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

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.

This file or an individual page shall not be considered a certified document.

| 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.
 SHEET SWEET SWEET
 N.C.

 N.C.
 33727.1.1 (B-4490)
 1
 10

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

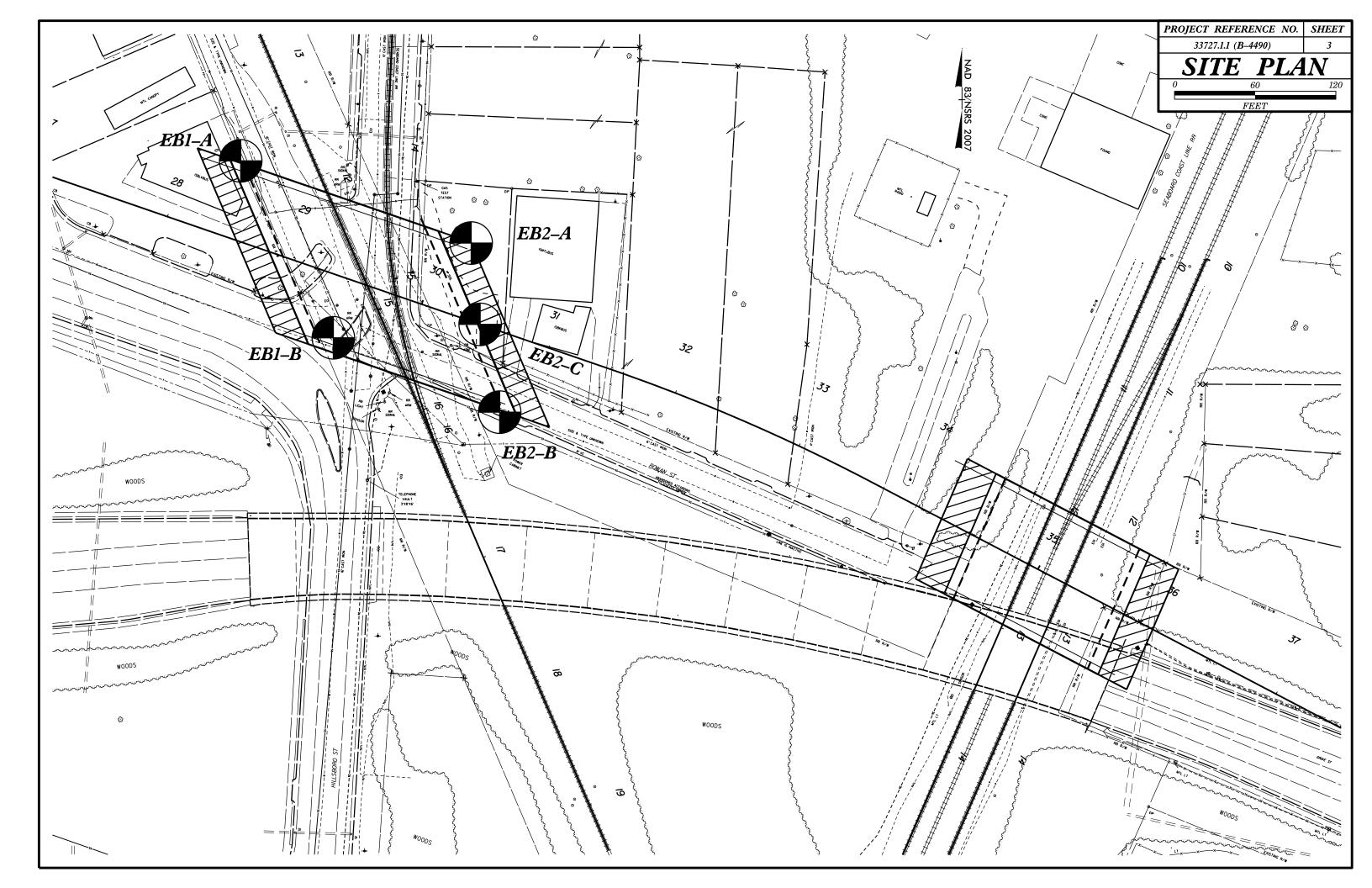
DIVISION OF HIGHWAYS

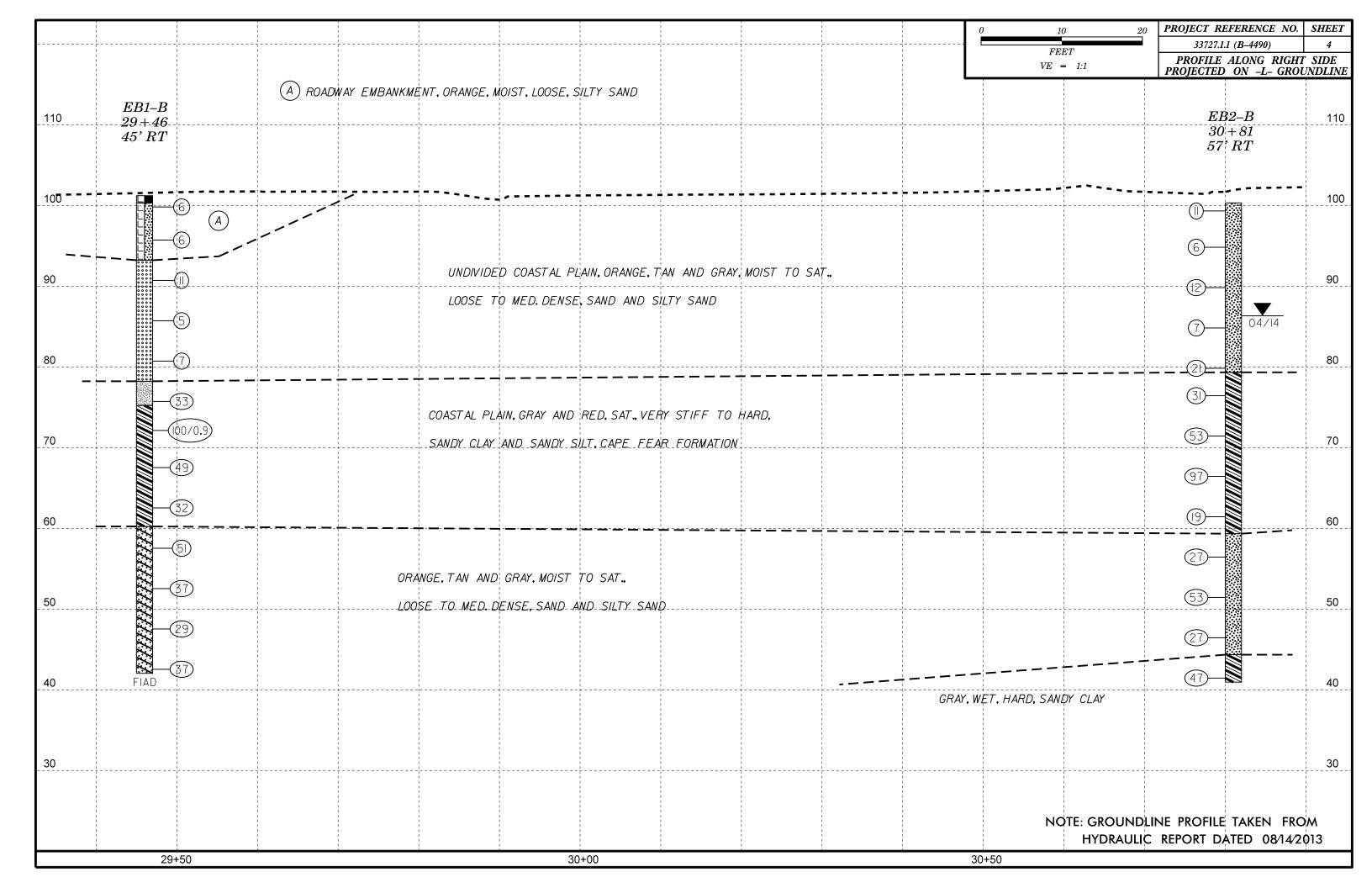
GEOTECHNICAL ENGINEERING UNIT

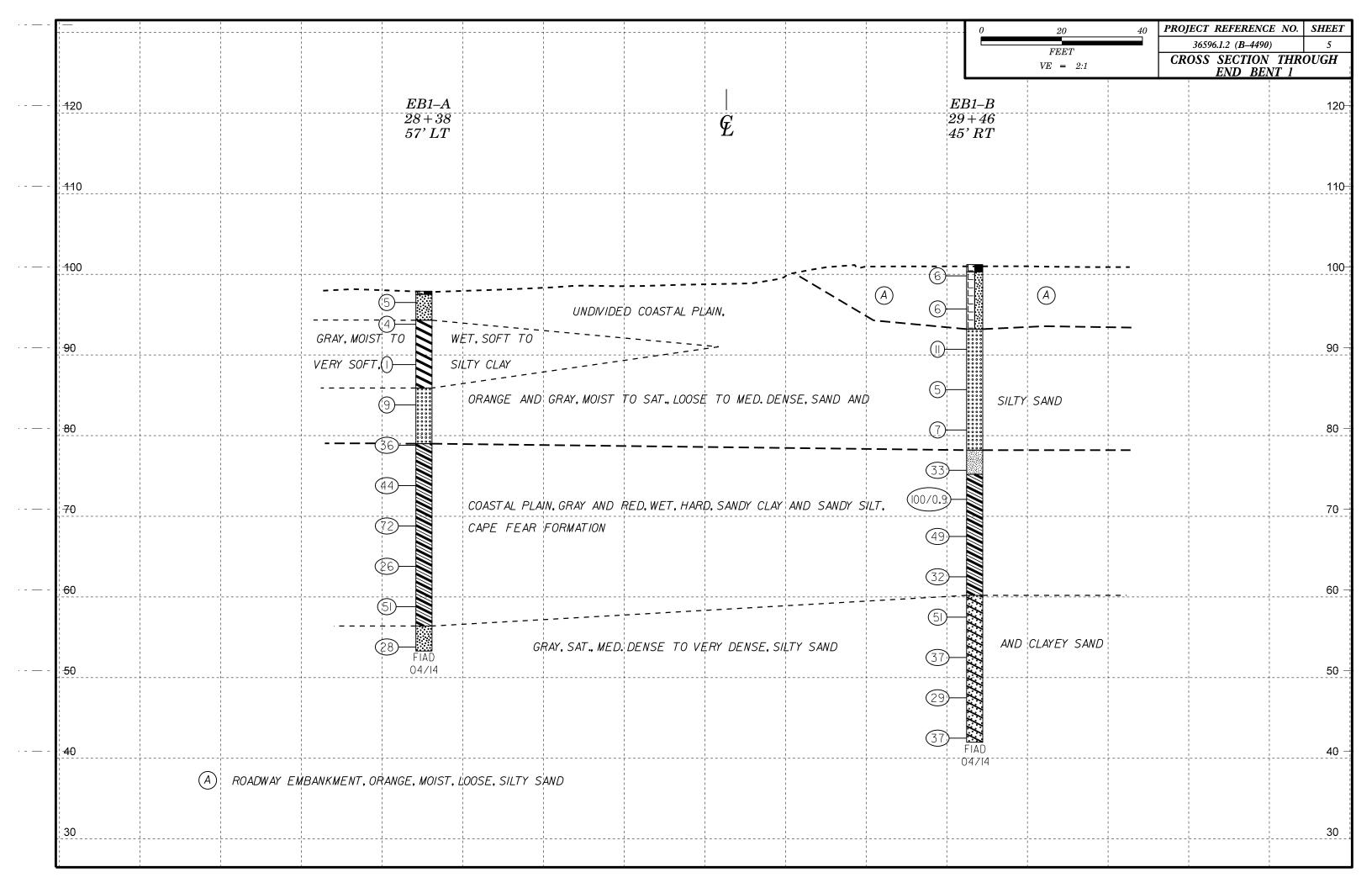
SUBSURFACE INVESTIGATION

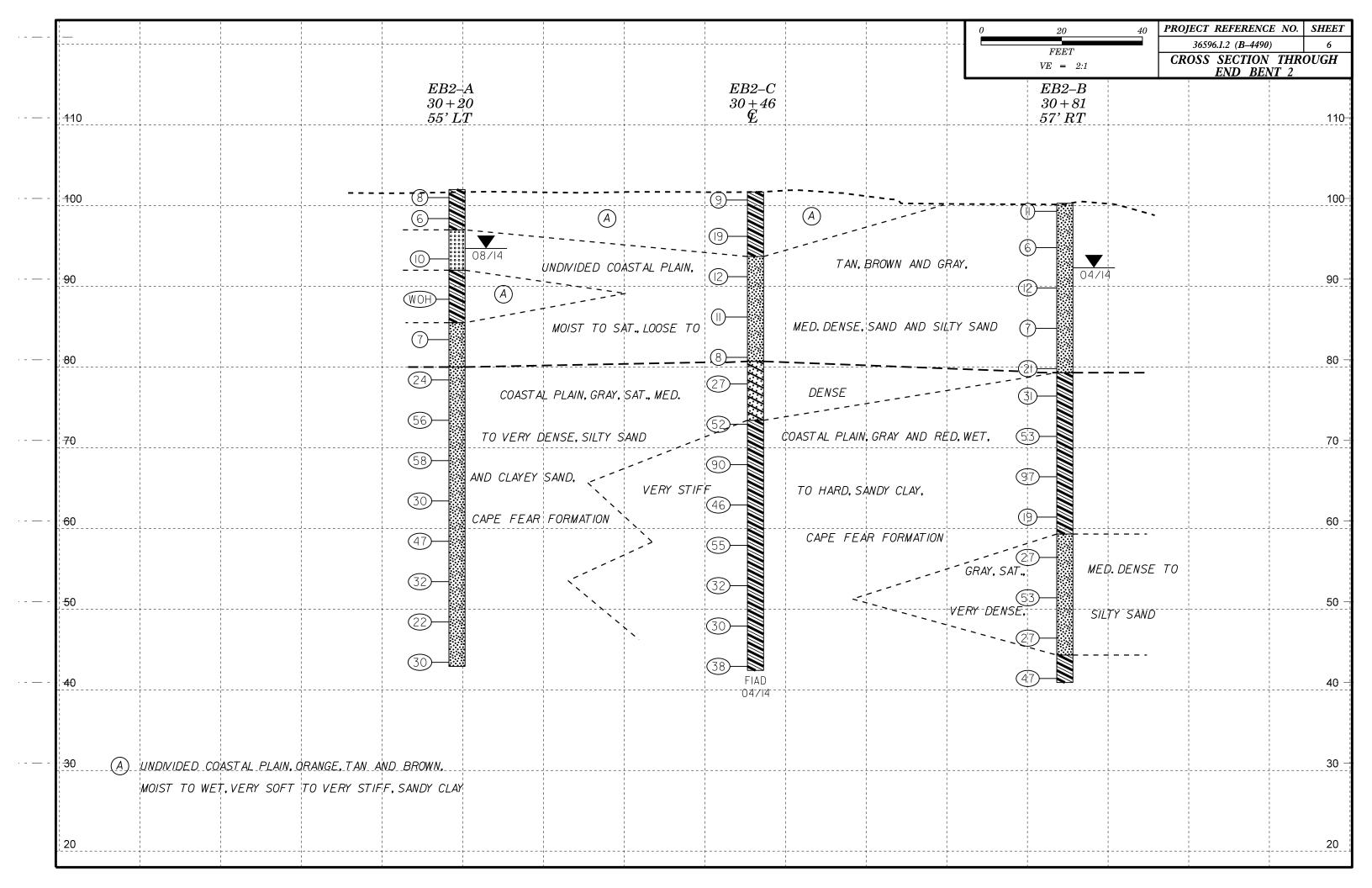
SOIL AND BOCK LEGEND TERMS SYMBOLS AND ARRESTIATIONS

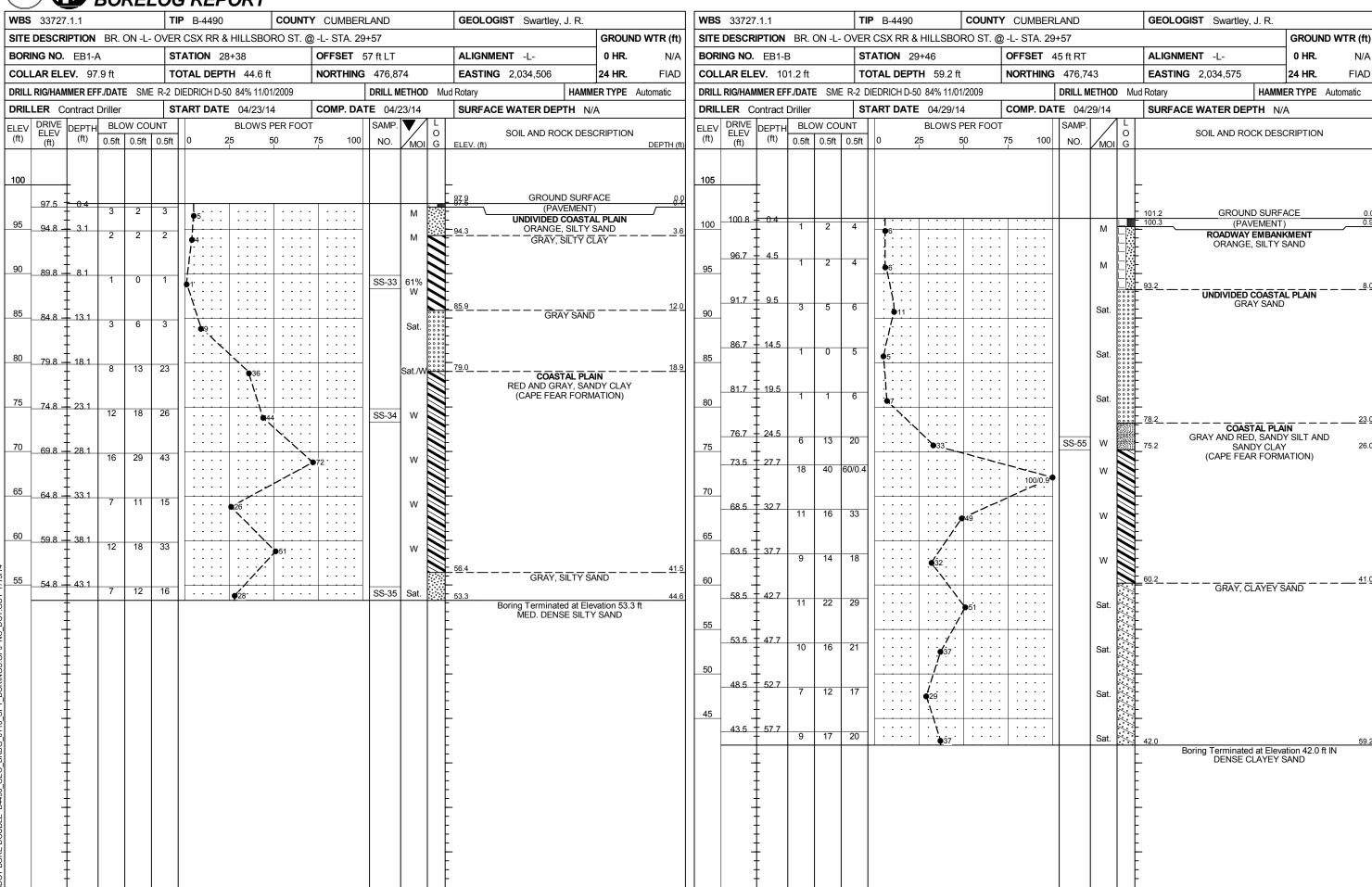
| | SOIL AND ROCK LEGEND, TERM | , TERMS, SYMBOLS, AND ABBREVIATIONS | | | | | | |
|--|--|---|---|--|--|--|--|--|
| SOIL DESCRIPTION | GRADATION | ROCK DESCRIPTION | TERMS AND DEFINITIONS | | | | | |
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS | WELL 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) 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. | | | | | |
| 7. 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 | | | | | |
| LIGHT LIMIT | 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 -B | 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 | | | | | |











| WBS 33727.1.1 TIP B-4490 | OUNTY CUMBERLAND | GEOLOGIST Oti, O. B. | | TY CUMBERLAND | GEOLOGIST Swartley, J. R. |
|--|--|--|---|-------------------------|--|
| SITE DESCRIPTION BR. ON -L- OVER CSX RR & HILLSBO | | GROUND WTR (ft) | SITE DESCRIPTION BR. ON -L- OVER CSX RR & HILLSBORO ST. | @ -L- STA. 29+57 | GROUND WTR (ft) |
| BORING NO. EB2-A STATION 30+20 | OFFSET 55 ft LT | ALIGNMENT -L- 0 HR. N/A | BORING NO. EB2-B STATION 30+81 | OFFSET 57 ft RT | ALIGNMENT -L- 0 HR. N/A |
| COLLAR ELEV. 102.0 ft TOTAL DEPTH 59.1 ft | NORTHING 476,813 | EASTING 2,034,677 24 HR. 7.3 | COLLAR ELEV. 100.3 ft TOTAL DEPTH 59.4 ft | NORTHING 476,688 | EASTING 2,034,699 24 HR. 8.0 Caved |
| DRILL RIG/HAMMER EFF./DATE RF00074 CME-55 92% 07/12/2011 | DRILL METHOD M | ud Rotary HAMMER TYPE Automatic | DRILL RIG/HAMMER EFF./DATE SME R-2 DIEDRICH D-50 84% 11/01/2009 | DRILL METHOD Muc | d Rotary HAMMER TYPE Automatic |
| DRILLER Conley, H. R. START DATE 08/14/1 | COMP. DATE 08/15/14 | SURFACE WATER DEPTH N/A | DRILLER Contract Driller START DATE 04/17/14 | COMP. DATE 04/17/14 | SURFACE WATER DEPTH N/A |
| DRIVE DEPTH BLOW COUNT BLOWS | 400 | SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft) | ELEV (ft) | 75 100 NO. MOI G | SOIL AND ROCK DESCRIPTION |
| 100 99.4 2.6 | м | 102.0 GROUND SURFACE 0.0 UNDIVIDED COASTAL PLAIN TAN AND BROWN, SANDY CLAY | 100 100.3 0.0 10 7 4 | M 800 | - - - - 100.3 GROUND SURFACE 0.0 |
| 95 94.4 7.6 4 4 6 | SS-7 M | 97.0 | 95 95.8 4.5 9 4 2 | | TAN AND GRAY, SILTY SAND |
| 90 89.4 12.6 WOH WOH WOH WOH | SS-8 W | GRAY AND BROWN, SANDY CLAY | 90 90.8 9.5 4 5 7 12 | Sat. | · |
| 80 79.4 22.6 8 12 12 | SS-9 Sat. SS-10 Sat. | 80.0 <u>COASTAL PLAIN</u> GRAY, SILTY SAND | 80 80.8 19.5 15 11 10 | Sat. | |
