

CONTRACT: ID: B-3814

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33269.1.1 I.D. NO. B-3814

F.A. PROJECT _____

COUNTY BURKE

PROJECT DESCRIPTION BURKE CO. BR. 56
ON SR-1250 OVER CANOE CREEK

SITE DESCRIPTION _____

CONTENTS:

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| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 8.2852601 | BRZ-1250(1) | P.E. CONST. | |

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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-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, 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 THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

INVESTIGATED BY PQ LOCKAMY PERSONNEL MM HAGER

CHECKED BY WD FRYE DO CHEEK

SUBMITTED BY WD FRYE GK ROSE

DATE 3-24-6



DRAWN BY: PQ LOCKAMY

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO.
33269.111 B-3814

SHEET NO.
2

| SOIL DESCRIPTION | | GRADATION | | ROCK DESCRIPTION | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, MOD. PLASTIC, A-7-6</i> | | 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 POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. | | 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. 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: | | ALLOUVIUM (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, 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 DISLODGED 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 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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th>SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-b, A-3, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6</td> <td>A-1, A-2, A-3, A-4, A-5, A-6, A-7</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>50 MX, 30 MX, 15 MX, 50 MX, 25 MX, 10 MN, 51 MN, 35 MX, 35 MX, 35 MX, 35 MX, 36 MN, 36 MN, 36 MN, 36 MN, 40 MX, 41 MN, 40 MX, 41 MN, 11 MN, 11 MN, 11 MN, 11 MN</td> <td>GRANULAR SOILS, SILT-CLAY SOILS, MUCK, PEAT</td> <td>MUCK, PEAT, HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX, NP</td> <td>40 MX, 41 MN, 40 MX, 41 MN, 11 MN</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <td>GROUP INDEX</td> <td>0, 0, 0, 4 MX, 8 MX, 12 MX, 16 MX, No MX</td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS, CLAYEY SOILS</td> <td></td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td>EXCELLENT TO GOOD</td> <td>FAIR TO POOR</td> <td>FAIR TO POOR, POOR, UNSUITABLE</td> </tr> </table> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p> | | GENERAL CLASS. | GRANULAR MATERIALS (≤ 35% PASSING #200) | SILT-CLAY MATERIALS (> 35% PASSING #200) | ORGANIC MATERIALS | GROUP CLASS. | A-1, A-1-b, A-3, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6 | A-1, A-2, A-3, A-4, A-5, A-6, A-7 | | SYMBOL | | | | % PASSING | 50 MX, 30 MX, 15 MX, 50 MX, 25 MX, 10 MN, 51 MN, 35 MX, 35 MX, 35 MX, 35 MX, 36 MN, 36 MN, 36 MN, 36 MN, 40 MX, 41 MN, 40 MX, 41 MN, 11 MN, 11 MN, 11 MN, 11 MN | GRANULAR SOILS, SILT-CLAY SOILS, MUCK, PEAT | MUCK, PEAT, HIGHLY ORGANIC SOILS | LIQUID LIMIT PLASTIC INDEX | 6 MX, NP | 40 MX, 41 MN, 40 MX, 41 MN, 11 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | 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 | | GENERAL RATING AS A SUBGRADE | EXCELLENT TO GOOD | FAIR TO POOR | FAIR TO POOR, POOR, UNSUITABLE | <p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> <tr> <td></td> <td></td> <td></td> <td>35% AND ABOVE</td> </tr> </table> <p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP</p> | | ORGANIC MATERIAL | GRANULAR SOILS | SILT-CLAY SOILS | OTHER MATERIAL | TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% | TRACE | LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% | LITTLE | MODERATELY ORGANIC | 5 - 10% | 12 - 20% | SOME | HIGHLY ORGANIC | >10% | >20% | HIGHLY | | | | 35% AND ABOVE | <p>WEATHERING</p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) - 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. SLIGHT (SLI.) - 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. 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. 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> 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> | |
| GENERAL CLASS. | GRANULAR MATERIALS (≤ 35% PASSING #200) | SILT-CLAY MATERIALS (> 35% PASSING #200) | ORGANIC MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SYMBOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| LIQUID LIMIT PLASTIC INDEX | 6 MX, NP | 40 MX, 41 MN, 40 MX, 41 MN, 11 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS, GRAVEL, AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND | SILTY SOILS, CLAYEY SOILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GENERAL RATING AS A SUBGRADE | EXCELLENT TO GOOD | FAIR TO POOR | FAIR TO POOR, POOR, UNSUITABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORGANIC MATERIAL | GRANULAR SOILS | SILT-CLAY SOILS | OTHER MATERIAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% | TRACE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% | LITTLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY ORGANIC | 5 - 10% | 12 - 20% | SOME | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIGHLY ORGANIC | >10% | >20% | HIGHLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 35% AND ABOVE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>CONSISTENCY OR DENSENESS</p> <table border="1"> <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> <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 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4</td> </tr> </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 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4 | <p>MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD</p> <p>SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL</p> <p>S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RM - RESILIENT MODULUS SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE</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 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>TEXTURE OR GRAIN SIZE</p> <table border="1"> <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> <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> </table> <table border="1"> <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> <tr> <td>GRAIN SIZE MM 305, IN. 12</td> <td>75, 3</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> </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.) | GRAIN SIZE MM 305, IN. 12 | 75, 3 | 2.0 | 0.25 | 0.05 | 0.005 | | <p>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</p> <p>HI. - HIGHLY MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL</p> <p>W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W_d - DRY UNIT WEIGHT</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.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GRAIN SIZE MM 305, IN. 12 | 75, 3 | 2.0 | 0.25 | 0.05 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p>EQUIPMENT USED ON SUBJECT PROJECT</p> <p>DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45 TRACK <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> OTHER _____ <input type="checkbox"/> OTHER _____</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING w/ ADVANCER <input type="checkbox"/> TRICONE _____ STEEL TEETH <input type="checkbox"/> TRICONE _____ TUNG-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> OTHER _____</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B _____ <input checked="" type="checkbox"/> -N _____ <input type="checkbox"/> -H _____</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> OTHER _____</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OM - OPTIMUM MOISTURE | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>PLASTICITY</p> <table border="1"> <tr> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>NONPLASTIC</td> <td>VERY LOW</td> </tr> <tr> <td>LOW PLASTICITY</td> <td>SLIGHT</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>MEDIUM</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>HIGH</td> </tr> </table> | | PLASTICITY INDEX (PI) | DRY STRENGTH | NONPLASTIC | VERY LOW | LOW PLASTICITY | SLIGHT | MED. PLASTICITY | MEDIUM | HIGH PLASTICITY | HIGH | <p>FRACTURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <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 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> <p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <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>MODERATELY 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> </table> <p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> | | TERM | SPACING | VERY WIDE | MORE THAN 10 FEET | WIDE | 3 TO 10 FEET | MODERATELY CLOSE | 1 TO 3 FEET | CLOSE | 0.16 TO 1 FEET | VERY CLOSE | LESS THAN 0.16 FEET | TERM | THICKNESS | VERY THICKLY BEDDED | > 4 FEET | THICKLY BEDDED | 1.5 - 4 FEET | MODERATELY 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 | | | | | | | | | | | | | | | | | | | | | | |
| PLASTICITY INDEX (PI) | DRY STRENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NONPLASTIC | VERY LOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW PLASTICITY | SLIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MED. PLASTICITY | MEDIUM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIGH PLASTICITY | 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 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY CLOSE | LESS THAN 0.16 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TERM | THICKNESS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY THICKLY BEDDED | > 4 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THICKLY BEDDED | 1.5 - 4 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 24, 2006

STATE PROJECT: 33269.1.1 (B-3814)
COUNTY: Burke
DESCRIPTION: Bridge No. 56 on SR-1250 over Canoe Creek
SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This proposed bridge replacement project is located at the northwestern suburban fringe of Morganton. The bridge will be on new location slightly upstream of the existing structure. The new structure will be a single, steel span of 100 feet with a 41-degree skew. This foundation investigation utilized a track mounted CME-45 drill machine. Borings were advanced using N-casing for both SPT and NXWL core borings. The Hydraulics Report used for this investigation is dated 05/09/05.

Foundation Materials

Shallow, hard rock is present across the site. Bedrock consists of massive Late Paleozoic granite with a very slight metamorphic imprint. The rock has a healed joint set parallel to the stream valley with fewer joints perpendicular to the valley. Surficial exfoliation joints (dipping downstream at a slight angle) were observed in exposures upstream. Red clay infilling in a weathered exfoliation joint was observed in an SPT sample from EB1-C. Overall, the rock is extremely hard and fresh with few breaks and has very high Recovery and RQD rates.

