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REFERENCE: B-5166

PROJECT: 42342

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY GRANVILLE  
 PROJECT DESCRIPTION BRIDGE NO. 138 OVER GRASSY CREEK ON SR 1300 (CORNWALL ROAD) BETWEEN SR 1410 AND SR 1413 AT STA. 16+34  
 SITE DESCRIPTION \_\_\_\_\_  
 \_\_\_\_\_  
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Z. AGHAZADEH

INVESTIGATED BY M. WITMORE  
 DRAWN BY S. CROCKETT  
 CHECKED BY Z. AGHAZADEH  
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 DATE DECEMBER, 2015



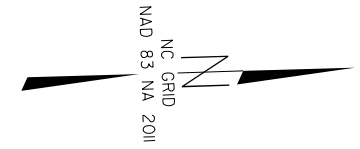
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

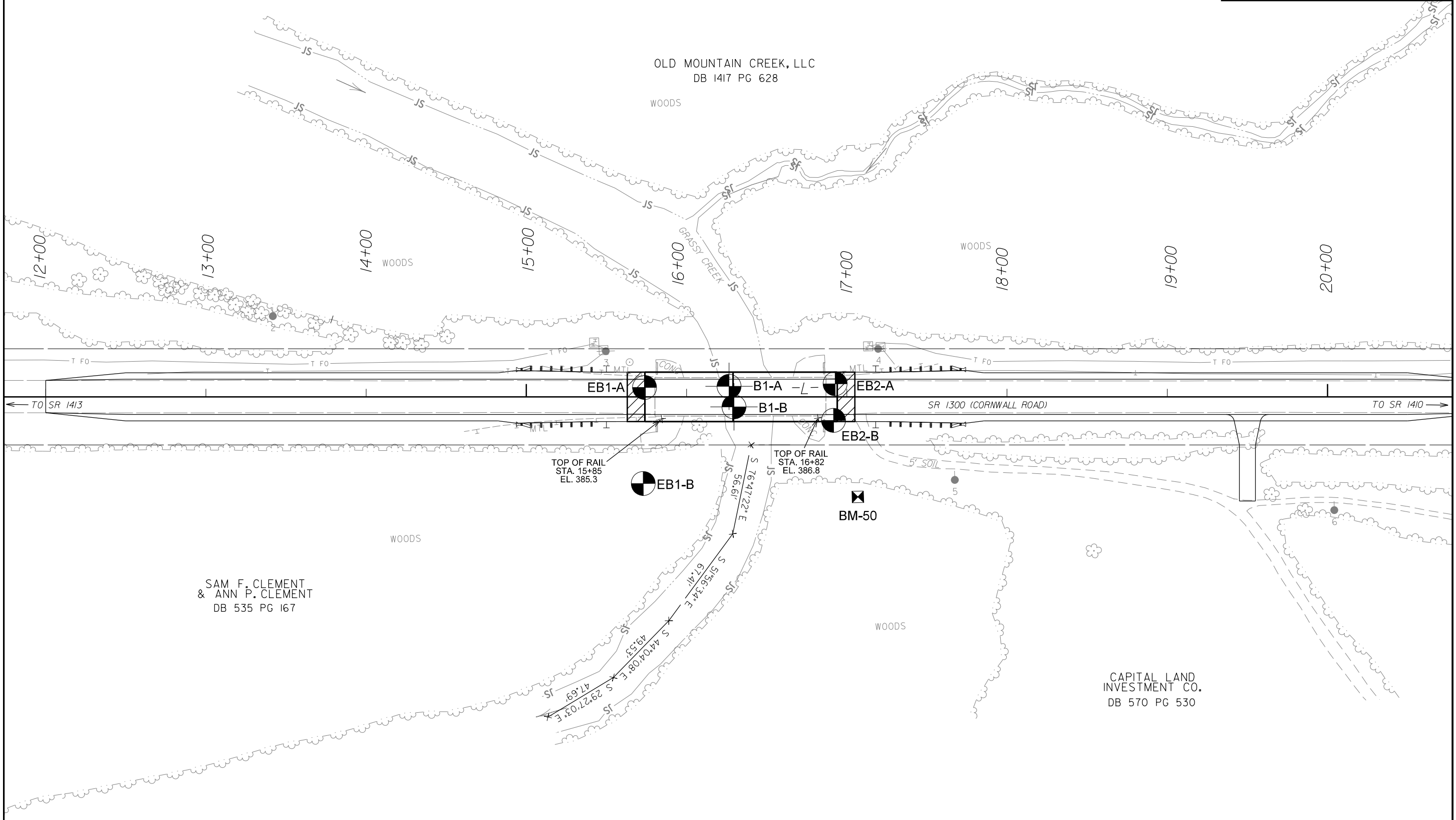
| SOIL DESCRIPTION  |   |              |                            |                   |  |   |             |             |  | GRADATION   |                   |   |                 |            |  |      |                      |                                |  | ROCK DESCRIPTION  |   |  |  |                   |  |  |                           |  |  | TERMS AND DEFINITIONS   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  | 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| 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>   |   |              |                            |                   |  |   |             |             |  | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. |                   |   |                 |            |  |      |                      |                                |  | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS 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: |   |  |  |                   |  |  |                           |  |  | 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 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 (IN 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. |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |    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SIEVE SIZE OPENING (MM)</td> <td>4</td> <td>10</td> <td>40</td> <td>60</td> <td>200</td> <td>270</td> <td colspan="3"></td> </tr> <tr> <td colspan="2"></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> <td colspan="3"></td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td>COBBLE (COB.)</td> <td>GRAVEL (GR.)</td> <td>COARSE SAND (CSE. SD.)</td> <td>FINE SAND (F SD.)</td> <td>SILT (SL.)</td> <td>CLAY (CL.)</td> <td colspan="5"></td> </tr> <tr> <td>GRAIN SIZE</td> <td>MM</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td colspan="5"></td> </tr> <tr> <td>SIZE</td> <td>IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td colspan="5"></td> </tr> </table> |  |  |  |  |  |  |  |  |  | TEXTURE OR GRAIN SIZE |  |  |  |  |  |  |  |  |  | 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 | 75 | 2.0 | 0.25 | 0.05 | 0.005 |  |  |  |  |  | SIZE | IN. | 12 | 3 |  |  |  |  |  |  |  |  |  | <table border="1"> <tr> <th colspan="10">SOIL MOISTURE - CORRELATION OF TERMS</th> </tr> <tr> <td colspan="3">SOIL MOISTURE SCALE (ATTERBERG LIMITS)</td> <td colspan="3">FIELD MOISTURE DESCRIPTION</td> <td colspan="4">GUIDE FOR FIELD MOISTURE DESCRIPTION</td> </tr> <tr> <td colspan="3">LL - LIQUID LIMIT</td> <td colspan="3">- SATURATED - (SAT.)</td> <td colspan="4">USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td colspan="3">PLASTIC RANGE (PI)</td> <td colspan="3">- WET - (W)</td> <td colspan="4">SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="3">PL - PLASTIC LIMIT</td> <td colspan="3">- MOIST - (M)</td> <td colspan="4">SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="3">OM - OPTIMUM MOISTURE</td> <td colspan="3">- DRY - (D)</td> <td colspan="4">REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="3">SL - SHRINKAGE LIMIT</td> <td colspan="7"></td> </tr> </table> |  |  |  |  |  |  |  |  |  | SOIL MOISTURE - CORRELATION OF TERMS |  |  |  |  |  |  |  |  |  | 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 |  |  |  | PLASTIC RANGE (PI) |  |  | - WET - (W) |  |  | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE |  |  |  | PL - PLASTIC LIMIT |  |  | - MOIST - (M) |  |  | SOLID; AT OR NEAR OPTIMUM MOISTURE |  |  |  | OM - OPTIMUM MOISTURE |  |  | - DRY - (D) |  |  | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE |  |  |  | SL - SHRINKAGE LIMIT |  |  |  |  |  |  |  |  |  | <table border="1"> <tr> <th colspan="10">PLASTICITY</th> </tr> <tr> <td colspan="5">NON PLASTIC</td> <td colspan="5">SLIGHTLY PLASTIC</td> <td colspan="5">MODERATELY PLASTIC</td> <td colspan="5">HIGHLY PLASTIC</td> </tr> <tr> <td colspan="5">PLASTICITY INDEX (PI)</td> <td colspan="5">DRY STRENGTH</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td colspan="5">0-5</td> <td colspan="5">VERY LOW</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td colspan="5">6-15</td> <td colspan="5">SLIGHT</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td colspan="5">16-25</td> <td colspan="5">MEDIUM</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td colspan="5">26 OR MORE</td> <td colspan="5">HIGH</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <th colspan="10">COLOR</th> </tr> <tr> <td colspan="10">DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). 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4 FEET |  |  |  |  | MODERATELY CLOSE |  |  |  |  | 1 TO 3 FEET |  |  |  |  | THINLY BEDDED |  |  |  |  | 0.16 - 1.5 FEET |  |  |  |  | CLOSE |  |  |  |  | 0.16 TO 1 FOOT |  |  |  |  | VERY THINLY BEDDED |  |  |  |  | 0.03 - 0.16 FEET |  |  |  |  | VERY CLOSE |  |  |  |  | LESS THAN 0.16 FEET |  |  |  |  | THICKLY LAMINATED |  |  |  |  | 0.008 - 0.03 FEET |  |  |  |  |  |  |  |  |  |  |  |  |  |  | THINLY LAMINATED |  |  |  |  | < 0.008 FEET |  |  |  |  | INDURATION |  |  |  |  |  |  |  |  |  | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. |  |  |  |  |  |  |  |  |  | FRIABLE |  |  |  |  | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. |  |  |  |  |  |  |  |  |  |  |  |  |  |  | MODERATELY INDURATED |  |  |  |  | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. |  |  |  |  |  |  |  |  |  |  |  |  |  |  | INDURATED |  |  |  |  | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EXTREMELY INDURATED |  |  |  |  | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <p> <b>FRAC. MARK: BM-50, RR SPIKE IN I4" BLACK OAK</b><br/> <b>N: 991163 E: 2098814</b><br/> <b>ELEVATION: 391.21 FEET</b> </p> <p> <b>NOTES:</b><br/>     WOH = WEIGHT OF HAMMER<br/>     FIAD = FILLED IMMEDIATELY AFTER DRILLING<br/>     TOP OF RAIL EL. - SOUTH END OF BRIDGE (EB-1): 385.3<br/>     TOP OF RAIL EL. - NORTH END OF BRIDGE (EB-2): 386.8   </p> |  |  |  |  |  |  |  |  |  |
| SOIL LEGEND AND AASHTO CLASSIFICATION   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| GENERAL CLASS.  | GRANULAR MATERIALS (≤ 35% PASSING #200) |              |                            |                   |  | SILT-CLAY MATERIALS (> 35% PASSING #200)                            |             |             |  |   | ORGANIC MATERIALS |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                 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| GROUP CLASS.  | A-1                                     | A-3          | A-2                        | A-4               | A-5  | A-6   | A-7         | A-1, A-2    | A-3  | A-4, A-5  | A-6, A-7          |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  | 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          |  |  |                               |  |  |              |  |  |                        |  |  |                                |  |  |                |  |  |          |  |  |                       |  |  |                              |  |  |                    |  |  |              |  |  |               |  |  |                  |  |  |                   |  |  |                  |  |  |                |  |  |                          |  |  |                   |  |  |                   |  |  |                   |  |  |                 |  |  |                       |  |  |                      |  |  |          |  |  |                       |  |  |                  |  |  |             |  |  |                 |  |  |                      |  |  |          |  |  |                  |  |  |                  |  |  |           |  |  |                           |  |  |                                |  |  |   |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  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| SYMBOL  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 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| % PASSING #10 #40 #200  | 50 MX 30 MX 15 MX                       | 50 MX 25 MX  | 51 MN 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 36 MN   | 36 MN 36 MN       | GRANULAR SOILS  | SILT-CLAY SOILS | MUCK, PEAT |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |             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| MATERIAL PASSING #40 LL PI  |   |              |                            |                   |  |   |             |             |  |   |                   | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER |                 |            |  |      | HIGHLY ORGANIC SOILS |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  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| GROUP INDEX   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           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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   |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  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RATING AS SUBGRADE   | EXCELLENT TO GOOD                       |              |                            |                   |  | FAIR TO POOR  |             |             |  |   | FAIR TO POOR      |   |                 |            |  | POOR |                      |                                |  |   | UNSATURABLE                             |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  | 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| PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  | 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| ANGULARITY OF GRAINS  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   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| THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                   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| MINERALOGICAL COMPOSITION   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  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| COMPRESSIBILITY   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       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| SLIGHTLY COMPRESSIBLE   |   |              |                            |                   | LL < 31  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| MODERATELY COMPRESSIBLE   |   |              |                            |                   | LL = 31 - 50   |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| HIGHLY COMPRESSIBLE   |   |              |                            |                   | LL > 50  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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 |  |  |  |               |  |  |  |  |                 |  |  |  |  |       |  |  |  |  |                |  |  |  |  |                    |  |  |  |  |                  |  |  |  |  |            |  |  |  |  |                     |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |            |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
| PERCENTAGE OF MATERIAL  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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 |  |               |  |  |  |  |                 |  |  |  |  |       |  |  |  |  |                |  |  |  |  |                    |  |  |  |  |                  |  |  |  |  |            |  |  |  |  |                     |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |            |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
| ORGANIC MATERIAL  |   |              | GRANULAR SOILS             |                   |  | SILT - CLAY SOILS   |             |             | OTHER MATERIAL                                       |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             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                 |  |  |                |  |  |                   |  |  |                |  |  |                         |  |  |        |  |  |        |  |  |               |  |  |                       |  |  |        |  |  |         |  |  |                 |  |  |                    |  |  |         |  |  |          |  |  |               |  |  |                |  |  |       |  |  |       |  |  |                      |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |     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| TRACE OF ORGANIC MATTER   |   |              | 2 - 3%                     |                   |  | 3 - 5%  |             |             | TRACE 1 - 10%  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| LITTLE ORGANIC MATTER   |   |              | 3 - 5%                     |                   |  | 5 - 12%   |             |             | LITTLE 10 - 20%                                      |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  | 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| MODERATELY ORGANIC  |   |              | 5 - 10%                    |                   |  | 12 - 20%  |             |             | SOME 20 - 35%  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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|                   |  |  |                |  |  |                         |  |  |        |  |  |        |  |  |               |  |  |                       |  |  |        |  |  |         |  |  |                 |  |  |                    |  |  |         |  |  |          |  |  |               |  |  |                |  |  |       |  |  |       |  |  |                      |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |         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| HIGHLY ORGANIC  |   |              | > 10%                      |                   |  | > 20%   |             |             | HIGHLY 35% AND ABOVE                                 |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  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 |                                   |  |   |    |    |    |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  |           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| GROUND WATER  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           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|   |   |              |                            |                   |  |   |             |             |  | WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  | 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|   |   |              |                            |                   |  |   |             |             |  | STATIC WATER LEVEL AFTER 24 HOURS   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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|   |   |              |                            |                   |  |   |             |             |  | PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  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|   |   |              |                            |                   |  |   |             |             |  | SPRING OR SEEP  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         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   |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |          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| MISCELLANEOUS SYMBOLS   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |              |  |  |  |  |      |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |         |  |  |  |  |                         |  |  |  |  |              |  |  |  |  |                     |  |  |  |  |         |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |                  |  |  |                |  |  |                  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|    |    |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |   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 |  |               |  |  |  |  |                 |  |  |  |  |       |  |  |  |  |                |  |  |  |  |                    |  |  |  |  |                  |  |  |  |  |            |  |  |  |  |                     |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |            |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
|   |   |              |                            |                   | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION  |   |             |             |  |   |                   |   |                 |            | DIP & DIP DIRECTION OF ROCK STRUCTURES               |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |  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|   |   |              |                            |                   | SOIL SYMBOL  |   |             |             |  |   |                   |   |                 |            | TEST BORING  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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|   |   |              |                            |                   | ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT   |   |             |             |  |   |                   |   |                 |            | AUGER BORING   |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  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|   |   |              |                            |                   | INFERRED SOIL BOUNDARY   |   |             |             |  |   |                   |   |                 |            | CORE BORING  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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|   |   |              |                            |                   | INFERRED ROCK LINE   |   |             |             |  |   |                   |   |                 |            | MONITORING WELL                                      |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  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|   |   |              |                            |                   | ALLUVIAL SOIL BOUNDARY   |   |             |             |  |   |                   |   |                 |            | PIEZOMETER INSTALLATION                              |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |              |  |  |  |  |      |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |         |  |  |  |  |                         |  |  |  |  |              |  |  |  |  |                     |  |  |  |  |         |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |            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 |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                              |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |               |  |  |  |  |  |  |  |  |  |                    |  |  |                        | 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|   |   |              |                            |                   | SPT N-VALUE  |   |             |             |  |   |                   |   |                 |            | SLOPE INDICATOR INSTALLATION                         |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  | 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|   |   |              |                            |                   | CONE PENETROMETER TEST   |   |             |             |  |   |                   |   |                 |            | SOUNDING ROD   |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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|   |   |              |                            |                   | TEST BORING WITH CORE  |   |             |             |  |   |                   |   |                 |            | TEST BORING WITH CORE                                |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  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|   |   |              |                            |                   | SPT N-VALUE  |   |             |             |  |   |                   |   |                 |            | SPT N-VALUE  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| RECOMMENDATION SYMBOLS  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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|   |   |              | UNDERCUT EXCAVATION        |                   |  |   |             |             | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE           |   |                   |   |                 |            | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  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|   |   |              | SHALLOW UNDERCUT           |                   |  |   |             |             | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK |   |                   |   |                 |            | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  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| ABBREVIATIONS   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         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| AR - AUGER REFUSAL  |   |              | BT - BORING TERMINATED     |                   |  | CL - CLAY   |             |             | CPT - COARSE 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 |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |              |  |  |  |  |      |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |         |  |  |  |  |                         |  |  |  |  |             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| 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   |                   |  | w - MOISTURE CONTENT |  |  | V - VERY     |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |   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| VST - VANE SHEAR TEST   |   |              | WEA. - WEATHERED           |                   |  | UNIT WEIGHT   |             |             | DRY UNIT WEIGHT                                      |   |                   | SAMPLE ABBREVIATIONS                                    |                 |            | S - BULK   |      |                      | SS - SPLIT SPOON               |  |   | ST - SHELBY TUBE                        |  |  | RS - ROCK         |  |  | RT - RECOMPACTED TRIAXIAL |  |  | CBR - CALIFORNIA BEARING RATIO  |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |              |  |  |  |  |      |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |         |  |  |  |  |                         |  |  |  |  |     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| TEXTURE OR GRAIN SIZE   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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 |  |               |  |  |  |  |                 |  |  |  |  |       |  |  |  |  |                |  |  |  |  |                    |  |  |  |  |                  |  |  |  |  |            |  |  |  |  |                     |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |            |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
| U.S. STD. SIEVE SIZE OPENING (MM)   |   | 4            | 10                         | 40                | 60   | 200   | 270         |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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  |    |    |    |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  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|   |   | 4.76         | 2.00                       | 0.42              | 0.25   | 0.075   | 0.053       |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           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| BOULDER (BLDR.)   | COBBLE (COB.)                           | GRAVEL (GR.) | COARSE SAND (CSE. SD.)     | FINE SAND (F SD.) | SILT (SL.)   | CLAY (CL.)  |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |           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| GRAIN SIZE  | MM                                      | 305          | 75                         | 2.0               | 0.25   | 0.05  | 0.005       |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  | 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| SIZE  | IN.                                     | 12           | 3                          |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| SOIL MOISTURE - CORRELATION OF TERMS  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| SOIL MOISTURE SCALE (ATTERBERG LIMITS)  |   |              | FIELD MOISTURE DESCRIPTION |                   |  | GUIDE FOR FIELD MOISTURE DESCRIPTION                                |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  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| LL - LIQUID LIMIT   |   |              | - SATURATED - (SAT.)       |                   |  | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  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| PLASTIC RANGE (PI)  |   |              | - WET - (W)                |                   |  | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE               |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  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              |  |  |                |  |  |                   |  |  |                |  |  |                         |  |  |        |  |  |        |  |  |               |  |  |                       |  |  |        |  |  |         |  |  |                 |  |  |                    |  |  |         |  |  |          |  |  |               |  |  |                |  |  |       |  |  |       |  |  |                      |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        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 |  |  |  |  |                                   |  |   |    |    |    |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  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| PL - PLASTIC LIMIT  |   |              | - MOIST - (M)              |                   |  | SOLID; AT OR NEAR OPTIMUM MOISTURE                                  |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  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| OM - OPTIMUM MOISTURE   |   |              | - DRY - (D)                |                   |  | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE                |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |            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| SL - SHRINKAGE LIMIT  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   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| PLASTICITY  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             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| NON PLASTIC   |   |              |                            |                   | SLIGHTLY PLASTIC   |   |             |             |  | MODERATELY PLASTIC  |                   |   |                 |            | HIGHLY PLASTIC                                       |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  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|  |  |  |              |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                              |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |               |  |  |  |  |  |  |  |  |  |                    |  |  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 |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |                    |  |  |  |  |                |  |  |  |  |                       |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |            |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |              |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |                                  |  |  |  |  |                                    |  |  |  |  |   |  |  |  |  |                                 |  |  |  |  |   |  |  |  |  |            |  |  |  |  |                                  |  |  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| PLASTICITY INDEX (PI)   |   |              |                            |                   | DRY STRENGTH   |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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 |  |  |  |  |  |   |  |  |  |  |   |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                          |  |  |  |  |   |  |  |  |  |                                     |  |  |  |  |                          |  |  |  |  |  |  |  |  |  |                                       |  |  |  |  |                          |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |                          |  |  |  |  |                          |  |  |  |  |                          |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |      |  |  |  |  |         |  |  |  |  |      |  |  |  |  |           |  |  |  |  |           |  |  |  |  |                   |  |  |  |  |                     |  |  |  |  |        |  |  |  |  |      |  |  |  |  |              |  |  |  |  |                |  |  |  |  |              |  |  |  |  |                  |  |  |  |  |        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| 0-5   |   |              |                            |                   | VERY LOW   |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         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| 16-25   |   |              |                            |                   | MEDIUM   |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         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| DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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| EQUIPMENT USED ON SUBJECT PROJECT   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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| DRILL UNITS:  |   |              |                            |                   | ADVANCING TOOLS:   |   |             |             |  | HAMMER TYPE:  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| <input type="checkbox"/> CME-55   |   |              |                            |                   | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER  |   |             |             |  | CORE SIZE:  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |      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| <input type="checkbox"/> CME-550  |   |              |                            |                   | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS                                       |   |             |             |  | <input type="checkbox"/> -B <input type="checkbox"/> -H   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  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| <input type="checkbox"/> VANE SHEAR TEST  |   |              |                            |                   | <input type="checkbox"/> HARD FACED FINGER BITS  |   |             |             |  | <input checked="" type="checkbox"/> -N Q  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |       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 |  |  |            |  |  |  |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |                    |  |  |  |  |                |  |  |  |  |                       |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |            |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |              |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |                                  |  |  |  |  |                                    |  |  |  |  |   |  |  |  |  |                                 |  |  |  |  |   |  |  |  |  |            |  |  |  |  |            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| <input type="checkbox"/> PORTABLE HOIST   |   |              |                            |                   | <input type="checkbox"/> TUNG-CARBIDE INSERTS  |   |             |             |  | HAND TOOLS:   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |  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| <input checked="" type="checkbox"/> D-50  |   |              |                            |                   | <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER |   |             |             |  | <input type="checkbox"/> POST HOLE DIGGER   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  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| <input type="checkbox"/>  |   |              |                            |                   | <input type="checkbox"/> TRICONE *STEEL TEETH  |   |             |             |  | <input type="checkbox"/> HAND AUGER   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  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| <input type="checkbox"/>  |   |              |                            |                   | <input type="checkbox"/> TRICONE *TUNG-CARB.   |   |             |             |  | <input type="checkbox"/> SOUNDING ROD   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  | 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| <input type="checkbox"/>  |   |              |                            |                   | <input type="checkbox"/> CORE BIT  |   |             |             |  | <input type="checkbox"/> VANE SHEAR TEST  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |  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| <input type="checkbox"/>  |   |              |                            |                   | <input type="checkbox"/>   |   |             |             |  | <input type="checkbox"/>  |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  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| FRACTURE SPACING  |   |              |                            |                   |  |   |             |             |  | BEDDING   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| TERM  |   |              |                            |                   | SPACING  |   |             |             |  | TERM  |                   |   |                 |            | THICKNESS  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| VERY WIDE   |   |              |                            |                   | MORE THAN 10 FEET  |   |             |             |  | VERY THICKLY BEDDED   |                   |   |                 |            | 4 FEET   |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  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| WIDE  |   |              |                            |                   | 3 TO 10 FEET   |   |             |             |  | THICKLY BEDDED  |                   |   |                 |            | 1.5 - 4 FEET   |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  | 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| MODERATELY CLOSE  |   |              |                            |                   | 1 TO 3 FEET  |   |             |             |  | THINLY BEDDED   |                   |   |                 |            | 0.16 - 1.5 FEET                                      |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |      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| CLOSE   |   |              |                            |                   | 0.16 TO 1 FOOT   |   |             |             |  | VERY THINLY BEDDED  |                   |   |                 |            | 0.03 - 0.16 FEET                                     |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |        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| VERY CLOSE  |   |              |                            |                   | LESS THAN 0.16 FEET  |   |             |             |  | THICKLY LAMINATED   |                   |   |                 |            | 0.008 - 0.03 FEET                                    |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  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|   |   |              |                            |                   |  |   |             |             |  | THINLY LAMINATED  |                   |   |                 |            | < 0.008 FEET   |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  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| INDURATION  |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             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    |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |               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 |  |  |   |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                          |  |  |  |  |   |  |  |  |  |                                     |  |  |  |  |                          |  |  |  |  |  |  |  |  |  |                                       |  |  |  |  |                          |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |                          |  |  |  |  |                          |  |  |  |  |                          |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |      |  |  |  |  |         |  |  |  |  |      |  |  |  |  |           |  |  |  |  |           |  |  |  |  |                   |  |  |  |  |                     |  |  |  |  |        |  |  |  |  |      |  |  |  |  |              |  |  |  |  |                |  |  |  |  |              |  |  |  |  |                  |  |  |  |  |             |  |  |  |  |       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| FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.   |   |              |                            |                   |  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |                               |  |           |  |                                 |  |             |  |              |  |  |  |  |  |  |  |  |  |  |  |                         |                   |  |  |  |  |              |  |  |  |  |              |  |  |  |  |      |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |         |  |  |  |  |                         |  |  |  |  |              |  |  |  |  |                     |  |  |  |  |         |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |                  |  |  |                |  |  |                   |  |  |                |  |  |                         |  |  |        |  |  |        |  |  |               |  |  |                       |  |  |        |  |  |         |  |  |                 |  |  |                    |  |  |         |  |  |          |  |  |               |  |  |                |  |  |       |  |  |       |  |  |                      |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |                              |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |                       |  |  |  |  |  |  |  |  |  |             |  |  |  |  |  |  |  |  |  |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |               |  |  |  |  |  |  |  |  |  |                    |  |  |   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 |  |  |  |  |  |  |  |  |  |                                   |  |   |    |    |    |     |     |  |  |  |  |  |      |      |      |      |       |       |  |  |  |                 |               |              |                        |                   |            |            |  |  |  |  |  |            |    |     |    |     |      |      |       |  |  |  |  |  |      |     |    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |  |                            |  |  |                                      |  |  |  |                   |  |  |                      |  |  |   |  |  |  |                    |  |  |             |  |  |   |  |  |  |                    |  |  |               |  |  |                                    |  |  |  |                       |  |  |             |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |            |  |  |  |  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            |  |  |  |  |                  |  |  |  |  |             |  |  |  |  |               |  |  |  |  |                 |  |  |  |  |       |  |  |  |  |                |  |  |  |  |                    |  |  |  |  |                  |  |  |  |  |            |  |  |  |  |                     |  |  |  |  |                   |  |  |  |  |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |            |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
| FRIABLE   |   |              |                            |                   | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.     |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  |  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| MODERATELY INDURATED  |   |              |                            |                   | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  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| INDURATED   |   |              |                            |                   | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.         |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  |  |  |  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 |  |  |  |  |  |  |             |  |  |  |  |                  |  |  |  |  |                    |  |  |  |  |                |  |  |  |  |                       |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |            |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                   |  |  |  |  |  |  |  |  |  |              |  |  |  |  |                  |  |  |  |  |              |  |  |  |  |                                  |  |  |  |  |                                    |  |  |  |  |   |  |  |  |  |                                 |  |  |  |  |   |  |  |  |  |            |  |  |  |  |                                  |  |  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| EXTREMELY INDURATED   |   |              |                            |                   | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.                  |   |             |             |  |   |                   |   |                 |            |  |      |                      |                                |  |   |   |  |  |                   |  |  |                           |  |  |   |                   |  |                      |  |  |              |     |     |     |     |     |     |     |          |     |          |          |  |  |  |  |  |        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                        |                   |             |                   |             |             |             |             |             |             |             |             |                |                 |            |  |  |  |  |                            |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |                      |  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|                       |       |
|-----------------------|-------|
| PROJECT REFERENCE NO. | SHEET |
| B-5166                | 3     |
| <b>SITE PLAN</b>      |       |
|                       |       |
| FEET                  |       |