| 75 74.4 27.6 8 27 29 | p.56 : : : : : : : : : : : : : : : : : : : | (CAPE FEAR FORMATION) | 77 4 22.9 11 13 18 31 | | RED AND GRAY, SANDY CLAY (CAPE FEAR FORMATION) |
| 70 69.4 32.6 17 18 40 | \$58. Sat. | | 65 65 16 30 67 | | - - - - - - |
| 60 59.4 42.6 12 21 26 | Sat. | | 60 60 4 9 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | w w | |
| 55 54.4 47.6 9 12 20 | Sat. | - - - - - | 55 55 524 47.9 13 23 30 | SS-22 Sat. Sat. Sat. | <u>-</u> - - - |
| 50 49.4 52.6 9 13 9 · · · · · · · · · · · · · · · · · · | Sat. | - - - - | 50 47 4 52 9 6 10 17 | | - - - - |
| 44.4 57.6 10 12 18 | Sat. | 42.9 59.1 Boring Terminated at Elevation 42.9 ft IN | 424 - 570 | | |
| 50 49.4 52.6 9 13 9 45 44.4 57.6 10 12 18 | | MED. DENSE SILTY SAND | 424 57.9 14 23 24 | | 40.9 59.4 Boring Terminated at Elevation 40.9 ft IN HARD SANDY CLAY |

| | _ |
|--|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

SHEET 9 OF 10

| WBS | 33727 | 1.1.1 | | | TI | P 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- | 0 HR . N/A |
| COLI | AR ELE | EV . 10 | 1.7 ft | | т | OTAL DEPT | H 59.3 ft | | NORTHING | 476,7 | 53 | | EASTING 2,034,684 | 24 HR . 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 | d Rotary HAMM | ER TYPE Automatic |
| 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. | T / | 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 | - | ‡ | | | | ; . | | | | | | | _ _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 | | | | . | | | | | | | - | |
| | 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> — — 28.3 |
| 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 - | 42.8 | | | | | | \ | | | | | - | |
| | - | | 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 |
| | - | ‡ | | | | | | | | | | | | |
| | - | ‡ | | | | | | | | | | | | |
| | _ | <u> </u> | | | | | | | | | | <u> </u> | - | |
| | _ | ł | | | | | | | | | | F | | |
| | _ | F | | | | | | | | | | F | | |
| | - | F | | | | | | | | | | F | - | |
| | - | F | | | | | | | | | | | | |
| | - | t | | | | | | | | | | 1 | | |

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 | SS-35 57LT 28+38 43.1-44.6 A-2-4(0) 31 10 48.6 31.1 16.2 4.1 100 74 26 | | | | | | | | | | | | | | |

EB1-B

| | SOIL TEST RESULTS | | | | | | | | | | | | | | |
|--------|-------------------|---------|-----------|--------|-----|----|--------|--------|------|-------|---------|-------|-----|---------|---------|
| SAMPLE | | | DEPTH | AASHTO | | % | BYWEIG | HT | | % PAS | SING (S | EVES) | | % | % |
| 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) | 36 | 9 | 26.9 | 36.2 | 28.8 | 81 | 99 | 84 | 44 | - | - |

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 55LT 30+20 22.6-241 A-2-4(0) 37 NP 62.7 16.7 12.5 81 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 | | % | BYWEIG | HT | | % PAS | SING (S | EVES) | | 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 | - | - |



| | I |
|---|---|
| 0 | I |
| 0 | I |
| 4 | I |
| 4 | I |
| | I |
| P | I |
| • | I |

CONTENTS

DESCRIPTION

BORE LOG & CORE REPORT(S)

TITLE SHEET

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)

1

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.

