	SU//2SU//A	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) CONTROL PARTICULARS  GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1 A-2 A-4 A-5	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ONEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-7 A-1, A-2 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK (NCR)  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED CP) SHELL BEDS, ETC.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX   GRANULAR   GRANULAR   CLAY   MUCK,   *40 30 MX 50 MX 51 MN   SOILS   CONS   PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
2000 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%, LITTLE ORGANIC MATTER 3 - 5%, 5 - 12%, LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 48 MX 41 MN LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) 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
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 12 MX 12 MX 11 MN 11 MN MODERATE OPCOME	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
GRUDY INDEX U U 4 MX 8 MX 12 MX 16 MX NU MX AMUUNIS UF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO  1 INCH. OPEN JOINTS MAY CONTAIN 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 MATOR CRAYEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.  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	→ SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	POODWAY EMBANKMENT (PE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONTRACTIVES ON PENETRATION RESISTENCE COMPRESSIVE STRENGTH (IONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES  ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SITE TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	ADTIFICIAL SILL (AS) OTHER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER  TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY ( ) CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	MW TEST PODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4  HARD > 30 > 4	→→→→→→ ALLUVIAL SOIL BOUNDARY △ PIEZOMETER INSTALLATION — SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL OF SHALLOW UNDERCUT	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED  CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE CAUSE FOR EXAMPLE ASSOCIATION	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS 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	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT,) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC   CEMICOLID. REQUIRES DRVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK:
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE	
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D)  ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	
PLASTICITY	CME-55	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:  CASING POST HOLE DIGGER	CDAING CAN BE CERARATED FROM CAMPLE WITH CTEEL BRORE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH X HAND AUGER	MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;  SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
		•	



**CONTENTS** 

**DESCRIPTION** 

SITE PLAN & PROFILE

SOIL TEST RESULTS

TITLE SHEET LEGEND

SHEET NO.

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## STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND PROJECT DESCRIPTION BR. NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR & HILLSBORO ST. SITE DESCRIPTION MSE RETAINING WALL NO. 2

STATE PROJECT REFERENCE NO. B-4490 4

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

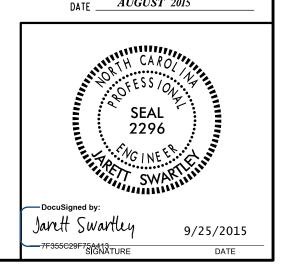
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS ASOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY 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.

SUBMIT

S&ME, INC.
J.R. SWARTLEY
INVESTIGATED BY J.R. SWARTLEY
DRAWN BY
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON

**PERSONNEL** 



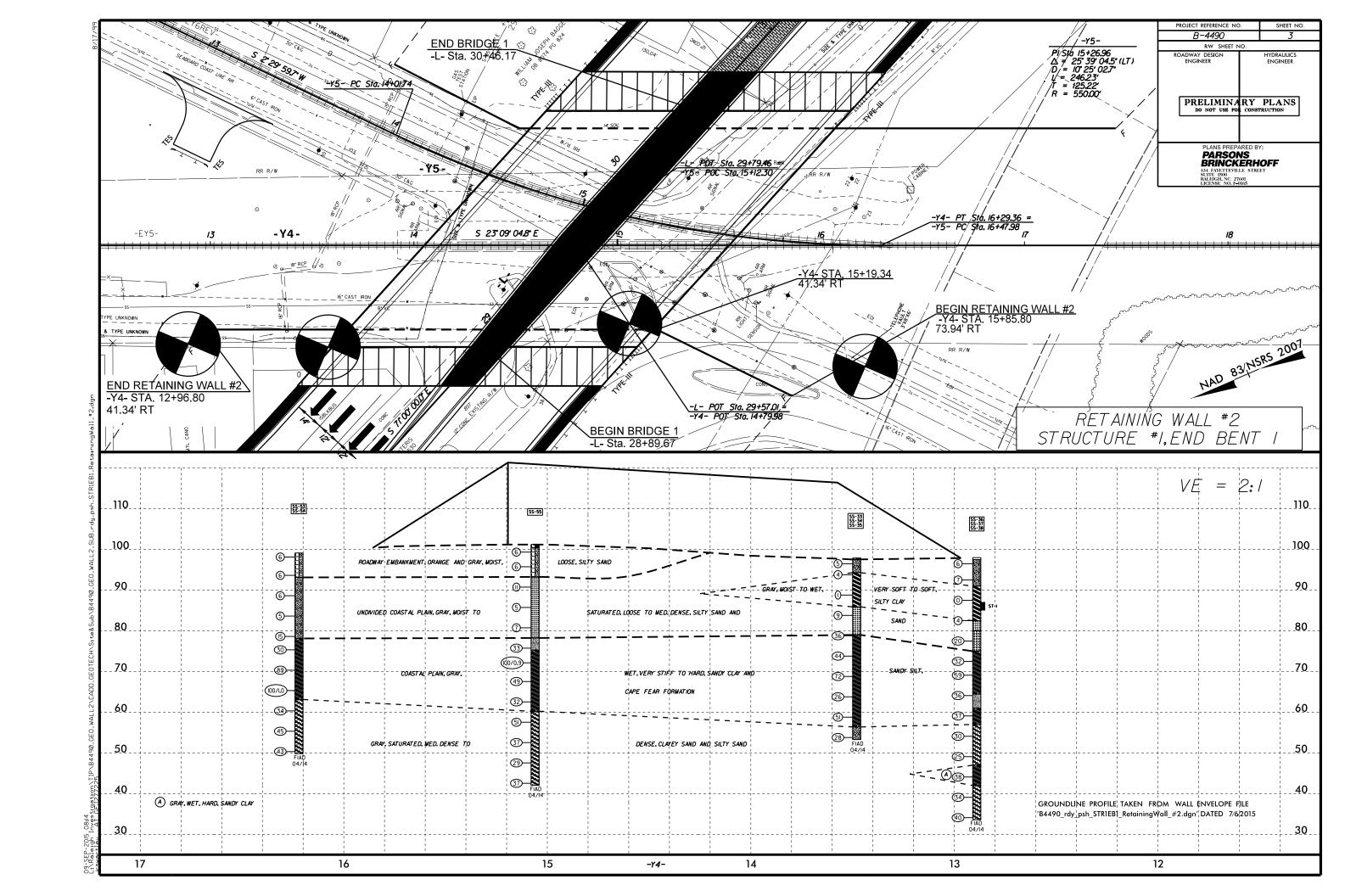
AUGUST 2015

PROJECT REFERENCE NO. SHEET NO. 2

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

## SUBSURFACE INVESTIGATION

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SASTM D1586). SASTM D1586, SASTM D1586	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.  MINERAL OGICAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.  ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:  WEATHERED  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  AQUIFER - A WATER BEARING FORMATION OR STRATA.  ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CROUP A-I A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7 SYMBOL CROSS CROS	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31	ROCK (CR)  NON-CRYSTALLINE ROCK (NCR)  NON-CRYSTALLINE ROCK (NCR)  NON-CRYSTALLINE ROCK (NCR)  ROCK (NCR)  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED  FRESH  ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  VERY SLIGHT (V SLI,)  CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.  SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI,)  1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORATION AND WEATHERING EFFECTS, IN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM 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.  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 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 ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGED FROM
CONSISTENCY   COMPRESSIVE	PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  SPRING OR SEEP  MISCELLANEOUS SYMBOLS  ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  INFERRED ROCK LINE  MW MONITORING WELL TEST  ALLUVIAL SOIL BOUNDARY  PIEZOMETER INSTALLATION  SPT N-VALUE	(MOD.)  GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.  MODERATELY SEVERE (MOD. SEV.)  AND CISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND COAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL  SEVERE (SEV.)  ALL ROCK EXCEPT QUARITZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARITZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK USTAINS. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF  COMPLETE  ROCK REDUCED TO SOIL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF  ROCK REDUCED TO SOIL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF  ROCK REDUCED TO SOIL ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARITZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	PAGENT MATERIAL.  FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  LEGGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  MOTITLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTITLING 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.  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.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE	UNDERCUT UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNDERCUT UNDERC	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.  MODERATELY HARD  CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT  OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  STANDARD PERTATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF I 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 OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - 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.
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS $\omega$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING         BEDDING           TERM         SPACING         TERM         THICKNESS	BENCH MARK:
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY	DRILL UNITS:  ORIGHNAT USED ON SUBJECT PROJECT  DRILL UNITS:  ORIGHNAT USED ON SUBJECT PROJECT  HAMMER TYPE:  ORIGHNATIC MANUAL  ORIGHNATIC MANUAL	VERY WIDE	ELEVATION: FEET  NOTES:
PLASTICITY INDEX (PI)  NON PLASTIC SLIGHTLY PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC 26 OR MORE HIGH  COLOR  DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CME-550	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  INDURATED  GRAINS ARE DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHAPP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1