OLD MOUNTAIN CREEK, LLC  
DB 1417 PG 628

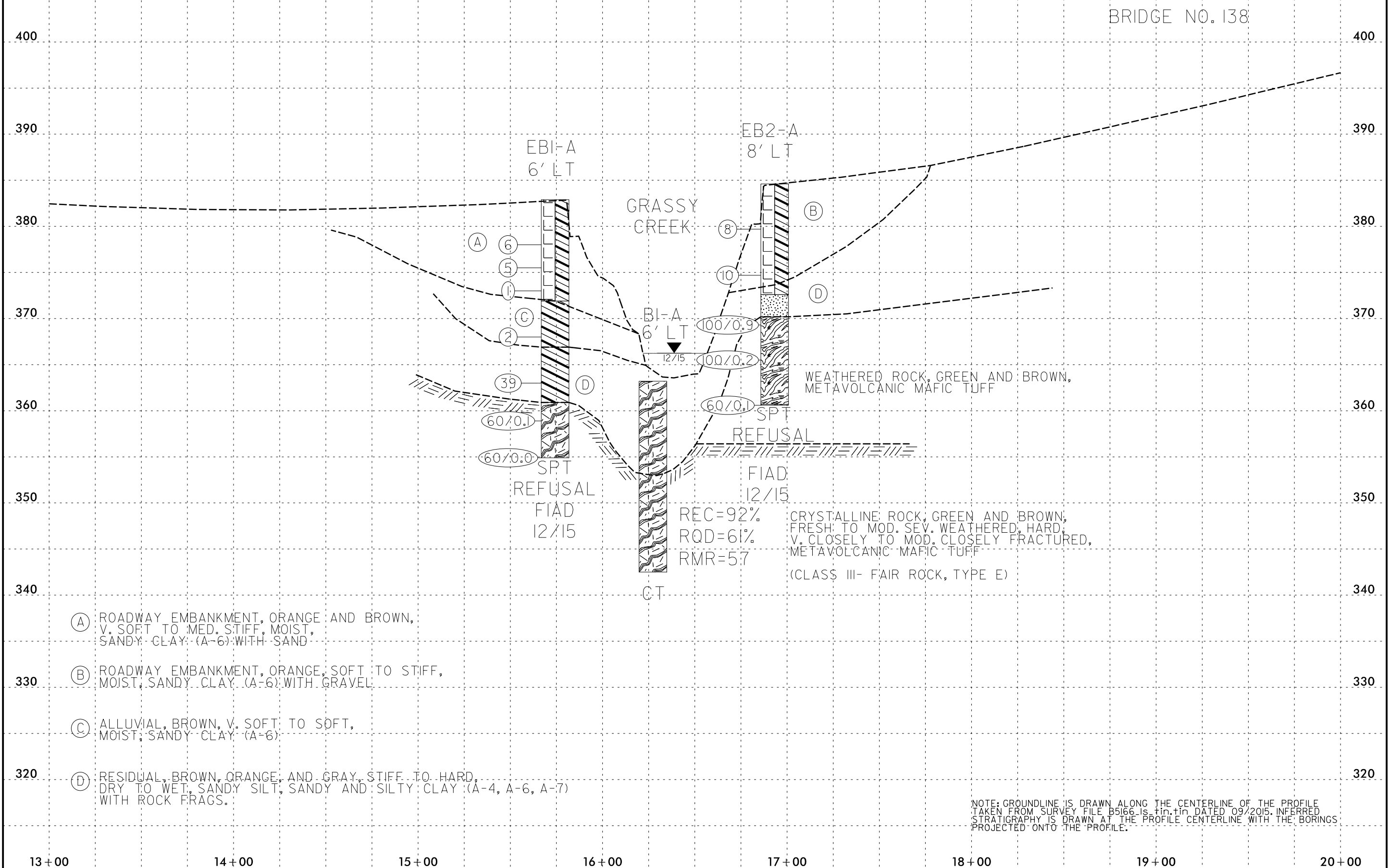
WOODS



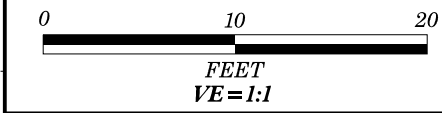
SAM F. CLEMENT  
& ANN P. CLEMENT  
DB 535 PG 167

CAPITAL LAND  
INVESTMENT CO.  
DB 570 PG 530

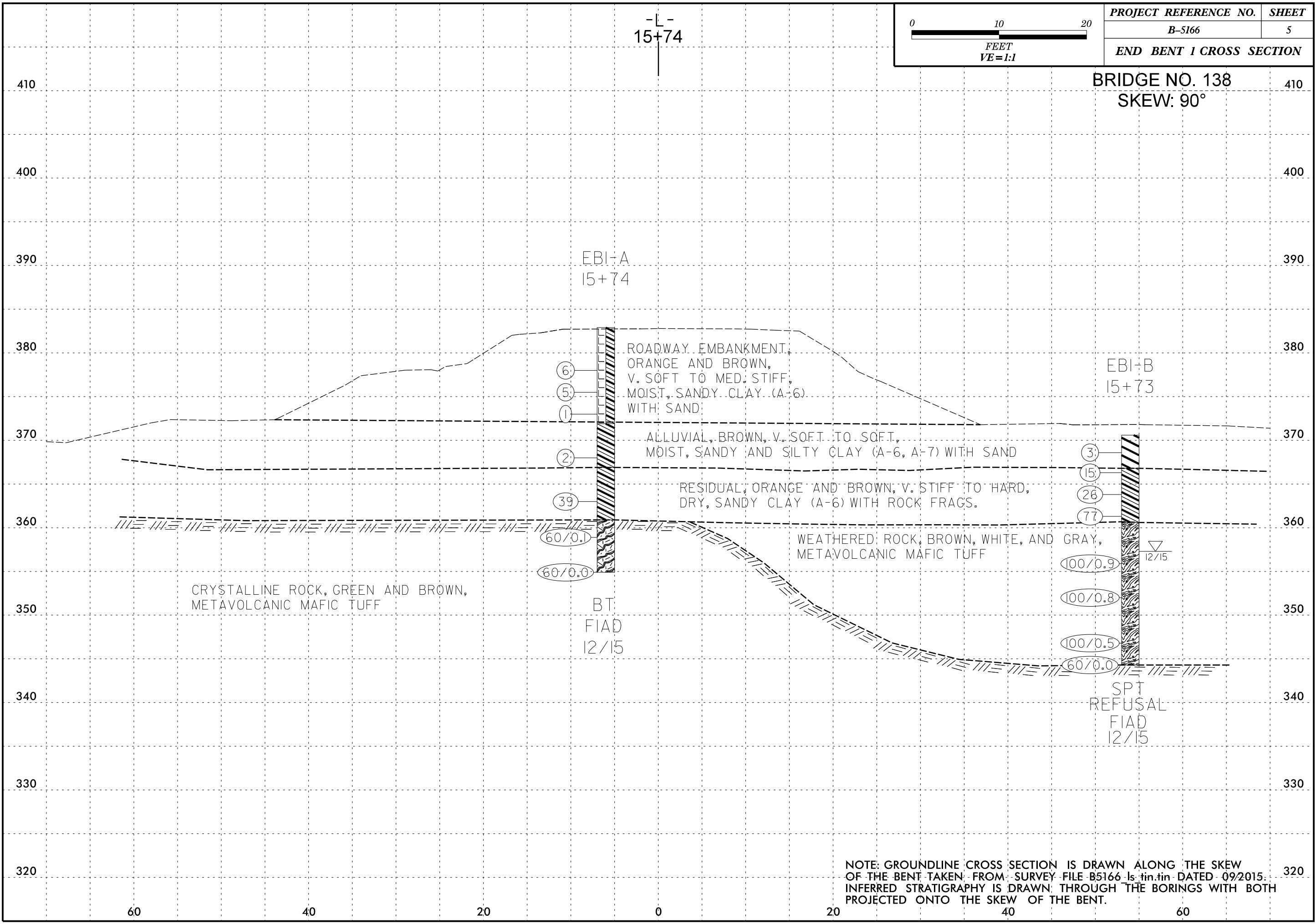
BRIDGE NO. 138  
OVER GRASSY CREEK  
SKEW = 90°



NOTE: GROUNDLINE IS DRAWN ALONG THE CENTERLINE OF THE PROFILE TAKEN FROM SURVEY FILE B5166.ls\_tin.tin DATED 09/2015. INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE CENTERLINE WITH THE BORINGS PROJECTED ONTO THE PROFILE.



BRIDGE NO. 138  
SKEW: 90°



-L-  
15+74

EBI-A  
15+74

EBI-B  
15+73

- ⑥
- ⑤
- ①
- ②
- ③⑨
- ⑥⑦/0.1
- ⑥⑦/0.0

- ③
- ⑮
- ②⑥
- ⑦⑦
- ⑩⑦/0.9
- ⑩⑦/0.8
- ⑩⑦/0.5
- ⑥⑦/0.0

ROADWAY EMBANKMENT,  
ORANGE AND BROWN,  
V. SOFT TO MED. STIFF,  
MOIST, SANDY CLAY (A-6)  
WITH SAND

ALLUVIAL, BROWN, V. SOFT TO SOFT,  
MOIST, SANDY AND SILTY CLAY (A-6, A-7) WITH SAND

RESIDUAL, ORANGE AND BROWN, V. STIFF TO HARD,  
DRY, SANDY CLAY (A-6) WITH ROCK FRAGS.

