

PROJECT: 17BP.3.R.99 REFERENCE: B-5651

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY SAMPSON
 PROJECT DESCRIPTION BRIDGE NO. 214 ON -L- (SR 1706)
OVER KILL SWAMP AT STA. 14 + 70.00

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5651	1	6

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 1919 TOT-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 (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL 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.

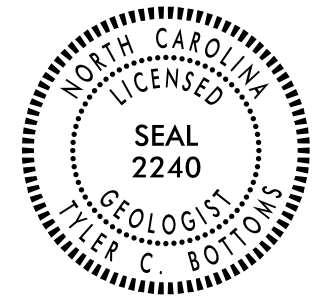
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

- NOTES:
1. 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.
 2. 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

CATLIN PERSONNEL

INVESTIGATED BY T.C. BOTTOMS
 DRAWN BY C.J. CORNETTE
 CHECKED BY D.N. ARGENBRIGHT
 SUBMITTED BY D.N. ARGENBRIGHT
 DATE NOVEMBER 2018



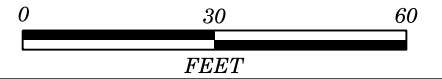
DocuSigned by:
Tyler C. Bottoms 1/15/2019
 48A2D3BD08... SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

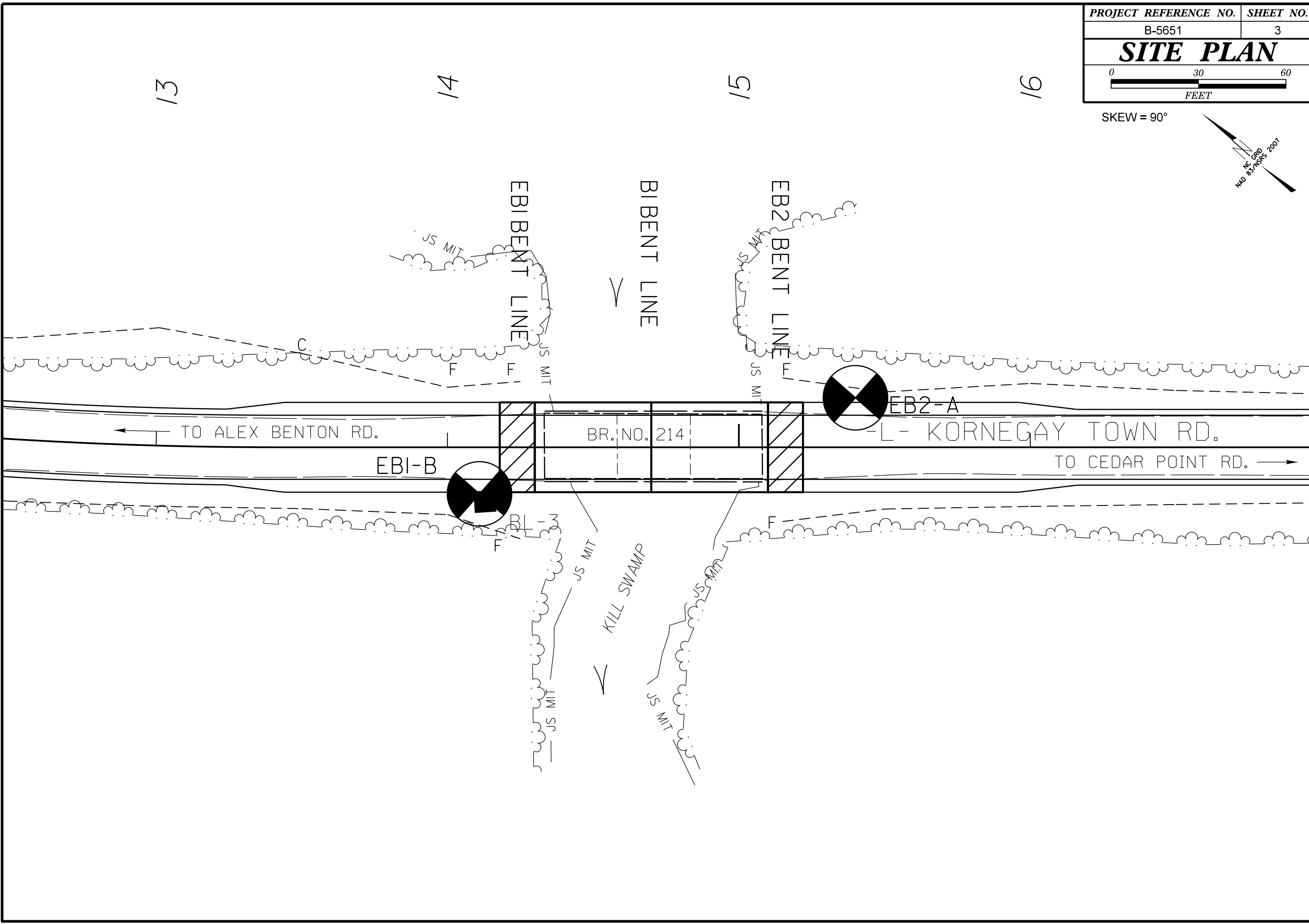
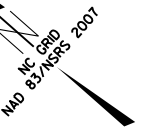
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
<p>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). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH 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</p>										<p>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.</p>										<p>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:</p>										<p>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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED 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. LEDGE - 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 (RQD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL 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 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.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
<p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-7-5</td> <td>A-7-6</td> <td>A-3</td> <td>A-6, A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td>A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td colspan="5"></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td> <td>6 MX</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td colspan="5"></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td colspan="5"></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSUITABLE</td> <td colspan="5"></td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽/24 STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽/PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p> </td> <td colspan="10"> <p align="center">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 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.</p> <p>SEVERE (SEV.) 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 TESTED, WOULD YIELD SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK 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.</p> <p>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.</p> </td> <td colspan="10"> <p align="center">MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p> </td> </tr> <tr> <td colspan="10"> <p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> </thead> <tbody> <tr> <td>MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> <tr> <td>IN. 12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">RECOMMENDATION SYMBOLS</p> <p>UNDERCUT</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p> </td> <td colspan="10"> <p align="center">ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p> <p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILTY, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ_d - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p> </td> </tr> <tr> <td colspan="10"> <p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <thead> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td></td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER</td> <td>HAND TOOLS:</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * TUNG-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">COLOR</p> <p>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.</p> </td> <td colspan="10"> <p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> </td> </tr> <tr> <td colspan="10"> <p align="center">FRACURE SPACING</p> <p>TERM SPACING</p> <p>VERY WIDE MORE THAN 10 FEET</p> <p>WIDE 3 TO 10 FEET</p> <p>MODERATELY CLOSE 1 TO 3 FEET</p> <p>CLOSE 0.16 TO 1 FOOT</p> <p>VERY CLOSE LESS THAN 0.16 FEET</p> </td> <td colspan="10"> <p align="center">BEDDING</p> <p>TERM THICKNESS</p> <p>VERY THICKLY BEDDED 4 FEET</p> <p>THICKLY BEDDED 1.5 - 4 FEET</p> <p>THINLY BEDDED 0.16 - 1.5 FEET</p> <p>VERY THINLY BEDDED 0.03 - 0.16 FEET</p> <p>THICKLY LAMINATED 0.008 - 0.03 FEET</p> <p>THINLY LAMINATED < 0.008 FEET</p> </td> </tr> <tr> <td colspan="10"> <p align="center">NOTES:</p> <p>FIAD: FILLED IMMEDIATELY AFTER DRILLING</p> </td> <td colspan="10"> <p align="center">ELEVATION: 143.4 FEET</p> </td> </tr> </tbody> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-7-5	A-7-6	A-3	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT						MATERIAL PASSING #40 LL PI	-	6 MX	NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC SOILS	GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX							USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS	CLAYEY SOILS							GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSUITABLE						PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																														<p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table>										PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	<p align="center">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽/24 STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽/PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>										<p align="center">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 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.