PROJECT REFERENCE NO.	SHEET				
B-4490	4				
SOIL TEST RESULTS					

## RETAINING WALL #2

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	C.SAND	% BY I	WEIGHT SILT	CLAY	% PAS	SING (S	IEVES) 200	% MOISTURE	% ORGANIC
SS- 53	60 RT	16 +22	22. 8- 24. 3	A-6(4)	36	14	21.0	37.4	<i>33</i> . 5	8. 1	100	88	51	-	-
SS- 54	60 RT	16 +22	37.8-39.3	A- 2-6(0)	31	12	42. 1	28.4	18. 3	11.2	95	70	31	-	-
SS- 55	38 RT	15+06	24. 5- 26. 0	A- 4( 1)	36	9	26.9	36.2	28.8	8. 1	99	84	44	-	-
SS- 33	50 RT	13+58	8. 1-9.6	A-7-5(35)	66	29	3. 1	3. 1	16.6	77.3	100	98	95	61	-
SS- 34	50 RT	13+58	23. 1-24.6	A-6(4)	35	13	22.8	34. 2	32. 9	10.2	100	86	50	-	-
SS- 35	50 RT	13+58	43. 1-44.6	A- 2- 4( 0)	31	10	48.6	31.1	16. 2	4. 1	100	74	26	-	-
SS- 36	48 RT	12+89	19. 5- 21. 0	A- 1- b( 0)	44	NP	68.6	21.1	6.3	4. 1	94	47	12	-	-
SS- 37	48 RT	12+89	33. 4- 34. 4	A- 4( 0)	24	9	34.8	31.1	21.9	12. 2	99	81	38	-	-
SS- 38	48 RT	12+89	42. 9- 44. 4	A-2-6(1)	32	14	47.0	24.9	16.9	11.2	95	68	29	-	-

**CONTENTS** 

**DESCRIPTION** 

SITE PLAN & PROFILE

SOIL TEST RESULTS

TITLE SHEET LEGEND

SHEET NO.

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## STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND PROJECT DESCRIPTION BR. NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR & HILLSBORO ST. SITE DESCRIPTION MSE RETAINING WALL NO. 3

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4490	1	4

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1999 707-8850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

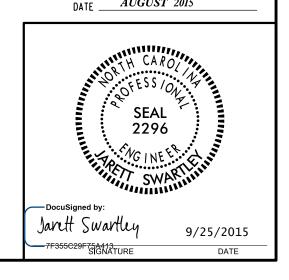
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY 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.

	S&ME, INC.
	J.R. SWARTLEY
INVESTIGATED	BY J.R. SWARTLEY
DRAWN BY	J.R. SWARTLEY
CHECKED BY _	N.T. ROBERSON
	N.T. ROBERSON

PERSONNEL



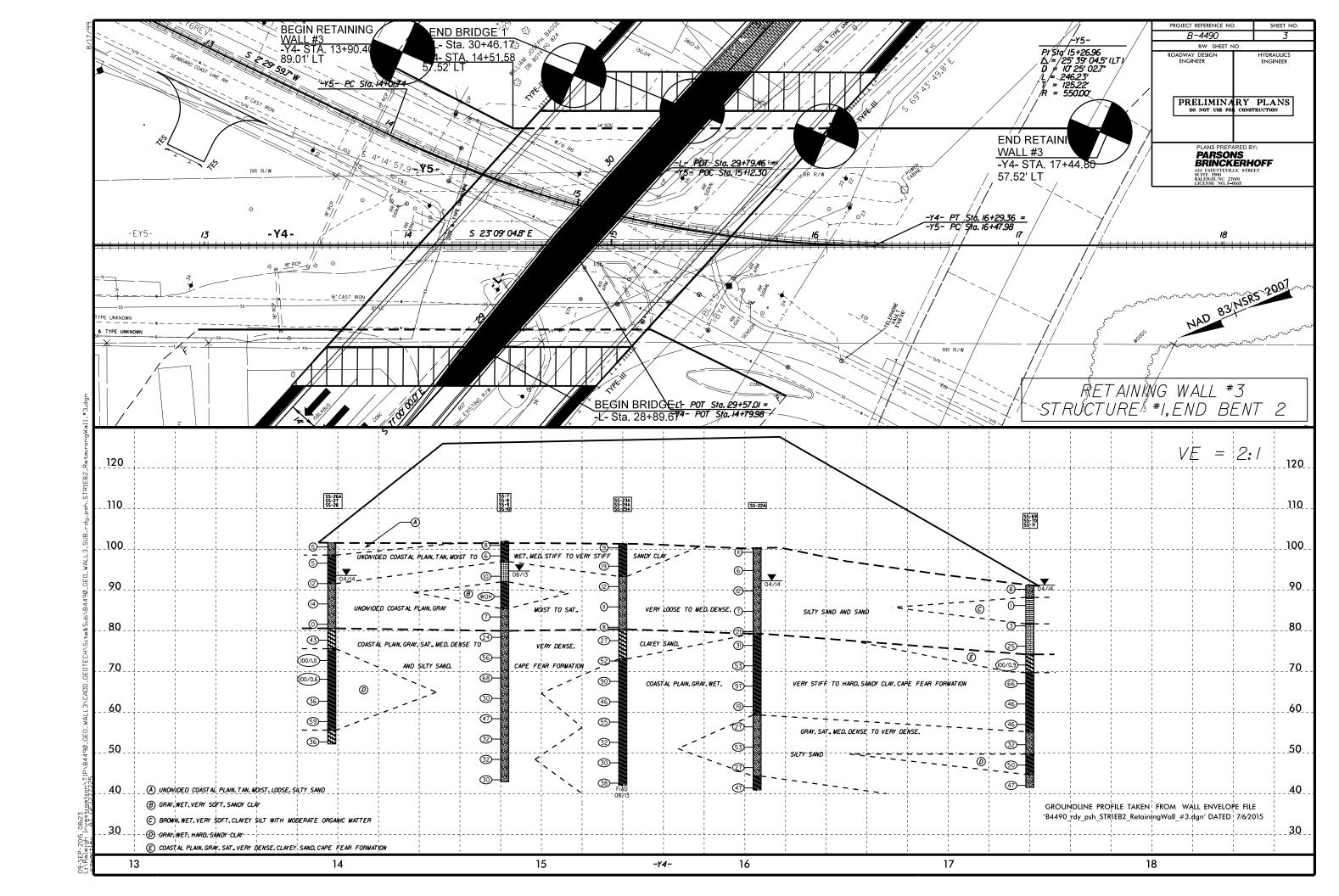
AUGUST 2015

PROJECT REFERENCE NO. SHEET NO. 2

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

## SUBSURFACE INVESTIGATION

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø.1 FOOT PER 60	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.  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. FOR EXAMPLE.	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE 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	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	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	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK 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.
**10 58 MX   GRANULAR   SILT   MUCK, CLAY   MUCK, CLAY   PEAT	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL 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 HAMMER IF CRYSTALLINE.	ROCKS OR CUTS MASSIVE ROCK.  DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL - 48 MX 41 MM 11 MM LITTLE OR HIGHLY PI 6 MX MP 18 MX 18 MX 11 MM 11 MM 18 MX 18 MX 11 MM 11 MM MOREOLOGY HIGHLY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 8 8 8 4 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STUNE FRAGS.  OF MAINE GRAVELAND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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.
GEN.RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 ; P1 OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	₩ITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  SPT DMT TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED  TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER AUSER RODIUS ACCORDED PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
DENSE   30 TO 50   VERY DENSE   > 50	THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  MW MONITORING WELL  TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 → 4	INSTRUCTION —	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
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	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
COADCE	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND (SL.) (CL.)  (BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	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	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(P) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK:
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55  X 6 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	1	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UTUNG,-CARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH  COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
	X D-50 TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK 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 VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
The second of Electry Strang of the English Color to Second of the English		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14