End Bent One

End Bent One traverses along the cusp of a short bluff on the south side of the creek which is plated with blast boulders and possibly some soil fill from a nearby road cut. Soils encountered include approximately 5 feet of moist, very loose silty sand. The

majority of the sand is red (very recent alluvium) partially underlain by grey sand (older alluvium) or weathered rock. A slightly stepped hard rock line with a rind of weathered rock less than one foot thick underlies alluvium. EB1-A and EB1-B were cored. The top 2 feet of core from EB1-B were slightly weathered; otherwise all of the core from this side of the creek is very hard and fresh. Hard rock is present across the bent below elevations ranging from 1046 to 1052 feet.

End Bent Two

End Bent Two traverses the edge of a dirt road and has 1 to 4 feet of loose silty sand fill across the right side of the bent. Underlying the fill and exposed on the surface at EB2-A is about 3 feet of loose sandy alluvium. Below the alluvium is from 2 to 4 feet of saprolitic silty sand. Saprolite grades to weathered rock which is approximately 2 feet thick. Fresh, very hard, hard rock is present below elevations 1045 to 1048 feet.

Groundwater

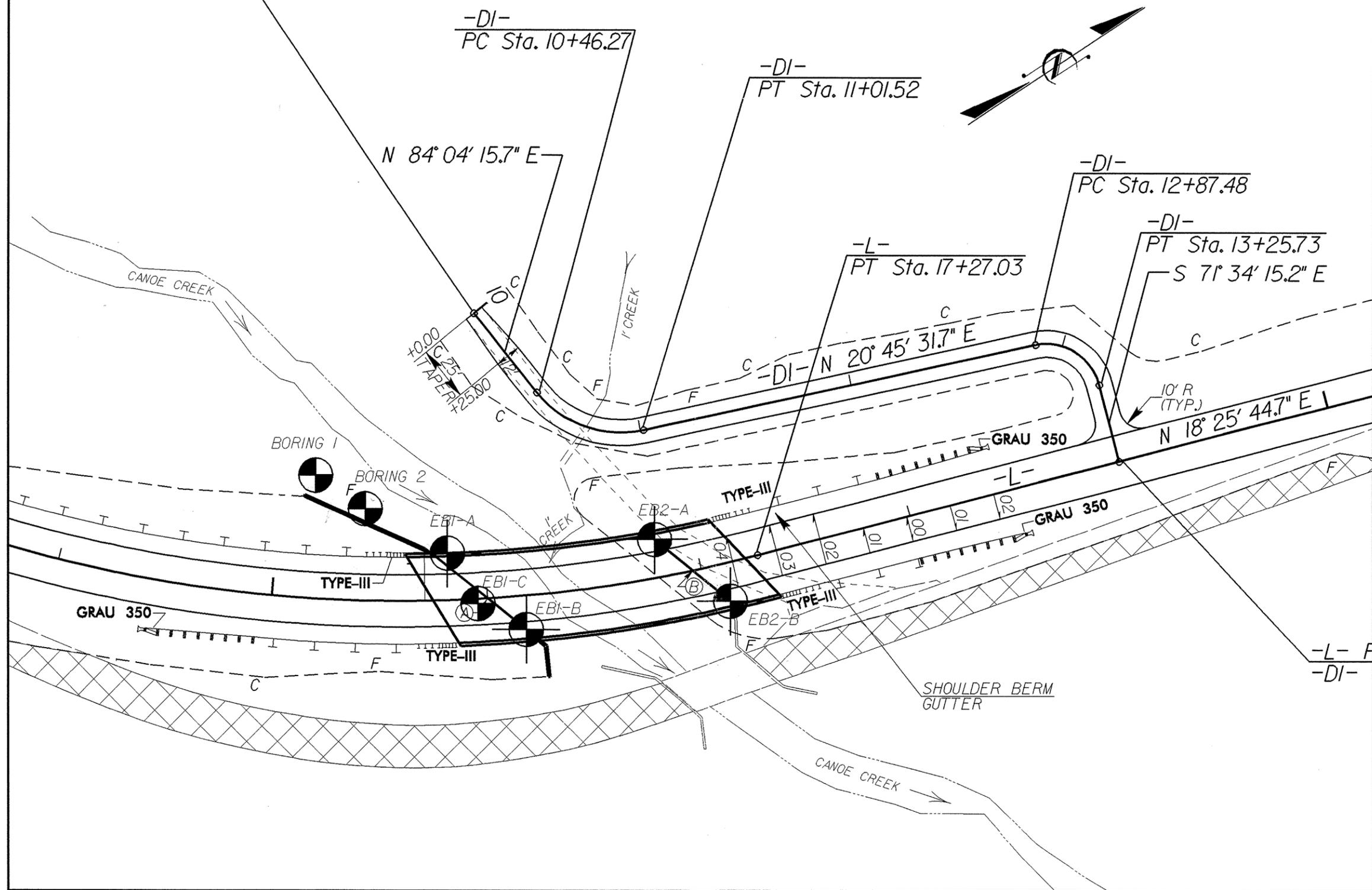
Groundwater is present at the site near an elevation of 1045 to 1046 feet.

Respectfully Submitted,

P. Q. Lockamy
PQ Lockamy LG

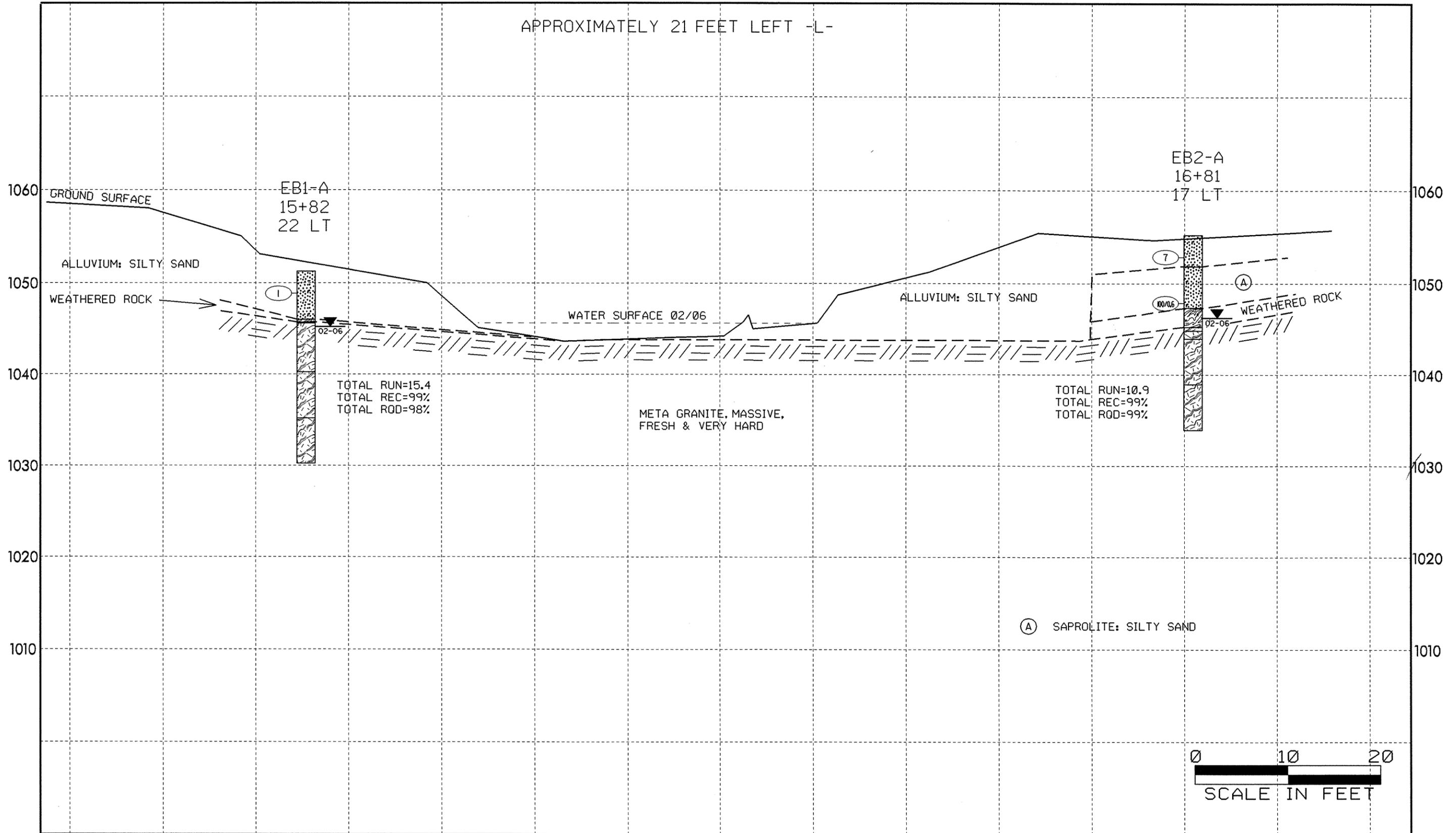
33269JJ B-3814
BURKE CO. BR. 56

BORING LOCATIONS



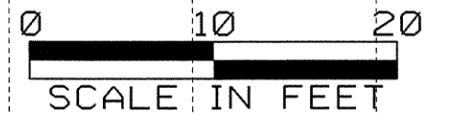
PROFILE THRU PROPOSED EB1-A TO EB2-A ON TANGENT