</p> <p>SEVERE (SEV.) 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 TESTED, WOULD YIELD SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK 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.</p> <p>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.</p>										<p align="center">MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p>										<p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> </thead> <tbody> <tr> <td>MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> <tr> <td>IN. 12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)	MM 305	75	2.0	0.25	0.05	0.005		IN. 12	3						<p align="center">RECOMMENDATION SYMBOLS</p> <p>UNDERCUT</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>										<p align="center">ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p> <p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILTY, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ_d - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>										<p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>										SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <thead> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td></td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER</td> <td>HAND TOOLS:</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * TUNG-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> </tbody> </table>										DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	<input checked="" type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER		<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	CORE SIZE:	<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -B <input type="checkbox"/> -H	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	<input type="checkbox"/> -N		<input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER	HAND TOOLS:		<input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER		<input type="checkbox"/> TRICONE * TUNG-CARB.	<input type="checkbox"/> HAND AUGER		<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD			<input type="checkbox"/> VANE SHEAR TEST	<p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>										NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	SLIGHTLY PLASTIC	0-5	VERY LOW	MODERATELY PLASTIC	6-15	SLIGHT	HIGHLY PLASTIC	16-25	MEDIUM		26 OR MORE	HIGH	<p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table>										TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	<p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table>										TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET	<p align="center">COLOR</p> <p>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.</p>										<p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p align="center">FRACURE SPACING</p> <p>TERM SPACING</p> <p>VERY WIDE MORE THAN 10 FEET</p> <p>WIDE 3 TO 10 FEET</p> <p>MODERATELY CLOSE 1 TO 3 FEET</p> <p>CLOSE 0.16 TO 1 FOOT</p> <p>VERY CLOSE LESS THAN 0.16 FEET</p>										<p align="center">BEDDING</p> <p>TERM THICKNESS</p> <p>VERY THICKLY BEDDED 4 FEET</p> <p>THICKLY BEDDED 1.5 - 4 FEET</p> <p>THINLY BEDDED 0.16 - 1.5 FEET</p> <p>VERY THINLY BEDDED 0.03 - 0.16 FEET</p> <p>THICKLY LAMINATED 0.008 - 0.03 FEET</p> <p>THINLY LAMINATED < 0.008 FEET</p>										<p align="center">NOTES:</p> <p>FIAD: FILLED IMMEDIATELY AFTER DRILLING</p>										<p align="center">ELEVATION: 143.4 FEET</p>									
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-7-5	A-7-6	A-3	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
SYMBOL	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
MATERIAL PASSING #40 LL PI	-	6 MX	NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC SOILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS	CLAYEY SOILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSUITABLE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
<p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table>										PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	<p align="center">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽/24 STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽/PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>										<p align="center">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) 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 CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 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.</p> <p>SEVERE (SEV.) 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 TESTED, WOULD YIELD SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK 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.</p> <p>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.</p>										<p align="center">MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