PROJECT REFERENCE NO.	SHEET				
B-4490	4				
SOIL TEST RESULTS					

## RETAINING WALL #3

	SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	C.SAND	% BY I	WEIGHT SILT	CLAY	% PAS	SING (S	IEVES) 200	% MOISTURE	% ORGANIC
SS- 26A	95 LT	13+97	4. 0- 5. 5	A- 6( 6)	28	11	1. 2	33. 8	30. 4	34.6	100	100	74	-	-
SS- 27	95 LT	13+97	22. 9- 24. 4	A-2-7(1)	41	17	47.4	24. 2	24. 3	4. 1	90	60	29	-	
SS- 28	95 LT	13+97	37.9-39.4	A- 6( 1)	35	14	29.5	36.6	23.7	10. 2	99	86	38	-	-
SS- 7	84 LT	14+82	2.6-4.1	A-6(5)	32	16	31.1	18.2	16. 3	34.4	97	75	52	-	-
SS- 8	84 LT	14+82	12.6-14.1	A-6(7)	31	16	7.5	37.0	15. 1	40.4	100	97	62	-	-
SS- 9	84 LT	14+82	17.6-19.1	A-2-4(0)	23	NP	5. 9	75.0	9.0	10. 1	100	100	26	-	-
SS- 10	84 LT	14+82	22. 6- 2 <b>4</b> . 1	A- 2- 4( 0)	37	NP	62.7	16.7	12. 5	8. 1	97	54	23	-	-
SS- 23A	66 LT	15+40	22. 8- 24. 3	A- 2- 6( 0)	38	16	57.6	22. 4	16.0	4. 1	96	58	23	-	-
SS-24A	66 LT	15+40	37.8-39.3	A-6(1)	37	13	31.5	37.6	22.7	8. 1	100	85	36	-	-
SS- 25A	66 LT	15+40	42. 8- 44. 3	A-6(1)	36	12	37.4	30.3	22. 1	10. 2	99	77	37	-	-
SS- 22A	54 LT	16 +06	42.9-44.1	A- 2- 4( 0)	28	8	43.4	30.8	16.8	9.0	99	76	29	-	-
SS- 69	56 LT	17 +40	<b>4.</b> 0- 5. 5	A- 5( 4)	42	10	18. 3	30.7	<i>33.</i> 0	18. 1	99	90	56	56	14
SS-70	56 LT	17 +40	23. 2 <sup>-</sup> 24. 7	A-6(6)	38	21	31.9	25.7	28.4	14.0	100	81	48	-	-
SS-71	56 LT	17 +40	<i>38. 2- 39.</i> 7	A- 2- 4( 0)	33	6	48. 3	32. 4	13. 2	6.0	93	68	21	-	-

**CONTENTS** 

**DESCRIPTION** 

SITE PLAN & PROFILE

SOIL TEST RESULTS

TITLE SHEET LEGEND

SHEET NO.

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STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND PROJECT DESCRIPTION BR. NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR & HILLSBORO ST. SITE DESCRIPTION MSE RETAINING WALL NO. 4

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4490	1	4

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1999 707-8850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

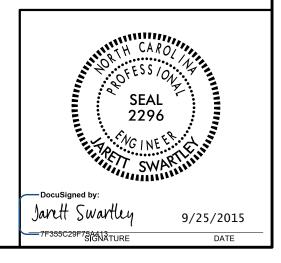
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY 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.

S&ME, INC.
J.R. SWARTLEY
-
INVESTIGATED BY J.R. SWARTLEY
DRAWN BY J.R. SWARTLEY
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON

PERSONNEL



AUGUST 2015

PROJECT REFERENCE NO. SHEET NO.

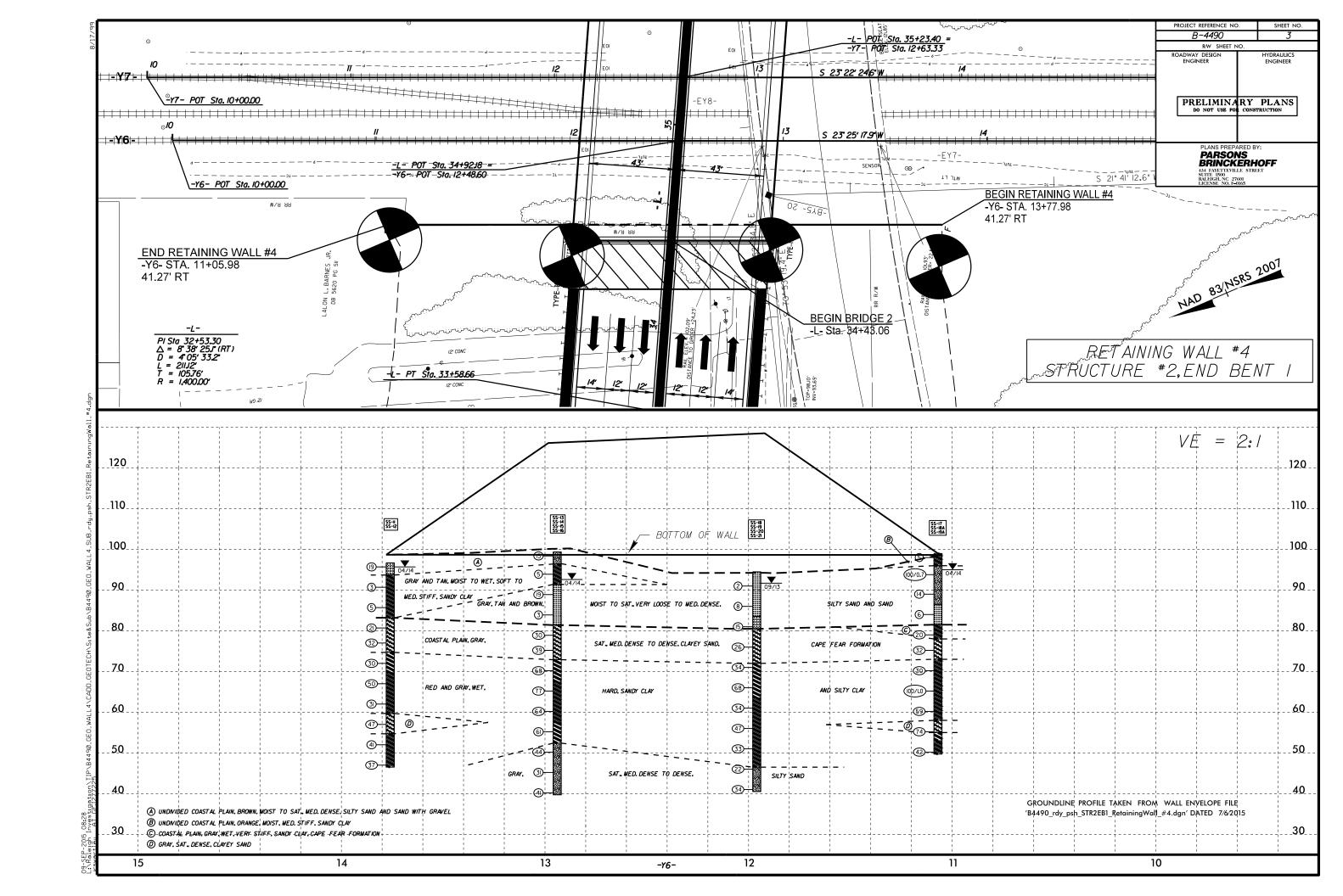
B-4490

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

## SUBSURFACE INVESTIGATION

			T50.10 .110 .2551.11710.10		
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS		
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.		
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.		
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.		
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	SU/AW/A	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.		
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT		
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND		
LLASS. (≤ 35% PASSING *2000) (> 35% PASSING *2000)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.		
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-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-7 A-3-5 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.		
00000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.		
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 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		
7. PASSING SILT- SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.		
10 50 MX	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.		
13 MX 25 MX 13 MX 25 MX 25 MX 25 MX 25 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	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		
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%  LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.		
LL 40 MX 41 MN LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) 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		
PI   6 MX   NP   10 MX   11 MN   11 MN   10 MX   11 MN   11 MN   11 MN   MODERATE   HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.		
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.		
USUAL TYPES STUNE FRAGS. FINE STITY OR CLAYEY STITY CLAYEY MATTER		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.		
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM		
GEN, RATING FUSCULTURE TO COOR FAIR TO COOR WISHERD	∇PW     PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.		
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	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 THE STREAM.		
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	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE		
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD.   <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.		
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO		
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.		
GENERALLY VERY LOOSE < 4	SOIL SYMBOL  SPI OMT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.		
GRANULAR LUUSE 4 10 10 10 N/A	- W	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF IESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS		
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.		
VERT DENSE > 500	<u> </u>	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.		
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.		
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF		
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A ALLUMIAL COLL POLINDARY A PIEZOMETER COLL NO VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE		
HARD > 30 > 4	TTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY SPT N-VALUE		RUN AND EXPRESSED AS A PERCENTAGE.		
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND		
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	HOLD IN THE TOD 3 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO		
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.		
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE 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 OR SLIP PLANE.		
GRAIN MM 305 75 2.0 0.25 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF		
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL		
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.		
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY		
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS  DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.		
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY		
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.		
PLASTIC SEMISOLIDA PEQUIPES DEVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.		
	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:		
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET			
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET		
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:		
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET			
- DRT - (D)	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET			
- UKT - (U) ATTAIN OPTIMUM MOISTURE					
PLASTICITY	8* HOLLOW AUGERS	INDURATION			
PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH	8* HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
PLASTICITY           PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         0-5         VERY LOW	B*HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS;			
PLASTICITY   PLASTIC   PLASTICITY   DRY STRENGTH	8* HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS;  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
PLASTICITY   PLASTIC   PLASTICITY   DRY STRENGTH	B*HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS;			
PLASTICITY   PLASTIC   PLASTICITY   DRY STRENGTH	B*HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  FRIABLE  RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  INDURATED  GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;			
PLASTICITY    PLASTICITY   PLASTIC   PLASTICITY   PLASTIC   PLASTI	B*HOLLOW AUGERS   -B	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.			
PLASTICITY   PLASTIC   PLASTICITY   DRY STRENGTH	B*HOLLOW AUGERS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  FRIABLE  RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  INDURATED  GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	DATE: 8-15-1-		