APPROXIMATELY 21 FEET LEFT -L-



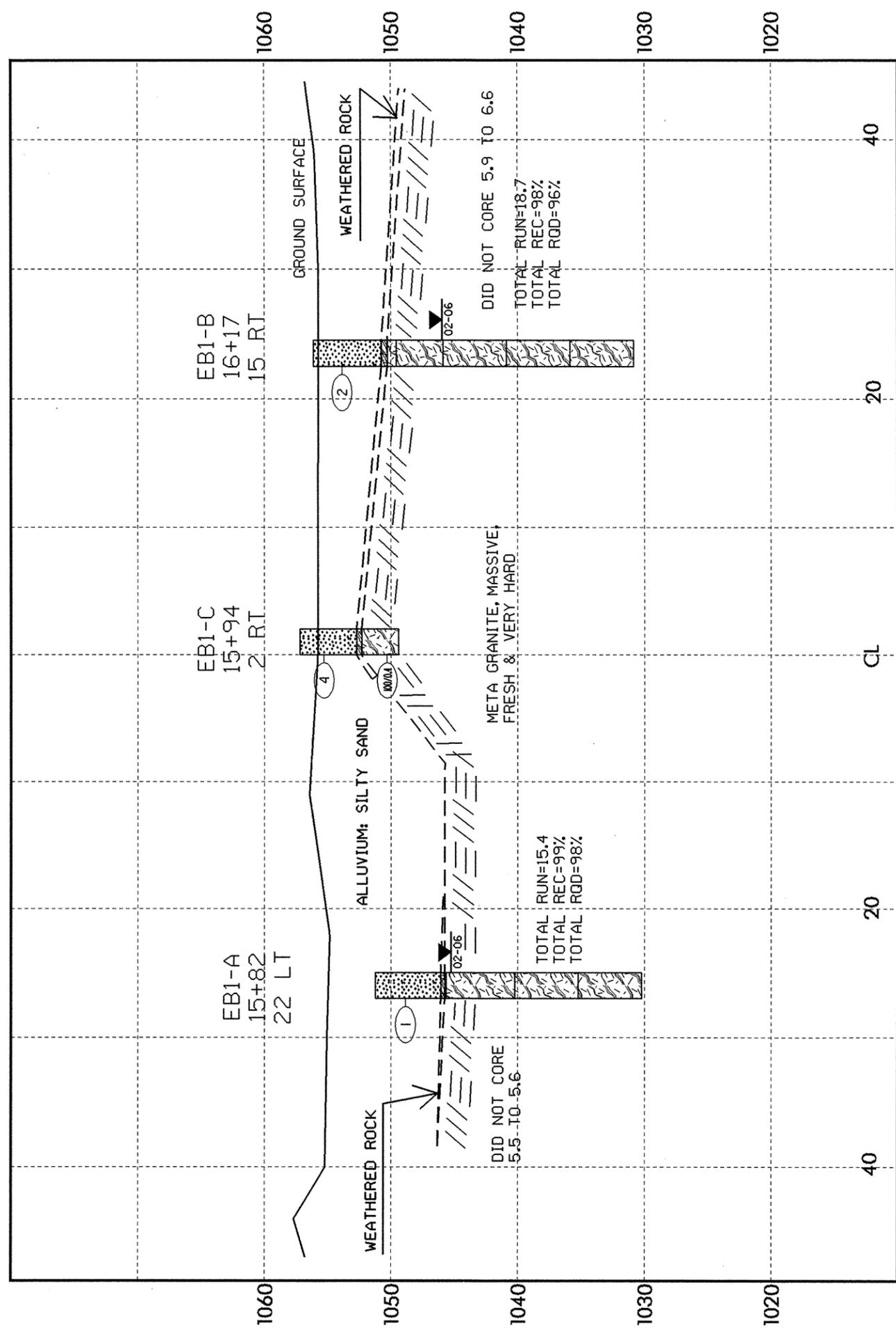
16+00

16+50

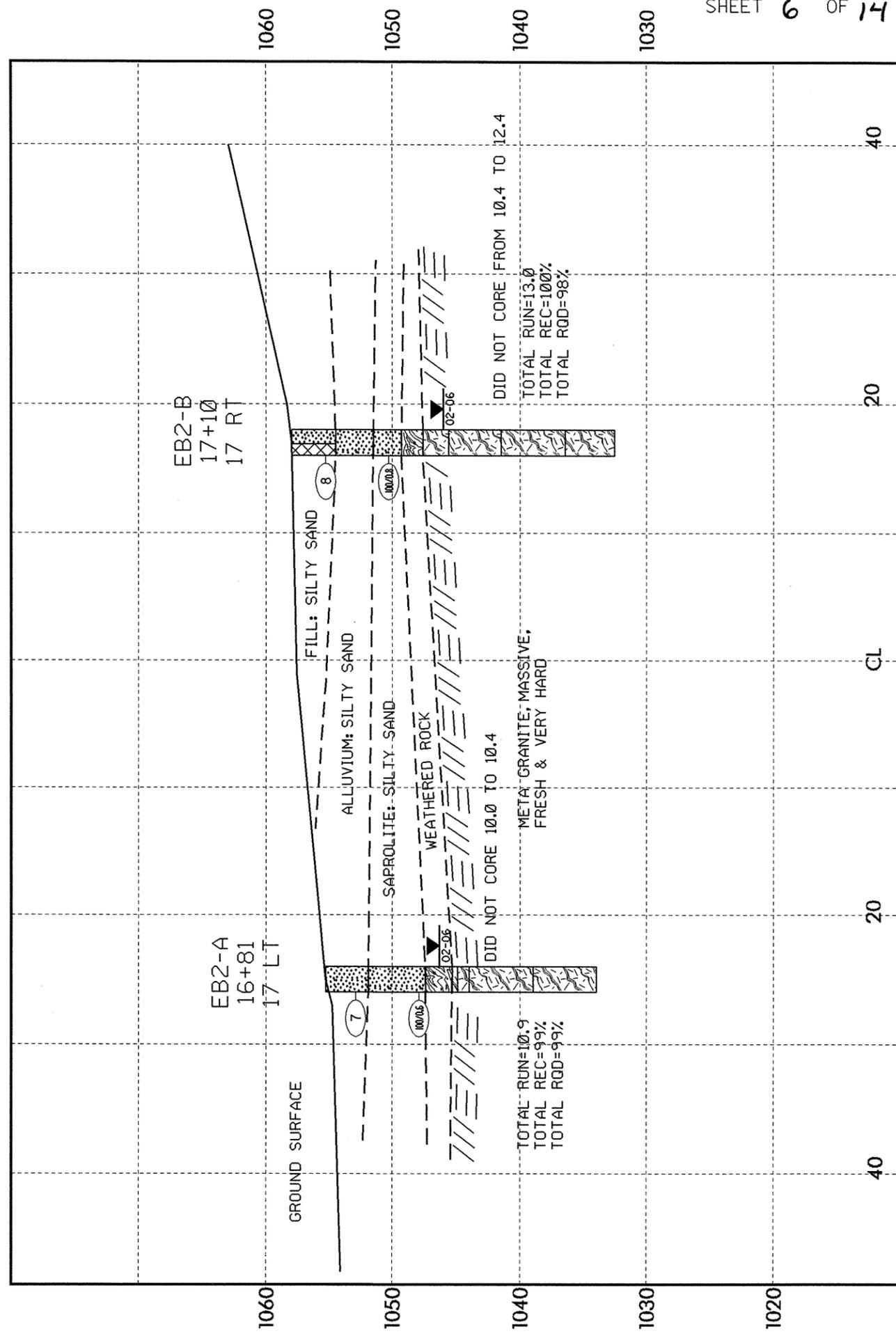


SECTION THRU PROPOSED EBION SKEW

BRIDGE NO. 56, 33269.1.1 B-3814



SECTION THRU PROPOSED EB2 ON SKEW



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST MM HAGER | | | | | | | | |
|---|-------|---------------------------|------------------------------|--------------------|----------|--------------------------|----|----|----|-----|-----------|-----|---------------------------|--|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | GND WATER | | | | | | | | |
| BORING NO EB1-A | | NORTHING 744226.00 | | EASTING 1179832.00 | | 0 HR N/A | | | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 15+82.000 | | OFFSET 22.00ft LT | | 24 HR 6.00ft | | | | | | | | |
| COLLAR ELEV 1051.24ft | | TOTAL DEPTH 21.00ft | | START DATE 2/15/06 | | COMPLETION DATE 02/15/06 | | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | DRILL METHOD SPT CORE BORING | | | HAMMER TYPE AUTOMATIC | | | | | | | | |
| SURFACE WATER DEPTH | | | DEPTH TO ROCK N/A | | | Log EB1-A, Page 1 of 1 | | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | |
| 1051.24 | 2.40 | 0 | 1 | 0 | 1.0 | | | | | | | | | Ground Surface |
| | | | | | | | | | | | | | | ALLUVIUM: BROWN SILTY SAND |
| | | | | | | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | | HARD ROCK, FRESH, VERY HARD GRANITE. CORED 5.6-21.0. TOTAL REC=99% TOTAL RQD=98% |
| | | | | | | | | | | | | | | - BORING TERMINATED AT A DEPTH OF 21.0 FEET IN FRESH, VERY HARD ROCK |

SHEET 7 OF 14
 DATE 2/15/2006

CORE BORING REPORT

| PROJECT: 33269.1.1 | | I. D. NO: B-3814 | | BORING NO: EB1-A | | GEOLOGIST: MM HAGER | |
|--|--------------|------------------------------|------------|-------------------------|-----------------------|---------------------|---|
| DESCRIPTION: BRIDGE NO.56 ON SR-1250 OVER CANOE CREEK IN BURKE COUNTY. 15+82. 22 LT. -L- | | | | | | | |
| COUNTY: BURKE | | COLLAR ELEVATION: 1051.2 FT. | | | TOTAL DEPTH: 21.0 FT. | | |
| ELEV. (FEET) | DEPTH (FEET) | DRILL RATE MIN./FT. | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
| 1045.6 | 5.6 | | 5.4 | 5.1 | 5.1 | | METAGRANITE. WEATHERED RIND AT TOP OF FIRST RUN 5.6 - 5.7 OTHERWISE FRESH AND VERY HARD. THREE NATURAL BREAKS WITH ROUGH UNWEATHERED SURFACES. BREAKS AT 0 TO 15 DEGREES. |
| | | | | 94 | 94 | | |
| 1040.2 | 11.0 | | | 5.0 | 4.8 | | |
| 1040.2 | 11.0 | | | 100 | 96 | | |
| 1035.2 | 16.0 | | | | | | |
| 1035.2 | 16.0 | | 5.0 | 5.2 | 5.2 | | |
| 1030.2 | 21.0 | | | 104 | 104 | | |
| CORING TERMINATED AT ELEVATION 1030.2 FT. | | | | | | | |
| DRILLER: GK ROSE | | CORE SIZE: NXWL | | EQUIPMENT: CME-45 TRACK | | | |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST PQ LOCKAMY | | | | | | | | | |
|---|-------|---------------------------|-------------------------|--------------------|----------|--------------------------|-----------|----|----|-----|-----------|-----|-----|---------------------------|---|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | | GND WATER | | | | | | | | |
| BORING NO EB1-C | | NORTHING 744224.00 | | EASTING 1179858.00 | | 0 HR N/A | | | | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 15+96.000 | | OFFSET 2.00ft RT | | 24 HR N/A | | | | | | | | | |