<p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> </thead> <tbody> <tr> <td>MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> <tr> <td>IN. 12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)	MM 305	75	2.0	0.25	0.05	0.005		IN. 12	3						<p align="center">RECOMMENDATION SYMBOLS</p> <p>UNDERCUT</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>										<p align="center">ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p> <p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILTY, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ_d - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	4.76	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
MM 305	75	2.0	0.25	0.05	0.005																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
IN. 12	3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>										SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <thead> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td></td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER</td> <td>HAND TOOLS:</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * TUNG-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> </tbody> </table>										DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	<input checked="" type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER		<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	CORE SIZE:	<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -B <input type="checkbox"/> -H	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	<input type="checkbox"/> -N		<input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER	HAND TOOLS:		<input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER		<input type="checkbox"/> TRICONE * TUNG-CARB.	<input type="checkbox"/> HAND AUGER		<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD			<input type="checkbox"/> VANE SHEAR TEST																																																																																																																																																																																																																																																																																																																																																																																																																																																					
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
LL	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
OM	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
SL	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<input checked="" type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<input type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	CORE SIZE:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -B <input type="checkbox"/> -H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	<input type="checkbox"/> -N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER	HAND TOOLS:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<input checked="" type="checkbox"/> TRICONE 2 3/8" STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<input type="checkbox"/> TRICONE * TUNG-CARB.	<input type="checkbox"/> HAND AUGER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		<input type="checkbox"/> VANE SHEAR TEST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>										NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	SLIGHTLY PLASTIC	0-5	VERY LOW	MODERATELY PLASTIC	6-15	SLIGHT	HIGHLY PLASTIC	16-25	MEDIUM		26 OR MORE	HIGH	<p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table>										TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	<p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table>										TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																		
NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
SLIGHTLY PLASTIC	0-5	VERY LOW																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
MODERATELY PLASTIC	6-15	SLIGHT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
HIGHLY PLASTIC	16-25	MEDIUM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	26 OR MORE	HIGH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
TERM	SPACING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
VERY WIDE	MORE THAN 10 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
WIDE	3 TO 10 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
MODERATELY CLOSE	1 TO 3 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
CLOSE	0.16 TO 1 FOOT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
VERY CLOSE	LESS THAN 0.16 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
TERM	THICKNESS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
VERY THICKLY BEDDED	4 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
THICKLY BEDDED	1.5 - 4 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
THINLY BEDDED	0.16 - 1.5 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
THICKLY LAMINATED	0.008 - 0.03 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<p align="center">COLOR</p> <p>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.</p>										<p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
<p align="center">FRACURE SPACING</p> <p>TERM SPACING</p> <p>VERY WIDE MORE THAN 10 FEET</p> <p>WIDE 3 TO 10 FEET</p> <p>MODERATELY CLOSE 1 TO 3 FEET</p> <p>CLOSE 0.16 TO 1 FOOT</p> <p>VERY CLOSE LESS THAN 0.16 FEET</p>										<p align="center">BEDDING</p> <p>TERM THICKNESS</p> <p>VERY THICKLY BEDDED 4 FEET</p> <p>THICKLY BEDDED 1.5 - 4 FEET</p> <p>THINLY BEDDED 0.16 - 1.5 FEET</p> <p>VERY THINLY BEDDED 0.03 - 0.16 FEET</p> <p>THICKLY LAMINATED 0.008 - 0.03 FEET</p> <p>THINLY LAMINATED < 0.008 FEET</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
<p align="center">NOTES:</p> <p>FIAD: FILLED IMMEDIATELY AFTER DRILLING</p>										<p align="center">ELEVATION: 143.4 FEET</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