PROJECT REFERENCE NO.	SHEET
B-4490	4
SOIL TEST RESU	<i>T</i>

## RETAINING WALL #4

	SOIL TEST RESULTS														
SAMPLE	OFFSET	STATION	DEPTH	AASHTO	1 1	P.I.		% BY 1	WEIGHT		% PAS	SING (S.	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	1.1.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS- 11	62 RT	13+76	18.7-20.2	A-2-6(0)	37	15	61.2	18.8	12.0	8.0	96	58	22	-	
SS- 12	62 RT	13+76	23. 7 - 25. 2	A-7-5(7)	45	13	17.1	30. 3	36.6	16.0	100	92	61	-	
SS- 13	54 RT	12+94	19. 5- 21. 0	A- 2- 6( 1)	40	15	43. 3	26. <b>4</b>	19. 3	11.0	93	7 1	32	-	-
SS- 14	54 RT	12+94	28. 2- 29. 7	A-7-6(7)	43	15	20.9	28.9	36.2	14.0	100	89	57	-	-
SS- 15	54 RT	12+94	43. 2- 44. 7	A-7-6(9)	44	15	8.8	36.5	38.6	16.0	100	96	66	-	-
SS- 16	54 RT	12+94	53. 2- 54. 7	A-2-4(0)	40	NP	56. 3	30.4	9. 3	4.0	99	72	16	-	-
SS- 18	57 RT	11+96	17.5-19.0	A- 2- 6( 0)	40	13	51.8	24. 1	18. 1	6. 1	96	63	28	-	-
SS- 19	57 RT	11+96	22. 5- 24. 0	A-7-6(5)	43	15	20.7	39.8	31.4	8. 1	100	89	49	-	-
SS- 20	57 RT	11+96	<i>32.</i> 5- <i>34.</i> 0	A-6(2)	40	13	25.8	42.0	24. 1	8. 1	100	90	39	-	-
SS- 21	57 RT	11+96	47.5-49.0	A- 2- 4( 0)	33	NP	66.0	23.7	8.3	2. 0	97	62	13	-	•
SS- 17	49 RT	11+07	4.0-5.2	A- 2- 4( 0)	27	2	43.5	21.9	18.6	16.0	72	49	28	-	-
SS- 18A	49 RT	11+07	22. 8- 24. 3	A- 2-6(0)	33	13	48.8	24. 4	16.8	10.0	95	67	28	-	-
SS- 19A	49 RT	11+07	42. 8- 43. 8	A- 2- 6( 0)	37	12	51.9	20.4	18.8	9.0	100	73	31	-	·

**CONTENTS** 

**DESCRIPTION** 

SITE PLAN & PROFILE

SOIL TEST RESULTS

TITLE SHEET LEGEND

SHEET NO.

~

STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND PROJECT DESCRIPTION BR. NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR & HILLSBORO ST. SITE DESCRIPTION MSE RETAINING WALL NO. 5

STATE PROJECT REFERENCE NO. B-4490 4

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. 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 DIES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION 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.

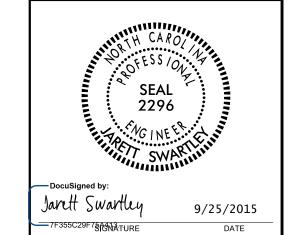
- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
  FOR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