RR @ -L-STA. 35+23

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

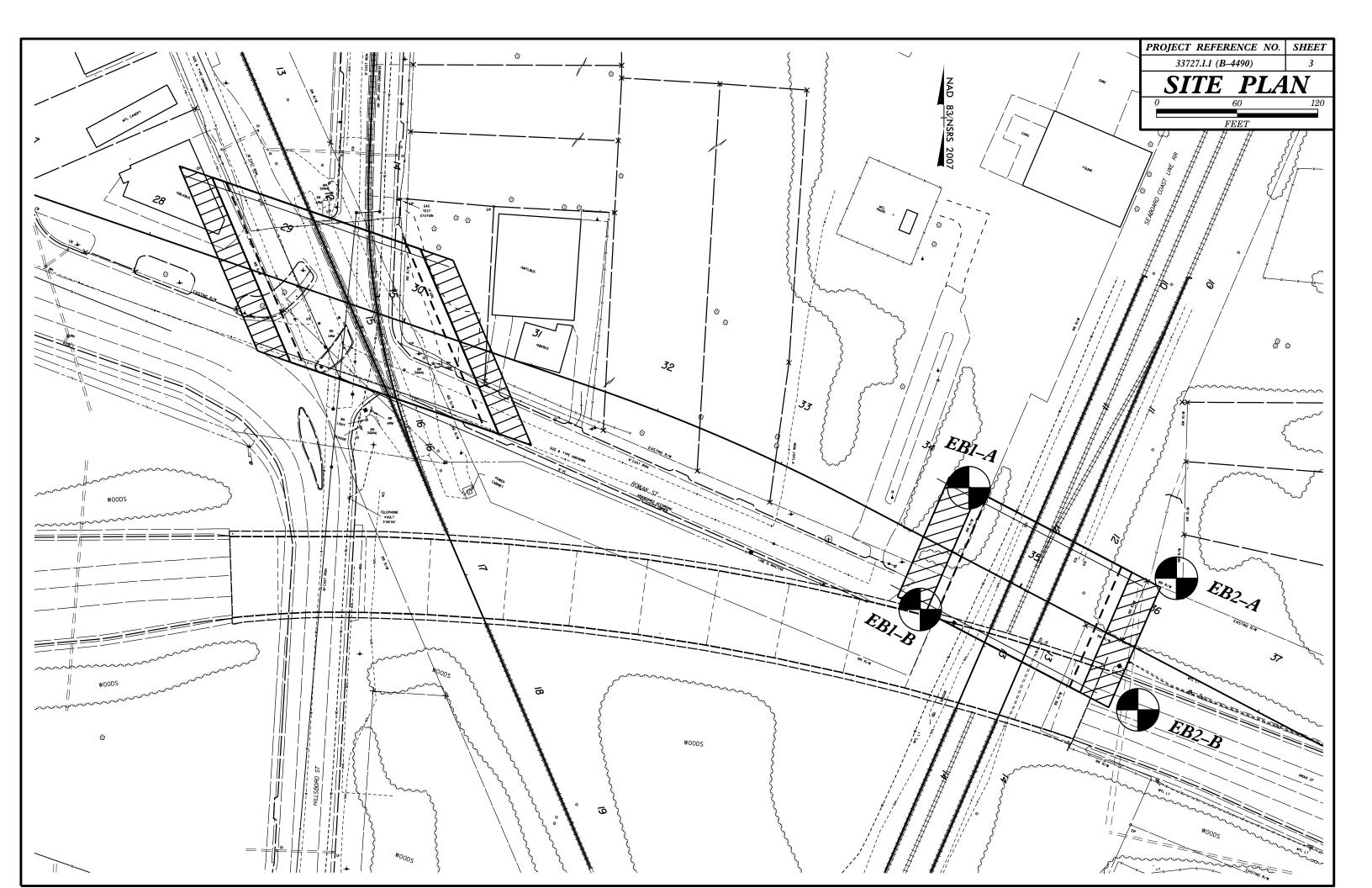
DIVISION OF HIGHWAYS

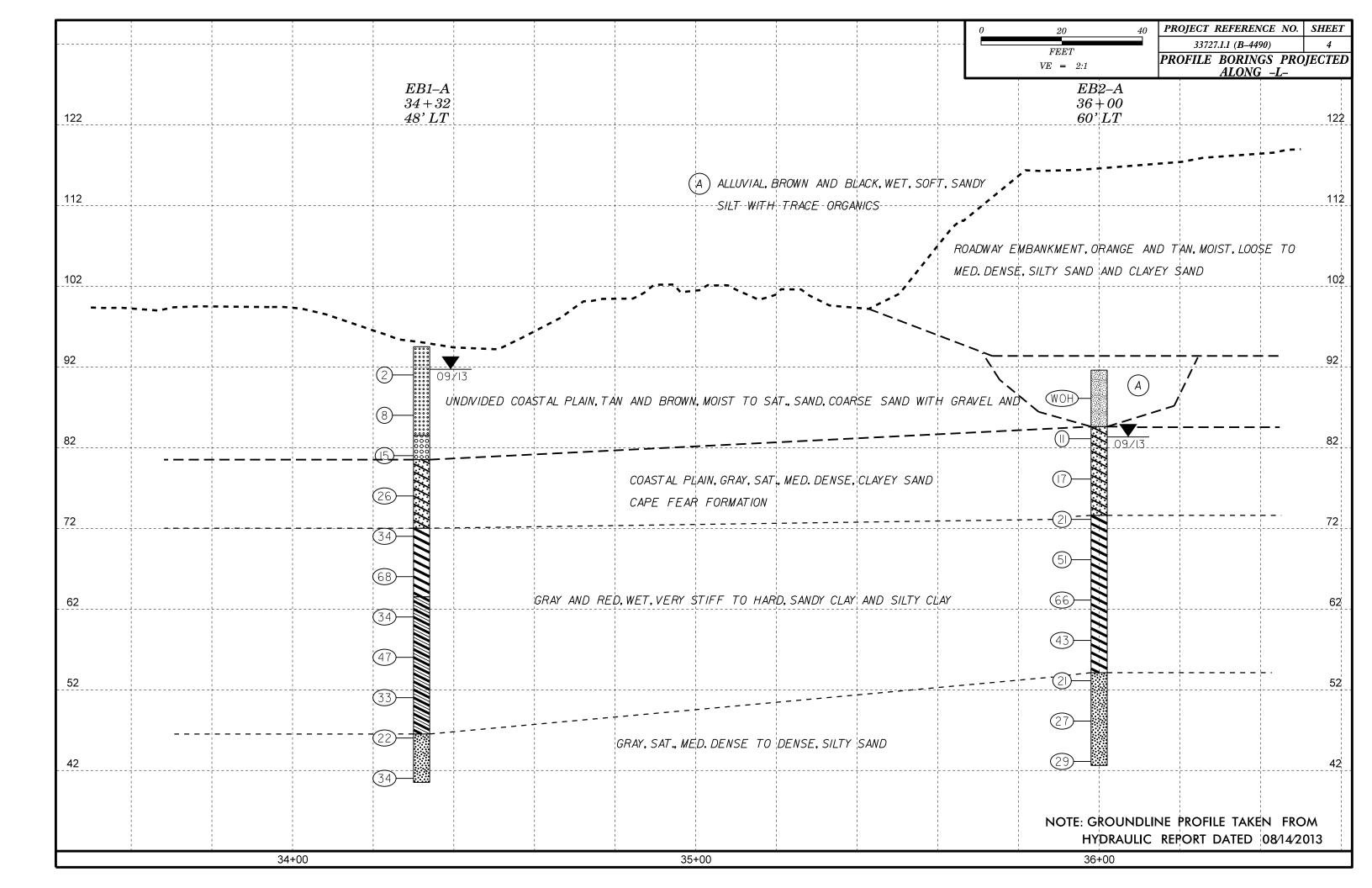
GEOTECHNICAL ENGINEERING UNIT

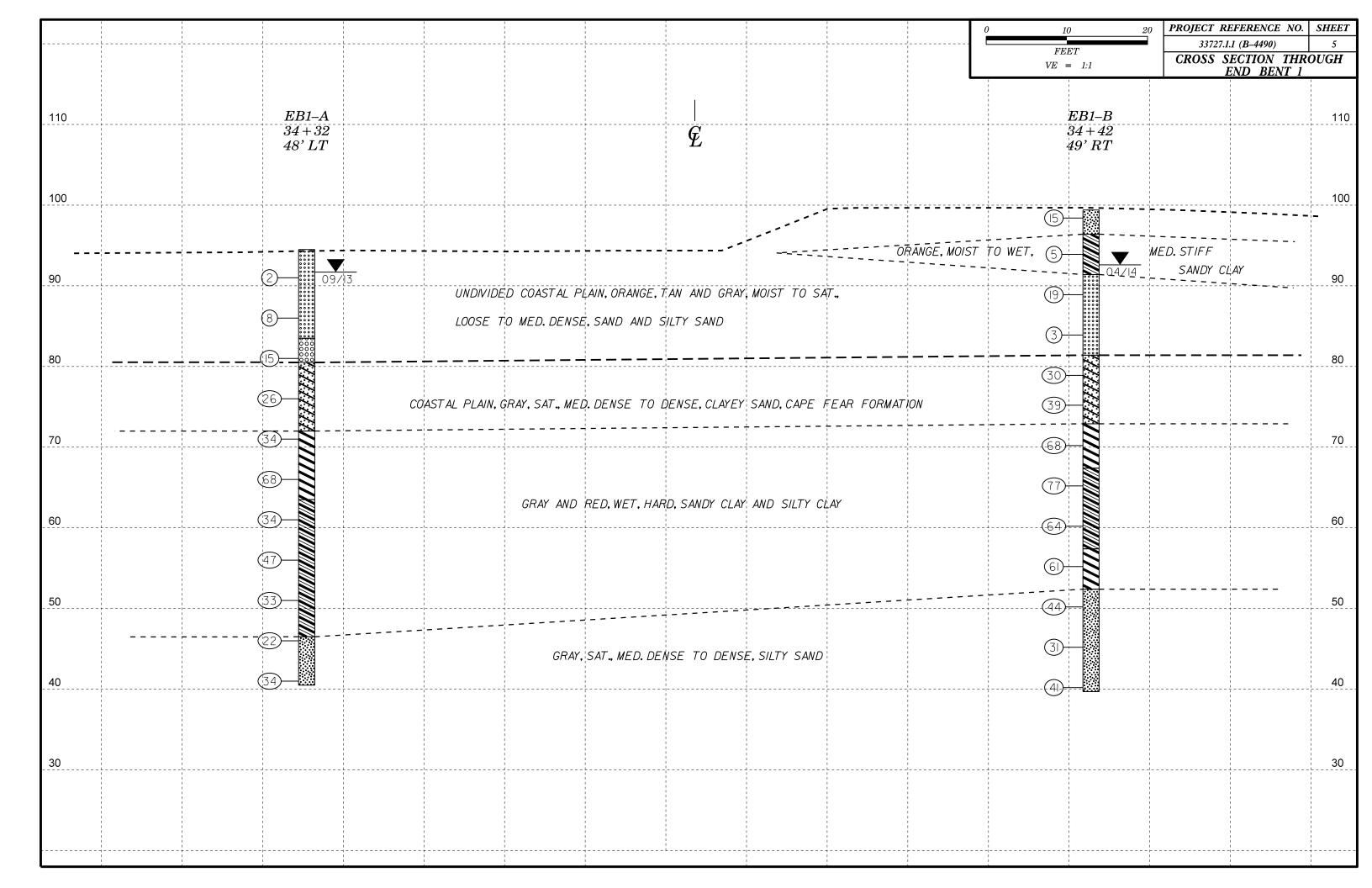
SUBSURFACE INVESTIGATION

SOIL AND BOCK LEGEND TERMS SYMBOLS AND ARRESTIATIONS

| | SOIL AND ROCK LEGEND, TERM | , 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) 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. | | | | | |
| 7. 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 | | | | | |
| LIGHT LIMIT | 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 -B | 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 | | | | | |