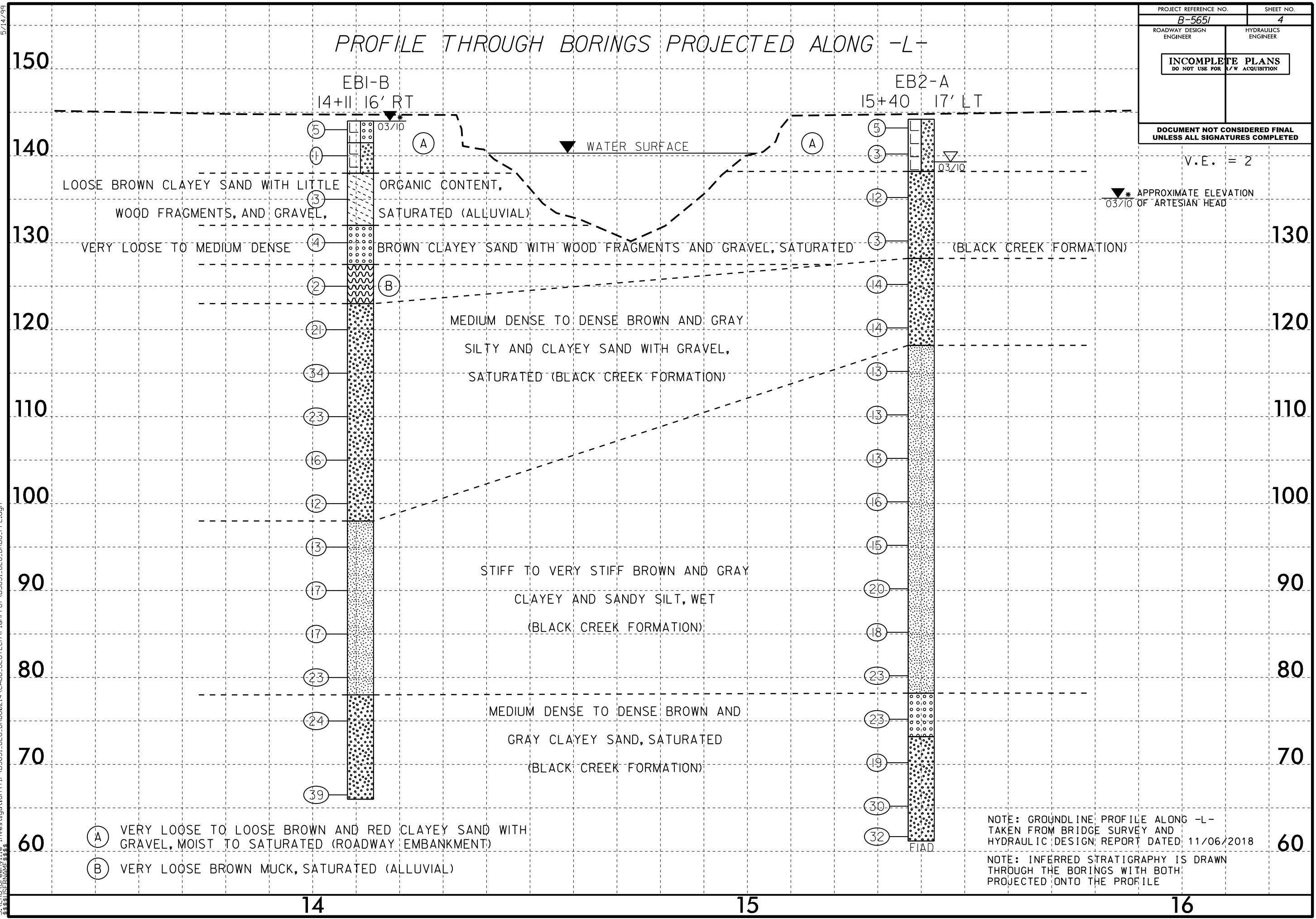
SITE PLAN



SKEW = 90°



PROFILE THROUGH BORINGS PROJECTED ALONG -L-



- (A) VERY LOOSE TO LOOSE BROWN AND RED CLAYEY SAND WITH GRAVEL, MOIST TO SATURATED (ROADWAY EMBANKMENT)
- (B) VERY LOOSE BROWN MUCK, SATURATED (ALLUVIAL)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 11/06/2018

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

5/14/99
 29-NOV-2018 14:52
 S:\ERDC\Greenville_Investigation\TIP_B5651_GEO_BRDG0214\CADD_GEOTECH\PlanProf\B5651_GEO_BRDG_PFL.dgn
 \$\$\$\$

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.3.R.99		TIP B-5651		COUNTY SAMPSON		GEOLOGIST Heter, J.										
SITE DESCRIPTION BRIDGE NUMBER 214 ON -L- (SR 1706) OVER KILL SWAMP AT STA. 14+70							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 14+11		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 144.0 ft		TOTAL DEPTH 78.0 ft		NORTHING 537,750		EASTING 2,198,251										
DRILL RIG/HAMMER EFF./DATE CME 45C			DRILL METHOD H.S. Augers w/ Mud Rotary			HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 03/09/10		COMP. DATE 03/09/10		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
150																
145	144.0	0.0	2	2	3	5								144.0	GROUND SURFACE	0.0
140	141.0	3.0	1	0	1	1								141.5	ROADWAY EMBANKMENT BROWN AND RED CLAYEY SAND WITH GRAVEL, MOIST TO SATURATED	2.5
135	136.0	8.0	2	1	2	3								138.0	ALLUVIAL BROWN CLAYEY SAND WITH LITTLE ORGANIC CONTENT, WOOD FRAGMENTS, AND GRAVEL, SATURATED	6.0
130	131.0	13.0	1	2	2	4								132.0	ALLUVIAL BROWN CLAYEY SAND WITH WOOD FRAGMENTS, SATURATED	12.0