S&ME, INC. J.R. SWARTLEY O.B. OTI H.R. CONLEY J.R. MATULA

**PERSONNEL** 

INVESTIGATED BY J.R. SWARTLEY DRAWN BY \_\_J.R. SWARTLEY CHECKED BY N.T. ROBERSON SUBMITTED BY N.T. ROBERSON

AUGUST 2015

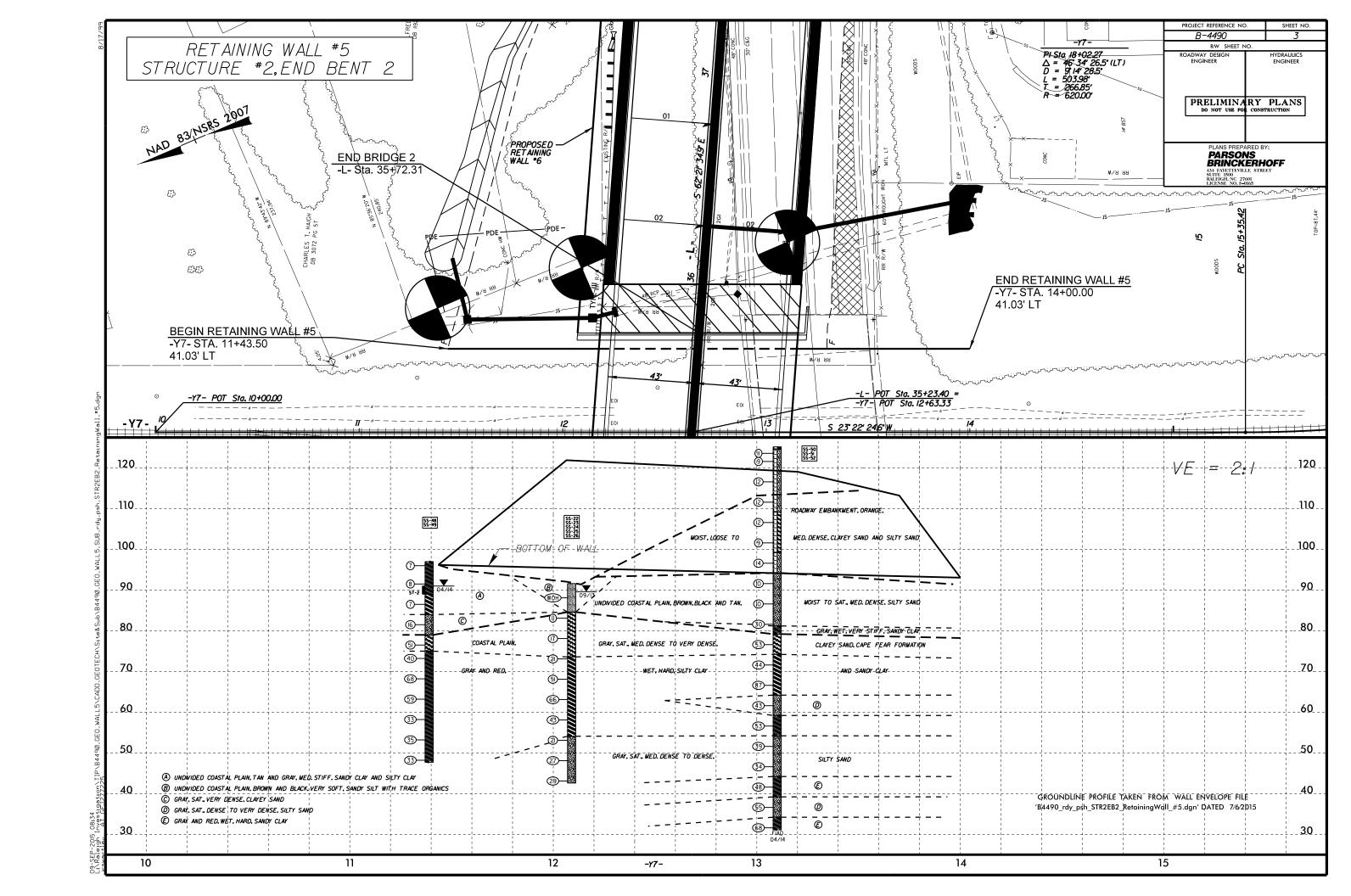


PROJECT REFERENCE NO. SHEET NO. 2

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

## SUBSURFACE INVESTIGATION

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	SU//2SU//A	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTALLINE CRYSTALLINE CRYSTALLINE CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
ULASS. (\$\leq 35% PASSING \(^2\)200) (> 35% PASSING \(^2\)200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 B-2-7 A-3 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
2 PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD  SEDIMENTARY ROCK  SPT REFUSAL, ROCK 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.
*10 50 MX GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC.  WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40   30 MX   50 MX   51 MN   PEAT   SOILS   SOILS   SOILS   SOILS   PEAT   PEA	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 48 MX 41 MN 48	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOUR	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	$lacksquare$ static water level after $\underline{24}$ hours	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
AS SUBURADE PUUR	SPRING OR SEEP	WITH FRESH 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	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PANCE OF STANDARD PANCE OF LINCONFINED		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES CLUNK SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE (COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE 4.4	- SPI	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANII AR LOOSE 4 TO 10	SOIL SYMBOL  OPT ONT TEST BORING  SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL MEDIUM DENSE 10 TO 30 N/A  MATERIAL DENSE 30 TO 50  (NON-COHESIVE) MEDIUM DENSE 10 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE 2 200	A COUNTRIE DOD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT         < 2	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4  TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK,
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	I I I I I I I I I I I I I I I I I I I	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  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 TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE 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 OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7- ORY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
<u> </u>	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO   SD SAND, SANDY   SS - SPLIT SPOON   F - FINE   SL SILT, SILTY   ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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 PLOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES  TCR - TRICONE REFUSAL  RT - RECOMPACTED TRIAXIAL  W - MOISTURE CONTENT  CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	DENCTI THINK.
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	Y 6* CONTINUOUS ELIGHT ALIGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
	X   CME-55	THINLY LAMINATED < 0.008 FEET  INDURATION	-
PLASTICITY	<b>-</b>	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS -N	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST Y CASING WY ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB. COUNTRIES FOR	CRAINS ARE DISEIGNET TO SERARATE WITH STEEL PROPE.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X D-50   INICUNE TUNG-LARB.   SOUNDING ROD   VANE SHEAR TEST	INDURATED DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	The street less	EXTREMELY INDURATED  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
		SHITTLE DREMAS AURUSS URAINS.	UAIE: 8-15-1-



PROJECT REFERENCE NO.	SHEET
B-4490	4
SOIL TEST RESUL	LTS

## RETAINING WALL #5

	SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	C.SAND	% BY F.SAND	WEIGHT SILT	CLAY	% PAS	SING (S.	IEVES) 200	% MOISTURE	% ORGANIC
SS- 48	61 LT	11+39	<b>4.</b> 5- 6. 0	A-6(2)	29	14	34. 2	25. 2	12. 1	28.5	98	78	44	-	3. 4
SS- <b>4</b> 9	61 LT	11+39	9. 5- 11. 0	A-7-6(20)	49	28	15. 3	13.8	18.0	52. 9	100	92	73	-	-
SS- 22	81 LT	12+09	2. 5- 4. 0	A- 4( 2)	25	9	23.6	29.8	28. 3	18.3	100	87	5 <i>2</i>	-	4.0
SS- 23	81 LT	12+09	7.5-9.0	A- 2-6(0)	35	13	47.3	28.8	15. 7	8. 1	85	58	24	-	-
SS- 24	81 LT	12+09	17.5-19.0	A-7-5(10)	46	16	7.5	39.4	45.0	8. 1	100	97	64	-	-
SS- 25	81 LT	12+09	27. 5- 29. 0	A-7-6(4)	46	20	44.8	16.4	25. 6	13. 2	97	64	40	-	-
SS- 26	81 LT	12+09	<i>37</i> . 5- <i>39</i> . <i>0</i>	A- 2- 4( 0)	31	9	<i>32. 9</i>	41.2	18.8	7.1	100	92	32	-	-
SS- 50	93 LT	13+10	17.6-19.1	A- 2-7(2)	45	23	34.0	36.0	1. 5	<i>28</i> . 5	99	79	32	-	-
SS- 51	93 LT	13+10	47.6-49.1	A-2-6(1)	37	15	51.0	22. 4	16.5	10.2	97	72	29	-	-
SS- 52	93 LT	13+10	72.6-74.1	A- 2- 4( 0)	32	8	28.9	48. 2	16.8	6. 1	100	88	29	-	-

**CONTENTS** 

**DESCRIPTION** 

TITLE SHEET LEGEND

SITE PLAN

PROFILE(S) SOIL TEST RESULTS

SHEET NO.

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STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_\_CUMBERLAND

PROJECT DESCRIPTION REPLACE BRIDGE 116 OVER CSX RR, NORFOLK SOUTHERN RR, & HILLSBORO ST. ON NC 24-210

SITE DESCRIPTION RETAINING WALL #6 LEFT OF -L-STA. 35 + 67.87

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4490	1	5

#### **CAUTION NOTICE**

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOISTURE CONDITIONS MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

**PERSONNEL** J.R. SWARTLEY O.B. OTI H.R. CONLEY J.R. MATULA

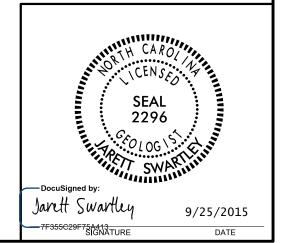
INVESTIGATED BY J.R. SWARTLEY

DRAWN BY \_\_\_\_\_\_J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE AUGUST 2015