| | | | | | | 1 1 | 0 20 40 | PROJECT REFERENCE | NO. SHEET |
|------|-------------------------|---------------|-------------------------|-----------------------|--|---------------------|---------------------------|--------------------------|--------------|
| | | | | | | | FEET | 33727.1.1 (B-4490) | 6 THROUGH |
| | | | | 1 1 1 1 1 | | L | VE = 1:1 | CROSS SECTION -L- STA 36 | 5+00 |
| | | 777.0 | | | | | | | 1 |
| 150 | | EB2– A | | \mathcal{G} | EB2 36+ | | | | 150 |
| | | 60' LT | | Ł | 40'. | | | | |
| 130 | | | | , | | | | | 130 |
| | A ALLUVIAL, BROWN AND B | LACK MOIST TO | NET VERY SOFT | 1 1 1 1 | , <u></u> | <u>-</u> | | | 1 |
| | SANDY SILT WITH TRACE | | WEI, VEIN 3011, | 1 1 1 1 | ROADWAY | FMRA | ANKMENT, | | |
| 440 | | | | | | | | | 110 |
| 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 | | | | | |
| 90 | | 77- | <u>-</u> ▼- <u></u> | | | | DOSE-TO-MED. DENSE, SILTY | | 90 |
| | B | | 09/13 O - UNDIVIDED COA | STAL PLAIN, TA | OMAN AND BLACK, MOIST | 욁 | TRACE ORGANIC MATTER | | |
| | COASTAL P | | | | | <u>L</u> _ | | | |
| 70 | | | GRAY, SAI., | MED. DENSE 1 | 0 VERY DENSE, 53 | CLAYEY SAN | D, CAPE FEAR FURMATION | | 70 |
| 70 | GRAY | 5)— | AND-RED, WET, VERY | \$T1F-FT-O-HAF | D, (4) | <i>S</i> -AN-DY- CL | AY | | |
| | | 66 | | <u> </u> | | SAT., DENSE, | SILTY SAND | | |
| | | 43 | | | 53 | | | | |
| 50 | | <u>-</u> | GRAY, SAT., MED. DEN | SET-0 | 39— | <i>VERYDEN</i> | ISE, SILTY-SAND | | 50 |
| | | | | | 34 | | | | |
| | | | | 1 1 1 1 | GRAY, 48 | WEI , HARD, | SANDY CLAY | | |
| 30 | | | | 1 1 1 1 | 34— GRAY, (48— GRAY, SAT,(55)— GRAY, (68— | WFT HARD | SANDY CLAY | | 30 |
| | | | | | FI7 04. | 14 | | | |
| | | | | | | | | | |
| | | | | 1 1 1 1 | | | | | 1 |
| 10 | | | | | | | | | 10 |
| | | | | 1 | | | | | |
| | | | | | | | | | |
| -10 | | | | : | | | | | -10 |
| | | | | | | _ | | | |
| | | | | 1 1 1 1 | | | | | |
| | | | | 1 1 1 1 | | | | | |
| -30 | | | | I I L | , , , , , , , , , , , , , , , , , , , | - | | | -30 |

| - | 33727 | | | | IP B-4490 | | | Y CUMBE | | | | GEOLOGIST Oti, O. B. | | | WBS 33 | | | | | IP B-4490 | | | CUMBER | | | 0 | GEOLOGIST 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 | | | | EASTING 2,035,061 | 24 HR. | 2.8 | COLLAR | | | | | OTAL DEP | | | NORTHING | | | | EASTING 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 [*] 50 | ı 75 10 | | | Ö, | SOIL AND ROCK DES | CRIPTION | | ELEV DRI (ft) CF | | H BI | OW CO | 0.5ft | $\left\ \cdot \right\ _{0}$ | | PER FOOT 50 | 75 100 | SAMP. | 1 / | OI G | SOIL AND ROCH | C DESCRIPTION | N |
| | (11) | | 0.011 0.0 | 10.010 | | <u> </u> | | | 110. | / MOI | G 1 | ELEV. (ft) | | DEPTH (ft) | (1 | .) | 0.0 | 0.010 | U.O.C | | 7 | Ţ | | 110. | / MC |) G | | | |
| 95 | | | | | | | | | | | | | | | 100 | | | | | | | | | | | | | | |
| 95 | | - | | | 1 | | | | | 0 | -9 | 94.5 GROUND SURF UNDIVIDED COASTA | | 0.0 | 100 | .4 0.0 | 7 | 7 | 8 | 1 1 | | | | | М | 99 | | SURFACE DASTAL PLAIN | 0.0 |
| | 92.0 | 2.5 | 1 1 | | | | | | | | | TAN AND BROWN | | | | ‡ | | | | /* 15 | | | | | IVI | | BROWN AND ORA | NGE, SILTY SA | AND 3.0 |
| 90 | | | 1 1 | ' | 2 | | | | | | | | | | 95 ₉₄ | .9 🕇 4.5 | | | | ' / ' · · | <u> </u> | | | | | | ORANGE, S | ANDY CLAY | |
| | | 7.5 | | | ' | | | | | 000 | | | | | | ‡ | 2 | 3 | 2 | 5 | | | | | ₩ | | | | |
| 85 | 87.0 | 7.5 | 1 2 | 6 | -\ | | | | | Sat. | | | | | 90 80 | . ‡ | | | | : \;:: | | | | | | 91 | <u>1.4</u> — — — — — GRĀY, | SAND | 8.0 |
| - 00 | 1 1 | - | | | '\ | | | | | | | 83.5 | | 11.0 | 90 89 | .9 + 9.5 | 3 | 9 | 10 | | 19 | | | | Sat | 0000 | | | |
| | 82.0 | 12.5 | 2 6 | 9 | : :/: : | | | | | | | | | | | ‡ | | | | ::/:: | : : : : | | | | | 0000 | | | |
| 80 | | - | | | - • • 15 | | | | 41 | Sat. | | 80.5 COASTAL PLA | | 14.0 | 85 84 | .9 🕇 14.5 | 3 | 2 | 1 | <u> </u> | | | | | | 0000 | | | |
| | 77.0 | 17.5 | | | : : : '\ | | | | | 6.%% | | GRAY, CLAYEY ((CAPE FEAR FORM | | | | Ŧ | ľ | - | ' | 3 | | | | | Sat | 0000L | | | |
| 75 | 17.0 | - 17.5 | 5 12 | 14 | | 26 | | | SS-18 | Sat. | | | | | 80 ₇₉ | .9 19.5 | . | | | ::``\` | | | | | | 81 | 1.4 | L PLAIN | 18.0 |
| | 1 7 | - | | | | <u>\</u> | | | | | \\ | | | | 79 | .9 + 19.5 | 7 | 11 | 19 | 1 | 30 | | | SS-13 | Sat | ·/ | GRAY, CLA (CAPE FEAR | YEY SAND FORMATION) | |
| ł | 72.0 | 22.5 | 8 12 | 2 22 | - | \ | | | SS-19 | | | 72.0 | YCLAYAN | <u>22</u> . <u>5</u> | 76 | .2 23.2 | , | | |] :::: | | | | | | | | | |
| 70 | | - | | | | Q 34 | | | - 33-18 | j " | 1 | SILTY CLAY | , | | 75 | + | 12 | 19 | 20 |] | 39. | | | | Sat | | | | |
| | 67.0 | 27.5 | | | | | | | | | | | | | | Ŧ | | | | | | `\.``` | | | | 72 | 2.9 | SANDY CLAY A | ND 26.5 |
| 65 | - | | 18 34 | 34 |] :::: | | | 68 | | w | | | | | 70 | .2 7 28.2 | 11 | 16 | 52 | :::: | : : : : | | | SS-14 | H w | | SILTY | | |
| 1 | 1 7 | - | | | | | / | | | | | 63.5 | | 31.0 | | Ŧ | | | | | | , | . | | 1 | | | | |
| ł | 62.0 | 32.5 | 11 18 | 3 16 | | ار | | · | SS-20 | | | | | | 66 | .2 7 33.2 | | | |] :::: | | | \ : : : : | | | 67 | 7.4 | | 32.0 |
| 60 | | - | | | | ₩34 | | | - 00 20 | <u> </u> | | | | | 65 | Ŧ | 17 | 25 | 52 | | ļ · · · · | + | 77 | | W | | | | |
| ł | 57.0 | 37.5 | | | | : : <u>'</u> : | | | | | | | | | | Ŧ | | | | | : : : : | : : : ; | <u> </u> | | | | | | |
| 55 | | - | 9 22 | 25 | | : : : } | ■ 47 | . | | l w | | | | | 60 | .2 7 38.2 | 13 | 26 | 38 | :::: | : : : : | /. 464 | | | l w | | | | |
| |] | | | | | 1::/ | | | | | | | | | | Ŧ | | | | | | [| | | | F | 7.4 | | 40.0 |
| ı | 52.0 | 42.5 | 8 12 | 2 21 | 1 : : : : | / | | | | l _w | | | | | | .2 43.2 | | <u> </u> | ļ | | | : : : : : | | | | 3 37 | 7.4 | | 42.0 |
| 50 | 1 - | | | | | /33 | | | - | " | | | | | _ 55 | Ŧ | 15 | 24 | 37 | | 1 | 61_ | | SS-15 | 5 W | | | | |
| | 47.0 | 47.5 | | | | /:::: | | | | | | 46.5 | | 48.0 | | Ī | | | | | | /:::: | | | | 52 | 2.4 GRAY, SII | | 47.0 |
| 45 | <u> </u> | | 9 9 | 13 | • | 22 | | | SS-21 | Sat./W | | GRAY, SILTY S | AND - | | 50 | .2 <u>T 48.2</u> | 10 | 16 | 28 | 1 | | ,/ 44 | | | Sat | | GRAT, SIL | IT SAND | |
| | | | | | | / ; : : : | | | | | | | | | | <u> </u> | | | | | 1::2: | | | | | | | | |
| | 42.0 | 52.5 | 12 14 | 20 | ╢:::: | 34 | | | | Sat. | | 40.5 | | 54.0 | | .2 = 53.2 | 10 | 11 | 20 | | :/::: | | | | | | | | |
| | | _ | | | | <u> </u> | <u> </u> | | | 1 1 | F | Boring Terminated at Elev DENSE SILTY S | | | 45 | + | 10 | '' | 20 | | √ 31 | | | SS-16 | Sat | | | | |
| | | | | | | | | | | | E | DENOE SIETT O | AND | | | . ‡ | | | | | : \ : : | | | | | | | | |
| | | _ | | | | | | | | | E | | | | 40 | .2 58.2 | 10 | 16 | 25 | 1 | 41 | 1 | | | Sat | 39 | 9.7 | | 59.7 |
| | | | | | | | | | | | ţ | | | | | ‡ | | | | | | | | | | | Boring Terminated a DENSE SI | t Elevation 39.7 LTY SAND | ft IN |
| | | - | | | | | | | | | Ė | | | | | ‡ | | | | | | | | | | | | | |
| | | - | | | | | | | | | - | | | | | ‡ | | | | | | | | | | | | | |
| | | | | | | | | | | | - | | | | | ‡ | | | | | | | | | | | | | |
| | | | | | | | | | | | F | | | | | ‡ | | | | | | | | | | | | | |
| | | | | | | | | | | | F | | | | | ‡ | | | | | | | | | | | | | |
| | | | | | | | | | | | F | | | | | ‡ | | | | | | | | | | | | | |
| | - | | | | | | | | | | - | | | | | ‡ | | | | | | | | | | - | | | |
| | | | | | | | | | | | F | | | | | ‡ | | | | | | | | | | | | | |
| 3 | | Ļ Ì | | 1 | 1 | | | | | | L | | | | | + | - 1 | 1 | 1 | | | | | 1 | 1 | 1 - | | | |

| | | ſ |
|--|--|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | - |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