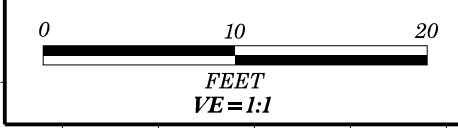
WEATHERED ROCK, BROWN, WHITE, AND GRAY,  
METAVOLCANIC MAFIC TUFF

CRYSTALLINE ROCK, GREEN AND BROWN,  
METAVOLCANIC MAFIC TUFF

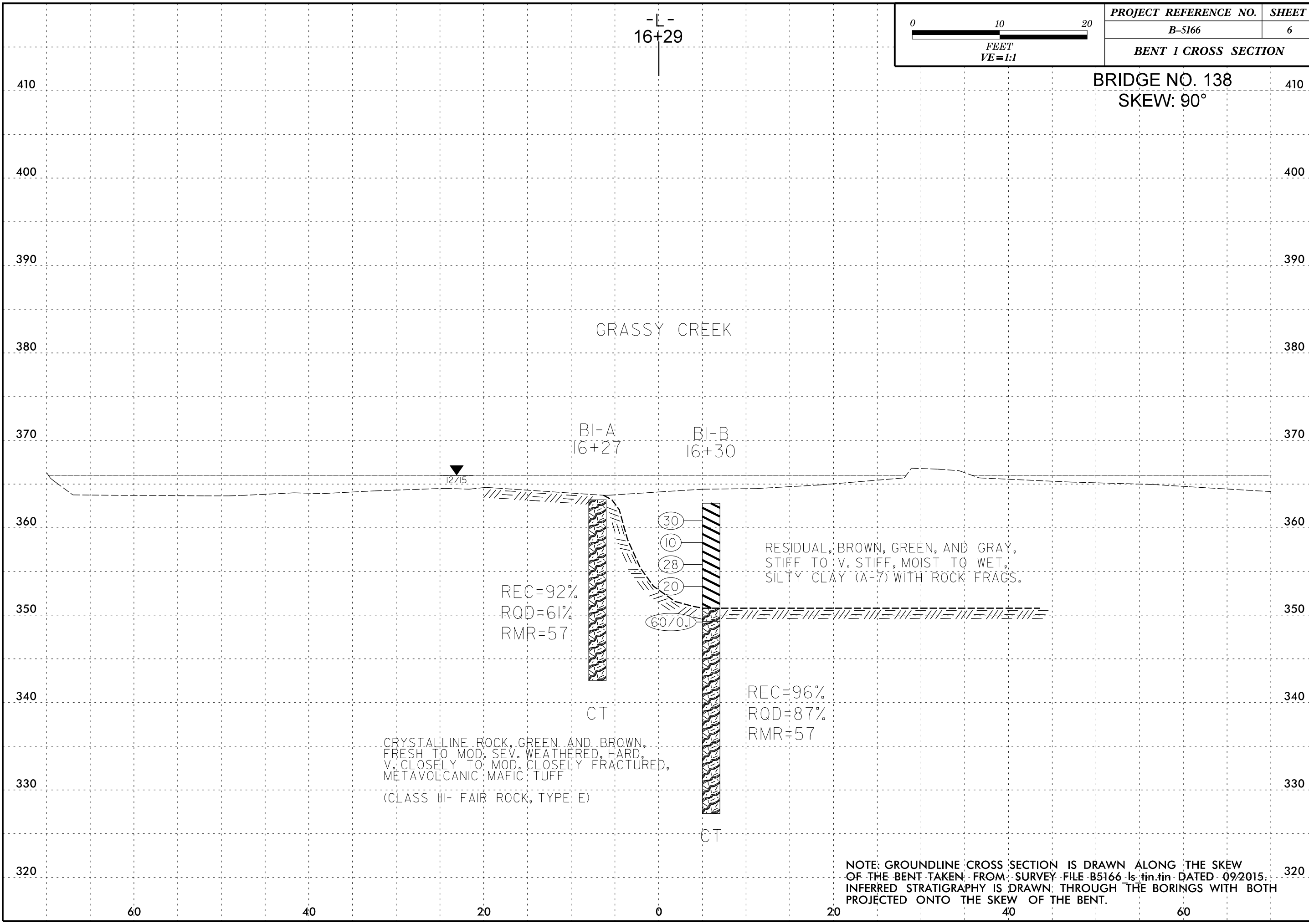
BT  
FIAD  
12/15

SPT  
REFUSAL  
FIAD  
12/15

NOTE: GROUNDLINE CROSS SECTION IS DRAWN ALONG THE SKEW OF THE BENT TAKEN FROM SURVEY FILE B5166 IS.TIN.DATED 09/2015. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE SKEW OF THE BENT.



BRIDGE NO. 138  
SKEW: 90°



-L-  
16+29

BI-A  
16+27

BI-B  
16+30

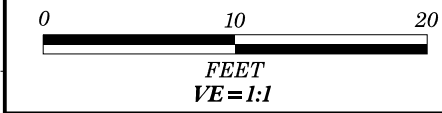
CT

CT

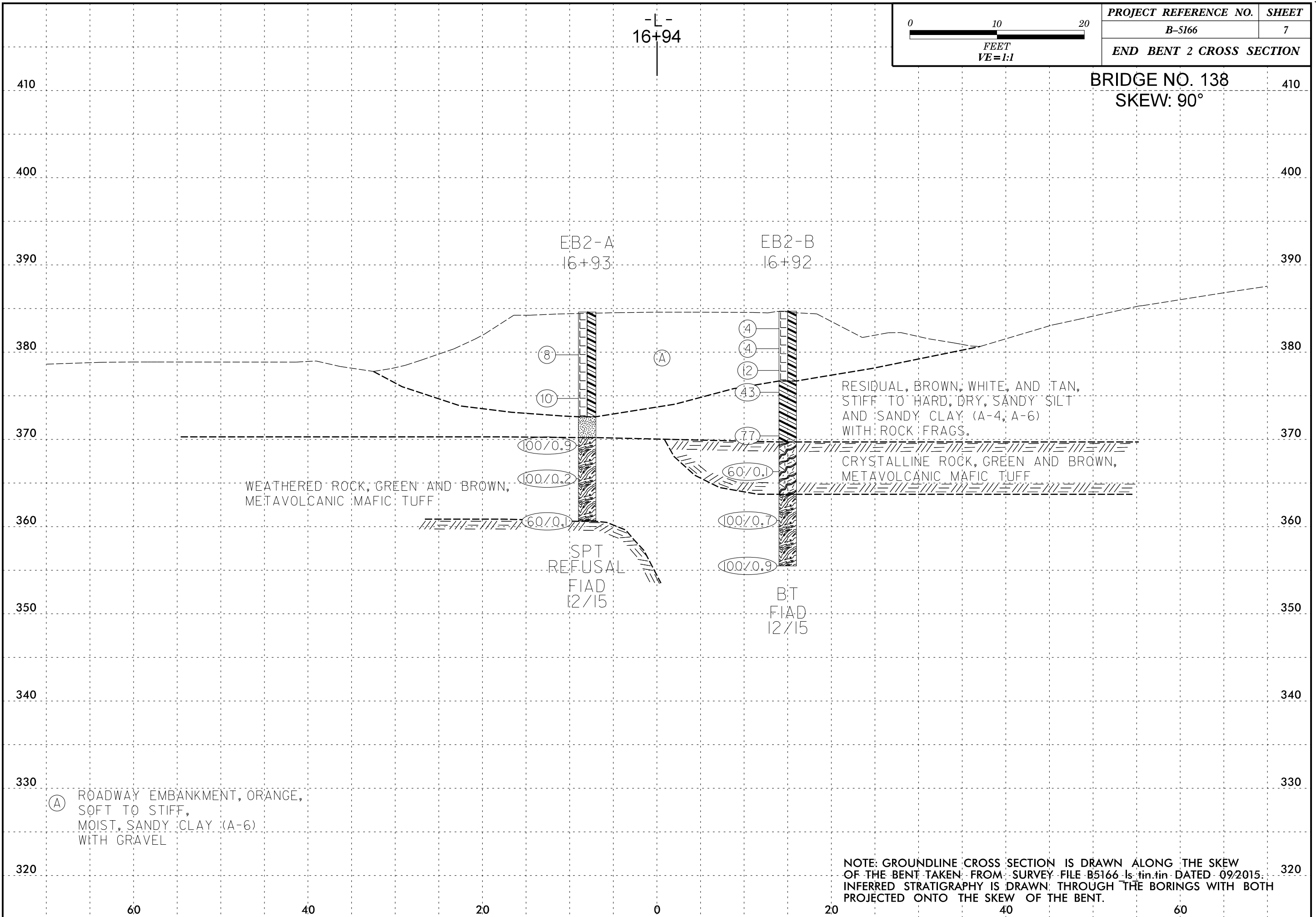
CRYSTALLINE ROCK, GREEN AND BROWN,  
FRESH TO MOD. SEV. WEATHERED, HARD,  
V. CLOSELY TO MOD. CLOSELY FRACTURED,  
METAVOLCANIC MAFIC TUFF  
(CLASS III- FAIR ROCK, TYPE E)

RESIDUAL, BROWN, GREEN, AND GRAY,  
STIFF TO V. STIFF, MOIST TO WET,  
SILTY CLAY (A-7) WITH ROCK FRAGS.

NOTE: GROUNDLINE CROSS SECTION IS DRAWN ALONG THE SKEW  
OF THE BENT TAKEN FROM SURVEY FILE B5166 Is .tin .tin DATED 09/2015.  
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH  
PROJECTED ONTO THE SKEW OF THE BENT.



BRIDGE NO. 138  
SKEW: 90°



-L-  
16+94

EB2-A  
16+93

EB2-B  
16+92

RESIDUAL, BROWN, WHITE, AND TAN,  
STIFF TO HARD, DRY, SANDY SILT  
AND SANDY CLAY (A-4, A-6)  
WITH ROCK FRAGS.

CRYSTALLINE ROCK, GREEN AND BROWN,  
METAVOLCANIC MAFIC TUFF

WEATHERED ROCK, GREEN AND BROWN,  
METAVOLCANIC MAFIC TUFF

(A) ROADWAY EMBANKMENT, ORANGE,  
SOFT TO STIFF,  
MOIST, SANDY CLAY (A-6)  
WITH GRAVEL

SPT  
REFUSAL  
FIAD  
12/15

BT  
FIAD  
12/15

NOTE: GROUNDLINE CROSS SECTION IS DRAWN ALONG THE SKEW  
OF THE BENT TAKEN FROM SURVEY FILE B5166-Is-1in-1in DATED 09/2015.  
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH  
PROJECTED ONTO THE SKEW OF THE BENT.