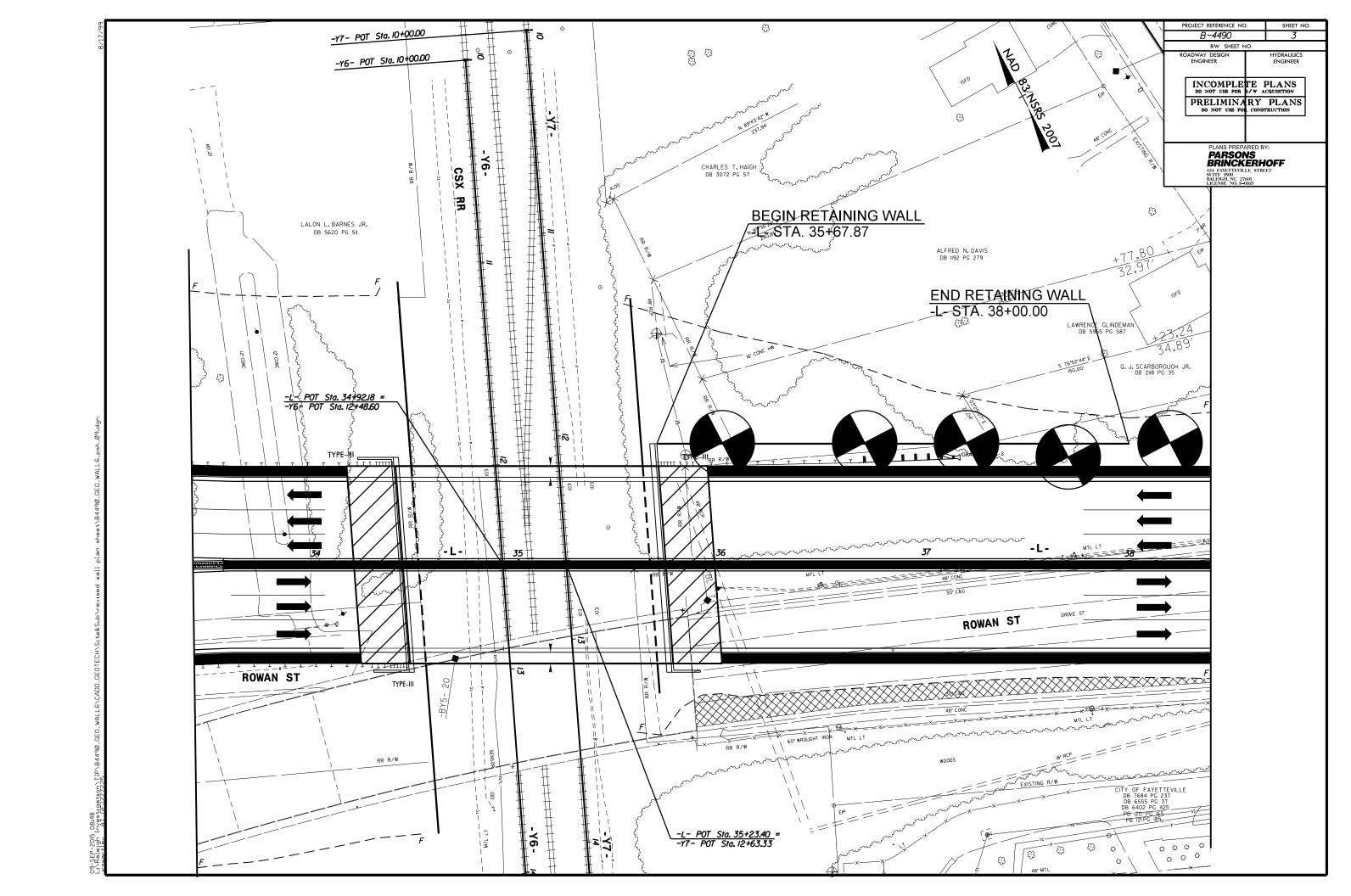


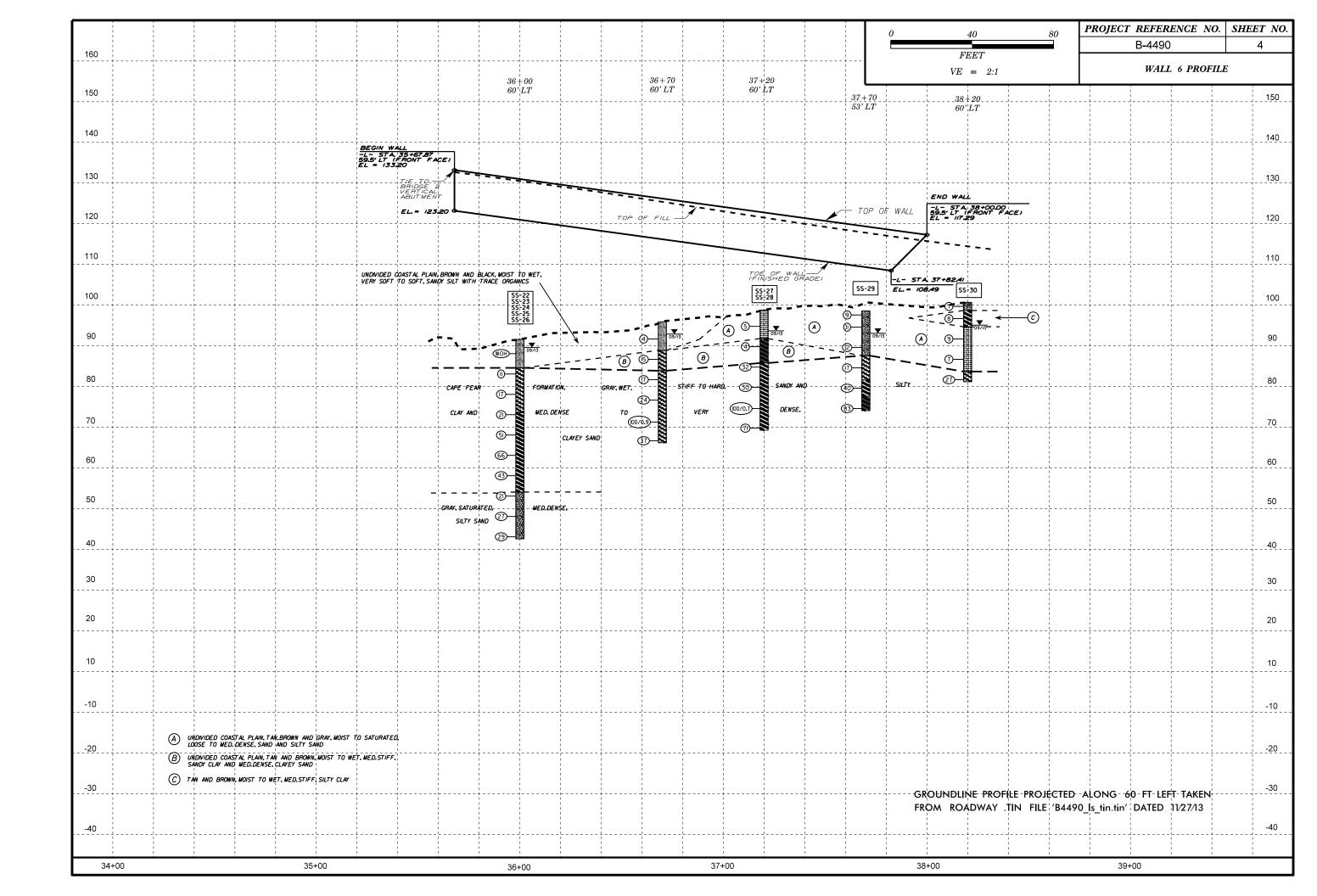
PROJECT REFERENCE NO. SHEET NO. 2

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

## SUBSURFACE INVESTIGATION

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. ( \( \leq \text{39% PASSING "200)} \)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.  CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 B-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-1-• A-1-• A-1-• A-2-4 A-2-5 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-2-4 A-2-6 A-2-7 CLASS. A-1-• A-1-• A-2-4 A-2-6 A-2-6 A-2-7 CLASS. A-1-• A-2-4 A-2-6 A-2-6 A-2-7 CLASS. A-1-• A-2-4 A-2-6 A-2-6 A-2-7 CLASS. A-1-• A-1-6 A-2-6 A-2-7 CLASS. A-1-6 A-2-6 A-2-7 CLASS. A-1-6 A-2-7 C	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING   GRANULAR SILT-MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
-200 13 PA 23 PA 10 PA 33 PA 33 PA 33 PA 33 PA 35 PA 3	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  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 HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 9 9 9 4 MY 8 MY 12 MY 16 MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USIAL TYPES STAME EPACS ORGANIC	✓ 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.
OF MAJOR GRAVEL, AND SAMP SAMP SAMP SOUR SOUR SOUR	▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	✓ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (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.
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL  SOIL SYMBOL  SPT ONT TEST BORING  INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A	씨	IF TESTED. WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL   DENSE   30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY CORE BORING    SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TECT DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0   MATERIAL   STIFF   8 TO 15   1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	FIEZOMETER INSTALLATION  — SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4  TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
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	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  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 TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSF. SD.) (F SD.) (SL.) (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, COUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
(CSE, SU.) (F SU.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.
COSE	ABBREVIATIONS  AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR COUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
GRAIN MM 305 75 2.0 0.25 0.05 0.005	ABBREVIATIONS  AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA, - MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
CSE. SU.   (F SU.)	ABBREVIATIONS  AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - COME PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST  ABBREVIATIONS  MED MEDIUM VST - VANE SHEAR TEST WEA WEATHERED Y - UNIT WEIGHT ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST  SAMPLE ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
GRAIN MM 305 75 SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS)  SOIL MOISTURE DESCRIPTION  FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC PT - VOINAMIC PENETRATION TEST SAP SAPROLITIC PT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF 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 OF STRATOM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS)  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  LL LIQUID LIMIT	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS C.L CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST E - VOID RATIO S SAP. SAPROLITIC S SPLIT SPOON F - FINE S SLIT SILTY ST - SHELBY TUBE	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM GOUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  CATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC CATURATED - SEMISOLID; REQUIRES DRYING TO	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED CL CLAY CPT - CONE PENETRATION TEST CSE COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST DPT - DYNAMIC PENETRATION TEST PMT - SAPPOLITIC S - SAPPOLITIC S - SPLIT SPOON F - FINE SL SILT, SILTY FRACE, - FRACTURED, FRACTURES SMEDE ABBREVIATION ST - SHELBY TUBE FRACE, - FRACTURED, FRACTURES  AMED MED MED MED MED WELL - SLICHLY ST - SHELBY TUBE RECOMPACTED TRIAXIAL RT - RECOMPACTED TRIAXIAL	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIECES 1 INCH OR MODERATE BLOWS OF A PICK PICK. PIC	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF 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 OF STRATOM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  CALL (ATTERBERG LIMITS)  SOUR MOISTURE SCALE (ATTERBERG LIMITS)  CALL (ATTERBERG LIMITS)  CALL (SAT,)  CALL (SAT,)  CALL (SAT,)  CALL (SAT,)  SEMISOLID; REQUIRES DRYING TO	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST OPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC CSC VOID RATIO F - FINE SL SLIT, SLITY SS - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  BEDDING	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM GOUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC RANGE (PI) PLASTIC LIMIT  PLASTIC LIMIT  - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS MEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE ORG ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST E - VOID RATIO F - FINS SL SILT, SILTY FRESUREMETER FRACTURED, FRACTURES FRAC FRACTURED, FRACTURES TWO MODITATION SS - SOLIT SOLN SAMD, SAMDY SS - SPLIT SPOON SS - SPLIT SPOON FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRACS FRAGMENTS W - MOISTURE CONTENT CGR - CALIFORNIA BEARING	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING BEDDING  IERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 BL. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  - SATURATED - (SAT.,)  FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  - SATURATED - (SAT.,)  FROM BELOW THE GROUND WATER TABLE  PLASTIC RANGE (PI) PL  PLASTIC LIMIT  OM OPTIMUM MOISTURE  - MOIST - (M)  SOLID; AT OR NEAR OPTIMUM MOISTURE	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST E - VOID RATIO F - FINE SL SILT, SILTY FRESSUREMETER FOSS FOSSILIFEROUS SL SLICHTLY RS - ROCK FRAC FRACTURED, FRACTURES FRACS FRAGMENTS MOISTURE CONTENT WEATHER WEATHER WEATHER WEATHER WEATHER WEATHER SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRAGMENTS MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  BEDDING  TERM  SPACING  THICKNESS	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  PLASTIC RANGE (PI) PL  OM OPTIMUM MOISTURE SCALE (PI) PL  OF THE CORRELATION OF TERMS  GUIDE FOR FIELD MOISTURE DESCRIPTION  GUIDE FOR FIELD MOISTURE GROUND WATER TABLE  USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  SHRINKAGE LIMIT  OPTIMUM MOISTURE SHRINKAGE LIMIT  PEOLIPES ADDITIONAL WATER TO	ABBREVIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS CL CLAY CDT - CONE PENETRATION TEST CSE COARSE DHT - DULATOMETER TEST DPT - DYNAMIC PENETRATION TEST C - VOID RATIO F - FINE FOSS FOSSILIFEROUS SL SILT, SILTY FRAGC FRACTURED, FRACTURES FRACS FRAGMENTS M/ - MOISTURE CONTENT RATIO  EQUIPMENT USED ON SUBJECT PROJECT	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  HARD  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  SPACING  VERY WIDE  MODERATED  MODERATED  3 TO 10 FEET  THICKLY BEDDED  1.5 - 4 FEET  THICKLY BEDDED  0.16 - 1.5 FEET  CLOSE  0.16 TO 1 FOOT  VERY THICKLY BEDDED  0.03 - 0.16 FEET	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 BL. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  - SATURATED - (SAT.)  PLASTIC RANGE (PI) PL  PLASTIC LIMIT  OM OPTIMUM MOISTURE  - MOIST - (M)  SOLID; AT OR NEAR OPTIMUM MOISTURE	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TEMNINATED MICA MICACEOUS MEA WEAL WEATHERED C.L CLAY MOD MODERATELY CPT - CONE PENETRATION TEST OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST F - FINE SL SILT, SILTY F - FINE FOSS FOSSILIFEROUS SL SILT, SILTY FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRACS FRAGMENTS M - MOISTURE CONTENT TRICONE REFUSAL FRACS FRAGMENTS M - MOISTURE CONTENT TRICONE REFUSAL HI HIGHLY  EQUIPMENT USED ON SUBJECT DRILL UNITS:  ADVANCING TOOLS:  ANNORANCE M - MANUAL  EQUIPMENT  BUT - TRICONE REFUSAL	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM HARD  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  SPACING  VERY WIDE  MORE THAN 10 FEET  WIDE  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  0.16 - 1.5 - 4 FEET  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  0.16 - 1.5 FEET	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  SOIL MOISTURE SCALE DESCRIPTION  (ATTERBERG LIMITS)  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC LAMIT  OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT  - MOIST - (M)  SOLID; AT OR NEAR OPTIMUM MOISTURE SHRINKAGE LIMIT  - PLASTIC LIMIT  - MOIST - (M)  REQUIRES ADDITIONAL WATER TO	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MEDLUM WEA WEATHERED CL CLAY MOD MODERATELY CT - CONE PENETRATION TEST OMC ORGANIC DMT - DILATOMETER TEST DMT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC C - VOID RATIO F - FINE SL SILT, SILTY FOSS FOSSILIFEROUS FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL HI HIGHLY  DRILL UNITS:  DRILL UNITS: ADVANCING TOOLS:  MEA VANE SHEAR TEST WEA WEATHERED WEA SAPROLITIC S - BULK SS - SPLIT SPOON SS - SPLIT SPOON FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL HI HIGHLY  CBR - CALIFORNIA BEARING HI HIGHLY  DRILL UNITS:  ADVANCING TOOLS:  MAMMER TYPE:  X AUTOMATIC MANUAL  X CME-55  CORE SIZE:	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 0.15 - 4 FEET THICKLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THICKLY BEDDED 0.003 - 0.16 FEET THICKLY LAMINATED 0.000 - 0.03 FEET THICKLY LAMINATED 0.000 - 0.03 FEET THICKLY LAMINATED 0.000 - 0.03 - 0.16 FEET THICKLY LAMINATED 0.000 - 0.03 FEET THICKLY LAMINATED 0.0000 - 0.03 FEET THICKLY LAMINATED 0.0000 - 0.03 FEET THICKLY LAMINATED 0.0000 - 0.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