SHEET 8 OF 10

| WBS | 33 | 727 | .1.1 | | | Т | IP B-4490 | | COUNTY | CUMBER | LAND | | | GEOLOGI | ST Oti, O. E | 3. | | |
|-------|------------|----------|----------------|--------|-------|----------|------------------|----------------------|---------------|--------------|----------|------------|----------------|-------------------|----------------------------|------------------------|----------------------|------------|
| SITE | DES | CR | IPTION | BR. | ON -L | - OVE | R NORFOLK | SOUTHE | RN RR @ | :-L- STA. 35 | +23 | | | | | | GROUI | ND WTR (ft |
| BORI | ING N | 10. | EB2- | A | | S | TATION 36 | 6+00 | | OFFSET (| 60 ft LT | | | ALIGNME | NT -L- | | 0 HR. | N/A |
| COLL | LAR | ELE | EV . 91 | I.6 ft | | T | OTAL DEPI | H 49.0 ft | : | NORTHING | 476,57 | 77 | | EASTING | 2,035,215 | | 24 HR. | 2.0 |
| DRILL | . RIG/I | IAN | IMER EF | F./DAT | E RF | 00074 0 | CME-55 92% | 07/12/2011 | | | DRILL M | ETHO | D Mu | d Rotary | | HAMM | ER TYPE | Automatic |
| DRIL | LER | С | onley, H | 1. R. | | S | TART DATE | 09/12/1 | 3 | COMP. DA | | | | | WATER DE | PTH N | A | |
| ELEV | DD1 | | DEPTH | | ow co | UNT | | BLOWS | PER FOOT | | SAMP. | | 1 L T | 1 | | | | |
| (ft) | ELE (ft | : V) | (ft) | 0.5ft | 0.5ft | 0.5ft | 0 2 | 25 | 50 | 75 100 | NO. | MO | 0 G | | SOIL AND RO | JCK DES | CRIPTION | N . |
| | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | |
| | | - | F | | | | | | | | | | l | - · | | | | |
| | | - | | | | <u> </u> | <u> </u> | T | | | | | 520000 | 91.6 | | ND SURF | | 0 |
| 90 | 89. | - 1 | 2.5 | | | | | | | | | | | - BL | UNDIVIDED ACK AND GR | AY, SANI | OY SILT W | /ITH |
| | | <u> </u> | 2.5 | WOH | WOF | WOH | 1 | | | | SS-22 | w | | • | TRACI | E ORGAN | IICS | |
| 85 | | - | - | | | | `\` | | | | | | | | | | | |
| 65 | 84. | 1 | 7.5 | 3 | 6 | 5 | .\ | | | 1 | | | | <u>-84.6</u> | | STAL PLA | | |
| | | - | _ | | 0 |) 5 | 11 - | | | | SS-23 | Sat. | | • | | CLAYEY S | SAND | |
| 80 | | _ | Ė | | | 1 | · · · · | <u> </u> | : : : : | | | | /// | - | (5/11 [] | a vi Oiviv | (1 (OIN) | |
| | 79. | 1_ | 12.5 | 4 | 6 | 11 | · · · \ . | | | | | Sat. | | | | | | |
| | | - | - | | | | :::-7:" | | | | | | / /// | • | | | | |
| 75 | 74. | 1 - | | | | | | | | 1 | | | / // | - | | | | 46 |
| | | - | - 17.0 | 7 | 10 | 11 |] : : : 7 | · · · · · 21 · · · · | | | SS-24 | Sat./W | | <u>73.6</u> | GRAY | SILTYC | LAY - | 18 |
| 70 | | - | - | | | | | | | | | | | | | | | |
| 70 | 69. | 1 | 22.5 | 11 | 21 | 30 | | | | 1 | | l | | - | | | | |
| | | - | _ | '' | 21 | 30 | | | 51 | | | W | | | | | | |
| 65 | | - | L | | | | | | · · · · | | | | | · _ | | | | |
| | 64. | 1_ | 27.5 | 14 | 25 | 41 | - | | | | SS-25 | W | | | | | | |
| | | - | | | | | | : : : : | | ' :::: | 00.20 | '' | | | | | | |
| 60 | 59. | , - | 32.5 | | | | | | / ···· | | | | | - | | | | |
| | | ٠. | - 32.3 | 10 | 18 | 25 | 1 | | 3 | | | w | | · · | | | | |
| | | - | _ | | | | | : /: : | | | | | | • | | | | |
| 55 | 54. | 1 - | 37.5 | - | 10 | 14 | | <i>/</i> | | | | | | 54.1 | | | | 37 |
| | | - | <u> </u> | 7 | 10 | 11 | | 21 | | | SS-26 | Sat./W | /!::: <u>-</u> | • | GRAY, | SILTY S | AND | |
| 50 | | - | <u>L</u> | | | | | | | | | | | · _ | | | | |
| | 49. | 1_ | 42.5 | 11 | 13 | 14 | | | | | | Sat. | | • | | | | |
| | | - | - | | | | | 127 | : : : : | | | | | • | | | | |
| 45 | 44. | , - | 47.5 | | | | | 1 | | | | | | - | | | | |
| | | | | 7 | 12 | 17 | | 29 | | | | Sat. | | 42.6 | | | | 49 |
| | | - | <u> </u> | | | | | | | | | | | Boi | ring Terminate MED. DEN | ed at Elev ISE SILT | ation 42.6 / SAND | ft IN |
| | | - | - | | | | | | | | | | 1 - 1 | - | | | | |
| | | - | _ | | | | | | | | | | | | | | | |
| | | - | F | | | | | | | | | | F | • | | | | |
| | | - | - | | | | | | | | | | F | - · | | | | |
| | | - | - | | | | | | | | | | | · · | | | | |
| | | _ | _ | | | 1 | | | | | | | | - | | | | |
| | | - | <u> </u> | | | 1 | | | | | | | | | | | | |
| | | - | _ | | | 1 | | | | | | | F | | | | | |
| | | - | F | | | 1 | | | | | | | | - | | | | |
| | | - | ļ | | | 1 | | | | | | | | • | | | | |
| | | - | ţ | | | 1 | | | | | | | | • | | | | |
| | | - | <u> </u> | | | 1 | | | | | | | <u> </u> | - | | | | |
| | | - | ŀ | | | 1 | | | | | | | F | | | | | |
| | | - | Į. | | 1 | | | | | | | | 1 [| • | | | | |

| WBS | 33 | 727.1. | 1 | | | TIP B-4 | 490 | | COUNT | Y CUMB | ERLAND | D | | GEOLO | OGIST Swar | tley, J. R. | | | W | BS 3372 | 7.1.1 | | | TIF | B -4490 | | COUNT | Y CUMBER | RLAND | | | GEOLOG | SIST Swartl | ey, J. R. | _ | |
|--------------|--------------------|-------------------|-----------|----------------|-----------------|--------------|---------|---------------------------------------|----------------|---------|--------------|--------|---------------|----------------------------|--------------------|---------------------------------------|-----------|--------------------|-----------|--------------------------|--|---------|--------|---------|----------------|---------------|--------------|--------------|--|--------|----------------|-----------------------|------------------------|---------------------------|-----------------------|------------|
| 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 | IG 2,035,18 | 37 | 24 HR. | FIAD | C | OLLAR EL | . EV . 12 | 25.2 ft | | TC | TAL DEPT | H 94.1 | ft | NORTHING | G 476,4 | 480 | | EASTING | 3 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 OD 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 | DEPTH N | I/A | | | RILLER (| | | | | ART DATE | 04/28/ | 14 | COMP. DA | ATE 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 | | | | | _ | 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 : 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. | | | | | | | | | _ | 9 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 |] ; * | 12 | | | | - - | -50 N | V | , | | | | | | | † † | | | | | | | | | | | - - - | | | | |
| 100 | | 2.6 + 2 | 2.6 | 2 3 | 6 | - | | | | | - | 1 | VI | 99.2 | | | | 26. | | | ‡ | | | | | | | | | | | - - - | | | | |
| 95 | 97. | .6 - 2 | 7.6 | 6 6 | 5 8 | | 14 | | | | - | 1 | и 🗔 | - - - | | | | | | | ‡ | | | | | | | | | | | - - - | | | | |
| | 92. | .6 - 3 | 2.6 | 3 4 | 6 | | 0 | | | | - | 1 | VI | 94.2 - - - | TAN AND BL | DED COASTA ACK, SILTY ACE ORGAN | Y SAND WI | <u>31</u> . ITH | | | Ī | | | | | | | | | | | - | | | | |
| 90 | 87. | .6 = 3 | 7.6 | 5 5 | 5 5 | | | | | | - | S | at. | | | | | | | | | | | | | | | | | | | - - - | | | | |
| 85 | 82. | .6 + 4 | 2.6 | | | | | | | | - - - | | | | | | | | | | ‡ | | | | | | | | | | | - - - | | | | |
| 80 | | Ī | | 10 10 | 0 20 | | | 30 | | | - | S | at. | 81.2 | GR/ | AY, SANDY | CLAY - | 44. | | | Ī | | | | | | | | | | | - - | | | | |
| 75 | 77. | .6 + 4 | 7.6 | 12 19 | 9 34 | | | | 53 | | - SS- | -51 S | at. | 79.2 — | GRA | OASTAL PLA Y, CLAYEY FEAR FORM | SAND | 46. | | | ‡ ‡ | | | | | | | | | | | - - - | | | | |
| | 72. | .6 + 5 | 2.6 | 14 1 | 5 29 | | | • • • • • • • • • • • • • • • • • • • | 4 | | - - - | | <i>N</i> | 74.2 | GR | AY, SILTY C | CLAY | <u>51</u> . | | | † | | | | | | | | | | | - - - | | | | |
| 70 | 67. | .6 ± 5 | 7.6 | 21 3 | 7 50 | | | | | | - | | , | | | | | | | | <u> </u> | | | | | | | | | | | - - - | | | | |
| 65 | 62. | .6 + 6 | | | - | :: | | | | · · · · | - - - | | | 64.2 | | ĀY, SILTY S | SAND | 61. | | | ‡ | | | | | | | | | | | - - - | | | | |
| 60 | | ‡ ; | | 9 17 | 7 26 | | | Q 43 | | | - - - | S | at. [| 5 <u>9</u> .2 | | AY, SANDY (| CLAY | 66. | | | ‡ <u>†</u> | | | | | | | | | | | - - - | | | | |
| 55 | 57. | 6 + 6 | 7.6 | 12 18 | 8 35 | | | | 53 | | | \ | ^ \ | 54.2 | | | | <u>71</u> . | | | <u> </u> | | | | | | | | | | | | | | | |
| 50 | 52. | .6 7 | 2.6 | 8 13 | 3 26 | | | 4 39 | | | . SS- | -52 S | at. | | ĠŔ. | ĀY, SILTY S | SAND | | | | Į Į | | | | | | | | | | | _ - - | | | | |

PROJ. NO. -33727.1.1 ID NO. - B-4490 COUNTY -CUMBERLAND

EB1-A

| | | | S | OIL 7 | 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

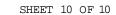
| | | | S | OIL 7 | TE. | ST | RE | SUI | LTS | | | | | | |
|--------|--------|---------|----------------------------|----------|-----|----|--------|-------------|------|-------|---------|-------|-----|---------|---------|
| SAMPLE | | | DEPTH | AASHTO | | % | BYWEG | НТ | | % PAS | SING (S | EVES) | | % | ્રે |
| NO. | OFFSET | STATION | I 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 | TE. | ST | RE | SUI | LTS | | | | | | |
| SAMPLE | | | DEPTH | AASHTO | | % | BYWEIG | HT | | % PAS | SING (S | EVES) | | % | % |
| NO. | OFFSET | STATION | I 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 | RE | SUI | LTS | | | | | | |
|--------|--------|---------|------------------|----------|-----|----|-----------|-------|------|-------|---------|-------|-----|---------|---------|
| SAMPLE | | | DEPTH | AASHTO | | % | BYWEG | НТ | | % PAS | SING (S | EVES) | | % | ્રે |
| NO. | OFFSET | STATION | I 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 | - | _ |
| SS-51 | 40RT | 36+20 | 47.6-49.1 | A-2-6(1) | 37 | 15 | 51 D | 22.4 | 165 | 102 | 97 | 72 | 29 | _ | _ |
| SS-52 | 40 RT | 36+20 | 72.6-74.1 | A-2-4(0) | 32 | 8 | 28.9 | 48.2 | 16.8 | 61 | 100 | 88 | 29 | - | 1 |



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 | VG | WA | LL | 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

-7F355C29F75A413ATURE

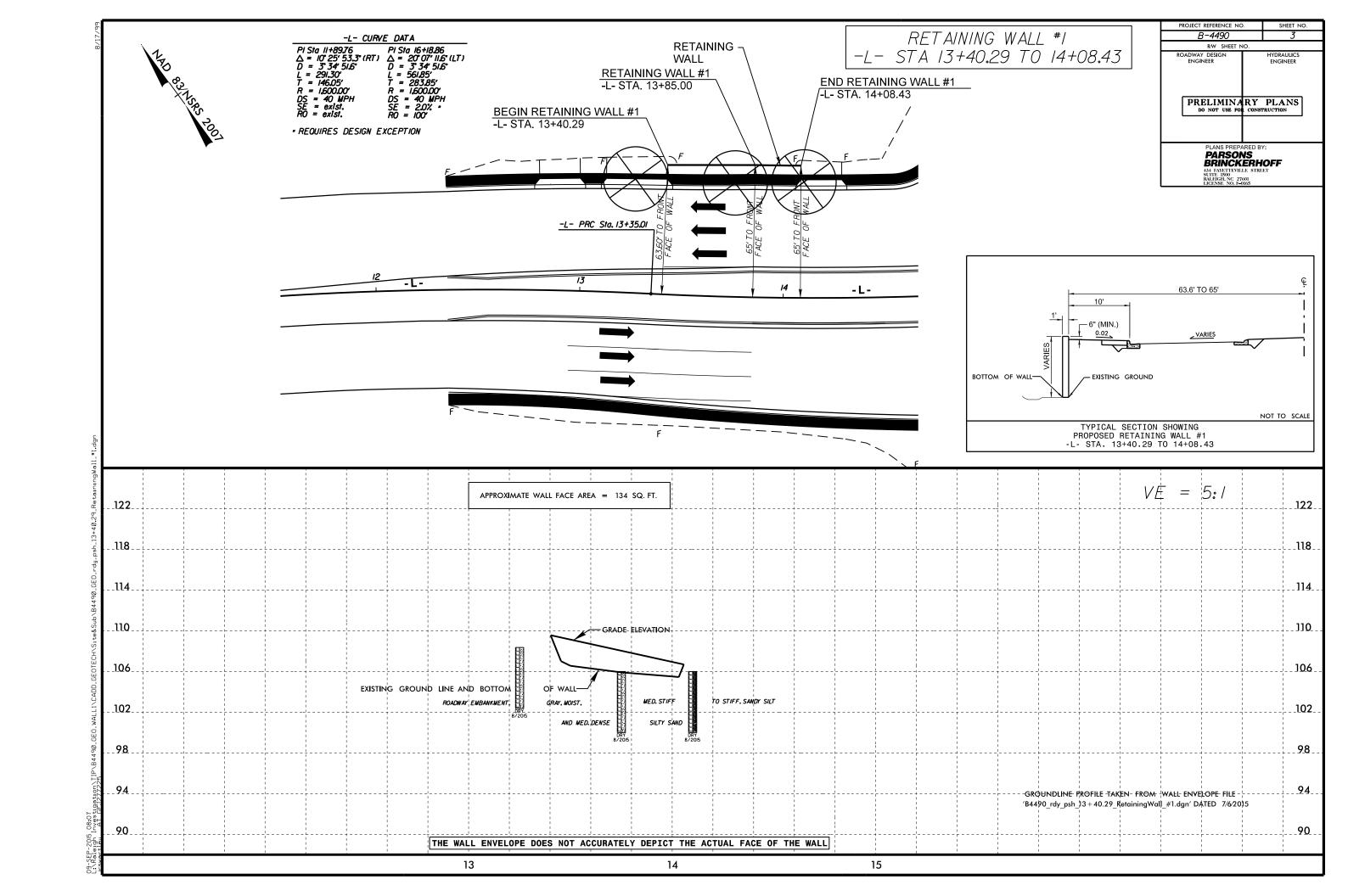
DATE

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, 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 OUARTZ 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 | POONWAY 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. |
| PRIMARY SOIL TYPE CONTRACTIVES ON PENETRATION RESISTENCE COMPRESSIVE STRENGTH (IONS/FT ²) | 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.