# GEOTECHNICAL BORING REPORT

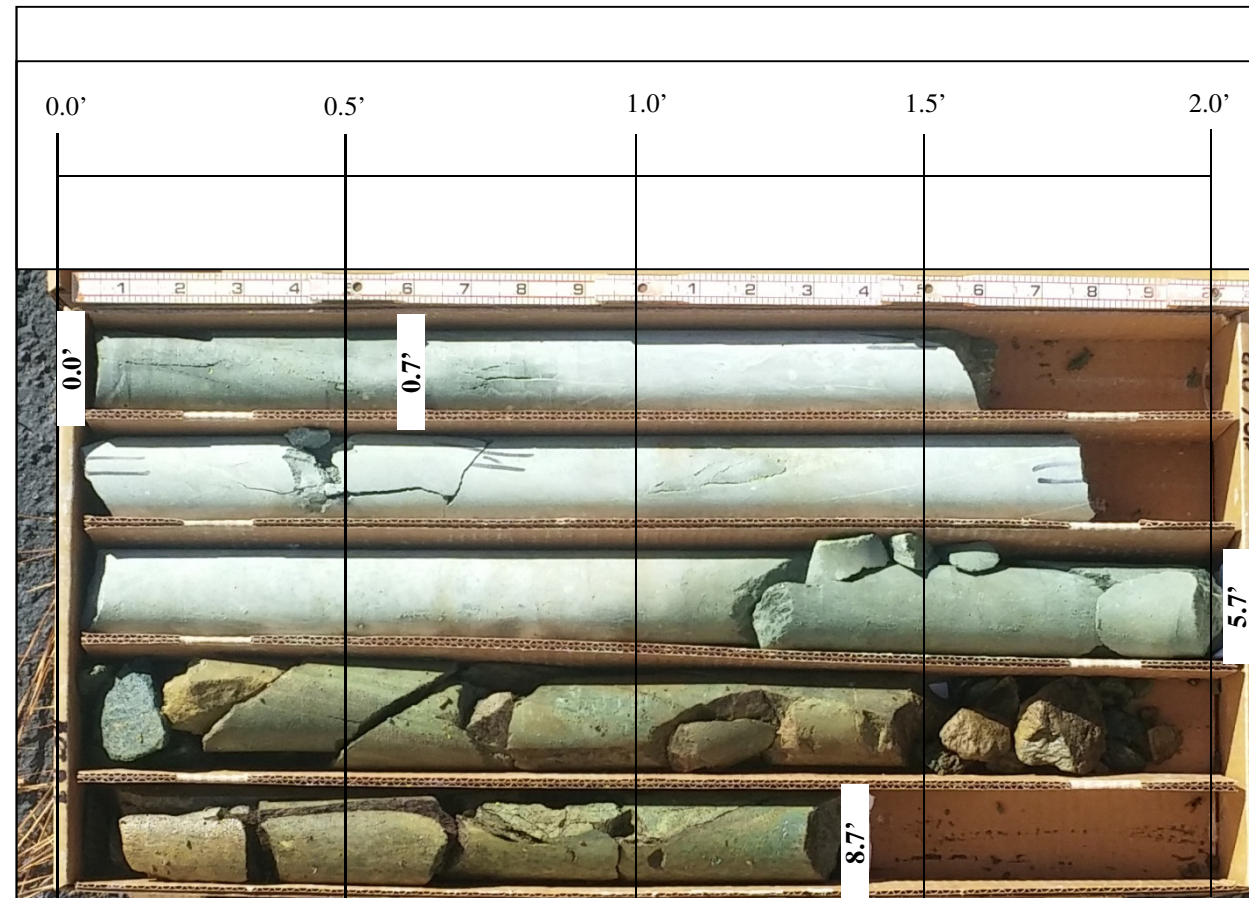
## BORE LOG

| WBS 42342.1.1  |                 | TIP B-5166          |                          | COUNTY GRANVILLE    |                       | GEOLOGIST M. WITMORE    |                 |    |    |     |           |     |                           |   |      |  |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|---|------|--|
| SITE DESCRIPTION Bridge No. 138 over Grassy Creek on SR 1300 (Cornwall Road) Between SR 1410 and SR 1413 at Sta. 16+34 |                 |                     |                          |                     |                       |                         | GROUND WTR (ft) |    |    |     |           |     |                           |   |      |  |
| BORING NO. EB1-A   |                 | STATION 15+74       |                          | OFFSET 6 ft LT      |                       | ALIGNMENT -L-           |                 |    |    |     |           |     |                           |   |      |  |
| COLLAR ELEV. 382.9 ft  |                 | TOTAL DEPTH 28.0 ft |                          | NORTHING 991,032    |                       | EASTING 2,098,742       |                 |    |    |     |           |     |                           |   |      |  |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015  |                 |                     | DRILL METHOD H.S. Augers |                     | HAMMER TYPE Automatic |                         |                 |    |    |     |           |     |                           |   |      |  |
| DRILLER J. BARE  |                 | START DATE 12/01/15 |                          | COMP. DATE 12/01/15 |                       | 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 |           |     |                           |   |      |  |
| 385  |                 |                     |                          |                     |                       |                         |                 |    |    |     |           |     |                           |   |      |  |
| 380  | 379.0           | 3.9                 | 2                        | 2                   | 4                     |                         |                 |    |    |     |           |     | M                         | GROUND SURFACE<br>ROADWAY EMBANKMENT<br>ORANGE AND BROWN, V. SOFT TO MED. STIFF, SANDY CLAY (A-6)             | 0.0  |  |
|  | 376.5           | 6.4                 | 2                        | 3                   | 2                     |                         |                 |    |    |     |           |     | M                         |   |      |  |
| 375  | 374.0           | 8.9                 | WOH                      | WOH                 | 1                     |                         |                 |    |    |     |           |     | M                         |   |      |  |
|  | 369.0           | 13.9                | WOH                      | WOH                 | 2                     |                         |                 |    |    |     |           |     | M                         | ALLUVIAL<br>BROWN, V. SOFT TO SOFT, SANDY CLAY (A-6)  | 11.0 |  |
| 370  | 364.0           | 18.9                | 11                       | 15                  | 24                    |                         |                 |    |    |     |           |     | D                         | RESIDUAL<br>ORANGE, HARD, SANDY CLAY (A-6)  | 16.0 |  |
| 365  | 359.0           | 23.9                | 60/0.1                   |                     |                       |                         |                 |    |    |     |           |     |                           |   |      |  |
| 360  | 354.9           | 28.0                | 60/0.0                   |                     |                       |                         |                 |    |    |     |           |     |                           | CRYSTALLINE ROCK<br>GREEN AND BROWN, METAVOLCANIC MAFIC TUFF  | 22.0 |  |
| 355  |                 |                     |                          |                     |                       |                         |                 |    |    |     |           |     |                           | Boring Terminated with Standard Penetration Test Refusal at Elevation 354.9 ft IN CR: METAVOLCANIC MAFIC TUFF | 28.0 |  |

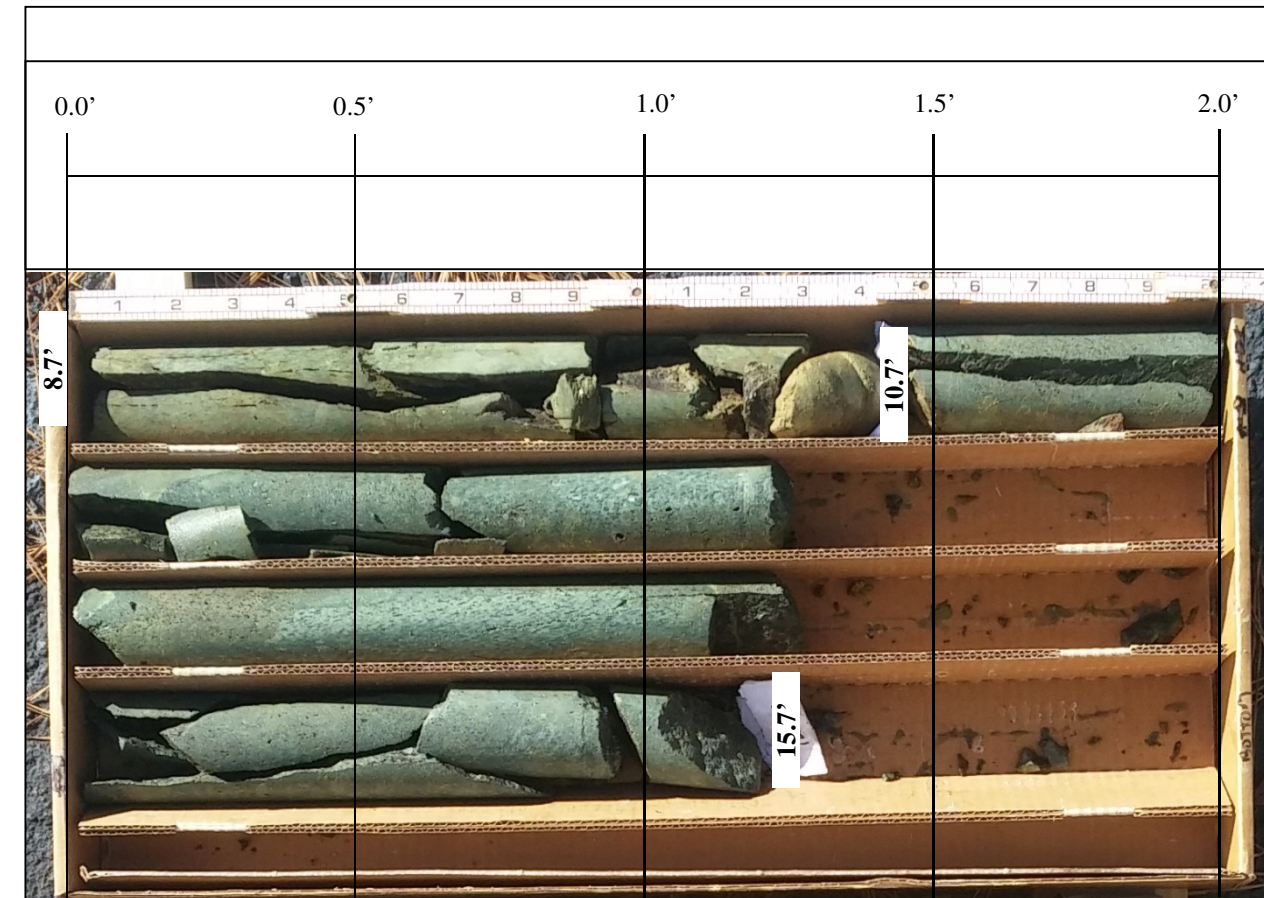
| WBS 42342.1.1  |                 | TIP B-5166          |                          | COUNTY GRANVILLE    |                       | GEOLOGIST M. WITMORE    |                 |    |    |     |           |     |                           |   |      |  |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|---|------|--|
| SITE DESCRIPTION Bridge No. 138 over Grassy Creek on SR 1300 (Cornwall Road) Between SR 1410 and SR 1413 at Sta. 16+34 |                 |                     |                          |                     |                       |                         | GROUND WTR (ft) |    |    |     |           |     |                           |   |      |  |
| BORING NO. EB1-B   |                 | STATION 15+73       |                          | OFFSET 54 ft RT     |                       | ALIGNMENT -L-           |                 |    |    |     |           |     |                           |   |      |  |
| COLLAR ELEV. 370.6 ft  |                 | TOTAL DEPTH 26.3 ft |                          | NORTHING 991,030    |                       | EASTING 2,098,802       |                 |    |    |     |           |     |                           |   |      |  |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015  |                 |                     | DRILL METHOD H.S. Augers |                     | HAMMER TYPE Automatic |                         |                 |    |    |     |           |     |                           |   |      |  |
| DRILLER J. BARE  |                 | START DATE 12/04/15 |                          | COMP. DATE 12/04/15 |                       | 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 |           |     |                           |   |      |  |
| 375  |                 |                     |                          |                     |                       |                         |                 |    |    |     |           |     |                           |   |      |  |
| 370  | 369.6           | 1.0                 | 1                        | 1                   | 2                     |                         |                 |    |    |     |           |     | M                         | GROUND SURFACE  | 0.0  |  |
|  | 367.3           | 3.3                 | 3                        | 8                   | 7                     |                         |                 |    |    |     |           |     | D                         | ALLUVIAL<br>BROWN, V. SOFT, SILTY CLAY (A-7)  | 3.8  |  |
| 365  | 364.8           | 5.8                 | 8                        | 6                   | 20                    |                         |                 |    |    |     |           |     | D                         | RESIDUAL<br>BROWN V. STIFF TO HARD, SANDY CLAY (A-6) WITH ROCK FRAGMENTS                                      | 10.0 |  |
|  | 362.3           | 8.3                 | 27                       | 34                  | 43                    |                         |                 |    |    |     |           |     | D                         |   |      |  |
| 360  | 357.3           | 13.3                | 42                       | 64                  | 36/0.4                |                         |                 |    |    |     |           |     |                           | WEATHERED ROCK<br>BROWN, WHITE, AND GRAY, METAVOLCANIC MAFIC TUFF   | 10.0 |  |
| 355  | 352.3           | 18.3                | 36                       | 100/0.3             |                       |                         |                 |    |    |     |           |     |                           |   |      |  |
| 350  | 347.3           | 23.3                | 100/0.5                  |                     |                       |                         |                 |    |    |     |           |     |                           |   |      |  |
| 345  | 344.3           | 26.3                | 60/0.0                   |                     |                       |                         |                 |    |    |     |           |     |                           | Boring Terminated with Standard Penetration Test Refusal at Elevation 344.3 ft ON CR: METAVOLCANIC MAFIC TUFF | 26.3 |  |

NCDOT BORE DOUBLE B5166\_GEO\_BRDG.GPJ NC\_DOT.GDT 12/21/15





B1-A, Box 1 of 3, 0.0 to 8.7 feet.