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GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  PLASTIC RANGE (PI) PL PLASTIC LIMIT  OM OPTIMUM MOISTURE SCALE (PI) PL PLASTIC LIMIT  OF IMM MOISTURE SCALE (SAT.) - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  SHRINKAGE LIMIT  - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY  PLASTICITY  PLASTICITY INDEX (PI) ORY STRENGTH VERY LOW	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TEMNINATED MICA MICACEOUS WEA WEATHERED C.L CLAY MOD MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST DPT - PRESSUREMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC E - VOID RATIO F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SILT, SILTY ST - SHELBY TUBE FRACT FRACTURED, FRACTURES TER - TRICONE REFUSAL FRAGS FRAGMENTS HI HIGHLY  EQUIPMENT USED ON SUBJECT DRILL UNITS: ADVANCING TOOLS:  AVANCING TOOLS:  WEA VANE SHEAR TEST WEA VICENTIAL WEA VICENTIAL WEA VICENTIAL SAMPLE ABBREVIATIONS S - BULK S - SPLIT SPOON RS - ROCK RS - CALIFORNIA BEARING RATIO  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS:  AVANCING TOOLS:  AUTOMATIC MANUAL  CME - 45C  CLAY BITS  CME - 550  HARD FACED FINGER BITS  TUNG CARBIDE INSERTS	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  SPACING  VERY WIDE  MODERATELY CLOSE  1 TO 3 FEET  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  1.5 - 4 FEET  THICKLY BEDDED  0.016 FEET  THICKLY LAMINATED  CROWN BEET  THICKLY LAMINATED  CROWN BEE	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  FIELD MOISTURE DESCRIPTION  CUIDE FOR FIELD MOISTURE DESCRIPTION  CUIDE FOR FIELD MOISTURE DESCRIPTION  CUIDE FOR FIELD MOISTURE DESCRIPTION  SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC  PLASTIC LIMIT  OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT  - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY INDEX (PI)  ORY STRENGTH	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TEMNINATED MICA MICACEOUS WEA WEATHERED C.L CLAY MOD MODERATELY CPT - CONE PENETRATION TEST OMC ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC C - VOID RATIO F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRACS FRAGMENTS M - MOISTURE CONTENT HI HIGHLY  EQUIPMENT USED ON SUBJECT  DRILL UNITS:  DRILL UNITS:  C - CME-45C  AVANCING TOOLS:  WARD SHEAR TEST  VANE SHEAR TEST  VST - VANE SHEAR TEST WEA WEA. WEA VANE SHEAR TEST WEA MICA WEA. WEA VAN WEA. WEA VAN WEA. WEA VAN WEATHER TEST WEA WEATHERED SAMPLE ABBREVIATIONS S - BULK S - SPLIT SPOON S - SHELBY TUBE R - ROCK R - RECOMPACTED TRIAXIAL CRE - CALIFORNIA BEARING RATIO  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS:  AUTOMATIC MANUAL  CORE SIZE:  B* HOLLOW AUGERS  HAND TOOLS:  WARADWANER HAND TOOLS:	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  VERY WIDE  MORE THAN 10 FEET  WIDE  3 TO 10 FEET  MODERATELY CLOSE  1 TO 3 FEET  CLOSE  0.16 TO 1 FOOT  VERY THINLY BEDDED  0.03 - 0.16 FEET  THICKLY LAMINATED  C.0.008 FEET  THINLY LAMINATED  C.0.008 FEET  THINLY LAMINATED  C.0.008 FEET  INDURATION  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  FIELD MOISTURE DESCRIPTION  CHARGE (PI) PL  OM OPTIMUM MOISTURE SHRINKAGE LIMIT  OM OPTIMUM MOISTURE SHRINKAGE LIMIT  ON OPTIMUM MOISTURE  SHRINKAGE LIMIT  ONO PLASTIC  PLASTICITY  PLASTICITY  PLASTICITY  PLASTICITY INDEX (PI)  ONO PLASTIC  SLIGHTLY PLASTIC  ONO PLASTIC  SLIGHTLY PLASTIC  ONO SITEMOTH  OFF WERY LOW  SLIGHTLY PLASTIC  SIGHTLY PLASTIC  SIGHT	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TEMNINATED MICA MICACEOUS WEA WEATHERED C.L CLAY MOD MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE COARSE ORG ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC CSE COARSE ORG ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S SBULK S SPLIT SPOON SS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRACS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO  EQUIPMENT USED ON SUBJECT DRILL UNITS: ADVANCING TOOLS:  CME-45C  CME-45C  DRILL UNITS: ADVANCING TOOLS:  CME-550  HARD FACED FINGER BITS  VANE SHEAR TEST  VANE STEEL TEST  HAND TOOLS: POST HOLE DIGGER	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  SPACING  VERY WIDE  MODERATELY CLOSE  1 TO 3 FEET  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  1.5 - 4 FEET  THICKLY BEDDED  0.016 FEET  THICKLY LAMINATED  CROWN BEET  THICKLY LAMINATED  CROWN BEE	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  PLASTIC RANGE (PI) PL OPTIMUM MOISTURE SHRINKAGE LIMIT  OM OPTIMUM MOISTURE SCALE (PI) PLASTIC LIMIT  OPTIMUM MOISTURE - CORRELATION OF TERMS  SUIDE FOR FIELD MOISTURE DESCRIPTION  SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE  PLASTICITY  ON PLASTIC PLASTIC O-5 VERY LOW SLIGHTLY PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 16-25 MEDIUM	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TEMNINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE COARSE ORG ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC C - VOID RATIO F - FINE SL SILT, SILTY FRACTURED, FRACTURES FRAC FRACTURED, FRACTURES HI HIGHLY  DRILL UNITS: DRILL UNITS: ADVANCING TOOLS:  CME-550 ABBRE VIATIONS WEA WEATHERED WEA WEATHERED WEA WEATHERED WEA WEATHERED WEA WEATHERED WEA WEATHERED WEA ORGANIC WEA WEATHERED WEA WEATHERED WEA WEATHERED WEA WEATHERED SAMPLE ABBREVIATIONS S - BULK S - SHLIK SPOON SS - SPLIT SPO	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  VERY WIDE  MORE THAN 10 FEET  WIDE  SPACING  VERY WIDE  MODERATELY CLOSE  0.16 TO 1 FOOT  VERY THICKLY BEDDED  0.15 - 4 FEET  THICKLY BEDDED  0.16 - 1.5 FEET  VERY THINLY BEDDED  0.03 - 0.16 FEET  THICKLY LAMINATED  0.000 - 0.03 FEET  THINLY BEDDED  0.000 - 0.03 FEET  THINLY LAMINATED  0.000 - 0.03 FEET  THINLY LAMINATED	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - 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.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  PLASTIC LIMIT  OM OPTIMUM MOISTURE SL SHINKAGE LIMIT  NON PLASTIC SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  CUIDE FOR FIELD MOISTURE DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION  SUBJECT OF STRENGTH  - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (W) SUBJECT OF STRENGTH  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY  PLASTICITY  PLASTICITY INDEX (P) SIGHTLY PLASTIC MODERATELY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC 16-25 MEDIUM HIGH  COLOR	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MEDIUM WEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST OFF CONE PENETRATION TEST OFF CORSE ORG ORGANIC OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S SHULK SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RRS - ROCK FRACT, - FRACTURED, FRACTURES HI HIGHLY  FOULTMENT  EQUIPMENT USED ON SUBJECT  DRILL UNITS:  ADVANCING TOOLS:  CME-45C  CME-45C  CME-550  HARD FACED FINGER BITS  CME-550  HARD FACED FINGER BITS  VANE SHEAR TEST  X CASING W/ ADVANCER HAND TOOLS: HAND AUGER SOUNDING ROD	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  CAN BE CARYEO WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  TERM  SPACING  VERY WIDE  MORE THAN 10 FEET  WIDE  VERY WIDE  MORE THAN 10 FEET  THICKLY BEDDED  A FEET  WIDE  CLOSE  US 1 TO 3 FEET  THICKLY BEDDED  A FEET  THICKLY LAMINATED  CRASS FEET  THICKLY LAMINATED  CRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  BREAKS EASILY WHEN HIT WITH HAMMER.	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET
GRAIN MM 305 75 2.0 0.25 0.05 0.005  SIZE IN. 12 3  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE (ATTERBERG LIMITS)  PLASTIC CRANGE (PI) PL  OM OPTIMUM MOISTURE SCALE (PI) PL  OPTIMUM MOISTURE SCALE (SAT,) - SATURATED - USUALLY LIQUID, VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  - WET - (W) SEMISOLID, REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (W) SOLID, AT OR NEAR OPTIMUM MOISTURE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY  NON PLASTIC PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGH  HIGHLY PLASTIC 26 OR MORE HIGH	ABBRE VIATIONS  AR - AUGER REFUSAL BT - BORING TERMINATED MICA MEDIUM WEA WEATHERED CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC C - VOID RATIO F - FINE SL SILT, SILTY FOSS FOSSILIFEROUS SLI SLIGHTLY RRAC FRACTURED, FRACTURES HI HIGHLY  CME-45C  CME-550  AVANCING TOOLS:  VANE SHEAR TEST  VANE SHEAR TEST  VANE SHEAR TEST  ARBOLANCING TOOLS:  CME-550  HARD FACED FINGER BITS  VANE SHEAR TEST  TRICONE TRICONE TRICONE TRICONE  TRICONE  *STEEL TEETH HAMDER TYPE:  HAND TOOLS: HAMMER TYPE:  WADVANCER HAND TOOLS: HAMMER TYPE:  WADVANCER HAND TOOLS: HAMMER TYPE:  WADVANCER HAND TOOLS: HAMMER TYPE:  WAND TOOLS: HAMD TOOLS: HAMMER TYPE:  WAND TOOLS: HAMMER TYPE:  WAND TOOLS: HAMD TOOLS: HAMD TOOLS: HAMD TOOLS: HAND TOOLS HAND TOOLS HAND TOOLS HAND TOOLS HAND TOOLS HAND TOOLS H	HARD  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  SOFT  CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.  FRACTURE SPACING  VERY WIDE  MORE THAN 10 FEET  WIDE  SPACING  VERY WIDE  MODERATELY CLOSE  0.16 TO 1 FOOT  VERY THICKLY BEDDED  0.15 - 4 FEET  THICKLY BEDDED  0.16 - 1.5 FEET  VERY THINLY BEDDED  0.03 - 0.16 FEET  THICKLY LAMINATED  0.000 - 0.03 FEET  THINLY BEDDED  0.000 - 0.03 FEET  THINLY LAMINATED  0.000 - 0.03 FEET  THINLY LAMINATED	OR SLIP PLANE.  STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  JOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK:  ELEVATION: FEET