~

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.

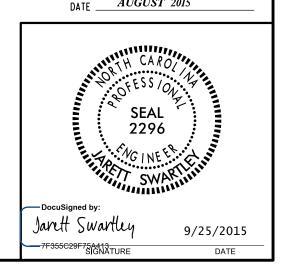
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS ASOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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



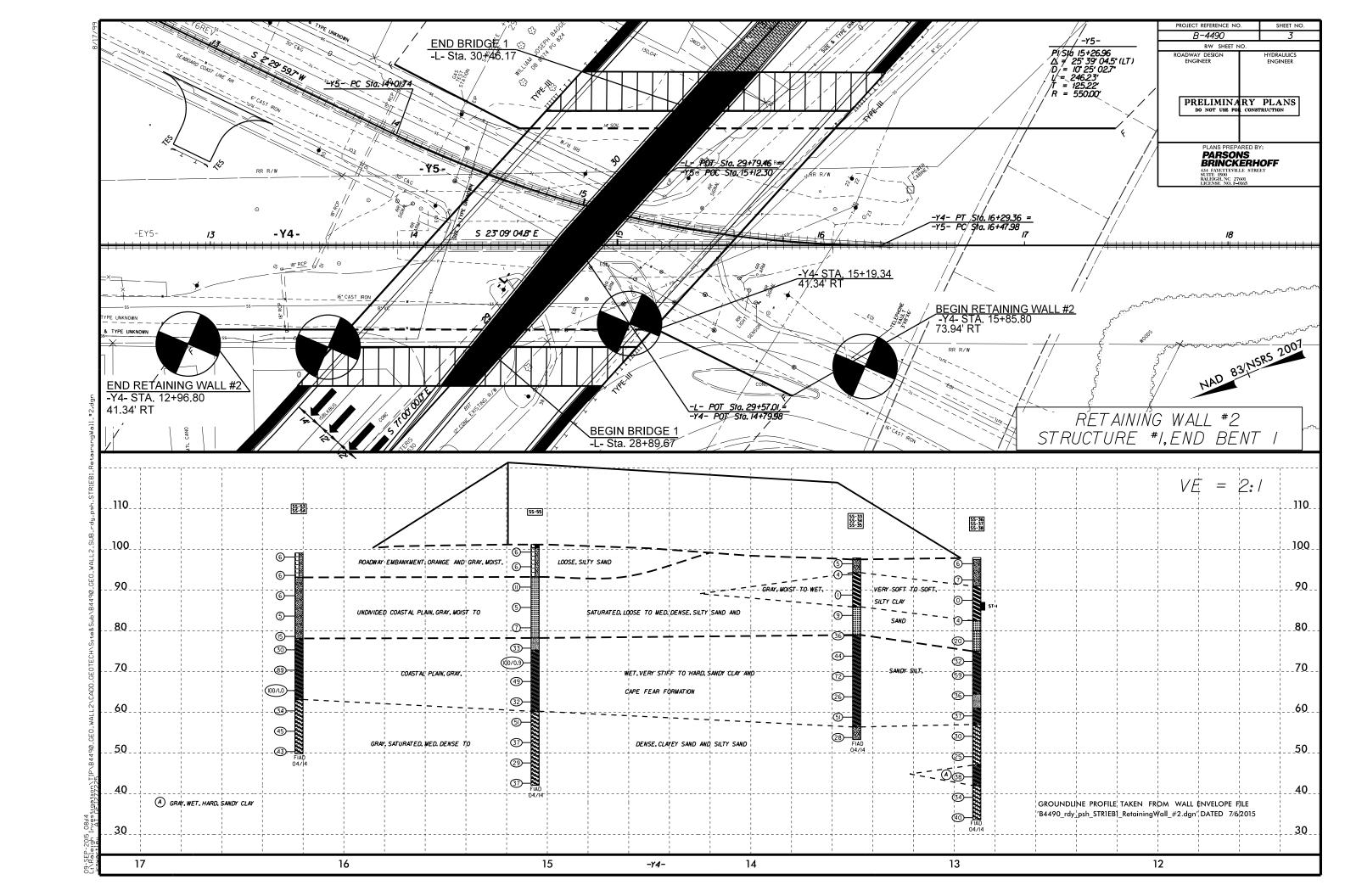
AUGUST 2015

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). SAIM D1586 PENETRATION SONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDOED FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (\$ 35%, PASSING *200) 1 > 35%, PASSING *200) 1 > 35%, PASSING *2000 | 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 ROCK (WR) JOUR DESCRIPTION OF THE TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT CRONS THE CORNITE OF THE ROLL OF CRANITE. | 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-1 | ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE LL < 31 HIGHLY COMPRESSIBLE LL = 31 - 50 LL > 50 LL > 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL ORGANIC MATERIAL SOILS SOILS TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC > 10% > 20% HIGHLY ORGANIC > 10% > 20% HIGHLY ORGANIC > 10% STATIC WATER LEVEL AFTER 24 HOURS | 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. COLLUYIUM - 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 |
| CEN.RATING SAME EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR | SPRING OR SEEP MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE MM MONITORING WELL TEST MISCELLANEOUS SYMBOLS DIP & DIP DIRECTION OF ROCK STRUCTURES SOLOPE INDICATOR INSTALLATION COME PENETROMETER TEST TEST TEST TEST MONITORING WELL TEST BORING WITH CORE WITH CORE PIEZOMETER INSTALLATION SOUNDING ROD TEST BORING WITH CORE 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 CISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN 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. VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARITZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REQUECT TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK VSEV.) REMAINING, 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 YALUES \ 100 BPF COMPLETE ROCK REDUCED TO SOIL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N YALUES \ 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 ALSO AN EXAMPLE. | POLIT - PROCE PROGRESS ON SOMPHILE NEAR THEIR ORIGINAL POSITION AND DISCOGED FROM PARENT 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. LEOGE - 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. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. 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 UNCLASSIFIED EXCAVATION - UNDERCUT | 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. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR 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. STARTA 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 (15.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |
| (PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE | FRAGS FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO | FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS | BENCH MARK: |
| OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SUBJECT: SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE PLASTICITY | EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: CME-45C CLAY BITS CME-55 B'HOLLOW AUGERS AUTOMATIC MANUAL CORE SIZE: B'HOLLOW AUGERS -B -H -H | VERY WIDE | ELEVATION: FEET NOTES: |
| PLASTICITY NDEX (PI) PLASTICITY INDEX (PI) NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH COLOR 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. | 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 SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARDE HAMMER BLOWS REFULIEFO TO BREAK SAMPLE. | |
| | | EXTREMELY INDURATED 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.

~

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.

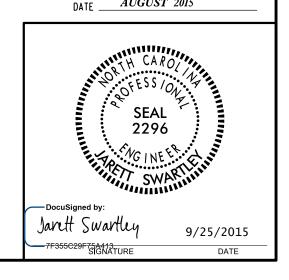
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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