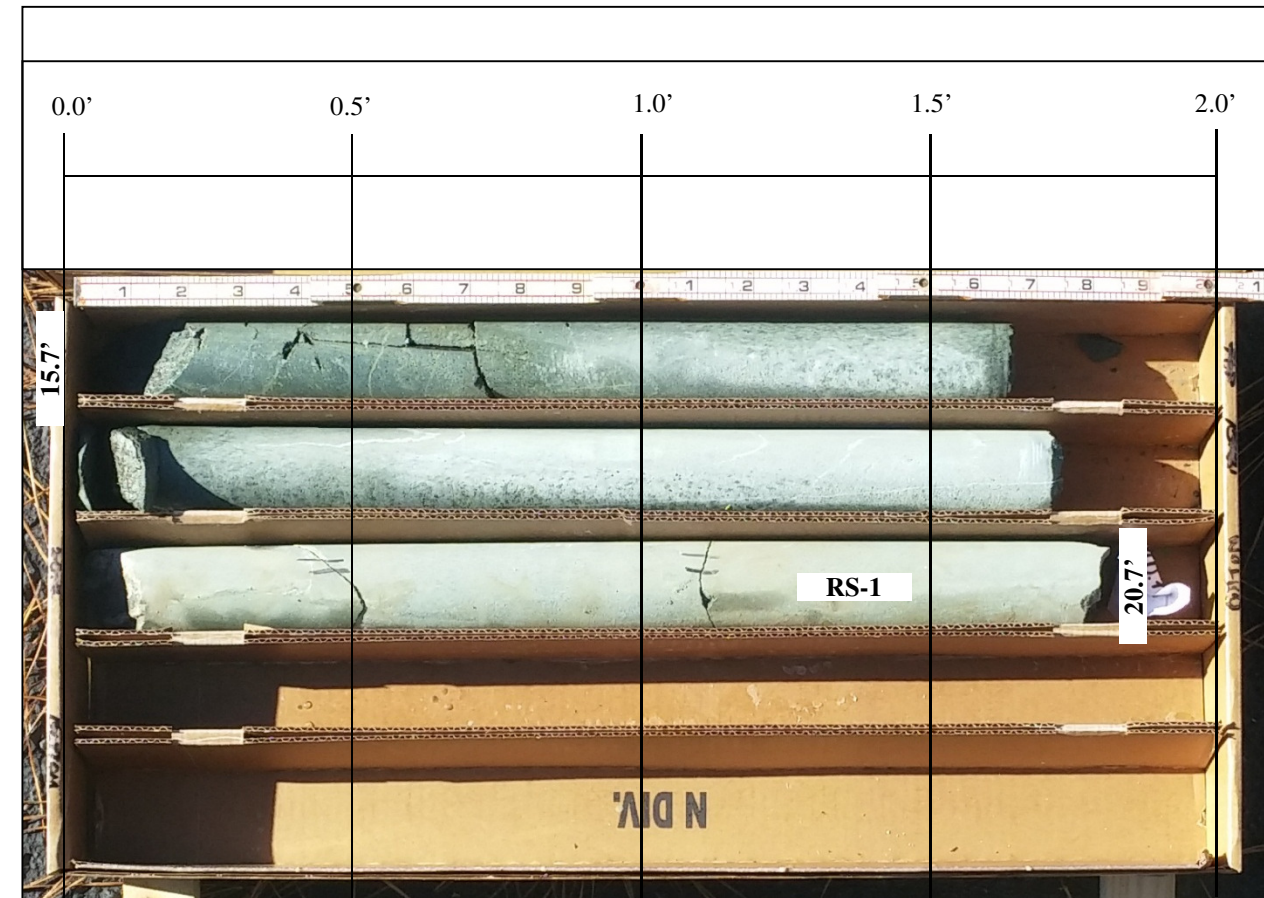
B1-A, Box 2 of 3, 8.7 to 15.7 feet.

**ROCK CORE PHOTOGRAPHS**

**BRIDGE NO. 138 ON SR 1300  
OVER GRASSY CREEK  
GRANVILLE COUNTY, NORTH CAROLINA  
WBS NO.: 42342.1.1, TIP NO.: B-5166**



AECOM – North Carolina  
1600 Perimeter Park Drive, Suite 400  
Morrisville, NC 27560  
Tel: 919-461-1100 Fax: 919-46-1415



B1-A, Box 3 of 3, 15.7 to 20.7 feet.

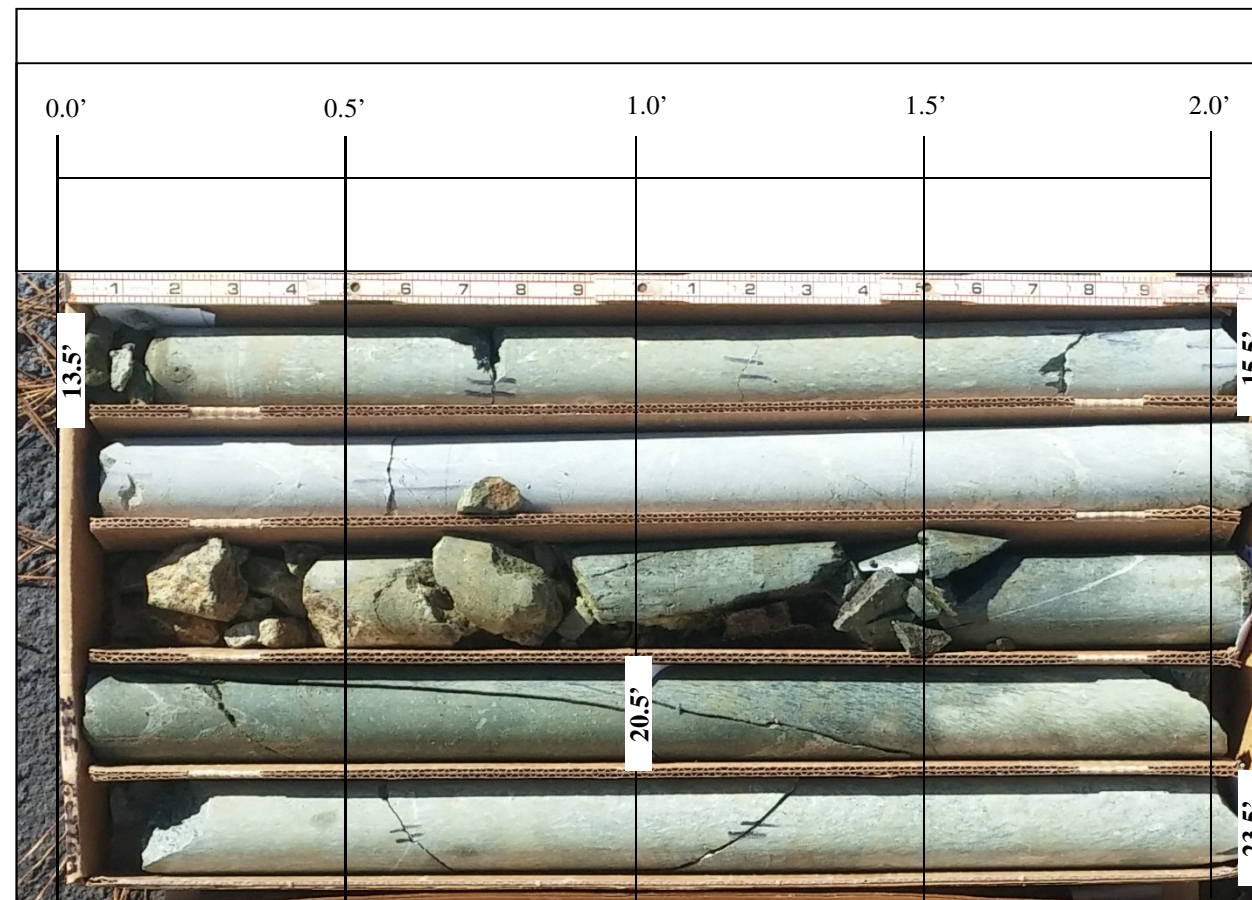
**ROCK CORE PHOTOGRAPHS**

**BRIDGE NO. 138 ON SR 1300  
OVER GRASSY CREEK  
GRANVILLE COUNTY, NORTH CAROLINA  
WBS NO.: 42342.1.1, TIP NO.: B-5166**