| COLLAR ELEV 1057.20ft | | TOTAL DEPTH 7.80ft | | START DATE 2/20/06 | | COMPLETION DATE 02/20/06 | | | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | DRILL METHOD CASING SPT | | | HAMMER TYPE AUTOMATIC | | | | | | | | | |
| SURFACE WATER DEPTH | | | DEPTH TO ROCK N/A | | | Log EB1-C, Page 1 of 1 | | | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | MOI | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | | |
| 1057.20 | | | | | | | | | | | | | | | |
| | 1.92 | 1 | 2 | 2 | 1.0 | 4 | | | | | | | | | ALLUVIUM: TAN SILTY SAND |
| 1049.40 | 6.90 | 100 | | | 0.4 | | | | | | | | | | WEATHERED ROCK HARD ROCK WITH FEW RED CLAY FILLED FRACTURES AND THIN ZONES OF WEATHERED ROCK |
| | | | | | | | | | | | | | | | BORING TERMINATED AT A DEPTH OF 7.8 FEET IN HARD ROCK |

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST MM HAGER | | | | | | | | |
|---|-------|---------------------------|-----|------------------------------|----------|--------------------------|-----------|----|----|-----|-----------|-----|---------------------------|---|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | | GND WATER | | | | | | | |
| BORING NO EB1-B | | NORTHING 744238.00 | | EASTING 1179881.00 | | 0 HR N/A | | | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 16+17.000 | | OFFSET 15.00ft RT | | 24 HR 10.20ft | | | | | | | | |
| COLLAR ELEV 1056.15ft | | TOTAL DEPTH 25.30ft | | START DATE 2/17/06 | | COMPLETION DATE 02/17/06 | | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | | DRILL METHOD SPT CORE BORING | | HAMMER TYPE AUTOMATIC | | | | | | | | |
| SURFACE WATER DEPTH | | | | DEPTH TO ROCK N/A | | Log EB1-B, Page 1 of 1 | | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | |
| 1056.15 | | | | | | | | | | | | | | Ground Surface |
| | 2.30 | 1 | 1 | 1 | 1.0 | | | | | | | | | ALLUVIUM: ORANGE SILTY SAND |
| 1050.00 | | | | | | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | | HARD ROCK. CORED FROM 6.6 TO 25.3. TOTAL REC=98% TOTAL RQD=96%. FRESH, VERY HARD GRANITE. |
| 1040.00 | | | | | | | | | | | | | | |
| 1030.85 | | | | | | | | | | | | | | BORING TERMINATED AT A DEPTH OF 25.3 FEET IN FRESH, VERY HARD ROCK |

SHEET 9 OF 14
DATE 2/17/2006

CORE BORING REPORT

| PROJECT: | 33269.1.1 | I. D. NO: | B-3814 | BORING NO: | EB1-B | GEOLOGIST: | MM HAGER |
|---|---|---------------------|------------|-------------------------|-------------|------------|---|
| DESCRIPTION: | BRIDGE NO.56 ON SR-1250 OVER CANOE CREEK IN BURKE COUNTY. 16+17. 15 RT. -L- | | | | | | |
| COUNTY: | BURKE | COLLAR ELEVATION: | 1056.2 FT. | TOTAL DEPTH: | 25.3 FT. | | |
| ELEV. (FEET) | DEPTH (FEET) | DRILL RATE MIN./FT. | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
| 1049.6 | 6.6 | | | 3.5 | 3.1 | | METAGRANITE 5.6-6.0 - SEVERAL HORIZONTAL BREAKS WITH WEATHERED SURFACES. 6.6-8.2 SLIGHTLY WEATHERED AND HARD. |
| | | | 3.7 | 95 | 84 | | |
| 1045.9 | 10.3 | | | 5.0 | 5.0 | | 6.0-25.3, FRESH, VERY HARD TWO NATURAL BREAKS AT 30 DEGREES WITH MICACEOUS PARTINGS, BOTH UNWEATHERED. |
| 1045.9 | 10.3 | | | 100 | 100 | | |
| 1040.9 | 15.3 | | | 5.0 | 5.0 | | |
| 1040.9 | 15.3 | | | 100 | 100 | | |
| 1035.9 | 20.3 | | | 4.9 | 4.9 | | |
| 1035.9 | 20.3 | | | 98 | 98 | | |
| 1030.9 | 25.3 | | | | | | |
| CORING TERMINATED AT ELEVATION 1030.9 FT. | | | | | | | |
| DRILLER: GK ROSE | | CORE SIZE: NXWL | | EQUIPMENT: CME-45 TRACK | | | |