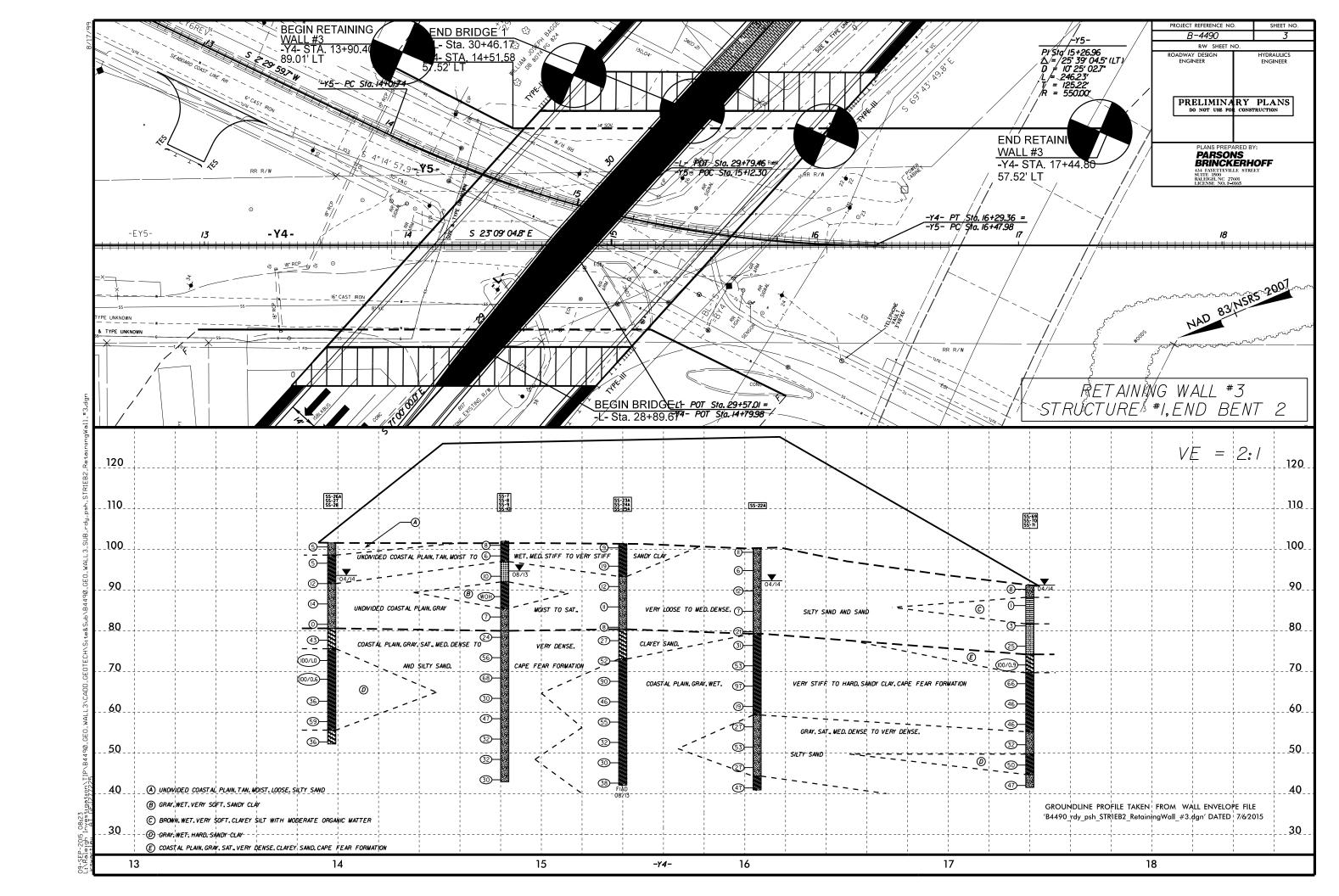
AUGUST 2015

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 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: | 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. | 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 PERTRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø.I FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN | 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. |
| CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SUTY CLW, MOIST WITH INTERBEDOED FINE SAND LAWERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION | ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | 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 > ROCK (WR) 100 BLOWS PER FOOT IF TESTED. | 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 |
| GENERAL CLASS. CRANULAR MATERIALS (> 35% PASSING *200) SILT-CLAY MATERIALS (> 35% PASSING *200) ORGANIC MATERIALS GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 | MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ONEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN | WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. |
| CLASS. A-1-b A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7 SYMBOL 000000000000000000000000000000000000 | COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOLLD YELLD ST REFUSAL IF TESTED. ROCK STAL PLAIN COASTAL PLAIN COASTAL PLAIN SEDIMENTARY ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. SEDIMENTARY ROCK SPI REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SPI REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED | COLLUYIUM - 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. |
| X PASSING X PASSING S8 MX *40 38 MX 58 MX 51 MN GRANULAR SILT- MUCK, SOILS SOILS SOILS PEAT | PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY | (CP) SHELL BEDS, ETC. WEATHERING | DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. |
| *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 3 | ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% | FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLING. | <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. |
| LL 48 MX 41 MN LITTLE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN MNEPARE HIGHLY | MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE | 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 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 | GROUND WATER | SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO INCH. DPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. | 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. |
| OF MAJOR GRAVEL, AND VILL STATE OF CARLEY AND SAND SAND SOILS SOILS GEN. RATING GEN. RATING FAIR TO 2000 FAIR TO 2000 HIGH FAIR TO 2000 | STATIC WATER LEVEL AFTER 24 HOURS \times 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. |
| | SPRING OR SEEP | DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED 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, FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE |
| CONSISTENCY OR DENSENESS COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH | MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION | SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL | FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO |
| CUNSISTENCY (N-VALUE) (TONS/FT ²) GENERALLY VERY LOOSE < 4 | with soil description of rock structures soil symbol of rock structures sport omit test boring slope indicator installation | SEVERE ALL ROCK EXCEPT QUARTZ 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 TESTEO, MOULD SYELD SYT N VALUES > 100 BPF | ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS |
| DENSE 30 TO 50 | ARTIFICIAL FILL (AF) OTHER AUGER BORING AUGER BORING CONE PENETROMETER TEST INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD | 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 (V SEV.) REMAINING, 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 | 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. |
| GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4 | INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE PIEZOMETER INSTALLATION SPT N-VALUE | 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 ALSO AN EXAMPLE. | 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. |
| 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 |
| 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 POULDER CORPLE CORVEL COARSE FINE SUIT CLAY | UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. | ROCK, <u>SILL</u> - 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. |
| (BLDR.) (COB.) (GR.) (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 BY MODERATE BLOWS. | 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 SOIL MOISTURE - CORRELATION OF TERMS | AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY 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 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. | STANDARD PENETRATION TEST (PENETRATION RESISTANCE) SPI) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB, HAMMER FALLING 30 INCHES REDUIRED TO PRODUCE A PENETRATION OF I FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EDUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. |
| SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK | SOFT CAN BE GROVED OR COUGED 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. | STRATA CORE RECOVERY ISBEC TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. |
| - SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE | e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI - SLIGHTLY RS - ROCK | 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. | 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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |
| PLASTIC SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS ω - MOISTURE CONTENT CBR - CALIFORNIA BEARING | FRACTURE SPACING BEDDING | BENCH MARK: |
| (PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE | HI HIGHLY V - VERY RATIO 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 SL SHRINKAGE LIMIT | ORILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL | WIDE | ELEVATION: FEET NOTES: |
| - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | X 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 | | INDURATION 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 | TUNGCARBIDE INSERTS | RUBBING WITH FINGER FREES NUMEROUS GRAINS: | |
| SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH | VANE SHEAR TEST X CASING W/ ADVANCER HAND TOOLS: POST HOLE DIGGER POST HOLE DIGGER AND AUGUST | GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED ORAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. | |
| COLOR | 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; 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- 24. 1 | A- 2- 4(0) | 37 | NP | <i>62.7</i> | 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 | <i>37.4</i> | 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 | 4. 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- 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. 7</i> | 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.

~

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.

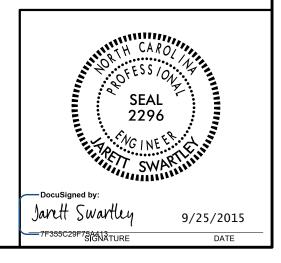
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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.

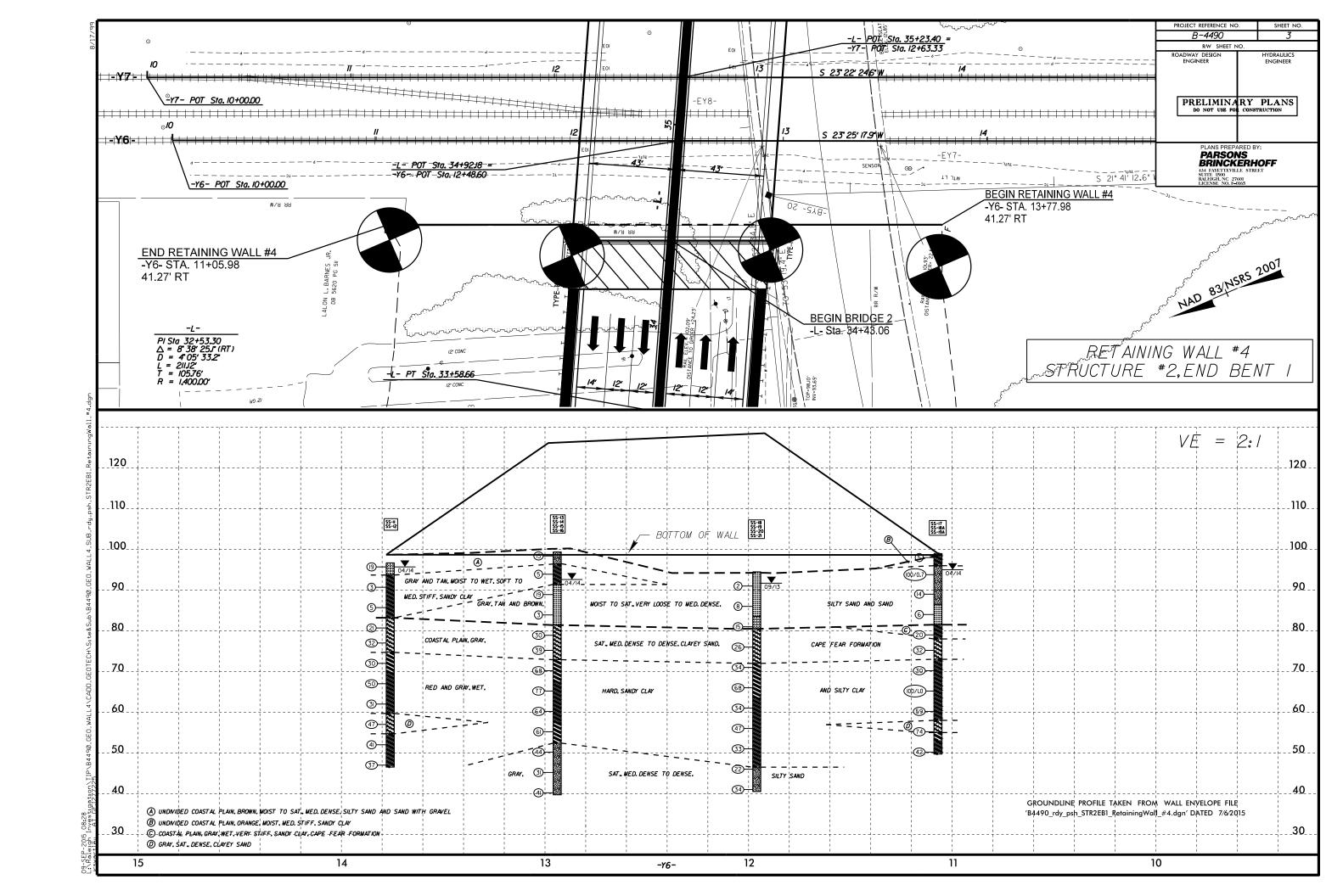
B-4490

2

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. JOINT - 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 ²) | 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 (NON-COHESIVE) 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 2 200 | <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 COTL BOUNDARY A PIEZOMETER COT 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 | | |
| 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 | SIATION | 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 | - | ı |
| SS- 13 | 54 RT | 12+94 | 19. 5- 21. 0 | A- 2- 6(1) | 40 | 15 | 43. 3 | 26. 4 | 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 | <i>43</i> . 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

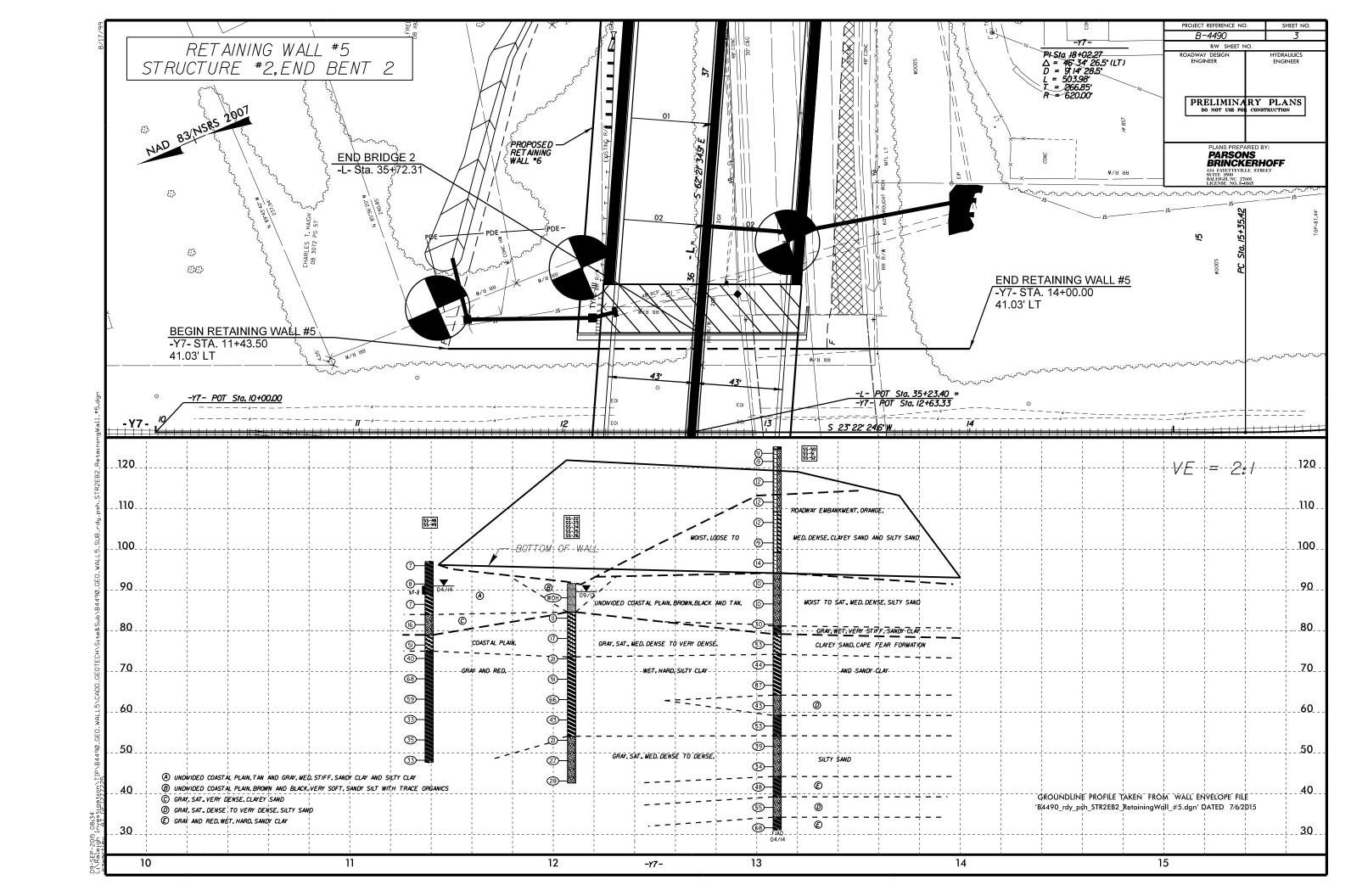


PROJECT REFERENCE NO. SHEET NO. 2

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 CRYSTA | 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 ²) | 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 < 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. <u>IF TESTED, WOULD YIELD SPT N VALUES < 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 | - | 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 | 4. 5- 6. 0 | A-6(2) | 29 | 14 | 34. 2 | 25. 2 | 12. 1 | 28.5 | 98 | 78 | 44 | - | 3. 4 |
| SS- 4 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 | 37.5-39.0 | 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.