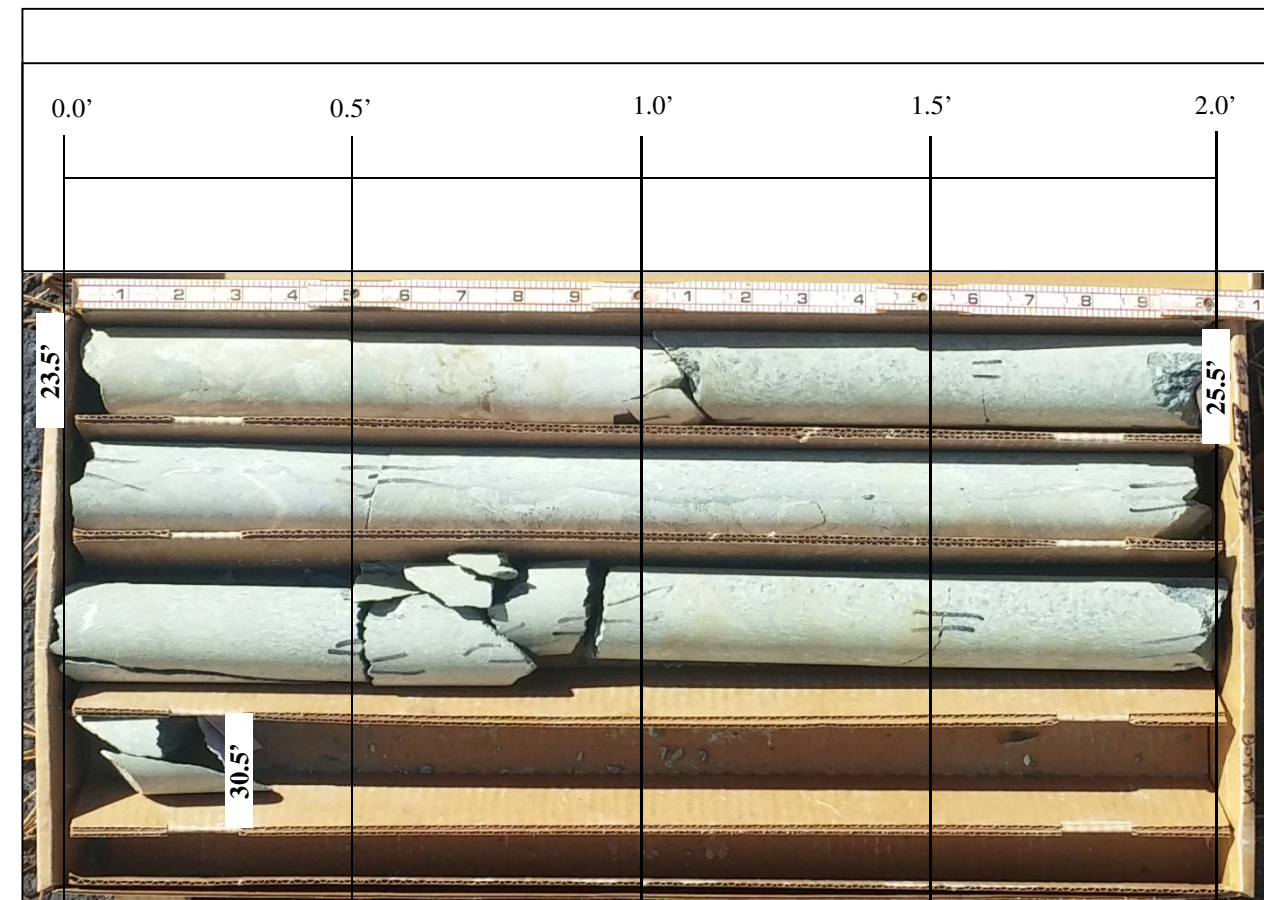


AECOM – North Carolina  
1600 Perimeter Park Drive, Suite 400  
Morrisville, NC 27560  
Tel: 919-461-1100 Fax: 919-46-1415





B1-B, Box 1 of 3, 13.5 to 23.5 feet.



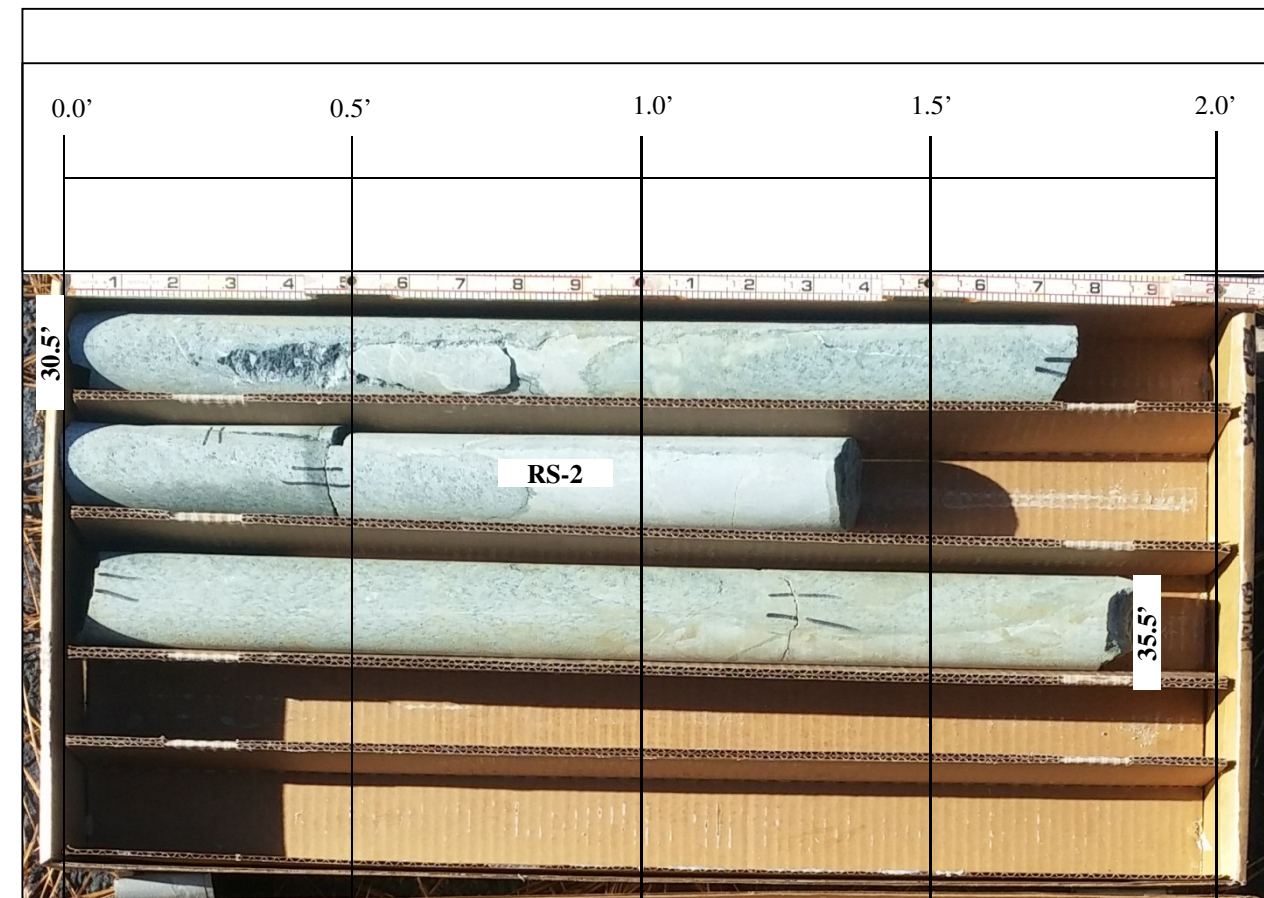
B1-B, Box 2 of 3, 23.5 to 30.5 feet.

**ROCK CORE PHOTOGRAPHS**

**BRIDGE NO. 138 ON SR 1300  
OVER GRASSY CREEK  
GRANVILLE COUNTY, NORTH CAROLINA  
WBS NO.: 42342.1.1, TIP NO.: B-5166**



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Morrisville, NC 27560  
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B1-B, Box 3 of 3, 30.5 to 35.5 feet.

**ROCK CORE PHOTOGRAPHS**

**BRIDGE NO. 138 ON SR 1300  
OVER GRASSY CREEK  
GRANVILLE COUNTY, NORTH CAROLINA  
WBS NO.: 42342.1.1, TIP NO.: B-5166**



AECOM – North Carolina  
1600 Perimeter Park Drive, Suite 400  
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**UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS**

ASTM D 7012-14 Method C

(This method does not report Strain Rate or Deformation)

Sample Prep and Conformance Verification: ASTM D4543-08

Client: AECOM Boring No.: B1-A  
 Client Reference: B-5166 Bridge over Grassy Creek 60447478 Depth (ft): 20.0-20.7  
 Project No.: 2015-648-001 Sample No.: RS-1  
 Lab ID: 2015-648-001-001 Moisture Condition: As Received-Unpreserved

**UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS**

ASTM D 7012-14 Method C

(This method does not report Strain Rate or Deformation)

Sample Prep and Conformance Verification: ASTM D4543-08

Client: AECOM Boring No.: B1-B  
 Client Reference: B-5166 Bridge over Grassy Creek 60447478 Depth (ft): 32.8-33.7  
 Project No.: 2015-648-001 Sample No.: RS-2  
 Lab ID: 2015-648-001-002 Moisture Condition: As Received-Unpreserved

SPECIMEN LENGTH (in)

Reading 1: 4.03  
 Reading 2: 4.03  
 Reading 3: 4.03  
**Average Length: 4.03**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
**Average Diameter: 1.99**  
 Area (in<sup>2</sup>): 3.11  
 Length/Diameter: 2.03

Total Load (lb): 27,780  
**Uniaxial Compressive Strength (psi): 8,920**

Fracture Type: **Cone & Split**

Rate of Loading (lb/sec): 138  
 Time to Break (min:sec): 3:21.38  
 Deviation from Straitness<sup>(2)</sup>:

Axial: Pass Top: Pass Bottom: Pass

SPECIMEN LENGTH (in)

Reading 1: 3.98  
 Reading 2: 3.99  
 Reading 3: 3.99  
**Average Length: 3.99**

SPECIMEN DIAMETER (in):

Reading 1: 1.99  
 Reading 2: 1.99  
**Average Diameter: 1.99**  
 Area (in<sup>2</sup>): 3.11  
 Length/Diameter: 2.00

Total Load (lb): 33,770  
**Uniaxial Compressive Strength (psi): 10,840**

Fracture Type: **Cone & Split**

Rate of Loading (lb/sec): 146  
 Time to Break (min:sec): 3:51.94  
 Deviation from Straitness<sup>(2)</sup>:

Axial: Pass Top: Pass Bottom: Pass



Physical Properties: ROCK CORE

Notes:

- 1) Moisture conditions at time of the test are: As Received-Unpreserved
- 2) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 3) Temperature is laboratory room temperature.
- 4) Geotechnics Equipment Used: G788 Compression Tester, G1122 Digital Calipers, G1380 Dial Gauge, G1557 Straight Edge, G1571 Feeler Gauge, G1633 V-Block, G1634 Rock Saw, G1635 Grinder.



Physical Properties: ROCK CORE

Notes:

- 1) Moisture conditions at time of the test are: As Received-Unpreserved
- 2) Deviation from straightness, Procedure A of ASTM D 4543-08  
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
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Tested By: JAC Date: 12/9/15 Checked By: KC Date: 12/9/15

DCN: CT45A, Revision No.: 2e, Revision Date: 08/25/15

Tested By: JAC Date: 12/9/15 Checked By: KC Date: 12/9/15


DCN: CT45A, Revision No.: 2e, Revision Date: 08/25/15



GRASSY CREEK, LOOKING UPSTREAM TOWARDS EXISTING BRIDGE.



-L-, LOOKING DOWNSTATION FROM STA. 17+00.

|   |   |
|---|---|
| <b>SITE PHOTOGRAPHS</b>   |   |
| <b>BRIDGE NO. 138 ON SR 1300 (CORNWALL RD) OVER GRASSY CREEK</b>                      |   |
| <b>WBS NO.: 42342.1.1, TIP NO.: B-5166</b>  |   |
|  | AECOM – North Carolina<br>1600 Perimeter Park Drive, Suite 400<br>Morrisville, NC 27560<br>Tel: 919-461-1100 Fax: 919-46-1415 |