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

SHEET 10 OF 14

DATE 2/22/2006

CORE BORING REPORT

| | | | |
|---|---------------------------|------------------------------|--------------------------|
| PROJECT NO 33269.1.1 | ID B-3814 | COUNTY BURKE | GEOLOGIST MM HAGEER |
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | GND WATER |
| BORING NO EB2-A | NORTHING 744310.00 | EASTING 1179879.00 | 0 HR N/A |
| ALIGNMENT -L- | BORING LOCATION 16+81.000 | OFFSET 17.00ft LT | 24 HR 9.00ft |
| COLLAR ELEV 1055.27ft | TOTAL DEPTH 21.30ft | START DATE 2/22/06 | COMPLETION DATE 02/22/06 |
| DRILL MACHINE CME-45 TRACK | | DRILL METHOD SPT CORE BORING | HAMMER TYPE AUTOMATIC |
| SURFACE WATER DEPTH | | DEPTH TO ROCK N/A | Log EB2-A, Page 1 of 1 |

| | | | |
|---|-------------------------------------|------------------------------|----------------------------|
| PROJECT: <u>33269.1.1</u> | I. D. NO: <u>B-3814</u> | BORING NO: <u>EB2-A</u> | GEOLOGIST: <u>MM HAGER</u> |
| DESCRIPTION: <u>BRIDGE NO.56 ON SR-1250 OVER CANOE CREEK IN BURKE COUNTY.</u> <u>16+81. 17 LT -L-</u> | | | |
| COUNTY: <u>BURKE</u> | COLLAR ELEVATION: <u>1055.3</u> FT. | TOTAL DEPTH: <u>21.3</u> FT. | |

| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
|---------|-------|---------|-----|-----|----------|----------------|----|----|----|-----|-----------|-----|---------------------------|--|
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | |
| | | | | | | | | | | | | | | |
| 1055.27 | | | | | | | | | | | | | | Ground Surface |
| | 2.40 | 3 | 2 | 5 | 1.0 | | | | | | | | | ALLUVIUM: BROWN SILTY SAND WITH FEW GRAVEL. |
| 1050.00 | 7.40 | 24 | 60 | | 0.6 | | | | | | | | | SAPROLITE: SILTY SAND |
| | | | | | | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | | HARD ROCK. FRESH, VERY HARD GRANITE. CORED FROM 10.4 TO 21.3. TOTAL REC=99% TOTAL RQD=99%. |
| 1040.00 | | | | | | | | | | | | | | |
| 1033.97 | | | | | | | | | | | | | | BORING TERMINATED AT A DEPTH OF 21.3 FEET IN FRESH VERY HARD ROCK |

| ELEV. (FEET) | DEPTH (FEET) | DRILL RATE MIN./FT. | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
|--------------|--------------|---------------------|------------|-------------|-------------|---------|---|
| 1044.9 | 10.4 | | 0.9 | 0.8 | 0.8 | | MASSIVE, FRESH, VERY HARD METAGRANITE NO NATURAL BREAKS. NO STAINS OR DISCOLORATIONS |
| 1044.0 | 11.3 | | | 83 | 83 | | |
| 1044.0 | 11.3 | | 5.0 | 5.1 | 5.1 | | |
| | | | | 102 | 102 | | |
| 1039.0 | 16.3 | | | | | | |
| 1039.0 | 16.3 | | 5.0 | 4.9 | 4.9 | | |
| | | | | 98 | 98 | | |
| 1034.0 | 21.3 | | | | | | |

CORING TERMINATED AT ELEVATION 1034.0 FT.

DRILLER: GK ROSE CORE SIZE: NXWL EQUIPMENT: CME-45 TRACK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

SHEET 11 OF 14

DATE 2/20/2006

CORE BORING REPORT

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST MM HAGEER | | | | | | | | |
|---|-------|---------------------------|------------------------------|--------------------|----------|--------------------------|----|----|----|-----|-----------|-----|---------------------------|--|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | GND WATER | | | | | | | | |
| BORING NO EB2-B | | NORTHING 744325.00 | | EASTING 1179922.00 | | 0 HR N/A | | | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 17+10.000 | | OFFSET 17.00ft RT | | 24 HR 12.00ft | | | | | | | | |
| COLLAR ELEV 1057.96ft | | TOTAL DEPTH 25.40ft | | START DATE 2/21/06 | | COMPLETION DATE 02/21/06 | | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | DRILL METHOD SPT CORE BORING | | | HAMMER TYPE AUTOMATIC | | | | | | | | |
| SURFACE WATER DEPTH N/A | | | DEPTH TO ROCK N/A | | | Log EB2-B, Page 1 of 1 | | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | |
| 1057.96 | | | | | | | | | | | | | | Ground Surface |
| | 2.70 | 3 | 4 | 4 | 1.0 | | | | | | | | | FILL: BROWN AND RED SILTY SAND |
| | | | | | | | | | | | | | | ALLUVIUM: RED SILTY SAND |
| 1050.00 | 7.70 | 19 | 32 | 63 | 0.8 | | | | | | | | | SAPROLITE: ORANGE SILTY SAND |
| | | | | | | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | | HARD ROCK. CORED FROM 12.4 TO 25.4. TOTAL REC=100% TOTAL RQD =98.5%. FRESH, VERY HARD GRANITE. |
| | | | | | | | | | | | | | | BORING TERMINATED AT A DEPTH OF 25.4 FEET IN FRESH, VERY HARD ROCK |

| PROJECT: <u>33269.1.1</u> | | I. D. NO: <u>B-3814</u> | | BORING NO: <u>EB2-B</u> | | GEOLOGIST: <u>PQ LOCKAMY</u> | |
|---|--------------|-------------------------------------|------------|--------------------------------|-------------|------------------------------|---|
| DESCRIPTION: <u>BRIDGE NO.56 ON SR-1250 OVER CANOE CREEK IN BURKE COUNTY. 17+10, 17' RT -L-</u> | | | | | | | |
| COUNTY: <u>BURKE</u> | | COLLAR ELEVATION: <u>1058.0</u> FT. | | TOTAL DEPTH: <u>25.4</u> FT. | | | |
| ELEV. (FEET) | DEPTH (FEET) | DRILL RATE (MIN./FT.) | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
| 1045.6 | 12.4 | | 4.1 | 4.1 | 3.9 | | MASSIVE, FRESH, VERY HARD METAGRANITE. 2 NATURAL BREAKS, ROUGH SURFACES, UNWEATHERED, UNSTAINED. BREAKS ARE HORIZONTAL. |
| 1041.5 | 16.5 | | | 100 | 95 | | |
| 1041.5 | 16.5 | | | 5.0 | 5.0 | | |
| | | | | 100 | 100 | | |
| 1036.5 | 21.5 | | | | | | |
| 1036.5 | 21.5 | | 3.9 | 3.9 | 3.9 | | |
| 1032.6 | 25.4 | | | 100 | 100 | | |
| CORING TERMINATED AT ELEVATION 1032.6 FT. | | | | | | | |
| DRILLER: <u>GK ROSE</u> | | CORE SIZE: <u>NXWL</u> | | EQUIPMENT: <u>CM3-45 TRACK</u> | | | |



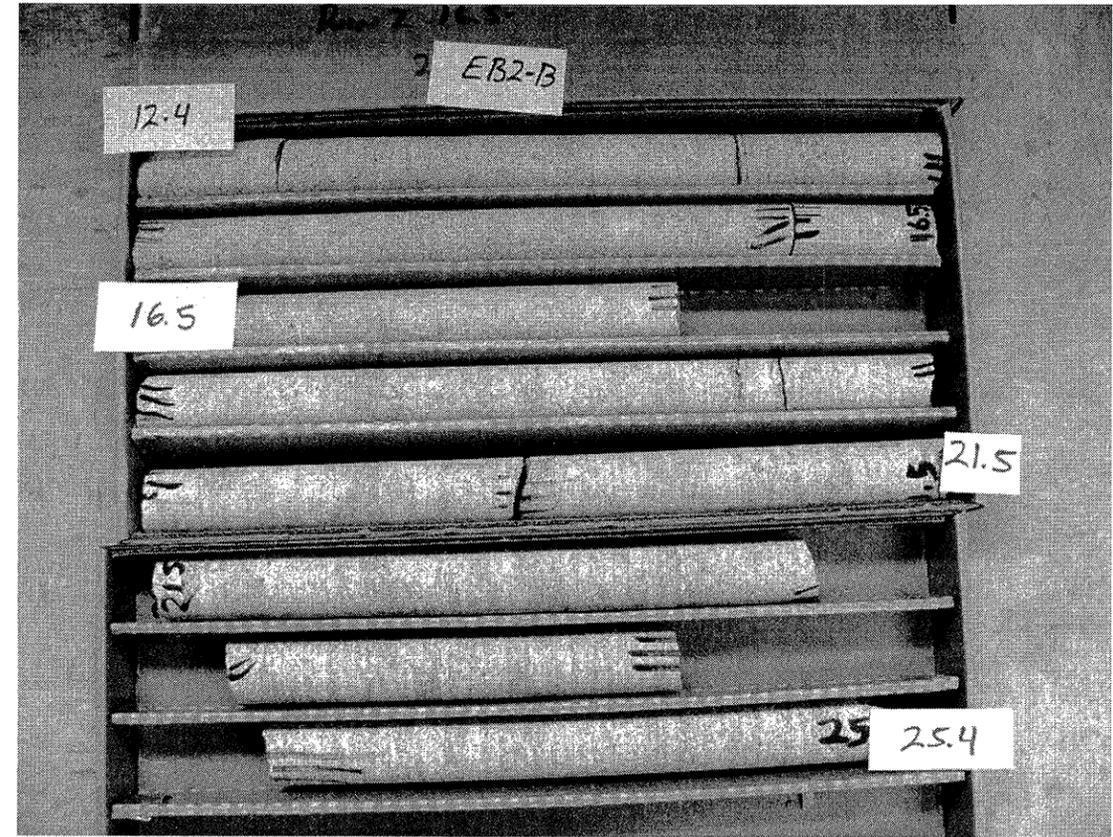
Burke Co. Br. 56 on SR-1250 over Canoe Creek
33269.1.1 B-3814