~

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

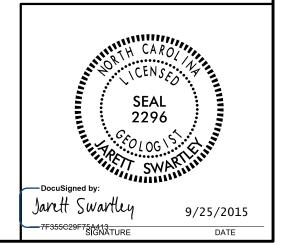
INVESTIGATED BY J.R. SWARTLEY

DRAWN BY ______J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE AUGUST 2015

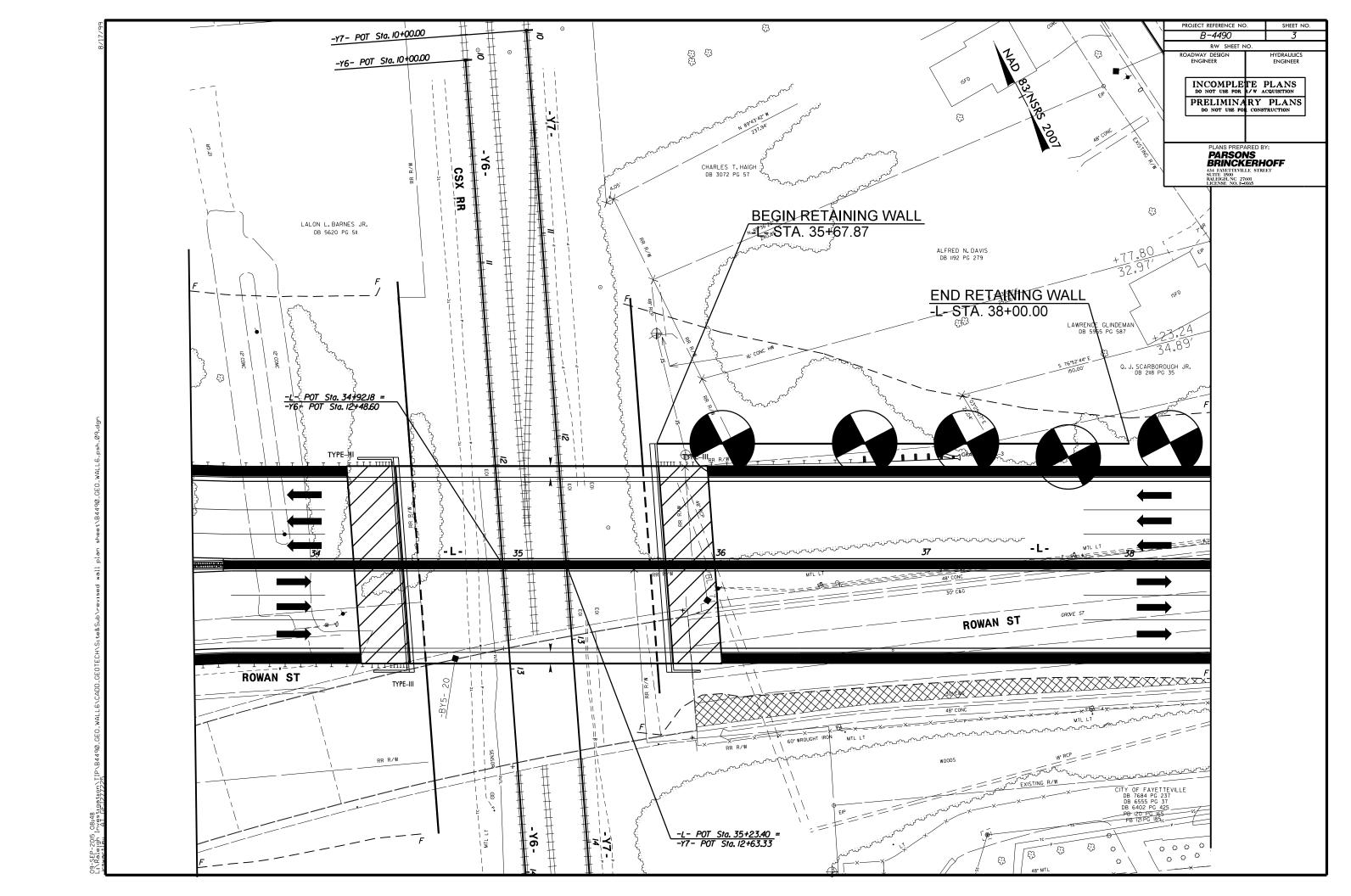


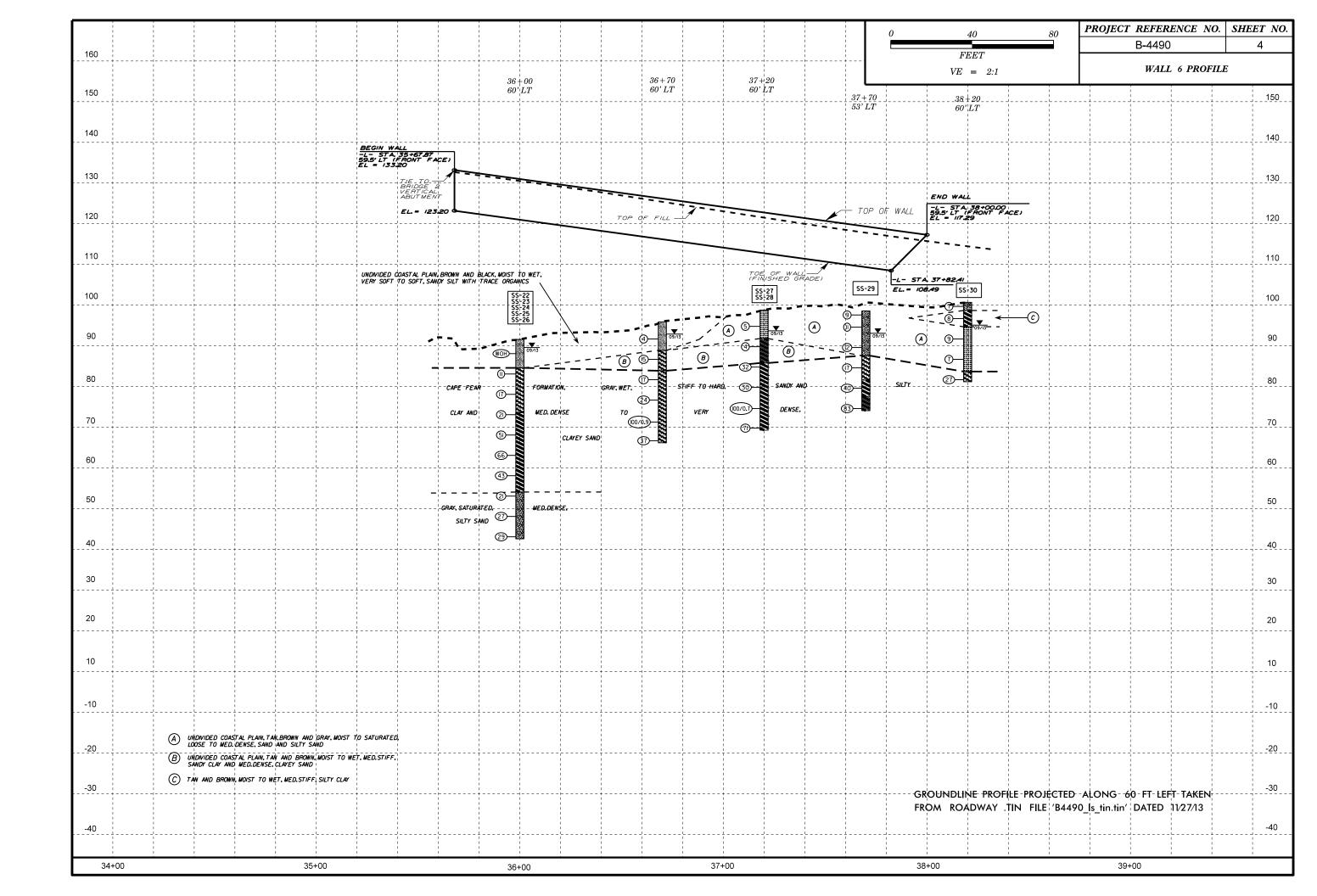
PROJECT REFERENCE NO. SHEET NO. 2

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-1-6 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 B-2-6 A-2-7 B-2-6 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 | 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 CAPAGE AND 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 ²) | 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 | M | 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 < 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 7/6 - 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 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 | 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 - OYNAMIC 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 MICACCOUS C.L CLAY MOD MODERATLY CPT - CONE PENETRATION TEST OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST DPT - DYNAMIC PENETRATION TEST E - VOID RATIO S 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 DANCE 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 PT - SPINE C - VOID RATIO F - FINE FOSS FOSSILIFEROUS FOSS FOSSILIFEROUS FRAC FRACTURED, FRACTURES AMED MEDOLIM MICA MICACEOUS WEA WEATHERED YOUNG - WEATHERED YOUNG - MICACEOUS YEAR - WEATHERED YOUNG - MICACEOUS SAMPLE ABBREVIATIONS S - BULK S - BULK S - SHULK S - SHU | 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 TERM 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 MEA WEAL - WEAL - WEAL - WEAL - WEAL - WEAL - REST CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST OPT - DYNAMIC PENETRATION TEST E - VOID RATIO F - FINE SL SILT, SILTY FF - FINE SL SILT, SILTY FRASC FRACTURED, FRACTURES FRAC FRACTURED, FRACTURES FRACS FRAGMENTS MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY MED WEAL - VANE SHEAR TEST WEAL - MICACOUNT WEAL - VANE SHEAR TEST WEAL - SHEAR TEST WEAL | 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 - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SHRINKAGE LIMIT SEMISOLID; AT OR NEAR OPTIMUM MOISTURE SHRINKAGE LIMIT SEMISOLID; AT OR NEAR OPTIMUM MOISTURE | 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 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 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 SAP SAPROLITIC C - VIDI RATIO F - FINE SL SILT, SILTY FRACTURED, FRACTURES SILI - SILITY FRACTURED, FRACTURES TICR - TRICONE REFUSAL FRACS FRAGMENTS M - MOISTURE CONTENT TRICONE REFUSAL HI HIGHLY EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: ANNUAL MANUAL MANUAL W - AUGURTA MANUAL ANNUAL MANUAL MED WEAL - VANE SHEAR TEST WEAL - PRACTURED FOR SHEAR TEST MEATHER SAMPLE ABBREVIATIONS S - BULK S - SPLIT SPOON S - SPLIT SPOON S - SPLIT SPOON S - FRACK FRACTURED, FRACTURES TICR - TRICONE REFUSAL TRICONE REFUSAL TO ME - CALIFORNIA BEARING RATIO MANUAL | 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 VEATHERED WEA WEATHERED WEA SAPPL SAMPLE ABBREVIATIONS SS - SPLIT SPOON SS - SPLIT SPOON SS - SPLIT SPOON FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL HI HIGHLY V - VERY RATIO EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: DRILL UNITS: ADVANCING TOOLS: WEA WEATHERED WEAL - WEATHERED WEA | 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 - 0.16 FEET THICKLY LAMINATED 0.0000 - 0.03 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 SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PLASTIC PLASTIC LIMIT OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE PLASTICITY PLASTICITY | ABBRE VIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED MICA MICACEOUS CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST OPT - OYNAMIC PENETRATION TEST E - VOID RATIO F - FINE SL SILT, SILTY FRESUMERETER FOSS FOSSILIFEROUS SLI SLIGHTLY FRAGC FRACTURED, FRACTURES HI HIGHLY FRAGC FRAGEMENTS W MOISTURE CONTENT HIGHLY V - VERY BOUIPMENT BOUIPMENT CME-45C ADVANCING TOOLS: ADVANCI | 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 CARYED 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 MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET THICKLY BEDDED 1.5 - 4 FEET THICKLY BEDDED 0.16 - 1.5 FEET CLOSE VERY CLOSE 1 TO 3 FEET THICKLY BEDDED 0.03 - 0.16 FEET THICKLY BEDDED 0.040 - 0.03 FEET THICKLY LAMINATED C0.000 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 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 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 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 VANE SHEAR TEST WEA FRACTURED, FRACTURES WEA MEDIUM WEA VANE SHEAR TEST WEA VANE SHEAR TEST VST - VANE SHEAR TEST WEA VANE SH | 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 SHRINKAGE LIMIT ONO PLASTIC SHRINKAGE LIMIT ONO PLASTIC SHRINKAGE LIMIT PLASTICITY INDEX (PI) ONO PLASTIC SLIGHTLY PLASTIC OF ONO PLASTIC SLIGHTLY PLASTIC ONO PLASTIC SLIGHTLY PLASTIC ONO PLASTIC SLIGHTLY PLASTIC ONO SIGNATURE OF OR FIELD MOISTURE SUBJECT OR FIELD MOISTURE OBSCRIPTION OUTGOIL MOISTURE OBSCRIPTION OF TERMS OUTGOIL MOISTURE OBSCRIPTION OF TERMS OUTGOIL MOISTURE OBSCRIPTION SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE PLASTICITY INDEX (PI) ONO PLASTIC SLIGHTLY PLASTIC ONO PLASTIC SLIGHTLY OF OR PLASTIC SLIGHTLY OBSCRIPTION OF OR PLASTIC SLIGHTLY PLAS | 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: DRIATOMATIC MANUAL CME-550 HARD FACED FINGER BITS VANE SHEAR TEST VANE SHEAR TEST VANE SHEAR TEST VANE SHEAR TEST TELONG 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 - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) 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 0-5 SLIGHT MEDIUM MODERATELY 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 S SHLK SS SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RRS - ROCK FRACT, - FRACTURED, FRACTURES HI HIGHLY DRILL UNITS: OFF CALIFORNIA BEARING HI HIGHLY DRILL UNITS: OFF CALIFORNIA BEARING 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 REDILY 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 A SPACING VERY WIDE MORE THAN 10 FEET THICKLY BEDDED A FEET WIDE CLOSE A 15 TO 19 FEET THICKLY BEDDED A FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED CROWN FEET THICKLY LAMINATED A 0.008 FEET THICKLY LAMINATED A 0.008 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 ARD - ARD AUGER WY ADVANCER PORTABLE HOIST TRICONE TRICONE TRICONE STEEL TEETH HAND TOOLS: HAND TOOLS HAND TOO | 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 | 1 1 | P.I. | | % BY 1 | 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 | 23.6 | 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 | 39. 4 | 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 | _ | _ |