STATE	STATE PROJECT REPERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4490	5	5

## RETAINING WALL #6

	SOIL TEST RESULTS														
SAMPLE	OFFSET	STATION	DEPTH	AASHTO	7 7	P.I.		% BY V	WEIGHT		% PAS	SING (S.	IEVES)	%	%
NO.	OFFSET	SIMIION	INTERVAL	CLASS.	L.L.	1 .1.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-22	60′ LT	36+00	2.5-4.0	A-4(2)	25	9	<i>23.</i> 6	29.8	28.3	18.3	100	87	52	_	<i>3.</i> 8
SS-23	60′ LT	36+00	7.5-9.0	A-2-6(0)	35	13	47.3	28.8	15.7	8.1	85	<i>58</i>	24	_	_
SS-24	60′ LT	36+00	17.5-19.0	A-7-5(10)	46	16	7.5	<i>39. 4</i>	45.0	8.1	100	97	64	_	_
SS-25	60′ LT	36+00	27.5-29.0	A-7-6(4)	46	20	44.8	16.4	25.6	13.2	97	64	40	_	_
SS-26	60′ LT	36+00	<i>37.5-39.0</i>	A-2-4(0)	31	9	<i>32.</i> 9	41.2	18.8	7.1	100	92	32	_	_
SS-27	60′ LT	37 +20	8.0-9.5	A-6(7)	30	13	1.8	40.0	29.7	28.4	100	99	70	_	_
SS-28	60′ LT	37 +20	<i>18.0-19.5</i>	A-7-6(9)	43	19	24.4	24.8	38.7	12.2	100	85	57	_	_
SS-29	53′ LT	37 +70	<i>13.0-14.5</i>	A-2-7(2)	41	22	50.5	16.0	15.2	18.3	93	60	33	_	_
SS-30	60′ LT	38+20	<i>3.0−4.</i> 5	A-7-6(24)	55	31	16.4	8.5	8.0	67.0	100	91	76	_	_