Burke Co. Br. 56 on SR-1250 over Canoe Creek
33269.1.1 B-3814



Burke Co. Br. 56 on SR-1250 over Canoe Creek
33269.1.1 B-3814



Burke Co. Br. 56 on SR-1250 over Canoe Creek
33269.1.1 B-3814



**FIELD
 SCOUR REPORT**

WBS: 33269.1.1 TIP: B-3814 COUNTY: BURKE

DESCRIPTION(1): BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel pos:)
 Other (explain) _____

Bridge No.: 56 Length: 41' 2" Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
 Foundation Type: CONCRETE FOOTINGS ON BEDROCK

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: LOOSE SAND AND OR BEDROCK VISIBLE ALONG FOOTINGS

Interior Bents: N/A

Channel Bed: 4' DEEP HOLE UPSTREAM OF EB1

Channel Bank: NOT MUCH

EXISTING SCOUR PROTECTION

Type(3): CONCRETE WINGS WITH DRY STACKED STONE EXTENSIONS ON ALL 4 CORNERS

Extent(4): CONCRETE ABUTMENT WALLS AND WINGS FROM CREEK BED TO ROAD

Effectiveness(5): VERY GOOD

Obstructions(6): NONE

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): GRANITE BEDROCK WITH SKIM OF LOOSE SAND

Channel Bank Material(8): LOOSE SILTY SAND

Channel Bank Cover(9): TREES

Floodplain Width(10): ABOUT 200 FEET

Floodplain Cover(11): TREES, GRASS, WEEDS, AND KUDZU

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): NAILED IN PLACE

Observations and Other Comments: VERY MINIMAL GRAVEL, FEW LOOSE BOULDERS, MOSTLY BEDROCK CHANNEL BED.

DESIGN SCOUR ELEVATIONS(14)

Feet _____ Meters _____

BENTS

| | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | |
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Comparison of DSE to Hydraulics Unit theoretical scour: _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

| | | | | | | | | | | |
|-------------|--|--|--|--|--|--|--|--|--|--|
| Bed or Bank | | | | | | | | | | |
| Sample No. | | | | | | | | | | |
| Retained #4 | | | | | | | | | | |
| Passed #10 | | | | | | | | | | |
| Passed #40 | | | | | | | | | | |
| Passed #200 | | | | | | | | | | |
| Coarse Sand | | | | | | | | | | |
| Fine Sand | | | | | | | | | | |
| Silt | | | | | | | | | | |
| Clay | | | | | | | | | | |
| LL | | | | | | | | | | |
| PI | | | | | | | | | | |
| AASHTO | | | | | | | | | | |
| Station | | | | | | | | | | |
| Offset | | | | | | | | | | |
| Depth | | | | | | | | | | |

Reported by: PQ LOCKAMY Date: 2/23/2006

CONTRACT: ID: B-3814

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|----------------|--------------|
| N.C. | 33269.1.1 B-3814 | 1 | 8 |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33269.1.1 | BRZ-1250(D) | P.E. CONST. | |

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

CONTENTS:

| SHEET | DESCRIPTION |
|-------|-------------------------|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | INVENTORY |
| 4 | PLAN VIEW |
| 5 | PROFILE |
| 6-7 | BORE LOG & CORE REPORTS |
| 8 | CORE PHOTOGRAPH |

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33269.1.1 I.D. NO. B-3814

F.A. PROJECT _____

COUNTY BURKE

PROJECT DESCRIPTION BURKE CO. BR. 56
ON SR-1250 OVER CANOE CREEK

SITE DESCRIPTION RETAINING WALL
AT EBI-A

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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 THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

4052

INVESTIGATED BY PQ LOCKAMY PERSONNEL MM HAGER

CHECKED BY WD FRYE DO CHEEK

SUBMITTED BY WD FRYE GK ROSE

DATE 3-24-6



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

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

DRAWN BY: PQ LOCKAMY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33269.111 B-3814
 SHEET NO. 2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | | GRADATION | | ROCK DESCRIPTION | | TERMS AND DEFINITIONS | |
|---|--|--|--|---|--|--|--|
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS 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 CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARDY PLASTIC, A-7-6 | | 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 POORLY GRADED) POORLY GRADED GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. | | 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. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 60 BLOWS PER FOOT 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: | | 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, 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 DISLODGED 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 (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. 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 60 BLOWS PER FOOT. 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. | |
| SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS GROUP CLASS. A-1, A-1-b, A-1-c, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6, A-7-7, A-3, A-4, A-5, A-6, A-7 SYMBOL [Diagrams showing soil patterns for various groups] % PASSING: * 10, * 40, * 200 LIQUID LIMIT PLASTIC INDEX: 6 MX, NP, 10 MX, 11 MN, 12 MN, 13 MN, 14 MN, 15 MN, 16 MN, 17 MN, 18 MN, 19 MN, 20 MN, 21 MN, 22 MN, 23 MN, 24 MN, 25 MN, 26 MN, 27 MN, 28 MN, 29 MN, 30 MN, 31 MN, 32 MN, 33 MN, 34 MN, 35 MN, 36 MN, 37 MN, 38 MN, 39 MN, 40 MN, 41 MN, 42 MN, 43 MN, 44 MN, 45 MN, 46 MN, 47 MN, 48 MN, 49 MN, 50 MN, 51 MN, 52 MN, 53 MN, 54 MN, 55 MN, 56 MN, 57 MN, 58 MN, 59 MN, 60 MN, 61 MN, 62 MN, 63 MN, 64 MN, 65 MN, 66 MN, 67 MN, 68 MN, 69 MN, 70 MN, 71 MN, 72 MN, 73 MN, 74 MN, 75 MN, 76 MN, 77 MN, 78 MN, 79 MN, 80 MN, 81 MN, 82 MN, 83 MN, 84 MN, 85 MN, 86 MN, 87 MN, 88 MN, 89 MN, 90 MN, 91 MN, 92 MN, 93 MN, 94 MN, 95 MN, 96 MN, 97 MN, 98 MN, 99 MN, 100 MN GROUP INDEX: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 USUAL TYPES: STONE FRAGS. GRAVEL AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND, SILTY SOILS, CLAYEY SOILS, GRANULAR SOILS, SILT-CLAY SOILS, MUCK, PEAT, HIGHLY ORGANIC SOILS GEN. RATING AS A 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 | | MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | | WEATHERING FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. 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, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK 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. 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. | | COMPRESSION SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50 | |
| CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE: GENERALY GRANULAR MATERIAL (NON-COHESIVE), GENERALY SILT-CLAY MATERIAL (COHESIVE) COMPACTNESS OR CONSISTENCY: VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE): <4, 4 TO 10, 10 TO 30, 30 TO 50, >50 RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²): <0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4 | | MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT CPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL SAMPLE DESIGNATIONS: S - BULK SAMPLE, SS - SPLIT SPOON SAMPLE, ST - SHELBY TUBE SAMPLE, RM - RESILIENT MODULUS SAMPLE, RS - ROCK SAMPLE, RT - RECOMPACTED TRIAXIAL SAMPLE, CBR - CALIFORNIA BEARING RATIO SAMPLE | | WEATHERING (continued) 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. 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, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK 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. 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. | | | |
| TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270 COEFFICIENTS: 4.76, 2.00, 0.42, 0.25, 0.075, 0.053 | | ABBREVIATIONS 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, MED. - MEDIUM, MICA - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, v - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, γ - UNIT WEIGHT, γ _d - DRY UNIT WEIGHT | | ROCK HARDNESS 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. 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 HARD: CAN BE GROUDED 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 GROUDED 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 SOFT: 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 FINGER NAIL. | | | |
| SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT - SATURATED - (SAT.) 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 | | EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-, BK-51, CME-45 TRACK, CME-550, PORTABLE HOIST, OTHER ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE TUNG-CARB., CORE BIT, OTHER HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST, OTHER | | FRACURE SPACING TERM: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET BEDDING TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, 0.008 - 0.03 FEET, < 0.008 FEET | | | |
| PLASTICITY NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY PLASTICITY INDEX (PI), DRY STRENGTH, VERY LOW, SLIGHT, MEDIUM, HIGH | | INDURATION 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; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | 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. | | | |
| BENCH MARK: BM2 -BL- STA. II+07.26, 42.4' RT. | | ELEVATION: 1071.84 FT. | | NOTES: | | | |