125	126.0	18.0	1	1	1	2								127.5	ALLUVIAL BROWN MUCK, SATURATED	16.5
120	121.0	23.0	3	9	12	21								123.0	COASTAL PLAIN BROWN AND GRAY CLAYEY SAND WITH GRAVEL, SATURATED (BLACK CREEK FORMATION)	21.0
115	116.0	28.0	8	14	20	34										
110	111.0	33.0	8	12	11	23										
105	106.0	38.0	3	6	10	16										
100	101.0	43.0	4	5	7	12										
95	96.0	48.0	4	6	7	13								98.0	COASTAL PLAIN BROWN AND GRAY SANDY AND CLAYEY SILT, WET (BLACK CREEK FORMATION)	46.0
90	91.0	53.0	9	7	10	17										
85	86.0	58.0	4	7	10	17										
80	81.0	63.0	5	9	14	23										
75	76.0	68.0	8	11	13	24								78.0	COASTAL PLAIN BROWN AND GRAY CLAYEY SAND, SATURATED (BLACK CREEK FORMATION)	66.0
70																

NCDOT BORE DOUBLE B5651_GEO_BRDG0214.GPJ NC_DOT.GDT 11/29/18

WBS 17BP.3.R.99		TIP B-5651		COUNTY SAMPSON		GEOLOGIST Heter, J.										
SITE DESCRIPTION BRIDGE NUMBER 214 ON -L- (SR 1706) OVER KILL SWAMP AT STA. 14+70							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 14+11		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 144.0 ft		TOTAL DEPTH 78.0 ft		NORTHING 537,750		EASTING 2,198,251										
DRILL RIG/HAMMER EFF./DATE CME 45C			DRILL METHOD H.S. Augers w/ Mud Rotary			HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 03/09/10		COMP. DATE 03/09/10		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
70																
	67.5	76.5	12	17	22	39								66.0	Boring Terminated at Elevation 66.0 ft in Dense Sand	78.0
															APPROXIMATE ELEVATION OF ARTESIAN HEAD: 144.0'	