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 29, 2006

STATE PROJECT: 33269.1.1 (B-3814)
COUNTY: Burke
DESCRIPTION: Retaining Wall at Bridge No. 56 on SR-1250 over Canoe Creek
SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This 61 foot long retaining wall will hold back approach embankment on the left side of End Bent One. This foundation investigation utilized a track mounted CME-45 drill machine. Three borings were advanced using N-casing for both SPT and NXWL core borings. The Hydraulics Report used for this investigation is dated 05/09/05.

Foundation Materials

Shallow, hard rock is present across the site. Bedrock consists of massive Late Paleozoic granite with a very slight metamorphic imprint. The rock has a healed joint set parallel to the stream valley with much fewer joints perpendicular to the valley. Surficial exfoliation joints (dipping downstream at a slight angle) were observed in exposures upstream. Overall, the rock is extremely hard and fresh with few breaks and has very high Recovery and RQD rates.

The Wall

The proposed wall traverses a waste fill slope that is lined with blast boulders. The boulders originated from a nearby road cut. Some soil fill may also be associated with the boulders but was not encountered in the investigation as the borings were offset from the slope to flatter ground by the creek.

Soils encountered include approximately 5 feet of very loose, alluvial sand, most of which is red and very recent in origin underlain by some intermittent basal grey (older) sand. A thin discontinuous band of weathered rock less than 1 foot thick and hard rock underlie the alluvial sand. Below elevation 1047 to 1043 feet lies hard rock - granite – that is very hard and fresh and massive.

Groundwater

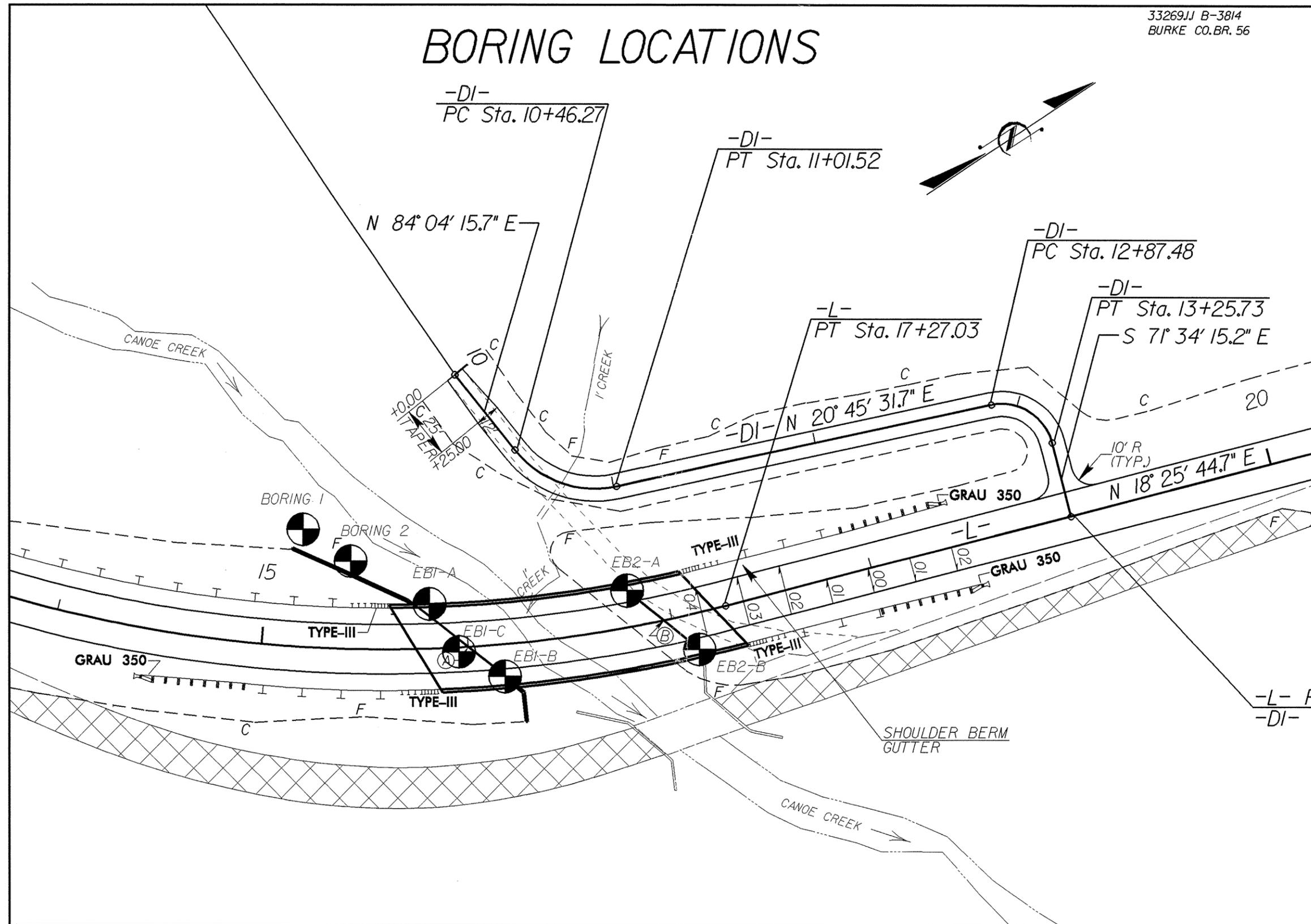
Groundwater is present along the proposed wall near an elevation of 1045 feet.

Respectfully Submitted,

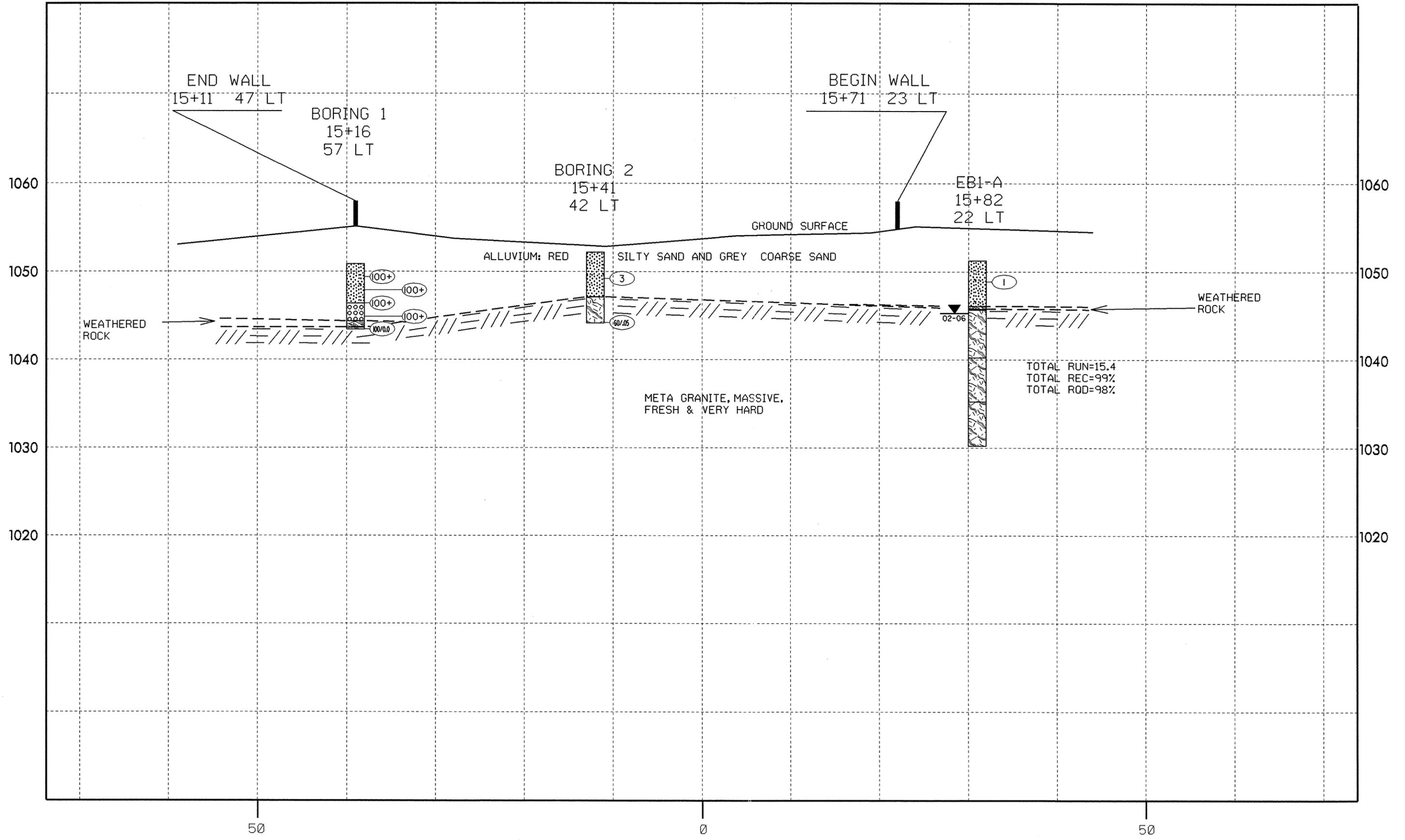
PQ Lockamy LG

33269JJ B-3814
BURKE CO. BR. 56

BORING LOCATIONS



PROFILE ALONG RETAINING WALL



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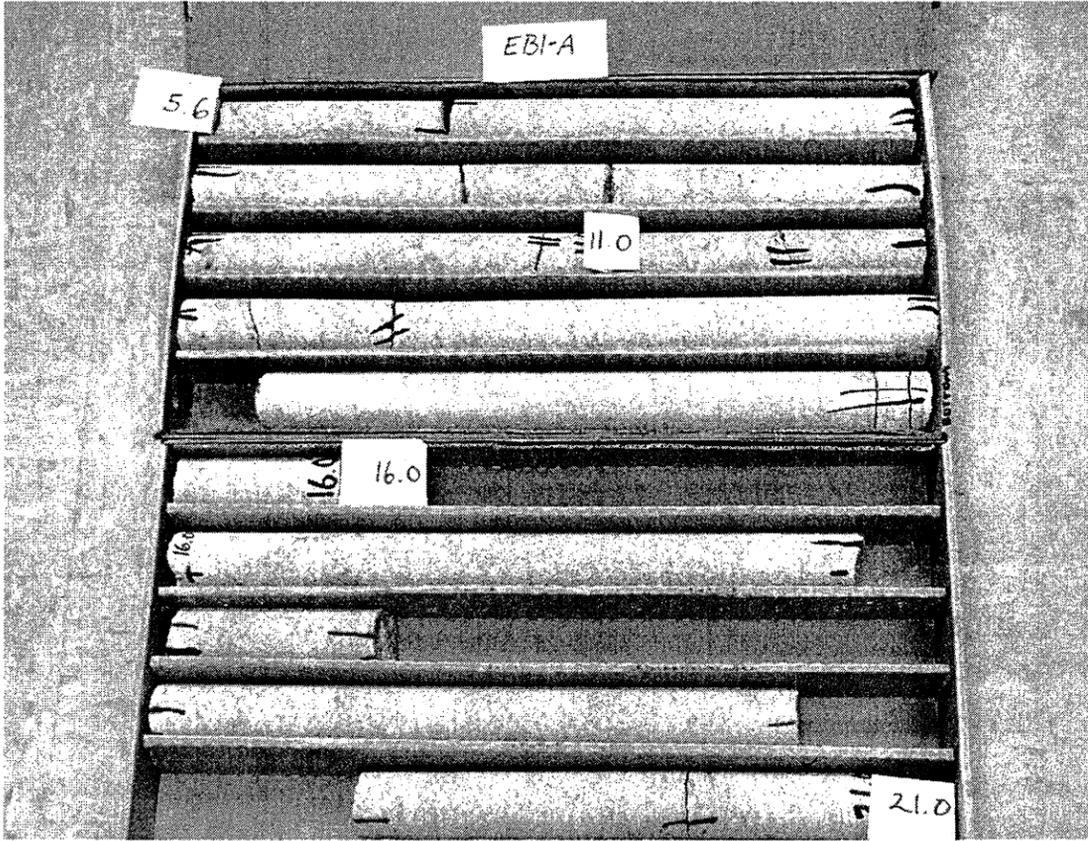
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST MM HAGEER | | | | | | | |
|---|-------|---------------------------|-------------------------|--------------------|----------|--------------------------|--------------|----|----|-----------|-----|---------------------------|--|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | | GND WATER | | | | | | |
| BORING NO WALL-1 | | NORTHING 744195.00 | | EASTING 1179769.00 | | 0 HR N/A | 24 HR 4.50ft | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 15+16.000 | | OFFSET 57.00ft LT | | | | | | | | | |
| COLLAR ELEV 1050.84ft | | TOTAL DEPTH 7.40ft | | START DATE 2/16/06 | | COMPLETION DATE 02/16/06 | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | DRILL METHOD CASING SPT | | | HAMMER TYPE AUTOMATIC | | | | | | | |
| SURFACE WATER DEPTH | | | DEPTH TO ROCK N/A | | | Log WALL-1, Page 1 of 1 | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | | | | 100 |
| 1050.84 | 0.00 | 0 | 1 | 1 | 1.0 | | | | | | | | Ground Surface |
| | 1.50 | 0 | 2 | 1 | 1.0 | X | 2 | | | | | | RECENT ALLUVIUM: YELLOW AND ORANGE SILTY SAND |
| | 3.00 | 1 | 1 | 2 | 1.0 | X | 3 | | | | | | |
| | 4.50 | 8 | 10 | 5 | 1.0 | X | 15 | | | | | | |
| 1043.44 | 7.40 | 100 | | | 0.0 | X | 100 | | | | | | BORING TERMINATED ON HARD ROCK AT A DEPTH OF 7.4 FEET. |
| | | | | | | | | | | | | | ALLUVIUM: GREY SILTY SAND WITH GRAVEL AND WOOD WITH THIN BEDS OF SILT. |
| | | | | | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | HARD ROCK |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

| PROJECT NO 33269.1.1 | | ID B-3814 | | COUNTY BURKE | | GEOLOGIST PQ LOCKAMY | | | | | | | |
|---|-------|---------------------------|-------------------------|--------------------|----------|--------------------------|-----------|----|----|-----------|-----|---------------------------|---|
| SITE DESCRIPTION BURKE CO. BR. 56 ON SR-1250 OVER CANOE CREEK | | | | | | | GND WATER | | | | | | |
| BORING NO WALL-2 | | NORTHING 0.00 | | EASTING 0.00 | | 0 HR N/A | 24 HR N/A | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 15+41.000 | | OFFSET 42.00ft LT | | | | | | | | | |
| COLLAR ELEV 1052.19ft | | TOTAL DEPTH 8.05ft | | START DATE 2/20/06 | | COMPLETION DATE 02/20/06 | | | | | | | |
| DRILL MACHINE CME-45 TRACK | | | DRILL METHOD CASING SPT | | | HAMMER TYPE | | | | | | | |
| SURFACE WATER DEPTH N/A | | | DEPTH TO ROCK N/A | | | Log WALL-2, Page 1 of 1 | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | | | | 100 |
| 1052.19 | | | | | | | | | | | | | Ground Surface |
| 1050.00 | 3.00 | 1 | 2 | 1 | 1.0 | X | 3 | | | | | | ALLUVIUM: RED SILTY SAND |
| 1044.14 | 8.00 | 60 | | | 0.0 | | | | | | | | BORING TERMINATED AT A DEPTH OF 8.05 FEET IN HARD ROCK. |
| | | | | | | | | | | | | | HARD ROCK WITH A SEAM OF WEATHERED ROCK FROM 6.7 TO 7.2 FEET. |



Burke Co. Br. 56 on SR-1250 over Canoe Creek
33269.1.1 B-3814